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This morning's Nuclear Regulatory Commission News Summary and Clips are attached.

Website: You can also read today's briefing, including searchable archive of past editions, at <http://www.BulletinNews.com/nrc>.

Full-text Links: Clicking the hypertext links in our write-ups will take you to the newspapers' original full-text articles.

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NUCLEAR REGULATORY COMMISSION NEWS SUMMARY

FRIDAY, APRIL 8, 2011 7:00 AM EDT

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NRC NEWS:

ACRS Questions NRC Officials On 50-Mile Evacuation Decision.

The AP (4/8, Cappiello) reports, "A recommendation for all US citizens living within 50 miles of the crippled Japan nuclear power plant to leave was based on incomplete information and assumptions about the reactors' condition," NRC officials told an Advisory Committee on Reactor Safeguards panel Thursday. The ACRS pressed NRC officials on "how they concluded that 50 miles was a safe distance from the crippled reactors" when the Japanese government set a 12-mile evacuation zone. According to Randy Sullivan, who leads an NRC protective measures

team, the decision was not based on data from the site, but "on 'a big release'" scenario, which "US officials could not confirm was happening."

According to Reuters (4/8, Rampton), the former chief of GE's nuclear fuel business, Sam Armijo, said he "would have expected there would have been high-level conversations between our regulatory bodies and our government" with their counterparts in Japan. Armijo added, "I want to make sure we get the analysis and the numbers that were actually used."

Under the headline, "NRC Officials Offer Panel Few Answers On Japan Disaster," E&E News PM (4/7, Northey) reported the ACRS panel questioned NRC staff about "who vetted NRC Chairman Gregory Jaczko's" 50-mile

recommendation, but got few answers. The ACRS "voiced concern" about the lack of knowledge surrounding Chairman Jaczko's "high-level statement."

On its website, Fox affiliate, WJBK-TV Detroit (4/7) reported that according to Randy Sullivan, senior emergency-preparedness specialist with the NRC, US "officials failed to get 'succinct information' from Japanese authorities" before the decision to declare the 50-mile evacuation zone, and even when they did get some information, it "wasn't at all what we would have expected [during] a nuclear event in the US." Sullivan said officials did not get "much information that would tell us things were going in the right direction."

Lawmakers Say NRC Study Points To Vulnerabilities At US Plants.

AFP (4/8) reports, "At a hearing in the House of Representatives' energy and commerce committee Wednesday, Democratic Congresswoman Diana DeGette said a study conducted last year by the Nuclear Regulatory Committee (NRC) raised 'grave questions about US preparedness to address reactor accidents.'" DeGette cited an NRC study which examined what would happen at Peach Bottom Station in Pennsylvania, and a number of other plants, in the event that the reactors "lost both [main] power and back-up generators after an extreme event such as a quake, flood or fire." AFP says the Peach Bottom reactor came "perilously close to meltdown in the simulations."

On Time's (4/8) "Swampland" blog, Mark Benjamin writes that the "simulation by the NRC" showed "that given a two-day power failure, the Peach Bottom plant" would come "shockingly close" to a reactor meltdown. "The Peach Bottom plant came within one hour of core damage in a severe loss-of-power scenario," Committee Ranking Member Henry Waxman (D-Calif.) said yesterday. "That result raises questions about whether our reactors may be as vulnerable as those in Fukushima," he said."

The New Yorker (4/8, Kolbert) reports on the "State of the Art Reactor Consequence Analyses," known by the acronym SOARCA, which "are a set of studies conducted by the Nuclear Regulatory Commission starting in 2006," to "develop the most realistic evaluations possible for the potential consequences of severe nuclear accidents." SOARCA examined two nuclear plants "with different designs—the Surry Power Station, a pressurized water reactor in Virginia, and the Peach Bottom Atomic Power Station, a boiling-water reactor in Pennsylvania." The New Yorker says that while the results of the study would be helpful to know, as nuclear security expert Ed Lyman, of the Union of Concerned Scientists, points out in a recent blog post, "the NRC has yet to make the results of this particular analysis—or any others performed for SOARCA—available to the public."

On its "All Things Nuclear" blog for the Union of Concerned Scientists (4/7) Ed Lyman wrote that contrary to its assertions that "US nuclear plants are better prepared to withstand a catastrophic event like the March 11 earthquake and tsunami than Japanese plants," according to internal NRC documents, "there is no consensus within the NRC that US plants are sufficiently protected. The documents indicate that technical staff members doubt the effectiveness of key safety measures adopted after the September 11, 2001, terrorist attacks."

NRC To Discuss Peach Bottom Plant Performance

April 13. The York (PA) Dispatch (4/8, Kauffman) notes that while "tens of thousands of Yorkers could be in jeopardy if there were ever an incident at Peach Bottom Atomic Power Station, public attendance at the annual meetings held to discuss the plant's safety assessment is sometimes lighter than at a school board meeting." Though the NRC is preparing "for a larger turnout than average because of the nuclear disaster in Japan that followed an earthquake last month." NRC spokesman Neil Sheehan said the public meeting April 13 will give "attendees an opportunity to ask questions regarding the plant's performance and the government's oversight."

US Said Unprepared For Catastrophic Nuclear Emergency.

The Washington Post (4/8, Fink) runs a ProPublica story reports, "US officials say the nation's health system is ill-prepared to cope with a catastrophic release of radiation, despite years of focus on the possibility of a terrorist 'dirty bomb' or an improvised nuclear device attack." A current assessment from the Department of Homeland Security said responders "can only handle a few radiation injuries at any one time" and said there was "no strategy for notifying the public" on recommendations for shelter or evacuation priorities. The report specifically mentions that the Strategic National Stockpile stopped purchasing potassium iodide, a decision partly made because distribution could take too long in a rapidly-developing emergency.

Edison Officials Weigh Prospects For San Onofre Relicensing.

The San Diego Union-Tribune (4/8, Soto) reports that "parallels are easy to draw" between the stricken plant at Fukushima and the San Onofre Nuclear Generating Station. SONGS is on the "ocean and near fault lines" and its "reactors are nearly 30 years old." But Southern California Edison will likely have to decide soon whether or not to pursue relicensing the two units there. SCE spokesman Gil Alexander said, "We're getting closer and closer," adding that SCE is "still studying the feasibility." But with nearly 11 years left on the current operating licenses the company cannot afford to "wait too long to begin the process leading to relicensing."

NRC To Discuss San Onofre Performance In Meeting. The Orange County (CA) Register (4/8, Swegles) reports, "The Nuclear Regulatory Commission's staff is inviting the public to an April 28 meeting in San Juan Capistrano to discuss federal regulators' annual evaluation of how the San Onofre Nuclear Generating Station is operating." According to the NRC, the plant operated safely in 2010, after addressing "longstanding concerns" having to do with "problem identification and resolution." Plant operators have not been "fully successful in addressing several longstanding human performance issues." The NRC meeting will be held at the Capistrano Unified School District's offices.

On its website, KPBS-Radio San Diego (4/7) reported, Southern California Edison spokesman Gil Alexander "said the NRC will also answer questions from residents who live near the plant. ... 'There are two or three resident inspectors who look over our shoulders all the time,' Alexander said." Those inspectors then "roll up their observations into semi-annual and annual report cards." San Clemente (CA) Patch (4/8) also reports about the meeting.

Town Calls For Meeting In September To Discuss San Onofre Concerns. The Orange County (CA) Register (4/7, Swegles) reported on a San Clemente City Council town meeting called for September 27, on concerns about safety and evacuation issues at San Onofre Nuclear Generating Station in the wake of the "earthquake- and tsunami-related nuclear-plant crisis in Japan." The council "set the date well in advance with the idea that it gives San Onofre owner Southern California Edison and staff of the US Nuclear Regulatory Commission time to develop information to present to the city and the public."

SONGS Evacuation Plan Said "Inherently Flawed". In a commentary for San Clemente (CA) Patch (4/7), "Barnes-Eye View" columnist Tom Barnes, wrote the "evacuation plan for San Clemente in case there is an accident at SONGS. The city, and presumably SONGS' plan is to use the I-5 North and Pacific Coast Highway (PCH) west as the evacuation routes to relocate San Clementians to the Orange County Fairgrounds." Barnes says if the stakes weren't so high, such a plan would be "laughable." Barnes wonders how officials can consider the plan to use the freeway to evacuate, adequate and says the "evacuation plan is inherently flawed."

NRC To Conduct Special Inspections At Byron, Braidwood Stations. The Morris (IL) Daily Herald (4/7, Hustis) reported, the NRC is reviewing two "equipment issues" at Braidwood and Byron Generating Stations. The NRC said that a special inspection team will review backup water pumps at the plants, which "remove heat from the reactors in case of a trip or accident," and will also examine "the loss of control room equipment alarms in

February of this year and late-August 2010." The Daily Herald says the NRC will make a special inspection report available to the public within 45 days after the investigation is completed. Meantime, both NRC spokeswoman Viktoria Mittyng and Neal Miller of Braidwood Station said there was no "immediate threat to public health or safety, and the two equipment issues have been resolved." The team began the review April 4.

The Rockford (IL) Register-Star (4/7, Gary) also reported briefly on the special inspections, while on his Rockford Register-Star (4/8) "Get Real" blog, Alex Gary noted that the issue came to light when "inspectors became concerned with the design of the auxiliary feedwater pumps (AFW) at Byron. Exelon's initial evaluation was that the pumps would be able to perform their safety function," though after more calculations, Exelon determined the pumps "would not be operable in an accident or reactor trip at either Byron or Braidwood, since both systems are similar in design."

Concerning the problem with Byron Station's back-up cooling pumps, which the NRC said might not work in the event of a system failure, MyStateline (4/7, Kasper) reported that NRC spokesperson Viktoria Mittyng "said safety inspectors found an air pocket inside a pipe that pumps water into the reactor and asked the company to make some changes. 'If that air got pushed into the pump, which is the system that would pump coolant into the reactor, that pump could be damaged,' said Mittyng."

MyStateline (4/8) added, "Backup systems at nuclear power plants have come under scrutiny since [those] at Japan's Fukushima facility failed during the earthquake and tsunami on March 11th."

WQRF-TV Rockford, IL (4/7, 9:18 p.m. CT, 20.560) reported that the NRC has launched an investigation into the Byron Nuclear Power Plant "following reports that back-up cooling pumps might not work in the event of a system failure." NRC spokesperson Viktoria Mittyng said that they launched the investigation after "it became apparent that the system would not be operable" and they asked the Exelon, the company that owns the plant, to make some changes. Paul Dempsey, Byron Station's communication manager, said that they have rectified the situation and configured the system according to NRC's requests.

NRC Says Fort Calhoun Moving In Right Direction. The Omaha World-Herald (4/8, Gaarder) reports that the Fort Calhoun Nuclear Station "north of Omaha appears to be solving the problems that placed it among the handful nationwide that have required the most oversight, federal regulators said Wednesday." NRC's regional deputy director Troy Pruett told Omaha Public Power District officials that it appears they "are heading in the right direction," in their efforts to correct "somewhat poor marks"

the NRC gave last year after "concluding that the utility's plans to protect against catastrophic, 1-in-1,000-year flooding were vulnerable to failure." NRC reactor inspector Gerond George said that one problem had to do with how Fort Calhoun planned to "stack sandbags atop flood gates," which the NRC says were positioned in such a way that they could have washed away during flooding.

Vermont Officials Say They Will Enforce Law To Shut Yankee Plant Down.

The Brattleboro (VT) Reformer (4/8, Audette) reports that if Entergy attempts to continue operating the Vermont Yankee nuclear plant past March 21, 2012, "the state will be ready to enforce its laws," according to Vermont Attorney General William Sorrell, who said, "We are not going to sit on our hands and let Vermont law be ignored." Sorrell insists he and his staff are prepared for "whatever legal action might be necessary" if Entergy "ignores the state's refusal to issue a certificate of public good for continued operation of Yankee." The Reformer notes that Entergy may ask a federal court "for a declaratory ruling prior to March 2012, or prior to the October refueling" which would assert that Vermont is trying to pre-empt the NRC's decision. Or it might continue to operate and wait for the state to sue to shut the plant down.

The Addison (VT) Independent (4/7) reported Gov. Shumlin "reiterated his desire to see the plant closed when its current license expires next year — in spite of the fact that the federal Nuclear Regulatory Commission has issued VY a renewal." Shumlin predicted Yankee's future might be decided by the courts, and suggested Entergy, "might argue that the Vermont Legislature doesn't have the right to decide the facility's fate; or Entergy might try to continue operation past 2012 with its NRC permit in hand, forcing the state to take court action."

Benefits Of Closing Yankee Expected. In an opinion piece for the Burlington (VT) Free Press (4/8), Sandra Levine of the Conservation Law Foundation talks up the benefits awaiting the state after Vermont Yankee closes. Levine said that "A cleaner, more prosperous energy future is available without Vermont Yankee. Let's set aside the bogey men and scare tactics and look at the facts." Levine says there is an "excess supply" of power, which all but "guarantee that the retirement of Vermont Yankee will have at most a small impact on Vermont's electricity supply."

Emergency Response Exercise Conducted At Vermont Yankee. On its website, WTEN-TV Albany, New York (4/7) reported, "Emergency officials in Vermont conducted drills near the Vermont Yankee Nuclear Power Plant on Thursday," to prepare for "if there was a leak at the plant." Richard Cogliano, of Vermont Emergency Management said officials conduct "a federally evaluated

exercise every two years, with every six years doing the ingestion pathway."

Lawmakers Sideline Power Bill Tax. The AP (4/8) reports, "The Vermont House has agreed to pull a new 55-cent charge on electric bills from a bill designed to promote renewable energy" and replace funding that had been coming from Vermont Yankee plant. "Gov. Peter Shumlin says he's working on an alternative to the new tax to fund the Clean Energy Development Fund, but he won't say what his plan is."

NRC Criticized For Response On Oyster Creek Relicensing.

In a commentary for Gloucester County (NJ) Times (4/8), Jeff Tittel, director of the Sierra Club writes to criticize the NRC, suggesting that it shows it "cares more about protecting industry interests than the public in a brief the agency filed with the Third Circuit Court of Appeals, which is hearing an appeal of the relicensing of the Oyster Creek power plant." Tittel calls the NRC a "cheerleader for industry" that "looks the other way it comes to relicensing, especially around issues of public safety." Tittel says that when the court asked the NRC to determine what impact the Fukushima disaster would have on the relicensing of Oyster Creek, the NRC said it would "have no bearing on the relicensing of Oyster Creek."

PhillyBubs (4/8) reports, "In light of the disaster at the Fukushima Dai-ichi nuclear plant in Japan after last month's earthquake and tsunami, and knowing Oyster Creek's nuclear reactor design and age are virtually identical to that of Fukushima's, some residents are casting a wary eye toward the Jersey shore." Perry Belnich of Shamong said "I know the tsunami caused the problem in Japan; we're not likely to get one here. But you worry about it because it's so old."

NRC Cited Beaver Valley Plant For Submerged Cables.

Drawing coverage from the Beaver County (PA) Times, the AP (4/8) reports that Beaver Valley Station was cited last December by the NRC for having electrical cables to safety systems the previous year in an environment where they could be submerged in water, which could cause the cables to fail. But FirstEnergy Corp., which operates the plant, said that the problem has since been corrected. The NRC report says Beaver Valley Station was "one of nine found since 2007 to have cables improperly submerged in water."

Unusual Event Declared At Columbia Station.

The AP (4/8) reports, "A small amount of hydrogen gas trapped in a pipe at a Washington nuclear power plant ignited in a brief, six-inch flame Thursday when workers cut into the pipe, a utility spokesman said." Energy Northwest spokesman Mike Paoli said the "puff" lasted less than a second and did no damage and caused no injuries, but still "Columbia Generating Station declared an 'unusual event'

and temporarily evacuated the immediate area." The AP notes that the NRC was notified. Paoli said, "There's no association whatsoever with the reactor building or radiation."

The Tri-City-Herald (4/8) reports, "Workers were cutting the pipe, which had been closed and purged, when a small amount of residual, trapped gas escaped the pipe. The immediate area was evacuated and an unusual event declared, said the release."

Columbia Station Enters Refueling Outage. The Tri-City (WA) Herald (4/7) reports, "The Columbia Generating Station near Richland powered down a couple days early on Saturday, but Energy Northwest decided to keep its planned outage schedule starting Wednesday." The plant began its longest scheduled refueling outage in its history. The "Bonneville Power Administration requested the early stop to operations because high water flows through the federal hydroelectric dam system would allow ample power production." More than 1,800 outage personnel will replace 244 of the 764 fuel assemblies during the 78-day shutdown. They will also replace the "condenser, which turns steam from the turbines back into water for reuse."

Group Holds Sail Event To Build Opposition To Indian Point Plant. The Westchester (NY) Journal News (4/7 Clary) reported on a three-hour sail event sponsored by the Hudson River environmental group, Clearwater, in which "passengers talked about a future without the nuclear plant." Clearwater Executive Director Jeff Rumpf said "We cannot afford the nuclear option," and added, "We are finally at a tipping point in the history of nuclear power and must move forward in advancing a renewable energy agenda." Some in the group "focused on risks to the region, including radiation exposure, earthquake potential, what would happen under evacuation plans, long-term storage of nuclear waste and the possibility of terrorism."

Mid-Hudson (NY) News (4/8) also covered the event, and said "Speakers including representatives from the Lamont-Doherty-Earth Institute, environmental groups, and former Congressman John Hall. Among the concerns expresses were the possibility of earthquake and the 10 mile radius evacuation zone around Indian Point."

N12WC New York (4/8, 12:10 a.m. ET) reported that during the Westchester County, New York's State of the County Address, County Executive Robert Astorino emphasized that the safety of the Indian Point Nuclear Plant "is the county's number one priority." Astorino also said that he "personally sent a letter to the Nuclear Regulatory Commission inquiring about the safety of the plant and they have assured us the plant is safe." However, Astorino said that they "continue to monitor the situation, updating all of our past assumptions with new information as it becomes

available and we are committed to keeping our residents informed every step of the way."

New Jersey Regulator Says Samples Show No Signs Of Elevated Radiation Levels. The AP (4/8, Delli Santi) reports, "Samples of milk, air and rainwater in New Jersey show no sign of elevated radiation from the Japan nuclear disaster, the state's top environmental official said Wednesday." According to Environmental Protection Commissioner Bob Martin, milk samples "taken last week show no signs of elevated radiation" and "preliminary air samples show trace amounts of radioactivity, but at levels far below those considered hazardous to human health." Martin spoke on emergency preparedness and nuclear power plant safety at the Statehouse, one of among five environment and security experts to testify at the briefing. on and at the on Wednesday.

Group Wants NRC To Reconsider Approval Of AP1000 Design. WUNC-Radio (4/7, DeWitt) reports, the "AP-1000 Oversight Group filed a petition with the NRC" urging regulators "to reconsider approval of a new design for nuclear power plants in North and South Carolina." The "group argues that the AP-1000 reactor design is flawed and should not be used at Shearon-Harris and other sites." Attorney John Runkle says the group is troubled that the "NRC seems poised on approving reactor designs that have not been fully reviewed nor fully resolved."

Small Amount Of Fukushima Plant Radiation Detected In Kansas. The Lawrence (KS) Journal World (4/8, Rothschild) reports, "State officials said Thursday that 'minuscule' levels of radiation from the damaged nuclear power plant in Japan have been detected in Kansas but posed no health threat." Lt. Gov. Jeff Colyer said that while Kansans may have concerns, "What we are seeing is a minuscule blip on the meter. The consensus remains from international, national and state health experts that this does not pose a health risk to Kansans." The Journal World adds Kansas Department of Health and Environment Secretary Robert Moser, said the "elevated levels of radiation" across the US are not unexpected.

The AP (4/8) notes that "Lt. Gov. Jeff Colyer, who's a surgeon, said while Kansans may be concerned, tests show only what he called a minuscule blip in readings for radioactive iodine."

On its website, KAKE-TV Wichita, Kansas (4/7) carries a news release from the Kansas Governor's office that reiterates that "these types of findings are being found all across the country and are far below levels of human health concern, including for infants and children."

KSNT-TV Topeka, KS (4/7, 10:09 CT, 19,642) reported that "Kansas officials say environmental testing has detected minimal levels of radiation from Japanese nuclear reactors damaged by last month's earthquake and tsunami." However, Lt. Governor Jeff Coyer said that the tests only showed "a miniscule blip in readings for radioactive iodine." The officials also "stressed...that the radiation doesn't represent a health hazard."

NRC Discusses Nuclear Fuel Services Performance Review. The Johnson City Press (4/8, Hicks) reports Anthony Gody with the NRC said the Licensee Performance Reviews "are compiled using data from public reports and are used to develop items to be addressed by the NRC and its licensees." Gody said that while "NFS has demonstrated improvement in the area of safety operations, he said two items mentioned in a confirmatory action letter issued by the NRC to NFS on Jan. 7, 2010, which outlined measures to be implemented by NFS prior to the restarting of several process lines voluntarily halted in December 2009, have not adequately been addressed and that the area of safety operations as a whole requires continued focus from the NRC and NFS."

On its website, WJHL-TV Bristol, TN (4/7, Jackson) added, "NRC said NFS improved performance in 2010 but needs to address operational and safety concerns. They also criticized NFS management." Newly appointed president, Retired Rear Admiral Joseph Henry "said NFS now has a 200-man security team and more on-floor supervision. 'One system process we have not started back up yet is the uranium hexafluoride processing line,' Henry said. 'Once we're satisfied that we are on the right path, we'll ask the NRC to come in, inspect us.'" WJHL-TV Tri-Cities (TN-VA), VA (4/7, 11:00 p.m. ET) also broadcast the story.

Prior to the meeting, WCYB-TV Bristol, Virginia (4/7, Taylor) reported on its website that NRC "representatives will be in Erwin tonight to talk about performance and safety of Nuclear Fuel Services." The Commission was to host a public meeting at the Unicoi County Courthouse, beginning at 6:30 pm. WCYB-TV Tri-Cities (TN-VA), VA (4/7, 5:35 p.m. ET) also broadcast the story.

TVA Board To Discuss Nuclear Safety Thursday. The Chattanooga (4/7) reported, "The TVA board will discuss the topic of nuclear safety at a meeting in Chattanooga next Thursday." The paper said "items on the agenda include a nuclear safety review and a report of the nuclear oversight committee." Notably, the board "will also discuss the future of the Bellefonte Nuclear Plant, which has long been moth-balled."

TVA Delays Decision On Bellefonte Plant. The AP (4/8) reports the TVA "has delayed giving the go-ahead on a

reactor at its Bellefonte Nuclear Plant in northeast Alabama, due to the emergency situation at a plant in Japan." AP says TVA President and CEO Tom Kilgore "told The Daily Sentinel in Scottsboro that the utility's board will not be asked at its April 14 meeting to approve completing the reactor."

TVA Studying Use Of MOX Fuel. Reuters (4/7, O'Grady), citing a TVA official, reported that the agency is weighing whether to use mixed-oxide fuel obtained from excess weapons-grade plutonium that the US government is looking to dispose of. MOX contains uranium and plutonium, and the US government is looking to getting rid of plutonium from dismantled nuclear weapons. Some groups have expressed concerns about using the highly radioactive plutonium, but Mick Mastilovic, TVA's nuclear fuel manager, said that "all nuclear plants produce plutonium over time as a byproduct of uranium fission."

Nuclear Safety Hot Topic At Public Meetings On Dominion Plants. The Central Virginian (4/8, Luck) reports, "The North Anna Nuclear Power Station received an overall positive assessment from the Nuclear Regulatory Commission for 2010 with Unit 2 receiving a 'white' indicator in one area." Although "the focus of the meeting was the annual NRC assessment of the power station, the approximately 25 citizens in attendance had many questions related to nuclear energy in general given the situation in Japan. Several representatives of the NRC were in attendance at the meeting in anticipation of the concerns and questions and provided as many answers in as much depth as they were able."

The Newport News Daily Press (4/7, Gillard) reports, "Safety was the hot topic during a public meeting Wednesday in Surry about nuclear safety." NRC officials "tried to dispel safety concerns residents had due to the recent earthquake, tsunami and nuclear disaster in northeast Japan." Local resident Betsy Shepard said, "Nuclear is not perfect ... but in relative terms, most people here are fairly comfortable with the nuclear plant here."

Entergy Officials Defend Pilgrim Nuclear While State Leaders Urge Relicensing Delay. The WBUR-FM Boston (4/8, Thys) reports on its website that Massachusetts "Gov. Deval Patrick, Senate President Therese Murray and House Speaker Robert DeLeo" want the NRC to delay relicensing of Pilgrim Nuclear. The officials admit that the Daiichi disaster affected their decision, adding, "they want to wait until 'we can all be sure that we have learned what we need to from the experience in Japan.'" During a Wednesday hearing with Entergy officials, Murray noted she's concerned about storm surges, wind monitoring, and spent-fuel storage. Entergy officials cautioned that they're committed to safety, including additional generators

not in use at Daiichi, and that natural events in Japan are unlikely to replicated in Massachusetts.

The Quincy (MA) Patriot Ledger (4/8, Stewart) reports that officials at the hearing received a "surprise" from Energy executives, who "revealed that they already plan to start transferring waste to dry storage by 2014." Murray said, "They've never said anything about it." Along with Massachusetts Attorney General Martha Coakley, Murray wrote the NRC asking that dry storage be a relicensing condition.

Rep. Gibson Remains Committed To Nuclear Power. Will Doolittle writes in a column for the Glen Falls (NY) Post Star (4/8, 27K), "Events in Japan of the last month would seem to cry out for a reassessment by Congressman Chris Gibson of his cheerleading for nuclear power," but "he has not wavered, despite nature's unfortunate timing." Gibson pushed to build a nuclear plant in his district shortly before Japan's earthquake and tsunami. Doolittle says that "while headlines around the world cry of the dangers of radiation poisoning the air and water in Japan," Gibson "has insisted on the necessity of alternative energy production, starting with nuclear."

Potassium Iodide Tablets Distributed In Delaware. The AP (4/8) reports, "Emergency management officials in Delaware say about 1,500 doses of potassium iodide have been distributed to residents who live within 10 miles of the Salem/Hope Creek nuclear power plant in New Jersey." According to the report, the pills, which protect against radioactive iodine, are distributed every year in the fall. However, "officials set up a second distribution after the earthquake and tsunami in Japan, which damaged one of Japan's nuclear power plants and resulted in radiation leaks."

The Wilmington (DE) News Journal (4/7, Montgomery) reports that the pills were distributed by Delaware Emergency Management Agency and Division of Public Health. According to the report, Roseann Pack, a spokeswoman for the agency, "said state officials scheduled Wednesday's distribution partly as a result of elevated public interest in the issue and after noting a significant population inside Salem-Hope Creek's 10-mile evacuation planning zone." The Journal also mentions that "in a report released Wednesday, the Union of Concerned Scientists cited Nuclear Regulatory Commission documents that they believe show NRC analysts' concern about the reliability of a study of reactor accident consequences." In that study, "some NRC analysts questioned the ability of some American reactors to avert severe damage under scenarios that involve problems seen in Japan."

Japan Crisis Raises Concerns Over Diablo Canyon. The Santa Barbara (CA) Independent (4/8, Welsh, 40K, 39K) reports, "Ongoing struggles to contain radioactivity spilling from the Japanese nuclear plants has reignited concern about the seismic vulnerability of Diablo Canyon," a nuclear reactor "built just off the coast from two earthquake faults." Rep. Lois Capps spoke on the phone last week with "Nuclear Regulatory Commission (NRC) chair Greg Jaczko, urging him to suspend Diablo Canyon's relicensing application pending the results from a high-energy 3-d seismic study on the new fault discovered in 2008, located 300-600 yards off the coast from Diablo Canyon." According to the report, "Capps has been joined in this demand by the San Luis Obispo County Board of Supervisors and State Senator Sam Blakeslee, a Republican who represents the district."

The San Luis Obispo (CA) Tribune (4/8, Sneed) adds that "as promised, county supervisors Tuesday will vote whether to send a letter to PG&E asking it to suspend the relicensing of Diablo Canyon nuclear power plant until seismic studies have been completed and verified." According to the report, the letter "says that staying license renewal would be a good way for the utility to restore the trust of the community." However, "PG&E and the federal Nuclear Regulatory Commission have insisted that license renewal and the seismic studies can proceed concurrently."

In a report about how a "megaquake" could affect areas along the US Pacific Coast, the Hartford (CT) Courant (4/8, Thorson) says, "If...your concern for the Big One involves the potential for death and destruction, then I suggest you keep your thoughts in central and southern California, where the earthquakes are smaller, but where the threat is higher." The article further explains that "the problem" in these areas "is mostly about human population and infrastructure investment, both of which are roughly an order of magnitude higher than" in the northern Pacific Coast. "Additionally, large cities are built in basins directly above faults rather than at distant removes, and a pair of nuclear reactors — Diablo Canyon and San [Onofre] — bracket Los Angeles," according to the Courant.

Slate V (4/8), Slate's online video magazine, posts an episode of "Smashing Crayons" created by Illustrator Steve Brodner. In the video Brodner refers to the Diablo Canyon nuclear power plant, which is built near two fault lines, as a "great big monument to stupid."

Japanese Crisis Could Usher In New Carbon-Emitting Plants. The AP (4/8) reports that the Daiichi disaster could adversely affect efforts to reduce greenhouse emissions. If nations scrap nuclear expansion projects, they could turn to plants that use coal, oil, and natural gas. The IAEA believes that half of the nuclear projects on the table for

consideration may be scrapped because of the Daiichi. IAEA chief economist Fatih Birol added if that occurs, "the result will mean an additional 5 percent — or 500 million tons — of carbon dioxide emitted globally by 2035." However, some say the disaster could actually spur efforts to increase use of renewable sources. Tove Maria Ryding of Greenpeace said, "It's a false choice to give the public an alternative between a climate change disaster or a nuclear disaster. We need renewable energy. Now, we can either have a kick back or a leap forward."

MIT Energy Director Predicts Impact Of Japanese Crisis For US Nuclear Industry. The Wall Street Journal (4/8, Garland) reports that as a result of the Daiichi disaster, the US nuclear industry faces four certainties, according to MIT Energy Initiative director Ernest Moniz. He said that costs will increase and waste-storage policies will be reviewed. Furthermore, Moniz believes that 20-year extensions will come under increased scrutiny and some recent extensions may be reviewed. Moniz also predicts that US nuclear research will shift to an emphasis safety and cladding.

Cobb Says Japan Crisis Shows Need For Storage Solution. In a commentary for the Las Vegas Review-Journal (4/7), Tyrus W. Cobb, who served as special assistant to President Ronald Reagan for National Security Affairs, writes on how the Fukushima Daiichi nuclear plant crisis demonstrates how essential a long-term solution to spent fuel storage is, and suggests that the current US policy — or lack of it — on nuclear waste, in which the Obama Administration plans to shut down the Yucca Mountain Project, does not make sense.

Commentary: US Should Move Away From Nuclear Energy. In an opinion piece for the Cape Cod (MA) Times (4/8), Lawrence Brown of Hyannis teaches humanities at Cape Cod Academy, writes how in "many respects, we're in worse shape than Japan was prior to the quake." Fully a tenth of US residents live within 10 miles of a nuclear plant and there "are 23 General Electric Mark 1 plants operating here identical to the ones currently failing in Japan." Brown chafes that the country has no "national facility to store spent fuel rods" and seems "to have no emergency equipment or strategies worked out for when the unthinkable happens." He adds, "Of the 26 states with nuclear power plants, their average 'radiological preparedness' scores were 4.7 — of a possible 10." He concludes that it is "time to get out while we still can."

WIPP Contractor Plans Layoffs. The AP (4/8) reports Washington TRU Solutions, the contractor for the

Waste Isolation Pilot Plant, "announced Wednesday it is restructuring its work force" at the nuclear waste repository, and "could cut as many as 90 jobs." Company president Farok Sharif said "there are now more workers than the budget allows. The company plans a voluntary separation program, followed by layoffs if necessary."

Concerns Raised About Safety At Hanford Vitrification Plant. During a hearing about safety oversight of DOE nuclear defense facilities before the House Armed Services Strategic Forces Subcommittee, the Tri-City (WA) Herald (4/8, Cary) reports, Defense Nuclear Facilities Safety Board Chairman Peter Winokur said the board "has concerns about the safety attitude of employees and management at the Hanford vitrification plant." He cited Walt Tamosaitis, the former research and technology manager for the project, who believes he was fired for raising concerns about the plant, saying, "The board believed he was a credible individual who had played a major role in the project." Winokur added that "the crux of a strong safety culture is an empowered work force...people must be comfortable raising concerns to management and be confident the messenger will not be shot."

DOE Says Additional SRS Layoffs Not Necessary. Drawing coverage from the Aiken (SC) Standard, the AP (4/8) reports the DOE has said "additional layoffs aren't needed now at the Savannah River Site near Aiken," because "necessary restructuring at the former nuclear weapons complex can be done without costing additional jobs."

INTERNATIONAL NUCLEAR NEWS:

Strong Aftershock In Japan Kills Two, Injures Dozens. ABC World News (4/7, story 6, 0:20, Sawyer) reported, "Today Japan was rocked by the most powerful aftershock yet, four weeks after the monster quake. Today's measured 7.1 and sent up new tsunami warnings for awhile, causing widespread blackouts. But it doesn't seem to have caused new damage to that Fukushima Nuclear Plant."

The CBS Evening News (4/7, story 6, 2:25, Smith) reported, "A massive 7.1 magnitude earthquake hit Japan today about 40 miles from Sendai. It is the strongest aftershock since last month's devastating quake and tsunami and it was felt 200 miles away in Tokyo. But no one was seriously hurt. And there was no new damage to those crippled nuclear reactors."

NBC Nightly News (4/7, lead story, 2:55, Curry), which opened with the story, reported the aftershock was "not far

from last month's 9.0 quake and tsunami struck off the coast of Japan, and after the shaking, there was again a fear of another tsunami and worries about whether the nuclear plant was further damaged. If you're wondering just how much more Japan can take, you're not alone." NBC (Cowan) added, "This certainly was a powerful quake, and as you say it hit along the same stretch of battered coastline hit so hard from the earthquake and tsunami last month. There weren't a lot of people left to evacuate, and so many places, the damage there had been done, but the big question is what happens to that stricken nuclear power plant that so many people fear is already hanging on by a thread. It struck nearly four weeks to the day since last month's massive quake. A grim reminder Japan is hardly out of the woods yet."

The AP (4/8, Alabaster, Hosaka) reports, "A strong aftershock ripped through northeastern Japan, killing two, injuring dozens and piling misery on a region still buried under the rubble of last month's devastating tsunami. The quake late Thursday was the strongest tremor since the March 11 jumbo and did some damage, but it did not generate a tsunami and appeared to have spared the area's nuclear power plants." According to the AP, "The Fukushima Dai-ichi complex – where workers have been frantically trying to cool overheated reactors since they lost cooling systems last month – reported no new abnormalities."

Bloomberg News (4/8, Inajima, Nakayama) reports, "Japan suffered the biggest aftershock since the day of the March 11 earthquake, prompting the operator of the stricken Fukushima nuclear plant to evacuate workers while they were cooling radioactive fuel. The magnitude-7.1 temblor struck at 11:32 p.m. local time yesterday near the site of last month's record quake in Japan, the US Geological Survey reported on its website." According to Bloomberg, "Work at Fukushima wasn't affected by the quake, Tokyo Electric spokesman Takashi Kurita said by telephone today." AFP (4/8, Hiyama) also runs a similar story, as does the New York Times (4/7, Tabuchi, Pollack, Subscription Publication, 950K), and Washington Post (4/8, Harlan, Higgins).

Japan Nuclear Crisis Easing, US Officials Say. The Los Angeles Times (4/8, Vartabedian, 657K) reports, "Although the damaged Fukushima Daiichi nuclear power plant has not yet been stabilized, there is no evidence that overheating during the last month has resulted in any melting of the reactor vessels or their containment structures, Obama administration officials said Thursday." According to the Times, "The assessment, provided to The Times on background, suggests that the plant is unlikely to suffer a complete meltdown, in which uranium fuel gets so hot that it melts through the bottom of the reactor and containment vessels, spewing high-level radiation into the plant's underlying foundation."

The New York Times (4/8, Belson, Subscription Publication, 950K) reports, "Already, dozens of engineers from Toshiba, which helped build four of the Fukushima Daiichi reactors, have been joined by experts from the United States to prepare for the decommissioning work, a job so big that the planning needs to start even now, in parallel with the efforts to contain the crisis. The team includes experts from Westinghouse, whose majority owner is Toshiba; the Shaw Power Group, a civil engineering firm; and the Babcock & Wilcox Company, an energy technology and services company, one of whose specialties is the disposal of hazardous materials." According to the Times, "The plans to take apart the reactors are complicated not only by the volatility of the situation but also by the uncertainty about the reactors' condition once they finally cool."

The Dow Jones Newswires (4/8) notes that the IAEA says it is seeing "early signs of recovery" at the stricken Fukushima Daiichi nuclear plant in Japan. IAEA deputy director general Denis Flory, said "There are early signs of recovery in some functions such as electrical power and instrumentation." Still, he said, the situation "remains very serious."

Arnie Gundersen of Fairewinds Associates appeared on CNN's John King USA (4/7, 7:47pm) and said that TEPCO and the Japanese nuclear regulatory authorities were "dealt a crappy hand and they've done well with the hand that they were dealt, but in the process they added saltwater and now they're paying the price for adding that saltwater because it in itself is corrosive. So they bought a month, but in the process now we've got a tough problem in front of us."

Bloomberg News (4/8, Nishimae, Polson, Suzuki) reports that yesterday's earthquake "minutes before midnight spared the stricken Fukushima Dai-ichi" plant, "although workers struggling to cool radioactive fuel were evacuated, Tokyo Electric Power Co. said based on its initial assessment. ... 'The main fear is more structural damage, leading to additional cracks or reopening of the fixed crack,' Peter Hosemann, an assistant professor of nuclear engineering at the University of California at Berkeley."

Two Of Three External Power Lines At Onagawa Plant Damaged. The Christian Science Monitor (4/8, Blair) noted that TEPCO said the "quake hasn't caused any further damage to the Daiichi nuclear power plant and that all the workers have been temporarily evacuated from the facilities." Two "of three external power lines to the Onagawa nuclear power plant, 75 miles northeast of Fukushima and near the epicenter of Thursday's temblor, have been damaged, causing power loss. The plant, operated by Tohoku Electric Power, has been shut down since the March 11 quake and has been relying on external power to cool the reactors."

Reuters (4/8, Nomiya) reports, Tetsuro Fukuyama, Japan's deputy chief cabinet secretary said the Onagawa plant was safe after the major aftershock.

Group Calls For Global Nuclear Regulatory Authority.

Bloomberg News (4/8, Humber) reports, "Nikolai Steinberg, who worked at the Chernobyl nuclear plant when it suffered the world's worst nuclear disaster in 1986, and Harold Denton, a presidential adviser on the 1979 Three Mile Island accident, are part of a 16-person group from 11 nations that made an appeal to the United Nations this week" for a global nuclear regulator "with authority to enforce safety standards." The group wants "a united response on safety standards" after the Fukushima nuclear plant disaster. Bloomberg adds that Victor Murogov, who served as former deputy director general of the IAEA called the situation "no longer tolerable" and said countries need to "limit our national interests for the global good."

Physicians Group Calls For Ban On New Nuclear Power Plants In Canada.

The Epoch Times (4/8 Zhu) reports, "As the nuclear crisis continues in Japan, Physicians for Global Survival are calling for a moratorium on new nuclear reactors in Canada and a suspension of operations at existing reactors on fault lines." The group said that radioactive emissions from nuclear power plants "expose entire populations and are 'gifts that keep on giving.'" According to the group, medical treatment for radiation exposure remains limited and PGS says it is "particularly concerned about a large radioactive release to densely populated areas and the financial effects of an accident."

French Strike Cuts 18,000 Megawatts Of Power Supply.

Bloomberg News (4/8, Patel, Torsoli) reported, "A 24-hour strike by French energy workers over a possible threat to subsidized bills cut power nationwide by 18,000 megawatts, a union representative at Electricite de France SA said." Bloomberg said that "about 9,000 megawatts of the cuts were from 12 of EDF's nuclear plants," citing Laurent Langland, a member of the CGT union.

Effect Of French Politics On Implementation Of Electricity Law Discussed. The Financial Times (4/7 Hollinger) reported that the French president, Nicolas Sarkozy, who faces a tough re-election battle if he again runs for office, is loathe to risk losing popular support by taking controversial decisions on energy-related matters. The Times said a plan was on the cards for the French government to set the price at which EDF would sell 25 percent of its nuclear-generated power to other competitors, as part of a compromise agreed with Brussels two years ago. The move would have done away with the artificially low

power rates that consumers now enjoy. But its implementation now seems remote in view of political challenges that Sarkozy now faces, the paper noted.

Iran Opposition Group Claims To Have Discovered Secret Nuclear Facility.

The Washington Post (4/8, Warrick, 572K) reports, "An Iranian opposition group claimed Thursday to have discovered the location of a secret factory that manufactures high-tech equipment for Iran's nuclear program, a facility the group says is disguised as a tool-making plant. The National Council of Resistance of Iran said the alleged plant makes centrifuge parts for Iran's uranium enrichment program and is closely tied to Iran's Defense Ministry." The Post notes that "UN nuclear officials have long known that Iran is operating factories for centrifuge parts, but Iranian officials have never allowed visits by UN inspectors or even revealed the location of the facilities."

The Christian Science Monitor (4/8, 48K) reports, "An Iranian dissident group with a track record of revealing secret sites involved in Iran's nuclear program on Thursday offered more information – this time, on industrial facilities where it says the Iranian regime is producing parts for the centrifuges used in its uranium enrichment program. Flanked by poster boards with aerial photos of the alleged sites northwest of Tehran, two members of the National Council of Resistance of Iran told a Washington audience that the two sites have produced as many as 100,000 centrifuges under the direction of Iran's Defense Ministry." According to the Monitor, "For several years, the International Atomic Energy Agency (IAEA) has noted Iran's growing numbers of centrifuges – the machines used to produce low- and highly-enriched uranium – but has been stymied in its efforts to ascertain where and how the centrifuges were produced." AFP (4/8) also covers this story.

Iran Promises IAEA To Operate Bushehr Plant Safely. Voice of America News (4/7, Young) reports, "As last month's nuclear disaster at Japan's Fukushima power plant shows, such safety considerations can become a life-or-death matter." Efforts of workers at the Fukushima power plant in Japan, "reflect the extensive emergency training they, and other nuclear power workers worldwide, are given. That includes the personnel at Iran's new Bushehr nuclear power plant." Iran's "Atomic Energy Agency has repeatedly said that as an IAEA member, it will follow that UN agency's operational and safety protocols at the Bushehr plant."

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NUCLEAR REGULATORY COMMISSION NEWS CLIPS

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NRC NEWS:

NRC: US 50-mile Evacuation Based On Assumptions (AP)

By Dina Cappiello, Associated Press

Associated Press, April 8, 2011

WASHINGTON – A recommendation for all US citizens living within 50 miles of the crippled Japan nuclear power plant to leave was based on incomplete information and assumptions about the reactors' condition, US nuclear officials told an independent advisory panel Thursday.

Members of the Nuclear Regulatory Commission's Advisory Committee on Reactor Safeguards pressed officials Thursday to explain how they concluded that 50 miles was a safe distance from the crippled reactors. The Japanese government had set a 12-mile evacuation zone.

On March 16, the Obama administration recommended that Americans evacuate from a 50-mile radius of the stricken nuclear plant, raising questions about US officials' confidence in Tokyo's risk assessments. Japan's government established a 12-mile evacuation zone after the March 11 earthquake and tsunami and has said that people living 12 to 20 miles from the plant should stay inside.

Randy Sullivan, who leads a protective measures team, said that no data from the site was used to determine the distance. Instead, he said, it was based on the potential conditions of the reactors.

Sullivan told the committee that the calculation was based on "a big release," which US officials could not confirm was happening. The scenario model assumed 100 percent fuel damage at Unit 2, leading to a radioactive release lasting 16 hours, Sullivan said.

Michael Corradini, chairman of the nuclear engineering program at the University of Wisconsin, said, "You were doing a what-if calculation."

Corradini continued: "Thirty-two years ago if Japan had done a what-if calculation about Three Mile Island and said all the Japanese living within 50 miles of Harrisburg should get out, what would our response be to that?" He referred to the partial meltdown of a nuclear reactor in Pennsylvania in 1979.

William Ruland, director of the Division of Safety Systems within the NRC's Nuclear Reactor Regulation Office said the 50-mile evacuation recommendation would be evaluated. Actual measurements taken since the March 17 decision have confirmed, according to NRC, that the decision was prudent.

"We were trying to ... protect our citizens or to make recommendations as appropriate based on the limited information we had," Ruland said. "Sometimes, during emergencies, you basically have to make a decision on the spot based on limited data. And sometimes you have to make a decision, and sometimes that is better than no decision."

Engineers Scrutinize US NRC's Japan Evacuation Call (REU)

By Roberta Rampton

Reuters, April 8, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

NRC Officials Offer Panel Few Answers On Japan Disaster (EPPM)

By Hannah Northey

E&E News PM, April 8, 2011

A panel that sought answers today from the Nuclear Regulatory Commission about the crisis at a crippled nuclear power plant in northeast Japan got little satisfaction.

Under questioning by the Advisory Committee on Reactor Safeguards, NRC staff were unable to say who vetted NRC Chairman Gregory Jaczko's recommendation last month that Japan evacuate people living within 50 miles of the Fukushima Daiichi plant, which was damaged by a March 11 earthquake and tsunami.

Japanese officials have maintained an evacuation area of 12 miles around the reactor complex, but Chief Cabinet Secretary Yukio Edano said that decision may be reconsidered after the country was hit today by a 7.4-magnitude aftershock (Greenwire, April 7).

The advisory committee – which includes part-time government employees with expertise in nuclear engineering, risk assessment and engineering – voiced concern over the lack of knowledge surrounding Jaczko's high-level statement.

"This is a very, very important decision, and I would have expected there would have been high-level conversations between our regulatory bodies and our government-equivalent people in the Japanese government on the worst-case analysis of why we were doing this," said John Sieber, a panel member and retired senior vice president of Duquesne Light Co.'s nuclear division.

NRC staff said the "conservative" decision to call for a 50-mile evacuation zone was based on assumptions that the spent fuel pool was full of fuel, as are American spent fuel pools. But NRC staff said they were surprised to later learn that the Japanese spent fuel pools were not as packed with nuclear fuel as they would have been in the United States.

Bill Ruland, acting deputy director for engineering and corporate support in the Office of Nuclear Reactor Regulation, said the commission usually does not make "protective action recommendations" but that the agency's role in a US emergency is to determine whether local authorities' or licensee's recommendations are sufficient. In Japan, he said, NRC played a "different role."

But Sieber said that it is "exactly how that role is portrayed in the United States that I'd be concerned about."

NRC staff also could not confirm the validity of an NRC report that Rep. Henry Waxman (D-Calif.) claimed to have obtained at a House Energy and Commerce subcommittee hearing yesterday.

Rep. Ed Markey (D-Mass.), the subcommittee chairman, said a nuclear watchdog group, the Union of Concerned Scientists, obtained the NRC models through freedom-of-information requests and the group had released excerpts from the draft assessment.

The model showed that the Peach Bottom Atomic Power Station in Pennsylvania would come within hours of suffering core damage in the event of a highly unlikely, sustained loss of primary and backup power (Greenwire, April 6).

Markey also said that NRC had told his office the Fukushima plant had kept pace with US nuclear safety requirements and had hardened vents to release hydrogen from the reactor's separation pools.

But commission officials today said they could not confirm whether the damaged reactor's owner, Tokyo Electric Power Co. (TEPCO), was still venting the reactors or if the plant actually has hardened vents.

The advisory panel said the commission should take care that incorrect information is not spread and recommended an immediate investigation.

"Somebody ought to follow up as to why these incorrect facts are getting out," said Michael Corradini, a member of the advisory panel and retired director of the Nuclear Engineering Department at Northeast Utilities in Connecticut.

NRC staff said they learned through media reports that a safety valve on Unit 1 was stuck open on April 5, possibly allowing coolant to flow out of the cooling system and making the system ineffective. But again, NRC could not confirm that information.

TEPCO officials yesterday began injecting Unit 1 with nitrogen gas to "inert the containment" and ensure hydrogen left in the reactor does not mix with oxygen and explode.

NRC staff members said they were not sure if venting was ongoing but that the utility is dealing with the stuck valve on Unit 1. They said they are "working to obtain" up-to-date drawings of the General Electric Mark 1 boiling water reactor, a statement that received smirks from the panel that advised NRC to ask GE for the drawings.

The agency's staff said they were also unsure why Units 5 and 6 at the reactor complex experienced less damage during the earthquake and tsunami, how much used nuclear fuel was in the spent fuel pools or how the rods were arranged.

"I'm sure during the weeks and months ahead, we'll be trying to get that information," Ruland said.

US Specialists Expand Evacuation Radius At Power Plant (WJBK)

WJBK-TV Detroit, MI, April 8, 2011

US officials failed to get "succinct information" from Japanese authorities before clearing a 50-mile (80.5-kilometer) evacuation zone around the Fukushima nuclear plant on March 16, a move that raised alarm bells by going beyond a 12-mile (19-kilometer) zone imposed at the time by the Japanese.

Even when US officials were able to get information from Japan, it "wasn't at all what we would have expected [during] a nuclear event in the US," said Randy Sullivan, a senior emergency-preparedness specialist with the US Nuclear Regulatory Commission (NRC).

"We didn't get much information that would tell us things were going in the right direction," Sullivan said Thursday during a meeting of the NRC's Advisory Committee on Reactor Safeguards.

A decision by the US to evacuate citizens and military personnel within 50 miles of the Fukushima Daiichi nuclear plant has been scrutinized and questioned, in part because it appeared to undermine Japanese officials who had cleared a smaller area.

During the meeting, the NRC's Advisory Committee on Reactor Safeguards – an independent committee made up of scientists and nuclear experts – asked the NRC to reveal which risk calculations served as the basis for the 50-mile determination.

Committee members also asked the NRC to disclose the identity of top-level officials who reviewed these calculations before the evacuation decision was made.

One committee member, Michael Corradini, who is the chairman of the engineering physics department at the University of Wisconsin, asked the NRC to consider how the US would respond if Japan had done the same thing during the 1979 meltdown at Three Mile Island in Pennsylvania.

"Let me reverse this, 32 years ago if Japan would have done an [independent] calculation about Three-Mile Island and said all the Japanese within 50 miles of Harrisburg should get out. What would be our response? From a policy standpoint?"

The move "could potentially create a misimpression," Corradini said.

NRC officials said they decided to recommend a wider evacuation zone amid concern over spent nuclear fuel pools while suffering from a lack of clear information.

Sullivan said the NRC called Japan's Nuclear and Industrial Safety Agency on the morning on March 16. Sullivan said one official with the agency "did his best to inform us of what he knew," but did not provide a clear picture of the risks, Sullivan said.

US Unprepared For Japan-style Nuke Accident: Lawmaker (AFP)

AFP, April 8, 2011

A US nuclear reactor near Baltimore would come dangerously close to meltdown within two days of a disaster on the scale of what happened in Japan three weeks ago, a lawmaker said, citing a draft report by the US nuclear watchdog.

At a hearing in the House of Representatives' energy and commerce committee Wednesday, Democratic Congresswoman Diana DeGette said a study conducted last year by the Nuclear Regulatory Committee (NRC) raised "grave questions about US preparedness to address reactor accidents."

The NRC modeled what would happen at two US nuclear power plants in the event of a major accident such as the one still unfolding at Fukushima in Japan three weeks after a massive earthquake and tsunami knocked out power that is critical to cooling the reactors' cores and "pools" of spent fuel rods.

One of the plants analyzed in the NRC report, Peach Bottom in Pennsylvania, is a GE Mark I boiling water reactor – the same model as reactors at Fukushima.

The NRC modeled scenarios in which Peach Bottom – which lies less than 40 miles from Baltimore, the largest city in Maryland with a population of 620,000 – lost both mains power and back-up generators after an extreme event such as a quake, flood or fire.

In one simulation, the reactor was equipped with the latest technology, introduced after the attacks on the United States of September 11, 2001 – in which some say nuclear reactors in Pennsylvania or New Jersey may have been a target – and in the other, it used older equipment and procedures.

Peach Bottom's reactor came perilously close to meltdown in the simulations.

"When a major earthquake, flood or fire was assumed to knock out all of the power of a nuclear reactor that is the same design as Fukushima and stands less than 40 miles from Baltimore – well within the contamination zone the US called for in Japan – that plant came less than an hour away from partial nuclear meltdown" in the NRC simulation, said DeGette.

Meltdown occurs when the core of a reactor overheats, allowing radiation to escape.

Congressman Henry Waxman said the NRC report "raises questions about whether our reactors may be as vulnerable as those in Fukushima," and said lawmakers "should be asking tough questions" about US nuclear safety in the light of the report's findings.

The United States has 104 operating nuclear reactors, 23 of which are the same Mark I model as the reactors that have come close to melting down in Japan.

How The Feds Are Reacting To Fukushima (TIME)

By Mark Benjamin

Time, April 8, 2011

Stark similarities between the stricken nuclear plant in Japan and dozens of sites in the United States continue to emerge, suggesting that under similar drastic scenarios, the United States might face the same kind of disaster. It's unclear what the Nuclear Regulatory Commission or Congress are prepared to do about it, but they do have the power to force the industry to implement new, costly safety measures.

A simulation by the NRC conducted last November showed that given a two-day power failure, the Peach Bottom plant in Lancaster, Pa. would come shockingly close to a reactor meltdown. Democrats on the House Energy and Commerce Committee released the model Wednesday. The plant is 40 miles away from Baltimore.

"The Peach Bottom plant came within one hour of core damage in a severe loss-of-power scenario," Committee Ranking Member Henry Waxman (D-Calif.) said yesterday. "That result raises questions about whether our reactors may be as vulnerable as those in Fukushima," he said. "Congress should be asking tough questions."

There are 35 so-called "boiling water" reactors operating in the United States similar to those under duress in Japan. Of those, 23 are virtually identical to those in Japan, though the industry says that additional safety precautions implemented domestically after 9-11 make US plants safer. Those measures were taken into account in the NRC simulation at the Peach Bottom plant.

The NRC is currently conducting a 90-day review of US nuclear reactors in the wake of the disaster in Japan. Critics have long argued that the commission is too close to the industry it regulates and sometimes eschews costly or burdensome regulation.

Meanwhile, Democrats and Republicans in Congress seem divided on how to respond. While Waxman says Congress should take a hard look at safety at US plants, some Republicans have expressed concern that reflexive overreaction to the events in Japan could stifle the industry, which generates 20% of electricity in the US.

News Desk: What We Don't Know About Reactors (NYORKER)

By Elizabeth Kolbert

The New Yorker, April 8, 2011

The "State of the Art Reactor Consequence Analyses," known by the acronym SOARCA, are a set of studies conducted by the Nuclear Regulatory Commission starting in 2006. In the words of the commission, the purpose of the studies was to "develop the most realistic evaluations possible for the potential consequences of severe nuclear accidents." SOARCA focussed on two plants with different designs—the Surry Power Station, a pressurized water reactor in Virginia, and the Peach Bottom Atomic Power Station, a boiling-water reactor in Pennsylvania. As it happens, Peach Bottom is very similar the reactors at the

Fukushima Daiichi plant, and, also as it happens, one of the hypothetical accidents that the N.R.C. examined was a so-called “station blackout,” which is just the situation that led to the nuclear crisis in Japan.

The results of this exercise would, it seems, be extremely useful in trying to figure out what went wrong at Fukushima—where the crisis has not yet been resolved, even as a new earthquake hit this morning, causing power outages in the region. Unfortunately, however, as Ed Lyman, an expert on nuclear security at the Union of Concerned Scientists, points out in a recent blog post, the N.R.C. has yet to make the results of this particular analysis—or any others performed for SOARCA—available to the public.

About a month before the crisis in Japan started, the U.C.S. filed a Freedom of Information request for all information associated with SOARCA. The commission withheld the actual results of the analyses; still, days ago, the commission released some information—including many e-mails. Their contents are not particularly encouraging. It seems that in some of its analyses, the N.R.C. was crediting plants with certain safety “strategies” that not even the plants’ operators were counting on. In one e-mail, a concerned staff member wrote,

Generally, we have not even seen licensees credit these strategies in their own [probabilistic risk assessments] but for some reason the NRC decided we should during SOARCA.

On another occasion, a staff member voiced dismay that in the analyses certain “mitigation measures” were being treated as if their success was guaranteed. However, as the staff member pointed out, “mitigation measures” are

just equipment on-site that can be useful in an emergency when used by knowledgeable operators if post-event conditions allow. If little is known about these post-event conditions, then assuming success is speculative.

It’s not clear how the actual events in Japan will figure into the N.R.C. analyses of hypothetical accidents, when—or if—these analyses are ever publicly released. Maybe the real lesson is that, in a crisis, it doesn’t matter how many strategies you’ve listed in a report; what matters is whether they work.

Lisbeth Gronlund (UCS)

Union of Concerned Scientists, April 8, 2011

Two nuclear plants northeast of Tokyo were initially the main focus of concern after the March 11 earthquake and tsunami: Fukushima Dai-ichi (or Fukushima I) with six reactors and Fukushima Daini (or Fukushima II) with four reactors.

Currently, all the reactors at Fukushima Daini have reached cold shutdown, meaning the water in the reactors is below boiling temperature and should remain that way as long as nothing disrupts the cooling. There have been no reported problems with the spent-fuel pools at this site.

Serious problems remain at Fukushima Dai-ichi with both the reactors and spent fuel pools, which contain large amounts of radioactive fuel. All the operating reactors were shut down in the period after the earthquake but before power was knocked out by the tsunami.

However, fuel in an operating reactor becomes highly radioactive and that radioactivity continues to generate heat even after the reactor has been turned off and the fuel has been removed from the reactor, so the radioactive fuel rods must be continually cooled for years. This is done by circulating cooling water around the fuel that is in the storage pools and in the reactor.

If the cooling stops, the fuel begins to heat up. If this continues long enough the cladding may get hot enough to react with water in the air to release hydrogen, which can explode if it builds up. If the cladding continues to heat up and react with water, it can expand and rupture, releasing radioactive gases. If the fuel heats up enough, the fuel pellets can begin to melt, which releases larger amounts of radioactive gases.

While the reactor has several layers of containment to keep gases in the core from escaping to the atmosphere—a steel reactor vessel and a steel and concrete containment structure—damage to the reactor vessel and reactor containment can allow some of this to escape, as can intentional venting of gas from the containment to reduce pressure. Gases released from spent fuel in the pools are contained by the reactor building, but can be released if the building is damaged.

The earthquake and tsunami caused a loss of AC power to the facilities so that motor-driven cooling of the reactors and spent fuel pools stopped. Cooling was provided for a few more hours to the reactors by steam-driven pumps, but those stopped when the batteries needed to operate the systems ran out of power. Workers have struggled to resume cooling to minimize damage to the fuel and release of radioactivity.

Current Status at Fukushima Dai-ichi

The Fukushima Dai-ichi facility has 6 reactors, all built in the 1970s. Three—Units 1, 2, and 3—were operating at the time of the earthquake, while Units 4, 5, and 6 were shut down for maintenance. All the fuel had been moved from the Unit 4 reactor

vessel into the spent fuel pool, so there is no concern about the Unit 4 reactor vessel. The Unit 5 and 6 reactor vessels still contain more than 75% of the fuel they use when operating, so they require cooling.

Units 5 and 6 are located a short distance away from the other reactors and do not appear to have been as badly damaged. The cooling systems have reportedly been restored to both these reactors and their associated spent fuel pools, so they are not considered a threat at this time.

Image from New York Times

The Fukushima Dai-Ichi facility also has a common storage pool for spent fuel, which contains fuel that has been out of a reactor for at least 19 months. Since the radioactivity of the fuel rods falls with time, this fuel is not generating as much heat as fuel more recently removed from the reactors, which is stored in the spent fuel pools located in the reactor buildings at each of the 6 reactors. Workers have reportedly been adding cool water to the common pool as needed, and this pool is apparently not currently seen as a threat.

So the concern at the Fukushima Dai-Ichi site is focused on the fuel in the reactor cores at Units 1, 2, and 3, and the spent fuel in cooling pools at Units 1, 2, 3, 4.

Reports say that electric power has now been reconnected to all four reactor buildings. While lights have been turned on in the control rooms of these reactors, few other systems appear to be working, including instrumentation that would allow workers to know what is happening in the reactor cores and spent fuel pools.

Atmospheric radiation releases

A significant amount of radiation has been released to the atmosphere from this site since the beginning of the crisis. Two of the main health hazards from the radioactive gases that have been released are from iodine-131 (I-131) and cesium-137 (Cs-137). One analysis estimated that roughly 20% of the I-131 and up to 50% of the Cs-137 released in the Chernobyl accident was released from Fukushima to the atmosphere within the first few days of the accident.

Very high radiation levels are being detected at some points many kilometers away from Fukushima, outside of the evacuation zone, although there is no clear picture at this point because the locations of the readings are not publicly available and there has not been a systematic survey.

Japan initially ordered residents to evacuate out to 3 km (1.9 miles) around the Fukushima site, with residents out to 10 km (6.2 km) told to stay indoors. By late on March 12, Japan expanded the evacuation zone to 20 km (12 miles) with sheltering to 30 km (19 miles). On March 25, Japanese officials said they were encouraging residents to evacuate out to 30 km.

In contrast, on March 17 the US embassy told US citizens to evacuate out to a radius of 80 km (50 miles) from the site.

As the radiation is carried by winds across the ocean, it spreads out and becomes diluted. While trace amounts have been detected in the US, these amounts have been much lower than the natural background levels of radiation that people are constantly exposed to, and are not a serious health hazard.

The radiation released to the atmosphere at Fukushima came from two main sources. First, when cooling stopped in the reactor cores, the fuel began to heat up and the pressure in the reactor vessels increased. To reduce the pressure, workers vented to the atmosphere some of the radioactive gas that had built up in the vessel and primary containment. There are also reports that the primary containment of Unit 2 and possibly Unit 3 may be damaged; if that is true, that would also allow radioactive gases to escape.

Second, loss of water in the spent fuel pools led to fuel assemblies being exposed to air, which caused damage to the fuel that then released radioactive gases. While the pools are contained in the reactor buildings, hydrogen explosions in the buildings of Units 1, 3, and 4 created holes in the walls that allowed these gases to escape. And vents were opened in the walls of the Unit 2 reactor building to prevent a buildup of hydrogen that could cause an explosion.

Fortunately, monitoring indicates that deposition of Cs-137 is currently no longer occurring around the site. This is because efforts to cool the reactors and spent fuel pools have been successful enough to eliminate the need for additional venting and to stop further releases from the spent fuel pools. However, as discussed below, additional venting may soon be needed.

It is also important to note that the amount of Cs-137 and other radioactive material that remain in the fuel in both the core and spent fuel pool is much larger than the amount that has already been released. Some of this remaining radioactive material could be released if new problems occur, so this remains a very serious concern.

Other releases of radiation

The other source of radioactive contamination around the plant is from contaminated water. To attempt to cool the reactors and spent fuel pools, many thousands of tons of water were dropped by helicopter or sprayed by hoses at the plants. Some of the runoff water from these efforts has apparently become contaminated and run into the ocean, since radiation has been detected in the coastal waters.

More recently, there is a concern about very highly contaminated water in trenches outside the buildings, especially at Unit 2, which appears to be coming from water that has collected in the lower parts of the reactor turbine buildings. Japanese officials apparently believe this is water that was pumped in to cool the fuel in the reactor that has somehow leaked out into the turbine buildings.

On Monday March 28, press reports said the radiation level of this water from the Unit 2 reactor was 1,000 milli-Sv/hr. This is high enough that an hour-long exposure would give someone a radiation dose sufficient to cause acute radiation syndrome. At an April 2 press conference Japanese officials said that this highly contaminated water is leaking into the ocean.

Less highly radioactive water has also been found in tunnels under the turbine buildings at Units 1 and 3.

This issue is creating new problems for workers at the plant. The volume of radioactive water is so large that they are running out of places to store it. To cut down on the volume of water they need to remove and store, they are trying to reduce the amount of water they pump into the reactors to cool the fuel in the cores. But without that cooling, the fuel in the cores has been heating up. This leads to a buildup of pressure in the reactor that may require additional venting of radioactive gas to the atmosphere. If the heating becomes great enough, it can also lead to additional fuel damage and further release of radioactive gases from the fuel.

There is speculation about the amount of fuel in the reactor cores that may have melted, and given the lack of cooling it may be substantial. But because of the lack of monitoring in the reactor vessels no one really knows the condition of the fuel. The state of the fuel at Three Mile Island was not known for several years after the accident there. Similarly, because of lack of water in some of the spent fuel pools early during the Japanese crisis, people assume that some of the fuel in the pools may have melted, but the status is not known.

I-131 and Cs-137

Because I-131 has a half-life of only 8 days, it reaches a stable concentration when the reactor is operating but decreases relatively quickly once the reactor stops. So very little of this material remains in the fuel in the spent fuel pools; for example, fuel that has been out of the reactor for two months would have less than 1% of the I-131 it had when it was removed from the reactor. This means that the I-131 found outside the plant likely came from venting the reactor cores.

If at this point workers can control the temperature and pressure in the cores to eliminate the need for additional venting, this would essentially cap the amount of I-131 released. Moreover, even if future venting is required, the longer venting can be delayed the more the level of I-131 in the core will decrease. Already, the amount in the fuel in the core is only about one-fifth of the amount present when the earthquake hit.

Recent reports say that seawater collected near the Fukushima I facility showed I-131 levels several thousand times safety standards. This high level seems to indicate that the iodine must have come from fuel in the core.

Cs-137, however, has a half-life of 30 years so it decays much more slowly and its release remains a serious concern. This is the main contaminant that has caused long-term evacuation of areas around Chernobyl.

The fuel in the core of Unit 3 has been a particular concern because it contains mixed-oxide (MOX) fuel, which is made from both uranium and plutonium oxide rather than just uranium. While releases from fuel with larger amounts of plutonium raises additional health concerns, the MOX fuel in Unit 3 only makes up about 6% of the core (32 out of 548 total fuel assemblies), so the increased risk due to the presence of MOX fuel is probably negligible. Public opposition to MOX in Japan slowed down the program and is the chief reason why there is so little MOX in the core and why the risk from the additional plutonium is limited.

Updated information about the reactors can be found on the New York Times site.

Yorkers Invited To Discuss Nuclear Safety At Peach Bottom (YORKDIS)

By Christina Kauffman

York (PA) Dispatch, April 8, 2011

Though tens of thousands of Yorkers could be in jeopardy if there were ever an incident at Peach Bottom Atomic Power Station, public attendance at the annual meetings held to discuss the plant's safety assessment is sometimes lighter than at a school board meeting.

The public is once again invited to discuss safety performance at the plant, an Exelon Nuclear-owned site that houses two boiling-water nuclear reactors.

And the Nuclear Regulatory Commission is preparing for a larger turnout than average because of the nuclear disaster in Japan that followed an earthquake last month.

The April 13 meeting will give attendees an opportunity to ask questions regarding the plant's performance and the government's oversight of the facility, said NRC spokesman Neil Sheehan.

Regulatory staff members are prepared to speak about their response in the wake of the Japanese disaster, such as the extra reviews that plants are undergoing and the "longer-term lessons learned from what's going on in Japan," he said.

The review: However, the primary focus of the meeting is Peach Bottom's 2010 review; the NRC found that the plant operated safely last year.

The NRC uses color codes to measure plant performance, with "green" representing very low safety significance, and increases to "white," "yellow" or "red" depending on the significance of the offense, he said.

Peach Bottom's performance indicators were green, and there were no inspection findings that were "greater than green," he said.

That means that, for 2011, the plant will continue to receive the inspection regime used for plants that are operating well.

Comparing years: The 2010 "green" assessment was similar to the NRC's findings for 2009. There were, however, extra inspections last year because of "two acts of deliberate misconduct" noted, Sheehan said.

The first incident involved a maintenance supervisor who provided incomplete and inaccurate information for unescorted access to the site. The second involved a reactor operator who deliberately failed to report his drunk-driving arrest, Sheehan said.

Routine inspections are carried out by two NRC on-site inspectors assigned to the plant and by inspection specialists from the agency's office in King of Prussia, Pa.

In 2010, the NRC devoted 5,500 hours to inspection at Peach Bottom, Sheehan said.

Exelon spokesman David Tillman said the company is undergoing a five-year, \$1.3 billion initiative at the site to enhance safety through plant-component upgrades.

For example, the company is replacing its six main power transformers for \$90 million.

Tillman said Exelon enjoys having a venue to interact with the public and answer questions. He said he also expects a larger crowd this year because of the radiation leak in Japan.

The meeting will be held starting 6 p.m. Wednesday at the Peach Bottom Inn, 6805 Delta Road, Delta.

US Health-care System Unprepared For Major Nuclear Emergency, Officials Say (WP)

By Sheri Fink

Washington Post, April 8, 2011

US officials say the nation's health system is ill-prepared to cope with a catastrophic release of radiation, despite years of focus on the possibility of a terrorist "dirty bomb" or an improvised nuclear device attack.

A blunt assessment circulating among American officials says, "Current capabilities can only handle a few radiation injuries at any one time." That assessment, prepared by the Department of Homeland Security in 2010 and stamped "for official use only," says "there is no strategy for notifying the public in real time of recommendations on shelter or evacuation priorities."

The Homeland Security report, plus several other reports and interviews with almost two dozen experts inside and outside the government, reveal other gaps that might increase the risks posed by a nuclear accident or terrorist attack.

One example: The US Strategic National Stockpile stopped purchasing the best-known agent to counter radioactive iodine-induced thyroid cancer in young people, potassium iodide, about two years ago and designated the limited remaining quantities "excess," according to information provided by the US Centers for Disease Control and Prevention to ProPublica. Despite this, the CDC Web site still lists potassium iodide as one of only four drugs in the stockpile specifically for use in radiation emergencies.

The drug is most effective when administered before or within hours of exposure. The decision to stop stockpiling it was made, in part, because distribution could take too long in a fast-moving emergency, one official involved in the discussions said. The interagency group that governs the stockpile decided that "other preparedness measures were more suitable to mitigate potential exposures to radioactive iodine that would result from a release at a nuclear reactor," a CDC spokesperson said in an e-mail to ProPublica.

Japan's ongoing nuclear crisis might prompt officials to revisit that conclusion. With radiation levels higher than expected outside the evacuation zones in some areas, the Japanese government recently asked the United States for potassium iodide. The federal government agreed to send some of its dwindling stockpile of the liquid version used in children or adults, which is due to reach its expiration date within about a year. The government is "finalizing the paperwork," according to an official with the US Department of Health and Human Services.

Another example: Although hospitals near nuclear power plants often drill for radiological emergencies, few hospitals outside of that area practice such drills. Most medical personnel are untrained and unfamiliar with the level of risk posed by radiation, whether it is released from a nuclear power plant, a "dirty" bomb laced with radioactive material or the explosion of an improvised nuclear weapon.

Many states don't have a basic radiation emergency plan for communicating with the public or responding to the health risks. Even something as fundamental as the importance of sheltering inside sturdy buildings to avoid exposure to radioactive fallout from a nuclear explosion — which experts say could determine whether huge numbers of people live or die — hasn't been communicated to the public.

Recently the White House and other federal officials concerned about deficiencies in public readiness met with experts to explore what might be done to make nuclear events more survivable. "The bottom line is that the citizenry are not prepared at all," said Michael McDonald, president of Global Health Initiatives, who participated in White House and congressional briefings.

The Department of Homeland Security report acknowledges that officials are poorly prepared to communicate with the public and that the current organization of medical care "does not support the anticipated magnitude of the requirements" following an attack with an improvised nuclear device. It says the United States has "limited" treatment options for radiation exposure and notes that staff and materials aren't in place to carry out mass evacuations after a large-scale release of radiation. "The requirements to monitor, track, and decontaminate large numbers of people have not been identified," the report said.

Underlying the preparedness problems is the need for additional research. It isn't known, for example, how a nuclear blast and electromagnetic pulse would affect modern communications infrastructure, or to what extent modern buildings can protect people from nuclear blast, heat and radiation effects.

A report prepared last year by the Council on State and Territorial Epidemiologists was equally pessimistic about US readiness. Based on surveys of public health officials in 38 states, it concluded that "in almost every measure of public health capacity and capability, the public health system remains poorly prepared to adequately respond to a major radiation emergency incident." Forty-five percent of the states surveyed had no radiation plan at all for areas outside federally mandated nuclear power plant emergency zones. Almost 85 percent of the officials said their states couldn't properly respond to a radiation incident because of inadequate planning, resources, staffing and partnerships.

More troubling was the fact that the situation hadn't improved since a similar survey was taken in 2003. "Most of those comparisons appear to indicate either the same poor level of preparedness and planning or a decline in capacity," the report said.

The nation's investment in emergency preparedness seems likely to decrease rather than increase, experts say, because of massive federal and state deficits.

President Obama's proposed budget would cut funding for a federal hospital preparedness program by about 10 percent. The release of proposed federal regulations that would require hospitals to meet emergency management standards has been delayed.

"If the public isn't demanding that we be better prepared, the politicians won't put the money in for us to be better prepared and the regulators" won't require it, said Arthur Cooper, a professor of surgery at Columbia University and director of trauma and pediatric surgical services at Harlem Hospital Center. "It all begins with the public knowing this is a problem that's got to be solved and it's worth spending some money and effort to try to be prepared in a real way."

Hospital preparedness

In the days after nuclear fuel at Japan's Fukushima power plant began to overheat, the greatest threat to one hospital within 50 miles of the plant wasn't radiation, but fear. Many staff members had fled, and government emergency workers hadn't delivered food and medicine needed for the 120 patients. Masaru Nakayama, director of Kashima Hospital in Iwaki, Japan, said it took time to convince people that the area around the hospital was in fact safe.

Yet in national surveys, US hospital workers have expressed fears similar to those of Nakayama's staff, saying they would be less willing to report to work for a radiological or nuclear incident than for other types of emergencies. They also said they feel unprepared for the work they would be required to do, even though the risk of radiation exposure from treating contaminated patients outside the danger zone is considered negligible when workers are properly trained and wear protective equipment.

"The level of education for disasters across the board in American hospitals is really pretty terrible," Cooper said. "People don't have a good sense of how to focus on any disaster, let alone a radiation disaster. Radiation adds a level of complexity that most folks aren't prepared to face."

Cooper said hospital drills have improved in recent years, "but they occur far too seldom and they end far too quickly and they're far too superficial to really prepare a hospital for a major disaster."

"Shutting down part of the hospital's work for a period of time to conduct a full-scale exercise, that's daunting for a hospital," he said. "Trying to 'do the right thing' and provide employees with in-depth disaster education across the board is not something they're going to do unless it becomes a major regulatory mandate."

William Fales, an associate professor of emergency medicine at Michigan State University and a regional medical director in southwest Michigan, said he has yet to see a hospital outside of a nuclear reactor's emergency planning zone conduct a drill for a nuclear or radiological emergency.

In the courses Fales teaches for medical professionals, he has seen firsthand what little baseline knowledge many of them have. In one exercise they are treating mock bombing victims when they are suddenly told that the explosive was a dirty bomb packed with radioactive material. Typically they drop everything, run the patients outside and decontaminate them. But that reflects a lack of knowledge of a basic principle — that medical workers should treat a patient's life-threatening traumatic injuries from a bomb blast before worrying about radiological decontamination.

"It's amazing," Fales said. "It's a knee-jerk reaction because they hear the word 'radiation.' ... Imagine what would happen if, God forbid, we had a real terrorist bombing and a rumor started on TV that it was a dirty bomb. How many potentially salvageable trauma patients would be compromised by that reaction?"

Health workers made a different mistake at a recent radiation emergency conference sponsored by the CDC. When a workshop leader in a white decontamination suit asked nurses to practice cutting the garments off a mock contamination patient, one volunteer slid the scissors quickly from ankle to torso. That could send radioactive debris flying, the leader warned. The more careful approach took about two minutes—a long time if hundreds are awaiting assistance.

Knowing when a patient has been contaminated versus exposed to radiation is an important distinction that is acquired with simple training. "If you put a chicken in a microwave and cook it, it comes out a rubbery chicken, but it doesn't come out contaminated," Fales said. "It's been irradiated, but it's not radioactive."

Fales said few participants in his training courses think about doing a quick survey with a radiation detector to verify the existence of contamination. At many hospitals, most workers don't even know where the Geiger-Müller counter is kept.

Facing a worst-case emergency

The American Medical Association devoted the March issue of its journal, *Disaster Medicine and Public Health Preparedness*, to the No. 1 scenario on the federal government's list of 15 planning scenarios for emergency preparedness: a nuclear explosion equivalent to the force of a 10-kiloton trinitrotoluene (TNT) blast on a major population center.

Using Washington as an example, one study estimated that 180,000 hospital beds could be needed after such a detonation and that 61,000 of those patients could require intensive care. But Washington typically has only about 1,000 vacant beds — and there are only about 9,400 vacant intensive care unit beds in the entire United States.

After a nuclear blast, hospitals probably would fill with trauma patients. Later, others would arrive with acute radiation syndrome, which can take days to manifest and affects multiple organ systems. Without supportive care, about 50 percent of people exposed to 3.5 Gray, a measure of radiation dose, would die. Proper care would almost double the exposure level at which 50 percent would survive, but only a small fraction of American medical professionals have training and expertise in treating radiation injury.

Given that not enough beds would be available, hospitals and first responders would have to choose which patients to save. Authors of the journal articles recommend basing those decisions in part on how much radiation exposure patients have received and treating only those with a reasonable chance of surviving. "It's very hard to turn someone away who needs medical care who comes to your hospital," Cooper said. "I don't think any American hospital is prepared to do this kind of triage."

The staff would be hampered by a shortage of the laboratory equipment needed to help evaluate so many patients, a lack of approved devices to rapidly quantify the level of radiation exposure and a lack of approved medicines to counter the cellular effects of radiation. About \$200 million in federal funding has been invested since 2008 to develop diagnostics and treatments, but HHS officials say most are still years away from approval.

Even getting the protective measures that do exist, including potassium iodide, where they are needed is a challenge. Michigan has developed a round-the-clock dispatch system with ready-to-go medical packs designed for a range of emergencies and stored at 16 sites around the state. Four of those sites stock radiological countermeasures.

"We think we're one of the few states that's really designed a statewide system that can deliver these countermeasures," Fales said. In the case of one particularly expensive drug provided by the federal government, "my sense is in a lot of states it's sitting in a warehouse in the state capital, hopefully secure and warm. On a Saturday night if something goes boom in a location on another side of the state, how long will it take to get it to where it's needed?"

Improving future response

One of the top priorities in preparing for a major nuclear disaster is readying ordinary citizens for the role they will have to play. "The common misperception is any nuclear blast means everybody's vaporized," McDonald said. "That's just wrong."

But experts say the government has done little to educate the public about its responsibilities.

When police and fire departments have run nuclear exercises in conjunction with federal authorities, "they haven't included the public," McDonald said. "They've basically treated it like a classified event."

The motivation might be to safeguard the public from fear and panic, McDonald said, but "it does almost no good for the federal government to be talking about this with the top officers and not have the public understand what to do." Although

government Web sites including ready.gov and cdc.gov contain useful preparedness information, there is no single Web site the public can turn to for up-to-the-minute public health information in disasters.

One of the crucial things the public must know is when to evacuate and when to shelter underground or in a heavily constructed building. Yet making decisions on sheltering and evacuation and communicating those decisions to the public is precisely what the Homeland Security report found government agencies aren't inadequately prepared to do.

Sheltering in place could make a major difference in how many people live or die, because the danger of fallout decreases rapidly as radioactive elements decay and debris is dispersed. The dose rate drops 90 percent every seven hours.

"You can't wait until the event to put out this information," said James James, director of the American Medical Association's Center for Public Health Preparedness and Disaster Response.

Many experts predict that without more education, people probably would flee as many are doing in Tokyo and as many Americans did after the Three Mile Island nuclear accident in 1979. An estimated 144,000 people — many times more than the number advised to do so — needlessly left the area because of fear and inadequate information.

"Such an exodus would extend panic and devastation far beyond the locus of the event, draining food, water, medicines, gasoline and other resources from surrounding communities and potentially causing gridlock that would severely compromise many elements of the official disaster response," according to a modeling study published by University of Chicago researcher Michael Meit and colleagues in the same issue of the journal.

Not knowing what to do would be especially harmful to those who are least likely to be able get out of harm's way: children and the elderly, people with disabilities, and patients with chronic illnesses requiring regular treatment. The federal government enacted a number of reforms after elderly and disabled people died after Hurricane Katrina. But those reforms aren't necessarily reflected in critical front-line emergency plans. A federal court in California recently found the city of Los Angeles violated the Americans with Disabilities Act and other laws for failing to consider the needs of the disabled in its emergency response plans.

Eric Toner, a senior associate at the University of Pittsburgh Medical Center's Center for Biosecurity in Baltimore, said the key to protecting as many people as possible during an emergency is offering them frank communication about what is known and unknown.

"Nature abhors a vacuum. If credible officials aren't out there constantly, that void will get filled with people who don't know what they're talking about or have different agendas."

Still, there is no guarantee the public will act on information once they get it. Several years ago Michigan, like many other states, sent vouchers for potassium iodide to people living within a 10-mile radius of a nuclear power plant. The goal was to give them the medication free of charge from local pharmacies, so they wouldn't risk their lives searching for the drug in an emergency, when they should be sheltering in place or evacuating.

But only about 6 percent of the residents picked up their allotted supply, said Fales, the Michigan regional medical director, a rate that's similar to some other states. "So much for pre-event planning," he concluded.

ProPublica's Sasha Chavkin contributed to this report.

US Health Care System Unprepared For Major Nuclear Emergency (PROPUB)

By Sheri Fink

Pro Publica, April 8, 2011

US officials say the nation's health system is ill-prepared to cope with a catastrophic release of radiation, despite years of focus on the possibility of a terrorist "dirty bomb" or an improvised nuclear device attack.

A blunt assessment circulating among American officials says "Current capabilities can only handle a few radiation injuries at any one time." That assessment, prepared by the Department of Homeland Security in 2010 and stamped "for official use only," says "there is no strategy for notifying the public in real time of recommendations on shelter or evacuation priorities."

The Homeland Security report, plus several other reports and interviews with almost two dozen experts inside and outside the government, reveal other gaps that may increase the risks posed by a nuclear accident or terrorist attack.

One example: The US Strategic National Stockpile stopped purchasing the best-known agent to counter radioactive iodine-induced thyroid cancer in young people, potassium iodide, about two years ago and designated the limited remaining quantities "excess," according to information provided by the US Centers for Disease Control and Prevention to ProPublica. Despite this, the CDC website still lists potassium iodide as one of only four drugs in the stockpile specifically for use in radiation emergencies.

The drug is most effective when administered before or within hours of exposure. The decision to stop stockpiling it was made, in part, because distribution could take too long in a fast-moving emergency, one official involved in the discussions said. The interagency group that governs the stockpile decided that "other preparedness measures were more suitable to mitigate

potential exposures to radioactive iodine that would result from a release at a nuclear reactor," a CDC spokesperson said in an email to ProPublica.

Japan's ongoing nuclear crisis may prompt officials to revisit that conclusion. With radiation levels higher than expected outside the evacuation zones in some areas, the Japanese government recently asked the United States for potassium iodide. The federal government agreed to send some of its dwindling stockpile of the liquid version used in children or adults, which is due to reach its expiration date within about a year. The government is currently "finalizing the paperwork," according to an official with the US Department of Health and Human Services.

Another example: While hospitals near nuclear power plants often drill for radiological emergencies, few hospitals outside of that area practice such drills. Most medical personnel are untrained and unfamiliar with the level of risk posed by radiation, whether it is released from a nuclear power plant, a "dirty" bomb laced with radioactive material, or the explosion of an improvised nuclear weapon. A dirty bomb would cause major damage at the scene but spread little radiation. The explosion of a nuclear weapon would devastate the surrounding area and create radioactive fallout.

Many states don't have a basic radiation emergency plan for communicating with the public or responding to the health risks. Even something as fundamental as the importance of sheltering inside sturdy buildings to avoid exposure to radioactive fallout from a nuclear explosion -- which experts say could determine whether huge numbers of people live or die -- hasn't been communicated to the public.

Recently the White House and other federal officials concerned about deficiencies in public readiness met with experts to explore what might be done to make nuclear events more survivable. "The bottom line is that the citizenry are not prepared at all," said Michael McDonald, president of Global Health Initiatives, who participated in White House and congressional briefings.

The Department of Homeland Security report acknowledges that officials are poorly prepared to communicate with the public and that the current organization of medical care "does not support the anticipated magnitude of the requirements" following an attack with an improvised nuclear device. It says the United States has "limited" treatment options for radiation exposure and notes that staff and materials aren't in place to carry out mass evacuations after a large-scale release of radiation. "The requirements to monitor, track, and decontaminate large numbers of people have not been identified," the report said. The Department of Homeland Security has convened groups to work on filling the gaps.

Underlying the preparedness problems is the need for additional research. It isn't known, for example, how a nuclear blast and electromagnetic pulse would affect modern communications infrastructure, or to what extent modern buildings can protect people from nuclear blast, heat and radiation effects.

A report prepared last year by the Council on State and Territorial Epidemiologists was equally pessimistic about US readiness. Based on surveys of public health officials in 38 states, it concluded that "In almost every measure of public health capacity and capability, the public health system remains poorly prepared to adequately respond to a major radiation emergency incident." Forty-five percent of the states surveyed had no radiation plan at all for areas outside federally mandated nuclear power plant emergency zones. Almost 85 percent of the officials said their states couldn't properly respond to a radiation incident because of inadequate planning, resources, staffing and partnerships.

More troubling was the fact that the situation hasn't improved since a similar survey was taken in 2003. "Most of those comparisons appear to indicate either the same poor level of preparedness and planning or a decline in capacity," the report said.

The nation's investment in emergency preparedness seems likely to decrease rather than increase, experts say, because of massive federal and state deficits.

President Obama's proposed budget would cut funding for a federal hospital preparedness program by about 10 percent. The release of proposed federal regulations that would require hospitals to meet emergency management standards has been delayed.

"If the public isn't demanding that we be better prepared, the politicians won't put the money in for us to be better prepared and the regulators" won't require it, said Dr. Arthur Cooper, a professor of surgery at Columbia University and director of trauma and pediatric surgical services at Harlem Hospital Center. "It all begins with the public knowing this is a problem that's got to be solved and it's worth spending some money and effort to try to be prepared in a real way."

Hospital Preparedness

In the days after nuclear fuel at Japan's Fukushima power plant began to overheat, the greatest threat to one hospital within 50 miles of the plant wasn't radiation, but fear. Many staff members had fled, and government emergency workers hadn't delivered food and medicine needed for the 120 patients. Dr. Masaru Nakayama, director of Kashima Hospital in Iwaki, Japan, said it took time to convince people that the area around the hospital was in fact safe.

Yet in national surveys, US hospital workers have expressed fears similar to those of Dr. Nakayama's staff, saying they would be less willing to report to work for a radiological or nuclear incident than for other types of emergencies. They also said

they feel unprepared for the work they would be required to do, even though the risk of radiation exposure from treating contaminated patients outside the danger zone is considered negligible when workers are properly trained and wear protective equipment.

"The level of education for disasters across the board in American hospitals is really pretty terrible," said Dr. Cooper. "People don't have a good sense of how to focus on any disaster, let alone a radiation disaster. Radiation adds a level of complexity that most folks aren't prepared to face."

Cooper said hospital drills have improved in recent years, "but they occur far too seldom and they end far too quickly and they're far too superficial to really prepare a hospital for a major disaster."

"Shutting down part of the hospital's work for a period of time to conduct a full-scale exercise, that's daunting for a hospital," he said. "Trying to 'do the right thing' and provide employees with in-depth disaster education across the board is not something they're going to do unless it becomes a major regulatory mandate."

Dr. William Fales, an associate professor of emergency medicine at Michigan State University and a regional medical director in southwest Michigan, said he has yet to see a hospital outside of a nuclear reactor's emergency planning zone conduct a drill for a nuclear or radiological emergency.

In the courses Fales teaches for medical professionals, he has seen firsthand what little baseline knowledge many of them have. In one exercise they are treating mock bombing victims when they are suddenly told that the explosive was a dirty bomb packed with radioactive material. Typically they drop everything, run the patients outside and remove their contaminated clothing. But that reflects a lack of knowledge of a basic principle—that medical workers should treat a patient's life-threatening traumatic injuries from a bomb blast before worrying about radiological decontamination.

"It's amazing," Fales said. "It's a kneejerk reaction because they hear the word 'radiation.' ... Imagine what would happen if, God forbid, we had a real terrorist bombing and a rumor started on TV that it was a dirty bomb. How many potentially salvageable trauma patients would be compromised by that reaction?"

Health workers made a different mistake at a recent radiation emergency conference sponsored by the CDC. When a workshop leader in a white decontamination suit asked nurses to practice cutting the garments off a mock contamination patient, one volunteer slid the scissors quickly from ankle to torso. That could send radioactive debris flying, the leader warned. The more careful approach took about two minutes—a long time if hundreds are awaiting assistance.

Knowing when a patient has been contaminated versus exposed to radiation is an important distinction that is acquired with simple training. "If you put a chicken in a microwave and cook it, it comes out a rubbery chicken, but it doesn't come out contaminated," Fales said. "It's been irradiated, but it's not radioactive."

Fales said few participants in his training courses think about doing a quick survey with a radiation detector to verify the existence of contamination. At many hospitals, most workers don't even know where the Geiger-Müller counter is kept.

Facing a Worst Case Emergency

The American Medical Association devoted the March issue of its journal, *Disaster Medicine and Public Health Preparedness*, to the No. 1 scenario on the federal government's list of 15 planning scenarios for emergency preparedness—a nuclear explosion equivalent to the force of a 10-kiloton trinitrotoluene (TNT) blast on a major population center.

Using Washington, D.C. as an example, one study estimated that 180,000 hospital beds could be needed after such a detonation and that 61,000 of those patients could require intensive care. But Washington typically has only about 1,000 vacant beds—and there are only about 9,400 vacant intensive care unit beds in the entire United States.

After a nuclear blast, hospitals would likely fill with trauma patients. Later, others would arrive with acute radiation syndrome, which can take days to manifest and affects multiple organ systems. Without supportive care, about 50 percent of people exposed to 3.5 Gray, a measure of radiation dose, would die. Proper care would almost double the exposure level at which 50 percent would survive, but only a small fraction of American medical professionals have training and expertise in treating radiation injury.

Given that not enough beds would be available, hospitals and first responders would have to choose which patients to save. Authors of the journal articles recommend basing those decisions in part on how much radiation exposure patients have received and treating only those with a reasonable chance of surviving. "It's very hard to turn someone away who needs medical care who comes to your hospital," Cooper said. "I don't think any American hospital is prepared to do this kind of triage."

The staff would be hampered by a shortage of the laboratory equipment needed to help evaluate so many patients, a lack of approved devices to rapidly quantify the level of radiation exposure, and a lack of approved medicines to counter the cellular effects of radiation. About \$200 million in federal funding has been invested since 2008 to develop diagnostics and treatments, but HHS officials say most are still years away from approval.

Even getting the protective measures that do exist, including potassium iodide, where they are needed is a challenge. Michigan has developed a round-the-clock dispatch system with ready-to-go medical packs designed for a range of emergencies and stored at 16 sites around the state. Four of those sites stock radiological countermeasures.

"We think we're one of the few states that's really designed a statewide system that can deliver these countermeasures," Fales said. In the case of one particularly expensive drug provided by the federal government, "my sense is in a lot of states it's sitting in a warehouse in the state capital, hopefully secure and warm. On a Saturday night if something goes boom in a location on another side of the state, how long will it take to get it to where it's needed?"

Improving Future Response

One of the top priorities in preparing for a major nuclear disaster is readying ordinary citizens for the role they will have to play. "The common misperception is any nuclear blast means everybody's vaporized," McDonald said. "That's just wrong."

But experts say the government has done little to educate the public about its responsibilities.

When police and fire departments have run nuclear exercises in conjunction with federal authorities, "they haven't included the public," McDonald said. "They've basically treated it like a classified event."

The motivation may be to safeguard the public from fear and panic, McDonald said, but "it does almost no good for the federal government to be talking about this with the top officers and not have the public understand what to do." Although government websites including ready.gov and cdc.gov contain useful preparedness information, there is no single website the public can turn to for up-to-the-minute public health information in disasters.

One of the crucial things the public must know is when to evacuate and when to shelter underground or in a heavily constructed building. Yet making decisions on sheltering and evacuation and communicating those decisions to the public is precisely what the Homeland Security report found government agencies aren't inadequately prepared to do.

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Not knowing what to do would be especially harmful to those who are least likely to be able get out of harm's way: children and the elderly, people with disabilities, and patients with chronic illnesses requiring regular treatment. The federal government enacted a number of reforms after elderly and disabled people died after Hurricane Katrina. But those reforms aren't necessarily reflected in critical front-line emergency plans. A federal court in California recently found the city of Los Angeles violated the Americans with Disabilities Act and other laws for failing to consider the needs of the disabled in its emergency response plans.

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"Nature abhors a vacuum. If credible officials aren't out there constantly, that void will get filled with people who don't know what they're talking about or have different agendas."

Still, there is no guarantee the public will act on information once they get it. Several years ago Michigan, like many other states, sent vouchers for potassium iodide to people living within a 10-mile radius of a nuclear power plant. The goal was to give them the medication free of charge from local pharmacies, so they wouldn't risk their lives searching for the drug in an emergency, when they should be sheltering in place or evacuating.

But only about 6 percent of the residents picked up their allotted supply, said Fales, the Michigan regional medical director, a rate that's similar to some other states. "So much for pre-event planning," he concluded.

Relicensing San Onofre (SDUT)

The license is good through 2022, but Edison says it can't wait until the last minute

By Onell R. Soto

San Diego Union-Tribune, April 8, 2011

As reactors and spent fuel storage pools still leak radioactivity after an earthquake and tsunami in Japan a month ago, federal and state officials here are taking a second look at San Diego County's oceanfront nuclear plant.

The parallels are easy to draw. San Onofre also is on the ocean and near fault lines. Its reactors are nearly 30 years old. The plant houses more than 1,000 tons of spent fuel.

Southern California Edison, which operates the plant, and federal regulators say it can withstand the biggest quakes and tsunamis that can reasonably be predicted to happen in the region.

But Edison has not yet applied for the renewal of San Onofre's license, which expires in 2022. Officials say they need to consider a variety of issues before deciding whether to seek relicensing.

"We're getting closer and closer," Edison spokesman Gil Alexander said this week. "We're still studying the feasibility."

Although there are nearly 11 years left in the license for San Onofre Nuclear Generating Station, Edison says it can't wait too long to begin the process leading to relicensing. It would take several years to get approval for the funds and then to get a decision from nuclear regulators. The company wants a decision by about 2017. If its application is rejected, there would still be time to plan for additional generation and transmission to make up for the loss of the region's biggest power plant.

San Onofre generates about 20 percent of the region's electricity. Edison operates the plant and owns 79 percent. San Diego Gas & Electric owns 20 percent, and the city of Riverside the other 1 percent.

If Edison does apply for a 20-year extension, it's not simply a matter of determining whether the plant is safe today.

That question, in fact, isn't really part of the relicensing scheme, nuclear regulators say, because safety is evaluated all the time.

"If at any point during the time it has a valid license it fails to meet our requirements, we will not allow it to operate," said NRC spokesman Scott Burnell.

If San Onofre were deemed unsafe tomorrow, Edison would have to make it safe or shut it down, he said. Same thing if a 20-year license extension is granted and then it turns out the plant is dangerous.

Besides the safety issues — which aren't minor — there are decisions about the impact on the environment, the cost, and the alternatives, plus how to store the plant's spent fuel.

How things go from here will reflect the variety of values and decisions to be made by government officials and utility executives. Each decision will involve studies costing millions of dollars. Many will involve hearings giving the public an opportunity to comment.

Here is a look at the decisions to be made, who would make them and what goes into them.

Is San Onofre run safely?

Nuclear safety is a federal issue. The federal government decided long ago it didn't want to let states regulate nuclear plants and made that the exclusive responsibility of the Nuclear Regulatory Commission.

The NRC says San Onofre is safe and wouldn't be allowed to operate if it weren't. It says there's ongoing oversight of safety questions at the plant that is independent of the licensing process.

The NRC has cited problems with the culture at San Onofre, specifically that workers have said they're afraid of retaliation for bringing up safety issues.

Edison says it wants workers to know they can bring up safety issues and is working to change the culture at the plant, something that the NRC says has been improving.

But a former manager recently filed a lawsuit claiming he was wrongly fired just last October for bringing safety concerns to the NRC.

Is it quake-safe?

Southern California is earthquake country. When San Onofre's operating reactors were designed to withstand shaking of 67 percent the force of gravity. That's equivalent to a 7-magnitude quake within five miles. But some geologists say a complex of faults just off the coast could create a much bigger quake.

Edison said recently it wants to do a \$21 million seismic study. It wants approval from the Public Utilities Commission to charge it to ratepayers.

That study is one of the things Edison will look at before deciding whether to pursue a license renewal, Alexander said.

It may be that predictions of a bigger quake don't change anything because the plant was built to withstand stronger shaking than what was previously predicted.

If changes are necessary, they won't wait until the license renewal.

"That is an ongoing process that is separate from license renewal," the NRC's Burnell said.

Earthquake safety also is part of what the NRC and the California Coastal Commission look at.

The NRC is focused on nuclear safety. Before renewing a license, it needs to know the nuclear equipment and the buildings that house it can last 20 years past the current license with regular inspections and maintenance, and can do so in the event of a quake.

These are what it calls the passive systems: the bolts, the concrete, the tanks with radioactive water.

Beyond that, however, the California Coastal Commission is charged with the earthquake safety of buildings near the shore, whether they house power plants, businesses or people.

Without looking at the risks of a nuclear leak, it looks at the structural stability, said spokesman Tom Luster.

Is the plant tsunami-safe?

Tsunamis are a separate question. It's a problem in Japan, where the Fukushima Daiichi plant was overrun with water, which damaged the cooling systems for reactors and spent-fuel storage, leading to meltdowns.

San Onofre sits behind a 30-foot sea wall. (This is measured from the top of the wall to the water level.) Edison says the biggest tidal wave reasonably predicted in the region is 23 feet.

The risk of tsunamis here is lower than in Japan for a couple of reasons.

First, the faults here are the result of two plates in the crust of the earth sliding past each other. In Japan, it's one plate diving underneath another. As a result, the kinds of quakes we have are different. When an underwater quake releases energy from one plate diving under another, it pushes water up, causing a big tsunami. Faults in which plates slide past each other don't produce the same big tsunamis.

Second, the offshore geology here takes a lot of the energy out of tsunamis before they reach land.

Is it worth it trying to renew the license?

Getting the license renewed will cost millions of dollars. There are studies to be done. There are hearings to hold. And possibly lots of upgrades.

Whether it's worth doing has to be answered by the public and investors. Edison will have to decide whether the investment to extend the license and do any necessary upgrades is a good use of money it will get from investors and lenders.

Meanwhile, the California Public Utilities Commission will decide whether those investments are a good deal for ratepayers.

Utilities like Edison and San Diego Gas & Electric, which owns 20 percent of San Onofre, have their rates set in part on the value of their infrastructure. And that includes not only brick-and-mortar expenditures, but also the costs of exploring such expenditures.

In San Onofre's case, the question breaks down to this: Is the cost of applying for a license worth it? How does the cost of having the plant run for another 20 years, until 2042, compare to the best guess for costs of alternative sources of power, such as traditional natural gas-fired plants.

Should the plant continue to use seawater for cooling?

The state Water Resources Control Board says oceanfront power plants shouldn't use seawater for cooling if they can help it. Cooling is needed to turn the nonradioactive steam that drives turbines to make electricity back into water.

But sea creatures are killed in the process. Fish are trapped against screens — though San Onofre has fish-ladder-like devices designed to prevent this, and the vast majority survive. Plankton, larvae and fish eggs die after being sucked into the plant's innards, and the plant has paid for kelp reefs and wetlands restoration to make up for those losses. The warm water is sent back out into the ocean.

There are other ways to cool power plants, but San Onofre officials estimate that changing out the cooling system there could cost \$3 billion and have unintended consequences, such as putting salt in the air that would affect wildlife east of Interstate 5.

What about nuclear waste?

San Onofre was built under the assumption that the federal government would build a central repository for nuclear waste. That hasn't happened, and the spent fuel from the reactors is all still at the plant. Most of it — 885 metric tons — is cooling in pools of water. An additional 433 metric tons are in dry cask storage.

This storage is holding a lot more spent fuel than it was designed for. Although federal regulators have approved the way it is being used, some critics worry about long-term prospects.

The pools of cooling fuel have played a large part of the problem in Japan, where cooling systems have failed.

Feds To Issue San Onofre Report Card In Meeting (OCR)

By Fred Swegles

Orange County Register, April 8, 2011

The Nuclear Regulatory Commission's staff is inviting the public to an April 28 meeting in San Juan Capistrano to discuss federal regulators' annual evaluation of how the San Onofre Nuclear Generating Station is operating.

"San Onofre operated safely in 2010," the NRC staff said in a news release. "The licensee addressed longstanding concerns in the area of problem identification and resolution but has not been fully successful in addressing several longstanding human performance issues. The NRC will conduct additional focused inspections in the human performance area and also in the safety-conscious work environment area to verify that corrective actions are effective and sustainable."

Nuclear Regulatory Commission staff is inviting the public to an April 28 meeting in San Juan Capistrano to discuss federal regulators' annual evaluation of how the San Onofre Nuclear Generating Station is operating.

Every year, the NRC staff holds a public meeting to discuss the San Onofre plant's annual performance evaluation, and this year's meeting will be at 6 p.m. April 28 at the Capistrano Unified School District's offices, 33122 Valle Road, San Juan Capistrano.

NRC personnel will be available after the meeting to answer questions from the public, the news release said. This will be a meeting between NRC staff and representatives of Southern California Edison, which operates the power plant south of San Clemente.

The NRC already has notified Edison of the results of the annual evaluation in a letter.

Gil Alexander, Edison spokesman, said the utility company looks forward to the April 28 meeting.

"The letter can be thought of as an annual report card," he said. "We saw reason for encouragement in the annual assessment that will be discussed but also recognize that we still have work to do."

Edison is planning an emergency drill next week during which residents

Feds Review San Onofre Nuclear Plant Safety (KPBS)

By Ed Joyce

KPBS-Radio, April 8, 2011

The Nuclear Regulatory Commission NRC will issue the annual assessment for the San Onofre Nuclear Generating Station with Southern California Edison officials.

Gil Alexander with Southern California Edison said the NRC will also answer questions from residents who live near the plant.

He said on-site NRC inspectors compile information every day on the plant's safety.

"There are two or three resident inspectors who look over our shoulders all the time," Alexander said. "Then they roll up their observations into semi-annual and annual report cards."

Last year, the NRC told plant operators their concern about employee work habits which could lead to safety issues at San Onofre.

The meeting, which is open to the public, starts at 6:00 p.m. on April 28 at the Capistrano Unified School District Board Room, 33122 Valle Road, San Juan Capistrano in Orange County.

Is San Onofre Nuke Plant Safe? Find Out At These Meetings (SANCLEM)

By Adam Townsend

San Clemente Patch, April 8, 2011

The Nuclear Regulatory Commission, Federal Emergency Management Agency and the city of San Clemente have all scheduled public meetings to talk about the safety of and potential risks at the San Onofre Nuclear Generating Station.

The first is a public meeting April 15 to present initial observations on nuclear power plant exercise.

Plant spokesman Gil Alexander said Tuesday that the plant will be undergoing a series of safety drills.

(Alexander said there will be some alarms going off inside the plant as part of the drill, so don't worry that there is an emergency. The public sirens will remain silent.)

The Tuesday meeting will be the public's chance to hear how they went.

The meeting begins at 4 p.m. at the Capistrano Unified School District Education Center at 33122 Valle Rd.

Participants in the exercise at San Onofre include the state of California; the counties of Los Angeles, Orange, Riverside, San Bernardino and San Diego; the cities of Dana Point, San Clemente and San Juan Capistrano; and the Capistrano Unified School District, each of which are required to activate their emergency operations during this exercise, according to the release.

The NRC will observe and evaluate the on-site performance of SONGS staff.

The second meeting is one of several scheduled regularly every year by the Nuclear Regulatory Commission to talk about any regulatory problems at the plant with plant executives in a public forum.

The Nuclear Regulatory Commission staff will meet in San Juan Capistrano April 28 with representatives of Southern California Edison Co. to discuss the agency's 2010 assessment of safety performance at San Onofre, according to an NRC release.

The meeting will begin at 6 p.m. at the Capistrano Unified School District Board Room, 33122 Valle Rd., San Juan Capistrano.

Following the performance assessment, the NRC staff will be available to answer questions from the public concerning San Onofre, as well as the NRC's role in ensuring safe plant operation.

According to the NRC:

San Onofre operated safely in 2010. The licensee addressed longstanding concerns in the area of problem identification and resolution but has not been fully successful in addressing several longstanding human performance issues. The NRC will conduct additional focused inspections in the human performance area and also in the safety-conscious work environment area to verify that corrective actions are effective and sustainable.

The following is a series of links to regulatory documents the NRC included in its release about the meeting:

A letter sent from the NRC Region IV office to plant officials addresses the performance of the plant during 2010 and will serve as the basis for the meeting discussion. It is available on the NRC website at nrc.gov/NRR/OVERSIGHT/ASSESS/LETTERS/sano_2010q4.pdf.

Current performance information for San Onofre Unit Two is available on the NRC web site at nrc.gov/NRR/OVERSIGHT/ASSESS/SANO2/sano2_chart.html.

Current performance information for San Onofre Unit 3 is available at nrc.gov/NRR/OVERSIGHT/ASSESS/SANO3/sano3_chart.html.

San Clemente Mayor Lori Donchak has led an effort by the City Council to examine the San Onofre plant's safety and its impact on the community. During this week's City Council meeting, Donchak went through a list of concerns and issues she wanted to learn about the plant and information she wanted available to residents.

The council voted unanimously to hold a public meeting Sept. 27 to address issues involving the plant.

Donchak said at the meeting this week that one of her main goals was to get a spot at the table when decisions about the plant were made; so many state and federal agencies have jurisdiction over the plant that it can be difficult to get anything done.

She charged the city's General Plan Advisory Committee, the group of appointees who are hashing out a new citywide set of zoning ordinances, to take a hard look at the plan's "nuclear element."

At a meeting in March, she asked San Onofre chief Pete Dietrich for a full assessment of safety at the plant in light of lessons learned from the Fukushima disaster that is still ongoing after the earthquake and tsunami in Japan.

Town Meeting About San Onofre Nuclear Plant Set For September (OCR)

By Fred Swegles

Orange County Register, April 8, 2011

You can mark your calendar for Sept. 27 if you'd like to attend a town meeting in San Clemente about lessons the San Onofre Nuclear Generating Station has learned from the earthquake/tsunami disaster at the Fukushima Daiichi nuclear plant in Japan.

The San Clemente City Council this week set the date well in advance with the idea that it gives San Onofre owner Southern California Edison and staff of the US Nuclear Regulatory Commission time to develop information to present to the city and the public.

SONGS: Evacuation Plan Needs Much Work (SCP)

By Tom Barnes

San Clemente Patch, April 8, 2011

Taking a break from North Beach in this week's Barnes-Eye view, I have been asked by readers for my take on the San Onofre Nuclear Generating Station (SONGS) issue. This is a hot local topic with national repercussions.

The question is, what, if anything, should be done about SONGS in the aftermath of the Fukushima earthquake, tsunami, and the damage to the nuclear reactors in Japan?

The scientific and engineering facts regarding nuclear facilities and their safety go far beyond my pay grade. Attempting to understand these arguments on both sides of the issue boggles my mind.

Maybe these plants are as safe as the nuclear lobby says they are, and maybe not. I have no way of discerning whether SONGS can withstand an earthquake of up to 7.0 on the Richter scale as their latest study said it could.

What I can comment on is the evacuation plan for San Clemente in case there is an accident at SONGS. The city, and presumably SONGS' plan is to use the I-5 North and Pacific Coast Highway (PCH) west as the evacuation routes to relocate San Clementians to the Orange County Fairgrounds. If this were not such a serious issue, this plan, or lack thereof, would be almost laughable.

Try going north on the I-5 on a Friday afternoon without a nuclear accident, the traffic can be unbearable and if there is a normal "fender-bender," everything can come to a halt. Imagine adding most of the cars in San Clemente, or imagine if there is even slight damage to the freeway from a disaster, the I-5 will become a parking lot with abandoned vehicles everywhere.

To expect the freeway to provide an adequate evacuation route defies credulity.

How can city officials consider this an adequate evacuation plan for its 68,000 residents? It reminds me of the evacuation plan administrators had for students at Laguna Hills High School when I taught there. Earthquake evacuation was to be between two cement block buildings out to the playing fields. The problem was that route would undoubtedly have been blocked by the cement buildings tumbling down. So much for a safe evacuation between felled buildings.

SONGS' evacuation plan is inherently flawed.

The only evacuation route that would have any chance of success in the wake of a earthquake effecting SONGS would be the area to the northeast of San Clemente, the area between the ranches (Forster, Rancho San Clemente, & Talega) and San Juan Capistrano and beyond.

Where are the maps for the emergency trails in this area? If they do exist they have not been widely distributed.

Many cars will not be able to traverse this rugged terrain but many will be able to, especially ones with 4-wheel drive or a high undercarriage including most trucks.

If enough vehicles can be diverted to these routes it may relieve some of the pressure on I-5 and PCH and make evacuation workable.

Both the city of San Clemente and SONGS lose credibility by their failure to seriously address the issue of evacuating San Clemente in the event of a disaster emergency.

If Southern California Edison cannot be believed because of their lack of a logical, detailed evacuation plan, can they be believed about other, often more complex, issues regarding safety at a nuclear plant?

When I moved into Rancho San Clemente a quarter of a century ago it was with the assurance that the La Pata extension would be cut through to the Ortega Hwy. and what is now San Antonio Parkway.

This is one ideal alternate route out of San Clemente but has been stalled all these years, in part, because of opposition from the Toll Road who touted their 241 pay road as the alternative way out of San Clemente. A quarter of a century to build a road that is still not finished, compare this to the US Seabees who built entire airfields in two days during WWII.

It is time for this opposition to stop and for the La Pata extension to be finished. Completing this alternative way out of San Clemente is one small step that could be taken to give the public more assurance that government and business is serious about disaster preparedness.

A deeper and more serious issue is why a nuclear generating plant was built in an earthquake zone in the first place. If nuclear facilities have to be built why choose a location that is prone to seismic activity?

Most of the United States is not in the earthquake belt and would be a much better location for a nuclear generating plant than the California coast.

No matter how safe you try to make it, the plant has 3,000 employees, millions of parts and is subject to Murphy's law. As Robert Burns has told us, "the best laid plans of mice and men can quickly go awry."

One recent bumper sticker says it best. "No Nukes in Quake Zone."

Special Inspections Under Way At Braidwood, Byron (MORRISDH)

By Jo Ann Hustis

Morris (IL) Daily Herald, April 8, 2011

Two equipment issues are under review by the Nuclear Regulatory Commission at Braidwood and Byron Generating Stations.

One issue involves the operability of the backup system to remove heat from the reactors in case of a trip or accident. The other is the loss of control room equipment alarms in February of this year and late-August 2010.

The NRC's special inspection report will be available to the public within 45 days after the investigation is finished.

In the meantime, there is no immediate threat to public health or safety, and the two equipment issues have been resolved, both Viktoria Mitlyng of the NRC's Region 3 in Lisle and Neal Miller of Braidwood Station at Braceville, said today.

The first issue is related to a dry pipe design between two (in series) essential service water supply valves on the auxiliary feedwater system at both stations. A part of the original designs at Braidwood and Byron, the valves supply a backup water source to the system.

However, if the auxiliary feedwater system does become unavailable in case of emergency, operators are trained in procedures to cool the plant, Miller said.

The NRC's special inspection team began reviewing the issues at both plants — which are very similar in design — on April 4. The inspections involve concerns that arose at Byron after an auxiliary feedwater pump inspection in February.

"The questions we are asking have to do with going back to the original design, and whether there were operability issues back to then," Mitlyng said of the special inspection team.

She said an evaluation by Exelon Nuclear, owner of both Braidwood and Byron stations, showed the pumps would work as designed.

"We asked the company to provide us with more than calculations saying the pumps were operable — something more specific that would give us confidence they were operable. Exelon did an evaluation, and showed the pumps would not be operable," Mitlyng said.

"Then there was a second issue two weeks ago when the maintenance alarms were checked (at Braidwood,) and a certain number of alarms would not be available ... so this triggered the threshold of an unusual event."

When issues like these occur, the company has to go into their records on previous maintenance work.

Their check showed an identical maintenance issue in 2010, but was not identified at the time.

Operators did identify the problem in February of this year, Mitlyng said.

"We want to find out why they didn't identify the problem in 2010, if it happened other times in the past, and if there were similar issues at Byron. In addition, the NRC will evaluate Exelon's actions to address both the issues, and whether there is possible concern with the way Exelon assessed these equipment issues," Mitlyng said.

"It's something we feel we need to look at and understand better, and review in context of the company's handling of these kinds of issues. The initial information provided to the NRC said the pumps

Nuclear Commission To Inspect Exelon Plant In Byron (ROCKREGS)

Rockford (IL) Register-Star, April 8, 2011

The US Nuclear Regulatory Commission is reviewing the handling of two equipment issues at Exelon Generation Co.'s Byron and Braidwood nuclear power plants, the agency announced Wednesday.

The Byron plant is one of Ogle County's largest employers with about 850 workers. The Braidwood plant is about 20 miles southwest of Joliet.

The NRC is reviewing backup systems that would be used to remove heat from the reactor in case of an accident and the loss of control room equipment alarms during maintenance activities.

Read more on Alex Gary's blog

Nuclear Commission Conducting Special Inspection At Byron Nuclear (RRS)

By Alex Gary

Rockford Register-Star, April 8, 2011

The US Nuclear Regulatory Commission is reviewing the handling of two equipment issues at Exelon Generation Company's Byron and Braidwood nuclear power plants, the agency announced Wednesday.

The Byron plant is one of Ogle County's largest employers with about 850 workers. The Braidwood plant is about 20 miles southwest of Joliet.

The NRC is reviewing backup systems that would be used to remove heat from the reactor in case of an accident and the loss of control room equipment alarms during maintenance activities.

The NRC said both issues have been resolved and did not pose an immediate public threat.

The first issue was discovered in February when inspectors became concerned with the design of the auxiliary feedwater pumps (AFW) at Byron. Exelon's initial evaluation was that the pumps would be able to perform their safety function. Further calculations though showed the pumps would not be operable in an accident or reactor trip at either Byron or Braidwood, since both systems are similar in design.

The second issue was discovered in March when control room equipment alarms became unavailable during maintenance activities. Further review showed the alarms were unavailable during maintenance work in August 2010.

The inspection report will be available to the public 45 days after the inspection is completed. The last time the NRC did a special inspection in Byron was October 2007 to fix a cooling pipe leak.

Nuclear plant safety has been a major topic lately after a tsunami in Japan in March damaged reactors at a Tokyo plant, knocking out the cooling systems, leaving the temperature of the nuclear cores to rise and setting off a worldwide effort to prevent a meltdown.

Inspectors Say Byron Nuclear Power Plant's Back-Up Pumps Are Inoperable (STATELINE)

By Marty Kasper

MyStateline.com, April 8, 2011

The Byron Nuclear Power Plant is being investigated following reports that back-up cooling pumps might not work in the event of a system failure.

Safety is a number one concern at the Byron Nuclear Power Plant, especially after the recent disaster in Japan.

"We have changed a few things as well, gone further and checked our safety systems and our processes to make sure their okay," said communication manager for the Byron station Paul Dempsey.

But when the US Nuclear Regulatory Commission learned that some of the Exelon Company's back-up water pumps would not work as planned, the NRC launched an investigation.

"It became apparent that the system would not be operable," said NRC spokesperson Viktoria Mitlyng.

Mitlyng said safety inspectors found an air pocket inside a pipe that pumps water into the reactor and asked the company to make some changes.

"If that air got pushed into the pump, which is the system that would pump coolant into the reactor, that pump could be damaged," said Mitlyng.

But Dempsey says the Byron facility has operated that way since it was built, and quickly responded to the NRC's request.

"This is the way it was configured from the very start, the NRC took a look at it and said they didn't like the way it was configured, we have since reconfigured that situation and now it is the configuration the NRC wants it in," said Dempsey.

The NRC says the issues never posed any immediate safety concerns for the public, and that their inspection report will be available 45 days after they have completed their analysis.

Nuclear Regulatory Commission Reviewing Two Illinois Plants (MYSTATE)

MyStateline, April 8, 2011

Special inspections are taking place at two Illinois nuclear power plants operated by Exelon Corporation.

The Nuclear Regulatory Commission says issues were found with backup pumps that are used to remove heat from the reactors in case of an accident.

There was a separate problem with alarms in the plants' control rooms.

Engineers at the Braidwood and Byron power plants have corrected the problems and neither caused an immediate threat to public health.

The NRC will review Exelon's issues and actions within the next 45 days.

Backup systems at nuclear power plants have come under scrutiny since the one's at Japan's Fukushima facility failed during the earthquake and tsunami on March 11th.

Nuclear Plant In 'Right Direction' (OMAHA)

By Nancy Gaarder

Omaha World-Herald, April 8, 2011

The nuclear power plant north of Omaha appears to be solving the problems that placed it among the handful nationwide that have required the most oversight, federal regulators said Wednesday.

"Our early insights are that you are heading in the right direction," Troy Pruett, a regional deputy director for the Nuclear Regulatory Commission, told officials with the Omaha Public Power District.

The utility owns the Fort Calhoun Nuclear Station, which is about 20 miles north of Omaha.

Federal regulators gave OPPD somewhat poor marks last year after concluding that the utility's plans to protect against catastrophic, 1-in-1,000-year flooding were vulnerable to failure.

The utility received what was basically a C — if an A indicates that no extra oversight is necessary while an F means that the plant should be shut down.

The difference between a B, C and D centers on how much additional oversight and inspections are required.

Gerond George, reactor inspector for the NRC, said one of the problems was the way Fort Calhoun had planned to stack sandbags atop flood gates.

The floodgates were only one-half inch wide, but the utility was planning to place a 6-foot-high stack of sandbags atop the gates.

Even though the bags would have been stacked against a door, a stack of that nature — a single bag wide — perched in that manner, could have washed away during flooding, George said.

Dave Bannister, chief nuclear officer at Fort Calhoun, told federal regulators that OPPD realizes its flood procedures "were not what they needed to be."

OPPD has remedied that problem by turning to a new method of flood protection, Bannister said.

Bill Pook, regional emergency manager for the counties that encompass the nuclear plant, defended OPPD to the regulators.

Fort Calhoun has been a good partner in the community, he said, and the NRC sensationalized Fort Calhoun's troubles in testimony before a congressional committee.

Pook said the NRC, too, deserves a poor grade for not catching the sandbagging problems at any time during the past 30-plus years and for calling attention to Fort Calhoun's low ranking — even though OPPD had addressed the problems.

Wednesday's meeting drew about nine members of the public. Questions from the public centered on the spent fuel pool, evacuation plans, releases of radioactivity and potential damage from a dam breach upstream on the Missouri River.

Officials said the plant drills for a variety of complex failures and that extra analysis is under way as a result of the nuclear plant crisis in Japan.

Vt. Ready For Legal Action By Yankee (BR)

By Bob Audette

Brattleboro Reformer, April 8, 2011

BRATTLEBORO — If Entergy continues to operate Vermont Yankee nuclear power plant past March 21, 2012, the state will be ready to enforce its laws.

"We are not going to sit on our hands and let Vermont law be ignored," said Vermont Attorney General William Sorrell in a telephone interview with the Reformer.

Sorrell said he and his staff have already met a number of times to prepare for whatever legal action might be necessary if Entergy, which owns and operates the plant, ignores the state's refusal to issue a certificate of public good for continued operation of Yankee.

"We are prepared for any eventuality," he said.

The Nuclear Regulatory Commission recently issued a new 20-year license that allows the plant to continue to operate until 2032.

However, when Entergy bought Yankee in 2002, it agreed it would abide by the Vermont Public Service Board's decision on whether it would issue a certificate of public good, which is required to operate a utility in the state.

In 2006, the Legislature passed Act 160, which gave itself the power to forbid the PSB from issuing the certificate.

In January 2010, the Senate voted 26 to 4 against its issuance. The House of Representatives didn't take up the issue and doesn't appear likely to do so during this legislative session.

Entergy could file in federal court for a declaratory ruling prior to March 2012, or prior to the October refueling of the reactor, contesting Vermont is trying to pre-empt the NRC's decision. Or Entergy could continue to operate Yankee and wait for the state to sue it to shut the plant down.

What Entergy might or might not do is not known.

"We have no comment on possible litigation," said Larry Smith, spokesman for Yankee.

"We've been of the view that Entergy was going to be suing us and we would be defending the law, but it's seeming more likely that they might not be filing a suit against us," said Sorrell.

He added that Entergy's intentions might become clearer when the refueling begins — or doesn't begin — in October.

"Refueling could be taken as another indicator that they are expecting to be here for the long haul," said Sorrell.

Filing suit or defending Act 160 in court could be quite expensive for the state, but Gov. Peter Shumlin said Vermont will take whatever actions are necessary to enforce its laws.

"As governor, my job is to enforce the law," he said, adding the state will find the money necessary to defend its laws in court. "We will always make the resources available to insure that corporations are held to the same standard as our citizens are and obey our laws."

Shumlin, who was Senate President Pro Tem at the time the Senate voted against the plant's continued operation, voted in the majority and has not changed his position since becoming governor.

Shumlin also questioned whether Entergy, a publicly traded company, would actually flout the state's laws.

"They are a very profitable company that does business in lots of other states," he said. "It's hard for me to believe that a publicly traded company can break the laws and still be trusted in other states or by Wall Street. "If Entergy wants to join Bear Stearns, Lehman Brothers and others in breaking laws, they do so at their own peril."

Shumlin said that Entergy not only signed off in 2002 on the memorandum of understanding stating it would abide by the PSB's decision, it also publicly supported Act 160 while it was being discussed.

"They would have to go before a judge and say 'We didn't tell the truth, again, when we agreed to comply with Vermont law.' That's a pretty tough sell to a judge."

Pat Parenteau, professor of law and senior counsel at the Natural Resources Law Clinic at Vermont Law School told the Reformer

the state may not have to sue Entergy to force it to shut Yankee down.

Instead, the PSB might be able to order Vermont Electric Company, which transmits Yankee's electricity to Vermont and the New England grid, to not accept power from the plant.

Because Velco's switchyard is in Vermont, it also requires a certificate of public good to operate and the PSB might have the power to modify the certificate to keep Velco from transmitting Yankee's power.

A spokesman for Velco said he could not comment on what the PSB or Velco might do if Entergy keeps the plant online past March 21, 2012.

A spokeswoman from ISO-New England, which distributes power throughout the region, also could not comment on actions not yet taken.

A spokesman from the Federal Energy Regulatory Commission said it could not determine what power FERC might have in this situation unless it had a filing that it could review.

Shumlin Stresses Jobs, Health Care, And No New Taxes (ADDIND)

By John Flowers

Addison (VT) Independent, April 8, 2011

Gov. Peter Shumlin on Monday praised lawmakers for supporting a 2011 legislative agenda he predicted will lift the state to economy to heights unseen since the tech boom of the 1990s.

"I am really proud of the work that the Legislature has done," Shumlin said at the weekly Legislative Breakfast held at the Middlebury American Legion. "We are united in what the challenge has been."

That challenge, Shumlin said, has included overcoming a projected state budget deficit of more than \$170 million, creating more jobs, crafting a health care reform plan, plotting a new energy course (that he said should not include Vermont Yankee), and extending broadband Internet and cell phone coverage throughout the state within the next two years.

"Vermonters are making around the same amount of money they were 10 years ago," Shumlin said. "We are making progress for the unemployed, but we are not making as quick progress as we would like on raising the incomes of those who have jobs."

Shumlin acknowledged a tough fiscal year 2012 budget process, one that saw him propose some substantial cuts that drew protests from human service providers. The House ultimately restored a portion of the cuts he had recommended.

"I think when we're done, we'll have a budget that meets the needs of Vermonters and balances our appetite for spending with the ability of Vermonters to pay the bill, so we won't be back here next year with a \$150 million deficit, or \$160 million, like we have for four years in a row," Shumlin said.

Looking forward, Shumlin said he sees blue economic skies on the horizon. His optimism is fueled by what he said are new business opportunities that will be made possible by enhanced broadband and cell phone coverage and by an emerging renewable energy industry.

"I am convinced this will be true if we make the right decisions," Shumlin said. "As we move off of the oil-based economy to other ways of powering the world, there is going to be a huge ton of money to be made.

"I think it's going to make the industrial revolution and the tech boom look small."

Shumlin said he believes that oil prices will never again be as low as \$70 per barrel. He said prices will only get higher as developing nations become more affluent and become bigger consumers of a fossil fuel that is getting increasingly scarce.

"The price is going up, and we've got to get off it for financial reasons," Shumlin said. "If we don't, the Saudis are going to own us. We are going to be fighting wars all the time and we can't even keep up with the wars we're fighting now."

The governor said he can envision a time in the near future when Addison County farmland will be used to raise crops for local food and renewable energy.

Shumlin added that enhancing the state's telecommunications system will open the door for a lot of new companies that would suddenly be able to give their employees the quality of life of the Green Mountain State while staying electronically connected to the major business hubs.

"We've got to do it," Shumlin said of extending good broadband and cell phone coverage to the last rural mile.

HEALTH CARE REFORM

Vermont's business climate would also benefit from having a single-payer health care system, according to Shumlin. He noted the state currently spends \$5 billion annually on health care. Nine percent of that figure is related to administration of the system, he said. The governor envisions a time when each Vermonter will be issued a Green Mountain Care policy card that will not only expedite billing and administration, but also instantly link physicians to the patient's health care records.

He said the current health care system is not financially sustainable.

"We've got 20-percent increases, 30-percent increases, on an annual basis, in our health insurance premiums," Shumlin said. "We are paying more and more insurance for less and less coverage."

He said the state can't afford to not implement health care reform.

"We are not doing this health care thing because it's popular; we're not doing it because it's easy," Shumlin said. "We're doing it because we have to."

Shumlin applauded the House for doing a "tremendous job" on H.202, a bill that lays the foundation for a single-payer health care system in Vermont called "Green Mountain Care." H.202, among other things, calls for the creation of a Green Mountain Care Board to help the state contain health care costs. The legislation would also set up a "Vermont Health Benefit Exchange" to begin enrolling individuals and small business for coverage beginning Jan. 1, 2014.

Addison County legislators said at Monday's breakfast that many aspects of Green Mountain Care still need to be sorted out — not the least of which is how it will be financed. They added future Legislatures could decide to pull the plug on the program if it appears untenable.

A single-payer system, Shumlin argued, would relieve businesses from the responsibility of covering workers and therefore give Vermont an advantage over the other 49 states in attracting economic development.

Shumlin predicted that the state's smaller hospitals — like Middlebury's Porter Medical Center — will not last much longer in a current health care system in which providers are reimbursed (by Medicaid and other programs) at around 40 cents for each dollar of service they provide.

"You can't run a business that way," said Shumlin, who added the state needs better training programs in schools to prepare students for job openings.

"If we can be the state training more kids for science, math, technology and engineering, we get the jobs, we get the bright economic future," Shumlin said.

The governor acknowledged his agenda has drawn some criticism from some who argue that Vermont should not proceed unilaterally on health care and other major initiatives, as federal action could force the state to reverse course.

"I say not much is going to happen in Congress," Shumlin said. "We've got the (US) House over there and they want to slash everything ... It's a mess. We've got a time here where in Washington, we can't count on them for much change."

GOVERNOR CHALLENGED

Shumlin's message drew polite applause from the approximately 50 residents and lawmakers at Monday's breakfast. But the governor did not go unchallenged on his priorities — particularly those related to health care and taxes.

Three county residents questioned Shumlin's refusal to consider an increase in broad-based taxes — in particular the state income tax — to generate more revenue to sustain some of the human services programs currently on the chopping block.

Bridport resident George Klohck said he recently learned from his accountant that his household will, for the first time, be receiving a state income tax refund.

"This doesn't seem right to me, given that I am not suffering and that there are people in need in many ways in Vermont that we need to support," Klohck said.

He alluded to a March 22 letter signed by 50 of the state's most prosperous Vermonters urging Shumlin to support bill H.401, which would slightly raise the state income tax rate for the highest two income brackets.

"As you know, H.401 would raise a relatively small amount of money (\$17 million) given our state deficit and the fact that the wealthiest Vermonters (top 5 percent) will receive a \$180 million tax cut this year thanks to extension of the Bush tax cuts," reads the letter, which includes several Addison County signers. "But that money will go a long way in helping vulnerable Vermonters through these hard times."

Shumlin invited the letter writers to “send it to the state; we’d love to have the money.” But he reiterated his opposition to an increase in Vermont’s income tax, which he said was already one of the highest in the nation.

“I think the fact that the Obama administration was unable to return us to the Clinton tax rates is a real tragedy for America, and I hope they will see the light,” Shumlin said. “And I agree with you that wealthier people are getting a better deal from taxes than they ever have in the history of America, and they should pay more.”

Burt Shumlin argued that Vermont already has the most progressive state income taxes in the country, and that an increase in that assessment would result in more affluent people leaving the state — thereby eroding the tax base and discouraging job creation.

“The dumbest thing we could do is raise our already progressive income tax even higher,” said Shumlin, who last year declared a net worth of \$10.67 million.

“There are 162 Vermonters who made \$500,000 or more, more than once, in the last nine years,” Shumlin said. “What we know is that they pay the lion’s share of income taxes to the state of Vermont — roughly 32 percent. We know that when you get roughly 10 percent of your check going to the state of Vermont, people start to say, ‘Wow, I’m sending a lot of change to the state of Vermont.’ And there is a point where you lose more than you gain.”

Shumlin said his job is to keep the 162 top wage earners in Vermont and “grow the base. What if we doubled it in the next two years? We would have all sorts of revenue that we don’t have now.”

NUCLEAR POWER PLANT

The governor was also asked about the future of the Vermont Yankee (VY) nuclear power plant in Vernon. Shumlin reiterated his desire to see the plant closed when its current license expires next year — in spite of the fact that the federal Nuclear Regulatory Commission has issued VY a renewal.

Ultimately, VY’s future might have to be decided in court, even if the Vermont Legislature demands that the facility be closed, according to Shumlin. He said the plant’s owners, Entergy, might argue that the Vermont Legislature doesn’t have the right to decide the facility’s fate; or Entergy might try to continue operation past 2012 with its NRC permit in hand, forcing the state to take court action.

“We’re in for a tough, long battle,” Shumlin said.

My Turn: A Brighter Future Without Vermont Yankee (BURFP)

By Sandra Levine

Burlington (VT) Free Press, April 8, 2011

A cleaner, more prosperous energy future is available without Vermont Yankee. Let’s set aside the boogey men and scare tactics and look at the facts.

Power Supply: The excess supply, regional grid and development of newer, cleaner resources for meeting our electricity needs guarantee that the retirement of Vermont Yankee will have at most a small impact on Vermont’s electricity supply.

- 5,000 MW of extra power capacity was recently offered at auction for delivery in 2013. This is four times Vermont’s needed supply and one-fifth of the overall regional needs in the region.

- 1,500 MW of new supply was offered. This includes New Generation (144 MW), Imports (830 MW) and Demand Resources (515 MW).

- There is enough energy available to replace Vermont Yankee.

Grid Function and Reliability: Studies are ongoing, but preliminary results suggest some limited transmission grid improvements will be needed by 2020 with or without Vermont Yankee.

- The effect of Vermont Yankee’s retirement or continued operation has little impact on the overall reliability of the electrical grid.

- Problems will arise even with Vermont Yankee in operation.

- The effect of Vermont Yankee retirement is like a school moving across town and a new travel lane and traffic light being added to accommodate the change in traffic.

Cost: Claims that power prices will increase without Vermont Yankee are specious. Without a favorable power contract, Vermont would simply pay market prices for any power from Vermont Yankee. It is disingenuous to call Vermont Yankee low cost when it would simply sell power to Vermont at the going market price. It is no cheaper for Vermonters than other available resources.

Legal Validity: The legal validity of closing Vermont Yankee when its current license expires in 2012 is supported by contract obligations, constitutional principles, Public Service Board orders and US Supreme Court precedent — as well as simple fairness.

- Vermont Yankee's owners signed a contract that precludes them from operating the plant past March of 2012 without approval from the Vermont Public Service Board.
- Vermont law requires legislative approval for a state license.
- Federal law governing nuclear power facilities covers matters of radiological health and safety. States maintain their traditional authority to oversee the need for and type of facility to be licensed as well as authority over land use, ratemaking and environmental impacts.
- The previous sale of Vermont Yankee and the storage of waste at the site were allowed based on Vermont's continued oversight and authority. Vermonters and courts don't tolerate corporate double dealing. A late, legal challenge at the end of Vermont Yankee's current license would be stopped.

Officials Conduct Drills At Nuclear Power Plant (WTEN)

WTEN-TV Albany (NY), April 8, 2011

Emergency officials in Vermont conducted drills near the Vermont Yankee Nuclear Power Plant on Thursday.

Authorities have been working at the plant all week and are looking into what to do if there was a leak at the plant.

State officials said they planned the drill months before the disaster in Japan.

"We do a federally evaluated exercise every two years, with every six years doing the ingestion pathway," said Richard Cogliano, of Vermont Emergency Management.

The drill was announced ahead of time so people who live nearby would not panic.

Crews are taking samples of soil, vegetation, milk, and other materials to determine any contamination.

Vt. House Agrees To Skip New Power Bill Charge (BSWK)

BusinessWeek, April 8, 2011

The Vermont House has agreed to pull a new 55-cent charge on electric bills from a bill designed to promote renewable energy.

Gov. Peter Shumlin says he's working on an alternative to the new tax to fund the Clean Energy Development Fund, but he won't say what his plan is.

Shumlin's intervention came just before the House gave the bill final approval, and some lawmakers were angry with the governor for backing away from a plan his administration had supported.

At issue is how to replace money in the fund that had been coming from the Vermont Yankee nuclear plant. The Vernon reactor is scheduled to close next year.

Despite the misgivings, the energy bill passed easily and now heads to the Senate.

Japan Offers Lessons To N.J. (GCT)

By Jeff Tittel, Special to the Times

Gloucester County Times (NJ), April 8, 2011

Once again the Nuclear Regulatory Commission (NRC) shows it cares more about protecting industry interests than the public in a brief the agency filed with the Third Circuit Court of Appeals, which is hearing an appeal of the relicensing of the Oyster Creek power plant.

NRC must stand for 'no regulatory commission.' The agency is a cheerleader for industry and looks the other way it comes to relicensing, especially around issues of public safety.

On March 21, the court had asked the NRC and the plant's owner Exelon to determine what impact the tragedy at Japan's Fukushima Daiichi Nuclear Power Station would have on the relicensing of the Oyster Creek facility, which is the same design as the plant in Japan. The NRC brief favored industry interests saying the situation in Japan should have no bearing on the relicensing of Oyster Creek.

By raising the issue of Japan to the NRC, the judges demonstrate the court has serious questions on safety of the Oyster Creek facility. NRC has not learned anything from the tragedy in Japan and is blind to the safety issues that face nuclear power plants.

The NRC argued that the matter before the court of appeals is limited to aging management issues, not lessons learned from Japan. Environmental groups challenging NRC's relicensing of the facility are concerned because Oyster Creek is an aging plant vulnerable to management issues such as tritium leaks from old piping and corroding drywall liner, but also management issues stemming from an emergency situation or natural disaster. The facility is located in an area prone to hurricanes where moderate earthquakes have occurred.

The NRC brief goes on to say the record on this case is closed and no new facts, such as two reactors in Japan of the same design as Oyster Creek are spewing radioactive waste into the atmosphere or are having issues with above ground spent fuel rod storage containers leaking radioactive waste, should be considered.

The NRC should be saying license renewals across the country should be on hold while we reevaluate the safety of these facilities. This brief shows the NRC will not learn any lessons from Japan, just as they did not learn any lessons from Three Mile Island or Chernobyl.

The situation in Japan continues to worsen. The plant is becoming more like Chernobyl every day. Four of the reactors will become permanently disabled after leaking plutonium into the surrounding soils, aquifer, and into the ocean. Almost 5,000 times the legal limit of radioactive iodine has been recorded in the ocean surrounding the plant in Japan. What would a leak like this do to Barnegat Bay? With these risks, it is not worth keeping Oyster Creek running over the next ten years.

Given what we are learning about Japan, it does not make any sense — and could be outright dangerous — to keep Oyster Creek open. The lesson is that these older plants with above ground waste storage need to be closed, and they need to be closed now.

Gov. Christie must abandon his deal with Oyster Creek's owner Exelon to allow the plant to operate for 10 more years. Instead, New Jersey should be joining environmental groups in a lawsuit opposing the re-licensing of Oyster Creek by the Nuclear Regulatory Commission and demand the plant be shut down as soon as possible. Gov. Cuomo is calling for the closure of the Indian Point Nuclear Plant in New York, and that facility's license does not expire until September 2013.

If Christie really cares about nuclear safety in Barnegat Bay, he should file a motion to oppose the relicensing of Oyster Creek.

Even a moderate earthquake at Oyster Creek could impact the dry well or the spent fuel rod storage system.

The Japanese reactor had a cement dome over the containment vessel and Oyster Creek does not, possibly making it more at risk if a build up of hydrogen occurs. Just as at the Japanese facility, spent fuel is stored above ground.

The Sierra Club is concerned with excavation procedures and routes during an emergency at Oyster Creek. Ocean County's population doubles on a summer weekend.

There is close to 1 million people in a 12-13 mile radius of the power plant. It is hard enough to get home from a day at the beach, let alone when you have to evacuate people during an emergency.

The design of Oyster Creek is the same as the Fukushima Daiichi Unit 1 and 3, a GE Mark I BWR. We know the Fukushima plant was designed to withstand a magnitude 7.2 earthquake. Oyster Creek was designed to withstand a moderate earthquake but given the age of the plant and metal fatigue, it is questionable if it would meet those standards today.

According to the US Geological Survey, Toms River has experienced earthquakes of a magnitude 5.0 or greater in the last 150 years.

The highest intensity earthquake ever observed in New Jersey occurred on June 1, 1927, in the Asbury Park area, less than 35 miles away from Oyster Creek. Three shocks were felt along the coast from Sandy Hook to Toms River. Several chimneys fell, plaster cracked, and articles were thrown from shelves. The felt area extended over approximately 7,800 square kilometers.

All of New Jersey's nuclear power facilities are located in areas prone to damages from hurricanes.

Category five hurricanes have hit the Jersey shore in the past, and we are long overdue for the next one. Such a storm could have very similar impacts on Oyster Creek as a tsunami. The task force must review the impacts of hurricanes on these plants.

Given the NRC record, they would probably relicense the Fukushima Daiichi Nuclear Power Station and Chernobyl, too.

Jeff Tittel is director of the N.J. Sierra Club.

Getting Tuned In To Oyster Creek (PHIBURBS)

PhillyBurbs.com, April 8, 2011

Inside the Vincentown Diner on Route 206 in Southampton, the lunch crowd shuffles in.

Clattering dishes, mouth-watering aromas, and the hum of the customers crowd the place. A radio in the kitchen is playing oldies. Among them are such 1969 hits as "I Can't Get Next to You" by the Temptations and "Bad Moon Rising" by Creedence Clearwater Revival.

Thirty miles away, in neighboring Lacey Township in Ocean County, and only 12 miles from Burlington County, another oldie born that year also is still alive: the Oyster Creek Nuclear Generating Station.

Located in the Forked River neighborhood, it's the oldest operating nuclear plant in the country. In light of the disaster at the Fukushima Dai-ichi nuclear plant in Japan after last month's earthquake and tsunami, and knowing Oyster Creek's nuclear

reactor design and age are virtually identical to that of Fukushima's, some residents are casting a wary eye toward the Jersey shore.

"I usually don't think too much about what can happen if something goes wrong at that (Oyster Creek) plant," said Perry Belnich of Shamong in the diner parking lot before going inside for lunch. "I know the plant is close. But if something bad happens there, it's like we're living next door, you know?"

"I know the tsunami caused the problem in Japan; we're not likely to get one here. But you worry about it because it's so old."

Like those songs on the radio, the Oyster Creek plant is old. Belnich worries that the facility is like an old man still showing spring in his step.

"One minute he looks fine, but the next he's having a heart attack and checking out," he said. "When things get that old, you never know."

Oyster Creek will close in 2019, 10 years earlier than originally scheduled. By agreeing to shutter the facility, plant owner and operator Exelon Corp. won't be required to build cooling towers that would cost an estimated \$800 million.

So for the next eight years, without those cooling towers, the plant will continue using 1.4 billion gallons of water daily from Barnegat Bay to cool its reactor, a process that the New Jersey Department of Environmental Protection reports kills billions of shrimp and tens of thousands of fish, crabs and clams each year. For the state to allow this blatant ruination of the environment is unconscionable.

As Mary Beth Markley of Pemberton Township stood outside a Wawa near the diner, the reality of the Oyster Creek plant's negative effect on nature was, unlike the coffee in her hand, hard to swallow.

"It's not the possibility of a major problem that scares me," Markley said. "It's the stuff like last year, when their radioactive water got into the aquifer that supplies drinking water. How long was that going on before people were alerted? And what about all the sea animals killed every day from their radioactive water?"

"But if something that old does have a big problem, it'll be too late for those of us who live so close."

And so the beat goes on. The nuclear plant in Japan will continue to be repaired. The nuclear plant in the shadow of Burlington County will live eight more years. And the delicious oldies music in the diner will continue to play.

Perhaps in 2019, when the then-50-year-old Oyster Creek plant closes for good, a gathering could be held at the diner. Maybe an oldie will play in its memory. Maybe another hit from 1969:

"Na Na Hey Hey Kiss Him Goodbye."

Phil Gianficaro's column appears weekly.

Western Pa. Nuke Plant Once Had Submerged Cables (AP)

Associated Press, April 8, 2011

A nuclear power plant in western Pennsylvania has been cited in the past for having electrical power cables to safety systems that could be submerged in water, but the company that runs the plant says that 2009 problem has since been corrected.

A FirstEnergy Corp. spokesman tells the Beaver County Times that the Nuclear Regulatory Commission approved the corrections during a recent license renewal process at the Beaver Valley Nuclear Power Station in Shippingport.

An NRC report in December says the plant was one of nine found since 2007 to have cables improperly submerged in water. NRC officials were concerned the cables could fail disabling emergency safety systems in the event of an accident or natural disaster.

FirstEnergy says the company has made changes to keep the cables dry, even though they're suitable for underwater use.

'Unusual Event' Declared At Hanford Nuclear Plant (AP)

A small amount of hydrogen gas trapped in a pipe at a Washington nuclear power plant ignited in a brief, six-inch flame Thursday when workers cut into the pipe, a utility spokesman said.

Associated Press, April 8, 2011

RICHLAND, Wash. —

A small amount of hydrogen gas trapped in a pipe at a Washington nuclear power plant ignited in a brief, six-inch flame Thursday when workers cut into the pipe, a utility spokesman said.

No one was injured and no equipment was damaged in the "puff," which Energy Northwest spokesman Mike Paoli said lasted less than a second. Still, the Columbia Generating Station declared an "unusual event" and temporarily evacuated the immediate area.

Officials notified the Nuclear Regulatory Commission.

The pipe is located in the plant's main turbine building, which is a non-nuclear area, Paoli said.

"There's no association whatsoever with the reactor building or radiation," he said.

An "unusual event" describes a condition at a commercial nuclear power plant or its surroundings that could potentially compromise normal safety levels. It's the least serious of four NRC emergency classifications.

The plant is located on the Hanford nuclear reservation in southcentral Washington.

The Columbia Generating Station began a scheduled refueling outage on Wednesday that will keep the plant off line until mid-June.

The gas ignited during work that is part of the refueling outage.

During normal operations, the pipe is filled with water and some hydrogen, which is used to cool the generator, the spokesman said.

Paoli said the pipe had been closed and purged of gas - "or so they thought" - when a small amount of residual trapped gas escaped when workers cut the pipe.

He said he wasn't sure how many people were evacuated.

After a safety inspection by Columbia officials, "work resumed in the general area after an hour and a half or so," he said.

Energy Northwest is a joint operating agency including 28 public power member utilities. It operates a mix of hydroelectric, solar and wind energy projects as well as the nuclear plant.

RICHLAND: Nuclear Plant Releases Hydrogen Gas 'Puff' (TRICITYH)

Tri-City Herald (WA), April 7, 2011

Richland – Columbia Generating Station in Richland declared an "unusual event" at 4:07 p.m. Thursday after the release of a small amount of residual gas that briefly suspended some plant activity.

During work for the plant's ongoing refueling outage, a small amount of hydrogen gas was released from a pipe and ignited – a less-than-one-second "puff," said a news release.

The work was in the nuclear plant's main turbine building, which is a non-nuclear area of the plant. No one was hurt and no equipment was damaged.

During normal operations, the pipe is filled with water and some hydrogen, which is used to cool the generator, said the release.

Workers were cutting the pipe, which had been closed and purged, when a small amount of residual, trapped gas escaped the pipe. The immediate area was evacuated and an unusual event declared, said the release.

An unusual event is a classification describing a condition at a commercial nuclear power plant or its surroundings that could potentially compromise the normal level of plant safety, or that warrants increased awareness by plant staff.

The Nuclear Regulatory Commission was notified shortly after the incident.

Outage work resumed in the area following a safety inspection by plant officials, said the release.

The plant powered down April 2 leading up to its biennial refueling outage, which started April 6, and is scheduled to be completed by mid-June.

Refueling Outage Begins At Energy Northwest (TRICITYH)

Tri-City Herald (WA), April 8, 2011

The longest refueling outage in the history of the Energy Northwest nuclear power plant began Wednesday.

The Columbia Generating Station near Richland powered down a couple days early on Saturday, but Energy Northwest decided to keep its planned outage schedule starting Wednesday.

The Bonneville Power Administration requested the early stop to operations because high water flows through the federal hydroelectric dam system would allow ample power production.

More than 1,800 workers have been hired to help with the planned 78-day refueling outage. They are in addition to 1,100 permanent employees at the plant.

Crews plan to replace 244 of the 764 fuel assemblies in the reactor core and perform maintenance.

The largest project – accounting for the extended outage – will be the replacement of the condenser, which turns steam from the turbines back into water for reuse. The work will cost \$113 million.

The new condenser will provide up to 12 megawatts of additional power generation, paying for itself over time.

Read more: <http://www.tri-cityherald.com/2011/04/07/1440847/refueling-outage-begins-at-energy.html#ixzz1lvM1lx00>

'Clearwater Power Sail' Seeks Alternatives To Nuclear (WESTJN)

By Greg Clary

Westchester Journal News, April 8, 2011

The Sloop Clearwater took its first sail of the season Wednesday morning, tacking back and forth across the Hudson River near Indian Point, while passengers talked about a future without the nuclear plant.

"We cannot afford the nuclear option," said Jeff Rumpf, executive director of the Hudson River environmental group, Clearwater, whose icon is the 106-foot wooden sloop. "We are finally at a tipping point in the history of nuclear power and must move forward in advancing a renewable energy agenda."

The three-hour sail, which left from Verplanck and never strayed out of view of the plant, was called "Power Sail: A Summit for Solutions," and was largely populated by longtime opponents of Indian Point.

There were two main discussions, run simultaneously, after many of the participants had helped hoist the ship's 3,000-pound mainsail and boom.

One group of a couple dozen people focused on risks to the region, including radiation exposure, earthquake potential, what would happen under evacuation plans, long-term storage of nuclear waste and the possibility of terrorism.

Former Democratic Rep. John Hall summarized their discussion, saying he saw parallels between United States citizens and Japanese people enduring the Fukushima tragedy.

The Japanese "have been quoted saying that they now know the government wasn't telling them the truth along," said Hall, who lost his re-election bid in November. "I'm sorry to say it's no different in this country or anywhere else there are nuclear plants and nuclear accidents."

Another group of equal size talked about changing the way power is generated and used to more sustainable methods that can create jobs and reduce the impact on the environment.

Jeff Jones, who works for a coalition of labor, business and environmental groups known as the Apollo Alliance, said the discussion he led focused on the opportunities for "good green jobs."

"We started by wanting to know what the real story is on just how much electricity really is being produced at any one time," Jones said. "We need to quantify that so we can have an accurate assessment of how we're doing in terms of generating alternative sources of power and the gains we are making in conservation."

(Page 2 of 2)

Marilyn Elie, co-founder of Westchester Citizens Awareness Network, told both discussion groups that Indian Point supplies only 560 megawatts of electricity to the grid, not the 2,147 megawatts that the Nuclear Regulatory Commission says.

She said that is about 5 percent of the electricity used in Westchester County and New York City on a typical day.

Elie's numbers are disputed by Con Edison, the New York Independent System Operator that oversees the grid; James Van Nostrand, executive director of the Pace Energy and Climate Center; and Indian Point.

"Indian Point produces on average 25 percent of the electricity used in NYC and Westchester," spokesman Jerry Nappi said Wednesday via email. "Electrons flow to where they are most needed and in the case of Indian Point, they are needed in NYC and Westchester."

Similar figures are offered by Van Nostrand and Con Ed.

New York Independent System Operator officials said Indian Point produced 12 percent of the state's electricity in 2009. Last year's production numbers are not yet available from the state group.

Clearwater officials said they hope to bring out as many facts on Indian Point as possible at a more technical meeting they're putting together for April 25. The meeting will be held near the plant.

Clearwater Conducts "Power Sail" To Discuss Indian Point (MIDHUD)

Mid-Hudson News, April 8, 2011

Hudson River Sloop Clearwater, the organization, assembled environmentalists, scientists, public officials and students to take to the Hudson River aboard their famed schooner Clearwater and discuss the Indian Point nuclear power plant and alternative forms of energy production.

The sail was full of visual imagery as the boat passed in front of the nuclear plant as song and discussion continued.

Clearwater Executive Director Jeff Rumpf noted the nuclear plant disaster in Japan is what brought the Indian Point safety issue to the surface.

"There is a tragedy unfolding in Japan and we feel and we respect the horrors that are going on over there," he said. "Coming here today is related to that. There are real risks associated with Indian Point. Many of these risks are not even being considered by the NRC."

Speakers including representatives from the Lamont-Doherty-Earth Institute, environmental groups, and former Congressman John Hall.

Among the concerns expressed were the possibility of earthquake and the 10 mile radius evacuation zone around Indian Point.

No Raised Radiation Found In NJ Air, Milk Samples (AP)

Associated Press, April 8, 2011

Samples of milk, air and rainwater in New Jersey show no sign of elevated radiation from the Japan nuclear disaster, the state's top environmental official said Wednesday.

Environmental Protection Commissioner Bob Martin said milk samples taken last week show no signs of elevated radiation. He said preliminary air samples show trace amounts of radioactivity, but at levels far below those considered hazardous to human health. Samples of precipitation show trace amounts of Iodine-131, but not enough to cause concern, he said.

"We're seeing virtually nothing right now - we've tested the water, we've tested the milk, and we're testing rainwater," Martin said. "In rainwater, we're seeing mere traces."

He said he does not expect the situation to worsen.

Martin was among five environment and security experts to testify at a briefing on nuclear power plant safety and emergency preparedness at the Statehouse on Wednesday.

The most densely populated state has four nuclear reactors, including Oyster Creek, the nation's oldest. Two of the reactors, Oyster Creek in Ocean County and Hope Creek in Salem County, are a similar design to two of the damaged Japanese reactors.

[Read All Comments](#)

Martin and Charles McKenna, director of the state Homeland Security office, said it would be nearly impossible for a nuclear accident similar to the one unfolding in Japan to happen in New Jersey. That's because New Jersey doesn't experience earthquakes nearly as powerful as the quake that hit Japan; the state does not experience tsunamis; and its four nuclear power plants are built with sturdier backups than the reactors of similar design in Japan, the officials said.

New Jersey gets about half its electricity from nuclear power.

The biggest threat to New Jersey's nuclear generating plants is hurricanes, the officials said.

Still, the officials said there are lessons to be learned from the Japan disaster.

Gov. Chris Christie has convened a task force to review safety and emergency response plans.

Federal nuclear regulators are considering expanding planning requirements for evacuation from the current 10-mile radius to 25 or even 50 miles in wake of the Japan crisis, McKenna said.

Those proposals are in the preliminary stages, however, and may not be deemed necessary, Martin said.

Assemblyman John McKeon, a South Orange Democrat who chairs the Assembly environmental committee, wondered how it would be possible to evacuate large numbers of summer tourists from Long Beach Island in the event of a nuclear accident.

McKenna said it's often better to advise residents to stay indoors until a radiation cloud passes, so a large-scale evacuation wouldn't be necessary.

New Jersey officials also said it's time to renew cooperation with neighboring states operating nuclear facilities near the New Jersey border. New York's Indian Point nuclear plant is 15 miles from New Jersey and Pennsylvania's Limerick Nuclear Power Plant is 25 miles from the New Jersey state line.

Group Wants To Slow Down Nuclear (WUNC)

By Dave DeWitt

WUNC-Radio, April 8, 2011

Environmental groups are urging the Nuclear Regulatory Commission to reconsider approval of a new design for nuclear power plants in North and South Carolina. The AP-1000 Oversight Group filed a petition with the NRC. The group argues that the AP-1000 reactor design is flawed and should not be used at Shearon-Harris and other sites. John Runkle is the attorney for the group.

John Runkle: What's troublesome to us is the NRC seems poised on approving reactor designs that have not been fully reviewed nor fully resolved. And importantly do not reflect what we know and what we will learn about the Fukushima accident.

The AP-1000 is designed by Westinghouse and uses a different process for cooling and backup power than the reactors in Japan. The NRC is reviewing the new design and may decide on its use by the end of the year.

Tiny Bit Of Radiation From Japan's Nuclear Plant Reaches Kansas; Officials Say Residents' Health Not At Risk / LJWorld.com (LJW)

By Scott Rothschild

Lawrence Journal World, April 8, 2011

State officials said Thursday that "minuscule" levels of radiation from the damaged nuclear power plant in Japan have been detected in Kansas but posed no health threat.

"We understand the concern Kansans may have," said Lt. Gov. Jeff Colyer, who is also a surgeon. "What we are seeing is a minuscule blip on the meter. The consensus remains from international, national and state health experts that this does not pose a health risk to Kansans," said Colyer.

The magnitude-9.0 earthquake and ensuing tsunami that struck Japan on March 11 started a nuclear crisis at the Fukushima Dai-ichi facility. Explosions rocked two reactor buildings resulting in the release of dangerous nuclear radiation.

The Environmental Protection Agency, Nuclear Regulatory Commission, and other federal agencies in the United States have been monitoring the situation.

The Kansas Department of Health and Environment conducts a wide variety of soil, air, water, vegetation and animal life samplings on a weekly and quarterly basis.

KDHE Secretary Robert Moser, who also is a physician, said the elevated levels of radiation in the United States, including Kansas, were expected.

"While these levels are well below any need for public concern, we are working with county health departments in case Kansans have any questions," said Moser. "We will also continue to monitor our state's environment and report future spikes in these levels if they were to occur," he said.

Kansas Agriculture Secretary Dale Rodman said the Kansas food supply is safe and secure.

The Food and Drug Administration and US Department of Agriculture has been working on the situation with the Japanese government to ensure imported food is safe to eat, officials said.

Officials advised Kansans against taking potassium iodide, which can block radioactive iodine. Potassium iodide is only appropriate when one is close to an incident at a nuclear facility, they said.

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Kansas Officials Say Radiation From Damaged Japanese Nuclear Reactors Is 'Minuscule' In State (AP)

Associated Press, April 8, 2011

Kansas officials say environmental testing has detected minimal levels of radiation from Japanese nuclear reactors damaged by last month's earthquake and tsunami.

But they stressed Thursday that the radiation doesn't represent a health hazard.

Lt. Gov. Jeff Colyer, who's a surgeon, said while Kansans may be concerned, tests show only what he called a minuscule blip in readings for radioactive iodine.

The Kansas Department of Health and Environment has been regularly testing soil, air, water, plants and animals. Federal agencies, including the Environmental Protection Agency and the Nuclear Regulatory Commission, also have been monitoring radiation levels.

Kansas Agriculture Secretary Dale Rodman said the state's food supply is safe.

Small Amounts Of Japan Radiation Reaches Kansas (KAKE)

KAKE-TV Wichita (KS), April 8, 2011

Recent state environmental samplings have detected miniscule levels of iodine-131 in Kansas from the Japanese nuclear reactors in Fukushima Dai-ichi. According to the Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC) and other federal agencies, these types of findings are being found all across the country and are far below levels of human health concern, including for infants and children.

Lt. Governor Jeff Colyer, M.D. stressed there is no anticipated health threat to the US or Kansas.

"We understand the concern Kansans may have. What we are seeing is a miniscule blip on the meter. The consensus remains from international, national and state health experts that this does not pose a health risk to Kansans," said Lt. Gov. Colyer. "Along with the EPA, NRC and other federal agencies, we have been monitoring the situation from the beginning and

expected to eventually see some evidence of slightly increased radiation levels in the United States. We will continue to monitor the situation and keep Kansans informed."

The Kansas Department of Health and Environment (KDHE) conducts a wide variety of environmental samplings on a weekly and quarterly basis. They include soil, air, water, vegetation and animal life.

"In Kansas, we remain at no risk for any adverse affects from the current situation," said Dr. Robert Moser, secretary of KDHE. "The miniscule traces of radiation found are equal to what the health and environment regulators in surrounding states are seeing."

According to radiation experts with KDHE and EPA, all of us are exposed to natural radiation on a daily basis. Elevated levels of radioactive material in the US have been expected as a result of the nuclear incident in Japan since radiation is known to travel in the atmosphere.

"While these levels are well below any need for public concern, we are working with county health departments in case Kansans have any questions," said Moser. "We will also continue to monitor our state's environment and report future spikes in these levels if they were to occur."

Kansans are still advised against taking potassium iodide (also called KI) pills in response to the nuclear incident in Japan. Generally, KI is only issued to emergency responders and nuclear power plant workers who must work in close proximity to a radiological release or are likely to receive a higher than normal exposure to radioactive iodine. Consumption of KI can lead to harmful side effects if not taken properly.

KDHE will continue monitoring the environment and will notify the public as pertinent information becomes available.

"The Kansas food supply is safe and secure," said Kansas Secretary of Agriculture Dale Rodman. "We continue to work with our state and federal partners to monitor the safety of our food supply."

Maj. Gen. (KS) Lee Tafari, the adjutant general and director of the Kansas Division of Emergency Management, said that KDEM will continue to monitor the situation and coordinate all information with its partner state agencies.

"Our mission is to ensure the safety of Kansans," said Tafari. "In this situation, the best way for us to do that is provide the public with accurate information. At this time, there is no cause for concern and that is not expected to change. We are diligently monitoring the situation and will provide updates should anything new develop."

The state of Kansas prepares and conducts exercises for disaster response routinely and recently updated its Kansas Response Plan. It details how state agencies respond to emergencies in the state to assist local governments and coordinate with federal agencies, should federal assistance be needed. The document is available for the public at http://kansastag.ks.gov/AdvHTML_doc_upload/2011%20Final%20Plan.pdf

There is one nuclear plant in Kansas, Wolf Creek Nuclear Generating Station near Burlington in Coffey County. A plant in Nebraska, Cooper Nuclear, is within 50 miles of the Kansas-Nebraska border. The state of Kansas works closely with Wolf Creek and Cooper to ensure that all possible precautions are taken to protect the health and safety of the public.

Wolf Creek was designed to withstand the effects of earthquakes, tornadoes and other disasters. The plant was also designed with multiple safety systems to ensure it can be shut down safely. The state conducts several exercises with Wolf Creek and Coffey County each year to test emergency plans regarding the plant under different disaster scenarios.

Any updates to the FAQs will be posted on the www.KsReady.gov Website.

Additional information may be found at the Environmental Protection Agency Website <http://www.epa.gov> and the Food and Drug Administration Website.

NRC Says NFS safe And Secure, But More Work To Do (JOHNSCP)

By Brad Hicks

Johnson City (TN) Press, April 8, 2011

ERWIN — Although officials with the Nuclear Regulatory Commission said there are still areas in need of improvement, the NRC has found operations at Nuclear Fuel Services were conducted in a "safe and secure" manner during 2010.

NFS and NRC officials met Thursday evening at the Unicoi County Courthouse to discuss the findings of the NRC's Licensee Performance Review. This review covered a period from Jan. 7-Dec. 31, 2010, and looked at several items, including safety operations, safeguards and radiological controls at NFS. Anthony Gody with the NRC said the LPRs are compiled using data from public reports and are used to develop items to be addressed by the NRC and its licensees.

"NFS is currently operating in a safe and secure manner," the NRC's Leonard Wert said of the LPR's conclusions. "However, continued improvement is needed in the areas of safety operations and facility support."

Gody said while NFS has demonstrated improvement in the area of safety operations, he said two items mentioned in a confirmatory action letter issued by the NRC to NFS on Jan. 7, 2010, which outlined measures to be implemented by NFS prior

to the restarting of several process lines voluntarily halted in December 2009, have not adequately been addressed and that the area of safety operations as a whole requires continued focus from the NRC and NFS.

As an example of an NRC finding in this area, Gody said NFS had failed to conduct a complete "root cause analysis" on a bowl-cleaning incident that occurred in the fall of 2009. This incident resulted in an unexpected increase in the rate of a chemical reaction and led to some piping damage at NFS. No one was injured in the incident.

"We will not make a decision that this area no longer needs improvement until the licensee demonstrates that they are able to sustain high-quality performance for a period of time," Gody said. "In other words, they have to demonstrate sustainability of their corrective actions."

In the area of Facility Support, which includes the evaluation of the safety culture at NFS, Gody again said the NRC has seen improvements. He said many of the improvements have not had the time to be considered sustainable.

"Until we see results for an extended duration, this area will continue to be an area needing improvement," he said.

Gody said other areas evaluated in the LPR — safeguards, radiological control and special topics — were in need of no improvements.

The NRC plans to take several actions in 2011, including inspection of items that remain open from the CAL, and will follow up on a confirmatory order issued last fall regarding inaccurate information provided to the NRC by a former NFS employee that dealt with fire damper inspections at NFS.

Recently named NFS President Joe Henry said a number of programs and measures have been implemented at the plant to continue safety improvements, and he said NFS officials and staff will continue to work toward further enhancing safety at the facility.

"In my short time at NFS, I am convinced that what we have is good people at NFS doing vital work for the nation with a strong commitment to do it safely and securely," he said.

Though most of the previously halted process lines have received NRC approval to resume operations, the uranium hexafluoride line has not. Henry said there have been a number of modifications to this line and NFS, along with an independent review team, is currently conducting a readiness restart assessment on the line. Once satisfied with the line, Henry said NFS will ask the NRC to conduct its own readiness restart assessment on the line.

Though the NRC stated in a letter to NFS officials that NFS operated safely and protected public health and the environment during the LPR period, some used the public comments portion of Thursday's meeting to question safety improvements made by NFS.

Greene County resident Park Overall said there were nine violations during the LPR period, including issues dealing with fire control, management and personnel.

"I shudder to think about the highly enriched uranium on my property," she said to NRC officials. "... I've been coming to these meetings for four years and everybody's doing better. ... It doesn't help my property and it doesn't help the sick people. When do you really intend to bring this place into compliance?"

Barbara O'Neal said the community has been exposed to hazardous effluence coming from stacks at NFS for more than 50 years.

NFS has contended that the facility operates well within regulatory limits.

Meeting Becomes A Public Evaluation Of NRC Supervision (TRICIT)

By George Jackson

TriCities.com, April 7, 2011

ERWIN, Tenn. — The Nuclear Regulatory Commission held a public meeting on Thursday night to review safety inspections at Nuclear Fuel Services.

The Erwin plant shut down in October of 2009 to address safety concerns. Several processing lines reopened last summer and the plant is under new management.

The NRC said NFS improved performance in 2010 but needs to address operational and safety concerns. They also criticized NFS management.

Retired Rear Admiral Joseph Henry was appointed president by the NFS Board of Directors in January. He said NFS now has a 200-man security team and more on-floor supervision.

"One system process we have not started back up yet is the uranium hexafluoride processing line," Henry said. "Once we're satisfied that we are on the right path, we'll ask the NRC to come in, inspect us, and give approval to start that line back up."

Speakers from Erwin and other cities in East Tennessee were not impressed with Henry or the NRC. They think the 2009 shutdown was a slap on the wrist.

Nuclear Regulatory Commission Hosting Public Meeting Tonight (WCYB)

WCYB-TV Bristol, VA, April 7, 2011

Nuclear Regulatory Commission representatives will be in Erwin tonight to talk about performance and safety of Nuclear Fuel Services.

They're hosting a public meeting at 6:30 p.m. On the second floor of the Unicoi County Courthouse.

The NRC assessed NFS all of last year for a licensee performance review.

They'll be on hand to present that information and to answer any questions you have.

TVA Board To Discuss Nuclear Safety At Meeting In Chattanooga On Thursday (CHATNOOG)

The Chattanooga (TN), April 7, 2011

The TVA board will discuss the topic of nuclear safety at a meeting in Chattanooga next Thursday.

Items on the agenda include a nuclear safety review and a report of the nuclear oversight committee.

The panel will also discuss the future of the Bellefonte Nuclear Plant, which has long been moth-balled.

The meeting begins at 8:30 a.m. at TVA's Chattanooga Office Complex, 1101 Market St.

Members of the public wanting to address the board must pre-register at TVA's website online or sign in prior to the start of the meeting.

The agenda includes:

Chairman's Report

A. Welcome

B. Nuclear Safety Review

Old Business

Approval of minutes of Feb. 18, 2011, board meeting

New Business

1. President's Report

2. Selection of Chairman

3. Integrated Resource Plan

4. TVA Environmental Future and Implementing Agreements

5. Report of the Nuclear Oversight Committee

6. Report of the Audit, Risk, and Regulation Committee

A. Board's Role as Regulator

7. Report of the Customer and External Relations Committee

8. Report of the People and Performance Committee

9. Report of the Finance, Rates, and Portfolio Committee

A. Valley Investment Initiative - Eligibility Pilot Program

B. Power Contracts

C. Transformer Contracts

D. Bellefonte Nuclear Plant - Extension of Decision and Budget

E. Coal Combustion Product Process Conversions

TVA Delays Decision On Bellefonte Due To Japan (AP)

Associated Press, April 8, 2011

SCOTTSBORO, Ala. (AP) – The Tennessee Valley Authority has delayed giving the go-ahead on a reactor at its Bellefonte Nuclear Plant in northeast Alabama, due to the emergency situation at a plant in Japan.

TVA President and CEO Tom Kilgore told The Daily Sentinel in Scottsboro that the utility's board will not be asked at its April 14 meeting to approve completing the reactor.

Kilgore said Wednesday the "good news is we're not stopping" on Bellefonte.

The indefinite delay will not affect about 500 workers who are at the site doing engineering work.

Kilgore said the tentative startup date for the facility is still in the 2018-2019 timeframe.

Kilgore said TVA will learn from Japan's ongoing situation with leaking reactors since an earthquake and tsunami.

TVA Studying Use Of Mixed-oxide Nuclear Fuel (REU)

By Eileen O'Grady

Reuters, April 8, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

Unit 2 In Louisa County Scrams Have Reactor In Regulatory Response Category (CENTVA)

By Irene Luck

Central Virginian, April 8, 2011

The North Anna Nuclear Power Station received an overall positive assessment from the Nuclear Regulatory Commission for 2010 with Unit 2 receiving a "white" indicator in one area.

During the past year, Unit 2 experienced four unplanned "scrams" or unanticipated shutdowns of the reactor, a higher than acceptable level, according to James Reece, NRC Senior Resident Inspector at North Anna. Two of the automatic shutdowns were the result of lightning strikes, however, the power plant is designed to be able to continue operating despite those incidents and the failure to maintain operations was an unpredicted event. The other two shutdowns were the results of non-nuclear system failures during what was anticipated to be routine testing of the equipment, Reece summarized.

"These individual incidents were investigated by plant staff as well as the NRC and have been corrected," Reece said. "Both units are now operating in the licensee response matrix [lowest regulatory action] as of January."

Of the 104 reactors nationwide, nine fell into the "regulatory response" category based on unexplained occurrences. Of those, only two remained in the category as of the annual briefing Monday, Apr. 4, including North Anna's Unit 2. It was the only Dominion-owned operating unit to fall into that classification.

While the focus of the meeting was the annual NRC assessment of the power station, the approximately 25 citizens in attendance had many questions related to nuclear energy in general given the situation in Japan. Several representatives of the NRC were in attendance at the meeting in anticipation of the concerns and questions and provided as many answers in as much depth as they were able.

"In response to what has happened in Japan, we will be re-evaluating each of our power stations this year to make sure they all meet the commitments we have..."

To read the entire story, see this week's The Central Virginian now available on newsstands.

Surry County Residents Assured Of Safety Of Nuclear Plant (NWPRTNWZ)

Newport News (VA) Daily Press, April 8, 2011

SURRY —

Safety was the hot topic during a public meeting Wednesday in Surry about nuclear safety.

Residents who live near the Surry Power Station expressed concerns about safety at the public meeting.

Officials from the US Nuclear Regulatory Commission tried to dispel safety concerns residents had due to the recent earthquake, tsunami and nuclear disaster in northeast Japan.

"It was a perfect storm" of events, said Roger Hannah with the commission. "Lessons can be learned from Japan."

"All nuclear plants (built in the US) are designed to withstand natural phenomena," he said.

Many of the near 20 people who attended asked about safety and evacuation route concerns.

"Nuclear is not perfect ... but in relative terms, most people here are fairly comfortable with the nuclear plant here," said resident Betsy Shepard.

According to Dominion's website, the Surry Power Station, which was the company's first nuclear station, generates 1,598 megawatts of electric power from its two nuclear reactors — enough electricity to power 400,000 homes.

Unit 1 began commercial operation in December 1972 and Unit 2 began operating in May 1973.

Both reactors have a potential life expectancy of 60 years. The plant recently had its license extended through 2012.

A recently completed inspection by the NRC found that both units "operated in a manner that preserved public health and safety and met all cornerstone objectives," said Gerald McCoy with the commission in a recent letter to plant officials.

NOTE: Comments area is for meaningful discussion. Readers are reminded to post comments that are germane to the article and write in a common language that steers clear of personal attacks and/or vulgarities. Readers may report comments by clicking report abuse. Once a comment has been flagged, a Daily Press staffer will investigate.

Patrick, Murray, DeLeo Want To Delay Pilgrim Re-Licensing (WBUR)

By Fred Thys

WBUR-FM Boston, April 8, 2011

BOSTON — Gov. Deval Patrick, Senate President Therese Murray and House Speaker Robert DeLeo are asking the US Nuclear Regulatory Commission to delay re-licensing of the Pilgrim Nuclear Power Plant in Plymouth. The three say they want to wait until “we can all be sure that we have learned what we need to from the experience in Japan.”

Officials from Entergy, the company that runs Pilgrim, defended the safety of their plant at a hearing at the State House Wednesday.

The Pilgrim plant is in Murray’s district. She pointed out that it sits atop a bluff.

This is the first time since the tsunami in Japan that officials from Entergy have come out in public to defend the Pilgrim plant.

“But will it sustain, can it sustain a storm surge?” Murray asked. “It has in the past. Can it happen in the future as it ages?”

Murray said five years ago, the town’s Nuclear Matters Committee asked where the wind would go if there is a release of radiation.

“They said: ‘We check with the Weather Channel,’ ” Murray said. “That doesn’t make me feel very good. I would like to see some ongoing monitoring in the direction of the wind. Prevailing winds change. If there is a release, is it going to Duxbury, or is going to go up towards the Boston area? Or is it going to go down to the Cape? We should know things like that. The biggest issue: the on-site storage of spent fuels.”

Questions about a storm surge and where the wind might blow if there is ever a release of radioactivity from the plant went unanswered. But officials from Entergy did point out many ways in which they say an accident like the one in Japan couldn’t happen here.

This is the first time since the tsunami in Japan that officials from Entergy have come out in public to defend the Pilgrim plant. They listed the differences: In Japan, the cooling systems stopped working when the power went out. Bob Smith, Entergy’s vice president in charge of Pilgrim, said that could not happen in Plymouth because there is a backup system to the backup systems.

“We’ve installed a third diesel generator,” Smith said, “separate and remote from the existing emergency diesel generators.”

At the Fukushima plant in Japan, the fuel tanks for the backup diesel generators were destroyed by the tsunami. Smith said that couldn’t happen at Pilgrim.

“Our fuel tanks are secured and below ground,” Smith said.

Smith said Pilgrim’s outer containment vessel couldn’t blow up the way it did at Fukushima. At Pilgrim, any radioactive steam that built up would be released right through the smokestack and into the atmosphere.

“We installed hardened systems at our facility to allow bypassing of the secondary containment and go right to the stack,” Smith said.

Smith did answer that biggest question asked by Murray, the one about storage of spent fuels at Plymouth. Entergy is building dry storage for the spent fuel at the site so that starting in 2014, they can begin taking fuel rods out of the pools they are in now.

The plant’s current license expires in 2012. Company officials say they’ve spent the last five years working on renewing the license. It’s not clear if a letter from the state’s three top elected officials asking for a delay will make any difference.

State Officials Caught Off Guard By Pilgrim’s Storage Plans (QPL)

By Nancy Reardon Stewart

Quincy (MA) Patriot Ledger, April 8, 2011

State officials pushing for safer nuclear-waste storage at the Pilgrim plant got surprise news from corporate executives in charge of the facility.

Two weeks after state officials began pressing for changes and writing to federal officials to ask that they step in, Entergy Corp. executives revealed that they already plan to start transferring waste to dry storage by 2014.

The news caught lawmakers off guard during a nearly five-hour oversight hearing on the safety of nuclear plants in and near Massachusetts. Plant officials spoke last, after members of watchdog groups, nuclear experts and state officials working in health, public safety and environmental issues.

Entergy officials delivered their news after several people testified that a dry-storage system should be made a priority.

“They’ve never said anything about it,” said Dave Falcone, spokesman for Senate President Therese Murray, whose district includes the Pilgrim plant.

Murray, who was not present when Entergy officials spoke, briefly attended the hearing earlier to speak about the urgency of requiring dry-cask storage at the plant, which has stored its spent fuel assemblies in pools of water since it opened in 1972.

This "wet" storage system has come under scrutiny for the problems it has caused Japanese officials trying to bring the Fukushima Dai-ichi plant under control in the aftermath of the March 11 earthquake and tsunami in Japan.

Asked if Murray had any idea that a plan for dry storage was already in place, Falcone, her spokesman, said, "If they have a plan, we'd like to hear about it."

Murray and Attorney General Martha Coakley have been vocal in recent weeks on the need for dry-cask storage at Pilgrim; they say it is much safer for the public and the environment than wet storage. They wrote to federal officials and the chairman of the Nuclear Regulatory Commission last week, strongly urging them to make dry storage a condition for the plant to be licensed for another 20 years. Its current operating license expires next year.

State Sen. Marc Pacheco, D-Taunton, chaired the oversight hearing. Afterward, he said Entergy's dry-storage plan "was news to me, ...and I don't think anyone else on the panel was aware of it."

The oversight panel included four legislative committees dealing with energy, the environment, health and public safety.

What wasn't clear Wednesday night is whether Entergy's plans for dry storage meet the safety requirements of the system Coakley, Murray and others have been calling for.

Coakley spokesman Corey Welford could not answer that question when reached Wednesday after the hearing, which lasted until nearly 7 p.m.

Michael Balduzzi, Entergy CEO for the company's Northeast region, said Entergy is investing \$65 million in the project to cover the capital costs and unload the first fuel rods.

Asked why the company is doing it now, he said it had no choice. It is running out of room in the current "wet" storage pools, he said.

"We're not going to have any more room in that pool, and we want to operate our plant for 20 more years," Balduzzi said.

The Vermont Yankee plant in Vernon, Vt., just over the Massachusetts border, is also owned by Entergy. It began moving its spent fuel rods into dry-cask storage in 2008.

Officials including Murray, Gov. Deval Patrick and House Speaker Robert DeLeo are still pushing for more information. While they have no authority over the power plant, which is under the jurisdiction of the federal Nuclear Regulatory Commission, they want safety concerns addressed before a 20-year license extension is granted to Pilgrim.

State Rep. James Cantwell, D-Marshfield, who attended the hearing, said the issue is important to him because the plant is 10 miles from his district.

Despite Wednesday's news, the state should push for a written agreement with Entergy about its long-term plans for dry storage as a condition of its re-licensing, Cantwell said.

Events Don't Sway Gibson On Nuclear Power (POSTSTAR)

Column

By Will Doolittle

Post Star (Glens Fall, NY), April 8, 2011

Events in Japan of the last month would seem to cry out for a reassessment by Congressman Chris Gibson of his cheerleading for nuclear power.

But he has not wavered, despite nature's unfortunate timing.

He has shown the fortitude of consistency in the face of changing circumstances, standing his ground despite the recent tsunami of bad news.

Who could have predicted that, right after he launched a push to put a nuclear plant in his own district, one of the world's worst nuclear emergencies would begin?

Chris Gibson still stands tall for the possibilities of nuclear energy, never mind nay-saying earthquakes trying to knock him down.

While headlines around the world cry of the dangers of radiation poisoning the air and water in Japan, he has insisted on the necessity of alternative energy production, starting with nuclear.

Did you know the March 11 earthquake in Japan was about 1,000 times more powerful than the one that hit Kobe, Japan, in 1995 and ripped gaps in roads, brought down buildings and killed 6,000 people?

No one thought a quake as massive as the one on March 11 - the fourth-largest earthquake ever recorded - would occur where it did.

Two months ago, it would have been absurd to suggest the worst earthquake ever to hit Japan would strike offshore and send a tsunami at the Fukushima nuclear power plant that would sweep over its seawalls, incapacitate it and cripple its emergency systems.

Now, you might worry that, if a nuclear plant is built on the Hudson, spring rains could fall for a month straight and the river swell to 30 feet over flood stage and inundate the reactors.

But that would be absurd.

Chris Gibson doesn't deal in absurdities, nor allow crazy realities to obscure practical considerations.

He sticks to likelihoods, even when reality goes its own way by staging one-in-a-million events.

At Fukushima, the backup to the backup systems failed.

Perhaps our plant would have backups to the backups backing up the backups.

Chris Gibson believes we will be able to think of the eventualities that could blow up the plant, and plan for them. If you can't plan for them, they aren't worth thinking about - that's what Chris Gibson thinks.

Let others melt down in the face of bad timing and bad luck. Chris Gibson soldiers on.

Will Doolittle is projects editor of The Post-Star. He may be reached at will@poststar.com and followed on Twitter at @trafficstatic.

Radiation Protection Tablets Distributed In Del. (AP)

Associated Press, April 8, 2011

MIDDLETOWN, Del. - April 7, 2011-- Emergency management officials in Delaware say about 1,500 doses of potassium iodide have been distributed to residents who live within 10 miles of the Salem/Hope Creek nuclear power plant in New Jersey.

The pills were distributed Wednesday at the volunteer fire department in Middletown. They can protect the thyroid gland from radioactive iodine, which a plant may release in an emergency.

The tablets are distributed annually in the fall. But officials set up a second distribution after the earthquake and tsunami in Japan, which damaged one of Japan's nuclear power plants and resulted in radiation leaks.

More than 39,000 people in Delaware live or work within 10 miles of the plant.

The tablets are good for five to seven years.

Delawareans Stockpile Radiation Pills (NEWSJO)

By Jeff Montgomery

News Journal (Wilmington, DE), April 7, 2011

MIDDLETOWN — Townsend-area newcomer Cheryl Falkowski was one of the first in line here Wednesday for the latest distribution of pills used to stock radiation emergency kits in homes and businesses near the Salem-Hope Creek nuclear complex.

"I went early to make sure that I didn't miss it," said Falkowski, who moved to the area from Bucks County, Pa., in January. "When we moved in, I knew that we were supposed to get potassium iodide, but I had no idea what else I was supposed to do."

Continuing news about the unfolding nuclear crisis in northern Japan added to the concern, Falkowski said after picking up enough potassium iodide tablets for her husband and three children. She got them at an event sponsored by the Delaware Emergency Management Agency and Division of Public Health.

At least four of six reactors at Japan's Fukushima complex were badly damaged and released large amounts of radiation to the air, soil and water after they were slammed by a monster earthquake and tsunami last month. Radiation from the still uncontrolled plant disaster recently was measured in nearby seawater at 1 million times the accepted limit, while air samples as far away as Tennessee detected evidence of the release.

Agency spokeswoman Roseann Pack said state officials scheduled Wednesday's distribution partly as a result of elevated public interest in the issue and after noting a significant population inside Salem-Hope Creek's 10-mile evacuation planning zone.

The 2010 Census counted about 41,000 Delaware residents inside the 10-mile circle, twice the number recorded 10 years ago, Pack said. Some of those new residents may not yet have secured a supply of pills that can block the body's uptake of radioactive iodine, a common radiation hazard in the event of a reactor leak.

Others, she added, could benefit from public education and readiness materials available at the pill distribution, inside Middletown's Volunteer Hose Company station.

More than 700 people turned out, and more than 1,500 adult and child doses were handed out, the state said.

(Page 2 of 2)

Tara Dalik, who lives near Odessa, picked up tablets to replace a mail-order supply she received five years ago after moving to Delaware.

"We can see the power plant from our backyard," Dalik said as daughters Molly, 10, and Erin, 6, stood nearby. "They call it 'the cloud machine' because of the steam that comes out of the tower.

"We try to stay on top of it – I keep pills in each car just in case, in the glove box, and some at home. We moved in from out of state, and we read about it, but it didn't deter us from coming here."

DEMA held its daylong public information effort as debate continued around the country over the safety of nuclear power and the wisdom of adding new generations of reactors.

In a report released Wednesday, the Union of Concerned Scientists cited Nuclear Regulatory Commission documents that they believe show NRC analysts' concern about the reliability of a study of reactor accident consequences. During that study, some NRC analysts questioned the ability of some American reactors to avert severe damage under scenarios that involve problems seen in Japan.

The NRC study has focused in part on the Peach Bottom reactors in York County, Pa., a plant with a 50-mile planning zone that takes in 561,000 Delaware residents. Two reactors there, owned by Exelon, are boiling-water reactors similar to designs used in Japan.

Senior reactor analysts familiar with the battery backup and recovery systems at Peach Bottom, the UCS said, "apparently do not have faith in the effectiveness of the very ... measures that the NRC and nuclear industry officials are touting as a reason why the United States is better prepared to deal with a Fukushima-like event than Japan."

The Nuclear Energy Institute disputed the UCS claims, and said NRC officials already have said the unfinished report shows that reactor accidents are likely to be smaller and less sudden than previously forecast, releasing radiation more slowly.

In Middletown, William and Dolores Fachet were philosophical after picking up their tablets. The Fachets, who moved to Stonefield south of Odessa from Chicago eight years ago, said consistently bad weather prevented them from spotting Salem-Hope Creek on the horizon until they were driving home from settling on their new home.

"It's a little more real now. We've always been conscious of it since then, but now it seems like we need to do our part and prepare ourselves, at least," William Fachet said. "It's there, and now we have these [pills]. When we were coming out, Dolores said, 'It protects your thyroid, so at least that's one part of your body that's taken care of.'"

"The rest you can kiss goodbye," Dolores Fachet added.

The Santa Barbara Independent Political Fallout Hits Diablo Canyon (INDEPEND)

By Nick Welsh

[Santa Barbara \(CA\) Independent](#), April 8, 2011

Trace amounts of radioactive iodine, presumably fallout from the ongoing nuclear nightmare at Japan's Fukushima plants, have been found in milk produced by dairy cows owned by Cal Poly in San Luis Obispo, but in quantities 5,000 times less than federal safety standards. State officials have tested the milk for years based on the herd's proximity to the Diablo Canyon nuclear plant just outside Avila Beach, and, until the Fukushima catastrophe, no radioactive readings had registered. In the meantime, officials with PG&E, which owns the Diablo Canyon plant, announced that Reactor Number Two had been placed back in service after being shut down for a week because of electrical problems afflicting a feed water pump that serves a nonnuclear portion of the plant and which ultimately delivers water to the plant's steam generators.

Ongoing struggles to contain radioactivity spilling from the Japanese nuclear plants has reignited concern about the seismic vulnerability of Diablo Canyon, built just off the coast from two earthquake faults. Last week, Congresswoman Lois Capps spoke on the phone with Nuclear Regulatory Commission (NRC) chair Greg Jaczko, urging him to suspend Diablo Canyon's relicensing application pending the results from a high-energy 3-d seismic study on the new fault discovered in 2008, located 300-600 yards off the coast from Diablo Canyon. Capps has been joined in this demand by the San Luis Obispo County Board of Supervisors and State Senator Sam Blakeslee, a Republican who represents the district. Opposing her on this score is Congresswoman Kevin McCarthy, a politically influential Republican who represents portions of San Luis Obispo County, and State Assemblymember Katcho Achadjian, a former member of the SLO Board of Supervisors.

To date, PG&E and the NRC have declined to put off relicensing efforts in deference to new seismic studies. Both groups have insisted that new seismic information is the subject of constant reevaluation, and falls outside the purview of the relicensing process. Although Diablo Canyon's twin reactors don't expire for another 13 years, PG&E officials insist they need to launch the relicensing process so that California energy regulators plan for the state's future energy needs with reliable information. The seismic studies would take three years to complete. A Capps spokesperson questioned PG&E's motivations, noting that owners

of the San Onofre Nuclear Power Plant have yet to take steps to relicense its generators, even though its licenses expire sooner than Diablo Canyon's. Likewise, San Onofre has already pledged to launch new seismic studies.

Officials May Seek Diablo License Delay (SLOT)

By David Sneed

San Luis Obispo (CA) Tribune, April 8, 2011

As promised, county supervisors Tuesday will vote whether to send a letter to PG&E asking it to suspend the relicensing of Diablo Canyon nuclear power plant until seismic studies have been completed and verified.

The letter was put on the agenda by Supervisor Adam Hill, whose district includes the power plant. Approval of the letter is considered all but certain given that a majority of the board has already expressed support for it.

Addressed to PG&E President Chris Johns, the letter says that staying license renewal would be a good way for the utility to restore the trust of the community. The letter cites an interview Johns gave The Tribune shortly after the earthquake and nuclear disaster in Japan in which he admitted that the company needs to "earn its customers' trust."

"We can think of no better way to do so in our county than to agree to our request," summarizes the letter. "In doing so, PG&E would help to allay many concerns, rebuild customer confidence and show that indeed safety is of the utmost importance."

PG&E and the federal Nuclear Regulatory Commission have insisted that license renewal and the seismic studies can proceed concurrently. If approved, license renewal would extend the operating lives of the plant's two reactors to 2044 and 2045.

PG&E will hold an open house from 4 to 7 p.m., Wednesday at the South County Regional Center in Arroyo Grande to answer the public's questions about seismic safety and other issues at Diablo Canyon.

California Earthquakes, Tsunamis Vary: California Earthquakes, Tsunamis Vary North And South (HARTC)

Column

By Robert M. Thorson

Hartford (CT) Courant, April 8, 2011

Has the recent disaster in Japan made you jittery about large earthquakes and tsunamis? Are your family and friends waiting for the next "Big One" somewhere along the US Pacific Coast?

If you're concerned about earthquake magnitude and tsunami potential, then I suggest you focus your thoughts northward, away from central and southern California to the coasts of Washington, Oregon and northern California. In this region, coastal salt marshes contain compelling geological evidence of seven large tsunami-generating, mega-thrust earthquakes within the past 3,500 years — or one every 400 to 600 years.

The last one struck in 1700, and was so strong it was recorded in Japan. This was more than a century before the American discovery expedition of Lewis & Clark, which is why so few people are aware that megaquakes are a very real concern in this region. The next one is due at any moment.

If, however, your concern for the Big One involves the potential for death and destruction, then I suggest you keep your thoughts in central and southern California, where the earthquakes are smaller, but where the threat is higher. Here, the problem is mostly about human population and infrastructure investment, both of which are roughly an order of magnitude higher than in the north. Additionally, large cities are built in basins directly above faults rather than at distant removes, and a pair of nuclear reactors — Diablo Canyon and San Onofre — bracket Los Angeles.

Within the past few weeks, dozens of people have asked me about the Fukushima disaster in Japan and its implication for the United States. Few people appear to understand the pronounced contrast in tectonic style between the northern and southern parts of the US Pacific Coast. Confusion between these two regions — especially with respect to Japan — is generating undue anxiety.

To the north, the oceanic plate is being stuffed eastward beneath the edge of the North American continental plate. This is a fairly regular and predictable process in which the offshore boundary becomes locked by friction and the plates flex while strain accumulates, until finally the bond breaks. This allows the oceanic plate to lurch downward, only to be locked once again.

Because the slip takes place over such a large area, the magnitudes are consistently very high and the vibrations are strong and long-lasting. Because fault slip takes place beneath the sea, a large tsunami is generated. Because the plate slides downward, it melts to produce the volcanic arc of the Cascades, the namesake for what geologists call this region, Cascadia.

To the south, in central and southern California, the oceanic plate slides sideways and northward with respect to North America along a great shear zone more than a hundred miles wide. Within it are slivers and blocks of continental crust that are

being squeezed, rotated, folded and up-thrust in a complex array. Between each sliver and block is an onshore fault rising to or near the land surface.

Here, the main hazard is not a mega-magnitude, but the proximity of tens of millions of people to shallow faults capable of producing earthquakes between magnitudes 6 and 8. The tsunami threat is minimal.

In Cascadia and northern Japan, coherent crustal slabs slide against one another. There, the main unknowns involve the location and size of tearing events on a local rupture. In California, however, tearing events occur on different faults, all of which interact in complex ways. Though there has been tremendous progress in earthquake preparedness and forecasting in California, the chaotic properties of this system make short-term prediction an impossible dream.

What is your seismic psychology? Would you prefer to live with astonishing displays of power at infrequent intervals? Or would you rather take your chances with more frequent events of lower strength? But, then again, perhaps you are like me, preferring to stay out of trouble here in the land of steady tectonic habits. The geographic choice is yours.

Robert M. Thorson is a professor of geology at the University of Connecticut's College of Liberal Arts and Sciences and a member of The Courant's Place Board of Contributors. His column appears every other Thursday. He can be reached at proffthorson@yahoo.com.

Diablo Canyon For Dummies (SLATE)

Slate's online video magazine

Slate V, April 8, 2011

Wondering why the California nuclear power plant was built near two fault lines. The Diablo Canyon nuclear power plant in California was built near two fault lines. Illustrator Steve Brodner wonders just what were they thinking in this episode of "Smashing Crayons."

Japan Disaster Complicates Moves To Clean Energy (AP)

Associated Press, April 8, 2011

BANGKOK (AP) — Worldwide calls to curb nuclear power amid Japan's plant crisis could be bad news for the fight against global warming — unless nations finally go all-out to tap wind, solar and other clean, renewable energy, climate change negotiators and activists say.

If countries scrap nuclear plants, which emit no greenhouse gases blamed for global warming, they may turn to the fossil fuels that experts call the main culprit behind climate change. Environmental activists say the tragedy could provide an opportunity to strike a decisive blow against both.

"It's a false choice to give the public an alternative between a climate change disaster or a nuclear disaster. We need renewable energy," said Tove Maria Ryding of the environmental group Greenpeace. "Now, we can either have a kick back or a leap forward."

Christiana Figueres, the U.N.'s top climate change official, said that all countries are reviewing nuclear policies in the wake of Japan's crisis.

"It remains to be seen what they decide," she said at a 173-nation conference running through Friday in Bangkok. The gathering aims to build on a climate summit held last December in Cancun, Mexico.

Figueres and others are concerned that pledges made by governments to reduce greenhouse gas emissions so far equal only 60 percent of what scientists say is required by 2020 to keep temperatures from rising more than 2 degrees Celsius (3.8 F) above preindustrial levels.

A swing back to fossil fuels presumably would worsen the effects of climate change, which many scientists say causes a melting of polar ice caps and glaciers, a rise in sea levels and extreme weather.

Before a tsunami ravaged Japan's Fukushima Dai-ichi nuclear complex last month, the Paris-based International Energy Agency had estimated that nuclear plants would add 360 gigawatts of generating capacity to the global inventory by 2035.

After the accident, that projection has been cut in half, agency chief economist Fatih Birol said, citing the pressure to halt new nuclear plants and phase out older ones sooner than planned.

The gap is likely to be filled equally by renewable energy, coal and gas. The result will mean an additional 5 percent — or 500 million tons — of carbon dioxide emitted globally by 2035, Birol said in an interview.

"The doors are fast closing on the 2-degree target, and with a decrease in nuclear energy it makes it even more difficult," Birol said. "It's all bad news — cost of energy will increase, energy security and diversification decrease and carbon emission will go up."

Experts wonder whether countries really will slash nuclear power as much as their initial reactions to the Fukushima tragedy suggest, and if so, whether they will speed toward renewables or simply burn more coal.

Ryding said she is concerned that several governments, already backtracking on earlier pledges to reduce emissions, may use Fukushima as an argument to do even less.

Birol of the IEA, which advises governments on energy policy, says some world leaders may have been "too abrupt" in moving away from nuclear energy in wake of the Japanese disaster.

"When we have all the input from Fukushima, I am sure that policy makers will take another look, especially given the big economic stakes," he says.

The scene is hardly uniform around the globe, where there are currently 507 nuclear power plants in operation or under construction and where oil, coal and gas still provide the bulk of energy in most countries.

In Japan, climate negotiators expect a greater, short-term reliance on fossil fuels to fill the nuclear power gap and are concerned the country could reduce its pledge to cut emissions by 2020 — from 25 percent down to 20 percent.

But Prime Minister Naoto Kan said alternative new energy would become "a major pillar" after the Fukushima accident.

"Taking this as a lesson, we will lead the world in clean energy such as solar and biomass, as we take a step toward resurrection," he told lawmakers last week.

China, the world's no. 1 emitter of greenhouse gases, has ambitious plans to move away from coal plants that provide 70 percent of its energy and go toward clean alternatives. It may also scale back its nuclear program in light of the Japan emergency, Chinese climate envoy Xie Zhenhua said.

"I believe this accident will have some impact on the development of nuclear power not only in China, but also the rest of the world," he told reporters in Australia last week.

US President Barack Obama has defended nuclear energy, but also strongly supports development of solar cells, clean coal and biofuel technology.

The most dramatic developments are likely to occur in Western Europe. Germany had planned to phase out nuclear power over 25 years. But the Fukushima crisis — which Chancellor Angela Merkel called a "catastrophe of apocalyptic dimensions" — has accelerated those plans.

The government almost immediately took seven of its 17 reactors offline for three months of safety checks. Most of Germany's leaders now seem determined to swiftly abolish nuclear power, possibly by 2020, and are willing to pay for intensive development of renewable energy, already a major industry in Germany.

The country currently gets 23 percent of its energy from nuclear power — about as much as the US. Germany's Environment Ministry says that in 10 years, renewable energy will account for 40 percent.

That kind of plan would not work for countries such as France, which relies on nuclear for 70 percent of its power and has no intention of shifting, but could provide a map for other countries, activists say.

Sven Teske, Greenpeace's renewable energy director, said Germany was able to fill its energy gap left by idled nuclear plants with wind and solar power, though it has had to import some energy from nuclear-reliant neighbors.

"Switching to renewable is a matter of years, not decades," Teske said.

The International Panel on Climate Change, a scientific body set up by the UN and winner of a Nobel Peace Prize, says a global phase-out of nuclear power plants is feasible at moderate costs and without taking away from climate change efforts.

Artur Runge-Metzger, a European Union climate change official in Bangkok, said the issue is often seen in terms of "two kinds of evils."

"On the one hand you say we can't use nuclear energy because we might have nuclear disasters, but everybody at the table is also saying if we have climate change it is also going to lead to disaster," he said. "So we have to find a way forward."

Associated Press reporters Mari Yamaguchi in Tokyo and Juergen Baetz in Berlin contributed to this report.

Why Japan's Nuke Disaster Could Upset US Energy Policy Assumptions (WSJ)

By Russell Garland

Wall Street Journal, April 8, 2011

Full-text stories from the Wall Street Journal are available to Journal subscribers by clicking the link.

Japan Shows Need For Spent Fuel Storage (LVSJRJ)

By TYRUS W. COBB

Las Vegas Review-Journal, April 8, 2011

Full-text stories from this source currently cannot be included in this document. You may, however, click the link above to access the story.

What Nuclear Power Really Costs (CAPECOD)

By Lawrence Brown

Cape Code Times, April 8, 2011

In the last year, we've seen 5 million barrels of oil gush into the Gulf of Mexico for 86 straight days. We've seen coal miners die and others saved. Over and over we've been reminded that accidents happen, but only nuclear power has the capability to punish whole generations of Americans for a single mistake.

In many respects, we're in worse shape than Japan was prior to the quake. One-tenth of our population lives within 10 miles of a nuclear plant. There are 23 General Electric Mark 1 plants operating here identical to the ones currently failing in Japan.

First, since we have no national facility to store spent fuel rods, they're stored at the 104 nuclear plants across the country. American plants store far more rods than do their counterparts in Japan. Our nearby Pilgrim plant in Plymouth has some 3,000 spent fuel rods in storage — over five times what the facility was designed to hold.

As in Japan, we seem to have no emergency equipment or strategies worked out for when the unthinkable happens. Of the 26 states with nuclear power plants, their average "radiological preparedness" scores were 4.7 — of a possible 10.

The Japanese plants had backup generators, but they were not elevated above the worst-case tsunami elevation, so they drowned in the flood and could not be used to rescue the reactors.

Our reactors on the West Coast — most of them built right on top of massive fault lines — also have back-up generators, and they aren't elevated either. It was cheaper that way. Meanwhile, industry lobbyists have convinced the Nuclear Regulatory Commission to relax fire safety and cooling regulations to lower construction and operating costs. The NRC allows American plants to store spent rods "dense-packed" rather than in open racks that allow for better cooling.

The commonwealth of Massachusetts has been urging the NRC to consider alternative storage at the Pilgrim and Yankee plants since 2006, but the NRC concluded that further study was unnecessary because the risk of breach and subsequent fire was "insignificant."

In 2003, lobbyists successfully weakened regulations that would protect US plants from the hydrogen explosions we're now seeing in Japan.

Not only is our coastline vulnerable to storms, the Japanese crisis surely offers would-be terrorists food for thought — yet the NRC has decided not to require nuclear plants to be staffed with security personnel sufficiently well-armed to defend against a terrorist attack.

New York's Indian Point nuclear plant has over 20 million people living within 50 miles of it. It's estimated a meltdown would seriously if not fatally sicken thousands, with delayed cancer possibly killing several hundred thousand. The city of New York could be rendered uninhabitable. The NRC is sufficiently satisfied that 20 million people can evacuate the metro New York area, and it's poised to issue Indian Point a 20-year renewal.

It would make sense to create robotic machines capable of working in highly irradiated environments. In highly radioactive settings, only unmanned machines could enter, manipulate equipment, connect water pipes and pour concrete. Trained nuclear "SWAT teams" should be maintained in locations around the world, their expenses paid by the nuclear industry. It is hubris to adopt technologies for which no remedy exists when they fail.

Many private investors avoid nukes — the risks and costs are too high. New reactors cost \$10 billion, so new plants are built only where citizens and taxpayers are footing the bill. Congress has approved rich subsidies to support almost every aspect of nuclear power production, even "risk insurance" for utilities if regulation causes construction delays.

Several states have approved billing ratepayers for the costs of reactor construction, even if the plants never come online. Both parties are in on it, though Republicans, so vocally opposed to national debt, want bigger subsidies than the Democrats.

All energy production has social and environmental costs, but the old promises made when I was a boy — how the peaceful atom would rise like a genie out its electron shell and produce energy so cheap they wouldn't even bother to meter it — have all proved false. It's time to get out while we still can.

Lawrence Brown of Hyannis teaches humanities at Cape Cod Academy in Osterville. Email him at columnresponse@gmail.com.

Waste Isolation Pilot Plant Contractor Looking At Layoffs (REPUBCO)

Republic (Columbus, IN), April 8, 2011

The contractor for the federal government's nuclear waste repository in southeastern New Mexico could cut as many as 90 jobs.

Washington TRU Solutions announced Wednesday it is restructuring its work force at the Waste Isolation Pilot Plant near Carlsbad.

The company's president, Farok Sharif, says it had planned to use attrition to help reduce staff levels.

Attrition had been running 6 percent to 8 percent annually, but that's dropped below 2 percent in the last two years.

Sharif says there are now more workers than the budget allows.

The company plans a voluntary separation program, followed by layoffs if necessary.

Company officials say a worst-case scenario could impact up to 90 people.

Sharif says the company also is looking at departmental budgets, overtime and other areas to save money.

Vit Plant Safety Attitude Concerns National Panel (TACOMA)

By Annette Cary

Tacoma News Tribune, April 8, 2011

The Defense Nuclear Facilities Safety Board has concerns about the safety attitude of employees and management at the Hanford vitrification plant, board Chairman Peter Winokur said at a congressional hearing this week.

"We will be identifying them for the energy secretary" in the near future, he said at a hearing about safety oversight of Department of Energy nuclear defense facilities before the House Armed Services Strategic Forces Subcommittee.

Winokur also outlined the three key safety issues at the plant that the board believes require prompt resolution.

The \$12.2 billion plant is being built to turn much of the 53 million gallons of radioactive waste now held in underground tanks at Hanford into a stable glass form for disposal.

The board, which provides independent oversight of Hanford and other DOE defense sites, began an investigation of the vitrification plant's safety culture after Walt Tamosaitis, the former research and technology manager for the project, sent a letter in July. He believes he was dismissed from the project for raising concerns about future safe operations of the plant – claims contractor Bechtel National denies.

"The board believed he was a credible individual who had played a major role in the project," Winokur said at the hearing.

It also wanted to make sure that it heard the full story and that witnesses freely could speak at a hearing held in Kennewick in October to gather information about technical issues related to safe operation of the plant.

"Subsequent to that, we've identified other issues," Winokur said.

The crux of a strong safety culture is an empowered work force, he said. People must be comfortable raising concerns to management and be confident the messenger will not be shot, he said.

In addition, safety culture is driven by leadership, so the board also has looked at that, he said.

"The Department of Energy has a strong history and culture of safety in working with unique nuclear hazards and facilities," Shari Davenport, a DOE spokeswoman, said after the hearing. "We stand by our safety record and the nuclear safety culture of the department."

The board has been concerned about the vit plant's system to keep wastes mixed and moving through the processing system. The high-level radioactive waste is so hazardous that there can be no human access to the mixing tanks during the 40 years the plant operates, so the mixers have been designed without moving parts that would require maintenance.

But if the mixing system is ineffective, flammable gas could accumulate in the tanks and solids could build up on the bottom of tanks, posing a hazard of a nuclear criticality occurring, Winokur said in the written testimony he submitted.

DOE agreed at the October hearing to conduct large-scale testing to make sure the mixing issue is resolved, and the board has sent its recommendations on what should be required in the testing, Winokur said.

"DOE is developing a plant to implement the recommendations now, but it is not yet clear whether the plan will be fully responsive to the board's concerns," according to Winokur's written testimony.

The second technical issue of safety concern is a new control strategy for flammable gas in the plant's processing systems. DOE for the first time has used a quantitative risk analysis as a design tool, but it has no standards for controlling the assumptions that underpin the analysis, according to the written testimony.

The board hopes to see validation of the methodology this month that will convince members hydrogen-related issues in pipes and vessels of the plant will be appropriately addressed, Winokur said. However, if the approach cannot be shown to be adequate, the board will want active safety controls re-established.

The final issue will take longer to resolve. The board is concerned about the ability of the Hanford tank farm to supply waste that is compatible with the vitrification plant. The plant's mixers have limited ability to control the amount and size of solid particles in the waste.

It's an ongoing issue that will be addressed during the next couple of years as the vitrification plant project refines what waste it can accept and the tank farms continue to adjust, Winokur said.

"We have identified a path forward for the remaining three technical issues that will assure the safe design, construction and operation of the (vitrification) plant," Davenport said. DOE is planning to start operating the plant in 2019.

DOE: Additional Layoffs At SRS Not Needed (AP)

By Tony Santaella

Associated Press, April 8, 2011

The US Department of Energy says additional layoffs aren't needed now at the Savannah River Site near Aiken.

The Aiken Standard reports Thursday that necessary restructuring at the former nuclear weapons complex can be done without costing additional jobs.

In December, the company that manages the site said nearly 1,100 employees would be laid off in two phases between January and August of this year. That's on top of more than 300 Savannah River Nuclear Solutions employees who opted to leave voluntarily.

Work at the site that once produced plutonium and tritium for atomic bombs is now focused mostly on research and environmental cleanup.

The site received about \$1.6 billion in federal stimulus cash that funded 1,000 jobs. Those are not included among the 1,400 jobs being eliminated.

INTERNATIONAL NUCLEAR NEWS:

Strongest Aftershock Since Japan Tsunami Kills 2 (AP)

By Jay Alabaster And Tomoko A. Hosaka, Associated Press

Associated Press, April 8, 2011

SENDAI, Japan – A strong aftershock ripped through northeastern Japan, killing two, injuring dozens and piling misery on a region still buried under the rubble of last month's devastating tsunami.

The quake late Thursday was the strongest tremor since the March 11 jumbo and did some damage, but it did not generate a tsunami and appeared to have spared the area's nuclear power plants. The Fukushima Dai-ichi complex — where workers have been frantically trying to cool overheated reactors since they lost cooling systems last month — reported no new abnormalities. Other facilities retained a connection to the grid or switched to diesel generators after the 7.1-magnitude quake knocked out power to much of the area.

Many people in the area have lived without water and electricity for nearly a month, and the latest tremor sunk more homes into blackness: In total, around 3.6 million households — about 60 percent of residents in the area — were dark Friday, said Souta Nozu, a spokesman for Tohoku Electric Power Co., which serves northern Japan.

Five conventional plants in the area were out, and it was not clear when power would be restored, he said.

Matsuko Ito, who has been living in a shelter in the small northeastern city of Natori since the tsunami, said there's no getting used to the terror of being awoken by shaking.

"I was almost as scared as much as last time," said the 64-year-old while smoking a cigarette outside. "It's enough."

She said she started screaming when the quake struck around 11:30 p.m.

"Something has changed," she said. "The world feels strange now. Even the way the clouds move isn't right."

Thursday's quake initiated a tsunami warning of its own, but it was later canceled. Two people were killed, fire department spokesman Junichi Sawada reported Friday. A 79-year-old man died of shock and a woman in her 60s was killed when power was cut to her oxygen tank. More than 130 people were injured, according to the national police agency.

The temblor's epicenter was in about the same location as the original 9.0-magnitude tremor, off the eastern coast and about 40 miles (65 kilometers) from Sendai, an industrial city on the eastern coast, according to the US Geological Survey. It was strong enough to shake buildings for about a minute as far away as Tokyo, about 200 miles (330 kilometers) away.

At a Toyota dealership in Sendai, most of a two-story show window was shattered, and thick shards of glass were heaped in front of the building. Items fell off store shelves and a large automated teller machine crept across the floor at a FamilyMart convenience store.

Police directed cars through intersections throughout the city on Friday because traffic lights were out. Small electrical fires were reported.

While the city is far enough inland that it largely escaped tsunami damage, people there lived without regular services for weeks. Within an hour of Thursday's quake, they rushed convenience stores and cleared shelves of ice, water and instant noodles — items that were in short supply after the bigger quake.

The operator of the tsunami-ravaged Fukushima Dai-ichi plant said there was no sign the aftershock had caused new problems there. Workers briefly retreated to a quake-resistant shelter in the complex and suffered no injuries.

After the March 11 quake knocked out power in the region, the wave flooded the plant's diesel generators, leaving the complex without any electricity. Workers have been struggling to stem a tide of radiation since, using makeshift methods to pump cooling water into the reactors. That work continued uninterrupted after the latest quake, according to Japan's Nuclear and Industrial Safety Agency.

Other facilities along the northeastern coast remained connected to a power source Friday, and the agency said they were all under control. Backup generators kicked in at two — Rokkasho and Higashidori.

At a third north of Sendai — which has been shut down since the tsunami — one of three power lines was supplying electricity, and radiation monitoring devices detected no abnormalities. The Onagawa power plant's spent fuel pools briefly lost cooling capacity, but it resumed because a power line was available for electricity.

"It's the way it's supposed to work if power is lost for any reason," said David Lochbaum, director of the nuclear safety project for the US-based Union of Concerned Scientists.

Associated Press writers Shino Yuasa, Malcolm Foster, Ryan Nakashima, Mari Yamaguchi and Cara Rubinsky in Tokyo and Colleen Slevin in Denver contributed to this report.

Japan Hit By 7.1 Quake; Workers Evacuated From Fukushima (BLOOM)

By Tsuyoshi Inajima And Michio Nakayama
Bloomberg News, April 8, 2011

Japan suffered the biggest aftershock since the day of the March 11 earthquake, prompting the operator of the stricken Fukushima nuclear plant to evacuate workers while they were cooling radioactive fuel.

The magnitude-7.1 temblor struck at 11:32 p.m. local time yesterday near the site of last month's record quake in Japan, the US Geological Survey reported on its website. No unusual conditions were observed at the Fukushima plant, according to statements from Tokyo Electric Power Co. and Japan's Nuclear and Industrial Safety Agency.

"Indications of new leakage or a change in radiation levels will be the only way they'll tell if there's further damage," Murray Jennix, a nuclear engineer who specialized in radioactive containment leaks and teaches at San Diego State University, said in a telephone interview. "You've got cracks that could have been made bigger."

Two people died and 93 were injured from yesterday's quake, the Fire and Disaster Management Agency said, as more than 3.6 million households lost power. Tokyo Electric, the operator of the Fukushima Dai-ichi plant 220 kilometers (137 miles) north of Tokyo, evacuated 15 workers who were pumping nitrogen into the No. 1 reactor to prevent hydrogen explosions of the type that damaged radiation containment buildings last month.

Work at Fukushima wasn't affected by the quake, Tokyo Electric spokesman Takashi Kurita said by telephone today. There have been no signs of changes in radiation levels or damage at the plant, he said.

Tepco, as the utility is known, started injecting nitrogen, the most prevalent inert gas in the atmosphere, into the reactor early yesterday and the process may take six days, spokesman Yoshinori Mori said before the aftershock.

Shares of Tepco rose 3.8 percent to 353 yen as of 10:48 a.m. Tokyo time. The stock has slumped 86 percent since the quake on March 11.

"They are manually injecting nitrogen through a very narrow pipe," Tadashi Narabayashi, a professor of nuclear engineering at Hokkaido University in northern Japan, said by phone yesterday. "High radiation levels in the building are also making it difficult as workers have to keep rotating."

Tepco is still using emergency pumps to cool the reactors and pools holding spent fuel, almost four weeks after the initial disaster. Three blasts damaged reactor buildings and hurled radiation into the air last month.

Tohoku Electric Power Co., the main power supplier to Japan's north, restarted its No. 2 350-megawatt oil-fired unit at the Akita plant this morning, spokesman Kazuya Sugawara said by telephone today. Five units at three of its thermal power plants remain shut after the aftershock, he said.

Tohoku Electric also restored power at its Higashidori nuclear power plant in northern Japan this morning, Sugawara said. Cooling systems at the utility's Onagawa nuclear station, which was safely shut down after the March 11 quake, were operating normally, Sugawara said. Two of three power lines remain disabled to the station, he said.

The Rokkasho nuclear material reprocessing facility lost its outside power source and is running on emergency diesel generation, Japan's Nuclear Industrial Safety Agency said.

East Japan Railway Co. (9020), the nation's largest rail operator, suspended bullet train services on three of its five lines. The train operator halted the Tohoku, Yamagata and Akita lines, according to a release on its website.

There have been 897 aftershocks since last month's temblor, which left more than 27,600 dead or-missing and caused an estimated 25 trillion yen (\$294 billion) in damage.

The magnitude-7.1 temblor was measured at a depth of about 49 kilometers, the US Geological Survey reported on its website. A tsunami alert for a possible two-meter wave was canceled by Japan about two hours later. There was a magnitude-7.9 aftershock on March 11 about half an hour after the main quake, according to the USGS.

"It is tremendously smaller than the main shock," said Don Blakeman, a geophysicist in the US National Earthquake Information Center in Golden, Colorado. "The main shock caused about 80 times more ground movement."

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Two Killed, 100 Hurt In Japan Aftershock (AFP)

By Hiroshi Hiyama

AFP, April 8, 2011

TOKYO (AFP) – A powerful aftershock that rocked an area of Japan still reeling from last month's earthquake and tsunami disaster killed two people and injured around 100, emergency services said Friday.

The Fire and Disaster Management Agency said a 63-year-old woman in Yamagata prefecture died after her respirator failed when the power was knocked out by the 7.1 magnitude tremor.

"Her respiratory equipment was found turned off. We believe the machine was turned off due to the outage," a spokesman for the agency said.

The agency said one person also died in Miyagi prefecture – the area worst hit by the 9.0 magnitude quake of March 11 and the tsunami it spawned.

Broadcaster NHK identified the Miyagi casualty as a 79-year-old man. It said he was found unconscious after the quake and taken to hospital, where he was confirmed dead.

The disaster management agency said at least 93 people were confirmed injured as of 9:30 am (0030 GMT) while Jiji Press said about 130 were injured.

Power remains off for about 3.6 million households in the northeastern region, Jiji said.

Workers battling to control the stricken Fukushima Daiichi nuclear plant on the northeast coast were temporarily ordered to evacuate, plant operator Tokyo Electric Power Co. (TEPCO) said.

The evacuation order came less than 24 hours after they began pumping nitrogen, an inert gas, into reactor No. 1, where engineers were concerned a build-up of hydrogen might react with oxygen to cause an explosion.

Work at the plant was remotely controlled and was continuing, the company said.

A TEPCO spokesman told a press conference there was "no information immediately indicating any abnormality at Fukushima Daiichi plant."

A nuclear safety agency official told reporters: "There are no abnormal readings at the Fukushima Daiichi's monitoring posts", adding: "We have not seen any problem... with regard to the injection of nitrogen."

The official said some external power sources used to cool reactor cores had been lost at plants in Onagawa in Miyagi prefecture and at Rokkasho and Higashidori in Aomori prefecture, but at least one emergency source remained operational at each.

The loss of external power sources at Fukushima Daiichi in the March 11 tsunami left reactor cores heating up uncontrollably, resulting in the world's worst nuclear emergency since Chernobyl.

There was no indication that Thursday's loss of power was causing a problem at any of the nuclear plants.

The tremor hit at 11:32 pm local time (1432 GMT) with an offshore epicentre 66 kilometres (40 miles) east of Sendai, a city severely impacted by the March 11 quake and tsunami, according to the US Geological Survey.

Japan's Meteorological Agency promptly issued a tsunami alert for the Pacific coast, saying waves of up to two metres (six feet) could hit the shoreline, but the alert was cancelled 83 minutes after the quake.

Footage from broadcaster NHK showed power was off in parts of Sendai, a regional commercial hub badly shaken last month's double disaster.

An AFP photographer in Kitakami city in Iwate prefecture reported that power had gone off following Thursday's quake.

Jiji Press news agency said shortly after midnight there were five fires and 13 gas leaks in Sendai city, according to the Miyagi prefectural office.

In Iwate prefecture, local authorities ordered some 500 households to evacuate, NHK said. The broadcaster also reported three fires in Iwate and Miyagi prefectures.

The quake had a depth of 49 kilometres, the USGS said. Although the epicentre was 330 kilometres from Tokyo, it shook buildings in the Japanese capital.

A Meteorological Agency official said the tremor was an aftershock of the March 11 tremor, and data on the organisation's website showed that it was one of the most powerful.

Around 400 strong aftershocks have rocked Japan since the 9.0 magnitude quake last month and the tsunami it spawned, which killed 12,500 people and left around 15,000 unaccounted for.

Before the tremor chief government spokesman Yukio Edano indicated Tokyo was considering widening the 20-kilometre (12-mile) evacuation zone around the stricken plant, a week after a UN nuclear watchdog said it should be increased.

"The existing safety standards for local residents are that an evacuation order is issued if there is a possibility that they might receive radiation 50 millisieverts or above," he said.

"The standard assumed that a high level of radiation is emitted temporarily. We are discussing how best to issue evacuation orders based on data and standards for accumulative radiation," Edano said.

Around 3,400 people are unaccounted for along the 40-kilometre stretch of coast covered by the exclusion zone and on Thursday, around 300 police began searching for bodies in the the outer 10-kilometre band of the zone.

Television pictures showed officers in full body suits entering the area, while a police spokesman said all officers were armed with radiation meters.

The Bank of Japan on Thursday warned of pressures as a result of the triple disaster and bolstered funding for quake-hit areas, unveiling a 1.0 trillion yen (\$11.7 billion) scheme to keep banks in affected areas liquid.

The BoJ also downgraded its view of the economy due to last month's disasters.

Powerful Aftershock Complicates Japan's Nuclear Efforts (NYT)

By Hiroko Tabuchi And Andrew Pollack

New York Times, April 7, 2011

TOKYO — The strongest aftershock to hit since the day of the March 11 earthquake and tsunami in Japan rocked a wide section of the country's northeast Thursday night, prompting a tsunami alert, raising fears of further damage to the already crippled Fukushima Daiichi nuclear plant and knocking out external power at three other nuclear facilities.

The public broadcaster, NHK, said there were local reports of injuries, fires and blackouts. The aftershock had a magnitude of 7.1, according to the United States Geological Survey; last month's quake, which devastated much of the northeastern coast, was measured at 9.0.

The tsunami alert, which warned of waves up to three feet and possibly higher in some areas, was lifted after about an hour and a half and Japan's Meteorological Agency said no tsunami had been detected.

But it warned that slight changes in sea level were still possible and it was unclear whether there was any damage along the coast. Many coastal communities were ravaged last month, and some are vulnerable because sea walls were breached and land levels have sunk.

Workers at the Fukushima plant were told to take cover until the tsunami warning was lifted, but Japanese officials said at a news conference that water was being automatically pumped into three damaged reactors in the crucial effort to keep their nuclear fuel cool. The plant's cooling systems were knocked out by last month's quake and tsunami, and there was no immediate word of whether there was new damage to the plant, according to its operator, the Tokyo Electric Power Company.

Nitrogen also continued to be piped into the No. 1 reactor, the company said, in an effort to prevent a possible explosion. Tokyo Electric said it was unsure of the status of the damaged No. 4 reactor because it has not been able to station workers there.

Monitoring posts around the plant were not showing any rise in radiation levels, the company said.

Experts have said that a big aftershock poses an additional risk to the Fukushima plant because its containment structures are filled with water that was used in the cooling efforts and is now highly radioactive. The strain from holding that water could make the structures more vulnerable to rupture in the event of an earthquake, according to an assessment made by the United States Nuclear Regulatory Commission in late March.

Two other nuclear facilities — a fuel reprocessing plant at Rokkasho and a nuclear power plant at Higashidori, both in northern Aomori Prefecture — were running on emergency diesel generators after their external power supplies were knocked out by the aftershock.

A third site, the Onagawa nuclear power station in Miyagi Prefecture, lost two of its three external power systems. All three facilities have been shut down since the March 11 quake, but power is needed to keep the nuclear fuel cool.

The aftershock hit at 11:32 p.m. local time and was centered 41 miles east of Sendai, 72 miles from Fukushima and 205 miles from Tokyo, officials said. It was about 30 miles below the ocean floor, considerably deeper than March 11's magnitude 9.0 quake, which hit about 20 miles below the sea floor.

Thursday's aftershock was the strongest since the day of the March 11 quake, according to the United States Geological Survey. There have been hundreds of aftershocks since the initial quake.

Also on Thursday, the police searched for people missing in an evacuation zone around the Fukushima Daiichi plant.

Nearly 240 police officers from Tokyo and about 100 from Fukushima Prefecture fanned out wearing protective suits in a search for bodies in the 12-mile evacuation zone around the plant, according to Mikio Murakoshi, a spokesman for the Fukushima Prefecture police.

Japanese and American soldiers last weekend conducted a huge search for the missing but avoided the evacuation zone because of the radiation risk. But Mr. Murakoshi said radiation levels had dropped, making a search in the area possible.

The police say about 12,600 people have died as a result of the March 11 earthquake and tsunami. More than 14,700 are listed as missing, including about 4,200 in the evacuation zone around the Fukushima plant.

The magnitude 9.0 quake and tsunami flattened communities, has kept an estimated 160,000 still housed in temporary shelters and knocked out power at the Fukushima Daiichi plant, where workers have since battled to stabilize the reactors.

Raising new concerns about the plant, the United States Nuclear Regulatory Commission said that some of the core of the No. 2 reactor had probably leaked from its steel pressure vessel into the bottom of the containment structure. The assessment implied that the damage at the No. 2 unit was worse than previously believed.

The agency emphasized its interpretation was speculative and based on high radiation readings that Tokyo Electric had found in the lower part of unit No. 2's primary containment structure, called the drywell. The statement said that the commission "does not believe that the reactor vessel has given way, and we do believe practically all of the core remains in the vessel."

Linda L. Gunter, a spokeswoman for Tokyo Electric, dismissed the analysis, saying Thursday morning, "We believe the containment for the reactor is still functioning at Unit 2; however, the damage to the suppression pool may be the source of the radiation."

But a spokesman for the Nuclear and Industrial Safety Agency of Japan said that he was familiar with the Nuclear Regulatory Commission's statement and agreed that it was possible the core had leaked into the larger containment vessel.

The statement was issued after Representative Edward J. Markey, Democrat of Massachusetts, told a House hearing on Wednesday morning that the commission had told him that the core had melted through the vessel.

He based that on a question his staff had asked the agency. But the agency responded to him by e-mail on Tuesday without directly addressing possible melting, saying only that it speculated that "part of the Unit 2 core may be out of the reactor pressure vessel and may be in the lower space of the drywell." After the hearing, in response to numerous questions, the agency said that "there are possible leakage paths from the reactor vessel into the drywell."

It did not say whether the fuel was molten or solid. If molten fuel has left the reactor's pressure vessel and reached the drywell in substantial quantities, it raises the possibility that the fuel could escape the larger containment structure, leading to a large-scale radioactive release.

Some engineers have theorized that if a core melted down and concentrated at the bottom of the vessel it could melt through the vessel and then burn through the concrete of the foundation. One element of such an event would probably be a resumption of the nuclear chain reaction, in a molten mass in which no control would be possible because there would be no control rods to slide smoothly between neatly arrayed bundles of fuel.

Other experts say that a resumption of the chain reaction would be difficult or impossible with the type of fuel in use at Fukushima Daiichi.

But extremely radioactive material continues to ooze out of the reactor pressure vessel at Reactor 2, and the leak is likely to widen with time, a senior nuclear executive said.

"It's a little like pulling a thread out of your tie," he said. "Any breach gets bigger."

Flashes of extremely intense radioactivity have become a serious problem, he said. Tokyo Electric's difficulties in providing accurate information on radiation are not a result of software problems, as some Japanese officials have suggested, but stem from radiation damaging measurement instruments because it exceeds the maximum dose that they are designed to measure, he said.

"It's killing the measuring equipment," he said. "They're blaming it on software — it's their meters getting cooked."

Broken pieces of fuel rods have been found outside of Reactor 2, and are now being covered with bulldozers, he said. The broken pieces may be from spent fuel rods in the spent-fuel pools, as opposed to the reactors themselves. Hydrogen explosions have flung them out of the reactor building.

"They're running bulldozers around to bury the stuff so it doesn't cook people going by," he said.

Keith Bradsher contributed reporting from Hong Kong.

AfterShock In Japan Highlights Vulnerability Of Nuclear Network (WP)

By Andrew Higgins And Chico Harlan

Washington Post, April 7, 2011

TOKYO — A powerful aftershock 16 miles off northeastern Japan late Thursday disrupted power supplies to two nuclear facilities and complicated efforts to contain a month-long emergency at a third, the Fukushima Daiichi nuclear power station.

The quake, which left tens of thousands of homes without power, struck an area still digging itself out from the wreckage left by a devastating tsunami on March 11.

Japanese television interrupted programming Thursday night to flash warnings of another tsunami, but the alert was later lifted.

The US Geological Survey estimated the quake's magnitude at 7.1, down from an initial estimate of 7.4, compared with 9.0 on March 11.

Broadcaster NHK reported scores of injuries.

Blackouts were seen throughout the northeastern coastak region of Honshu, Japan's main island, and two nuclear facilities lost much of their external power supply.

Electrical troubles at the Onagawa nuclear power station, north of Sendai, the region's biggest city, and a nuclear reprocessing plant farther north, near a US air base in Aomori prefecture, did not appear to pose any risk of catastrophic failure, as happened after the March 11 tsunami slammed into the Fukushima Daiichi nuclear plant.

But they highlighted the vulnerability of Japan's nuclear archipelago, a network of reactors and other facilities that have been a central pillar of the country's energy policy since the 1970s.

Seeking to calm a public traumatized by the debacle at the Fukushima Daiichi plant, Tetsuro Fukuyama, the deputy chief cabinet secretary, told a hastily convened late-night news conference that adequate power had been restored to both the Onagawa plant and the reprocessing facility, either from generators or from undamaged power lines, and that they pose no danger.

The quake came just hours after a rare bit of good news — a successful operation to avert a possible explosion at a crippled reactor at Fukushima Daiichi by injecting nitrogen. Earlier blasts at the six-reactor plant had led to the world's worst nuclear disaster since Chernobyl.

In Tokyo, 207 miles south of the epicenter of Thursday's quake, buildings swayed for more than a minute. Japan has experienced hundreds of aftershocks since the March 11 quake, but until Thursday none had exceeded a 6.6.

This aftershock was stronger than the 6.9-magnitude Kobe earthquake in 1995 that led to more than 5,000 deaths, with 310,000 evacuated to temporary shelters.

A spokesman for Tokyo Electric Power Co. said at a news conference that it had no information of any further damage to the Fukushima Daiichi plant and that Thursday's quake would not interrupt efforts to bring the facility under control. But the temblor added another headache for workers engaged in an already highly risky and technically difficult operation to cool overheating and to plug leaks that have allowed radiation to seep into the air and sea — and that have led to the evacuation of more than 80,000 people at risk of contamination.

Japanese TV broadcast footage of of swaying newsrooms, toppled store shelves and burst pipes at Sendai railway station, which had only just started to operate again following the March 11 quake. One female newscaster reported updates wearing a hard hat.

The damage was nowhere near as severe that that caused by the March quake and tsunami, which killed more than 12,500 people, with nearly 15,000 still listed as missing. But it plunged the country back into a state of deep anxiety that, at least in areas undamaged last month, has been slowly beginning to lift.

The Onagawa plant, which is also being used as an evacuation center, stands on relatively high ground outside the town of the same name, a seaside community pulverized by the March 11 tsunami, which killed up to half the population. The Onagawa facility is operated by Tohoku Electric Power Co.

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Japan Nuclear Crisis Ebbing, US Experts Say (LAT)

Although the situation at the Fukushima Daiichi nuclear plant is far from stabilized, evidence suggests that a complete meltdown is unlikely, Obama administration experts say. Meanwhile, a 7.1 aftershock rattles Japan, killing two and injuring more than 1

By Ralph Vartabedian

Los Angeles Times, April 8, 2011

Although the damaged Fukushima Daiichi nuclear power plant has not yet been stabilized, there is no evidence that overheating during the last month has resulted in any melting of the reactor vessels or their containment structures, Obama administration officials said Thursday.

If that assessment is correct, then significant additional releases of radioactivity into the environment will be limited, and emergency crews should have a far better chance of preventing further damage to the plant's reactors.

The assessment, provided to The Times on background, suggests that the plant is unlikely to suffer a complete meltdown, in which uranium fuel gets so hot that it melts through the bottom of the reactor and containment vessels, spewing high-level radiation into the plant's underlying foundation.

"We are a long way from a point where anybody would say this is stable," a senior administration official said. "But it is not a runaway. For a long time, we will be at a declining level of risk."

The conclusions by Obama administration experts appear more optimistic about the outcome at Fukushima than recent reports that have leaked out of the Nuclear Regulatory Commission, which have suggested that the situation is increasingly risky and dangerous.

Separately, the staff of the NRC came under heavy questioning Thursday by the Advisory Committee on Reactor Safeguards, a panel of outside experts, academics and nuclear industry officials that provides guidance to the agency.

At a committee meeting, NRC officials were asked about the scientific basis for their agency's advice that Americans evacuate a 50-mile zone around the plant. NRC officials said they couldn't provide an explanation and would have to get back to the committee.

NRC officials were unavailable for comment afterward.

Meanwhile, northern Japan was rattled by a 7.1 aftershock, the strongest since March 11, when the magnitude 9 earthquake and tsunami struck the region and set in motion the nuclear disaster at Fukushima.

Authorities blamed two deaths on Thursday's 11:30 p.m. earthquake, which triggered a new tsunami warning that was later canceled. A 79-year-old man died of shock, and a woman in her 60s perished when a power failure turned off her oxygen tank, Japanese media reports said. More than 130 people were injured, police said.

The operator of the battered nuclear plant said there were no indications that the aftershock caused any new problems or injuries there.

The information filtering out of Japan increasingly appears to be setting a boundary for the severity of the problem at Fukushima — though no doubt it is going to take years, if not decades, to remediate the damage already caused.

The most telling evidence about the condition of the reactors is the absence of heavy radionuclide contamination around the plant, which would indicate that uranium fuel became so overheated that it vaporized heavy fission products such as strontium and technetium, experts said.

Instead, the main contaminants have been isotopes of iodine and cesium, which are water soluble and are not held in the uranium fuel itself.

The Obama administration experts said it appears that three reactors could be leaking radioactive water and other contaminants into areas of the plant that should be free from radioactivity, although the cause of breaches is not yet known.

"We don't know how the containment failed," one expert said. "It is more of a leak than a massive rupture. There is an extremely low probability of a melt-through of the reactor vessel. There is no conclusive evidence of a melt-through."

Temperature gauges at the bottom of the reactor vessel recorded levels of 300 degrees Celsius, far below the 1,500-degree melting point of steel. Even if that level were reached, the experts said they are confident that water in the containment structure would have prevented any melt.

Instead of a melt-through, the experts said the leakage from the reactors might be coming through various pieces of equipment that enter the heavy-gauge steel reactor vessel, including mechanical systems that operate control rods or pipes.

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Times staff writer John M. Glionna in Tokyo contributed to this report.

Even As Disaster Unfolds, Plan Forms To Dismantle Reactors (NYT)

By Ken Belson

New York Times, April 8, 2011

TOKYO — Hydrogen explosions. High levels of radiation. Thousands of gallons of contaminated water dumped into the sea. With the drumbeat of bad news, including another powerful aftershock on Thursday, it will take months, if not years, to stabilize the six reactors and spent fuel pools that were damaged in last month's earthquake and tsunami at the Fukushima Daiichi plant.

Yet it is not too soon for a team of engineers from Japan and the United States to begin working on the thorny task of how to dismantle the reactors, at least four of which are so badly damaged that the plant's operator has said they will be scrapped.

Already, dozens of engineers from Toshiba, which helped build four of the Fukushima Daiichi reactors, have been joined by experts from the United States to prepare for the decommissioning work, a job so big that the planning needs to start even now, in parallel with the efforts to contain the crisis.

The team includes experts from Westinghouse, whose majority owner is Toshiba; the Shaw Power Group, a civil engineering firm; and the Babcock & Wilcox Company, an energy technology and services company, one of whose specialties is the disposal of hazardous materials.

The plans to take apart the reactors are complicated not only by the volatility of the situation but also by the uncertainty about the reactors' condition once they finally cool. No one has ever decommissioned four damaged reactors at one power plant, let alone reactors rocked by a powerful earthquake and swamped by a tsunami.

In fact, no Japanese nuclear power plant has ever been entirely decommissioned, which is one reason Westinghouse and Babcock & Wilcox — companies that helped shut down the damaged reactor at Three Mile Island in Pennsylvania after the accident there in 1979 — have joined the effort.

Among myriad problems, the engineers must find ways to dispose of the fuel, remove reactors, demolish buildings, and clean up nearby land and water.

"Each of these problems is solvable and have been solved before," said Hiroshi Sakamoto, a senior vice president at Toshiba America Nuclear Energy Corporation, who returned to Japan to lead the team. (It has dubbed itself "Mt. Fuji," short for Management Support for Fukushima US and Japan Initiative.)

"The situation is really the complexity and combination of factors," he said.

While the team makes plans, 800 of Toshiba's engineers are helping the Tokyo Electric Power Company, which operates the Fukushima Daiichi plant, with the more pressing problem of cooling the reactors and reducing the radioactivity there. About 250 engineers are stationed in Fukushima, and an additional 500 are working at Toshiba's nuclear engineering center in Yokohama, Japan.

They are helping to re-establish electrical power to pumps and motors and to install power panels; draining contaminated water; and acquiring desalination equipment, underwater pumps and air purifiers to filter radioactive dust. Westinghouse has provided Tokyo Electric with boron, fuel, spare pumps and other supplies.

"We are taking a two-tier approach for Fukushima," said Kiyoshi Okamura, chief of Toshiba's nuclear business. "These efforts are mutually complementary."

Because of the emergency, Toshiba's engineers — those who are helping Tokyo Electric and those planning the decommissioning — are working without a formal contract. But the Japanese-American team submitted a proposal to Tokyo Electric on April 4 that lays out a long-term plan to remove and transfer spent fuel as part of a larger project.

Toshiba has not been told when a decision will be made on the proposal, which might ultimately be worth billions of dollars.

Westinghouse, Shaw and Babcock & Wilcox were eager to help when it became apparent early on that the Fukushima reactors might have to be scrapped. But the crisis made it difficult for Tokyo Electric to respond. By joining hands with Toshiba, the American companies won instant credibility and found a conduit to reach the utility.

"It was chaos at the beginning, so it helps to have Toshiba" as a partner, said Jack Allen, the president of Westinghouse in Asia.

Two weeks ago, engineers from the American companies started arriving in Japan, where they were briefed about the situation. They moved into a war room at Toshiba's headquarters that includes offices in a secure part of the building. The rooms are stuffed with desks, computers, whiteboards and dozens of engineers slumped over laptops.

One door is covered with business cards and a sheet that includes photographs of the engineers so that names can be more easily matched to faces. On the walls are aerial photographs and schematics of the Fukushima reactors, as well as charts and photographs from decommissioned reactors at Three Mile Island and the Maine Yankee nuclear power plant in Wiscasset, Me., which took eight years to shut down. Graphic illustrations of cranes and other equipment are taped to the walls.

A well-used coffee cart sits in the hallway. Soda cans and snacks share desk space with laptops. A mixture of Japanese and English fills the air.

Though it is still in its early days, the "Mt. Fuji" team has proposed installing devices around the Fukushima Daiichi plant to monitor radioactivity. It is weighing what machinery is needed, based on various scenarios, and will soon open an office in New York so that engineers there can take over when the team in Tokyo is asleep.

Most of all, the team is waiting for the engineers at Fukushima Daiichi to cool the reactors so it can begin work. "All things hinge," said David J. Richardson, a president at Babcock & Wilcox, "on having safe access."

IAEA: Signs Of Recovery At Fukushima Nuclear Plant -Kyodo (DJNews)

Dow Jones Newswires, April 8, 2011

Full-text stories from the Wall Street Journal are available to Journal subscribers by clicking the link.

Japan's Stricken Nuclear Reactors Spared Damage From Latest 7.1 Earthquake (BLOOM)

By Akiko Nishimae, Jim Polson And Ichiro Suzuki

Bloomberg News, April 8, 2011

A 7.1-magnitude earthquake minutes before midnight spared the stricken Fukushima Dai-ichi nuclear plant in Japan, although workers struggling to cool radioactive fuel were evacuated, Tokyo Electric Power Co. said based on its initial assessment.

The aftershock was the strongest since March 11 when a record 9-magnitude earthquake and tsunami devastated the coast of Northeast Japan. No unusual conditions were observed at the plant afterward, the utility, known as Tepco, and Japan's Nuclear and Industrial Safety Agency said in statements.

No unusual measurements of water level, pressure or other operations were found at the No. 3 and No. 4 reactors at the six-unit plant, Tepco officials told reporters today.

"Indications of new leakage or a change in radiation levels will be the only way they'll tell if there's further damage," Murray Jennix, a nuclear engineer who specialized in radioactive containment leaks and teaches at San Diego State University, said in a telephone interview. "You've got cracks that could have been made bigger."

Tepco said April 6 engineers had plugged a leak of radioactive water into the ocean from a pit near the No. 2 reactor after several failed attempts. Concentration of radioactive iodine in seawater near the reactor discharge pipe fell by half, to 140,000 times the regulatory limit, the company said yesterday.

"The main fear is more structural damage, leading to additional cracks or reopening of the fixed crack," Peter Hosemann, an assistant professor of nuclear engineering at the University of California at Berkeley, said in an e-mailed message. "Radioactivity can leak again if cracks open."

A day may be needed to detect additional damage at the plant, he said.

Crews at the crippled nuclear station north of Tokyo will continue pumping nitrogen into the No. 1 reactor to prevent hydrogen explosions of the type that damaged radiation containment buildings last month. Injection of nitrogen, the inert gas that comprises most of air, may take six days spokesman Yoshinori Mori said before today's quake.

"They are manually injecting nitrogen through a very narrow pipe," Tadashi Narabayashi, a professor of nuclear engineering at Hokkaido University in northern Japan, said by phone yesterday. "High radiation levels in the building are also making it difficult as workers have to keep rotating."

The March 11 tsunami flooded emergency generators at the Fukushima plant, triggering cooling-system failures at four of the plant's six nuclear units.

Tepco is still using emergency pumps to cool the reactors and pools holding spent fuel, almost four weeks after the initial disaster. Three blasts damaged reactor buildings and hurled radiation into the air last month.

About 3.64 million households in six Japanese prefectures were without power following the aftershock, Kyodo News reported, citing Tohoku Electric Power Co., which operates in seven prefectures.

The Rokkasho nuclear-fuel reprocessing plant and the Higashidori nuclear power plant lost power and were operating on backup diesel generators, the nuclear safety agency said today in a statement. Two of three power lines to the Onagawa nuclear power plant also were disabled, it said.

Five other power stations were shut down by the aftershock, broadcaster NHK reported, citing Tohoku Electric.

"What occurred today is an aftershock in the same area and rupture zone to the magnitude-9 main shock that occurred about a month ago," said Don Blakeman, a geophysicist in the US National Earthquake Information Center in Golden, Colorado. "It is tremendously smaller than the main shock. The main shock caused about 80 times more ground movement."

The 7.1 aftershock was the fourth of magnitude-7 or higher since the major quake on March 11, according to the Japanese Meteorological Agency. The largest measured 7.7, about 30 minutes after the record quake, according to the agency's website.

Police and fire officials reported the number of people injured in today's earthquake reached 82 as of 3:30 a.m. local time, public broadcaster NHK said on its website.

There have been 464 aftershocks of magnitude 5 or greater, counting today's, according to agency statistics.

More than 27,300 people are dead or missing after the initial natural disaster in northeastern Japan, according to the latest figures from the National Police Agency.

Japan Earthquake Today: Tsunami Warning Lifted, But Fukushima Evacuated (CSM)

By Gavin Blair

Christian Science Monitor, April 8, 2011

A magnitude 7.1 earthquake struck off the coast of Japan's Miyagi Prefecture – the region worst affected by the huge March 11 quake and tsunami – at 11:32 p.m. local time on Thursday. Evacuation orders were issued for hundreds of homes along the northeast coastline. Skip to next paragraph

Tsunami advisories were immediately issued, but were lifted approximately one hour later. The quake is the strongest of the hundreds of aftershocks that have shaken Japan since the magnitude 9.0 temblor on March 11. That earthquake caused a tsunami that destroyed thousands of homes, displaced nearly a half million people, and severely crimped the iconic fishing industry there.

The center of the earthquake was 40 kilometers below the seabed, about 60 miles east of the city of Sendai and about 90 miles from Fukushima, according to Japan's Meteorological Agency.

Tokyo Electric Power Company (Tepco) says that the quake hasn't caused any further damage to the Daiichi nuclear power plant and that all the workers have been temporarily evacuated from the facilities. There were no injuries reported.

Two out of three external power lines to the Onagawa nuclear power plant, 75 miles northeast of Fukushima and near the epicenter of Thursday's temblor, have been damaged, causing power loss. The plant, operated by Tohoku Electric Power, has been shut down since the March 11 quake and has been relying on external power to cool the reactors. Japan's Atomic Energy Agency said the two lost power lines were not being used for cooling when tonight's earthquake hit.

The Oshika Peninsula, on which the Onagawa plant is located, was also the closest part of the main Honshu island of Japan to the March 11 earthquake, which shifted the whole peninsula 27 feet to the southeast and sunk it 7 feet. The March 11 tsunami reached heights of 42.5 feet, just below the base of the nuclear plant.

The Meteorological Agency has said that no increased radiation levels have been detected around the plant.

Electricity blackouts have occurred across the northeast region and some highways have been closed.

The Tohoku, Joetsu, and Nagoya bullet train lines were stopped but were able to restart shortly afterwards. The lines closest to the earthquake had not resumed operations since March 11.

Tohoku Elec Onagawa Nuclear Plant Safe - Dep Chief Cabinet Sec (REU)

By Chizu Nomiyama

Reuters, April 8, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

Chernobyl Engineer, Carter Adviser Call For Atomic Enforcer (1) (BLOOM)

By Yuriy Humber

Bloomberg News, April 8, 2011

Nuclear veterans including the chief engineer at Chernobyl and the adviser to US President Jimmy Carter on Three Mile Island are calling for a global regulator with authority to enforce safety standards.

Nikolai Steinberg, who worked at the Chernobyl nuclear plant when it suffered the world's worst nuclear disaster in 1986, and Harold Denton, a presidential adviser on the 1979 Three Mile Island accident, are part of a 16-person group from 11 nations that made an appeal to the United Nations this week.

The group, which also includes the former heads of the nuclear agencies in Germany and India, is calling for a united response on safety standards after the Fukushima nuclear plant disaster in Japan that began last month. China, India, Germany and the U.K. are postponing new plants as the Japanese station spews radiation that has carried around the globe, stoking public opinion against atomic energy.

"We won't survive another accident like this," Victor Murogov, a member of the group and former deputy director general of the UN's International Atomic Energy Agency, said by phone from Moscow. "We need to limit our national interests for the global good. The situation is no longer tolerable."

The IAEA monitors global policy without the power to enforce changes. National regulators accept IAEA guidance on a voluntary basis, according to the agency's website.

Emergency Equipment

Almost a month after the March 11 earthquake and tsunami damaged the station at Tokyo Electric Power Co.'s Fukushima plant, workers are still using emergency equipment to try to cool the reactors. The plant operator did not prepare adequately for the quake and tsunami that disabled the cooling systems, Prime Minister Naoto Kan said last week.

The 40-year-old Fukushima plant was given approval by Japan's Nuclear and Industrial Safety Agency to keep running for another decade a month before the quake.

Seventy-two countries that signed the Convention on Nuclear Safety, drafted after the 1986 Chernobyl meltdown in Ukraine, are in Vienna this week for a triennial meeting. The 10-day closed-door event, during which Ukraine and Japan are scheduled to provide safety assessments, is hosted by the IAEA.

The group of industry veterans was set up two weeks ago to collate ideas and provide a public response to the situation in Japan, Murogov said. The aim is to lobby for change to prevent nuclear accidents and raise safety levels, he said. The statement will be presented to the US Nuclear Regulatory Commission and Department of Energy, as well as the IAEA.

International Rules

IAEA Director General Yukiya Amano reiterated calls for more stringent international safety rules at an April 4 briefing in Vienna. The agency will convene in June a four-day ministerial meeting among its 151 member states to discuss new atomic safety measures.

Members of the 16-person ad hoc group delivered their five-page statement to IAEA's Amano yesterday and plan for a wider distribution among governments and industry players, Murogov said. The group hopes the statement, entitled "Never Again: An Essential Goal for Nuclear Safety," will initiate talks on implementing change in the industry by the June meeting of the IAEA, he said.

"There are signs that national and international safety assessments and peer review missions are becoming more focused on demonstrating that safety is satisfactory and in compliance with national and international standards than on finding and correcting deficiencies, be they in design, operation, or the standards themselves," according to the statement, a copy of which was e-mailed to Bloomberg News.

Could Have Avoided

"Relatively inexpensive improvements detectable by more extensive analysis beforehand may have avoided" the world's worst nuclear accidents, the statement said.

The nuclear industry must enforce a standard level of education and training, allow countries to vet each other's regulation and plant operations, and have more thorough accident management plans, according to the group. Insurance premiums for nuclear power plant owners should be tied to plant safety track records, the statement said.

"Nuclear technology is global but all our regulation regimes are national," Murogov said. "Responsibility on a national level must rise."

Physicians Call For Nuclear Power Moratorium (Epoch)

By Helena Zhu

The Epoch Times, April 8, 2011

As the nuclear crisis continues in Japan, Physicians for Global Survival are calling for a moratorium on new nuclear reactors in Canada and a suspension of operations at existing reactors on fault lines.

PGS said that unlike x-rays, which have little effect on human health due to their limited exposure, radioactive emissions from nuclear power plants expose entire populations and are “gifts that keep on giving.”

“There is no safe level of radiation exposure,” said Dr. Michael Dworkind, ex-president of PGS, in a press release.

“Only recently, scientists discovered that background natural radon was responsible for an estimated 20 percent of lung cancers in Canadians. The same scientists estimate that 20 percent of childhood leukemia occurs as a result of exposure to natural radiation.”

According to the US National Academy of Sciences, any exposure, but especially long-term exposure, increases the risk of developing cancer.

The public health risk from a large radioactive release from Canadian reactors near densely populated areas around Toronto is substantial.

— Physicians for Global Survival

“Human fallibility being what it is, the only way to avoid nuclear accidents is to not build nuclear reactors,” said Dr. Birkett, a long-time board member of PGS.

The organization stressed that medical treatment for radiation exposure is still limited. Among other radioactive isotopes, iodine-131 can cause thyroid cancer when absorbed through inhalation and ingestion. Yet iodine pills can only provide minimal protection against the absorption of iodine-131.

PGS is particularly concerned about a large radioactive release to densely populated areas and the financial effects of an accident.

“The public health risk from a large radioactive release from Canadian reactors near densely populated areas around Toronto is substantial,” the release said.

The Ottawa-based organization is calling on the federal government and the Canadian Nuclear Safety Commission to immediately implement a moratorium on new nuclear reactor licensing and design certification, and to suspend operations at nuclear reactors on fault lines while a safety review is conducted.

The call comes just as a new nuclear project is proposed for Ontario. Ontario Power Generation is planning to build two new reactors at its Darlington generating station—a move welcomed by the Canadian Nuclear Association.

“This proposed project is a very important step in fulfilling Canada’s growing energy demands,” CNA president and CEO Denise Carpenter said in a release.

Carpenter said the new nuclear units would meet the Ontario government’s commitment to maintaining nuclear power at 50 percent of the province’s energy supply and provide jobs for up to 7,500 workers directly and indirectly across the province.

Even though Japan’s Fukushima Daiichi nuclear power plant is presenting challenges to the global nuclear community, Canada’s nuclear industry will apply lessons learned from Japan’s experience, Carpenter said.

“At home and abroad, our industry is participating in discussions on lessons learned from this event and how to address any necessary changes required to enhance safety systems.”

South of the border, President Barack Obama said last week that the US will continue to endorse nuclear energy, but future plants will be built based on lessons learned from Japan’s crisis.

“Right now, America gets about one-fifth of our electricity from nuclear energy,” Obama said at Georgetown University on March 30. “We can’t simply take [nuclear power] off the table.”

Obama has called for a comprehensive safety review by the Nuclear Regulatory Commission to make sure all domestic nuclear facilities are safe.

EDF Strike Cuts 18,000 Megawatts Of French Power Supply (BLOOM)

By Tara Patel And Albertina Torsoli

Bloomberg News, April 7, 2011

A 24-hour strike by French energy workers over a possible threat to subsidized bills cut power nationwide by 18,000 megawatts, a union representative at Electricite de France SA said.

About 9,000 megawatts of the cuts were from 12 of EDF’s nuclear plants, said Laurent Langlard, a member of the CGT union. EDF’s press office didn’t comment on the strike when contacted by Bloomberg News.

Workers are protesting against a move by management to scale back the size of the discount they receive on electricity and natural gas rates, Langlard said. EDF, which is 85 percent owned by the government, operates the country’s 58 reactors.

EDF wants workers to pay taxes on their power bills rather than the current arrangement where they are treated as a perk on income tax forms, he said.

The power and gas discounts date to before World War II and employees are “attached” to them, Langland said. Ending the discounts will help EDF meet future balance sheet provisions of as much as 2.3 billion euros (\$3.3 billion), he said.

Industry Minister Eric Besson told RMC Radio today that the discounted bills for EDF's current and former employees “weigh heavily on its costs.”

It's not “abnormal” to suggest they should face higher bills, alongside the rest of the country, he said.

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Sarkozy Risks Brusses Meltdown (FT)

By Peggy Hollinger, Paris

Financial Times, April 8, 2011

Full-text stories from the Financial Times are available to FT subscribers by clicking the link.

Dissident Group Says Iran Factory Really A Nuke Site (WP)

By Joby Warrick

Washington Post, April 8, 2011

An Iranian opposition group claimed Thursday to have discovered the location of a secret factory that manufactures high-tech equipment for Iran's nuclear program, a facility the group says is disguised as a tool-making plant.

The National Council of Resistance of Iran said the alleged plant makes centrifuge parts for Iran's uranium enrichment program and is closely tied to Iran's Defense Ministry. The dissident group also claimed that Iran already has made components for 100,000 centrifuge machines, far more than is needed to supply the country's known uranium facilities.

“This is a clear indication that there are other secret sites out there, either undergoing construction or perhaps already completed,” Alireza Jafarzadeh, a consultant and former spokesman for the NCRI, told reporters after unveiling satellite photos of the site 80 miles west of Tehran.

U.N. nuclear officials have long known that Iran is operating factories for centrifuge parts, but Iranian officials have never allowed visits by U.N. inspectors or even revealed the location of the facilities. Centrifuges are fast-spinning machines used to make enriched uranium, a key ingredient in both nuclear reactor fuel and nuclear weapons.

The opposition group identified a cluster of three buildings inside a small industrial park as Iran's main production center for centrifuge parts since 2006. The complex is dubbed “Taba,” after a cutting-tool plant that once occupied the site, and is under heavy security, Jafarzadeh said.

He said some components for Taba were being manufactured at a nearby facility called Shahid Shafi'zadeh Industrial Complex, a subsidiary of the Iranian Defense Ministry's Aerospace Industries Organization.

Other than labeled satellite photos, the dissidents offered no evidence to back their claims. The NCRI and its operational wing — the Mujaheddin-e Khalq — have revealed the existence of other secret Iranian nuclear sites in the past, and the group was the first to publicly disclose the existence of Iran's underground uranium enrichment site at Natanz.

Jafarzadeh said the group has shared the new information with both the US government and the International Atomic Energy Agency, and he called on Iran to allow inspectors into the Taba facility to remove any doubt about the nature of the site. There was no immediate reaction to the NCRI's claim from US or U.N. officials.

“The easy way to verify this is to open the site to the IAEA so they can inspect it,” he said.

Iran, which insists that its nuclear program is entirely peaceful, contends that it is not obligated under international treaties to open its centrifuge production facilities to outsiders for inspection.

About 9,000 centrifuges are currently installed at the Natanz facility, including about 1,000 machines that were rushed into production in the past two years to replace damaged equipment after a series of apparent cyber-attacks on Natanz.

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Dissidents: Secret Factories Making Key Parts For Iran Nuclear Program (CSM)

Christian Science Monitor, April 8, 2011

An Iranian dissident group with a track record of revealing secret sites involved in Iran's nuclear program on Thursday offered more information — this time, on industrial facilities where it says the Iranian regime is producing parts for the centrifuges used in its uranium enrichment program. Skip to next paragraph

Flanked by poster boards with aerial photos of the alleged sites northwest of Tehran, two members of the National Council of Resistance of Iran told a Washington audience that the two sites have produced as many as 100,000 centrifuges under the direction of Iran's Defense Ministry.

"The number of centrifuges is way beyond the needs of Tehran for its already-declared sites," said Alireza Jafarzadeh, a prominent Iranian dissident who is known for revealing the Natanz nuclear site in 2002.

For several years, the International Atomic Energy Agency (IAEA) has noted Iran's growing numbers of centrifuges – the machines used to produce low- and highly-enriched uranium – but has been stymied in its efforts to ascertain where and how the centrifuges were produced.

Iran has insisted it is under no obligations to divulge that information. Tehran also maintains that the Iran nuclear program is for peaceful purposes.

Mr. Jafarzadeh and Soona Samsami, an Iranian women's rights activist, said the two sites are located at what they called the TABA industrial site outside the city of Karaj and a site called Shafizadeh outside Qazvin. The two sites, Jafarzadeh said, are closely managed by the Defense Ministry – a fact he said should serve as a "red flag" to the IAEA and others trying to determine if Iran's nuclear program is aimed at military applications.

As in the past, the information was provided by members of the People's Mojahedin Organization of Iran (PMOI, or MEK) who have infiltrated the Iranian nuclear program, according to the two Washington dissidents.

And also as in the past, the dissidents used the opportunity of a press conference to lobby for MEK's removal from the State Department's list of terrorist organizations.

MEK supporters were not successful in efforts to persuade the Bush administration to delist the group, and they've so far failed with the Obama administration as well.

Raymond Tanter, a former national security official in the Reagan White House and a longtime supporter of the MEK, says US intelligence agencies "missed" the so-called Arab spring because they were too focused on official groups rather than on those that "are not permitted." A similar scenario is playing out in Iran, he says, with intelligence officials ignoring the groups that have the best inside information, particularly on Iran's nuclear program.

With the international community paying heightened attention to other parts of the Middle East, the Iranian government is trying to further its own political and security aims, says Mr. Tanter, a visiting professor at Georgetown University in Washington. "The Iranian regime is seeking to fly under the radar while it continues more activities for enriching uranium," he says.

Jafarzadeh and Ms. Samsami provided detailed information concerning what centrifuge parts are produced where. The information also includes the names of Iranian military officers and others involved in managing the TABA and Shafizadeh sites, some of whom are already named in United Nations Security Council resolutions for their involvement in the Iranian nuclear program.

The information divulged at the press conference was turned over to US officials earlier, they said.

Jafarzadeh offered some colorful detail of the operations at the two sites. He said the informants claim that employees traveling between sites with production documents have their briefcases handcuffed to them so they cannot become separated. All phone calls at the facilities are closely monitored, while electronic devices and personal computers are not allowed, he says – making the removal of any information extremely difficult.

Coincidentally or not, the Iranian dissidents are expecting a new State Department ruling on the MEK's terrorist listing within a few weeks. The MEK was listed as a terrorist organization under the Clinton administration, with the urging of the Iranian government at the time and based on information that members of the group were involved in killing American citizens.

But Tanter claims the MEK has not been involved in any "military activity" for a decade.

Nuclear-related Site Detected In Iran: Opposition (AFP)

AFP, April 8, 2011

WASHINGTON (AFP) – A group close to the Iranian opposition in exile said Thursday it has located an industrial site near Tehran that produces components for centrifuges used to enrich uranium.

The Taba site has been in operation for four and a half years, Alireza Jafarzadeh said at a news conference in Washington, citing information gathered by the People's Mujahedeen of Iran (PMOI) opposition group.

Taba, which in Persian stands for Iranian Cutting Tools Factory, produces "aluminium casing, magnets, molecular pumps, composite tubes, centrifuge bases," he said.

Several aerial photographs of industrial installations were presented at the news conference. The site was said to be located in Karaj in Tehran's western suburbs.

"This is another indication that Tehran, unlike what it says, is not transparent, (does not intend) to be cooperative with the international community, is not pursuing a peaceful nuclear energy program, because otherwise there's no need for any of these things, no need to hide the program since 2002," Jafarzadeh said.

He said there was also another factory for making centrifuge components in Sahfizadeh, near Qazvin, 130 kilometers (80 miles) west of Tehran, but provided few details.

He said Iran's capacity to build centrifuges, and the number of them in operation in the country, was a critical question for determining the true intentions and goals of the Iranian nuclear program.

The Iranian opposition in exile has passed detailed information on its findings to the US administration and the International Atomic Energy Agency, he said.

The major powers accuse Iran of secretly seeking to acquire nuclear weapons under the cover of a civilian nuclear program, a charge Tehran denies.

The Iranian nuclear program has been condemned in six UN Security Council resolutions, which have included four sets economic and political sanctions. The United States and other countries have adopted their own sanctions as well.

Iran's Bushehr Nuclear Plant To Open With International Oversight (VOA)

By Jeffrey Young

Voice of America, April 8, 2011

Iran's Bushehr nuclear power plant has been completed. Russia, which supplied the reactor, is now training Iranians to operate the facility. And the International Atomic Energy Agency, or IAEA, of which Iran is a member, says it is committed to imparting a "culture of nuclear safety" for all member nuclear power operators. As last month's nuclear disaster at Japan's Fukushima power plant shows, such safety considerations can become a life-or-death matter.

Workers at the Fukushima nuclear power plant, north of Tokyo, on the Pacific Ocean coast, have struggled to prevent the spread of radiation following damage incurred by that massive earthquake in March. Their efforts reflect the extensive emergency training they, and other nuclear power workers worldwide, are given. That includes the personnel at Iran's new Bushehr nuclear power plant.

The nuclear power industry will never forget what happened 25 years ago at the Chernobyl facility in Ukraine. There, an experiment with the cooling system - one not provided for in the training regimen - led to a reactor explosion and what became the world's worst nuclear power disaster.

Especially after Chernobyl, the global nuclear power industry has focused on what it calls a "culture of nuclear safety." At The Nuclear Energy Institute - a US trade group, Tony Pietrangelo explains the concept.

"The safety culture exists on a continuum," said Tony Pietrangelo. "You can always work to improve it. It is a questioning attitude. It is professionalism. And again, it is that profound respect for the technology you are dealing with."

One pillar of that safety culture is thorough training for those who will operate nuclear power plants. Russia's state nuclear power entity, ROSATOM, which completed the Bushehr plant after years of delays, is now training the Iranian staff to run it. At the US Brookhaven National Laboratory, senior scientist Upendra Rohatgi describes the training regimen.

"They are providing operator training in terms of classroom [instruction]. Then also, they have full-scope simulators, which are the same as western [in terms of] standards, and then, in-plant training," noted Rohatgi.

Like the aircraft simulators that pilots train on, nuclear power operators can learn how to cope with problems and sudden emergencies without making real-life mistakes that could cause fatalities and devastate the environment.

ROSATOM will remain on-site for the immediate future, as it has done with other client nations such as China and India.

And the International Atomic Energy Agency (IAEA), of which Iran is a member state, will oversee the plant's operation.

The IAEA sends teams of inspectors to nuclear power plants to ensure that best practices are being followed.

"They look at the training programs - how the operators are trained to cope with accidents on simulators, and so on. And, we also look at the qualifications of people to perform maintenance. And also, the preparation of the plant for possible emergencies," explained IAEA Nuclear Installation Safety Director Philippe Jamet.

Iran's Atomic Energy Agency has repeatedly said that as an IAEA member, it will follow that U.N. agency's operational and safety protocols at the Bushehr plant.

But what the disaster at Japan's Fukushima plant makes clear is that the severity of natural events, such as a massive earthquake, can overwhelm even the highest levels of training and attention to safety.

This is part three of a three-part series. [Click here for part 1](#) and [here part 2](#).

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LLLL/60

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** Reactor report

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China could resume reviews of new nuclear projects within a year, according to an industry official.

The Chinese government announced last month that it would suspend nuclear power projects approval until it finalizes a nuclear safety plan. It made the decision during a State Council Standing Committee meeting, less than a week after the Fukushima nuclear crisis unfolded in Japan.

The nuclear safety plan will be issued by June, said Yiren Wang, deputy director of China's National Defense Technology and Industry Administration, which is responsible for making policy and regulations governing defense and military-to-civilian technologies and industries. Wang spoke April 7 in Shenzhen at the China Nuclear Energy Association annual meeting.

An industry official from one of China's three nuclear power plant operators said during an interview the same day that he expects the government to restart reviews of new projects in six months to a year, although he said most in the industry are still "scratching their heads" about the exact timing.

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"The important role that nuclear power plays" in China's energy mix "won't change," said Chaofei Yang, chief nuclear safety engineer at the Chinese Ministry of Environmental Protection, speaking at the same event in Shenzhen. But "based on lessons from the Fukushima accident," he asked, "can we slow down the pace" of nuclear power expansion?

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Operators of nuclear power plants have to pay special attention to the impact of multiple extreme disasters, he said, of which it is "most important" to examine the effect of flooding. Despite the frequency of flooding in China, the country is inadequately prepared to prevent it, he said.

China currently focuses on blocking flood waters, while developed countries such as the US are focusing on diverting the water, Yang said, adding that the latter is a more

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Yang said the guidelines also require nuclear plant operators to assess reactors' capability to survive massive earthquakes. "If a magnitude 9.0 earthquake" the size of the earthquake that struck Japan last month "happens in China, can our plants be safe? We have to think about it," he said.

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Japan's deputy chief cabinet secretary, Tetsuro Fukuyama, told reporters during an April 7 briefing that two of three power lines to the three-unit Onagawa plant, which shut March 11 following the magnitude 9 earthquake, were knocked out by the earthquake. He said the third line is supplying sufficient electricity to power pumps that provide cooling water to the reactors, according to NHK television.

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Among other things, the resolution called for mandatory "stress tests" for all EU nuclear reactors. The tests called for by the EU Council last month are nominally voluntary, although all EU regulators have vowed to impose them on licensees.

At an EP plenary session, 300 members voted against the resolution and 264 in favor, with 61 abstentions.

"Various points of disagreement between political groups ... led to a majority rejecting the final text," the parliament's press service said.

In a debate on the measure April 6, several MEPs expressed concern that the proposed stress tests would not be tough enough, and some said they should be conducted by reviewers independent of national safety

authorities.

Other MEPs stressed that nuclear regulation is a matter of sovereign national control and that the EU should not act in haste to shut reactors. Concerns were also voiced over the EU's ability to ensure nuclear safety standards at installations beyond EU borders, for example in Belarus and Russia.

The Green/Liberal group in the EP said in a statement that its members, who originally cosigned a motion to put such a resolution to a vote, had voted against the final measure because it did not "clearly call for a phase-out" of nuclear power.

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"We don't have enough electricity of our own," party leader Timo Soini said. "And that's why we should build these reactors."

Fennovoima and Teollisuuden Voima Oy received approvals from the Eduskunta, or parliament, for one new reactor each.

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Net income increased 13% to Eur387.1 million, a lower increase than Ebitda because of higher depreciation costs and increased net finance costs associated with plant capacity expansions, the company said.

Urenco said it continued to invest heavily in capital expenditure in 2010, spending Eur703.4 million related to the ongoing capacity expansion across Europe and at the US plant.

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NB Power requested the one-year renewal to complete refurbishment activities and to prepare a request for a five-year renewal in 2012, the CNSC said. NB Power must receive CNSC approval before it can reload fuel and restart the reactor.

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Nuclear Energy Institute CEO Marvin Fertel said he believes four of the six units at Japan's Fukushima I nuclear power plant will need to be encased in concrete after they are stabilized.

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Decommissioning and cleaning up the site would be a massive effort, Fertel said, although it is technically possible.

Japan's government plans to use remote-controlled small helicopters soon to get close to spent fuel pools at some of the reactors at Fukushima I, also known as Fukushima Daiichi, Fertel said. Those drone-type aircraft could provide video of the pools, showing how much water they contain, as well as temperature data, he said.

*** NRC starts special inspection at Exelon's Braidwood and Byron

The NRC said April 6 that it has started a special inspection "to review the handling of two equipment issues" at Exelon Nuclear's Braidwood and Byron nuclear power plants in Illinois.

"The first issue involves the operability of backup systems that would be used to remove heat from the reactor in case of a reactor trip or an accident at Braidwood and Byron stations," NRC said in a statement. "The second issue is associated with the loss of control room equipment alarms during maintenance activities in 2010 and 2011."

"Neither of the issues posed an immediate threat to public health and safety," and both have been resolved, the agency said.

The inspection team "will review the circumstances surrounding" the equipment issues and evaluate Exelon Nuclear's responses, the NRC said. The inspection report will be available within 45 days of completion of the inspection, it said.

Exelon Nuclear "has already addressed both issues at Braidwood and Byron," spokeswoman Krista Lopykinski said April 6.

*** Correction

The Tennessee Valley Authority plans to submit a construction permit application for a small modular reactor to NRC in July-September 2012. The date was incorrect in the April 6 Nuclear News Flashes.

*** Reactor report

Entergy's Waterford-3 in Louisiana was shut early April 7 for refueling and maintenance, plant spokesman Carl Rhode said. Outage work includes replacement of the main generator rotor on the turbine deck, Rhode said. He declined to discuss the expected duration of the outage.

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Nuclear News Flashes

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States Energy Association's annual meeting. The decision on what to do with units 5 and 6, which are adjacent to the first four, but at a slight distance, is separate and will depend on radiation dose rates over time, he said. Ultimately, the government is likely to make the final decision on the future of those two units, Fertel said.

Decommissioning and cleaning up the site would be a massive effort, Fertel said, although it is technically possible.

Japan's government plans to use remote-controlled small helicopters soon to get close to spent fuel pools at some of the reactors at Fukushima I, also known as Fukushima Daiichi, Fertel said. Those drone-type aircraft could provide video of the pools, showing how much water they contain, as well as temperature data, he said.

*** NRC starts special inspection at Exelon's Braidwood and Byron

The NRC said April 6 that it has started a special inspection "to review the handling of two equipment issues" at Exelon Nuclear's Braidwood and Byron nuclear power plants in Illinois.

"The first issue involves the operability of backup systems that would be used to remove heat from the reactor in case of a reactor trip or an accident at Braidwood and Byron stations," NRC said in a statement. "The second issue is associated with the loss of control room equipment alarms during maintenance activities in 2010 and 2011."

"Neither of the issues posed an immediate threat to public health and safety," and both have been resolved, the agency said.

The inspection team "will review the circumstances surrounding" the equipment issues and evaluate Exelon Nuclear's responses, the NRC said. The inspection report will be available within 45 days of completion of the inspection, it said.

Exelon Nuclear "has already addressed both issues at Braidwood and Byron," spokeswoman Krista Lopykinski said April 6.

*** Correction

The Tennessee Valley Authority plans to submit a construction permit application for a small modular reactor to NRC in July-September 2012. The date was incorrect in the April 6 Nuclear News Flashes.

*** Reactor report

Entergy's Waterford-3 in Louisiana was shut early April 7 for refueling and maintenance, plant spokesman Carl Rhode said. Outage work includes replacement of the main generator rotor on the turbine deck, Rhode said. He declined to discuss the expected duration of the outage.

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Wagner, Katie

From: Wagner, Katie
Sent: Friday, March 18, 2011 8:59 AM
To: Tinkler, Charles
Subject: FW: BWR Zirc Fire Experiment

You've already seen this, but here it is for your reference . . . please let me know what is going on when you find out. – Thanks, Katie

From: Santiago, Patricia
Sent: Friday, March 18, 2011 8:26 AM
To: Wagner, Katie
Subject: RE: BWR Zirc Fire Experiment

We aren't to give any to NEI per Kathy by the way.
I think Ghani recognizes that
thanks

From: Wagner, Katie
Sent: Friday, March 18, 2011 8:16 AM
To: Santiago, Patricia
Subject: RE: BWR Zirc Fire Experiment

I didn't have this email before, thanks for passing it to me! - Katie

From: Santiago, Patricia
Sent: Thursday, March 17, 2011 7:01 PM
To: Wagner, Katie
Subject: FW: BWR Zirc Fire Experiment

Did u get

From: Gibson, Kathy
Sent: Wednesday, March 16, 2011 5:55 PM
To: Zigh, Ghani; Scott, Michael
Cc: Tinkler, Charles; Lee, Richard; Santiago, Patricia
Subject: Re: BWR Zirc Fire Experiment

Charlie also talked to Sandia and they told him that NEI and GE asked for a list of reports that are relevant to SFP zirc fire. Charlie told them to go ahead and provide the list. I suspect GE and/or NEI will then ask us for some or all of the docs on the list.

Richard sent an email to OGC to ask about releasing OUO docs and waiting to hear back.

We will keep working it until we have the relevant information to make a decision about what to release and to whom.

From: Zigh, Ghani
To: Gibson, Kathy; Scott, Michael
Sent: Wed Mar 16 16:30:23 2011
Subject: BWR Zirc Fire Experiment

Kathy,

I did talk to Sandia. They are going to inquire more about the information that both NEI and GE are looking for. They may refer them to us.

The bottom line is that no information about zirc fire will be exchanged without our knowledge.

I also told SNL that we may prepare a fact sheet that we can give to GE and NEI. The information sheet will have enough information to indicate that zirc fire is possible.

Thanks

Ghani Zigh

From: ET07 Hoc
Sent: Saturday, March 19, 2011 9:08 PM
To: tfrey@ofda.gov
Subject: Bechtel Contact

Tom:

I have checked here in the Operations Center and the information that I have is that the Bechtel point of contact is Ned Merchant [cemercha@bechtel.com]. We had a conference call earlier this evening at 1800 and the USAID rep on that call indicated that he had contact information for Bechtel and was going to confirm USG intent with respect to the pumping systems.

John Jolicoeur
Status Officer
NRC Operations Center

From: LIA05 Hoc
Sent: Saturday, March 19, 2011 4:35 PM
To: Andrew Seward; Harry Sherwood; Michelle Ralston; Steve Horwitz; Tim Greten; Vanessa E. Quinn
Subject: FAQ on Earthquakes (From NRC Press Release)
Attachments: faqs-related-to-japan.pdf

Please find the attached.

Bonnie Sheffield Dayshift 0700-1500
Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187

LLLL/63

NRC frequently asked questions related to the March 11, 2011 Japanese Earthquake and Tsunami

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Bookmark not defined.

1) Can an earthquake and tsunami as large as happened in Japan also happen here?

This earthquake occurred on a “subduction zone”, which is the type of tectonic region that produces earthquakes of the largest magnitude. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. Subduction zone earthquakes are also required to produce the kind of massive tsunami seen in Japan. In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of northern California, Oregon and Washington. So, a continental earthquake and tsunami as large as in Japan could only happen there. The only nuclear plant near the Cascadia subduction zone is the Columbia Generating Station. This plant is located a large distance from the coast (approximately 225 miles) and the subduction zone (approximately 300 miles), so the ground motions estimated at the plant are far lower than those seen at the Fukushima plants. This distance also precludes the possibility of a tsunami affecting the plant. Outside of the Cascadia subduction zone, earthquakes are not expected to exceed a magnitude of approximately 8. Magnitude is measured on a log scale and so a magnitude 9 earthquake is ten times larger than a magnitude 8 earthquake.

2) Did the Japanese underestimate the size of the maximum credible earthquake and tsunami that could affect the plants?

The magnitude of the earthquake was somewhat greater than was expected for that part of the subduction zone. However, the Japanese nuclear plants were recently reassessed using ground motion levels similar to those that are believed to have occurred at the sites. The ground motions against which the Japanese nuclear plants were reviewed were expected to result from earthquakes that were smaller, but were much closer to the sites. The NRC does not currently have information on the maximum tsunami height that was expected at the sites.

3) How high was the tsunami at the Fukushima nuclear plants?

The tsunami modeling team at the National Oceanic and Atmospheric Administration’s Pacific Marine Environmental Lab have estimated the wave height just offshore to be approximately 8 meters in height at Fukushima Daiichi and approximately 7 meters in Fukushima Daini. This is based on recordings from NOAA’s Deep-ocean Assessment and Reporting of Tsunamis (DART) buoys and a high resolution numerical model developed for the tsunami warning system. If plant recordings exist they were not yet provided to the NRC.

4) Was the damage to the Japanese nuclear plants mostly from the earthquake or the tsunami?

Because this event happened in Japan, it is hard for NRC staff to make the assessment necessary to understand exactly what happened at this time. In the nuclear plants there may have been some damage from the shaking, and the earthquake caused the loss of offsite power. However, the tsunami appears to have played a key role in the loss of other power sources at the site producing station blackout, which is a critical factor in the ongoing problems.

5) Have any lessons for US nuclear plants been identified?

The NRC is in the process of following and reviewing the event in real time. This will undoubtedly lead to the identification of issues that warrant further study. However, a complete

understanding of lessons learned will require more information than is currently available to NRC staff.

6) Was there any damage to US reactors from either the earthquake or the resulting tsunami?

No.

7) How many US reactors are located in active earthquake zones?

Although we often think of the US as having “active” and “non-active” earthquake zones, earthquakes can actually happen almost anywhere. Seismologists typically separate the US into low, moderate, and high seismicity zones. The NRC requires that every nuclear plant be designed for site-specific ground motions that are appropriate for their locations. In addition, the NRC has specified a minimum ground motion level to which nuclear plants must be designed.

8) What level of earthquake hazard are the US reactors designed for?

Each reactor is designed for a different ground motion that is determined on a site-specific basis. The existing nuclear plants were designed on a “deterministic” or “scenario earthquake” basis that accounted for the largest earthquakes expected in the area around the plant, without consideration of the likelihood of the earthquakes considered. New reactors are designed using probabilistic techniques that characterize both the ground motion levels and uncertainty at the proposed site. These probabilistic techniques account for the ground motions that may result from all potential seismic sources in the region around the site. Technically speaking, this is the ground motion with an annual frequency of occurrence of 1×10^{-4} /year, but this can be thought of as the ground motion that occurs every 10,000 years on average. One important aspect is that probabilistic hazard and risk-assessment techniques account for beyond-design basis events. NRC’s Generic Issue 199 (GI-199) project is using the latest probabilistic techniques used for new nuclear plants to review the safety of the existing plants. [see questions 16 to 21 for more information about GI-199]

9) What magnitude earthquake are currently operating US nuclear plants designed to?

Ground motion is a function of both the magnitude of an earthquake and the distance from the fault to the site. Nuclear plants, and in fact all engineered structures, are actually designed based on ground motion levels, not earthquake magnitudes. The existing nuclear plants were designed based on a “deterministic” or “scenario earthquake” basis that accounted for the largest earthquakes expected in the area around the plant. A margin is further added to the predicted ground motions to provide added robustness.

10) Have events in Japan changed our perception of earthquake risk to the nuclear plants in the US?

The NRC continues to determine that US nuclear plants are safe. This does not change the NRC’s perception of earthquake hazard (i.e., ground motion levels) at US nuclear plants. It is too early to tell what the lessons from this earthquake are. The NRC will look closely at all aspects of response of the plants to the earthquake and tsunami to determine if any actions need to be taken in US nuclear plants and if any changes are necessary to NRC regulations.

11) Can significant damage to a nuclear plant like we see in Japan happen in the US due to an earthquake? Are the Japanese nuclear plants similar to US nuclear plants?

All US nuclear plants are built to withstand environmental hazards, including earthquakes and tsunamis. Even those nuclear plants that are located within areas with low and moderate seismic activity are designed for safety in the event of such a natural disaster. The NRC requires that safety-significant structures, systems, and components be designed to take into account even rare and extreme seismic and tsunami events. In addition to the design of the plants, significant effort goes into emergency response planning and accident management. This approach is called defense-in-depth.

The Japanese facilities are similar in design to some US facilities. However, the NRC has required modifications to the plants since they were built, including design changes to control hydrogen and pressure in the containment. The NRC has also required plants to have additional equipment and measures to mitigate damage stemming from large fires and explosions from a beyond-design-basis event. The measures include providing core and spent fuel pool cooling and an additional means to power other equipment on site.

12) What is the likelihood of the design basis or “SSE” ground motions being exceeded over the life of a nuclear plant?

The ground motions that are used as seismic design bases at US nuclear plants are called the Safe Shutdown Earthquake ground motion (SSE). In the mid to late 1990s, the NRC staff reviewed the potential for ground motions beyond the design basis as part of the Individual Plant Examination of External Events (IPEEE). From this review, the staff determined that seismic designs of operating nuclear plants in the US have adequate safety margins for withstanding earthquakes. Currently, the NRC is in the process of conducting GI-199 to again assess the resistance of US nuclear plants to earthquakes. Based on NRC’s analyses to date, the probability of ground motions exceeding the SSE for the plants in the Central and Eastern United States is less than 2%, with values ranging from a low of 0.1% to a high of 6%.

It is important to remember that structures, systems and components are required to have “adequate margin,” meaning that they must continue be able withstand shaking levels that are above the plant’s design basis.

13) Which reactors are along coastal areas that could be affected by a tsunami?

Many nuclear plants are located in coastal areas that could potentially be affected by a tsunami. Two nuclear plants, Diablo Canyon and San Onofre, are on the Pacific Coast, which is known to have a tsunami hazard. Two nuclear plants on the Gulf Coast, South Texas and Crystal River, could also be affected by tsunami. There are many nuclear plants on the Atlantic Coast or on rivers that may be affected by a tidal bore resulting from a tsunami. These include St. Lucie, Turkey Point, Brunswick, Oyster Creek, Millstone, Pilgrim, Seabrook, Calvert Cliffs, Salem/Hope Creek, and Surry. Tsunami on the Gulf and Atlantic Coasts occur, but are very rare. Generally the flooding anticipated from hurricane storm surge exceeds the flooding expected from a tsunami for nuclear plants on the Atlantic and Gulf Coast. Regardless, all nuclear plants are designed to withstand a tsunami.

14) What is magnitude anyway? What is the Richter Scale? What is intensity?

An earthquake's magnitude is a measure of the strength of the earthquake as determined from seismographic observations. Magnitude is essentially an objective, quantitative measure of the size of an earthquake. The magnitude can be expressed in various ways based on seismographic records (e.g., Richter Local Magnitude, Surface Wave Magnitude, Body Wave Magnitude, and Moment Magnitude). Currently, the most commonly used magnitude measurement is the Moment Magnitude, M_w , which is based on the strength of the rock that ruptured, the area of the fault that ruptured, and the average amount of slip. Moment magnitude is, therefore, a direct measure of the energy released during an earthquake. Because of the logarithmic basis of the scale, each whole number increase in magnitude

represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

The Richter magnitude scale was developed in 1935 by Charles F. Richter of the California Institute of Technology and was based on the behavior of a specific seismograph that was manufactured at that time. The instruments are no longer in use and the magnitude scale is, therefore, no longer used in the technical community. However, the Richter Scale is a term that is so commonly used by the public that scientists generally just answer questions about "Richter" magnitude by substituting moment magnitude without correcting the misunderstanding.

The intensity of an earthquake is a qualitative assessment of effects of the earthquake at a particular location. The intensity assigned is based on observed effects on humans, on human-built structures, and on the earth's surface at a particular location. The most commonly used scale in the US is the Modified Mercalli Intensity (MMI) scale, which has values ranging from I to XII in the order of severity. MMI of I indicates an earthquake that was not felt except by a very few, whereas MMI of XII indicates total damage of all works of construction, either partially or completely. While an earthquake has only one magnitude, intensity depends on the effects at each particular location.

15) How do magnitude and ground motion relate to each other?

The ground motion experienced at a particular location is a function of the magnitude of the earthquake, the distance from the fault to the location of interest, and other elements such as the geologic materials through which the waves pass.

16) What is Generic Issue 199 about?

GI-199 investigates the safety and risk implications of updated earthquake-related data and models. These data and models suggest that the probability for earthquake ground motion above the seismic design basis for some nuclear plants in the Central and Eastern United States, although is still low, is larger than previous estimates.

17) Does GI-199 provide rankings of US nuclear plants in terms of safety?

The NRC does not rank nuclear plants by seismic risk. The objective of the GI-199 Safety/Risk Assessment was to perform a conservative, screening-level assessment to evaluate if further investigations of seismic safety for operating reactors in the central and eastern US (CEUS) are warranted, consistent with NRC directives. The results of the GI-199 safety risk assessment

should not be interpreted as definitive estimates of plant-specific seismic risk because some analyses were very conservative making the calculated risk higher than in reality. The nature of the information used (both seismic hazard data and plant-level fragility information) make these estimates useful only as a screening tool.

18) What are the current findings of GI-199?

Currently operating nuclear plants in the US remain safe, with no need for immediate action. This determination is based on NRC staff reviews of updated seismic hazard information and the conclusions of the first stage of GI-199. Existing nuclear plants were designed with considerable margin to be able to withstand the ground motions from the “deterministic” or “scenario earthquake” that accounted for the largest earthquakes expected in the area around the plant. The results of the GI-199 assessment demonstrate that the probability of exceeding the design basis ground motion may have increased at some sites, but only by a relatively small amount. In addition, the probabilities of seismic core damage are lower than the guidelines for taking immediate action. Although there is not an immediate safety concern, the NRC is focused on assuring safety during even very rare and extreme events. Therefore, the NRC has determined that assessment of updated seismic hazards and plant performance should continue.

19) What do you mean by “increased estimates of seismic hazards” at nuclear plant sites?

Seismic hazard (earthquake hazard) represents the chance (or probability) that a specific level of ground motion could be observed or exceeded at a given location. Our estimates of seismic hazard at some Central and Eastern United States locations have changed based on results from recent research, indicating that earthquakes occurred more often in some locations than previously estimated. Our estimates of seismic hazard have also changed because the models used to predict the level of ground motion, as caused by a specific magnitude earthquake at a certain distance from a site, changed. The increased estimates of seismic hazard at some locations in the Central and Eastern United States were discussed in a memorandum to the Commission, dated July 26, 2006. (The memorandum is available in the NRC Agencywide Documents Access and Management System [ADAMS] under Accession No. ML052360044).

20) Does the Seismic Core Damage represent a measurement of the risk of radiation release or only the risk of core damage (not accounting for additional containment)?

Seismic core damage frequency is the probability of damage to the core resulting from a seismic initiating event. It does not imply either a meltdown or the loss of containment, which would be required for radiological release to occur. The likelihood of radiation release is far lower.

21) Where can I get current information about Generic Issue 199?

The public NRC Generic Issues Program (GIP) website (<http://www.nrc.gov/about-nrc/regulatory/gen-issues.html>) contains program information and documents, background and historical information, generic issue status information, and links to related programs. The latest Generic Issue Management Control System quarterly report, which has regularly updated GI-199 information, is publicly available at <http://www.nrc.gov/reading-rm/doc-collections/generic-issues/quarterly/index.html>. Additionally, the US Geological Survey provides data and results that are publicly available at <http://earthquake.usgs.gov/hazards/products/conterminous/2008/>.

22) Could an accident sequence like the one at Japan's Fukushima Daiichi nuclear plants happen in the US?

It is difficult to answer this question until we have a better understanding of the precise problems and conditions that faced the operators at Fukushima Daiichi. We do know, however, that Fukushima Daiichi Units 1-3 lost all offsite power and emergency diesel generators. This situation is called "station blackout." US nuclear power plants are designed to cope with a station blackout event that involves a loss of offsite power and onsite emergency power. The Nuclear Regulatory Commission's detailed regulations address this scenario. US nuclear plants are required to conduct a "coping" assessment and develop a strategy to demonstrate to the NRC that they could maintain the plant in a safe condition during a station blackout scenario. These assessments, proposed modifications to the plant, and operating procedures were reviewed and approved by the NRC. Several plants added additional AC power sources to comply with this regulation.

In addition, US nuclear plant designs and operating practices since the terrorist events of September 11, 2001, are designed to mitigate severe accident scenarios such as aircraft impact, which include the complete loss of offsite power and all on-site emergency power sources.

US nuclear plant designs include consideration of seismic events and tsunamis'. It is important not to extrapolate earthquake and tsunami data from one location of the world to another when evaluating these natural hazards. These catastrophic natural events are very region- and location-specific, based on tectonic and geological fault line locations.

From: LIA05 Hoc
Sent: Sunday, March 20, 2011 9:04 AM
To: Feighert, Dan; john.simpson@dhs.gov
Subject: FW: Meetings

Per your request

Bonnie Sheffield Dayshift 0700-1500
Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187

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From: Quinn, Vanessa [mailto:Vanessa.Quinn@dhs.gov]
Sent: Sunday, March 20, 2011 8:31 AM
To: LIA05 Hoc
Subject: RE: Meetings

Thanks Bonnie

From: prvs=053680d6a=LIA05.Hoc@nrc.gov [mailto:prvs=053680d6a=LIA05.Hoc@nrc.gov] **On Behalf Of** LIA05 Hoc
Sent: Sunday, March 20, 2011 8:15 AM
To: Andrew Seward; Harry Sherwood; Michelle Ralston; Steve Horwitz; Tim Greten; Vanessa E. Quinn
Cc: James.Kish@dhs.gov
Subject: Meetings

FYI

Commission Meeting scheduled for Monday, March 21 (significant public/media attention expected) Bill Borchardt presenting – topics include supporting activities in Japan, justification for continued operation of U.S. facilities, and path forward for NRC staff.

No further information at this time.

Bonnie Sheffield Dayshift 0700-1500
Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187

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LLLL/64

From: LIA05 Hoc
Sent: Sunday, March 20, 2011 12:29 PM
To: Quinn, Vanessa
Subject: RE: On behalf of Timothy Greten, Deputy Director, FEMA THD/ FRPCC Executive Secretariat: March 17th FRPCC Minutes

Thank you, I will forward this to the staff that requested it.

Bonnie Sheffield Dayshift 0700-1500
Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187

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From: Quinn, Vanessa [mailto:Vanessa.Quinn@dhs.gov]
Sent: Sunday, March 20, 2011 12:10 PM
To: Sheffield, Bonnie; LIA05 Hoc
Cc: Quinn, Vanessa
Subject: FW: On behalf of Timothy Greten, Deputy Director, FEMA THD/ FRPCC Executive Secretariat: March 17th FRPCC Minutes
Importance: High

Hi Bonnie:

Please let me know that you received them. Thanks

LLLL/65

From: ET07 Hoc
Sent: Saturday, March 19, 2011 5:49 PM
To: RMTPACTSU_ELNRC
Subject: RE: Question: USAID (Nancy's) Inquiry?

Michael:

The Chairman is not expected to participate in the 6:00 PM call.

John Jolicoeur
Executive Team Status Officer
NRC Operations Center

From: RMTPACTSU_ELNRC [mailto:RMTPACTSU_ELNRC@ofda.gov]
Sent: Saturday, March 19, 2011 5:46 PM
To: ET07 Hoc; LIA01 Hoc; Gott, William; McDermott, Brian
Subject: Question: USAID (Nancy's) Inquiry?

Will the Chairman be on the 6:00 PM call on the Bechtel Pump Issue? Thanks!

-Michael I. Dudek

LLLL/66

From: ET02 Hoc
Sent: Saturday, March 19, 2011 9:18 AM
To: ET07 Hoc
Subject: Useful

<http://www.jaif.or.jp/english/aij/110319FukushimaEventStatus-15e.pdf>

From: Erlanger, Craig
Sent: Sunday, March 20, 2011 6:26 AM
To: Huyck, Doug; Gott, William; Jolicoeur, John; ET07 Hoc
Subject: RE: Availability

Monday 7-10 is fine

From: Huyck, Doug
Sent: Saturday, March 19, 2011 10:27 PM
To: Gott, William; Erlanger, Craig; Jolicoeur, John; ET07 Hoc
Subject: RE: Availability

I can cover Wed. from 7 to 3.
Doug

From: Gott, William
Sent: Saturday, March 19, 2011 9:38 PM
To: Erlanger, Craig; Jolicoeur, John; ET07 Hoc; Huyck, Doug
Subject: Re: Availability

Craig

Could you cover Monday 7 to 10?

John could do 10 to 3 and I will do 3 to 11.

Tuesday John 7 to 3 and I will do 3 to 11.

Doug can you cover Wednesday 7 to 3?

Bill

From: Erlanger, Craig
To: Gott, William
Sent: Sat Mar 19 18:51:54 2011
Subject: Availability

Bill,

Overall: use me where you need to and everything else will work out.

Preference:

Sunday: On watch from 7-3, available 1500-2300. You can even give me a short break if you feel guilty.

Monday: Available until 9 a.m., available for the full 1500-2300 shift

Tuesday: I can move stuff around for the majority of the day but would prefer to split time with someone, no matter what available 1500-2300

Wednesday: Before 1000, after 1500

Hope this helps, Craig

From: Astwood, Heather
To: Leeds, Eric; Boger, Bruce; McGinty, Tim
Cc: Cullingford, Michael; Hopkins, Jon; Quinones, Lauren; Regan, Christopher; Rodriguez, Veronica; Azeem, Almas; Cartwright, William; Cusumano, Victor; Fields, Leslie; Heida, Bruce; Meighan, Sean; Nguyen, Quynh; Roquecruz, Carla; Susco, Jeremy; Titus, Brett; Valentine, Nicholee
Subject: FW: Stricken Japan plant missed scheduled inspections of equipment
Date: Monday, March 21, 2011 3:46:26 PM

FYI – From one of my contacts at State Department.

Heather Astwood
International Team Leader
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
301-415-1075

From: Fladeboe, Jan P [mailto:FladeboeJP@state.gov]
Sent: Monday, March 21, 2011 1:53 PM
To: ISN-NESS-DL; ISN-RA-East Asia Team-DL; Dresser, Heather L (EAP/J); Shaffer, Mark R; Scheland, Mark DL; Duncan, Aleshia; Schwartzman, Jennifer; Astwood, Heather; Henderson, Karen; Doane, Margaret; Ramsey, Jack; Boudreau, Robert
Subject: Stricken Japan plant missed scheduled inspections of equipment

According to this Reuters article, the Fukushima Dai-ichi plant failed to conduct scheduled inspections, including the motor and backup power for unit #1, prior to the earthquake/tsunami. While it's not clear whether this failure to adhere to the inspection schedule was a significant factor in the failure of the backup generator, the disclosure is likely to cause repercussions..

Stricken Japan plant missed scheduled inspections:

By Kevin Krolicki
TOKYO | Mon Mar 21, 2011 3:27am EDT

(Reuters) - The operator of Japan's tsunami-damaged nuclear power plant told safety regulators less than two weeks before disaster struck that it had failed to carry out some scheduled inspections at the facility.

In a report submitted to Japan's nuclear safety agency on February 28, Japan's largest power utility, Tokyo Electric Power Co, said it had failed to inspect 33 pieces of equipment in the six reactors at the Fukushima Daiichi complex.

The equipment missed in scheduled inspections included a motor and a backup power generator for the No. 1 reactor, the firm said in a report available on a company website.

The exchange between the utility and safety regulators regarding safety misses at the plant has

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attracted attention because of its timing, and the equipment involved.

The failure of backup power systems is a key element of the current crisis, which has prompted a massive effort to contain radiation from the stricken plant.

In its response to the Tokyo Electric report, Japan's Nuclear and Industrial Safety Agency gave Tokyo Electric until June 2 to draw up a corrective plan for the plant, the utility's oldest nuclear facility, which dating back to the 1970s.

The nuclear safety agency said in its March 2 response, available on the agency's website, that it did not believe there was an immediate risk to safety as a result of the missed inspections.

The agency, which has been criticized for its close ties to the industry it regulates, said it had been assured the equipment that had gone without inspection would be tested in the near term by Tokyo Electric.

Hidehiko Nishiyama, the agency's deputy director general, told a briefing on Monday he was not aware of the correspondence between regulators and the utility.

Nishiyama said he could not say whether the safety lapses played any role in worsening the crisis, which began on March 11 when a tremendous earthquake and tsunami knocked out power and backup power to the plant.

The filings by Tokyo Electric and Japan's safety regulators were archived on their Web sites and first reported by Jiji Press.

(Reporting by Kevin Krolicki; Editing by Mark Bendeich and Daniel Magnowski)

Jan Peter Fladeboe
Office of Nuclear Energy, Safety and Security
Bureau of International Security and Nonproliferation
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【別紙】福島第一原子力発電所モニタリングカーによる計測状況
Radaitaion data around Fukushima No.1 NPP by monitoring vehicle

Date	Time	Location	Location	y-ray (μSv/h)
3/11	P.M. 5:30	体育館付近	around Gym	49 nG y/h
3/11	P.M. 5:40	正門付近	around Front Gate	56 nG y/h
3/11	P.M. 5:50	管理棟	admin. Bldg.	64 nG y/h
3/11	P.M. 6:45	MP-6		56 nG y/h
3/11	P.M. 7:00	MP-7		57 nG y/h
3/11	P.M. 7:10	MP-5		55 nG y/h
3/11	P.M. 7:15	MP-4		59 nG y/h
3/11	P.M. 7:20	MP-3		59 nG y/h
3/11	P.M. 7:52	MP-6		57 nG y/h
3/11	P.M. 8:00	MP-6		60 nG y/h
3/11	P.M. 8:10	MP-6		59 nG y/h
3/11	P.M. 8:20	MP-6		67 nG y/h
3/11	P.M. 9:30	正門付近	around Front Gate	62 nG y/h
3/11	P.M. 9:40	正門付近	around Front Gate	61 nG y/h
3/11	P.M. 9:50	正門付近	around Front Gate	61 nG y/h
3/11	P.M. 10:00	正門付近	around Front Gate	59 nG y/h
3/11	P.M. 10:10	正門付近	around Front Gate	60 nG y/h
3/11	P.M. 10:20	正門付近	around Front Gate	62 nG y/h
3/11	P.M. 10:30	正門付近	around Front Gate	60 nG y/h
3/11	P.M. 10:40	正門付近	around Front Gate	60 nG y/h
3/11	P.M. 10:50	正門付近	around Front Gate	59 nG y/h
3/11	P.M. 11:00	正門付近	around Front Gate	60 nG y/h
3/11	P.M. 11:10	正門付近	around Front Gate	63 nG y/h
3/11	P.M. 11:20	正門付近	around Front Gate	60 nG y/h
3/11	P.M. 11:40	正門付近	around Front Gate	63 nG y/h
3/11	P.M. 11:50	正門付近	around Front Gate	59 nG y/h
3/12	A.M.0:00	正門付近	around Front Gate	60 nG y/h
3/12	A.M. 0:10	正門	Front Gate	62 nG y/h
3/12	A.M. 0:20	正門	Front Gate	65 nG y/h
3/12	A.M. 0:30	正門	Front Gate	64 nG y/h
3/12	A.M. 0:40	正門	Front Gate	63 nG y/h
3/12	A.M. 1:40	正門	Front Gate	68 nG y/h
3/12	A.M. 1:50	正門	Front Gate	66 nG y/h
3/12	A.M. 2:00	正門	Front Gate	68 nG y/h
3/12	A.M. 2:10	正門	Front Gate	64 nG y/h
3/12	A.M. 2:20	正門	Front Gate	67 nG y/h
3/12	A.M. 2:30	正門	Front Gate	65 nG y/h
3/12	A.M. 2:40	正門	Front Gate	66 nG y/h
3/12	A.M. 2:50	正門	Front Gate	65 nG y/h

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3/12	A.M. 3:00	正門	Front Gate	69 nG y/h
3/12	A.M. 3:10	正門	Front Gate	66 nG y/h
3/12	A.M. 3:20	正門	Front Gate	69 nG y/h
3/12	A.M. 3:30	正門	Front Gate	68 nG y/h
3/12	A.M. 3:40	正門	Front Gate	66 nG y/h
3/12	A.M. 3:50	正門	Front Gate	64 nG y/h
3/12	A.M. 4:00	正門	Front Gate	69 nG y/h
3/12	A.M. 4:40	正門	Front Gate	866 nGy/h
3/12	A.M. 4:50	正門	Front Gate	1002 nGy/h
3/12	A.M. 5:00	正門	Front Gate	1307 nGy/h
3/12	A.M. 5:10	正門	Front Gate	1590 nGy/h
3/12	A.M.6:25	M P - 8 付	around MP-8	1.21μSv/h
3/12	A.M. 6:30	正門	Front Gate	3.29μSv/h
3/12	A.M.6:30	M P - 8 付	around MP-8	1.53μSv/h
3/12	A.M. 6:40	正門	Front Gate	4.92μSv/h
3/12	A.M.7:35	M P - 8 付	around MP-8	2.47μSv/h
3/12	A.M.7:40	M P - 8 付	around MP-8	2.56μSv/h
3/12	A.M.7:45	M P - 8 付	around MP-8	2.53μSv/h
3/12	A.M. 7:50	正門	Front Gate	4.97μSv/h
3/12	A.M.7:50	M P - 8 付	around MP-8	2.50μSv/h
3/12	A.M.7:55	M P - 8 付	around MP-8	2.50μSv/h
3/12	A.M.8:00	M P - 8 付	around MP-8	2.42μSv/h
3/12	A.M. 8:00	正門	Front Gate	4.89μSv/h
3/12	A.M.8:05	M P - 8 付	around MP-8	2.43μSv/h
3/12	A.M. 8:10	正門	Front Gate	5.08μSv/h
3/12	A.M.8:15	M P - 8 付	around MP-8	2.40μSv/h
3/12	A.M. 8:20	正門	Front Gate	4.77μSv/h
3/12	A.M.8:20	M P - 8 付	around MP-8	2.37μSv/h
3/12	A.M.8:25	M P - 8 付	around MP-8	2.38μSv/h
3/12	A.M.8:30	M P - 8 付	around MP-8	2.36μSv/h
3/12	A.M.8:35	M P - 8 付	around MP-8	2.40μSv/h
3/12	A.M. 8:40	正門	Front Gate	4.56μSv/h
3/12	A.M.8:40	M P - 8 付	around MP-8	2.34μSv/h
3/12	A.M.8:45	M P - 8 付	around MP-8	2.51μSv/h
3/12	A.M. 8:50	正門	Front Gate	4.87μSv/h
3/12	A.M.9:10	M P - 8 付	around MP-8	2.68μSv/h
3/12	A.M.9:15	M P - 8 付	around MP-8	2.77μSv/h
3/12	A.M.9:20	M P - 8 付	around MP-8	2.55μSv/h
3/12	A.M.9:25	M P - 8 付	around MP-8	2.59μSv/h
3/12	A.M. 9:30	正門	Front Gate	5.16μSv/h
3/12	A.M.9:30	M P - 8 付	around MP-8	2.61μSv/h
3/12	A.M.9:35	M P - 8 付	around MP-8	2.59μSv/h
3/12	A.M.9:40	M P - 8 付	around MP-8	2.62μSv/h
3/12	A.M.9:45	M P - 8 付	around MP-8	2.64μSv/h
3/12	A.M. 9:50	正門	Front Gate	5.03μSv/h
3/12	A.M.9:50	M P - 8 付	around MP-8	2.61μSv/h
3/12	A.M.9:55	M P - 8 付	around MP-8	2.62μSv/h

3/12	A.M.10:00	正門	Front Gate	5.28μSv/h
3/12	A.M.10:00	MP－8 付	around MP-8	4.50μSv/h
3/12	A.M.10:05	MP－8 付	around MP-8	4.56μSv/h
3/12	A.M.10:10	正門	Front Gate	6.65μSv/h
3/12	A.M.10:10	MP－8 付	around MP-8	4.61μSv/h
3/12	A.M.10:15	MP－8 付	around MP-8	4.25μSv/h
3/12	A.M.10:20	正門	Front Gate	180.2μSv/h
3/12	A.M.10:20	MP－8 付	around MP-8	3.85μSv/h
3/12	A.M.10:25	MP－8 付	around MP-8	4.75μSv/h
3/12	A.M.10:30	正門	Front Gate	385.5μSv/h
3/12	A.M.10:30	MP－8 付	around MP-8	9.14μSv/h
3/12	A.M.10:35	MP－8 付	around MP-8	24.1μSv/h
3/12	A.M.10:40	正門	Front Gate	162.9μSv/h
3/12	A.M.10:45	MP－8 付	around MP-8	16.9μSv/h
3/12	P.M. 10:50	正門	Front Gate	7.04μSv/h
3/12	P.M. 10:50	MP－8 付	around MP-8	6.65μSv/h
3/12	A.M.11:00	正門	Front Gate	6.69μSv/h
3/12	A.M.11:00	MP－8 付	around MP-8	5.16μSv/h
3/12	A.M.11:10	正門	Front Gate	6.32μSv/h
3/12	A.M.11:10	MP－8 付	around MP-8	4.86μSv/h
3/12	A.M.11:20	正門	Front Gate	9.43μSv/h
3/12	A.M.11:20	MP－8 付	around MP-8	5.22μSv/h
3/12	A.M.11:30	正門	Front Gate	35.77μSv/h
3/12	A.M.11:30	MP－8 付	around MP-8	5.03μSv/h
3/12	A.M.11:40	正門	Front Gate	12.53μSv/h
3/12	A.M.11:40	MP－8 付	around MP-8	3.80μSv/h
3/12	A.M.11:50	正門	Front Gate	17.10μSv/h
3/12	A.M.11:50	MP－8 付	around MP-8	4.05μSv/h
3/12	P.M. 0:00	正門	Front Gate	23.21μSv/h
3/12	P.M. 0:00	MP－8 付	around MP-8	5.32μSv/h
3/12	P.M. 0:05	MP－8 付	around MP-8	8.80μSv/h
3/12	P.M. 0:10	正門	Front Gate	48.23μSv/h
3/12	A.M.0:10	MP－8 付	around MP-8	13.5μSv/h
3/12	P.M. 0:15	MP－8 付	around MP-8	11.7μSv/h
3/12	P.M. 0:20	正門	Front Gate	11.56μSv/h
3/12	P.M. 0:20	MP－8 付	around MP-8	4.13μSv/h
3/12	P.M. 0:25	MP－8 付	around MP-8	3.83μSv/h
3/12	P.M. 0:30	正門	Front Gate	5.78μSv/h
3/12	P.M. 0:30	MP－8 付	around MP-8	3.58μSv/h
3/12	P.M. 0:40	正門	Front Gate	5.62μSv/h
3/12	P.M. 0:40	MP－8 付	around MP-8	3.60μSv/h
3/12	P.M. 0:50	正門	Front Gate	5.48μSv/h
3/12	P.M. 0:50	MP－8 付	around MP-8	3.52μSv/h
3/12	P.M. 1:00	正門	Front Gate	5.39μSv/h
3/12	P.M. 1:00	MP－8 付	around MP-8	3.66μSv/h
3/12	P.M. 1:10	正門	Front Gate	5.31μSv/h
3/12	P.M. 1:10	MP－8 付	around MP-8	3.74μSv/h

3/12	P.M. 1:20	正門	Front Gate	10.90μSv/h
3/12	P.M. 1:30	M P - 8 付	around MP-8	2.33μSv/h
3/12	P.M. 1:40	正門	Front Gate	4.782μSv/h
3/12	P.M. 1:40	M P - 8 付	around MP-8	2.31μSv/h
3/12	P.M. 1:50	M P - 8 付	around MP-8	2.81μSv/h
3/12	P.M. 1:50	正門	Front Gate	4.82μSv/h
3/12	P.M. 1:55	M P - 8 付	around MP-8	3.13μSv/h
3/12	P.M. 2:00	正門	Front Gate	4.60μSv/h
3/12	P.M. 2:00	M P - 8 付	around MP-8	2.11μSv/h
3/12	P.M. 2:10	正門	Front Gate	7.30μSv/h
3/12	P.M. 2:10	M P - 8 付	around MP-8	3.02μSv/h
3/12	P.M. 2:20	正門	Front Gate	10.90μSv/h
3/12	P.M. 2:20	M P - 8 付	around MP-8	3.80μSv/h
3/12	P.M. 2:30	正門	Front Gate	9.98μSv/h
3/12	P.M. 2:30	M P - 8 付	around MP-8	3.49μSv/h
3/12	P.M. 2:40	正門	Front Gate	8.86μSv/h
3/12	P.M. 2:40	M P - 8 付	around MP-8	3.33μSv/h
3/12	P.M. 2:50	正門	Front Gate	7.72μSv/h
3/12	P.M. 2:50	M P - 8 付	around MP-8	3.50μSv/h
3/12	P.M. 3:00	正門	Front Gate	6.95μSv/h
3/12	P.M. 3:00	M P - 8 付	around MP-8	3.50μSv/h
3/12	P.M. 3:10	正門	Front Gate	6.99μSv/h
3/12	P.M. 3:10	M P - 8 付	around MP-8	3.33μSv/h
3/12	P.M. 3:20	正門	Front Gate	5.59μSv/h
3/12	P.M. 3:20	M P - 8 付	around MP-8	3.23μSv/h
3/12	P.M. 3:30	正門	Front Gate	5.49μSv/h
3/12	P.M. 3:30	M P - 8 付	around MP-8	3.21μSv/h
3/12	P.M. 3:40	正門	Front Gate	8.23μSv/h
3/12	P.M. 3:40	M P - 8 付	around MP-8	3.33μSv/h
3/12	P.M. 3:50	正門	Front Gate	5.311μSv/h
3/12	P.M. 3:50	M P - 8 付	around MP-8	2.19μSv/h
3/12	P.M. 4:00	正門	Front Gate	5.29μSv/h
3/12	P.M. 4:00	M P - 8 付	around MP-8	2.22μSv/h
3/12	P.M. 4:10	正門	Front Gate	3.64μSv/h
3/12	P.M. 4:10	M P - 8 付	around MP-8	2.20μSv/h
3/12	P.M. 4:20	正門	Front Gate	3.43μSv/h
3/12	P.M. 4:20	M P - 8 付	around MP-8	2.18μSv/h
3/12	P.M. 4:30	正門	Front Gate	3.32μSv/h
3/12	P.M. 4:30	M P - 8 付	around MP-8	2.12μSv/h
3/12	P.M. 4:40	正門	Front Gate	3.25μSv/h
3/12	P.M. 4:40	M P - 8 付	around MP-8	2.06μSv/h
3/12	P.M. 4:50	正門	Front Gate	3.25μSv/h
3/12	P.M. 4:50	M P - 8 付	around MP-8	3.78μSv/h
3/12	P.M. 7:25	M P - 8 付	around MP-8	80.0μSv/h
3/12	P.M. 7:50	正門	Front Gate	23.9μSv/h
3/12	P.M. 8:00	正門	Front Gate	2.74μSv/h
3/12	P.M. 8:00	M P - 8 付	around MP-8	10.0μSv/h

3/12	P.M. 8:10	正門	Front Gate	3.21 μ Sv/h
3/12	P.M. 8:10	MP－8 付	around MP-8	10.0 μ Sv/h
3/12	P.M. 8:20	正門	Front Gate	3.19 μ Sv/h
3/12	P.M. 8:20	MP－8 付	around MP-8	10.0 μ Sv/h
3/12	P.M. 8:30	正門	Front Gate	3.16 μ Sv/h
3/12	P.M. 8:40	MP－8 付	around MP-8	5.0 μ Sv/h
3/12	P.M. 8:50	MP－8 付	around MP-8	6.0 μ Sv/h
3/12	P.M. 9:00	MP－8 付	around MP-8	80.0 μ Sv/h
3/12	P.M. 9:10	MP－8 付	around MP-8	80.0 μ Sv/h
3/12	P.M. 9:20	MP－8 付	around MP-8	70.0 μ Sv/h
3/12	P.M. 9:30	MP－8 付	around MP-8	80.0 μ Sv/h
3/12	P.M. 9:40	MP－8 付	around MP-8	50.0 μ Sv/h
3/12	P.M. 9:50	正門	Front Gate	2.958 μ Sv/h
3/12	P.M. 9:50	MP－8 付	around MP-8	70.0 μ Sv/h
3/12	P.M. 10:00	正門	Front Gate	2.985 μ Sv/h
3/12	P.M. 10:00	MP－8 付	around MP-8	70.0 μ Sv/h
3/12	P.M. 10:10	正門	Front Gate	21.620 μ Sv/h
3/12	P.M. 10:20	正門	Front Gate	2.91 μ Sv/h
3/12	P.M. 10:30	正門	Front Gate	2.92 μ Sv/h
3/12	P.M. 10:30	MP－8 付	around MP-8	4.87 μ Sv/h
3/12	P.M. 10:35	MP－8 付	around MP-8	4.70 μ Sv/h
3/12	P.M. 10:40	正門	Front Gate	2.85 μ Sv/h
3/12	P.M. 10:40	MP－8 付	around MP-8	4.12 μ Sv/h
3/12	P.M. 10:50	正門	Front Gate	3.14 μ Sv/h
3/12	P.M. 10:50	MP－8 付	around MP-8	4.35 μ Sv/h
3/12	P.M. 11:00	正門	Front Gate	3.33 μ Sv/h
3/12	P.M. 11:00	MP－8 付	around MP-8	4.30 μ Sv/h
3/12	P.M. 11:10	正門	Front Gate	3.29 μ Sv/h
3/12	P.M. 11:20	正門	Front Gate	3.27 μ Sv/h
3/12	P.M. 11:30	正門	Front Gate	3.09 μ Sv/h
3/12	P.M. 11:30	MP－8 付	around MP-8	4.50 μ Sv/h
3/12	P.M. 11:40	正門	Front Gate	3.21 μ Sv/h
3/12	P.M. 11:50	正門	Front Gate	3.07 μ Sv/h
3/13	A.M. 0:00	正門	Front Gate	3.16 μ Sv/h
3/13	A.M.0:00	MP－8 付	around MP-8	5.0 μ Sv/h
3/13	A.M. 0:10	正門	Front Gate	3.291 μ Sv/h
3/13	A.M.0:10	MP－8 付	around MP-8	4.7 μ Sv/h
3/13	A.M. 0:20	正門	Front Gate	3.016 μ Sv/h
3/13	A.M.0:20	MP－8 付	around MP-8	4.5 μ Sv/h
3/13	A.M. 0:30	正門	Front Gate	3.146 μ Sv/h
3/13	A.M.0:30	MP－8 付	around MP-8	4.5 μ Sv/h
3/13	A.M. 0:40	正門	Front Gate	3.181 μ Sv/h
3/13	A.M.0:40	MP－8 付	around MP-8	5.0 μ Sv/h
3/13	A.M. 0:50	正門	Front Gate	3.177 μ Sv/h
3/13	A.M.0:50	MP－8 付	around MP-8	4.5 μ Sv/h
3/13	A.M. 1:00	正門	Front Gate	3.201 μ Sv/h
3/13	A.M.1:00	MP－8 付	around MP-8	5.5 μ Sv/h

3/13	A.M. 1:10	正門	Front Gate	3.207μSv/h
3/13	A.M.1:10	M P - 8 付	around MP-8	4.5μSv/h
3/13	A.M. 1:20	正門	Front Gate	3.163μSv/h
3/13	A.M.1:20	M P - 8 付	around MP-8	5.0μSv/h
3/13	A.M. 1:30	正門	Front Gate	3.127μSv/h
3/13	A.M.1:30	M P - 8 付	around MP-8	5.5μSv/h
3/13	A.M. 1:40	正門	Front Gate	3.329μSv/h
3/13	A.M.1:40	M P - 8 付	around MP-8	5.0μSv/h
3/13	A.M. 1:50	正門	Front Gate	3.125μSv/h
3/13	A.M.1:50	M P - 8 付	around MP-8	5.0μSv/h
3/13	A.M. 2:00	正門	Front Gate	3.186μSv/h
3/13	A.M.2:00	M P - 8 付	around MP-8	5.5μSv/h
3/13	A.M. 2:10	正門	Front Gate	3.116μSv/h
3/13	A.M.2:10	M P - 8 付	around MP-8	5.0μSv/h
3/13	A.M. 2:20	正門	Front Gate	3.214μSv/h
3/13	A.M.2:20	M P - 8 付	around MP-8	4.5μSv/h
3/13	A.M. 2:30	正門	Front Gate	3.164μSv/h
3/13	A.M.2:30	M P - 8 付	around MP-8	4.5μSv/h
3/13	A.M. 2:40	正門	Front Gate	3.129μSv/h
3/13	A.M.2:40	M P - 8 付	around MP-8	4.5μSv/h
3/13	A.M. 2:50	正門	Front Gate	3.104μSv/h
3/13	A.M.2:50	M P - 8 付	around MP-8	4.5μSv/h
3/13	A.M. 3:00	正門	Front Gate	3.574μSv/h
3/13	A.M. 3:10	正門	Front Gate	3.978μSv/h
3/13	A.M. 3:20	正門	Front Gate	3.236μSv/h
3/13	A.M. 3:30	正門	Front Gate	3.103μSv/h
3/13	A.M. 3:40	正門	Front Gate	3.392μSv/h
3/13	A.M.3:40	M P - 8 付	around MP-8	5.0μSv/h
3/13	A.M. 3:50	正門	Front Gate	3.186μSv/h
3/13	A.M.3:50	M P - 8 付	around MP-8	5.1μSv/h
3/13	A.M. 4:00	正門	Front Gate	3.039μSv/h
3/13	A.M.4:00	M P - 8 付	around MP-8	5.2μSv/h
3/13	A.M. 4:10	正門	Front Gate	3.564μSv/h
3/13	A.M.4:10	M P - 8 付	around MP-8	5.0μSv/h
3/13	A.M. 4:20	正門	Front Gate	3.150μSv/h
3/13	A.M.4:20	M P - 8 付	around MP-8	5.5μSv/h
3/13	A.M. 4:30	正門	Front Gate	3.122μSv/h
3/13	A.M.4:30	M P - 8 付	around MP-8	5.0μSv/h
3/13	A.M. 4:40	正門	Front Gate	3.256μSv/h
3/13	A.M.4:40	M P - 8 付	around MP-8	5.0μSv/h
3/13	A.M.4:50	正門		3.104μSv/h
3/13	A.M.4:50	M P - 8 付	around MP-8	4.5μSv/h
3/13	A.M. 5:00	正門	Front Gate	3.204μSv/h
3/13	A.M.5:00	M P - 8 付	around MP-8	5.0μSv/h
3/13	A.M. 5:10	正門	Front Gate	3.360μSv/h
3/13	A.M.5:10	M P - 8 付	around MP-8	5.0μSv/h
3/13	A.M. 5:20	正門	Front Gate	3.472μSv/h

3/13	A.M.5:20	M P - 8 付	around MP-8	4.6μSv/h
3/13	A.M. 5:30	正門	Front Gate	3.817μSv/h
3/13	A.M.5:30	M P - 8 付	around MP-8	5.0μSv/h
3/13	A.M. 5:40	正門	Front Gate	3.224μSv/h
3/13	A.M.5:40	M P - 8 付	around MP-8	4.5μSv/h
3/13	A.M. 5:50	正門	Front Gate	3.192μSv/h
3/13	A.M.5:50	M P - 8 付	around MP-8	5.2μSv/h
3/13	A.M. 6:00	正門	Front Gate	3.467μSv/h
3/13	A.M.6:00	M P - 8 付	around MP-8	5.6μSv/h
3/13	A.M. 6:10	正門	Front Gate	3.188μSv/h
3/13	A.M.6:10	M P - 8 付	around MP-8	5.9μSv/h
3/13	A.M. 6:20	正門	Front Gate	3.160μSv/h
3/13	A.M.6:20	M P - 8 付	around MP-8	5.7μSv/h
3/13	A.M. 6:30	正門	Front Gate	3.625μSv/h
3/13	A.M.6:30	M P - 8 付	around MP-8	5.7μSv/h
3/13	A.M. 6:40	正門	Front Gate	3.092μSv/h
3/13	A.M.6:40	M P - 8 付	around MP-8	5.7μSv/h
3/13	A.M. 6:50	正門	Front Gate	3.006μSv/h
3/13	A.M.6:50	M P - 8 付	around MP-8	5.7μSv/h
3/13	A.M. 7:00	正門	Front Gate	3.652μSv/h
3/13	A.M.7:00	M P - 8 付	around MP-8	7.7μSv/h
3/13	A.M. 7:10	正門	Front Gate	3.415μSv/h
3/13	A.M.7:10	M P - 8 付	around MP-8	8.5μSv/h
3/13	A.M. 7:20	正門	Front Gate	3.325μSv/h
3/13	A.M.7:20	M P - 8 付	around MP-8	6.0μSv/h
3/13	A.M. 7:30	正門	Front Gate	3.530μSv/h
3/13	A.M.7:30	M P - 8 付	around MP-8	5.6μSv/h
3/13	A.M. 7:40	正門	Front Gate	3.413μSv/h
3/13	A.M. 7:50	正門	Front Gate	7.227μSv/h
3/13	A.M. 8:00	正門	Front Gate	3.510μSv/h
3/13	A.M. 8:10	正門	Front Gate	3.166μSv/h
3/13	A.M.8:10	M P - 1 付	around MP-1	100μSv/h
3/13	A.M. 8:20	正門	Front Gate	3.166μSv/h
3/13	A.M.8:20	M P - 1 付	around MP-1	100μSv/h
3/13	A.M. 8:30	正門	Front Gate	14.730μSv/h
3/13	A.M.8:30	M P - 1 付	around MP-1	80μSv/h
3/13	A.M. 8:40	正門	Front Gate	16.030μSv/h
3/13	A.M.8:40	M P - 1 付	around MP-1	80μSv/h
3/13	A.M. 8:50	正門	Front Gate	15.900μSv/h
3/13	A.M.8:50	M P - 1 付	around MP-1	90μSv/h
3/13	A.M. 9:00	正門	Front Gate	10.240μSv/h
3/13	A.M.9:00	M P - 1 付	around MP-1	37μSv/h
3/13	A.M.9:00	M P - 4 付	around MP-4	143.5μSv/h
3/13	A.M. 9:10	正門	Front Gate	175.000μSv/h
3/13	A.M.9:10	M P - 1 付	around MP-1	30μSv/h
3/13	A.M.9:10	M P - 4 付	around MP-4	137.8μSv/h
3/13	A.M. 9:20	正門	Front Gate	281.700μSv/h

3/13	A.M.9:20	MP - 1 付	around MP-1	27 μ Sv/h
3/13	A.M.9:20	MP - 4 付	around MP-4	76.9 μ Sv/h
3/13	A.M. 9:30	正門	Front Gate	26.000 μ Sv/h
3/13	A.M.9:30	MP - 1 付	around MP-1	25 μ Sv/h
3/13	A.M.9:30	MP - 4 付	around MP-4	70.3 μ Sv/h
3/13	A.M.9:40	MP - 1 付	around MP-1	25 μ Sv/h
3/13	A.M.9:40	MP - 4 付	around MP-4	66.8 μ Sv/h
3/13	A.M.9:50	MP - 1 付	around MP-1	23 μ Sv/h
3/13	A.M.9:50	MP - 4 付	around MP-4	64.7 μ Sv/h
3/13	A.M.10:00	正門	Front Gate	6.512 μ Sv/h
3/13	A.M.10:00	MP - 1 付	around MP-1	23 μ Sv/h
3/13	A.M.10:00	MP - 4 付	around MP-4	62.9 μ Sv/h
3/13	A.M.10:10	正門	Front Gate	6.372 μ Sv/h
3/13	A.M.10:10	MP - 1 付	around MP-1	23 μ Sv/h
3/13	A.M.10:10	MP - 4 付	around MP-4	61.1 μ Sv/h
3/13	A.M.10:20	正門	Front Gate	8.265 μ Sv/h
3/13	A.M.10:20	MP - 1 付	around MP-1	20 μ Sv/h
3/13	A.M.10:20	MP - 4 付	around MP-4	61.8 μ Sv/h
3/13	A.M.10:30	正門	Front Gate	6.755 μ Sv/h
3/13	A.M.10:30	MP - 1 付	around MP-1	19 μ Sv/h
3/13	A.M.10:30	MP - 4 付	around MP-4	58.0 μ Sv/h
3/13	A.M.10:40	正門	Front Gate	6.020 μ Sv/h
3/13	A.M.10:40	MP - 1 付	around MP-1	19 μ Sv/h
3/13	A.M.10:40	MP - 4 付	around MP-4	56.8 μ Sv/h
3/13	A.M.10:50	正門	Front Gate	6.038 μ Sv/h
3/13	A.M.10:50	MP - 1 付	around MP-1	19 μ Sv/h
3/13	A.M.10:50	MP - 4 付	around MP-4	55.4 μ Sv/h
3/13	A.M.11:00	正門	Front Gate	5.766 μ Sv/h
3/13	A.M.11:00	MP - 1 付	around MP-1	18 μ Sv/h
3/13	A.M.11:00	MP - 4 付	around MP-4	54.3 μ Sv/h
3/13	A.M.11:10	正門	Front Gate	5.610 μ Sv/h
3/13	A.M.11:10	MP - 1 付	around MP-1	18 μ Sv/h
3/13	A.M.11:10	MP - 4 付	around MP-4	53.3 μ Sv/h
3/13	A.M.11:20	正門	Front Gate	5.998 μ Sv/h
3/13	A.M.11:20	MP - 1 付	around MP-1	18 μ Sv/h
3/13	A.M.11:20	MP - 4 付	around MP-4	53.7 μ Sv/h
3/13	A.M.11:30	正門	Front Gate	7.888 μ Sv/h
3/13	A.M.11:30	MP - 1 付	around MP-1	17 μ Sv/h
3/13	A.M.11:30	MP - 4 付	around MP-4	51.3 μ Sv/h
3/13	A.M.11:40	正門	Front Gate	6.837 μ Sv/h
3/13	A.M.11:40	MP - 1 付	around MP-1	17 μ Sv/h
3/13	A.M.11:40	MP - 4 付	around MP-4	50.0 μ Sv/h
3/13	A.M.11:50	正門	Front Gate	6.617 μ Sv/h
3/13	A.M.11:50	MP - 1 付	around MP-1	17 μ Sv/h
3/13	A.M.11:50	MP - 4 付	around MP-4	49.4 μ Sv/h
3/13	P.M. 0:00	正門	Front Gate	5.545 μ Sv/h
3/13	P.M. 0:00	MP - 1 付	around MP-1	17 μ Sv/h

3/13	P.M. 0:00	MP - 4 付	around MP-4	48.7μSv/h
3/13	P.M. 0:10	正門	Front Gate	5.537μSv/h
3/13	P.M. 0:10	MP - 1 付	around MP-1	18μSv/h
3/13	P.M. 0:10	MP - 4 付	around MP-4	47.8μSv/h
3/13	P.M. 0:20	正門	Front Gate	5.316μSv/h
3/13	P.M. 0:20	MP - 1 付	around MP-1	18μSv/h
3/13	P.M. 0:20	MP - 4 付	around MP-4	47.1μSv/h
3/13	P.M. 0:30	正門	Front Gate	5.495μSv/h
3/13	P.M. 0:30	MP - 1 付	around MP-1	17μSv/h
3/13	P.M. 0:30	MP - 4 付	around MP-4	46.3μSv/h
3/13	P.M. 0:40	正門	Front Gate	5.266μSv/h
3/13	P.M. 0:40	MP - 1 付	around MP-1	17μSv/h
3/13	P.M. 0:40	MP - 4 付	around MP-4	49.7μSv/h
3/13	P.M. 0:50	正門	Front Gate	5.369μSv/h
3/13	P.M. 0:50	MP - 1 付	around MP-1	17μSv/h
3/13	P.M. 0:50	MP - 4 付	around MP-4	45.2μSv/h
3/13	P.M. 1:00	正門	Front Gate	4.953μSv/h
3/13	P.M. 1:00	MP - 1 付	around MP-1	17μSv/h
3/13	P.M. 1:00	MP - 4 付	around MP-4	44.6μSv/h
3/13	P.M. 1:10	正門	Front Gate	4.794μSv/h
3/13	P.M. 1:10	MP - 1 付	around MP-1	17μSv/h
3/13	P.M. 1:10	MP - 4 付	around MP-4	44.0μSv/h
3/13	P.M. 1:20	正門	Front Gate	4.907μSv/h
3/13	P.M. 1:20	MP - 1 付	around MP-1	17μSv/h
3/13	P.M. 1:20	MP - 4 付	around MP-4	43.5μSv/h
3/13	P.M. 1:30	正門	Front Gate	4.852μSv/h
3/13	P.M. 1:30	MP - 1 付	around MP-1	16μSv/h
3/13	P.M. 1:30	MP - 4 付	around MP-4	42.9μSv/h
3/13	P.M. 1:40	正門	Front Gate	4.883μSv/h
3/13	P.M. 1:40	MP - 1 付	around MP-1	16μSv/h
3/13	P.M. 1:40	MP - 4 付	around MP-4	44.0μSv/h
3/13	P.M. 1:50	正門	Front Gate	4.965μSv/h
3/13	P.M. 1:50	MP - 1 付	around MP-1	24μSv/h
3/13	P.M. 1:50	MP - 4 付	around MP-4	905.1μSv/h
3/13	P.M. 2:00	正門	Front Gate	21.880μSv/h
3/13	P.M. 2:00	MP - 1 付	around MP-1	21μSv/h
3/13	P.M. 2:00	MP - 4 付	around MP-4	499.3μSv/h
3/13	P.M. 2:10	正門	Front Gate	39.710μSv/h
3/13	P.M. 2:10	MP - 1 付	around MP-1	21μSv/h
3/13	P.M. 2:10	MP - 4 付	around MP-4	646.0μSv/h
3/13	P.M. 2:20	正門	Front Gate	57.630μSv/h
3/13	P.M. 2:20	MP - 1 付	around MP-1	21μSv/h
3/13	P.M. 2:20	MP - 4 付	around MP-4	135.4μSv/h
3/13	P.M. 2:30	正門	Front Gate	17.610μSv/h
3/13	P.M. 2:30	MP - 1 付	around MP-1	32μSv/h
3/13	P.M. 2:30	MP - 4 付	around MP-4	129.9μSv/h
3/13	P.M. 2:40	正門	Front Gate	10.050μSv/h

3/13	P.M. 2:40	MP - 1 付	around MP-1	52μSv/h
3/13	P.M. 2:40	MP - 4 付	around MP-4	133.0μSv/h
3/13	P.M. 2:50	正門	Front Gate	10.850μSv/h
3/13	P.M. 2:50	MP - 1 付	around MP-1	35μSv/h
3/13	P.M. 2:50	MP - 4 付	around MP-4	169.0μSv/h
3/13	P.M. 3:00	正門	Front Gate	8.311μSv/h
3/13	P.M. 3:00	MP - 1 付	around MP-1	52μSv/h
3/13	P.M. 3:00	MP - 4 付	around MP-4	58.7μSv/h
3/13	P.M. 3:10	正門	Front Gate	5.717μSv/h
3/13	P.M. 3:10	MP - 1 付	around MP-1	100μSv/h
3/13	P.M. 3:10	MP - 4 付	around MP-4	54.3μSv/h
3/13	P.M. 3:20	正門	Front Gate	4.717μSv/h
3/13	P.M. 3:20	MP - 1 付	around MP-1	24μSv/h
3/13	P.M. 3:20	MP - 4 付	around MP-4	54.0μSv/h
3/13	P.M. 3:30	正門	Front Gate	4.461μSv/h
3/13	P.M. 3:30	MP - 1 付	around MP-1	34μSv/h
3/13	P.M. 3:30	MP - 4 付	around MP-4	51.8μSv/h
3/13	P.M. 3:40	正門	Front Gate	4.360μSv/h
3/13	P.M. 3:40	MP - 1 付	around MP-1	24μSv/h
3/13	P.M. 3:40	MP - 4 付	around MP-4	56.5μSv/h
3/13	P.M. 3:50	正門	Front Gate	5.469μSv/h
3/13	P.M. 3:50	MP - 1 付	around MP-1	30μSv/h
3/13	P.M. 3:50	MP - 4 付	around MP-4	76.1μSv/h
3/13	P.M. 4:00	正門	Front Gate	5.154μSv/h
3/13	P.M. 4:00	MP - 1 付	around MP-1	31μSv/h
3/13	P.M. 4:00	MP - 4 付	around MP-4	107.1μSv/h
3/13	P.M. 4:10	正門	Front Gate	4.555μSv/h
3/13	P.M. 4:10	MP - 1 付	around MP-1	45μSv/h
3/13	P.M. 4:10	MP - 4 付	around MP-4	58.0μSv/h
3/13	P.M. 4:20	正門	Front Gate	4.336μSv/h
3/13	P.M. 4:20	MP - 1 付	around MP-1	150μSv/h
3/13	P.M. 4:20	MP - 4 付	around MP-4	57.6μSv/h
3/13	P.M. 4:30	正門	Front Gate	4.277μSv/h
3/13	P.M. 4:30	MP - 1 付	around MP-1	46μSv/h
3/13	P.M. 4:30	MP - 4 付	around MP-4	71.5μSv/h
3/13	P.M. 4:40	正門	Front Gate	4.235μSv/h
3/13	P.M. 4:40	MP - 1 付	around MP-1	60μSv/h
3/13	P.M. 4:40	MP - 4 付	around MP-4	57.2μSv/h
3/13	P.M. 4:50	正門	Front Gate	4.224μSv/h
3/13	P.M. 4:50	MP - 1 付	around MP-1	30μSv/h
3/13	P.M. 4:50	MP - 4 付	around MP-4	100.1μSv/h
3/13	P.M. 5:00	正門	Front Gate	4.301μSv/h
3/13	P.M. 5:00	MP - 1 付	around MP-1	120μSv/h
3/13	P.M. 5:00	MP - 4 付	around MP-4	79.4μSv/h
3/13	P.M. 5:10	正門	Front Gate	4.213μSv/h
3/13	P.M. 5:10	MP - 1 付	around MP-1	62μSv/h
3/13	P.M. 5:10	MP - 4 付	around MP-4	60.8μSv/h

3/13	P.M. 5:20	正門	Front Gate	4.640μSv/h
3/13	P.M. 5:20	MP - 1 付	around MP-1	45μSv/h
3/13	P.M. 5:20	MP - 4 付	around MP-4	57.0μSv/h
3/13	P.M. 5:30	正門	Front Gate	5.171μSv/h
3/13	P.M. 5:30	MP - 1 付	around MP-1	36μSv/h
3/13	P.M. 5:30	MP - 4 付	around MP-4	52.3μSv/h
3/13	P.M. 5:40	正門	Front Gate	5.898μSv/h
3/13	P.M. 5:40	MP - 1 付	around MP-1	40μSv/h
3/13	P.M. 5:40	MP - 4 付	around MP-4	56.8μSv/h
3/13	P.M. 5:50	正門	Front Gate	5.953μSv/h
3/13	P.M. 5:50	MP - 1 付	around MP-1	35μSv/h
3/13	P.M. 5:50	MP - 4 付	around MP-4	52.3μSv/h
3/13	P.M. 6:00	正門	Front Gate	5.382μSv/h
3/13	P.M. 6:00	MP - 1 付	around MP-1	35μSv/h
3/13	P.M. 6:00	MP - 4 付	around MP-4	50.1μSv/h
3/13	P.M. 6:10	正門	Front Gate	5.168μSv/h
3/13	P.M. 6:10	MP - 1 付	around MP-1	30μSv/h
3/13	P.M. 6:10	MP - 4 付	around MP-4	49.4μSv/h
3/13	P.M. 6:20	正門	Front Gate	5.250μSv/h
3/13	P.M. 6:20	MP - 1 付	around MP-1	27μSv/h
3/13	P.M. 6:20	MP - 4 付	around MP-4	48.6μSv/h
3/13	P.M. 6:30	正門	Front Gate	4.883μSv/h
3/13	P.M. 6:30	MP - 1 付	around MP-1	26μSv/h
3/13	P.M. 6:30	MP - 4 付	around MP-4	47.9μSv/h
3/13	P.M. 6:40	正門	Front Gate	4.980μSv/h
3/13	P.M. 6:40	MP - 1 付	around MP-1	25μSv/h
3/13	P.M. 6:40	MP - 4 付	around MP-4	47.3μSv/h
3/13	P.M. 6:50	正門	Front Gate	4.831μSv/h
3/13	P.M. 6:50	MP - 1 付	around MP-1	25μSv/h
3/13	P.M. 6:50	MP - 4 付	around MP-4	46.7μSv/h
3/13	P.M. 7:00	正門	Front Gate	5.224μSv/h
3/13	P.M. 7:00	MP - 1 付	around MP-1	25μSv/h
3/13	P.M. 7:00	MP - 4 付	around MP-4	46.1μSv/h
3/13	P.M. 7:10	正門	Front Gate	5.077μSv/h
3/13	P.M. 7:10	MP - 1 付	around MP-1	23μSv/h
3/13	P.M. 7:10	MP - 4 付	around MP-4	46.3μSv/h
3/13	P.M. 7:20	正門	Front Gate	4.709μSv/h
3/13	P.M. 7:20	MP - 1 付	around MP-1	22μSv/h
3/13	P.M. 7:23	MP - 4 付	around MP-4	44.8μSv/h
3/13	P.M. 7:30	正門	Front Gate	4.622μSv/h
3/13	P.M. 7:30	MP - 1 付	around MP-1	20μSv/h
3/13	P.M. 7:31	MP - 4 付	around MP-4	44.4μSv/h
3/13	P.M. 7:40	正門	Front Gate	4.844μSv/h
3/13	P.M. 7:40	MP - 1 付	around MP-1	26μSv/h
3/13	P.M. 7:41	MP - 4 付	around MP-4	44.0μSv/h
3/13	P.M. 7:50	正門	Front Gate	5.577μSv/h
3/13	P.M. 7:50	MP - 1 付	around MP-1	24μSv/h

3/13	P.M. 7:51	MP - 4 付	around MP-4	43.8 μ Sv/h
3/13	P.M. 8:00	正門	Front Gate	5.721 μ Sv/h
3/13	P.M. 8:00	MP - 1 付	around MP-1	24 μ Sv/h
3/13	P.M. 8:01	MP - 4 付	around MP-4	43.2 μ Sv/h
3/13	P.M. 8:10	正門	Front Gate	4.471 μ Sv/h
3/13	P.M. 8:10	MP - 2 付	around MP-1	450 μ Sv/h
3/13	P.M. 8:11	MP - 4 付	around MP-4	42.8 μ Sv/h
3/13	P.M. 8:20	正門	Front Gate	4.521 μ Sv/h
3/13	P.M. 8:20	MP - 2 付	around MP-1	450 μ Sv/h
3/13	P.M. 8:21	MP - 4 付	around MP-4	42.5 μ Sv/h
3/13	P.M. 8:30	正門	Front Gate	4.427 μ Sv/h
3/13	P.M. 8:30	MP - 2 付	around MP-2	440 μ Sv/h
3/13	P.M. 8:31	MP - 4 付	around MP-4	42.6 μ Sv/h
3/13	P.M. 8:40	正門	Front Gate	4.454 μ Sv/h
3/13	P.M. 8:40	MP - 2 付	around MP-2	440 μ Sv/h
3/13	P.M. 8:41	MP - 4 付	around MP-4	42.0 μ Sv/h
3/13	P.M. 8:50	正門	Front Gate	4.377 μ Sv/h
3/13	P.M. 8:50	MP - 2 付	around MP-2	440 μ Sv/h
3/13	P.M. 8:51	MP - 4 付	around MP-4	41.7 μ Sv/h
3/13	P.M. 9:00	正門	Front Gate	4.371 μ Sv/h
3/13	P.M. 9:00	MP - 2 付	around MP-2	440 μ Sv/h
3/13	P.M. 9:01	MP - 4 付	around MP-4	41.3 μ Sv/h
3/13	P.M. 9:10	正門	Front Gate	4.480 μ Sv/h
3/13	P.M. 9:10	MP - 2 付	around MP-2	440 μ Sv/h
3/13	P.M. 9:11	MP - 4 付	around MP-4	41.0 μ Sv/h
3/13	P.M. 9:20	正門	Front Gate	4.463 μ Sv/h
3/13	P.M. 9:20	MP - 2 付	around MP-2	440 μ Sv/h
3/13	P.M. 9:21	MP - 4 付	around MP-4	40.8 μ Sv/h
3/13	P.M. 9:30	正門	Front Gate	4.552 μ Sv/h
3/13	P.M. 9:30	MP - 2 付	around MP-2	440 μ Sv/h
3/13	P.M. 9:31	MP - 4 付	around MP-4	40.6 μ Sv/h
3/13	P.M. 9:40	正門	Front Gate	4.785 μ Sv/h
3/13	P.M. 9:40	MP - 2 付	around MP-2	440 μ Sv/h
3/13	P.M. 9:41	MP - 4 付	around MP-4	40.3 μ Sv/h
3/13	P.M. 9:50	正門	Front Gate	4.626 μ Sv/h
3/13	P.M. 9:50	MP - 2 付	around MP-2	440 μ Sv/h
3/13	P.M. 9:51	MP - 4 付	around MP-4	40.1 μ Sv/h
3/13	P.M. 10:00	正門	Front Gate	4.636 μ Sv/h
3/13	P.M. 10:00	MP - 2 付	around MP-2	430 μ Sv/h
3/13	P.M. 10:01	MP - 4 付	around MP-4	39.8 μ Sv/h
3/13	P.M. 10:10	正門	Front Gate	4.622 μ Sv/h
3/13	P.M. 10:10	MP - 2 付	around MP-2	430 μ Sv/h
3/13	P.M. 10:11	MP - 4 付	around MP-4	39.7 μ Sv/h
3/13	P.M. 10:20	正門	Front Gate	5.417 μ Sv/h
3/13	P.M. 10:20	MP - 2 付	around MP-2	430 μ Sv/h
3/13	P.M. 10:21	MP - 4 付	around MP-4	40.4 μ Sv/h
3/13	P.M. 10:30	正門	Front Gate	4.645 μ Sv/h

3/13	P.M. 10:30	MP - 2 付	around MP-2	430 μ Sv/h
3/13	P.M. 10:31	MP - 4 付	around MP-4	39.3 μ Sv/h
3/13	P.M. 10:40	正門	Front Gate	4.622 μ Sv/h
3/13	P.M. 10:40	MP - 2 付	around MP-2	430 μ Sv/h
3/13	P.M. 10:41	MP - 4 付	around MP-4	39.1 μ Sv/h
3/13	P.M. 10:50	正門	Front Gate	4.632 μ Sv/h
3/13	P.M. 10:50	MP - 2 付	around MP-2	420 μ Sv/h
3/13	P.M. 10:51	MP - 4 付	around MP-4	38.9 μ Sv/h
3/13	P.M. 11:00	正門	Front Gate	4.668 μ Sv/h
3/13	P.M. 11:00	MP - 2 付	around MP-2	420 μ Sv/h
3/13	P.M. 11:01	MP - 4 付	around MP-4	38.7 μ Sv/h
3/13	P.M. 11:10	正門	Front Gate	4.700 μ Sv/h
3/13	P.M. 11:10	MP - 2 付	around MP-2	420 μ Sv/h
3/13	P.M. 11:11	MP - 4 付	around MP-4	39.0 μ Sv/h
3/13	P.M. 11:20	正門	Front Gate	4.647 μ Sv/h
3/13	P.M. 11:20	MP - 2 付	around MP-2	420 μ Sv/h
3/13	P.M. 11:21	MP - 4 付	around MP-4	38.3 μ Sv/h
3/13	P.M. 11:30	正門	Front Gate	4.610 μ Sv/h
3/13	P.M. 11:30	MP - 2 付	around MP-2	410 μ Sv/h
3/13	P.M. 11:31	MP - 4 付	around MP-4	38.2 μ Sv/h
3/13	P.M. 11:40	正門	Front Gate	4.828 μ Sv/h
3/13	P.M. 11:40	MP - 2 付	around MP-2	420 μ Sv/h
3/13	P.M. 11:41	MP - 4 付	around MP-4	38.1 μ Sv/h
3/13	P.M. 11:50	正門	Front Gate	4.868 μ Sv/h
3/13	P.M. 11:50	MP - 2 付	around MP-2	410 μ Sv/h
3/13	P.M. 11:51	MP - 4 付	around MP-4	37.9 μ Sv/h
3/14	A.M. 0:00	正門	Front Gate	4.855 μ Sv/h
3/14	A.M.0:00	MP - 2 付	around MP-2	410 μ Sv/h
3/14	A.M.0:01	MP - 4 付	around MP-4	38.2 μ Sv/h
3/14	A.M. 0:10	正門	Front Gate	4.529 μ Sv/h
3/14	A.M.0:10	MP - 2 付	around MP-2	410 μ Sv/h
3/14	A.M.0:11	MP - 4 付	around MP-4	38.4 μ Sv/h
3/14	A.M. 0:20	正門	Front Gate	4.582 μ Sv/h
3/14	A.M.0:20	MP - 2 付	around MP-2	410 μ Sv/h
3/14	A.M.0:21	MP - 4 付	around MP-4	37.7 μ Sv/h
3/14	A.M. 0:30	正門	Front Gate	4.469 μ Sv/h
3/14	A.M.0:30	MP - 2 付	around MP-2	410 μ Sv/h
3/14	A.M.0:31	MP - 4 付	around MP-4	37.5 μ Sv/h
3/14	A.M. 0:40	正門	Front Gate	4.450 μ Sv/h
3/14	A.M.0:40	MP - 2 付	around MP-2	410 μ Sv/h
3/14	A.M.0:41	MP - 4 付	around MP-4	37.3 μ Sv/h
3/14	A.M. 0:50	正門	Front Gate	4.442 μ Sv/h
3/14	A.M.0:50	MP - 2 付	around MP-2	410 μ Sv/h
3/14	A.M.0:51	MP - 4 付	around MP-4	37.0 μ Sv/h
3/14	A.M. 1:00	正門	Front Gate	4.447 μ Sv/h
3/14	A.M.1:00	MP - 2 付	around MP-2	410 μ Sv/h
3/14	A.M.1:01	MP - 4 付	around MP-4	38.0 μ Sv/h

3/14	A.M. 1:10	正門	Front Gate	4.426μSv/h
3/14	A.M.1:10	MP - 2 付	around MP-2	410μSv/h
3/14	A.M.1:11	MP - 4 付	around MP-4	36.9μSv/h
3/14	A.M. 1:20	正門	Front Gate	4.281μSv/h
3/14	A.M.1:20	MP - 2 付	around MP-2	410μSv/h
3/14	A.M.1:21	MP - 4 付	around MP-4	36.7μSv/h
3/14	A.M. 1:30	正門	Front Gate	4.321μSv/h
3/14	A.M.1:30	MP - 2 付	around MP-2	410μSv/h
3/14	A.M.1:31	MP - 4 付	around MP-4	36.5μSv/h
3/14	A.M. 1:40	正門	Front Gate	4.322μSv/h
3/14	A.M.1:40	MP - 2 付	around MP-2	410μSv/h
3/14	A.M.1:41	MP - 4 付	around MP-4	36.4μSv/h
3/14	A.M. 1:50	正門	Front Gate	4.371μSv/h
3/14	A.M.1:50	MP - 2 付	around MP-2	410μSv/h
3/14	A.M.1:51	MP - 4 付	around MP-4	38.3μSv/h
3/14	A.M. 2:00	正門	Front Gate	4.356μSv/h
3/14	A.M.2:00	MP - 2 付	around MP-2	410μSv/h
3/14	A.M.2:00	MP - 4 付	around MP-4	36.4μSv/h
3/14	A.M. 2:10	正門	Front Gate	4.594μSv/h
3/14	A.M.2:10	MP - 2 付	around MP-2	410μSv/h
3/14	A.M.2:10	MP - 4 付	around MP-4	36.5μSv/h
3/14	A.M. 2:20	正門	Front Gate	751.2μSv/h
3/14	A.M.2:20	MP - 2 付	around MP-2	410μSv/h
3/14	A.M.2:20	MP - 4 付	around MP-4	44.6μSv/h
3/14	A.M. 2:30	正門	Front Gate	433.0μSv/h
3/14	A.M.2:30	MP - 2 付	around MP-2	440μSv/h
3/14	A.M.2:30	MP - 4 付	around MP-4	319.3μSv/h
3/14	A.M. 2:40	正門	Front Gate	420.0μSv/h
3/14	A.M.2:40	MP - 2 付	around MP-2	650μSv/h
3/14	A.M.2:40	MP - 4 付	around MP-4	189.7μSv/h
3/14	A.M. 2:50	正門	Front Gate	66.27μSv/h
3/14	A.M.2:50	MP - 2 付	around MP-2	490μSv/h
3/14	A.M.2:50	MP - 4 付	around MP-4	86.9μSv/h
3/14	A.M. 3:00	正門	Front Gate	65.520μSv/h
3/14	A.M.3:00	MP - 2 付	around MP-2	480μSv/h
3/14	A.M.3:00	MP - 4 付	around MP-4	144.2μSv/h
3/14	A.M. 3:10	正門	Front Gate	45.5μSv/h
3/14	A.M.3:10	MP - 2 付	around MP-2	650μSv/h
3/14	A.M.3:10	MP - 4 付	around MP-4	129.8μSv/h
3/14	A.M. 3:20	正門	Front Gate	15.43μSv/h
3/14	A.M.3:20	MP - 2 付	around MP-2	650μSv/h
3/14	A.M.3:20	MP - 4 付	around MP-4	123.9μSv/h
3/14	A.M. 3:30	正門	Front Gate	18.99μSv/h
3/14	A.M.3:30	MP - 2 付	around MP-2	720μSv/h
3/14	A.M.3:30	MP - 4 付	around MP-4	112.9μSv/h
3/14	A.M. 3:40	正門	Front Gate	14.99μSv/h
3/14	A.M.3:40	MP - 2 付	around MP-2	600μSv/h

3/14	A.M.3:40	M P - 4 付	around MP-4	73.6 μ Sv/h
3/14	A.M. 3:50	正門	Front Gate	10.32 μ Sv/h
3/14	A.M.3:50	M P - 2 付	around MP-2	680 μ Sv/h
3/14	A.M.3:50	M P - 4 付	around MP-4	70.0 μ Sv/h
3/14	A.M. 4:00	正門	Front Gate	10.07 μ Sv/h
3/14	A.M.4:00	M P - 2 付	around MP-2	820 μ Sv/h
3/14	A.M.4:00	M P - 4 付	around MP-4	68.8 μ Sv/h
3/14	A.M. 4:10	正門	Front Gate	6.706 μ Sv/h
3/14	A.M.4:10	M P - 2 付	around MP-2	450 μ Sv/h
3/14	A.M.4:10	M P - 4 付	around MP-4	54.7 μ Sv/h
3/14	A.M. 4:20	正門	Front Gate	7.748 μ Sv/h
3/14	A.M.4:20	M P - 2 付	around MP-2	430 μ Sv/h
3/14	A.M.4:20	M P - 4 付	around MP-4	47.6 μ Sv/h
3/14	A.M. 4:30	正門	Front Gate	7.710 μ Sv/h
3/14	A.M.4:30	M P - 2 付	around MP-2	420 μ Sv/h
3/14	A.M.4:30	M P - 4 付	around MP-4	50.0 μ Sv/h
3/14	A.M. 4:40	正門	Front Gate	7.045 μ Sv/h
3/14	A.M.4:40	M P - 2 付	around MP-2	420 μ Sv/h
3/14	A.M.4:40	M P - 4 付	around MP-4	42.9 μ Sv/h
3/14	A.M. 4:50	正門	Front Gate	6.900 μ Sv/h
3/14	A.M.4:50	M P - 2 付	around MP-2	420 μ Sv/h
3/14	A.M.4:51	M P - 4 付	around MP-4	40.6 μ Sv/h
3/14	A.M. 5:00	正門	Front Gate	6.65 μ Sv/h
3/14	A.M.5:00	M P - 2 付	around MP-2	400 μ Sv/h
3/14	A.M.5:01	M P - 4 付	around MP-4	39.9 μ Sv/h
3/14	A.M. 5:10	正門	Front Gate	6.516 μ Sv/h
3/14	A.M.5:10	M P - 2 付	around MP-2	420 μ Sv/h
3/14	A.M.5:11	M P - 4 付	around MP-4	39.0 μ Sv/h
3/14	A.M. 5:20	正門	Front Gate	6.735 μ Sv/h
3/14	A.M.5:20	M P - 2 付	around MP-2	420 μ Sv/h
3/14	A.M.5:21	M P - 4 付	around MP-4	41.3 μ Sv/h
3/14	A.M. 5:29	M P - 4 付	Front Gate	41.3 μ Sv/h
3/14	A.M.5:30	正門	around MP-2	6.494 μ Sv/h
3/14	A.M.5:30	M P - 2 付	around MP-4	400 μ Sv/h
3/14	A.M. 5:40	正門	Front Gate	6.410 μ Sv/h
3/14	A.M.5:40	M P - 2 付	around MP-2	420 μ Sv/h
3/14	A.M.5:41	M P - 4 付	around MP-4	38.3 μ Sv/h
3/14	A.M. 5:50	正門	Front Gate	6.340 μ Sv/h
3/14	A.M.5:50	M P - 2 付	around MP-2	400 μ Sv/h
3/14	A.M.5:51	M P - 4 付	around MP-4	38.1 μ Sv/h
3/14	A.M. 6:00	正門	Front Gate	5.144 μ Sv/h
3/14	A.M.6:00	M P - 2 付	around MP-2	400 μ Sv/h
3/14	A.M.6:01	M P - 4 付	around MP-4	37.9 μ Sv/h
3/14	A.M. 6:10	正門	Front Gate	5.021 μ Sv/h
3/14	A.M.6:11	M P - 4 付	around MP-4	37.8 μ Sv/h
3/14	A.M. 6:20	正門	Front Gate	5.032 μ Sv/h
3/14	A.M.6:21	M P - 4 付	around MP-4	37.4 μ Sv/h

3/14	A.M. 6:30	正門	Front Gate	4.920μSv/h
3/14	A.M.7:53	MP－4 付	arournd MP-4	69μSv/h
3/14	A.M.8:07	MP－4 付	arournd MP-4	40μSv/h
3/14	A.M.8:19	MP－4 付	arournd MP-4	39μSv/h
3/14	A.M.8:30	MP－3 付	arournd MP-3	287.2μSv/h
3/14	A.M.8:31	MP－4 付	arournd MP-4	75μSv/h
3/14	A.M.8:40	MP－3 付	arournd MP-3	274μSv/h
3/14	A.M.8:41	MP－4 付	arournd MP-4	40μSv/h
3/14	A.M.8:50	MP－3 付	arournd MP-3	268μSv/h
3/14	A.M.9:00	MP－3 付	arournd MP-3	304.8μSv/h
3/14	A.M.9:10	MP－3 付	arournd MP-3	443.7μSv/h
3/14	A.M.9:12	MP－3 付	arournd MP-3	518.7μSv/h
3/14	A.M.9:20	MP－3 付	arournd MP-3	481.0μSv/h
3/14	A.M.9:25	MP－4 付	arournd MP-4	87.083μSv/h
3/14	A.M.9:30	MP－3 付	arournd MP-3	339.4μSv/h
3/14	A.M.9:40	MP－3 付	arournd MP-3	293.7μSv/h
3/14	A.M.9:43	MP－4 付	arournd MP-4	48.899μSv/h
3/14	A.M.9:50	MP－3 付	arournd MP-3	274.9μSv/h
3/14	A.M.9:53	MP－4 付	arournd MP-4	43.256μSv/h
3/14	A.M.10:00	MP－3 付	arournd MP-3	269.4μSv/h
3/14	A.M.10:05	MP－4 付	arournd MP-4	41.998μSv/h
3/14	A.M.10:10	MP－3 付	arournd MP-3	266.8μSv/h
3/14	A.M.10:11	MP－4 付	arournd MP-4	41.533μSv/h
3/14	A.M.10:20	MP－3 付	arournd MP-3	265.4μSv/h
3/14	A.M.10:27	MP－4 付	arournd MP-4	40.694μSv/h
3/14	A.M.10:30	MP－3 付	arournd MP-3	261.6μSv/h
3/14	A.M.10:35	MP－4 付	arournd MP-4	40.155μSv/h
3/14	A.M.10:40	MP－3 付	arournd MP-3	261.900μSv/h
3/14	A.M.10:41	MP－4 付	arournd MP-4	39.716μSv/h
3/14	A.M.10:50	MP－3 付	arournd MP-3	261.0μSv/h
3/14	A.M.10:51	MP－4 付	arournd MP-4	39.406μSv/h
3/14	A.M. 11:37	正門	Front Gate	50.387μSv/h
3/14	A.M. 11:44	正門	Front Gate	19.6μSv/h
3/14	P.M. 0:06	正門	Front Gate	10.816μSv/h
3/14	P.M. 0:21	正門	Front Gate	10.65μSv/h
3/14	P.M. 0:34	MP－6 付	arournd MP-6	4.226μSv/h
3/14	P.M. 0:46	MP－5 付	arournd MP-5	6.86μSv/h
3/14	P.M. 0:52	MP－4 付	arournd MP-4	31.53μSv/h
3/14	P.M. 1:04	MP－3 付	arournd MP-3	229.7μSv/h
3/14	P.M. 1:10	正門	Front Gate	12.0μSv/h
3/14	P.M. 1:12	MP－4 付	arournd MP-4	34.2μSv/h
3/14	P.M. 1:15	正門	Front Gate	13.0μSv/h
3/14	P.M. 1:20	正門	Front Gate	15.0μSv/h
3/14	P.M. 1:25	正門	Front Gate	14.0μSv/h
3/14	P.M. 1:28	MP－5 付	arournd MP-5	6.377μSv/h
3/14	P.M. 1:30	正門	Front Gate	13.0μSv/h
3/14	P.M. 1:35	正門	Front Gate	13.0μSv/h

3/14	P.M. 1:40	正門	Front Gate	11.0μSv/h
3/14	P.M. 1:40	MP－6 付	around MP-6	3.65μSv/h
3/14	P.M. 1:45	正門	Front Gate	12.0μSv/h
3/14	P.M. 1:50	正門	Front Gate	13.0μSv/h
3/14	P.M. 1:55	正門	Front Gate	15.0μSv/h
3/14	P.M. 2:02	MP－5 付	around MP-5	6.088μSv/h
3/14	P.M. 2:14	MP－4 付	around MP-4	29.8μSv/h
3/14	P.M. 2:30	MP－3 付	around MP-3	231.1μSv/h
3/14	P.M. 2:46	MP－4 付	around MP-4	31.3μSv/h
3/14	P.M. 2:58	MP－5 付	around MP-4	6.2μSv/h
3/14	P.M. 3:09	MP－6 付	around MP-4	3.9μSv/h
3/14	P.M. 2:16	MP－5 付	around MP-5	6.0μSv/h
3/14	P.M. 3:23	MP－4 付	around MP-4	29.6μSv/h
3/14	P.M. 3:30	MP－3 付	around MP-3	226.2μSv/h
3/14	P.M. 3:38	MP－4 付	around MP-4	30.4μSv/h
3/14	P.M. 4:02	MP－5 付	around MP-5	5.9μSv/h
3/14	P.M. 4:10	MP－6 付	around MP-6	3.7μSv/h
3/14	P.M. 5:00	正門	Front Gate	8.1μSv/h
3/14	P.M. 5:10	正門	Front Gate	8.1μSv/h
3/14	P.M. 5:20	正門	Front Gate	7.275μSv/h
3/14	P.M. 5:30	正門	Front Gate	7.605μSv/h
3/14	P.M. 5:40	正門	Front Gate	7.620μSv/h
3/14	P.M. 5:50	正門	Front Gate	8.044μSv/h
3/14	P.M. 6:00	正門	Front Gate	7.637μSv/h
3/14	P.M. 6:10	正門	Front Gate	7.037μSv/h
3/14	P.M. 6:20	正門	Front Gate	7.177μSv/h
3/14	P.M. 6:30	正門	Front Gate	8.047μSv/h
3/14	P.M. 6:40	正門	Front Gate	10.4μSv/h
3/14	P.M. 6:46	正門	Front Gate	10.1μSv/h
3/14	P.M. 7:00	正門	Front Gate	7.7μSv/h
3/14	P.M. 7:10	正門	Front Gate	7.8μSv/h
3/14	P.M. 7:20	正門	Front Gate	7.7μSv/h
3/14	P.M. 7:30	正門	Front Gate	8.9μSv/h
3/14	P.M. 7:40	正門	Front Gate	7.6μSv/h
3/14	P.M. 7:50	正門	Front Gate	5.5μSv/h
3/14	P.M. 8:00	正門	Front Gate	5.4μSv/h
3/14	P.M. 8:10	正門	Front Gate	5.4μSv/h
3/14	P.M. 8:20	正門	Front Gate	5.4μSv/h
3/14	P.M. 8:30	正門	Front Gate	5.4μSv/h
3/14	P.M. 8:40	正門	Front Gate	5.4μSv/h
3/14	P.M. 8:50	正門	Front Gate	5.8μSv/h
3/14	P.M. 8:55	正門	Front Gate	5.0μSv/h
3/14	P.M. 9:00	正門	Front Gate	5.8μSv/h
3/14	P.M. 9:05	正門	Front Gate	5.8μSv/h
3/14	P.M. 9:10	正門	Front Gate	6.0μSv/h
3/14	P.M. 9:15	正門	Front Gate	5.8μSv/h
3/14	P.M. 9:20	正門	Front Gate	6.0μSv/h

3/14	P.M. 9:25	正門	Front Gate	6.8μSv/h
3/14	P.M. 9:30	正門	Front Gate	29.7μSv/h
3/14	P.M. 9:35	正門	Front Gate	760.0μSv/h
3/14	P.M. 9:37	正門	Front Gate	3130.0μSv/h
3/14	P.M. 10:15	正門	Front Gate	431.7μSv/h
3/14	P.M. 10:20	正門	Front Gate	336.6μSv/h
3/14	P.M. 10:25	正門	Front Gate	301.9μSv/h
3/14	P.M. 10:35	正門	Front Gate	326.2μSv/h
3/14	P.M. 10:40	正門	Front Gate	293.7μSv/h
3/14	P.M. 10:45	正門	Front Gate	271.7μSv/h
3/14	P.M. 10:50	正門	Front Gate	267.0μSv/h
3/14	P.M. 10:55	正門	Front Gate	263.0μSv/h
3/14	P.M. 11:00	正門	Front Gate	252.7μSv/h
3/14	P.M. 11:05	正門	Front Gate	242.8μSv/h
3/14	P.M. 11:10	正門	Front Gate	235.3μSv/h
3/14	P.M. 11:15	正門	Front Gate	231.5μSv/h
3/14	P.M. 11:20	正門	Front Gate	227.0μSv/h
3/14	P.M. 11:25	正門	Front Gate	216.0μSv/h
3/14	P.M. 11:30	正門	Front Gate	216.0μSv/h
3/14	P.M. 11:35	正門	Front Gate	211.3μSv/h
3/14	P.M. 11:40	正門	Front Gate	205.6μSv/h
3/14	P.M. 11:45	正門	Front Gate	201.7μSv/h
3/14	P.M. 11:50	正門	Front Gate	196.2μSv/h
3/14	P.M. 11:55	正門	Front Gate	192.3μSv/h
3/15	A.M. 0:00	正門	Front Gate	188.9μSv/h
3/15	A.M. 0:05	正門	Front Gate	185.0μSv/h
3/15	A.M. 0:10	正門	Front Gate	181.0μSv/h
3/15	A.M. 0:15	正門	Front Gate	177.3μSv/h
3/15	A.M. 0:20	正門	Front Gate	175.8μSv/h
3/15	A.M. 0:25	正門	Front Gate	173.3μSv/h
3/15	A.M. 0:30	正門	Front Gate	168.0μSv/h
3/15	A.M. 0:35	正門	Front Gate	164.9μSv/h
3/15	A.M. 0:40	正門	Front Gate	164.4μSv/h
3/15	A.M. 0:45	正門	Front Gate	167.6μSv/h
3/15	A.M. 0:50	正門	Front Gate	164.3μSv/h
3/15	A.M. 0:55	正門	Front Gate	151.7μSv/h
3/15	A.M. 1:00	正門	Front Gate	150.3μSv/h
3/15	A.M. 1:05	正門	Front Gate	147.1μSv/h
3/15	A.M. 1:20	正門	Front Gate	137.8μSv/h
3/15	A.M. 1:30	正門	Front Gate	135.5μSv/h
3/15	A.M. 1:40	正門	Front Gate	130.4μSv/h
3/15	A.M. 1:50	正門	Front Gate	123.3μSv/h
3/15	A.M. 2:00	正門	Front Gate	120.2μSv/h
3/15	A.M. 2:10	正門	Front Gate	114.1μSv/h
3/15	A.M. 2:20	正門	Front Gate	111.4μSv/h
3/15	A.M. 2:30	正門	Front Gate	109.6μSv/h
3/15	A.M. 2:40	正門	Front Gate	105.4μSv/h

3/15	A.M. 3:10	正門	Front Gate	94.3μSv/h
3/15	A.M. 3:20	正門	Front Gate	92.8μSv/h
3/15	A.M. 3:40	正門	Front Gate	87.0μSv/h
3/15	A.M. 4:00	正門	Front Gate	81.9μSv/h
3/15	A.M. 4:20	正門	Front Gate	77.6μSv/h
3/15	A.M. 4:40	正門	Front Gate	73.6μSv/h
3/15	A.M. 5:00	正門	Front Gate	70.0μSv/h
3/15	A.M. 5:20	正門	Front Gate	67.4μSv/h
3/15	A.M. 5:40	正門	Front Gate	65.7μSv/h
3/15	A.M. 6:00	正門	Front Gate	73.2μSv/h
3/15	A.M. 8:20	正門	Front Gate	807.7μSv/h
3/15	A.M. 8:31	正門	Front Gate	8217.0μSv/h
3/15	A.M. 8:40	正門	Front Gate	1726.0μSv/h
3/15	A.M. 8:50	正門	Front Gate	2208.0μSv/h
3/15	A.M. 9:00	正門	Front Gate	11930.0μSv/h
3/15	A.M. 9:15	MP - 4 付	around MP-4	58.0μSv/h
3/15	A.M. 9:20	MP - 4 付	around MP-4	50.0μSv/h
3/15	A.M. 9:35	正門	Front Gate	7241.0μSv/h
3/15	A.M.10:15	正門	Front Gate	8837.0μSv/h
3/15	A.M.11:40	西門	West Gate	253.8μSv/h
3/15	A.M.11:45	西門	West Gate	162.4μSv/h
3/15	P.M. 0:05	西門	West Gate	2431.0μSv/h
3/15	P.M. 0:15	西門	West Gate	2434.0μSv/h
3/15	P.M. 0:25	正門	Front Gate	1407.0μSv/h
3/15	P.M. 0:35	正門	Front Gate	1325.0μSv/h
3/15	P.M. 0:45	正門	Front Gate	1267.0μSv/h
3/15	P.M. 0:55	正門	Front Gate	1216.0μSv/h
3/15	P.M. 1:00	正門	Front Gate	1191.0μSv/h
3/15	P.M. 1:10	正門	Front Gate	1148.0μSv/h
3/15	P.M. 1:20	正門	Front Gate	1100.0μSv/h
3/15	P.M. 1:30	正門	Front Gate	1068.0μSv/h
3/15	P.M. 1:40	正門	Front Gate	1014.0μSv/h
3/15	P.M. 1:50	正門	Front Gate	969.9μSv/h
3/15	P.M. 2:00	正門	Front Gate	928.2μSv/h
3/15	P.M. 2:10	正門	Front Gate	903.9μSv/h
3/15	P.M. 2:20	正門	Front Gate	874.4μSv/h
3/15	P.M. 2:30	正門	Front Gate	855.5μSv/h
3/15	P.M. 2:40	正門	Front Gate	821.3μSv/h
3/15	P.M. 2:50	正門	Front Gate	673.8μSv/h
3/15	P.M. 3:00	正門	Front Gate	649.0μSv/h
3/15	P.M. 3:10	正門	Front Gate	628.5μSv/h
3/15	P.M. 3:20	正門	Front Gate	613.8μSv/h
3/15	P.M. 3:30	正門	Front Gate	596.4μSv/h
3/15	P.M. 3:40	正門	Front Gate	566.9μSv/h
3/15	P.M. 3:50	正門	Front Gate	544.9μSv/h
3/15	P.M. 4:00	正門	Front Gate	531.6μSv/h
3/15	P.M. 4:10	正門	Front Gate	513.2μSv/h

3/15	P.M. 4:20	正門	Front Gate	502.6μSv/h
3/15	P.M. 4:30	正門	Front Gate	489.8μSv/h
3/15	P.M. 4:40	正門	Front Gate	473.0μSv/h
3/15	P.M. 4:50	正門	Front Gate	460.3μSv/h
3/15	P.M. 5:00	正門	Front Gate	449.4μSv/h
3/15	P.M. 5:10	正門	Front Gate	437.5μSv/h
3/15	P.M. 5:30	正門	Front Gate	423.5μSv/h
3/15	P.M. 6:00	正門	Front Gate	401.7μSv/h
3/15	P.M. 6:30	正門	Front Gate	403.0μSv/h
3/15	P.M. 7:00	正門	Front Gate	353.8μSv/h
3/15	P.M. 7:30	正門	Front Gate	343.3μSv/h
3/15	P.M. 8:00	正門	Front Gate	347.0μSv/h
3/15	P.M. 8:30	正門	Front Gate	311.3μSv/h
3/15	P.M. 9:00	正門	Front Gate	298.8μSv/h
3/15	P.M. 9:30	正門	Front Gate	282.6μSv/h
3/15	P.M. 10:00	正門	Front Gate	313.2μSv/h
3/15	P.M. 10:30	正門	Front Gate	431.8μSv/h
3/15	P.M. 11:00	正門	Front Gate	4548.0μSv/h
3/15	P.M. 11:10	正門	Front Gate	6960.0μSv/h
3/15	P.M. 11:15	正門	Front Gate	2761.0μSv/h
3/15	P.M. 11:20	正門	Front Gate	3648.0μSv/h
3/15	P.M. 11:25	正門	Front Gate	4976.0μSv/h
3/15	P.M. 11:30	正門	Front Gate	8080.0μSv/h
3/15	P.M. 11:35	正門	Front Gate	6308.0μSv/h
3/15	P.M. 11:40	正門	Front Gate	6592.0μSv/h
3/15	P.M. 11:45	正門	Front Gate	6847.0μSv/h
3/15	P.M. 11:50	正門	Front Gate	6066.0μSv/h
3/15	P.M. 11:55	正門	Front Gate	7966.0μSv/h
3/16	A.M. 0:00	正門	Front Gate	4351.0μSv/h
3/16	A.M. 0:10	正門	Front Gate	3504.0μSv/h
3/16	A.M. 0:20	正門	Front Gate	3108.0μSv/h
3/16	A.M. 0:30	正門	Front Gate	2609.0μSv/h
3/16	A.M. 1:00	正門	Front Gate	2159.0μSv/h
3/16	A.M. 1:10	正門	Front Gate	2021.0μSv/h
3/16	A.M. 1:20	正門	Front Gate	1937.0μSv/h
3/16	A.M. 1:30	正門	Front Gate	1805.0μSv/h
3/16	A.M. 1:40	正門	Front Gate	1708.0μSv/h
3/16	A.M. 1:50	正門	Front Gate	1628.0μSv/h
3/16	A.M. 2:00	正門	Front Gate	1552.0μSv/h
3/16	A.M. 2:10	正門	Front Gate	1522.0μSv/h
3/16	A.M. 2:20	正門	Front Gate	1453.0μSv/h
3/16	A.M. 2:30	正門	Front Gate	1386.0μSv/h
3/16	A.M. 2:40	正門	Front Gate	1357.0μSv/h
3/16	A.M. 2:50	正門	Front Gate	1316.0μSv/h
3/16	A.M. 3:00	正門	Front Gate	1267.0μSv/h
3/16	A.M. 3:30	正門	Front Gate	1159.0μSv/h
3/16	A.M. 4:00	正門	Front Gate	1047.0μSv/h

3/16	A.M. 4:30	正門	Front Gate	975.3μSv/h
3/16	A.M. 5:00	正門	Front Gate	918.2μSv/h
3/16	A.M. 5:30	正門	Front Gate	868.0μSv/h
3/16	A.M. 6:00	正門	Front Gate	884.0μSv/h
3/16	A.M. 6:30	正門	Front Gate	848.4μSv/h
3/16	A.M. 6:40	正門	Front Gate	837.0μSv/h
3/16	A.M. 6:50	正門	Front Gate	815.9μSv/h
3/16	A.M. 7:00	正門	Front Gate	808.8μSv/h
3/16	A.M. 7:10	正門	Front Gate	670.3μSv/h
3/16	A.M. 7:20	正門	Front Gate	661.8μSv/h
3/16	A.M. 7:30	正門	Front Gate	651.1μSv/h
3/16	A.M. 7:40	正門	Front Gate	644.0μSv/h
3/16	A.M. 7:50	正門	Front Gate	636.8μSv/h
3/16	A.M. 8:00	正門	Front Gate	627.5μSv/h
3/16	A.M. 8:10	正門	Front Gate	620.6μSv/h
3/16	A.M. 8:20	正門	Front Gate	613.9μSv/h
3/16	A.M. 8:30	正門	Front Gate	606.6μSv/h
3/16	A.M. 8:40	正門	Front Gate	600.4μSv/h
3/16	A.M. 8:50	正門	Front Gate	593.4μSv/h
3/16	A.M. 9:00	正門	Front Gate	587.6μSv/h
3/16	A.M. 9:10	正門	Front Gate	582.2μSv/h
3/16	A.M. 9:20	正門	Front Gate	582.4μSv/h
3/16	A.M. 9:30	正門	Front Gate	582.3μSv/h
3/16	A.M. 9:40	正門	Front Gate	641.8μSv/h
3/16	A.M. 9:50	正門	Front Gate	700.6μSv/h
3/16	A.M.10:00	正門	Front Gate	810.3μSv/h
3/16	A.M.10:10	正門	Front Gate	908.5μSv/h
3/16	A.M.10:20	正門	Front Gate	2399.0μSv/h
3/16	A.M.10:30	正門	Front Gate	1361.0μSv/h
3/16	A.M.10:45	正門	Front Gate	6400.0μSv/h
3/16	A.M.10:54	正門	Front Gate	2300.0μSv/h
3/16	A.M.10:55	正門	Front Gate	2900.0μSv/h
3/16	A.M.11:00	正門	Front Gate	3391.0μSv/h
3/16	A.M.11:10	正門	Front Gate	2720.0μSv/h
3/16	A.M.11:20	正門	Front Gate	1900.0μSv/h
3/16	A.M.11:30	正門	Front Gate	5350.0μSv/h
3/16	A.M.11:40	正門	Front Gate	2633.0μSv/h
3/16	A.M.11:50	正門	Front Gate	2578.0μSv/h
3/16	A.M. 0:00	正門	Front Gate	4418.0μSv/h
3/16	P.M. 0:10	正門	Front Gate	3138.0μSv/h
3/16	P.M. 0:20	正門	Front Gate	3261.0μSv/h
3/16	P.M. 0:30	正門	Front Gate	10850.0μSv/h
3/16	P.M. 0:40	正門	Front Gate	8234.0μSv/h
3/16	P.M. 0:50	正門	Front Gate	2851.0μSv/h
3/16	P.M. 1:00	正門	Front Gate	2672.0μSv/h
3/16	P.M. 1:10	正門	Front Gate	2538.0μSv/h
3/16	P.M. 1:20	正門	Front Gate	2430.0μSv/h

3/16	P.M. 1:30	正門	Front Gate	2331.0μSv/h
3/16	P.M. 1:40	正門	Front Gate	2257.0μSv/h
3/16	P.M. 1:50	正門	Front Gate	2182.0μSv/h
3/16	P.M. 2:00	正門	Front Gate	2122.0μSv/h
3/16	P.M. 2:10	正門	Front Gate	2059.0μSv/h
3/16	P.M. 2:20	正門	Front Gate	2002.0μSv/h
3/16	P.M. 2:30	正門	Front Gate	1937.0μSv/h
3/16	P.M. 2:40	正門	Front Gate	1888.0μSv/h
3/16	P.M. 2:50	正門	Front Gate	1835.0μSv/h
3/16	P.M. 3:00	正門	Front Gate	1788.0μSv/h
3/16	P.M. 3:10	正門	Front Gate	1752.0μSv/h
3/16	P.M. 3:20	正門	Front Gate	1697.0μSv/h
3/16	P.M. 3:30	正門	Front Gate	1664.0μSv/h
3/16	P.M. 3:40	正門	Front Gate	1629.0μSv/h
3/16	P.M. 3:50	正門	Front Gate	1591.0μSv/h
3/17	A.M. 0:30	西門	West Gate	351.4 μSv/h
3/17	A.M. 0:50	西門	West Gate	350.1 μSv/h
3/17	A.M. 1:00	西門	West Gate	350.0 μSv/h
3/17	A.M. 1:30	西門	West Gate	348.2 μSv/h
3/17	A.M. 2:00	西門	West Gate	345.9 μSv/h
3/17	A.M. 2:30	西門	West Gate	344.8 μSv/h
3/17	A.M. 3:00	西門	West Gate	344.6 μSv/h
3/17	A.M. 3:30	西門	West Gate	341.7 μSv/h
3/17	A.M. 4:00	西門	West Gate	340.8 μSv/h
3/17	A.M. 4:30	西門	West Gate	339.4 μSv/h
3/17	A.M. 5:00	西門	West Gate	338.3 μSv/h
3/17	A.M. 5:30	西門	West Gate	336.1 μSv/h
3/17	A.M. 6:00	西門	West Gate	334.7 μSv/h
3/17	A.M. 6:30	西門	West Gate	333.8 μSv/h
3/17	A.M. 7:30	西門	West Gate	314.5 μSv/h
3/17	A.M. 7:30	西門	West Gate	313.5 μSv/h
3/17	A.M. 7:50	體育館脇	a side of Gym	381.3 μSv/h
3/17	A.M. 8:00	體育館脇	a side of Gym	379.0 μSv/h
3/17	A.M. 8:30	體育館脇	a side of Gym	373.0 μSv/h
3/17	A.M. 8:40	體育館脇	a side of Gym	372.5 μSv/h
3/17	A.M. 8:50	體育館脇	a side of Gym	372.7 μSv/h
3/17	A.M. 9:00	體育館脇	a side of Gym	373.7 μSv/h
3/17	A.M. 9:10	體育館脇	a side of Gym	371.9 μSv/h
3/17	A.M. 9:30	事務本館北	North of Main Admin. Bldg.	3786.0 μSv/h
3/17	A.M. 9:40	事務本館北	North of Main Admin. Bldg.	3782.0 μSv/h
3/17	A.M. 9:50	事務本館北	North of Main Admin. Bldg.	3763.0 μSv/h
3/17	A.M. 10:00	事務本館北	North of Main Admin. Bldg.	3759.0 μSv/h
3/17	A.M. 10:10	事務本館北	North of Main Admin. Bldg.	3755.0 μSv/h
3/17	A.M. 10:20	事務本館北	North of Main Admin. Bldg.	3754.0 μSv/h
3/17	A.M. 10:30	事務本館北	North of Main Admin. Bldg.	3750.0 μSv/h
3/17	A.M. 10:40	事務本館北	North of Main Admin. Bldg.	3753.0 μSv/h
3/17	A.M. 10:50	事務本館北	North of Main Admin. Bldg.	3743.0 μSv/h
3/17	A.M. 11:00	正門	Front Gate	647.3 μSv/h

3/17	A.M. 11:10	正門	Front Gate	646.2 $\mu\text{Sv/h}$
3/17	A.M. 11:15	西門	West Gate	313.1 $\mu\text{Sv/h}$
3/17	A.M. 11:20	西門	west Gate	312.5 $\mu\text{Sv/h}$
3/17	A.M. 11:30	西門	West Gate	312.3 $\mu\text{Sv/h}$
3/17	P.M. 0:00	西門	West Gate	311.0 $\mu\text{Sv/h}$
3/17	P.M. 0:30	西門	West Gate	310.7 $\mu\text{Sv/h}$
3/17	P.M. 1:00	西門	West Gate	309.7 $\mu\text{Sv/h}$
3/17	P.M. 1:10	西門	West Gate	309.3 $\mu\text{Sv/h}$
3/17	P.M. 1:20	西門	West Gate	309.1 $\mu\text{Sv/h}$
3/17	P.M. 1:30	事務本館北	North of Main Admin. Bldg.	4175.0 $\mu\text{Sv/h}$
3/17	P.M. 1:40	事務本館北	North of Main Adnmin. Bldg.	4165.0 $\mu\text{Sv/h}$
3/17	P.M. 2:00	事務本館北	North of Main Adnmin. Bldg.	3810.0 $\mu\text{Sv/h}$
3/17	P.M. 2:10	西門	West Gate	311.1 $\mu\text{Sv/h}$
3/17	P.M. 2:30	西門	West Gate	310.3 $\mu\text{Sv/h}$
3/17	P.M. 3:00	西門	West Gate	309.1 $\mu\text{Sv/h}$
3/17	P.M. 3:30	西門	West Gate	309.7 $\mu\text{Sv/h}$
3/17	P.M. 3:50	事務本館北	North of Main Admin. Bldg.	3700.0 $\mu\text{Sv/h}$
3/17	P.M. 4:00	事務本館北	North of Main Adnmin. Bldg.	3698.0 $\mu\text{Sv/h}$
3/17	P.M. 4:10	事務本館北	North of Main Adnmin. Bldg.	3695.0 $\mu\text{Sv/h}$
3/17	P.M. 4:15	事務本館北	North of Main Adnmin. Bldg.	3691.0 $\mu\text{Sv/h}$
3/17	P.M. 5:00	事務本館北	North of Main Adnmin. Bldg.	3676.0 $\mu\text{Sv/h}$
3/17	P.M. 5:10	事務本館北	North of Main Adnmin. Bldg.	3675.0 $\mu\text{Sv/h}$
3/17	P.M. 5:20	事務本館北	North of Main Adnmin. Bldg.	3672.0 $\mu\text{Sv/h}$
3/17	P.M. 5:30	事務本館北	North of Main Adnmin. Bldg.	3667.0 $\mu\text{Sv/h}$
3/17	P.M. 5:40	事務本館北	North of Main Adnmin. Bldg.	3639.0 $\mu\text{Sv/h}$
3/17	P.M. 5:50	事務本館北	North of Main Adnmin. Bldg.	3650.0 $\mu\text{Sv/h}$
3/17	P.M. 6:00	事務本館北	North of Main Adnmin. Bldg.	3649.0 $\mu\text{Sv/h}$
3/17	P.M. 6:10	事務本館北	North of Main Adnmin. Bldg.	3641.0 $\mu\text{Sv/h}$
3/17	P.M. 6:20	事務本館北	North of Main Adnmin. Bldg.	3645.0 $\mu\text{Sv/h}$
3/17	P.M. 6:30	事務本館北	North of Main Adnmin. Bldg.	3643.0 $\mu\text{Sv/h}$
3/17	P.M. 6:40	事務本館北	North of Main Adnmin. Bldg.	3638.0 $\mu\text{Sv/h}$
3/17	P.M. 5:50	事務本館北	North of Main Adnmin. Bldg.	3638.0 $\mu\text{Sv/h}$
3/17	P.M. 7:00	事務本館北	North of Main Adnmin. Bldg.	3630.0 $\mu\text{Sv/h}$
3/17	P.M. 7:10	事務本館北	North of Main Adnmin. Bldg.	3626.0 $\mu\text{Sv/h}$
3/17	P.M. 8:40	西門	West Gate	292.2 $\mu\text{Sv/h}$
3/17	P.M. 9:00	西門	West Gate	291.9 $\mu\text{Sv/h}$
3/17	P.M. 9:10	西門	West Gate	291.7 $\mu\text{Sv/h}$
3/17	P.M. 9:20	西門	West Gate	291.3 $\mu\text{Sv/h}$
3/17	P.M. 9:30	西門	West Gate	291.2 $\mu\text{Sv/h}$
3/17	P.M. 9:40	西門	West Gate	291.1 $\mu\text{Sv/h}$
3/17	P.M. 9:50	西門	West Gate	290.9 $\mu\text{Sv/h}$
3/17	P.M. 10:00	西門	West Gate	290.4 $\mu\text{Sv/h}$
3/17	P.M. 10:10	西門	West Gate	290.4 $\mu\text{Sv/h}$
3/17	P.M. 10:20	西門	West Gate	289.9 $\mu\text{Sv/h}$
3/17	P.M. 10:30	西門	West Gate	289.7 $\mu\text{Sv/h}$
3/17	P.M. 10:40	西門	West Gate	289.6 $\mu\text{Sv/h}$
3/17	P.M. 10:50	西門	West Gate	289.5 $\mu\text{Sv/h}$
3/17	P.M. 11:00	西門	West Gate	289.0 $\mu\text{Sv/h}$

3/17	P.M. 11:10	西門	West Gate	289.0 μ Sv/h
3/17	P.M. 11:20	西門	West Gate	288.8 μ Sv/h
3/17	P.M. 11:30	西門	West Gate	288.7 μ Sv/h
3/17	P.M. 11:40	西門	West Gate	287.8 μ Sv/h
3/17	P.M. 11:50	西門	West Gate	288.9 μ Sv/h
3/18	A.M. 0:00	西門	West Gate	287.0 μ Sv/h
3/18	A.M. 0:10	西門	West Gate	287.3 μ Sv/h
3/18	A.M. 0:20	西門	West Gate	286.6 μ Sv/h
3/18	A.M. 0:30	西門	West Gate	286.4 μ Sv/h
3/18	A.M. 0:40	西門	West Gate	286.3 μ Sv/h
3/18	A.M. 0:50	西門	West Gate	286.0 μ Sv/h
3/18	A.M. 1:00	西門	West Gate	285.6 μ Sv/h
3/18	A.M. 1:10	西門	West Gate	285.5 μ Sv/h
3/18	A.M. 1:20	西門	West Gate	285.2 μ Sv/h
3/18	A.M. 1:30	西門	West Gate	284.9 μ Sv/h
3/18	A.M. 1:40	西門	West Gate	284.6 μ Sv/h
3/18	A.M. 1:50	西門	West Gate	284.4 μ Sv/h
3/18	A.M. 2:00	西門	West Gate	284.0 μ Sv/h
3/18	A.M. 2:10	西門	West Gate	283.7 μ Sv/h
3/18	A.M. 2:20	西門	West Gate	283.7 μ Sv/h
3/18	A.M. 2:30	西門	West Gate	283.5 μ Sv/h
3/18	A.M. 2:40	西門	West Gate	283.0 μ Sv/h
3/18	A.M. 2:50	西門	West Gate	282.9 μ Sv/h
3/18	A.M. 3:00	西門	West Gate	282.6 μ Sv/h
3/18	A.M. 3:10	西門	West Gate	282.0 μ Sv/h
3/18	A.M. 3:20	西門	West Gate	282.0 μ Sv/h
3/18	A.M. 3:30	西門	West Gate	281.6 μ Sv/h
3/18	A.M. 3:40	西門	West Gate	281.5 μ Sv/h
3/18	A.M. 3:50	西門	West Gate	281.2 μ Sv/h
3/18	A.M. 4:00	西門	West Gate	281.1 μ Sv/h
3/18	A.M. 4:10	西門	West Gate	280.9 μ Sv/h
3/18	A.M. 4:20	西門	West Gate	280.7 μ Sv/h
3/18	A.M. 4:30	西門	West Gate	280.2 μ Sv/h
3/18	A.M. 4:40	西門	West Gate	280.0 μ Sv/h
3/18	A.M. 4:50	西門	West Gate	279.8 μ Sv/h
3/18	A.M. 5:00	西門	West Gate	279.4 μ Sv/h
3/18	A.M. 5:10	西門	West Gate	279.3 μ Sv/h
3/18	A.M. 5:20	西門	West Gate	279.0 μ Sv/h
3/18	A.M. 5:30	西門	West Gate	278.9 μ Sv/h
3/18	A.M. 5:40	西門	West Gate	278.9 μ Sv/h
3/18	A.M. 5:50	西門	West Gate	277.1 μ Sv/h
3/18	A.M. 6:00	西門	West Gate	274.0 μ Sv/h
3/18	A.M. 6:10	西門	West Gate	274.0 μ Sv/h
3/18	A.M. 6:20	西門	West Gate	273.8 μ Sv/h
3/18	A.M. 6:30	西門	West Gate	274.1 μ Sv/h
3/18	A.M. 6:40	西門	West Gate	272.7 μ Sv/h
3/18	A.M. 6:50	西門	West Gate	273.4 μ Sv/h
3/18	A.M. 7:00	西門	West Gate	272.4 μ Sv/h

3/18	A.M. 7:10	西門	West Gate	271.7 μ Sv/h
3/18	A.M. 7:20	西門	West Gate	271.6 μ Sv/h
3/18	A.M. 7:30	西門	West Gate	271.4 μ Sv/h
3/18	A.M. 7:40	西門	West Gate	271.1 μ Sv/h
3/18	A.M. 7:50	西門	West Gate	271.2 μ Sv/h
3/18	A.M. 8:00	西門	West Gate	270.5 μ Sv/h
3/18	A.M. 8:10	西門	West Gate	270.3 μ Sv/h
3/18	A.M. 8:20	西門	West Gate	269.9 μ Sv/h
3/18	A.M. 8:30	西門	West Gate	269.9 μ Sv/h
3/18	A.M. 8:40	西門	West Gate	269.8 μ Sv/h
3/18	A.M. 8:50	西門	West Gate	269.2 μ Sv/h
3/18	A.M. 9:00	西門	West Gate	268.7 μ Sv/h
3/18	A.M. 9:10	西門	West Gate	267.6 μ Sv/h
3/18	A.M. 9:20	西門	West Gate	268.9 μ Sv/h
3/18	A.M. 9:30	西門	West Gate	267.5 μ Sv/h
3/18	A.M. 9:40	西門	West Gate	267.0 μ Sv/h
3/18	A.M. 9:50	西門	West Gate	266.9 μ Sv/h
3/18	A.M. 10:00	西門	West Gate	266.7 μ Sv/h
3/18	A.M. 10:10	西門	West Gate	266.4 μ Sv/h
3/18	A.M. 10:20	西門	West Gate	266.1 μ Sv/h
3/18	A.M. 10:30	西門	West Gate	265.7 μ Sv/h
3/18	A.M. 10:40	西門	West Gate	265.4 μ Sv/h
3/18	A.M. 10:50	西門	West Gate	264.8 μ Sv/h
3/18	A.M. 11:00	西門	West Gate	265.0 μ Sv/h
3/18	A.M. 11:10	西門	West Gate	264.4 μ Sv/h
3/18	A.M. 11:20	西門	West Gate	264.5 μ Sv/h
3/18	A.M. 11:30	西門	West Gate	264.1 μ Sv/h
3/18	A.M. 11:40	西門	West Gate	264.4 μ Sv/h
3/18	A.M. 11:50	西門	West Gate	263.4 μ Sv/h
3/18	P.M. 0:00	西門	West Gate	263.5 μ Sv/h
3/18	P.M. 0:10	西門	West Gate	263.1 μ Sv/h
3/18	P.M. 0:20	西門	West Gate	262.9 μ Sv/h
3/18	P.M. 0:30	西門	West Gate	263.3 μ Sv/h
3/18	A.M. 0:40	西門	West Gate	264.3 μ Sv/h
3/18	P.M. 0:50	西門	West Gate	261.3 μ Sv/h
3/18	P.M. 1:00	西門	West Gate	262.0 μ Sv/h
3/18	P.M. 1:10	西門	West Gate	261.9 μ Sv/h
3/18	P.M. 1:20	西門	West Gate	262.7 μ Sv/h
3/18	P.M. 1:30	西門	West Gate	264.1 μ Sv/h
3/18	P.M. 1:50	事務本館北	North of Main Admin. Bldg.	3484.0 μ Sv/h
3/18	P.M. 2:00	事務本館北	North of Main Admin. Bldg.	3414.0 μ Sv/h
3/18	P.M. 2:10	事務本館北	North of Main Admin. Bldg.	3382.0 μ Sv/h
3/18	P.M. 2:15	事務本館北	North of Main Admin. Bldg.	3371 μ Sv/h
3/18	P.M. 2:20	事務本館北	North of Main Admin. Bldg.	3362 μ Sv/h
3/18	P.M. 2:25	事務本館北	North of Main Admin. Bldg.	3357 μ Sv/h
3/18	P.M. 2:30	事務本館北	North of Main Admin. Bldg.	3352 μ Sv/h
3/18	P.M. 2:35	事務本館北	North of Main Admin. Bldg.	3342 μ Sv/h
3/18	P.M. 2:40	事務本館北	North of Main Admin. Bldg.	3348 μ Sv/h

3/18	P.M. 2:45	事務本館北	North of Main Admin. Bldg.	3357 μ Sv/h
3/18	P.M. 2:50	事務本館北	North of Main Admin. Bldg.	3339 μ Sv/h
3/18	P.M. 2:55	事務本館北	North of Main Admin. Bldg.	3346 μ Sv/h
3/18	P.M. 3:00	事務本館北	North of Main Admin. Bldg.	3345 μ Sv/h
3/18	P.M. 3:10	事務本館北	North of Main Admin. Bldg.	3368 μ Sv/h
3/18	P.M. 3:20	事務本館北	North of Main Admin. Bldg.	3582 μ Sv/h
3/18	P.M. 3:30	事務本館北	North of Main Admin. Bldg.	4075 μ Sv/h
3/18	P.M. 3:40	事務本館北	North of Main Admin. Bldg.	3823 μ Sv/h
3/18	P.M. 3:50	事務本館北	North of Main Admin. Bldg.	4396 μ Sv/h
3/18	P.M. 4:00	事務本館北	North of Main Admin. Bldg.	4485 μ Sv/h
3/18	P.M. 4:10	事務本館北	North of Main Admin. Bldg.	4352 μ Sv/h
3/18	P.M. 4:20	事務本館北	North of Main Admin. Bldg.	4535 μ Sv/h
3/18	P.M. 4:30	事務本館北	North of Main Admin. Bldg.	4419 μ Sv/h
3/18	P.M. 4:40	事務本館北	North of Main Admin. Bldg.	4277 μ Sv/h
3/18	P.M. 4:50	事務本館北	North of Main Admin. Bldg.	4735 μ Sv/h
3/18	P.M. 5:00	事務本館北	North of Main Admin. Bldg.	5055 μ Sv/h
3/18	P.M. 5:10	事務本館北	North of Main Admin. Bldg.	5033 μ Sv/h
3/18	P.M. 5:20	事務本館北	North of Main Admin. Bldg.	4952 μ Sv/h
3/18	P.M. 5:30	事務本館北	North of Main Admin. Bldg.	4251 μ Sv/h
3/18	P.M. 5:40	事務本館北	North of Main Admin. Bldg.	4182 μ Sv/h
3/18	P.M. 5:50	事務本館北	North of Main Admin. Bldg.	4090 μ Sv/h
3/18	P.M. 6:00	事務本館北	North of Main Admin. Bldg.	4084 μ Sv/h
3/18	P.M. 6:10	事務本館北	North of Main Admin. Bldg.	4069 μ Sv/h
3/18	P.M. 6:20	事務本館北	North of Main Admin. Bldg.	4069 μ Sv/h
3/18	P.M. 6:30	事務本館北	North of Main Admin. Bldg.	3922 μ Sv/h
3/18	P.M. 6:40	事務本館北	North of Main Admin. Bldg.	3885 μ Sv/h
3/18	P.M. 6:50	事務本館北	North of Main Admin. Bldg.	3832 μ Sv/h
3/18	P.M. 7:00	事務本館北	North of Main Admin. Bldg.	3788 μ Sv/h
3/18	P.M. 7:10	事務本館北	North of Main Admin. Bldg.	3745 μ Sv/h
3/18	P.M. 7:20	事務本館北	North of Main Admin. Bldg.	3728 μ Sv/h
3/18	P.M. 7:30	事務本館北	North of Main Admin. Bldg.	3699 μ Sv/h
3/18	P.M. 7:40	事務本館北	North of Main Admin. Bldg.	3669 μ Sv/h
3/18	P.M. 7:50	事務本館北	North of Main Admin. Bldg.	3634 μ Sv/h
3/18	P.M. 8:00	事務本館北	North of Main Admin. Bldg.	3611 μ Sv/h
3/18	P.M. 8:10	西門	West Gate	447.6 μ Sv/h
3/18	P.M. 8:20	西門	West Gate	441.2 μ Sv/h
3/18	P.M. 8:30	西門	West Gate	434.5 μ Sv/h
3/18	P.M. 8:40	西門	West Gate	429.2 μ Sv/h
3/18	P.M. 8:50	西門	West Gate	423.9 μ Sv/h
3/18	P.M. 9:00	西門	West Gate	419.1 μ Sv/h
3/18	P.M. 9:10	西門	West Gate	414.2 μ Sv/h
3/18	P.M. 9:20	西門	West Gate	409.4 μ Sv/h
3/18	P.M. 9:30	西門	West Gate	405.2 μ Sv/h
3/18	P.M. 9:40	西門	West Gate	401.6 μ Sv/h
3/18	P.M. 9:50	西門	West Gate	397.8 μ Sv/h
3/18	P.M. 10:00	西門	West Gate	393.9 μ Sv/h
3/18	P.M. 10:10	西門	West Gate	389.2 μ Sv/h
3/18	P.M. 10:20	西門	West Gate	385.9 μ Sv/h

3/18	P.M. 10:30	西門	West Gate	382.9μSv/h
3/18	P.M. 10:40	西門	West Gate	379.6μSv/h
3/18	P.M. 10:50	西門	West Gate	375.9μSv/h
3/18	P.M. 11:00	西門	West Gate	373.6μSv/h
3/18	P.M. 11:10	西門	West Gate	371.2μSv/h
3/18	P.M. 11:20	西門	West Gate	368.9μSv/h
3/18	P.M. 11:30	事務本館北	North of Main Admin. Bldg.	3254μSv/h
3/18	P.M. 11:40	事務本館北	North of Main Admin. Bldg.	3256μSv/h
3/18	P.M. 11:50	事務本館北	North of Main Admin. Bldg.	3244μSv/h
3/19	A.M. 0:00	事務本館北	North of Main Admin. Bldg.	3229μSv/h
3/19	A.M. 0:10	事務本館北	North of Main Admin. Bldg.	3224μSv/h
3/19	A.M. 0:20	事務本館北	North of Main Admin. Bldg.	3219μSv/h
3/19	A.M. 0:30	事務本館北	North of Main Admin. Bldg.	3231μSv/h
3/19	A.M. 0:40	事務本館北	North of Main Admin. Bldg.	3342μSv/h
3/19	A.M. 0:50	事務本館北	North of Main Admin. Bldg.	3284μSv/h
3/19	A.M. 1:00	事務本館北	North of Main Admin. Bldg.	3248μSv/h
3/19	A.M. 1:10	事務本館北	North of Main Admin. Bldg.	3279μSv/h
3/19	A.M. 1:20	事務本館北	North of Main Admin. Bldg.	3247μSv/h
3/19	A.M. 1:30	事務本館北	North of Main Admin. Bldg.	3195μSv/h
3/19	A.M. 1:40	事務本館北	North of Main Admin. Bldg.	3188μSv/h
3/19	A.M. 1:50	事務本館北	North of Main Admin. Bldg.	3181μSv/h
3/19	A.M. 2:00	西門	West Gate	313.7μSv/h
3/19	A.M. 2:10	西門	West Gate	312.2μSv/h
3/19	A.M. 2:20	西門	West Gate	311.1μSv/h
3/19	A.M. 2:30	西門	West Gate	310μSv/h
3/19	A.M. 2:40	西門	West Gate	309.1μSv/h
3/19	A.M. 2:50	西門	West Gate	308.6μSv/h
3/19	A.M. 3:00	西門	West Gate	306.9μSv/h
3/19	A.M. 3:10	西門	West Gate	306μSv/h
3/19	A.M. 3:20	西門	West Gate	305.1μSv/h
3/19	A.M. 3:30	西門	West Gate	304.3μSv/h
3/19	A.M. 3:40	西門	West Gate	303.6μSv/h
3/19	A.M. 3:50	西門	West Gate	303.1μSv/h
3/19	A.M. 4:00	西門	West Gate	301.7μSv/h
3/19	A.M. 4:10	西門	West Gate	301.3μSv/h
3/19	A.M. 4:20	西門	West Gate	300.5μSv/h
3/19	A.M. 4:30	西門	West Gate	299.2μSv/h
3/19	A.M. 4:40	西門	West Gate	299.2μSv/h
3/19	A.M. 4:50	西門	West Gate	298.5μSv/h
3/19	A.M. 5:00	西門	West Gate	297.5μSv/h
3/19	A.M. 5:10	西門	West Gate	296.4μSv/h
3/19	A.M. 5:20	西門	West Gate	295.8μSv/h
3/19	A.M. 5:30	西門	West Gate	295.1μSv/h
3/19	A.M. 5:40	西門	West Gate	295.4μSv/h
3/19	A.M. 5:50	西門	West Gate	294.3μSv/h
3/19	A.M. 6:00	西門	West Gate	293.8μSv/h
3/19	A.M. 6:10	西門	West Gate	293.6μSv/h
3/19	A.M. 6:20	西門	West Gate	292.6μSv/h

3/19	A.M. 6:30	西門	West Gate	292.3μSv/h
3/19	A.M. 6:40	西門	West Gate	291.5μSv/h
3/19	A.M. 6:50	西門	West Gate	290.9μSv/h
3/19	A.M. 7:00	西門	West Gate	290.6μSv/h
3/19	A.M. 7:10	西門	West Gate	289.8μSv/h
3/19	A.M. 7:20	西門	West Gate	289.1μSv/h
3/19	A.M. 7:30	西門	West Gate	288.9μSv/h
3/19	A.M. 7:40	西門	West Gate	288.6μSv/h
3/19	A.M. 7:50	西門	West Gate	287.2μSv/h
3/19	A.M. 8:00	西門	West Gate	399μSv/h
3/19	A.M. 8:10	西門	West Gate	830.8μSv/h
3/19	A.M. 8:20	西門	West Gate	670.6μSv/h
3/19	A.M. 8:30	西門	West Gate	431.9μSv/h
3/19	A.M. 8:40	西門	West Gate	390.5μSv/h
3/19	A.M. 8:50	西門	West Gate	522.5μSv/h
3/19	A.M. 9:00	西門	West Gate	364.5μSv/h
3/19	A.M. 9:10	西門	West Gate	336.5μSv/h
3/19	A.M. 9:20	西門	West Gate	323.8μSv/h
3/19	A.M. 9:30	西門	West Gate	425.2μSv/h
3/19	A.M. 9:40	西門	West Gate	657.3μSv/h
3/19	A.M. 9:50	西門	West Gate	358.3μSv/h
3/19	A.M. 10:00	西門	West Gate	346.1μSv/h
3/19	A.M. 10:10	西門	West Gate	341.2μSv/h
3/19	A.M. 10:20	西門	West Gate	338.4μSv/h
3/19	A.M. 10:30	西門	West Gate	334.3μSv/h
3/19	A.M. 10:40	西門	West Gate	330.2μSv/h
3/19	A.M. 10:50	西門	West Gate	327.1μSv/h
3/19	A.M. 11:00	西門	West Gate	322.6μSv/h
3/19	A.M. 11:10	西門	West Gate	319.8μSv/h
3/19	A.M. 11:20	西門	West Gate	315.1μSv/h
3/19	A.M. 11:30	西門	West Gate	313.1μSv/h
3/19	A.M. 11:40	事務本館北	North of Main Admin. Bldg.	3954μSv/h
3/19	A.M. 11:50	事務本館北	North of Main Admin. Bldg.	3901μSv/h
3/19	P.M. 0:00	事務本館北	North of Main Admin. Bldg.	3882μSv/h
3/19	P.M. 0:10	事務本館北	North of Main Admin. Bldg.	3828μSv/h
3/19	P.M. 0:20	事務本館北	North of Main Admin. Bldg.	3802μSv/h
3/19	P.M. 0:30	事務本館北	North of Main Admin. Bldg.	3749μSv/h
3/19	A.M. 0:40	事務本館北	North of Main Admin. Bldg.	3704μSv/h
3/19	P.M. 0:50	事務本館北	North of Main Admin. Bldg.	3655μSv/h
3/19	P.M. 1:00	事務本館北	North of Main Admin. Bldg.	3629μSv/h
3/19	P.M. 1:10	事務本館北	North of Main Admin. Bldg.	3594μSv/h
3/19	P.M. 1:20	事務本館北	North of Main Admin. Bldg.	3565μSv/h
3/19	P.M. 1:30	事務本館北	North of Main Admin. Bldg.	3529μSv/h
3/19	P.M. 1:50	事務本館北	North of Main Admin. Bldg.	3491μSv/h
3/19	P.M. 2:00	事務本館北	North of Main Admin. Bldg.	3473μSv/h
3/19	P.M. 2:10	事務本館北	North of Main Admin. Bldg.	3443μSv/h
3/19	P.M. 2:15	事務本館北	North of Main Admin. Bldg.	3417μSv/h
3/19	P.M. 2:20	事務本館北	North of Main Admin. Bldg.	3396μSv/h

3/19	P.M. 2:30	事務本館北	North of Main Admin. Bldg.	3375μSv/h
3/19	P.M. 2:40	事務本館北	North of Main Admin. Bldg.	3348μSv/h
3/19	P.M. 2:50	事務本館北	North of Main Admin. Bldg.	3340μSv/h
3/19	P.M. 3:00	事務本館北	North of Main Admin. Bldg.	3279μSv/h
3/19	P.M. 3:10	事務本館北	North of Main Admin. Bldg.	3281μSv/h
3/19	P.M. 3:20	事務本館北	North of Main Admin. Bldg.	3229μSv/h
3/19	P.M. 3:30	事務本館北	North of Main Admin. Bldg.	3194μSv/h
3/19	P.M. 3:40	事務本館北	North of Main Admin. Bldg.	3474μSv/h
3/19	P.M. 3:50	事務本館北	North of Main Admin. Bldg.	3167μSv/h
3/19	P.M. 4:00	事務本館北	North of Main Admin. Bldg.	3165μSv/h
3/19	P.M. 4:10	事務本館北	North of Main Admin. Bldg.	3137μSv/h
3/19	P.M. 4:20	事務本館北	North of Main Admin. Bldg.	3135μSv/h
3/19	P.M. 4:30	事務本館北	North of Main Admin. Bldg.	3126μSv/h
3/19	P.M. 4:40	事務本館北	North of Main Admin. Bldg.	3111μSv/h
3/19	P.M. 4:50	事務本館北	North of Main Admin. Bldg.	3089μSv/h
3/19	P.M. 5:00	事務本館北	North of Main Admin. Bldg.	3078μSv/h
3/19	P.M. 5:10	事務本館北	North of Main Admin. Bldg.	3071μSv/h
3/19	P.M. 5:20	事務本館北	North of Main Admin. Bldg.	3058μSv/h
3/19	P.M. 5:30	事務本館北	North of Main Admin. Bldg.	3051μSv/h
3/19	P.M. 5:40	事務本館北	North of Main Admin. Bldg.	3033μSv/h
3/19	P.M. 5:50	事務本館北	North of Main Admin. Bldg.	3024μSv/h
3/19	P.M. 6:00	事務本館北	North of Main Admin. Bldg.	3020μSv/h
3/19	P.M. 6:10	事務本館北	North of Main Admin. Bldg.	3007μSv/h
3/19	P.M. 6:20	事務本館北	North of Main Admin. Bldg.	3002μSv/h
3/19	P.M. 6:30	事務本館北	North of Main Admin. Bldg.	2998μSv/h
3/19	P.M. 6:40	事務本館北	North of Main Admin. Bldg.	2992μSv/h
3/19	P.M. 6:50	事務本館北	North of Main Admin. Bldg.	2978μSv/h
3/19	P.M. 7:00	事務本館北	North of Main Admin. Bldg.	2972μSv/h
3/19	P.M. 7:10	事務本館北	North of Main Admin. Bldg.	2965μSv/h
3/19	P.M. 7:20	事務本館北	North of Main Admin. Bldg.	2961μSv/h
3/19	P.M. 7:30	事務本館北	North of Main Admin. Bldg.	2957μSv/h
3/19	P.M. 7:40	事務本館北	North of Main Admin. Bldg.	2946μSv/h
3/19	P.M. 7:50	事務本館北	North of Main Admin. Bldg.	2941μSv/h
3/19	P.M. 8:00	事務本館北	North of Main Admin. Bldg.	2937μSv/h
3/19	P.M. 8:10	事務本館北	North of Main Admin. Bldg.	2931μSv/h
3/19	P.M. 8:20	事務本館北	North of Main Admin. Bldg.	2924μSv/h
3/19	P.M. 8:30	事務本館北	North of Main Admin. Bldg.	2917μSv/h
3/19	P.M. 8:40	事務本館北	North of Main Admin. Bldg.	2912μSv/h
3/19	P.M. 8:50	事務本館北	North of Main Admin. Bldg.	2909μSv/h
3/19	P.M. 9:00	事務本館北	North of Main Admin. Bldg.	2906μSv/h
3/19	P.M. 9:10	事務本館北	North of Main Admin. Bldg.	2900μSv/h
3/19	P.M. 9:20	事務本館北	North of Main Admin. Bldg.	2895μSv/h
3/19	P.M. 9:30	事務本館北	North of Main Admin. Bldg.	2891μSv/h
3/19	P.M. 9:40	事務本館北	North of Main Admin. Bldg.	2883μSv/h
3/19	P.M. 9:50	事務本館北	North of Main Admin. Bldg.	2880μSv/h
3/19	P.M. 10:00	事務本館北	North of Main Admin. Bldg.	2880μSv/h
3/19	P.M. 10:10	事務本館北	North of Main Admin. Bldg.	2876μSv/h
3/19	P.M. 10:20	事務本館北	North of Main Admin. Bldg.	2855μSv/h

3/19	P.M. 10:30	事務本館北	North of Main Admin. Bldg.	2854 μ Sv/h
3/19	P.M. 10:40	事務本館北	North of Main Admin. Bldg.	2847 μ Sv/h
3/19	P.M. 10:50	事務本館北	North of Main Admin. Bldg.	2844 μ Sv/h
3/19	P.M. 11:00	事務本館北	North of Main Admin. Bldg.	2841 μ Sv/h
3/19	P.M. 11:10	事務本館北	North of Main Admin. Bldg.	2836 μ Sv/h
3/19	P.M. 11:20	事務本館北	North of Main Admin. Bldg.	2828 μ Sv/h
3/19	P.M. 11:30	事務本館北	North of Main Admin. Bldg.	2828 μ Sv/h
3/20	A.M. 0:00	事務本館北	North of Main Admin. Bldg.	2821.0 μ Sv/h
3/20	A.M. 0:10	事務本館北	North of Main Admin. Bldg.	2814.0 μ Sv/h
3/20	A.M. 0:20	事務本館北	North of Main Admin. Bldg.	2808.0 μ Sv/h
3/20	A.M. 0:30	事務本館北	North of Main Admin. Bldg.	2805.0 μ Sv/h
3/20	A.M. 0:40	事務本館北	North of Main Admin. Bldg.	2803.0 μ Sv/h
3/20	A.M. 0:50	事務本館北	North of Main Admin. Bldg.	2791.0 μ Sv/h
3/20	A.M. 1:00	事務本館北	North of Main Admin. Bldg.	2797.0 μ Sv/h
3/20	A.M. 1:10	事務本館北	North of Main Admin. Bldg.	2794.0 μ Sv/h
3/20	A.M. 1:20	事務本館北	North of Main Admin. Bldg.	2793.0 μ Sv/h
3/20	A.M. 1:30	事務本館北	North of Main Admin. Bldg.	2788.0 μ Sv/h
3/20	A.M. 1:40	事務本館北	North of Main Admin. Bldg.	2785.0 μ Sv/h
3/20	A.M. 1:50	事務本館北	North of Main Admin. Bldg.	2781.0 μ Sv/h
3/20	A.M. 2:00	事務本館北	North of Main Admin. Bldg.	2778.0 μ Sv/h
3/20	A.M. 2:10	事務本館北	North of Main Admin. Bldg.	2773.0 μ Sv/h
3/20	A.M. 2:20	事務本館北	North of Main Admin. Bldg.	2771.0 μ Sv/h
3/20	A.M. 2:30	事務本館北	North of Main Admin. Bldg.	2767.0 μ Sv/h
3/20	A.M. 2:40	事務本館北	North of Main Admin. Bldg.	2764.0 μ Sv/h
3/20	A.M. 2:50	事務本館北	North of Main Admin. Bldg.	2761.0 μ Sv/h
3/20	A.M. 3:00	事務本館北	North of Main Admin. Bldg.	2759.0 μ Sv/h
3/20	A.M. 3:10	事務本館北	North of Main Admin. Bldg.	2745.0 μ Sv/h
3/20	A.M. 3:20	事務本館北	North of Main Admin. Bldg.	2745.0 μ Sv/h
3/20	A.M. 3:30	事務本館北	North of Main Admin. Bldg.	2741.0 μ Sv/h
3/20	A.M. 3:40	事務本館北	North of Main Admin. Bldg.	2758.0 μ Sv/h
3/20	A.M. 3:50	事務本館北	North of Main Admin. Bldg.	3185.0 μ Sv/h
3/20	A.M. 4:00	事務本館北	North of Main Admin. Bldg.	2939.0 μ Sv/h
3/20	A.M. 4:10	事務本館北	North of Main Admin. Bldg.	2771.0 μ Sv/h
3/20	A.M. 4:20	事務本館北	North of Main Admin. Bldg.	2743.0 μ Sv/h
3/20	A.M. 4:30	事務本館北	North of Main Admin. Bldg.	2739.0 μ Sv/h
3/20	A.M. 4:40	西門	West Gate	273.2 μ Sv/h
3/20	A.M. 4:50	西門	West Gate	271.8 μ Sv/h
3/20	A.M. 5:00	西門	West Gate	271.2 μ Sv/h
3/20	A.M. 5:10	西門	West Gate	270.9 μ Sv/h
3/20	A.M. 5:20	西門	West Gate	270.4 μ Sv/h
3/20	A.M. 5:30	西門	West Gate	269.8 μ Sv/h
3/20	A.M. 5:40	西門	West Gate	269.5 μ Sv/h
3/20	A.M. 5:50	事務本館北	North of Main Admin. Bldg.	2683.0 μ Sv/h
3/20	A.M. 6:00	事務本館北	North of Main Admin. Bldg.	2679.0 μ Sv/h
3/20	A.M. 6:10	事務本館北	North of Main Admin. Bldg.	2679.0 μ Sv/h
3/20	A.M. 6:20	事務本館北	North of Main Admin. Bldg.	2677.0 μ Sv/h
3/20	A.M. 6:30	事務本館北	North of Main Admin. Bldg.	2670.0 μ Sv/h
3/20	A.M. 6:40	事務本館北	North of Main Admin. Bldg.	2654.0 μ Sv/h

3/20	A.M. 6:50	事務本館北	North of Main Admin. Bldg.	2664.0 μSv/h
3/20	A.M. 7:00	事務本館北	North of Main Admin. Bldg.	2661.0 μSv/h
3/20	A.M. 7:10	事務本館北	North of Main Admin. Bldg.	2661.0 μSv/h
3/20	A.M. 7:20	事務本館北	North of Main Admin. Bldg.	2659.0 μSv/h
3/20	A.M. 7:30	事務本館北	North of Main Admin. Bldg.	2652.0 μSv/h
3/20	A.M. 7:40	事務本館北	North of Main Admin. Bldg.	2653.0 μSv/h
3/20	A.M. 7:50	事務本館北	North of Main Admin. Bldg.	2637.0 μSv/h
3/20	A.M. 8:00	事務本館北	North of Main Admin. Bldg.	2630.0 μSv/h
3/20	A.M. 8:10	事務本館北	North of Main Admin. Bldg.	2629.0 μSv/h
3/20	A.M. 8:20	事務本館北	North of Main Admin. Bldg.	2627.0 μSv/h
3/20	A.M. 8:30	事務本館北	North of Main Admin. Bldg.	2625.0 μSv/h
3/20	A.M. 8:40	事務本館北	North of Main Admin. Bldg.	2619.0 μSv/h
3/20	A.M. 8:50	事務本館北	North of Main Admin. Bldg.	2617.0 μSv/h
3/20	A.M. 9:00	事務本館北	North of Main Admin. Bldg.	2614.0 μSv/h
3/20	A.M. 9:10	事務本館北	North of Main Admin. Bldg.	2614.0 μSv/h
3/20	A.M. 9:20	事務本館北	North of Main Admin. Bldg.	2608.0 μSv/h
3/20	A.M. 9:30	事務本館北	North of Main Admin. Bldg.	2623.0 μSv/h
3/20	A.M. 9:40	事務本館北	North of Main Admin. Bldg.	2661.0 μSv/h
3/20	A.M. 9:50	事務本館北	North of Main Admin. Bldg.	2742.0 μSv/h
3/20	A.M. 10:00	事務本館北	North of Main Admin. Bldg.	2726.0 μSv/h
3/20	A.M. 10:10	事務本館北	North of Main Admin. Bldg.	2608.8 μSv/h
3/20	A.M. 10:20	事務本館北	North of Main Admin. Bldg.	2605.0 μSv/h
3/20	A.M. 10:30	事務本館北	North of Main Admin. Bldg.	2596.0 μSv/h
3/20	A.M. 10:40	事務本館北	North of Main Admin. Bldg.	2589.0 μSv/h
3/20	A.M. 10:50	事務本館北	North of Main Admin. Bldg.	2583.0 μSv/h
3/20	A.M. 11:00	事務本館北	North of Main Admin. Bldg.	2579.0 μSv/h
3/20	A.M. 11:10	事務本館北	North of Main Admin. Bldg.	2578.0 μSv/h
3/20	A.M. 11:20	事務本館北	North of Main Admin. Bldg.	2569.0 μSv/h
3/20	A.M. 11:30	事務本館北	North of Main Admin. Bldg.	2571.0 μSv/h
3/20	A.M. 11:40	事務本館北	North of Main Admin. Bldg.	2562.0 μSv/h
3/20	A.M. 11:50	事務本館北	North of Main Admin. Bldg.	2564.0μSv/h
3/20	P.M. 0:00	事務本館北	North of Main Admin. Bldg.	2559.0 μSv/h
3/20	P.M. 0:10	事務本館北	North of Main Admin. Bldg.	2558.0 μSv/h
3/20	P.M. 0:20	事務本館北	North of Main Admin. Bldg.	2552.0 μSv/h
3/20	P.M. 0:30	事務本館北	North of Main Admin. Bldg.	2551.0 μSv/h
3/20	A.M. 0:40	事務本館北	North of Main Admin. Bldg.	2551.0 μSv/h
3/20	P.M. 0:50	事務本館北	North of Main Admin. Bldg.	2550.0 μSv/h
3/20	P.M. 1:00	事務本館北	North of Main Admin. Bldg.	2567.0 μSv/h
3/20	P.M. 1:10	事務本館北	North of Main Admin. Bldg.	2588.0 μSv/h
3/20	P.M. 1:20	事務本館北	North of Main Admin. Bldg.	2660.0 μSv/h
3/20	P.M. 1:30	事務本館北	North of Main Admin. Bldg.	2593.0 μSv/h
3/20	P.M. 1:40	事務本館北	North of Main Admin. Bldg.	2654.0 μSv/h
3/20	P.M. 1:50	事務本館北	North of Main Admin. Bldg.	2741.0 μSv/h
3/20	P.M. 2:00	事務本館北	North of Main Admin. Bldg.	2768.0 μSv/h
3/20	P.M. 2:10	事務本館北	North of Main Admin. Bldg.	2999.0 μSv/h
3/20	P.M. 2:20	事務本館北	North of Main Admin. Bldg.	2923.0 μSv/h
3/20	P.M. 2:30	事務本館北	North of Main Admin. Bldg.	3056.0 μSv/h
3/20	P.M. 2:40	事務本館北	North of Main Admin. Bldg.	3202.0 μSv/h

3/20	P.M. 2:50	事務本館北	North of Main Admin. Bldg.	3346.0 μ Sv/h
3/20	P.M. 3:00	事務本館北	North of Main Admin. Bldg.	3054.0 μ Sv/h
3/20	P.M. 3:10	事務本館北	North of Main Admin. Bldg.	3071.0 μ Sv/h
3/20	P.M. 3:20	事務本館北	North of Main Admin. Bldg.	3342.0 μ Sv/h
3/20	P.M. 3:30	事務本館北	North of Main Admin. Bldg.	3337.0 μ Sv/h
3/20	P.M. 3:40	事務本館北	North of Main Admin. Bldg.	3003.0 μ Sv/h
3/20	P.M. 3:50	事務本館北	North of Main Admin. Bldg.	3046.0 μ Sv/h
3/20	P.M. 4:00	事務本館北	North of Main Admin. Bldg.	3171.0 μ Sv/h
3/20	P.M. 4:10	事務本館北	North of Main Admin. Bldg.	2940.0 μ Sv/h
3/20	P.M. 4:20	事務本館北	North of Main Admin. Bldg.	2851.0 μ Sv/h
3/20	P.M. 4:30	事務本館北	North of Main Admin. Bldg.	2830.0 μ Sv/h
3/20	P.M. 4:40	事務本館北	North of Main Admin. Bldg.	2960.0 μ Sv/h
3/20	P.M. 4:50	事務本館北	North of Main Admin. Bldg.	2839.0 μ Sv/h
3/20	P.M. 5:00	事務本館北	North of Main Admin. Bldg.	2773.0 μ Sv/h
3/20	P.M. 5:10	事務本館北	North of Main Admin. Bldg.	2763.0 μ Sv/h
3/20	P.M. 5:20	事務本館北	North of Main Admin. Bldg.	2758.0 μ Sv/h
3/20	P.M. 5:30	事務本館北	North of Main Admin. Bldg.	2729.0 μ Sv/h
3/20	P.M. 5:40	事務本館北	North of Main Admin. Bldg.	2715.0 μ Sv/h
3/20	P.M. 5:50	事務本館北	North of Main Admin. Bldg.	2707.0 μ Sv/h
3/20	P.M. 6:00	事務本館北	North of Main Admin. Bldg.	2693.0 μ Sv/h
3/20	P.M. 6:10	事務本館北	North of Main Admin. Bldg.	2680.0 μ Sv/h
3/20	P.M. 6:20	事務本館北	North of Main Admin. Bldg.	2673.0 μ Sv/h
3/20	P.M. 6:30	事務本館北	North of Main Admin. Bldg.	2658.0 μ Sv/h
3/20	P.M. 6:40	事務本館北	North of Main Admin. Bldg.	2651.0 μ Sv/h
3/20	P.M. 6:50	事務本館北	North of Main Admin. Bldg.	2658.0 μ Sv/h
3/20	P.M. 7:00	事務本館北	North of Main Admin. Bldg.	2623.0 μ Sv/h
3/20	P.M. 7:10	事務本館北	North of Main Admin. Bldg.	2683.0 μ Sv/h
3/20	P.M. 7:20	事務本館北	North of Main Admin. Bldg.	2614.0 μ Sv/h
3/20	P.M. 7:30	事務本館北	North of Main Admin. Bldg.	2602.0 μ Sv/h
3/20	P.M. 7:40	事務本館北	North of Main Admin. Bldg.	2595.0 μ Sv/h
3/20	P.M. 7:50	事務本館北	North of Main Admin. Bldg.	2632.0 μ Sv/h
3/20	P.M. 8:00	事務本館北	North of Main Admin. Bldg.	2828.0 μ Sv/h
3/20	P.M. 8:10	事務本館北	North of Main Admin. Bldg.	2704.0 μ Sv/h
3/20	P.M. 8:20	事務本館北	North of Main Admin. Bldg.	2682.0 μ Sv/h
3/20	P.M. 8:30	事務本館北	North of Main Admin. Bldg.	2586.0 μ Sv/h
3/20	P.M. 8:40	事務本館北	North of Main Admin. Bldg.	2552.0 μ Sv/h
3/20	P.M. 8:50	事務本館北	North of Main Admin. Bldg.	2550.0 μ Sv/h
3/20	P.M. 9:00	事務本館北	North of Main Admin. Bldg.	2542.0 μ Sv/h
3/20	P.M. 9:10	事務本館北	North of Main Admin. Bldg.	2537.0 μ Sv/h
3/20	P.M. 9:20	事務本館北	North of Main Admin. Bldg.	2532.0 μ Sv/h
3/20	P.M. 9:30	事務本館北	North of Main Admin. Bldg.	2518.0 μ Sv/h
3/20	P.M. 9:40	事務本館北	North of Main Admin. Bldg.	2517.0 μ Sv/h
3/20	P.M. 9:50	事務本館北	North of Main Admin. Bldg.	2510.0 μ Sv/h
3/20	P.M. 10:00	事務本館北	North of Main Admin. Bldg.	2506.0 μ Sv/h
3/20	P.M. 10:10	事務本館北	North of Main Admin. Bldg.	2503.0 μ Sv/h
3/20	P.M. 10:20	事務本館北	North of Main Admin. Bldg.	2492.0 μ Sv/h
3/20	P.M. 10:30	事務本館北	North of Main Admin. Bldg.	2487.0 μ Sv/h
3/20	P.M. 10:40	事務本館北	North of Main Admin. Bldg.	2485.0 μ Sv/h

3/20	P.M. 10:50	事務本館北	North of Main Admin. Bldg.	2483.0 μ Sv/h
3/20	P.M. 11:00	事務本館北	North of Main Admin. Bldg.	2475.0 μ Sv/h
3/20	P.M. 11:10	事務本館北	North of Main Admin. Bldg.	2469.0 μ Sv/h
3/20	P.M. 11:20	事務本館北	North of Main Admin. Bldg.	2462.0 μ Sv/h
3/20	P.M. 11:30	事務本館北	North of Main Admin. Bldg.	2455.0 μ Sv/h
3/20	P.M. 11:40	事務本館北	North of Main Admin. Bldg.	2457.0 μ Sv/h
3/20	P.M. 11:50	事務本館北	North of Main Admin. Bldg.	2453.0 μ Sv/h
3/21	A.M. 0:00	事務本館北	North of Main Admin. Bldg.	2452.0 μ Sv/h
3/21	A.M. 0:10	事務本館北	North of Main Admin. Bldg.	2449.0 μ Sv/h
3/21	A.M. 0:20	事務本館北	North of Main Admin. Bldg.	2444.0 μ Sv/h
3/21	A.M. 0:30	事務本館北	North of Main Admin. Bldg.	2439.0 μ Sv/h
3/21	A.M. 0:40	事務本館北	North of Main Admin. Bldg.	2438.0 μ Sv/h
3/21	A.M. 0:50	事務本館北	North of Main Admin. Bldg.	2433.0 μ Sv/h
3/21	A.M. 1:00	事務本館北	North of Main Admin. Bldg.	2396.0 μ Sv/h
3/21	A.M. 1:10	事務本館北	North of Main Admin. Bldg.	2392.0 μ Sv/h
3/21	A.M. 1:20	事務本館北	North of Main Admin. Bldg.	2389.0 μ Sv/h
3/21	A.M. 1:30	事務本館北	North of Main Admin. Bldg.	2385.0 μ Sv/h
3/21	A.M. 1:40	事務本館北	North of Main Admin. Bldg.	2383.0 μ Sv/h
3/21	A.M. 1:50	事務本館北	North of Main Admin. Bldg.	2380.0 μ Sv/h
3/21	A.M. 2:00	事務本館北	North of Main Admin. Bldg.	2396.0 μ Sv/h
3/21	A.M. 2:10	事務本館北	North of Main Admin. Bldg.	2392.0 μ Sv/h
3/21	A.M. 2:20	事務本館北	North of Main Admin. Bldg.	2389.0 μ Sv/h
3/21	A.M. 2:30	事務本館北	North of Main Admin. Bldg.	2385.0 μ Sv/h
3/21	A.M. 2:40	事務本館北	North of Main Admin. Bldg.	2383.0 μ Sv/h
3/21	A.M. 2:50	事務本館北	North of Main Admin. Bldg.	2380.0 μ Sv/h
3/21	A.M. 3:00	事務本館北	North of Main Admin. Bldg.	2378.0 μ Sv/h
3/21	A.M. 3:10	事務本館北	North of Main Admin. Bldg.	2375.0 μ Sv/h
3/21	A.M. 3:20	事務本館北	North of Main Admin. Bldg.	2372.0 μ Sv/h
3/21	A.M. 3:30	事務本館北	North of Main Admin. Bldg.	2370.0 μ Sv/h
3/21	A.M. 3:40	事務本館北	North of Main Admin. Bldg.	2366.0 μ Sv/h
3/21	A.M. 3:50	事務本館北	North of Main Admin. Bldg.	2364.0 μ Sv/h
3/21	A.M. 4:00	事務本館北	North of Main Admin. Bldg.	2362.0 μ Sv/h
3/21	A.M. 4:10	事務本館北	North of Main Admin. Bldg.	2356.0 μ Sv/h
3/21	A.M. 4:20	事務本館北	North of Main Admin. Bldg.	2351.0 μ Sv/h
3/21	A.M. 4:30	事務本館北	North of Main Admin. Bldg.	2350.0 μ Sv/h
3/21	A.M. 4:40	事務本館北	North of Main Admin. Bldg.	2347.0 μ Sv/h
3/21	A.M. 4:50	正門	Front Gate	2345.0 μ Sv/h
3/21	A.M. 5:00	正門	Front Gate	2343.0 μ Sv/h
3/21	A.M. 5:10	M P - 7 付	around MP-7	2341.0 μ Sv/h
3/21	A.M. 5:20	正門	Front Gate	2339.0 μ Sv/h
3/21	A.M. 5:30	正門	Front Gate	2336.0 μ Sv/h
3/21	A.M. 5:40	正門	Front Gate	2333.0 μ Sv/h
3/21	A.M. 5:50	正門	Front Gate	2330.0 μ Sv/h
3/21	A.M. 6:00	正門	Front Gate	2324.0 μ Sv/h
3/21	A.M. 6:10	正門	Front Gate	2326.0 μ Sv/h
3/21	A.M. 6:20	正門	Front Gate	2325.0 μ Sv/h
3/21	A.M. 6:30	正門	Front Gate	2319.0 μ Sv/h
3/21	A.M. 6:40	正門	Front Gate	2312.0 μ Sv/h

3/21	A.M. 6:50	正門	Front Gate	2293.0 μ Sv/h
3/21	A.M. 7:00	正門	Front Gate	2283.0 μ Sv/h
3/21	A.M. 7:10	正門	Front Gate	2271.0 μ Sv/h
3/21	A.M. 7:20	正門	Front Gate	2251.0 μ Sv/h
3/21	A.M. 7:30	正門	Front Gate	2232.0 μ Sv/h
3/21	A.M. 7:40	正門	Front Gate	2215.0 μ Sv/h
3/21	A.M. 7:50	正門	Front Gate	2200.0 μ Sv/h
3/21	A.M. 8:00	正門	Front Gate	2168.0 μ Sv/h
3/21	A.M. 8:10	正門	Front Gate	2161.0 μ Sv/h
3/21	A.M. 8:20	正門	Front Gate	2147.0 μ Sv/h
3/21	A.M. 8:30	正門	Front Gate	2140.0 μ Sv/h
3/21	A.M. 8:40	正門	Front Gate	2128.0 μ Sv/h
3/21	A.M. 8:50	正門	Front Gate	2126.0 μ Sv/h
3/21	A.M. 9:00	正門	Front Gate	2122.0 μ Sv/h
3/21	A.M. 9:10	正門	Front Gate	2120.0 μ Sv/h
3/21	A.M. 9:20	正門	Front Gate	2127.0 μ Sv/h
3/21	A.M. 9:30	正門	Front Gate	2114.0 μ Sv/h
3/21	A.M. 9:40	正門	Front Gate	2111.0 μ Sv/h
3/21	A.M. 9:50	正門	Front Gate	2108.0 μ Sv/h
3/21	A.M. 10:00	正門	Front Gate	2098.0 μ Sv/h
3/21	A.M. 10:10	正門	Front Gate	2100.0 μ Sv/h
3/21	A.M. 10:20	正門	Front Gate	2100.0 μ Sv/h
3/21	A.M. 10:30	正門	Front Gate	2100.0 μ Sv/h
3/21	A.M. 10:40	正門	Front Gate	2102.0 μ Sv/h
3/21	A.M. 10:50	正門	Front Gate	2105.0 μ Sv/h
3/21	A.M. 11:00	正門	Front Gate	2107.0 μ Sv/h
3/21	A.M. 11:10	正門	Front Gate	2107.0 μ Sv/h
3/21	A.M. 11:20	正門	Front Gate	2108.0 μ Sv/h
3/21	A.M. 11:30	正門	Front Gate	2110.0 μ Sv/h
3/21	A.M. 11:40	正門	Front Gate	2112.0 μ Sv/h
3/21	A.M. 11:50	正門	Front Gate	2113.0 μ Sv/h
3/21	P.M. 0:00	正門	Front Gate	2108.0 μ Sv/h
3/21	P.M. 0:10	正門	Front Gate	2112.0 μ Sv/h
3/21	P.M. 0:20	正門	Front Gate	2107.0 μ Sv/h
3/21	P.M. 0:30	正門	Front Gate	2111.0 μ Sv/h
3/21	A.M. 0:40	正門	Front Gate	2112.0 μ Sv/h
3/21	P.M. 0:50	正門	Front Gate	2110.0 μ Sv/h
3/21	P.M. 1:00	正門	Front Gate	2105.0 μ Sv/h
3/21	P.M. 1:10	正門	Front Gate	2103.0 μ Sv/h
3/21	P.M. 1:20	正門	Front Gate	2098.0 μ Sv/h
3/21	P.M. 1:30	正門	Front Gate	2092.0 μ Sv/h
3/21	P.M. 1:40	正門	Front Gate	2089.0 μ Sv/h
3/21	P.M. 1:50	正門	Front Gate	2068.0 μ Sv/h
3/21	P.M. 2:00	正門	Front Gate	2064.0 μ Sv/h
3/21	P.M. 2:10	正門	Front Gate	2053.0 μ Sv/h
3/21	P.M. 2:20	正門	Front Gate	2043.0 μ Sv/h
3/21	P.M. 2:30	正門	Front Gate	2039.0 μ Sv/h
3/21	P.M. 2:40	正門	Front Gate	2035.0 μ Sv/h

3/21	P.M. 2:50	正門	Front Gate	2029.0 μ Sv/h
3/21	P.M. 3:00	正門	Front Gate	2019.0 μ Sv/h
3/21	P.M. 3:10	正門	Front Gate	2019.0 μ Sv/h
3/21	P.M. 3:20	正門	Front Gate	2013.0 μ Sv/h
3/21	P.M. 3:30	正門	Front Gate	2013.0 μ Sv/h
3/21	P.M. 3:40	正門	Front Gate	2012.0 μ Sv/h
3/21	P.M. 3:50	正門	Front Gate	2013.0 μ Sv/h
3/21	P.M. 4:00	正門	Front Gate	2016.0 μ Sv/h
3/21	P.M. 4:10	正門	Front Gate	2013.0 μ Sv/h
3/21	P.M. 4:20	正門	Front Gate	2011.0 μ Sv/h
3/21	P.M. 4:30	正門	Front Gate	2015.0 μ Sv/h
3/21	P.M. 4:42	正門	Front Gate	1140.0 μ Sv/h
3/21	P.M. 4:50	正門	Front Gate	508.0 μ Sv/h
3/21	P.M. 5:06	正門	Front Gate	1292.0 μ Sv/h
3/21	P.M. 5:30	正門	Front Gate	729.0 μ Sv/h
3/21	P.M. 5:40	正門	Front Gate	494.3 μ Sv/h
3/21	P.M. 5:50	正門	Front Gate	1383.0 μ Sv/h
3/21	P.M. 6:00	正門	Front Gate	1757.0 μ Sv/h
3/21	P.M. 6:10	正門	Front Gate	1256.0 μ Sv/h
3/21	P.M. 6:20	正門	Front Gate	1428.0 μ Sv/h
3/21	P.M. 6:30	正門	Front Gate	1932.0 μ Sv/h
3/21	P.M. 6:40	正門	Front Gate	1499.0 μ Sv/h
3/21	P.M. 6:50	正門	Front Gate	1105.0 μ Sv/h
3/21	P.M. 7:00	正門	Front Gate	1201.0 μ Sv/h
3/21	P.M. 7:10	正門	Front Gate	823.6 μ Sv/h
3/21	P.M. 7:20	正門	Front Gate	700.1 μ Sv/h
3/21	P.M. 7:30	正門	Front Gate	587.3 μ Sv/h
3/21	P.M. 7:40	正門	Front Gate	503.9 μ Sv/h
3/21	P.M. 7:50	正門	Front Gate	496.2 μ Sv/h
3/21	P.M. 8:00	正門	Front Gate	493.5 μ Sv/h
3/21	P.M. 8:10	正門	Front Gate	529.3 μ Sv/h
3/21	P.M. 8:20	正門	Front Gate	471.2 μ Sv/h
3/21	P.M. 8:30	正門	Front Gate	442.2 μ Sv/h
3/21	P.M. 8:40	正門	Front Gate	432.4 μ Sv/h
3/21	P.M. 8:50	正門	Front Gate	424.5 μ Sv/h
3/21	P.M. 9:00	正門	Front Gate	417.1 μ Sv/h
3/21	P.M. 9:10	正門	Front Gate	410.4 μ Sv/h
3/21	P.M. 9:20	正門	Front Gate	403.8 μ Sv/h
3/21	P.M. 9:30	正門	Front Gate	398.0 μ Sv/h
3/21	P.M. 9:40	正門	Front Gate	390.6 μ Sv/h
3/21	P.M. 9:50	正門	Front Gate	384.9 μ Sv/h
3/21	P.M. 10:00	正門	Front Gate	380.0 μ Sv/h
3/21	P.M. 10:10	正門	Front Gate	374.5 μ Sv/h
3/21	P.M. 10:20	正門	Front Gate	369.6 μ Sv/h
3/21	P.M. 10:30	正門	Front Gate	365.0 μ Sv/h
3/21	P.M. 10:40	正門	Front Gate	360.9 μ Sv/h
3/21	P.M. 10:50	正門	Front Gate	356.0 μ Sv/h
3/21	P.M. 11:00	正門	Front Gate	352.7 μ Sv/h

3/21	P.M. 11:10	正門	Front Gate	348.5 μ Sv/h
3/21	P.M. 11:20	正門	Front Gate	344.6 μ Sv/h
3/21	P.M. 11:30	正門	Front Gate	341.5 μ Sv/h
3/21	P.M. 11:40	正門	Front Gate	338.5 μ Sv/h
3/21	P.M. 11:50	正門	Front Gate	334.1 μ Sv/h
3/22	A.M. 0:00	正門	Front Gate	331.8 μ Sv/h
3/22	A.M. 0:10	正門	Front Gate	329.3 μ Sv/h
3/22	A.M. 0:20	正門	Front Gate	327.5 μ Sv/h
3/22	A.M. 0:30	正門	Front Gate	325.8 μ Sv/h
3/22	A.M. 0:40	正門	Front Gate	323.9 μ Sv/h
3/22	A.M. 0:50	正門	Front Gate	320.8 μ Sv/h
3/22	A.M. 1:00	正門	Front Gate	314.8 μ Sv/h
3/22	A.M. 1:10	正門	Front Gate	313.0 μ Sv/h
3/22	A.M. 1:20	正門	Front Gate	311.3 μ Sv/h
3/22	A.M. 1:30	正門	Front Gate	308.9 μ Sv/h
3/22	A.M. 1:40	正門	Front Gate	308.4 μ Sv/h
3/22	A.M. 1:50	正門	Front Gate	305.9 μ Sv/h
3/22	A.M. 2:00	正門	Front Gate	304.5 μ Sv/h
3/22	A.M. 2:10	正門	Front Gate	303.2 μ Sv/h
3/22	A.M. 2:20	正門	Front Gate	301.3 μ Sv/h
3/22	A.M. 2:30	正門	Front Gate	299.7 μ Sv/h
3/22	A.M. 2:40	正門	Front Gate	298.0 μ Sv/h
3/22	A.M. 2:50	正門	Front Gate	296.2 μ Sv/h
3/22	A.M. 3:00	正門	Front Gate	294.9 μ Sv/h
3/22	A.M. 3:10	正門	Front Gate	293.8 μ Sv/h
3/22	A.M. 3:20	正門	Front Gate	293.6 μ Sv/h
3/22	A.M. 3:30	正門	Front Gate	291.6 μ Sv/h
3/22	A.M. 3:40	正門	Front Gate	291.1 μ Sv/h
3/22	A.M. 3:50	正門	Front Gate	290.0 μ Sv/h
3/22	A.M. 4:00	正門	Front Gate	288.9 μ Sv/h
3/22	A.M. 4:10	正門	Front Gate	288.1 μ Sv/h
3/22	A.M. 4:20	正門	Front Gate	287.0 μ Sv/h
3/22	A.M. 4:30	正門	Front Gate	286.0 μ Sv/h
3/22	A.M. 4:40	正門	Front Gate	283.6 μ Sv/h
3/22	A.M. 4:50	正門	Front Gate	280.1 μ Sv/h
3/22	A.M. 5:00	正門	Front Gate	273.9 μ Sv/h
3/22	A.M. 5:10	正門	Front Gate	271.0 μ Sv/h
3/22	A.M. 5:20	正門	Front Gate	268.0 μ Sv/h
3/22	A.M. 5:30	正門	Front Gate	267.4 μ Sv/h
3/22	A.M. 5:40	正門	Front Gate	265.8 μ Sv/h
3/22	A.M. 5:50	正門	Front Gate	265.3 μ Sv/h
3/22	A.M. 6:00	正門	Front Gate	264.6 μ Sv/h
3/22	A.M. 6:10	正門	Front Gate	264.3 μ Sv/h
3/22	A.M. 6:20	正門	Front Gate	265.5 μ Sv/h
3/22	A.M. 6:30	正門	Front Gate	263.7 μ Sv/h
3/22	A.M. 6:40	正門	Front Gate	262.6 μ Sv/h
3/22	A.M. 6:50	正門	Front Gate	262.1 μ Sv/h
3/22	A.M. 7:00	正門	Front Gate	261.9 μ Sv/h

3/22	A.M. 7:10	正門	Front Gate	261.8 μ Sv/h
3/22	A.M. 7:20	正門	Front Gate	261.7 μ Sv/h
3/22	A.M. 7:30	正門	Front Gate	261.6 μ Sv/h
3/22	A.M. 7:40	正門	Front Gate	261.2 μ Sv/h
3/22	A.M. 7:50	正門	Front Gate	261.0 μ Sv/h
3/22	A.M. 8:00	正門	Front Gate	260.9 μ Sv/h
3/22	A.M. 8:10	正門	Front Gate	260.8 μ Sv/h
3/22	A.M. 8:20	正門	Front Gate	260.5 μ Sv/h
3/22	A.M. 8:30	正門	Front Gate	260.3 μ Sv/h
3/22	A.M. 8:40	正門	Front Gate	260.4 μ Sv/h
3/22	A.M. 8:50	正門	Front Gate	260.2 μ Sv/h
3/22	A.M. 9:00	正門	Front Gate	260.2 μ Sv/h
3/22	A.M. 9:10	正門	Front Gate	260.1 μ Sv/h
3/22	A.M. 9:20	正門	Front Gate	260.0 μ Sv/h
3/22	A.M. 9:30	正門	Front Gate	259.9 μ Sv/h
3/22	A.M. 9:40	正門	Front Gate	259.4 μ Sv/h
3/22	A.M. 9:50	正門	Front Gate	259.5 μ Sv/h
3/22	A.M. 10:00	正門	Front Gate	260.2 μ Sv/h
3/22	A.M. 10:10	正門	Front Gate	259.4 μ Sv/h
3/22	A.M. 10:20	正門	Front Gate	258.9 μ Sv/h
3/22	A.M. 10:30	正門	Front Gate	258.7 μ Sv/h
3/22	A.M. 10:40	正門	Front Gate	258.4 μ Sv/h
3/22	A.M. 10:50	正門	Front Gate	257.3 μ Sv/h
3/22	A.M. 11:00	正門	Front Gate	257.5 μ Sv/h
3/22	A.M. 11:10	正門	Front Gate	257.1 μ Sv/h
3/22	A.M. 11:20	正門	Front Gate	256.9 μ Sv/h
3/22	A.M. 11:30	正門	Front Gate	256.5 μ Sv/h
3/22	A.M. 11:40	正門	Front Gate	256.5 μ Sv/h
3/22	A.M.11:50	正門	Front Gate	256.4 μ Sv/h
3/22	P.M. 0:00	正門	Front Gate	256.3 μ Sv/h
3/22	P.M. 0:10	正門	Front Gate	256.0 μ Sv/h
3/22	P.M. 0:20	正門	Front Gate	256.1 μ Sv/h
3/22	P.M. 0:30	正門	Front Gate	256.3 μ Sv/h
3/22	A.M. 0:40	正門	Front Gate	255.6 μ Sv/h
3/22	P.M. 0:50	正門	Front Gate	255.8 μ Sv/h
3/22	P.M. 1:00	正門	Front Gate	255.6 μ Sv/h
3/22	P.M. 1:10	正門	Front Gate	255.7 μ Sv/h
3/22	P.M. 1:20	正門	Front Gate	255.2 μ Sv/h
3/22	P.M. 1:30	正門	Front Gate	254.8 μ Sv/h
3/22	P.M. 1:40	正門	Front Gate	254.8 μ Sv/h
3/22	P.M. 1:50	正門	Front Gate	254.5 μ Sv/h
3/22	P.M. 2:00	正門	Front Gate	254.6 μ Sv/h
3/22	P.M. 2:10	正門	Front Gate	254.3 μ Sv/h
3/22	P.M. 2:20	正門	Front Gate	254.4 μ Sv/h
3/22	P.M. 2:30	正門	Front Gate	254.3 μ Sv/h
3/22	P.M. 2:40	正門	Front Gate	244.3 μ Sv/h
3/22	P.M. 2:50	正門	Front Gate	254.4 μ Sv/h
3/22	P.M. 3:00	正門	Front Gate	254.1 μ Sv/h

3/22	P.M. 3:10	正門	Front Gate	255.3 μ Sv/h
3/22	P.M. 3:20	正門	Front Gate	265.7 μ Sv/h
3/22	P.M. 3:30	正門	Front Gate	277.5 μ Sv/h
3/22	P.M. 3:40	正門	Front Gate	265.2 μ Sv/h
3/22	P.M. 3:50	正門	Front Gate	258.8 μ Sv/h
3/22	P.M. 4:00	正門	Front Gate	274.0 μ Sv/h
3/22	P.M. 4:10	正門	Front Gate	280.6 μ Sv/h
3/22	P.M. 4:20	正門	Front Gate	330.6 μ Sv/h
3/22	P.M. 4:30	正門	Front Gate	352.3 μ Sv/h
3/22	P.M. 4:42	正門	Front Gate	384.2 μ Sv/h
3/22	P.M. 4:50	正門	Front Gate	294.0 μ Sv/h
3/22	P.M. 5:00	正門	Front Gate	330.8 μ Sv/h
3/22	P.M. 5:30	正門	Front Gate	351.6 μ Sv/h
3/22	P.M. 5:40	正門	Front Gate	278.9 μ Sv/h
3/22	P.M. 5:50	正門	Front Gate	275.2 μ Sv/h
3/22	P.M. 6:00	正門	Front Gate	265.5 μ Sv/h
3/22	P.M. 6:10	正門	Front Gate	264.1 μ Sv/h
3/22	P.M. 6:20	正門	Front Gate	261.5 μ Sv/h
3/22	P.M. 6:30	正門	Front Gate	324.6 μ Sv/h
3/22	P.M. 6:40	正門	Front Gate	322.8 μ Sv/h
3/22	P.M. 6:50	正門	Front Gate	303.8 μ Sv/h
3/22	P.M. 7:00	正門	Front Gate	367.9 μ Sv/h
3/22	P.M. 7:10	正門	Front Gate	363.1 μ Sv/h
3/22	P.M. 7:20	正門	Front Gate	320.9 μ Sv/h
3/22	P.M. 7:30	正門	Front Gate	472.7 μ Sv/h
3/22	P.M. 7:40	正門	Front Gate	340.7 μ Sv/h
3/22	P.M. 7:50	正門	Front Gate	258.0 μ Sv/h
3/22	P.M. 8:00	正門	Front Gate	254.1 μ Sv/h
3/22	P.M. 8:10	正門	Front Gate	253.4 μ Sv/h
3/22	P.M. 8:20	正門	Front Gate	252.5 μ Sv/h
3/22	P.M. 8:30	正門	Front Gate	251.5 μ Sv/h
3/22	P.M. 8:40	正門	Front Gate	250.5 μ Sv/h
3/22	P.M. 8:50	正門	Front Gate	249.1 μ Sv/h
3/22	P.M. 9:00	正門	Front Gate	246.1 μ Sv/h
3/22	P.M. 9:10	正門	Front Gate	244.4 μ Sv/h
3/22	P.M. 9:20	正門	Front Gate	242.8 μ Sv/h
3/22	P.M. 9:30	正門	Front Gate	241.0 μ Sv/h
3/22	P.M. 9:40	正門	Front Gate	240.6 μ Sv/h
3/22	P.M. 9:50	正門	Front Gate	239.5 μ Sv/h
3/22	P.M. 10:00	正門	Front Gate	239.3 μ Sv/h
3/22	P.M. 10:10	正門	Front Gate	237.0 μ Sv/h
3/22	P.M. 10:20	正門	Front Gate	237.4 μ Sv/h
3/22	P.M. 10:30	正門	Front Gate	236.2 μ Sv/h
3/22	P.M. 10:40	正門	Front Gate	235.7 μ Sv/h
3/22	P.M. 10:50	正門	Front Gate	235.8 μ Sv/h
3/22	P.M. 11:00	正門	Front Gate	235.9 μ Sv/h
3/23	A.M. 0:00	正門	Front Gate	233.4 μ Sv/h
3/23	A.M. 0:10	正門	Front Gate	233.3 μ Sv/h

3/23	A.M. 0:20	正門	Front Gate	232.3 $\mu\text{Sv/h}$
3/23	A.M. 0:30	正門	Front Gate	231.6 $\mu\text{Sv/h}$
3/23	A.M. 0:40	正門	Front Gate	230.1 $\mu\text{Sv/h}$
3/23	A.M. 0:50	正門	Front Gate	229.4 $\mu\text{Sv/h}$
3/23	A.M. 1:00	正門	Front Gate	227.5 $\mu\text{Sv/h}$
3/23	A.M. 1:10	正門	Front Gate	227.4 $\mu\text{Sv/h}$
3/23	A.M. 1:20	正門	Front Gate	227.2 $\mu\text{Sv/h}$
3/23	A.M. 1:30	正門	Front Gate	226.2 $\mu\text{Sv/h}$
3/23	A.M. 1:40	正門	Front Gate	226.8 $\mu\text{Sv/h}$
3/23	A.M. 1:50	正門	Front Gate	226.7 $\mu\text{Sv/h}$
3/23	A.M. 2:00	正門	Front Gate	226.7 $\mu\text{Sv/h}$
3/23	A.M. 2:10	正門	Front Gate	226.9 $\mu\text{Sv/h}$
3/23	A.M. 2:20	正門	Front Gate	227.1 $\mu\text{Sv/h}$
3/23	A.M. 2:30	正門	Front Gate	227.1 $\mu\text{Sv/h}$
3/23	A.M. 2:40	正門	Front Gate	227.2 $\mu\text{Sv/h}$
3/23	A.M. 2:50	正門	Front Gate	227.3 $\mu\text{Sv/h}$
3/23	A.M. 3:00	正門	Front Gate	227.6 $\mu\text{Sv/h}$
3/23	A.M. 3:10	正門	Front Gate	228.5 $\mu\text{Sv/h}$
3/23	A.M. 3:20	正門	Front Gate	228.7 $\mu\text{Sv/h}$
3/23	A.M. 3:30	正門	Front Gate	228.8 $\mu\text{Sv/h}$
3/23	A.M. 3:40	正門	Front Gate	228.8 $\mu\text{Sv/h}$
3/23	A.M. 3:50	正門	Front Gate	229.0 $\mu\text{Sv/h}$
3/23	A.M. 4:00	正門	Front Gate	229.1 $\mu\text{Sv/h}$
3/23	A.M. 4:10	正門	Front Gate	229.1 $\mu\text{Sv/h}$
3/23	A.M. 4:20	正門	Front Gate	229.4 $\mu\text{Sv/h}$
3/23	A.M. 4:30	正門	Front Gate	229.3 $\mu\text{Sv/h}$
3/23	A.M. 4:40	正門	Front Gate	229.5 $\mu\text{Sv/h}$
3/23	A.M. 4:50	正門	Front Gate	229.5 $\mu\text{Sv/h}$
3/23	A.M. 5:00	正門	Front Gate	229.5 $\mu\text{Sv/h}$
3/23	A.M. 5:10	正門	Front Gate	229.3 $\mu\text{Sv/h}$
3/23	A.M. 5:20	正門	Front Gate	229.6 $\mu\text{Sv/h}$
3/23	A.M. 5:30	正門	Front Gate	229.5 $\mu\text{Sv/h}$
3/23	A.M. 5:40	正門	Front Gate	229.5 $\mu\text{Sv/h}$
3/23	A.M. 5:50	正門	Front Gate	229.7 $\mu\text{Sv/h}$
3/23	A.M. 6:00	正門	Front Gate	229.6 $\mu\text{Sv/h}$
3/23	A.M. 6:10	正門	Front Gate	229.6 $\mu\text{Sv/h}$
3/23	A.M. 6:20	正門	Front Gate	229.4 $\mu\text{Sv/h}$
3/23	A.M. 6:30	正門	Front Gate	229.6 $\mu\text{Sv/h}$
3/23	A.M. 6:40	正門	Front Gate	229.5 $\mu\text{Sv/h}$
3/23	A.M. 6:50	正門	Front Gate	229.5 $\mu\text{Sv/h}$
3/23	A.M. 7:00	正門	Front Gate	229.3 $\mu\text{Sv/h}$
3/23	A.M. 7:10	正門	Front Gate	229.5 $\mu\text{Sv/h}$
3/23	A.M. 7:20	正門	Front Gate	229.3 $\mu\text{Sv/h}$
3/23	A.M. 7:30	正門	Front Gate	229.5 $\mu\text{Sv/h}$
3/23	A.M. 7:40	正門	Front Gate	229.0 $\mu\text{Sv/h}$
3/23	A.M. 7:50	正門	Front Gate	229.3 $\mu\text{Sv/h}$
3/23	A.M. 8:00	正門	Front Gate	229.4 $\mu\text{Sv/h}$
3/23	A.M. 8:10	正門	Front Gate	229.5 $\mu\text{Sv/h}$

3/23	A.M. 8:20	正門	Front Gate	229.2 μ Sv/h
3/23	A.M. 8:30	正門	Front Gate	229.4 μ Sv/h
3/23	A.M. 8:40	正門	Front Gate	229.1 μ Sv/h
3/23	A.M. 8:50	正門	Front Gate	229.1 μ Sv/h
3/23	A.M. 9:00	正門	Front Gate	229.1 μ Sv/h
3/23	A.M. 9:10	正門	Front Gate	228.7 μ Sv/h
3/23	A.M. 9:20	正門	Front Gate	227.6 μ Sv/h
3/23	A.M. 9:30	正門	Front Gate	226.9 μ Sv/h
3/23	A.M. 9:40	正門	Front Gate	228.6 μ Sv/h
3/23	A.M. 9:50	正門	Front Gate	227.6 μ Sv/h
3/23	A.M. 10:00	正門	Front Gate	211.4 μ Sv/h
3/23	A.M. 10:10	正門	Front Gate	227.7 μ Sv/h
3/23	A.M. 10:20	正門	Front Gate	227.2 μ Sv/h
3/23	A.M. 10:30	正門	Front Gate	227.3 μ Sv/h
3/23	A.M. 10:40	正門	Front Gate	227.1 μ Sv/h
3/23	A.M. 10:50	正門	Front Gate	227.2 μ Sv/h
3/23	A.M. 11:00	正門	Front Gate	227.0 μ Sv/h
3/23	A.M. 11:10	正門	Front Gate	226.8 μ Sv/h
3/23	A.M. 11:20	正門	Front Gate	226.8 μ Sv/h
3/23	A.M. 11:30	正門	Front Gate	226.3 μ Sv/h
3/23	A.M. 11:40	正門	Front Gate	225.7 μ Sv/h
3/23	A.M. 11:50	正門	Front Gate	226.3 μ Sv/h
3/23	P.M. 0:00	正門	Front Gate	225.2 μ Sv/h
3/23	P.M. 0:10	正門	Front Gate	226.0 μ Sv/h
3/23	P.M. 0:20	正門	Front Gate	224.8 μ Sv/h
3/23	P.M. 0:30	正門	Front Gate	224.9 μ Sv/h
3/23	P.M. 0:40	正門	Front Gate	224.7 μ Sv/h
3/23	P.M. 0:50	正門	Front Gate	224.8 μ Sv/h
3/23	P.M. 1:00	正門	Front Gate	225.4 μ Sv/h
3/23	P.M. 1:10	正門	Front Gate	224.8 μ Sv/h
3/23	P.M. 1:20	正門	Front Gate	225.7 μ Sv/h
3/23	P.M. 1:30	正門	Front Gate	224.1 μ Sv/h
3/23	P.M. 1:40	正門	Front Gate	223.7 μ Sv/h
3/23	P.M. 1:50	正門	Front Gate	222.7 μ Sv/h
3/23	P.M. 2:00	正門	Front Gate	222.4 μ Sv/h
3/23	P.M. 2:10	正門	Front Gate	231.1 μ Sv/h
3/23	P.M. 2:20	正門	Front Gate	435.0 μ Sv/h
3/23	P.M. 2:30	正門	Front Gate	288.7 μ Sv/h
3/23	P.M. 2:40	正門	Front Gate	309.7 μ Sv/h
3/23	P.M. 2:50	正門	Front Gate	267.8 μ Sv/h
3/23	P.M. 3:00	正門	Front Gate	265.4 μ Sv/h
3/23	P.M. 3:10	正門	Front Gate	396.0 μ Sv/h
3/23	P.M. 3:20	正門	Front Gate	415.6 μ Sv/h
3/23	P.M. 3:30	正門	Front Gate	414.7 μ Sv/h
3/23	P.M. 3:40	正門	Front Gate	401.6 μ Sv/h
3/23	P.M. 3:50	正門	Front Gate	318.4 μ Sv/h
3/23	P.M. 4:00	正門	Front Gate	331.5 μ Sv/h
3/23	P.M. 4:10	正門	Front Gate	313.4 μ Sv/h

3/23	P.M. 4:20	正門	Front Gate	280.9 μ Sv/h
3/23	P.M. 4:30	正門	Front Gate	283.7 μ Sv/h
3/23	P.M. 4:40	正門	Front Gate	274.4 μ Sv/h
3/23	P.M. 4:50	正門	Front Gate	269.3 μ Sv/h
3/23	P.M. 5:00	正門	Front Gate	265.1 μ Sv/h
3/23	P.M. 5:10	正門	Front Gate	262.1 μ Sv/h
3/23	P.M. 5:20	正門	Front Gate	259.5 μ Sv/h
3/23	P.M. 5:30	正門	Front Gate	257.0 μ Sv/h
3/23	P.M. 5:40	正門	Front Gate	255.8 μ Sv/h
3/23	P.M. 5:50	正門	Front Gate	254.2 μ Sv/h
3/23	P.M. 6:00	正門	Front Gate	253.0 μ Sv/h
3/23	P.M. 6:10	正門	Front Gate	251.3 μ Sv/h
3/23	P.M. 6:20	正門	Front Gate	241.2 μ Sv/h
3/23	P.M. 6:30	正門	Front Gate	249.0 μ Sv/h
3/23	P.M. 6:40	正門	Front Gate	246.9 μ Sv/h
3/23	P.M. 6:50	正門	Front Gate	245.8 μ Sv/h
3/23	P.M. 7:00	正門	Front Gate	244.6 μ Sv/h
3/23	P.M. 7:10	正門	Front Gate	243.5 μ Sv/h
3/23	P.M. 7:20	正門	Front Gate	242.1 μ Sv/h
3/23	P.M. 7:30	正門	Front Gate	241.0 μ Sv/h
3/23	P.M. 7:40	正門	Front Gate	240.2 μ Sv/h
3/23	P.M. 7:50	正門	Front Gate	237.6 μ Sv/h
3/23	P.M. 8:00	正門	Front Gate	236.5 μ Sv/h
3/23	P.M. 8:10	正門	Front Gate	235.8 μ Sv/h
3/23	P.M. 8:20	正門	Front Gate	235.3 μ Sv/h
3/23	P.M. 8:30	正門	Front Gate	234.3 μ Sv/h
3/23	P.M. 8:40	正門	Front Gate	233.2 μ Sv/h
3/23	P.M. 8:50	正門	Front Gate	232.8 μ Sv/h
3/23	P.M. 9:00	正門	Front Gate	232.3 μ Sv/h
3/23	P.M. 9:10	正門	Front Gate	231.5 μ Sv/h
3/23	P.M. 9:20	正門	Front Gate	230.6 μ Sv/h
3/23	P.M. 9:30	正門	Front Gate	230.2 μ Sv/h
3/23	P.M. 9:40	正門	Front Gate	229.5 μ Sv/h
3/23	P.M. 9:50	正門	Front Gate	228.8 μ Sv/h
3/23	P.M. 10:00	正門	Front Gate	228.3 μ Sv/h
3/23	P.M. 10:10	正門	Front Gate	227.3 μ Sv/h
3/23	P.M. 10:20	正門	Front Gate	226.8 μ Sv/h
3/23	P.M. 10:30	正門	Front Gate	226.5 μ Sv/h
3/23	P.M. 10:40	正門	Front Gate	225.8 μ Sv/h
3/23	P.M. 10:50	正門	Front Gate	225.4 μ Sv/h
3/23	P.M. 11:00	正門	Front Gate	224.9 μ Sv/h
3/23	P.M. 11:10	正門	Front Gate	224.7 μ Sv/h
3/23	P.M. 11:20	正門	Front Gate	224.3 μ Sv/h
3/23	P.M. 11:30	正門	Front Gate	224.0 μ Sv/h
3/23	P.M. 11:40	正門	Front Gate	223.0 μ Sv/h
3/23	P.M. 11:50	正門	Front Gate	223.0 μ Sv/h
3/24	A.M. 0:00	正門	Front Gate	222.3 μ Sv/h
3/24	A.M. 0:10	正門	Front Gate	222.0 μ Sv/h

3/24	A.M. 0:20	正門	Front Gate	221.8 μ Sv/h
3/24	A.M. 0:30	正門	Front Gate	221.5 μ Sv/h
3/24	A.M. 0:40	正門	Front Gate	221.7 μ Sv/h
3/24	A.M. 0:50	正門	Front Gate	221.0 μ Sv/h
3/24	A.M. 1:00	正門	Front Gate	220.6 μ Sv/h
3/24	A.M. 1:10	正門	Front Gate	220.4 μ Sv/h
3/24	A.M. 1:20	正門	Front Gate	220.0 μ Sv/h
3/24	A.M. 1:30	正門	Front Gate	219.7 μ Sv/h
3/24	A.M. 1:40	正門	Front Gate	219.2 μ Sv/h
3/24	A.M. 1:50	正門	Front Gate	219.2 μ Sv/h
3/24	A.M. 2:00	正門	Front Gate	218.9 μ Sv/h
3/24	A.M. 2:10	正門	Front Gate	218.7 μ Sv/h
3/24	A.M. 2:20	正門	Front Gate	217.5 μ Sv/h
3/24	A.M. 2:30	正門	Front Gate	217.2 μ Sv/h
3/24	A.M. 2:40	正門	Front Gate	216.8 μ Sv/h
3/24	A.M. 2:50	正門	Front Gate	216.6 μ Sv/h
3/24	A.M. 3:00	正門	Front Gate	216.6 μ Sv/h
3/24	A.M. 3:10	正門	Front Gate	216.5 μ Sv/h
3/24	A.M. 3:20	正門	Front Gate	216.2 μ Sv/h
3/24	A.M. 3:30	正門	Front Gate	215.5 μ Sv/h
3/24	A.M. 3:40	正門	Front Gate	215.7 μ Sv/h
3/24	A.M. 3:50	正門	Front Gate	215.4 μ Sv/h
3/24	A.M. 4:00	正門	Front Gate	215.1 μ Sv/h
3/24	A.M. 4:10	正門	Front Gate	215.0 μ Sv/h
3/24	A.M. 4:20	正門	Front Gate	214.7 μ Sv/h
3/24	A.M. 4:30	正門	Front Gate	214.5 μ Sv/h
3/24	A.M. 4:40	正門	Front Gate	214.7 μ Sv/h
3/24	A.M. 4:50	正門	Front Gate	214.3 μ Sv/h
3/24	A.M. 5:00	正門	Front Gate	214.4 μ Sv/h
3/24	A.M. 5:10	正門	Front Gate	214.0 μ Sv/h
3/24	A.M. 5:20	正門	Front Gate	213.6 μ Sv/h
3/24	A.M. 5:30	正門	Front Gate	213.8 μ Sv/h
3/24	A.M. 5:40	正門	Front Gate	216.2 μ Sv/h
3/24	A.M. 5:50	正門	Front Gate	213.6 μ Sv/h
3/24	A.M. 6:00	正門	Front Gate	212.8 μ Sv/h
3/24	A.M. 6:10	正門	Front Gate	212.8 μ Sv/h
3/24	A.M. 6:20	正門	Front Gate	214.7 μ Sv/h
3/24	A.M. 6:30	正門	Front Gate	230.9 μ Sv/h
3/24	A.M. 6:40	正門	Front Gate	213.7 μ Sv/h
3/24	A.M. 6:50	正門	Front Gate	212.3 μ Sv/h
3/24	A.M. 7:00	正門	Front Gate	212.2 μ Sv/h
3/24	A.M. 7:10	正門	Front Gate	212.0 μ Sv/h
3/24	A.M. 7:20	正門	Front Gate	211.8 μ Sv/h
3/24	A.M. 7:30	正門	Front Gate	211.9 μ Sv/h
3/24	A.M. 7:40	正門	Front Gate	211.9 μ Sv/h
3/24	A.M. 7:50	正門	Front Gate	211.7 μ Sv/h
3/24	A.M. 8:00	正門	Front Gate	211.6 μ Sv/h
3/24	A.M. 8:10	正門	Front Gate	211.6 μ Sv/h

3/24	A.M. 8:20	正門	Front Gate	21.6 $\mu\text{Sv/h}$
3/24	A.M. 8:30	正門	Front Gate	211.2 $\mu\text{Sv/h}$
3/24	A.M. 8:40	正門	Front Gate	211.5 $\mu\text{Sv/h}$
3/24	A.M. 8:50	正門	Front Gate	211.1 $\mu\text{Sv/h}$
3/24	A.M. 9:00	正門	Front Gate	210.1 $\mu\text{Sv/h}$
3/24	A.M. 9:10	正門	Front Gate	210.8 $\mu\text{Sv/h}$
3/24	A.M. 9:20	正門	Front Gate	210.8 $\mu\text{Sv/h}$
3/24	A.M. 9:30	正門	Front Gate	210.7 $\mu\text{Sv/h}$
3/24	A.M. 9:40	正門	Front Gate	210.6 $\mu\text{Sv/h}$
3/24	A.M. 9:50	正門	Front Gate	210.5 $\mu\text{Sv/h}$
3/24	A.M. 10:00	正門	Front Gate	210.1 $\mu\text{Sv/h}$
3/24	A.M. 10:10	正門	Front Gate	210.0 $\mu\text{Sv/h}$
3/24	A.M. 10:20	正門	Front Gate	209.7 $\mu\text{Sv/h}$
3/24	A.M. 10:30	正門	Front Gate	209.7 $\mu\text{Sv/h}$
3/24	A.M. 10:40	正門	Front Gate	209.5 $\mu\text{Sv/h}$
3/24	A.M. 10:50	正門	Front Gate	209.6 $\mu\text{Sv/h}$
3/24	A.M. 11:00	正門	Front Gate	209.3 $\mu\text{Sv/h}$
3/24	A.M. 11:10	正門	Front Gate	209.2 $\mu\text{Sv/h}$
3/24	A.M. 11:20	正門	Front Gate	209.5 $\mu\text{Sv/h}$
3/24	A.M. 11:30	正門	Front Gate	209.5 $\mu\text{Sv/h}$
3/24	A.M. 11:40	正門	Front Gate	209.6 $\mu\text{Sv/h}$
3/24	A.M. 11:50	正門	Front Gate	209.1 $\mu\text{Sv/h}$
3/24	P.M. 0:00	正門	Front Gate	209.4 $\mu\text{Sv/h}$
3/24	P.M. 0:10	正門	Front Gate	209.4 $\mu\text{Sv/h}$
3/24	P.M. 0:20	正門	Front Gate	209.2 $\mu\text{Sv/h}$
3/24	P.M. 0:30	正門	Front Gate	201.1 $\mu\text{Sv/h}$
3/24	A.M. 0:40	正門	Front Gate	208.8 $\mu\text{Sv/h}$
3/24	P.M. 0:50	正門	Front Gate	208.7 $\mu\text{Sv/h}$
3/24	P.M. 1:00	正門	Front Gate	208.1 $\mu\text{Sv/h}$
3/24	P.M. 1:10	正門	Front Gate	207.9 $\mu\text{Sv/h}$
3/24	P.M. 1:20	正門	Front Gate	207.5 $\mu\text{Sv/h}$
3/24	P.M. 1:30	正門	Front Gate	207.5 $\mu\text{Sv/h}$
3/24	P.M. 1:40	正門	Front Gate	207.2 $\mu\text{Sv/h}$
3/24	P.M. 1:50	正門	Front Gate	209.3 $\mu\text{Sv/h}$
3/24	P.M. 2:00	正門	Front Gate	209.0 $\mu\text{Sv/h}$
3/24	P.M. 2:10	正門	Front Gate	208.5 $\mu\text{Sv/h}$
3/24	P.M. 2:20	免震棟前	Seismic-isolated Building	429.5 $\mu\text{Sv/h}$
3/24	P.M. 2:30	免震棟前	Seismic-isolated Building	427.0 $\mu\text{Sv/h}$
3/24	P.M. 2:50	正門	Front Gate	210.0 $\mu\text{Sv/h}$
3/24	P.M. 3:00	正門	Front Gate	209.8 $\mu\text{Sv/h}$
3/24	P.M. 3:10	正門	Front Gate	209.4 $\mu\text{Sv/h}$
3/24	P.M. 3:20	正門	Front Gate	209.2 $\mu\text{Sv/h}$
3/24	P.M. 3:30	正門	Front Gate	208.8 $\mu\text{Sv/h}$
3/24	P.M. 3:40	正門	Front Gate	208.0 $\mu\text{Sv/h}$
3/24	P.M. 3:50	正門	Front Gate	207.6 $\mu\text{Sv/h}$
3/24	P.M. 4:00	正門	Front Gate	207.4 $\mu\text{Sv/h}$
3/24	P.M. 4:10	正門	Front Gate	207.3 $\mu\text{Sv/h}$
3/24	P.M. 4:20	正門	Front Gate	207.1 $\mu\text{Sv/h}$

3/24	P.M. 4:30	正門	Front Gate	207.0 μ Sv/h
3/24	P.M. 4:40	正門	Front Gate	206.9 μ Sv/h
3/24	P.M. 4:50	正門	Front Gate	206.5 μ Sv/h
3/24	P.M. 5:00	正門	Front Gate	206.4 μ Sv/h
3/24	P.M. 5:10	正門	Front Gate	206.3 μ Sv/h
3/24	P.M. 5:20	正門	Front Gate	206.1 μ Sv/h
3/24	P.M. 5:30	正門	Front Gate	206.0 μ Sv/h
3/24	P.M. 5:40	正門	Front Gate	205.6 μ Sv/h
3/24	P.M. 5:50	正門	Front Gate	205.3 μ Sv/h
3/24	P.M. 6:00	正門	Front Gate	204.6 μ Sv/h
3/24	P.M. 6:10	正門	Front Gate	204.9 μ Sv/h
3/24	P.M. 6:20	正門	Front Gate	204.7 μ Sv/h
3/24	P.M. 6:30	正門	Front Gate	204.5 μ Sv/h
3/24	P.M. 6:40	正門	Front Gate	204.4 μ Sv/h
3/24	P.M. 6:50	正門	Front Gate	204.4 μ Sv/h
3/24	P.M. 7:00	正門	Front Gate	204.3 μ Sv/h
3/24	P.M. 7:10	正門	Front Gate	204.2 μ Sv/h
3/24	P.M. 7:20	正門	Front Gate	203.9 μ Sv/h
3/24	P.M. 7:30	正門	Front Gate	203.5 μ Sv/h
3/24	P.M. 7:40	正門	Front Gate	203.0 μ Sv/h
3/24	P.M. 7:50	正門	Front Gate	202.9 μ Sv/h
3/24	P.M. 8:00	正門	Front Gate	202.9 μ Sv/h
3/24	P.M. 8:10	正門	Front Gate	202.6 μ Sv/h
3/24	P.M. 8:20	正門	Front Gate	202.5 μ Sv/h
3/24	P.M. 8:30	正門	Front Gate	202.4 μ Sv/h
3/24	P.M. 8:40	正門	Front Gate	202.4 μ Sv/h
3/24	P.M. 8:50	正門	Front Gate	202.2 μ Sv/h
3/24	P.M. 9:00	正門	Front Gate	202.0 μ Sv/h
3/24	P.M. 9:10	正門	Front Gate	202.0 μ Sv/h
3/24	P.M. 9:20	正門	Front Gate	201.7 μ Sv/h
3/24	P.M. 9:30	正門	Front Gate	201.4 μ Sv/h
3/24	P.M. 9:40	正門	Front Gate	201.3 μ Sv/h
3/24	P.M. 9:50	正門	Front Gate	201.3 μ Sv/h
3/24	P.M. 10:00	正門	Front Gate	201.2 μ Sv/h
3/24	P.M. 10:10	正門	Front Gate	201.1 μ Sv/h
3/24	P.M. 10:20	正門	Front Gate	201.2 μ Sv/h
3/24	P.M. 10:30	正門	Front Gate	200.5 μ Sv/h
3/24	P.M. 10:40	正門	Front Gate	200.6 μ Sv/h
3/24	P.M. 10:50	正門	Front Gate	200.4 μ Sv/h
3/24	P.M. 11:00	正門	Front Gate	200.2 μ Sv/h
3/24	P.M. 11:10	正門	Front Gate	199.9 μ Sv/h
3/24	P.M. 11:20	正門	Front Gate	200.0 μ Sv/h
3/24	P.M. 11:30	正門	Front Gate	199.8 μ Sv/h
3/24	P.M. 11:40	正門	Front Gate	199.8 μ Sv/h
3/24	P.M. 11:50	正門	Front Gate	199.6 μ Sv/h
3/25	A.M. 0:00	正門	Front Gate	199.5 μ Sv/h
3/25	A.M. 0:10	正門	Front Gate	199.3 μ Sv/h
3/25	A.M. 0:20	正門	Front Gate	199.0 μ Sv/h

3/25	A.M. 0:30	正門	Front Gate	199.0 μ Sv/h
3/25	A.M. 0:40	正門	Front Gate	198.9 μ Sv/h
3/25	A.M. 0:50	正門	Front Gate	198.8 μ Sv/h
3/25	A.M. 1:00	正門	Front Gate	198.6 μ Sv/h
3/25	A.M. 1:10	正門	Front Gate	197.7 μ Sv/h
3/25	A.M. 1:20	正門	Front Gate	197.0 μ Sv/h
3/25	A.M. 1:30	正門	Front Gate	196.9 μ Sv/h
3/25	A.M. 1:40	正門	Front Gate	196.5 μ Sv/h
3/25	A.M. 1:50	正門	Front Gate	196.5 μ Sv/h
3/25	A.M. 2:00	正門	Front Gate	196.5 μ Sv/h
3/25	A.M. 2:10	正門	Front Gate	196.4 μ Sv/h
3/25	A.M. 2:20	正門	Front Gate	196.3 μ Sv/h
3/25	A.M. 2:30	正門	Front Gate	196.1 μ Sv/h
3/25	A.M. 2:40	正門	Front Gate	195.9 μ Sv/h
3/25	A.M. 2:50	正門	Front Gate	195.8 μ Sv/h
3/25	A.M. 3:00	正門	Front Gate	195.7 μ Sv/h
3/25	A.M. 3:10	正門	Front Gate	195.7 μ Sv/h
3/25	A.M. 3:20	正門	Front Gate	195.6 μ Sv/h
3/25	A.M. 3:30	正門	Front Gate	195.6 μ Sv/h
3/25	A.M. 3:40	正門	Front Gate	195.5 μ Sv/h
3/25	A.M. 3:50	正門	Front Gate	195.1 μ Sv/h
3/25	A.M. 4:00	正門	Front Gate	195.1 μ Sv/h
3/25	A.M. 4:10	正門	Front Gate	195.0 μ Sv/h
3/25	A.M. 4:20	正門	Front Gate	195.0 μ Sv/h
3/25	A.M. 4:30	正門	Front Gate	195.0 μ Sv/h
3/25	A.M. 4:40	正門	Front Gate	194.5 μ Sv/h
3/25	A.M. 4:50	正門	Front Gate	194.5 μ Sv/h
3/25	A.M. 5:00	正門	Front Gate	194.4 μ Sv/h
3/25	A.M. 5:10	正門	Front Gate	194.4 μ Sv/h
3/25	A.M. 5:20	正門	Front Gate	194.3 μ Sv/h
3/25	A.M. 5:30	正門	Front Gate	194.2 μ Sv/h
3/25	A.M. 5:40	正門	Front Gate	194.1 μ Sv/h
3/25	A.M. 5:50	正門	Front Gate	193.8 μ Sv/h
3/25	A.M. 6:00	正門	Front Gate	193.8 μ Sv/h
3/25	A.M. 6:10	正門	Front Gate	193.6 μ Sv/h
3/25	A.M. 6:20	正門	Front Gate	193.0 μ Sv/h
3/25	A.M. 6:30	正門	Front Gate	192.9 μ Sv/h
3/25	A.M. 6:40	正門	Front Gate	193.0 μ Sv/h
3/25	A.M. 6:50	正門	Front Gate	192.5 μ Sv/h
3/25	A.M. 7:00	正門	Front Gate	192.6 μ Sv/h
3/25	A.M. 7:10	正門	Front Gate	192.5 μ Sv/h
3/25	A.M. 7:20	正門	Front Gate	192.7 μ Sv/h
3/25	A.M. 7:30	正門	Front Gate	192.3 μ Sv/h
3/25	A.M. 7:40	正門	Front Gate	192.5 μ Sv/h
3/25	A.M. 7:50	正門	Front Gate	193.3 μ Sv/h
3/25	A.M. 8:00	正門	Front Gate	193.8 μ Sv/h
3/25	A.M. 8:10	正門	Front Gate	193.9 μ Sv/h
3/25	A.M. 8:20	正門	Front Gate	193.3 μ Sv/h

3/25	A.M. 8:30	正門	Front Gate	196.3 μ Sv/h
3/25	A.M. 8:40	正門	Front Gate	196.3 μ Sv/h
3/25	A.M. 8:50	正門	Front Gate	192.8 μ Sv/h
3/25	A.M. 9:00	正門	Front Gate	192.6 μ Sv/h
3/25	A.M. 9:10	正門	Front Gate	192.3 μ Sv/h
3/25	A.M. 9:20	正門	Front Gate	192.5 μ Sv/h
3/25	A.M. 9:30	正門	Front Gate	193.7 μ Sv/h
3/25	A.M. 9:40	正門	Front Gate	191.7 μ Sv/h
3/25	A.M. 9:50	正門	Front Gate	204.2 μ Sv/h
3/25	A.M. 10:00	正門	Front Gate	216.2 μ Sv/h
3/25	A.M. 10:10	正門	Front Gate	203.2 μ Sv/h
3/25	A.M. 10:20	正門	Front Gate	430.8 μ Sv/h
3/25	A.M. 10:30	正門	Front Gate	540.0 μ Sv/h
3/25	A.M. 10:40	正門	Front Gate	286.5 μ Sv/h
3/25	A.M. 10:50	正門	Front Gate	264.7 μ Sv/h
3/25	A.M. 11:00	正門	Front Gate	259.0 μ Sv/h
3/25	A.M. 11:10	正門	Front Gate	255.2 μ Sv/h
3/25	A.M. 11:20	正門	Front Gate	250.9 μ Sv/h
3/25	A.M. 11:30	正門	Front Gate	248.6 μ Sv/h
3/25	A.M. 11:40	正門	Front Gate	244.3 μ Sv/h
3/25	A.M. 11:50	正門	Front Gate	240.0 μ Sv/h
3/25	P.M. 0:00	正門	Front Gate	235.8 μ Sv/h
3/25	P.M. 0:10	正門	Front Gate	232.8 μ Sv/h
3/25	P.M. 0:20	正門	Front Gate	231.6 μ Sv/h
3/25	P.M. 0:30	正門	Front Gate	229.5 μ Sv/h
3/25	A.M. 0:40	正門	Front Gate	226.7 μ Sv/h
3/25	P.M. 0:50	正門	Front Gate	224.5 μ Sv/h
3/25	P.M. 1:00	正門	Front Gate	222.3 μ Sv/h
3/25	P.M. 1:10	正門	Front Gate	221.2 μ Sv/h
3/25	P.M. 1:20	正門	Front Gate	218.8 μ Sv/h
3/25	P.M. 1:30	正門	Front Gate	216.4 μ Sv/h
3/25	P.M. 1:40	正門	Front Gate	216.2 μ Sv/h
3/25	P.M. 1:50	正門	Front Gate	213.7 μ Sv/h
3/25	P.M. 2:00	正門	Front Gate	212.6 μ Sv/h
3/25	P.M. 2:10	正門	Front Gate	210.8 μ Sv/h
3/25	P.M. 2:20	正門	Front Gate	209.0 μ Sv/h
3/25	P.M. 2:30	正門	Front Gate	209.0 μ Sv/h
3/25	P.M. 2:40	正門	Front Gate	297.2 μ Sv/h
3/25	P.M. 2:50	正門	Front Gate	206.6 μ Sv/h
3/25	P.M. 3:00	正門	Front Gate	205.8 μ Sv/h
3/25	P.M. 3:10	正門	Front Gate	204.8 μ Sv/h
3/25	P.M. 3:20	正門	Front Gate	203.6 μ Sv/h
3/25	P.M. 3:30	正門	Front Gate	202.5 μ Sv/h
3/25	P.M. 3:40	正門	Front Gate	201.7 μ Sv/h
3/25	P.M. 3:50	正門	Front Gate	199.5 μ Sv/h
3/25	P.M. 4:00	正門	Front Gate	197.4 μ Sv/h
3/25	P.M. 4:10	正門	Front Gate	196.9 μ Sv/h
3/25	P.M. 4:20	正門	Front Gate	197.6 μ Sv/h

3/25	P.M. 4:30	正門	Front Gate	196.1 $\mu\text{Sv/h}$
3/25	P.M. 4:40	正門	Front Gate	197.2 $\mu\text{Sv/h}$
3/25	P.M. 4:50	正門	Front Gate	196.8 $\mu\text{Sv/h}$
3/25	P.M. 5:00	正門	Front Gate	196.0 $\mu\text{Sv/h}$
3/25	P.M. 5:10	正門	Front Gate	195.9 $\mu\text{Sv/h}$
3/25	P.M. 5:20	正門	Front Gate	194.9 $\mu\text{Sv/h}$
3/25	P.M. 5:30	正門	Front Gate	195.4 $\mu\text{Sv/h}$
3/25	P.M. 5:40	正門	Front Gate	194.5 $\mu\text{Sv/h}$
3/25	P.M. 5:50	正門	Front Gate	195.6 $\mu\text{Sv/h}$
3/25	P.M. 6:00	正門	Front Gate	194.7 $\mu\text{Sv/h}$
3/25	P.M. 6:10	正門	Front Gate	194.4 $\mu\text{Sv/h}$
3/25	P.M. 6:20	正門	Front Gate	193.6 $\mu\text{Sv/h}$
3/25	P.M. 6:30	正門	Front Gate	199.5 $\mu\text{Sv/h}$
3/25	P.M. 6:40	正門	Front Gate	194.4 $\mu\text{Sv/h}$
3/25	P.M. 6:50	正門	Front Gate	193.6 $\mu\text{Sv/h}$
3/25	P.M. 7:00	正門	Front Gate	199.5 $\mu\text{Sv/h}$
3/25	P.M. 7:10	正門	Front Gate	261.7 $\mu\text{Sv/h}$
3/25	P.M. 7:20	正門	Front Gate	221.9 $\mu\text{Sv/h}$
3/25	P.M. 7:30	正門	Front Gate	225.0 $\mu\text{Sv/h}$
3/25	P.M. 7:40	正門	Front Gate	215.4 $\mu\text{Sv/h}$
3/25	P.M. 7:50	正門	Front Gate	243.0 $\mu\text{Sv/h}$
3/25	P.M. 8:00	正門	Front Gate	213.9 $\mu\text{Sv/h}$
3/25	P.M. 8:10	正門	Front Gate	206.3 $\mu\text{Sv/h}$
3/25	P.M. 8:20	正門	Front Gate	205.2 $\mu\text{Sv/h}$
3/25	P.M. 8:30	正門	Front Gate	228.4 $\mu\text{Sv/h}$
3/25	P.M. 8:40	正門	Front Gate	205.9 $\mu\text{Sv/h}$
3/25	P.M. 8:50	正門	Front Gate	239.6 $\mu\text{Sv/h}$
3/25	P.M. 9:00	正門	Front Gate	204.9 $\mu\text{Sv/h}$
3/25	P.M. 9:10	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 9:20	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 9:30	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 9:40	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 9:50	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 10:00	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 10:10	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 10:20	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 10:30	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 10:40	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 10:50	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 11:00	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 11:10	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 11:20	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 11:30	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 11:40	正門	Front Gate	$\mu\text{Sv/h}$
3/25	P.M. 11:50	正門	Front Gate	$\mu\text{Sv/h}$
3/26	A.M. 0:00	正門	Front Gate	184.4 $\mu\text{Sv/h}$
3/26	A.M. 0:10	正門	Front Gate	184.0 $\mu\text{Sv/h}$
3/26	A.M. 0:20	正門	Front Gate	183.8 $\mu\text{Sv/h}$

3/26	A.M. 0:30	正門	Front Gate	183.2 μ Sv/h
3/26	A.M. 0:40	正門	Front Gate	182.8 μ Sv/h
3/26	A.M. 0:50	正門	Front Gate	182.7 μ Sv/h
3/26	A.M. 1:00	正門	Front Gate	182.5 μ Sv/h
3/26	A.M. 1:10	正門	Front Gate	182.4 μ Sv/h
3/26	A.M. 1:20	正門	Front Gate	182.3 μ Sv/h
3/26	A.M. 1:30	正門	Front Gate	182.1 μ Sv/h
3/26	A.M. 1:40	正門	Front Gate	181.8 μ Sv/h
3/26	A.M. 1:50	正門	Front Gate	180.8 μ Sv/h
3/26	A.M. 2:00	正門	Front Gate	179.9 μ Sv/h
3/26	A.M. 2:10	正門	Front Gate	178.1 μ Sv/h
3/26	A.M. 2:20	正門	Front Gate	176.6 μ Sv/h
3/26	A.M. 2:30	正門	Front Gate	175.5 μ Sv/h
3/26	A.M. 2:40	正門	Front Gate	174.4 μ Sv/h
3/26	A.M. 2:50	正門	Front Gate	173.0 μ Sv/h
3/26	A.M. 3:00	正門	Front Gate	172.4 μ Sv/h
3/26	A.M. 3:10	正門	Front Gate	171.0 μ Sv/h
3/26	A.M. 3:20	正門	Front Gate	170.7 μ Sv/h
3/26	A.M. 3:30	正門	Front Gate	169.8 μ Sv/h
3/26	A.M. 3:40	正門	Front Gate	169.2 μ Sv/h
3/26	A.M. 3:50	正門	Front Gate	169.5 μ Sv/h
3/26	A.M. 4:00	正門	Front Gate	169.2 μ Sv/h
3/26	A.M. 4:10	正門	Front Gate	169.1 μ Sv/h
3/26	A.M. 4:20	正門	Front Gate	168.1 μ Sv/h
3/26	A.M. 4:30	正門	Front Gate	167.8 μ Sv/h
3/26	A.M. 4:40	正門	Front Gate	167.1 μ Sv/h
3/26	A.M. 4:50	正門	Front Gate	167.1 μ Sv/h
3/26	A.M. 5:00	正門	Front Gate	166.9 μ Sv/h
3/26	A.M. 5:10	正門	Front Gate	167.1 μ Sv/h
3/26	A.M. 5:20	正門	Front Gate	167.4 μ Sv/h
3/26	A.M. 5:30	正門	Front Gate	167.6 μ Sv/h
3/26	A.M. 5:40	正門	Front Gate	167.8 μ Sv/h
3/26	A.M. 5:50	正門	Front Gate	168.0 μ Sv/h
3/26	A.M. 6:00	正門	Front Gate	169.0 μ Sv/h
3/26	A.M. 6:10	正門	Front Gate	168.0 μ Sv/h
3/26	A.M. 6:20	正門	Front Gate	168.3 μ Sv/h
3/26	A.M. 6:30	正門	Front Gate	169.2 μ Sv/h
3/26	A.M. 6:40	正門	Front Gate	169.6 μ Sv/h
3/26	A.M. 6:50	正門	Front Gate	169.7 μ Sv/h
3/26	A.M. 7:00	正門	Front Gate	169.5 μ Sv/h
3/26	A.M. 7:10	正門	Front Gate	169.0 μ Sv/h
3/26	A.M. 7:20	正門	Front Gate	169.8 μ Sv/h
3/26	A.M. 7:30	正門	Front Gate	170.0 μ Sv/h
3/26	A.M. 7:40	正門	Front Gate	169 μ Sv/h
3/26	A.M. 7:50	正門	Front Gate	170.1 μ Sv/h
3/26	A.M. 8:00	正門	Front Gate	170.3 μ Sv/h

Neutron ray	Wind direction	Wind direction	Wind speed (m/s)
—	—		—
—	—		—
—	—		—
—	—		—
—	—		—
—	—		—
—	—		—
—	—		—
—	—		—
—	—		—
—	—		—
—	—		—
—	—		—
—	—		—
< 0.001μSv/h	北東	NE	0.4
< 0.001μSv/h	北西	NW	0.5
< 0.001μSv/h	東北東	ENE	0.4
< 0.001μSv/h	北	N	0.4
< 0.001μSv/h	東北東	ENE	0.6
< 0.001μSv/h	北東	NE	0.5
< 0.001μSv/h	北北西	NNW	0.5
< 0.001μSv/h	北	N	0.6
< 0.001μSv/h	西	W	0.7
< 0.001μSv/h	北	N	0.8
< 0.001μSv/h	西北西	WNW	0.4
< 0.001μSv/h	北	N	0.3
< 0.001μSv/h	北	N	0.4
< 0.001μSv/h	北北東	NNE	0.4
< 0.001μSv/h	南東	SE	0.5
< 0.001μSv/h	北東	NE	2.0
< 0.001μSv/h	北東		1.8
< 0.001μSv/h	東北東	ENE	0.9
< 0.001μSv/h	東北東	ENE	1.1
< 0.001μSv/h	北北西	NNW	0.6
< 0.001μSv/h	西南西	WSW	0.8
< 0.001μSv/h	南西	SW	0.7
< 0.001μSv/h	西南西	WSW	0.7
< 0.001μSv/h	北西	NW	1.0
< 0.001μSv/h	北北西	NNW	0.9
< 0.001μSv/h	北北西	NNW	1.4
< 0.001μSv/h	北北西	NNW	2.0

< 0.001μSv/h	北西	NW	1.7
< 0.001μSv/h	西	W	0.9
< 0.001μSv/h	西	W	1.0
< 0.001μSv/h	西	W	0.6
< 0.001μSv/h	西南西	WSW	0.5
< 0.001μSv/h	北北西	NNW	0.4
< 0.001μSv/h	北東	NE	0.5
—	—		—
—	—		—
—	—		—
< 0.001μSv/h	西	W	0.5
—	—		—
< 0.001μSv/h	西南西	WSW	0.2
—	—		—
< 0.001μSv/h	西北西	WNW	0.7
—	—		—
—	—		—
—	—		—
< 0.001μSv/h	南	S	1.1
—	—		—
—	—		—
—	—		—
< 0.001μSv/h	南東	SE	0.9
—	—		—
< 0.001μSv/h	南西	SW	0.9
—	—		—
< 0.001μSv/h	南	S	1.2
—	—		—
—	—		—
—	—		—
—	—		—
< 0.001μSv/h	南	S	2.0
—	—		—
—	—		—
< 0.001μSv/h	南	S	1.6
—	—		—
—	—		—
—	—		—
—	—		—
< 0.001μSv/h	南東	SE	2.5
—	—		—
—	—		—
—	—		—
—	—		—
< 0.001μSv/h	南南東	SSW	2.8
—	—		—
—	—		—

< 0.001μSv/h	南	S	1.9
—	—	—	—
—	—	—	—
< 0.001μSv/h	南東	SE	2.2
—	—	—	—
—	—	—	—
< 0.001μSv/h	南東	SE	2.0
—	—	—	—
—	—	—	—
< 0.001μSv/h	北	N	1.8
—	—	—	—
—	—	—	—
< 0.001μSv/h	北	N	2.0
—	—	—	—
< 0.001μSv/h	北	N	1.7
—	—	—	—
< 0.001μSv/h	南西	SW	1.6
—	—	—	—
< 0.001μSv/h	南西	SW	2.7
—	—	—	—
< 0.001μSv/h	北東	NE	2.2
—	—	—	—
< 0.001μSv/h	東	E	1.6
—	—	—	—
< 0.001μSv/h	南西	SW	2.0
—	—	—	—
< 0.001μSv/h	北西	NW	2.7
—	—	—	—
< 0.001μSv/h	北	N	2.3
—	—	—	—
—	—	—	—
< 0.001μSv/h	西	W	1.9
—	—	—	—
—	—	—	—
< 0.001μSv/h	北西	NE	2.2
—	—	—	—
—	—	—	—
< 0.001μSv/h	南東	SE	1.8
—	—	—	—
< 0.001μSv/h	南	S	2.0
—	—	—	—
< 0.001μSv/h	南東	SE	1.7
—	—	—	—
< 0.001μSv/h	東	E	1.7
—	—	—	—
< 0.001μSv/h	南	S	2.6
—	—	—	—

< 0.001μSv/h	東	E	2.6
—	—	—	—
< 0.001μSv/h	南東	SE	3.5
—	—	—	—
—	—	—	—
< 0.001μSv/h	東	E	2.9
—	—	—	—
< 0.001μSv/h	南南東	SSE	3.3
—	—	—	—
< 0.001μSv/h	南南東	SSE	3.3
—	—	—	—
< 0.001μSv/h	南南東	SSE	3.3
—	—	—	—
< 0.001μSv/h	南	S	2.7
—	—	—	—
< 0.001μSv/h	南	S	2.7
—	—	—	—
< 0.001μSv/h	南	S	3.4
—	—	—	—
< 0.001μSv/h	南南西	SSW	2.7
—	—	—	—
< 0.001μSv/h	南	S	2.5
—	—	—	—
< 0.001μSv/h	南南西	SSW	3.2
—	—	—	—
< 0.001μSv/h	南	S	2.5
—	—	—	—
< 0.001μSv/h	南	S	3.0
—	—	—	—
< 0.001μSv/h	南	S	2.6
—	—	—	—
< 0.001μSv/h	南南東	SSE	2.3
—	—	—	—
< 0.001μSv/h	南南東	SSE	2.4
—	—	—	—
< 0.001μSv/h	南南東	SSE	2.4
—	—	—	—
< 0.001μSv/h	南	S	2.2
—	—	—	—
< 0.001μSv/h	南南西	SSW	2.4
—	—	—	—
< 0.001μSv/h	南南西	SSW	1.9
—	—	—	—
—	—	—	—
< 0.001μSv/h	西	W	0.5
< 0.001μSv/h	北西	SW	0.4
—	—	—	—

< 0.001μSv/h	西	W	0.3
—	—	—	—
< 0.001μSv/h	西	S	0.5
—	—	—	—
< 0.001μSv/h	南西	SW	0.6
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
< 0.001μSv/h	南西	SW	0.5
—	—	—	—
< 0.001μSv/h	北西	NW	0.4
—	—	—	—
< 0.001μSv/h	南西	SW	0.4
< 0.001μSv/h	西	W	0.4
< 0.001μSv/h	西	W	0.4
—	—	—	—
—	—	—	—
< 0.001μSv/h	西	W	0.3
—	—	—	—
< 0.001μSv/h	南	S	0.4
—	—	—	—
< 0.001μSv/h	北	NW	0.4
—	—	—	—
< 0.001μSv/h	北西	NW	0.4
< 0.001μSv/h	西	W	0.4
< 0.001μSv/h	西	W	0.5
—	—	—	—
< 0.001μSv/h	西	W	0.4
< 0.001μSv/h	北西	NW	0.5
< 0.001μSv/h	北東	NE	0.3
—	—	—	—
< 0.001μSv/h	北北西	NNW	0.4
—	—	—	—
< 0.001μSv/h	西	W	0.4
—	—	—	—
< 0.001μSv/h	南	S	0.4
—	—	—	—
< 0.001μSv/h	西北西	WNW	0.6
—	—	—	—
< 0.001μSv/h	北西	NW	0.6
—	—	—	—
< 0.001μSv/h	南東	SE	0.5
—	—	—	—

< 0.001μSv/h	北西	NW	0.4
—	—	—	—
< 0.001μSv/h	西	W	0.4
—	—	—	—
< 0.001μSv/h	北東	NE	0.6
—	—	—	—
< 0.001μSv/h	北東	NE	0.5
—	—	—	—
< 0.001μSv/h	西	W	0.5
—	—	—	—
< 0.001μSv/h	西	W	0.5
—	—	—	—
< 0.001μSv/h	西北西	WNW	0.4
—	—	—	—
< 0.001μSv/h	南東	SE	0.5
—	—	—	—
< 0.001μSv/h	南	S	0.6
—	—	—	—
< 0.001μSv/h	南西	SW	0.7
—	—	—	—
< 0.001μSv/h	南	S	0.7
—	—	—	—
< 0.001μSv/h	南	S	1.2
< 0.001μSv/h	南東	SE	1.5
< 0.001μSv/h	南南東	SSE	2.0
< 0.001μSv/h	南	S	1.6
< 0.001μSv/h	南西	SW	1.2
—	—	—	—
< 0.001μSv/h	南	S	0.8
—	—	—	—
< 0.001μSv/h	南西	SW	1.2
—	—	—	—
< 0.001μSv/h	南	S	1.3
—	—	—	—
< 0.001μSv/h	南南西	SSW	1.3
—	—	—	—
< 0.001μSv/h	南	S	0.6
—	—	—	—
< 0.001μSv/h	西	W	1.2
—	—	—	—
< 0.001μSv/h	北北東	NNE	0.7
—	—	—	—
< 0.001μSv/h	北	N	0.8
—	—	—	—
< 0.001μSv/h	北	N	0.7
—	—	—	—
< 0.001μSv/h	西	W	0.3

—	—	—	—
0.002	北西	NW	0.6
—	—	—	—
0.002	西	W	0.6
—	—	—	—
0.001	南東	SE	0.5
—	—	—	—
< 0.001μSv/h	南	S	0.6
—	—	—	—
< 0.001μSv/h	南	S	0.9
—	—	—	—
< 0.001μSv/h	南	S	1.1
—	—	—	—
0.002	南南西	SSW	0.9
—	—	—	—
0.001	西	W	0.8
—	—	—	—
< 0.001μSv/h	南南西	SSW	1.3
—	—	—	—
< 0.001μSv/h	西北西	WNW	1.6
—	—	—	—
0.001	北	N	0.9
—	—	—	—
< 0.001μSv/h	北	N	0.9
—	—	—	—
< 0.001μSv/h	北西	NW	0.9
—	—	—	—
0.001	北西	NW	0.9
< 0.001μSv/h	北西	NW	0.4
0.001	南	S	0.4
< 0.001μSv/h	東	E	0.5
—	—	—	—
< 0.001μSv/h	東	E	0.5
—	—	—	—
< 0.001μSv/h	南南東	SSE	1.6
—	—	—	—
< 0.001μSv/h	南東	SE	1.4
—	—	—	—
< 0.001μSv/h	南東		2.0
—	—	—	—
< 0.001μSv/h	南南東	SSE	2.4
—	—	—	—
—	東北東	ENE	0.5
< 0.001μSv/h	東	E	1.5
—	—	—	—
—	西北西	WNW	0.8
< 0.001μSv/h	南南西	SSE	1.4

—	—	—	—
—	西北西	WNW	1.8
0.001	北	N	1.5
—	—	—	—
—	北西	NW	1.8
—	—	—	—
—	北西	NW	2.3
—	—	—	—
—	北西	NW	2.7
< 0.001μSv/h	北西	NW	3.1
—	—	—	—
—	北西	NW	2.6
< 0.001μSv/h	北西	NW	3.2
—	—	—	—
—	北西	NW	2.9
< 0.001μSv/h	北北西	NNW	4.2
—	—	—	—
—	北西	NW	2.3
< 0.001μSv/h	北	N	2.8
—	—	—	—
—	北西	NW	2.4
< 0.001μSv/h	北	N	3.3
—	—	—	—
—	北西	NW	2.8
0.002	北北西	NNW	3.3
—	—	—	—
—	北西	NW	2.7
< 0.001μSv/h	南東	SE	3.3
—	—	—	—
—	北西	NW	2.2
< 0.001μSv/h	南	S	2.4
—	—	—	—
—	北北西	NNW	2.3
< 0.001μSv/h	北西	NW	2.8
—	—	—	—
—	北西	NW	2.5
< 0.001μSv/h	北西	NW	2.7
—	—	—	—
—	北西	NW	2.1
< 0.001μSv/h	西	WNW	2.7
—	—	—	—
—	西北西	WNW	3.1
< 0.001μSv/h	北北西	NNW	2.5
—	—	—	—
—	北西	NW	2.4
< 0.001μSv/h	東	E	2.4
—	—	—	—

—	北西	NW	1.6
< 0.001μSv/h	西	W	2.2
—	—		—
—	北西	NW	1.3
< 0.001μSv/h	南	S	2.1
—	—		—
—	北西	NW	2.9
< 0.001μSv/h	北	N	2.0
—	—		—
—	北西	NW	2.3
< 0.001μSv/h	南南西		2.1
—	—		—
—	北西	NW	2.8
< 0.001μSv/h	西		2.1
—	—		—
—	北北西	NNW	1.9
< 0.001μSv/h	北西	NW	2.1
—	—		—
—	北北西	NNW	2.3
< 0.001μSv/h	南南西	SSW	2.6
—	—		—
—	西北西	WNW	2.6
< 0.001μSv/h	南	S	2.7
—	—		—
—	西北西	WNW	2.5
< 0.001μSv/h	南西	SW	1.6
—	—		—
—	西北西	WNW	1.7
< 0.001μSv/h	北北西	NNW	2.2
—	—		—
—	北西	NW	1.6
< 0.001μSv/h	南東	SE	1.7
—	—		—
—	東北東	ENE	1.5
< 0.001μSv/h	南	S	2.6
—	—		—
—	南	S	0.6
< 0.001μSv/h	南南東	SSE	2.1
—	—		—
—	東南東	ESE	0.7
< 0.001μSv/h	南南東	SSE	2.5
—	—		—
—	南	S	0.6
< 0.001μSv/h	南南東	SSE	2.2
—	—		—
—	南南東	SSE	0.5
< 0.001μSv/h	南東	SE	1.6

—	—	—	—
—	南南東	SSE	0.7
< 0.001μSv/h	南南東	SSE	2.0
—	—	—	—
—	—	—	—
< 0.001μSv/h	南西	SW	1.3
—	—	—	—
—	南南東	SSE	0.8
< 0.001μSv/h	南南東	SSE	1.6
—	—	—	—
—	西北西	—	2.3
< 0.001μSv/h	南南東	—	1.6
—	—	—	—
—	西北西	WNW	1.1
< 0.001μSv/h	北西	NW	2.0
—	—	—	—
—	東北東	ENE	2.1
< 0.001μSv/h	西北西	WNW	1.5
—	—	—	—
—	東北東	ENE	1.1
< 0.001μSv/h	南東	SE	2.3
—	—	—	—
—	南南東	SSE	0.7
< 0.001μSv/h	南東	SE	2.2
—	—	—	—
—	南	S	0.7
< 0.001μSv/h	南	S	1.8
—	—	—	—
—	南	S	0.4
< 0.001μSv/h	南	S	1.8
—	—	—	—
—	南南東	SSE	0.4
< 0.001μSv/h	南東	SE	1.1
—	—	—	—
—	南南東	SSE	0.5
< 0.001μSv/h	南	S	1.0
—	—	—	—
—	南南西	SSW	0.4
< 0.001μSv/h	南	S	1.0
—	—	—	—
—	南東	SE	0.5
< 0.001μSv/h	南南西	SSW	1.5
—	—	—	—
—	南西	SW	0.4
< 0.001μSv/h	南	S	1.8
—	—	—	—
—	南西	SW	0.4

< 0.001μSv/h	南南東	SSE	0.6
—	—	—	—
—	西南西	WSW	0.5
< 0.001μSv/h	北北西	NNW	0.5
—	—	—	—
—	南東	SE	0.4
< 0.001μSv/h	西	W	0.6
—	—	—	—
—	北北西	NNW	0.5
< 0.001μSv/h	西	W	0.5
—	—	—	—
—	北北西	NNW	0.4
< 0.001μSv/h	北西	NW	0.6
—	—	—	—
—	北西	—	0.6
< 0.001μSv/h	北西	NW	0.8
—	—	—	—
—	北北西	NNW	0.6
< 0.001μSv/h	北西	NW	0.9
—	—	—	—
—	北北東	NNE	0.3
< 0.001μSv/h	北西	NW	1.1
—	—	—	—
—	北北西	NNW	0.3
< 0.001μSv/h	北西	NW	1.3
—	—	—	—
—	北	N	0.3
< 0.001μSv/h	北北西	NNW	1.2
—	—	—	—
—	北西	NW	0.6
0.001μSv/h未滿	北西	NW	1.0
—	—	—	—
—	北北西	NNW	0.5
< 0.001μSv/h	西	W	0.8
—	—	—	—
—	北西	NW	0.3
< 0.001μSv/h	北西	NW	0.8
—	—	—	—
—	北西	NW	0.4
< 0.001μSv/h	南西	SW	0.8
—	—	—	—
—	西北西	WNW	0.4
< 0.001μSv/h	西	W	0.6
—	—	—	—
—	北	N	0.3
< 0.001μSv/h	西	W	0.5
—	—	—	—

—	北北西	NNW	0.5
< 0.001μSv/h	北西	NW	0.6
—	—	—	—
—	北西	NW	0.5
< 0.001μSv/h	南西	SW	0.3
—	—	—	—
—	北西	NW	0.6
< 0.001μSv/h	北西	NW	0.2
—	—	—	—
—	北北東	NNE	0.3
< 0.001μSv/h	西	W	0.5
—	—	—	—
—	西北西	WNW	0.4
< 0.001μSv/h	西北西	WNW	0.7
—	—	—	—
—	北	N	0.4
< 0.001μSv/h	西北西	WMW	0.6
—	—	—	—
—	北北東	NNE	0.3
< 0.001μSv/h	北西	NW	0.8
—	—	—	—
—	北	N	0.4
< 0.001μSv/h	北	N	0.5
—	—	—	—
—	北	N	0.4
< 0.001μSv/h	北	N	0.5
—	—	—	—
—	北北西	NNW	0.4
< 0.001μSv/h	西	W	0.5
—	—	—	—
—	北北西	NNW	0.3
< 0.001μSv/h	南	S	0.3
—	—	—	—
—	北西	NW	0.4
< 0.001μSv/h	北西	NW	0.3
—	—	—	—
—	北	N	0.3
< 0.001μSv/h	北	N	0.3
—	—	—	—
—	北北東	NNE	0.3
< 0.001μSv/h	西	W	0.5
—	—	—	—
—	北北西	NNW	0.3
< 0.001μSv/h	北	N	0.3
—	—	—	—
—	北北西	NNE	0.5
< 0.001μSv/h	西北西	WNW	0.4

—	—	—	—
—	東南東	ESE	0.3
< 0.001μSv/h	北東	NE	0.5
—	—	—	—
—	北北西	NNW	0.4
< 0.001μSv/h	北西	NW	0.4
—	—	—	—
—	北	N	0.5
< 0.001μSv/h	北	N	0.5
—	—	—	—
—	北北西	NNW	0.3
< 0.001μSv/h	北	N	0.7
—	—	—	—
—	北北西	NNW	0.3
< 0.001μSv/h	北	N	0.3
—	—	—	—
—	北北西	NNW	0.4
< 0.001μSv/h	西南西	WSW	0.6
—	—	—	—
—	東北東	ENE	0.4
< 0.001μSv/h	西	W	0.4
—	—	—	—
—	北北西	NNW	0.3
< 0.001μSv/h	西	E	0.5
—	—	—	—
—	北北西	NNW	0.3
< 0.001μSv/h	西	W	0.5
—	—	—	—
—	北西	NW	0.3
< 0.001μSv/h	西	W	0.5
—	—	—	—
—	北西	NW	0.3
< 0.001μSv/h	西	W	0.4
—	—	—	—
—	北	N	0.3
< 0.001μSv/h	北	N	0.4
—	—	—	—
—	北北西	NNW	0.3
< 0.001μSv/h	西	W	0.4
—	—	—	—
—	北	N	0.5
0.001μSv/h未滿	南	S	0.5
—	—	—	—
—	南西	SW	0.3
< 0.001μSv/h	南	S	0.5
—	—	—	—
—	北北西	NNW	0.3

< 0.001μSv/h	北西	NW	0.4
—	—	—	—
—	北北東	NNE	0.3
< 0.001μSv/h	南	S	0.3
—	—	—	—
—	南東	SE	0.3
< 0.001μSv/h	西北西	WNW	0.6
—	—	—	—
—	北西	NW	0.3
< 0.001μSv/h	西北西	WNW	0.6
—	—	—	—
—	北西	NW	0.6
< 0.001μSv/h	西北西	WNW	0.7
—	—	—	—
—	北北東	NNE	0.5
< 0.001μSv/h	南東	SE	0.7
—	—	—	—
—	東	E	0.4
< 0.001μSv/h	北東	NE	0.7
—	—	—	—
—	東南東	ESE	0.4
< 0.001μSv/h	北西	NE	0.5
—	—	—	—
—	北北西	NNW	0.4
< 0.001μSv/h	南	S	0.4
—	—	—	—
—	北北西	NNW	0.4
< 0.001μSv/h	南西	SW	0.5
—	—	—	—
—	北北西	NNW	0.3
< 0.001μSv/h	東北東	ENE	0.7
—	—	—	—
—	北	N	0.2
< 0.001μSv/h	西	W	0.5
—	—	—	—
—	北	N	0.4
< 0.001μSv/h	西	W	0.5
—	—	—	—
—	西北西	WNW	0.3
< 0.001μSv/h	西	W	0.5
—	—	—	—
—	北北東	NNE	0.4
< 0.001μSv/h	南東	SE	0.4
—	—	—	—
—	西北西	WNW	0.3
< 0.001μSv/h	南	S	0.4
—	—	—	—

—	西	W	0.5
< 0.001μSv/h	南	S	0.2
—	—	—	—
—	北西	NW	0.3
< 0.001μSv/h	北	N	0.3
—	—	—	—
—	北北東	NNE	0.4
< 0.001μSv/h	西北西	WNW	0.6
—	—	—	—
—	北北西	NNW	0.5
< 0.001μSv/h	北	N	0.9
—	—	—	—
—	北西	NW	0.5
< 0.001μSv/h	東南東	ESE	0.6
—	—	—	—
—	—	—	—
< 0.001μSv/h	北北西	NNW	0.7
—	—	—	—
—	北北西	NNW	0.4
< 0.001μSv/h	北	N	0.8
—	—	—	—
—	北北西	NNW	0.6
< 0.001μSv/h	南西	SW	0.5
—	—	—	—
—	北北西	NNW	0.5
< 0.001μSv/h	西	W	0.4
—	—	—	—
—	北西	NW	0.3
< 0.001μSv/h	南東	SE	0.5
—	—	—	—
—	東北東	ENE	0.3
< 0.001μSv/h	西北西	WNW	0.4
—	西南西	WSW	0.4
—	—	—	—
< 0.001μSv/h	西	W	0.4
—	—	—	—
—	西北西	WNW	0.5
< 0.001μSv/h	北西	NW	0.3
—	—	—	—
—	北	N	0.5
< 0.001μSv/h	西北西	WNW	0.5
—	—	—	—
—	北	N	0.6
< 0.001μSv/h	西	W	0.5
—	北北西	NNW	0.3
< 0.001μSv/h	南西	SW	0.4
—	西南西	WSW	0.6

< 0.001μSv/h	北西	NW	0.4
—	西	W	0.5
—	西北西	WNW	1.3
—	西北西	WNW	1.0
—	西	W	1.3
—	西	W	0.8
—	西	W	0.7
—	西	W	0.8
0μSv/h	南南西	SSE	0.8
0μSv/h	南南西	SSE	1.2
0μSv/h	西北西	WNW	1.1
0μSv/h	南東	SE	1.1
0μSv/h	南	S	0.8
—	南南西	SSW	0.5
0μSv/h	南	S	1.0
0μSv/h	南	S	1.0
—	南西	SW	0.8
0μSv/h	南南西	SSW	1.2
—	西北西	WSW	1.1
0μSv/h	南西	SW	1.3
—	北西	NW	1.8
0μSv/h	南西	SW	1.3
—	北北西	NNW	2.1
0μSv/h	南西	SW	1.2
—	北西	NW	2.5
0μSv/h	西	W	1.2
—	北西	NW	3.7
0μSv/h	西	W	1.1
—	北西	NW	3.0
0μSv/h	南南西	SSW	0.8
—	北北西	NNW	2.9
0μSv/h	—		—
0μSv/h	—		—
0μSv/h	北北東	NNE	1.9
0μSv/h	西北西	WNW	0.9
0μSv/h	北西	NW	3.1
0μSv/h	北		2.3
0μSv/h	西南西	WSW	3.2
0μSv/h	南東	SE	3.1
—	—		—
0μSv/h	南西	SW	2.4
—	—		—
—	—		—
—	—		—
0μSv/h	北	N	2.7
—	—		—
—	—		—

—	—	—	—
0μSv/h	北北西	NNW	1.0
—	—	—	—
—	—	—	—
—	—	—	—
0μSv/h	北	N	2.3
0μSv/h	北西	NW	2.6
0μSv/h	北西	NW	2.6
0μSv/h	北	N	2.2
0μSv/h	北	N	3.6
0μSv/h	北	N	2.2
0μSv/h	北北東	NNE	2.6
0μSv/h	西北西	WNW	3.2
0μSv/h	北北西	NNW	3.8
0μSv/h	西北西	WNW	3.6
0μSv/h	西北西	WNW	3.2
0μSv/h	北北東	NNE	2.1
0μSv/h	西北西	WNW	2.5
0μSv/h	北西	NW	3.1
< 0.001μSv/h	西北西	WNW	2.7
< 0.001μSv/h	西	W	2.8
< 0.001μSv/h	南西	SW	1.7
< 0.001μSv/h	西	W	1.9
< 0.001μSv/h	西	W	1.2
< 0.001μSv/h	南	S	1.3
< 0.001μSv/h	北西	NW	1.1
< 0.001μSv/h	南南東	SSE	1.2
< 0.001μSv/h	東	E	0.8
< 0.001μSv/h	南	S	1.3
< 0.001μSv/h	南東	SE	0.7
< 0.001μSv/h	南東	SE	0.8
< 0.001μSv/h	南	S	0.6
< 0.001μSv/h	北	N	0.6
< 0.001μSv/h	西	W	0.7
< 0.001μSv/h	東	E	0.8
< 0.001μSv/h	北	N	0.7
< 0.001μSv/h	北西	NW	0.8
< 0.001μSv/h	西北西	WNW	1.0
< 0.001μSv/h	北西	NW	—
< 0.001μSv/h	西北西	WNW	—
< 0.001μSv/h	西	W	0.9
< 0.001μSv/h	北東	NE	0.9
< 0.001μSv/h	北	N	0.9
< 0.001μSv/h	南西	SW	1.0
< 0.001μSv/h	南西	SW	1.0
< 0.001μSv/h	北	N	0.9
< 0.001μSv/h	北西	NW	0.7

< 0.001μSv/h	南西	SW	0.9
< 0.001μSv/h	南東	SE	1.0
< 0.001μSv/h	南東	SE	1.6
< 0.001μSv/h	南	S	1.7
< 0.001μSv/h	北	N	1.2
< 0.001μSv/h	北	N	1.2
< 0.001μSv/h	南西	SW	4.6
< 0.001μSv/h	北東	NE	4.2
—	北北東	NNE	4.4
—	北北東	NNE	4.4
—	北北東	NNE	4.4
—	北北東	NNE	4.4
—	北北東	NNE	4.8
—	北東	NE	2.2
—	北東	NE	2.1
—	北	N	2.2
—	北	N	2.2
—	北北西	NNW	1.8
—	北北西	NNW	1.8
—	北北東	NNE	1.8
—	北北西	NNW	1.1
—	北西	NW	1.0
—	西北西	WNW	0.9
—	西	W	0.8
—	西北西	WNW	0.7
—	西北西	WNW	0.7
—	北北東	NNE	0.6
—	北東	NE	0.6
—	北東	NE	0.5
—	北	N	0.5
—	北	N	0.6
—	北	N	0.7
—	北北東	NNE	0.8
—	東北東	ENE	0.8
—	北	N	0.6
—	北西	NW	0.5
—	北北西	NNW	0.5
—	北北東	NNE	0.7
< 0.01μSv/h	北北西	NNW	1.3
0.02μSv/h	北北東	NNE	1.1
0.01μSv/h	北	N	1.0
< 0.01μSv/h	北東	NE	2.8
< 0.01μSv/h	北北東	NNE	3.4
< 0.01μSv/h	北北東	NNE	3.2
< 0.01μSv/h	北	N	3.6
< 0.01μSv/h	北東	NE	3.6
< 0.01μSv/h	北北東	NNE	3.4

< 0.01μSv/h	北	N	3.4
< 0.01μSv/h	北東	NE	4.2
< 0.01μSv/h	北北西	NNW	2.0
< 0.01μSv/h	北	N	2.1
< 0.01μSv/h	北東	NE	1.0
< 0.01μSv/h	北	N	0.8
< 0.01μSv/h	北東	NE	0.9
< 0.01μSv/h	北北西	NNW	0.7
< 0.01μSv/h	北	N	0.7
< 0.01μSv/h	北	N	0.8
< 0.01μSv/h	北東	NE	1.5
< 0.01μSv/h	北東	NE	1.5
< 0.01μSv/h	北	N	1.6
< 0.01μSv/h	北	N	1.8
< 0.01μSv/h	北北東	NNE	1.5
< 0.01μSv/h	—		—
< 0.01μSv/h	—		—
< 0.01μSv/h	北東	NE	5.3
< 0.01μSv/h	—		—
< 0.01μSv/h	—		—
< 0.01μSv/h	—		—
< 0.01μSv/h	南東	SE	1.2
< 0.01μSv/h	東	E	1.3
< 0.01μSv/h	東南東	ESE	3.4
< 0.01μSv/h	南東	SE	1.3
< 0.01μSv/h	南	S	1.4
< 0.01μSv/h	南	S	1.8
< 0.01μSv/h	南	S	1.3
< 0.01μSv/h	南	S	1.3
< 0.01μSv/h	南南東	SSE	1.4
< 0.01μSv/h	南	S	1.0
< 0.01μSv/h	南南東	SSE	1.5
< 0.01μSv/h	南	S	1.9
< 0.01μSv/h	南	S	1.6
< 0.01μSv/h	南	S	1.5
< 0.01μSv/h	東南東	ESE	1.4
< 0.01μSv/h	南	S	1.2
< 0.01μSv/h	南南東	SSE	1.2
< 0.01μSv/h	東	E	1.2
< 0.01μSv/h	南東	SE	1.2
< 0.01μSv/h	南	S	1.0
< 0.01μSv/h	南東	SE	1.1
< 0.01μSv/h	南	S	1.1
< 0.01μSv/h	南東	SE	1.1
< 0.01μSv/h	南南東	SSE	1.3
< 0.01μSv/h	南	S	1.0
< 0.01μSv/h	南南東		1.4

< 0.01μSv/h	南	S	1.1
< 0.01μSv/h	南南東	SSE	1.1
< 0.01μSv/h	南南東	SSE	1.3
< 0.01μSv/h	南	S	1.3
< 0.01μSv/h	南	S	1.6
< 0.01μSv/h	南東	SE	1.5
< 0.01μSv/h	南	S	1.1
< 0.01μSv/h	南東	SE	1.2
< 0.01μSv/h	南	S	1.1
< 0.01μSv/h	南	S	1.0
< 0.01μSv/h	南	S	1.1
< 0.01μSv/h	南	S	1.0
< 0.01μSv/h	南南東	SSE	1.3
< 0.01μSv/h	東	S	1.4
< 0.01μSv/h	南南東	SSE	1.8
< 0.01μSv/h	南東	SE	1.6
< 0.01μSv/h	南東	SE	1.6
< 0.01μSv/h	西	W	0.7
< 0.01μSv/h	北	N	0.7
< 0.01μSv/h	南	S	0.9
< 0.01μSv/h	東	E	0.9
< 0.01μSv/h	北西	NW	1.0
< 0.01μSv/h	北西	NW	3.7
< 0.01μSv/h	東	E	5.6
< 0.01μSv/h	北北東	NNE	4.0
< 0.01μSv/h	北北東	NNE	4.0
< 0.01μSv/h	東	E	2.2
< 0.01μSv/h	北東	NE	1.7
< 0.01μSv/h	北北東	NNE	2.5
< 0.01μSv/h	北西	NW	2.1
< 0.01μSv/h	北	N	2.4
< 0.01μSv/h	北西	NW	1.0
< 0.01μSv/h	北西	NW	0.6
< 0.01μSv/h	北西	NW	0.6
< 0.01μSv/h	北東	NE	3.8
< 0.01μSv/h	北	N	1.1
< 0.01μSv/h	北西	NW	2.2
< 0.01μSv/h	北西	NW	1.0
< 0.01μSv/h	北西	NW	0.9
< 0.01μSv/h	北北西	NNE	0.9
< 0.01μSv/h	北西	NW	1.1
< 0.01μSv/h	北西	NW	1.0
< 0.01μSv/h	北西	NW	1.0
< 0.01μSv/h	北西	NW	1.0
< 0.01μSv/h	北西	NW	1.0
< 0.01μSv/h	北西	NW	1.0
< 0.01μSv/h	北西	NW	5.0
< 0.01μSv/h	北	N	4.2

< 0.01μSv/h	北北西	NNW	3.1
< 0.01μSv/h	北西	NW	2.9
< 0.01μSv/h	北北西	NNW	2.6
< 0.01μSv/h	北西	NW	2.0
< 0.01μSv/h	西	W	1.4
< 0.01μSv/h	西北西	WNW	1.4
< 0.01μSv/h	西北西	WNW	1.4
< 0.01μSv/h	北西	NW	1.4
< 0.01μSv/h	北西	NW	1.4
< 0.01μSv/h	北西	NW	1.2
< 0.01μSv/h	北西	NW	1.3
< 0.01μSv/h	西	W	1.2
< 0.01μSv/h	西	W	1.2
< 0.01μSv/h	北北西	NNW	1.2
< 0.01μSv/h	西北西	WNW	1.3
< 0.01μSv/h	北北西	NNW	1.4
< 0.01μSv/h	北北西	NNW	1.4
< 0.01μSv/h	北	N	1.7
< 0.01μSv/h	北北西	NNW	2.2
< 0.01μSv/h	北西	NW	1.7
< 0.01μSv/h	北	N	2.3
< 0.01μSv/h	北西	NW	1.8
< 0.01μSv/h	北西	NW	1.9
< 0.01μSv/h	西	W	1.6
< 0.01μSv/h	北北西	NNW	1.5
< 0.01μSv/h	東北東	ENE	1.8
< 0.01μSv/h	北東	NE	1.5
< 0.01μSv/h	東北東	ENE	1.4
< 0.01μSv/h	東	E	
< 0.01μSv/h	東北東	ENE	4.9
< 0.01μSv/h	北東	NE	—
< 0.01μSv/h	—		—
< 0.01μSv/h	北東	NE	2.0
< 0.01μSv/h	北北東	NNE	1.9
< 0.01μSv/h	東北東	ENE	2.3
< 0.01μSv/h	北東	NE	1.6
< 0.01μSv/h	東	E	1.8
< 0.01μSv/h	北	N	1.8
< 0.01μSv/h	東南東	ESE	1.6
< 0.01μSv/h	東	E	0.9
< 0.01μSv/h	北	N	1.8
< 0.01μSv/h	東北東	ENE	1.4
< 0.01μSv/h	西	W	1.4
< 0.01μSv/h	北西	NW	4.1
< 0.01μSv/h	西南西	WSW	3.0
< 0.01μSv/h	西南西	WSW	1.0
< 0.01μSv/h	西南西	WSW	1.2

< 0.01μSv/h	北	N	2.4
< 0.01μSv/h	北西	NW	2.7
< 0.01μSv/h	北西	NW	2.1
< 0.01μSv/h	東北東	ENE	1.7
< 0.01μSv/h	南南西	SSW	1.9
< 0.01μSv/h	南南東	SSE	2.3
< 0.01μSv/h	西	W	2.1
< 0.01μSv/h	西北西	WNW	2.1
< 0.01μSv/h	西南西	WEW	3.1
< 0.01μSv/h	北西	NW	2.3
< 0.01μSv/h	北西	NW	3.4
< 0.01μSv/h	北北西	NNW	3.0
< 0.01μSv/h	北	N	2.7
< 0.01μSv/h	北北西	NNW	2.6
< 0.01 μSv/h	西	W	2.6
< 0.01 μSv/h	北東	NE	1.1
< 0.01 μSv/h	南南西	SSW	0.4
< 0.01 μSv/h	北北西	NNW	0.6
< 0.01 μSv/h	東	E	0.9
< 0.01 μSv/h	西	W	0.5
< 0.01 μSv/h	北西	NW	1.5
< 0.01 μSv/h	北	N	1.5
< 0.01 μSv/h	西	W	1.8
< 0.01 μSv/h	西	W	1.8
< 0.01 μSv/h	北西	NW	1.0
< 0.01 μSv/h	西	W	1.3
< 0.01 μSv/h	西	W	2.3
< 0.01 μSv/h	西	W	3.1
< 0.01 μSv/h	西	W	3.6
< 0.01 μSv/h	西	W	3.7
< 0.01 μSv/h	西	W	3.8
< 0.01 μSv/h	西	W	3.7
< 0.01 μSv/h	南西	SW	3.7
< 0.01 μSv/h	西南西	WSW	3.2
< 0.01 μSv/h	南西	SW	3.8
< 0.01 μSv/h	南西	SW	3.4
< 0.01 μSv/h	南西	SW	3.7
< 0.01 μSv/h	南西	SW	3.0
< 0.01 μSv/h	西	W	5.1
< 0.01 μSv/h	西南西	WSW	5.0
< 0.01 μSv/h	西	W	6.8
< 0.01 μSv/h	北西	NW	5.2
< 0.01 μSv/h	北西	NW	5.6
< 0.01 μSv/h	西	W	5.2
< 0.01 μSv/h	西	W	7.0
< 0.01 μSv/h	西南西	WSW	4.5
< 0.01 μSv/h	南西	SW	2.2
< 0.01 μSv/h	北西	NW	4.8

< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.3
< 0.01 $\mu\text{Sv/h}$	北西	NW	4.7
< 0.01 $\mu\text{Sv/h}$	西	W	4.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.9
< 0.01 $\mu\text{Sv/h}$	西	W	3.5
< 0.01 $\mu\text{Sv/h}$	西	W	3.5
< 0.01 $\mu\text{Sv/h}$	西	W	3.8
< 0.01 $\mu\text{Sv/h}$	西	W	3.5
< 0.01 $\mu\text{Sv/h}$	西	W	3.1
< 0.01 $\mu\text{Sv/h}$	北西	NW	4.5
< 0.01 $\mu\text{Sv/h}$	西	W	4.7
< 0.01 $\mu\text{Sv/h}$	西	W	5.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	5.8
< 0.01 $\mu\text{Sv/h}$	西	W	3.5
< 0.01 $\mu\text{Sv/h}$	西	W	3.2
< 0.01 $\mu\text{Sv/h}$	西	W	3.1
< 0.01 $\mu\text{Sv/h}$	西	W	5.2
< 0.01 $\mu\text{Sv/h}$	西	W	4.3
< 0.01 $\mu\text{Sv/h}$	西	W	4.3
< 0.01 $\mu\text{Sv/h}$	西	W	4.1
< 0.01 $\mu\text{Sv/h}$	西	W	3.1
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	3.3
< 0.01 $\mu\text{Sv/h}$	北西	NW	3.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	3.6
< 0.01 $\mu\text{Sv/h}$	西	W	2.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.1
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.4
< 0.01 $\mu\text{Sv/h}$	西	W	2.6
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.9
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.4
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	2.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.9
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.6
< 0.01 $\mu\text{Sv/h}$	西	W	1.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.5
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.5
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.4
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.5
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.3
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.3
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.9

< 0.01 $\mu\text{Sv/h}$	北西	NW	0.9
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	0.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.3
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	1.4
< 0.01 $\mu\text{Sv/h}$	西	W	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	0.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.9
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.5
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.4
< 0.01 $\mu\text{Sv/h}$	北	N	0.9
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.5
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.2
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	0.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.2
< 0.01 $\mu\text{Sv/h}$	西	W	0.2
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.3
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.4
< 0.01 $\mu\text{Sv/h}$	西	W	0.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.6
< 0.01 $\mu\text{Sv/h}$	東	E	0.4
< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	北	N	0.4
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.2
< 0.01 $\mu\text{Sv/h}$	北	N	0.6
< 0.01 $\mu\text{Sv/h}$	北東	NE	0.5
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	0.5
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	0.5
< 0.01 $\mu\text{Sv/h}$	北	N	0.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.0
< 0.01 $\mu\text{Sv/h}$	北	N	1.0
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.3
< 0.01 $\mu\text{Sv/h}$	西	W	1.6
< 0.01 $\mu\text{Sv/h}$	北	N	1.4
< 0.01 $\mu\text{Sv/h}$	西	W	1.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.5
< 0.01 $\mu\text{Sv/h}$	西	W	1.6
< 0.01 $\mu\text{Sv/h}$	西	W	2.3

< 0.01 $\mu\text{Sv/h}$	北	N	2.1
< 0.01 $\mu\text{Sv/h}$	北	N	1.9
< 0.01 $\mu\text{Sv/h}$	西	W	2.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.9
< 0.01 $\mu\text{Sv/h}$	北	N	3.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.9
< 0.01 $\mu\text{Sv/h}$	西	W	3.4
< 0.01 $\mu\text{Sv/h}$	西	W	3.7
< 0.01 $\mu\text{Sv/h}$	西	W	3.3
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.5
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.6
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.8
< 0.01 $\mu\text{Sv/h}$	西	W	2.3
< 0.01 $\mu\text{Sv/h}$	西	W	3.3
< 0.01 $\mu\text{Sv/h}$	西	W	2.9
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	3.1
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.0
< 0.01 $\mu\text{Sv/h}$	西	W	1.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.5
< 0.01 $\mu\text{Sv/h}$	北	N	2.3
< 0.01 $\mu\text{Sv/h}$	南西	SW	1.8
< 0.01 $\mu\text{Sv/h}$	西	W	1.9
< 0.01 $\mu\text{Sv/h}$	北	N	1.5
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.3
< 0.01 $\mu\text{Sv/h}$	南西	SW	1.5
< 0.01 $\mu\text{Sv/h}$	南西	SW	1.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.6
< 0.01 $\mu\text{Sv/h}$	北	N	1.7
< 0.01 $\mu\text{Sv/h}$	西	W	1.3
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.2
< 0.01 $\mu\text{Sv/h}$	東	E	1.1
< 0.01 $\mu\text{Sv/h}$	南	S	1.8
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.7
< 0.01 $\mu\text{Sv/h}$	南	S	3.0
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	2.6
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.5
< 0.01 $\mu\text{Sv/h}$	東	E	2.0
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	1.8
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	2.0
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.7
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	1.6
< 0.01 $\mu\text{Sv/h}$	南	S	1.7
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	1.9
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.9
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	1.7
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	1.8

< 0.01 $\mu\text{Sv/h}$	南南東	SSE	1.6
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	1.5
< 0.01 $\mu\text{Sv/h}$	南	S	1.5
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.4
< 0.01 $\mu\text{Sv/h}$	南	S	1.7
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	1.9
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	2.3
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	2.1
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	2.2
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	2.4
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	2.0
< 0.01 $\mu\text{Sv/h}$	南	S	2.1
< 0.01 $\mu\text{Sv/h}$	南南西	SSE	1.8
< 0.01 $\mu\text{Sv/h}$	東	E	2.1
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	2.1
< 0.01 $\mu\text{Sv/h}$	南	S	2.0
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	2.1
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	3.1
< 0.01 $\mu\text{Sv/h}$	南	S	2.3
< 0.01 $\mu\text{Sv/h}$	南	S	1.8
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	1.8
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	1.2
< 0.01 $\mu\text{Sv/h}$	南	S	1.2
< 0.01 $\mu\text{Sv/h}$	南	S	1.2
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	1.5
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	1.5
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	1.4
< 0.01 $\mu\text{Sv/h}$	西	W	1.5
< 0.01 $\mu\text{Sv/h}$	南西	SW	1.3
< 0.01 $\mu\text{Sv/h}$	南西	SW	1.4
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	1.4
< 0.01 $\mu\text{Sv/h}$	南	S	1.3
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	1.5
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	1.3
< 0.01 $\mu\text{Sv/h}$	南	S	3.0
< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	西北西	WSW	0.7
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.6
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	0.5
< 0.01 $\mu\text{Sv/h}$	西	W	0.6
< 0.01 $\mu\text{Sv/h}$	西	W	0.3
< 0.01 $\mu\text{Sv/h}$	西	W	0.3
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	0.4
< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.5
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.7
< 0.01 $\mu\text{Sv/h}$	西	W	0.5

< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.4
< 0.01 $\mu\text{Sv/h}$	西	W	0.4
< 0.01 $\mu\text{Sv/h}$	北	S	0.3
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.3
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.2
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.2
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	1.4
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	1.4
< 0.01 $\mu\text{Sv/h}$	南西	SW	1.2
< 0.01 $\mu\text{Sv/h}$	南西	SW	1.1
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.9
< 0.01 $\mu\text{Sv/h}$	西	W	1.4
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	1.3
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	1.3
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	1.3
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	1.4
< 0.01 $\mu\text{Sv/h}$	南西	SW	1.6
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	1.3
< 0.01 $\mu\text{Sv/h}$	北	N	3.0
< 0.01 $\mu\text{Sv/h}$	北	N	0.3
< 0.01 $\mu\text{Sv/h}$	南	S	0.3
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.6
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.3
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	0.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.6
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.7
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	0.7
< 0.01 $\mu\text{Sv/h}$	東	E	0.7
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	0.9
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.6
< 0.01 $\mu\text{Sv/h}$	東	E	0.6
< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.4
< 0.01 $\mu\text{Sv/h}$	南東	SE	0.6
< 0.01 $\mu\text{Sv/h}$	西	W	0.6
< 0.01 $\mu\text{Sv/h}$	南	S	0.4
< 0.01 $\mu\text{Sv/h}$	南	S	0.5
< 0.01 $\mu\text{Sv/h}$	南	S	0.5
< 0.01 $\mu\text{Sv/h}$	東	E	0.9
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.9
< 0.01 $\mu\text{Sv/h}$	東	E	0.9
< 0.01 $\mu\text{Sv/h}$	南東	SE	0.9
< 0.01 $\mu\text{Sv/h}$	西	W	0.9
< 0.01 $\mu\text{Sv/h}$	南東	SE	0.7
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	0.5

< 0.01 $\mu\text{Sv/h}$	東南東	ESE	0.4
< 0.01 $\mu\text{Sv/h}$	南南東	NNE	0.3
< 0.01 $\mu\text{Sv/h}$	東	E	0.4
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.7
< 0.01 $\mu\text{Sv/h}$	西	W	0.3
< 0.01 $\mu\text{Sv/h}$	西	W	0.7
< 0.01 $\mu\text{Sv/h}$	西	W	0.8
< 0.01 $\mu\text{Sv/h}$	南西	NW	0.6
< 0.01 $\mu\text{Sv/h}$	南東	SE	0.6
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	0.3
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.5
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.3
< 0.01 $\mu\text{Sv/h}$	東	E	0.4
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	0.6
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	0.6
< 0.01 $\mu\text{Sv/h}$	北東	NE	0.9
< 0.01 $\mu\text{Sv/h}$	東	E	1.6
< 0.01 $\mu\text{Sv/h}$	東	E	2.1
< 0.01 $\mu\text{Sv/h}$	東	E	2.0
< 0.01 $\mu\text{Sv/h}$	東	E	1.5
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.8
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.8
< 0.01 $\mu\text{Sv/h}$	南	S	1.9
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.9
< 0.01 $\mu\text{Sv/h}$	東	E	1.7
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	1.5
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	1.5
< 0.01 $\mu\text{Sv/h}$	南西	SW	1.6
< 0.01 $\mu\text{Sv/h}$	西	W	2.2
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.9
< 0.01 $\mu\text{Sv/h}$	南西	SW	3.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	4.0
< 0.01 $\mu\text{Sv/h}$	西	W	4.7
< 0.01 $\mu\text{Sv/h}$	西	W	6.8
< 0.01 $\mu\text{Sv/h}$	西	W	5.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	5.6
< 0.01 $\mu\text{Sv/h}$	西	W	5.7
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	5.9
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	6.1
< 0.01 $\mu\text{Sv/h}$	北西	NW	4.2
< 0.01 $\mu\text{Sv/h}$	西	W	3.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	5.3
< 0.01 $\mu\text{Sv/h}$	西	W	4.3
< 0.01 $\mu\text{Sv/h}$	西	W	5.1
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	4.9
< 0.01 $\mu\text{Sv/h}$	西	W	5.8
< 0.01 $\mu\text{Sv/h}$	北東	NE	3.4
< 0.01 $\mu\text{Sv/h}$	西	W	4.6

< 0.01 $\mu\text{Sv/h}$	北	N	4.9
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	3.1
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.6
< 0.01 $\mu\text{Sv/h}$	西	W	4.9
< 0.01 $\mu\text{Sv/h}$	西	W	4.6
< 0.01 $\mu\text{Sv/h}$	西	W	3.4
< 0.01 $\mu\text{Sv/h}$	南西	SW	3.8
< 0.01 $\mu\text{Sv/h}$	南西	SW	4.6
< 0.01 $\mu\text{Sv/h}$	南	S	3.9
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.4
< 0.01 $\mu\text{Sv/h}$	西	W	4.8
< 0.01 $\mu\text{Sv/h}$	西	W	5.0
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	4.5
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	6.1
< 0.01 $\mu\text{Sv/h}$	西	W	5.1
< 0.01 $\mu\text{Sv/h}$	西	W	5.7
< 0.01 $\mu\text{Sv/h}$	西	W	4.5
< 0.01 $\mu\text{Sv/h}$	北西	NW	4.1
< 0.01 $\mu\text{Sv/h}$	西	W	3.3
< 0.01 $\mu\text{Sv/h}$	西	W	3.8
< 0.01 $\mu\text{Sv/h}$	西	W	3.5
< 0.01 $\mu\text{Sv/h}$	西	W	3.6
< 0.01 $\mu\text{Sv/h}$	西	W	2.7
< 0.01 $\mu\text{Sv/h}$	西	W	2.8
< 0.01 $\mu\text{Sv/h}$	西	W	4.1
< 0.01 $\mu\text{Sv/h}$	西	W	3.5
< 0.01 $\mu\text{Sv/h}$	西	W	4.4
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	4.1
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	3.2
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	2.7
< 0.01 $\mu\text{Sv/h}$	西	W	2.8
< 0.01 $\mu\text{Sv/h}$	西	W	2.7
< 0.01 $\mu\text{Sv/h}$	西	W	2.2
< 0.01 $\mu\text{Sv/h}$	西	W	2.6
< 0.01 $\mu\text{Sv/h}$	西	W	3.1
< 0.01 $\mu\text{Sv/h}$	西	W	2.6
< 0.01 $\mu\text{Sv/h}$	西	W	2.5
< 0.01 $\mu\text{Sv/h}$	西	W	2.6
< 0.01 $\mu\text{Sv/h}$	西	W	3.1
< 0.01 $\mu\text{Sv/h}$	西	W	3.4
< 0.01 $\mu\text{Sv/h}$	西	W	3.3
< 0.01 $\mu\text{Sv/h}$	西	W	2.3
< 0.01 $\mu\text{Sv/h}$	西	W	1.8
< 0.01 $\mu\text{Sv/h}$	西	W	2.0
< 0.01 $\mu\text{Sv/h}$	西	W	2.2
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	1.2
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.8
< 0.01 $\mu\text{Sv/h}$	西	W	1.0

< 0.01 $\mu\text{Sv/h}$	西	W	2.0
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.4
< 0.01 $\mu\text{Sv/h}$	西	W	1.8
< 0.01 $\mu\text{Sv/h}$	西	W	2.5
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.4
< 0.01 $\mu\text{Sv/h}$	西	W	2.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.9
< 0.01 $\mu\text{Sv/h}$	南西	SW	4.5
< 0.01 $\mu\text{Sv/h}$	南西	SW	3.7
< 0.01 $\mu\text{Sv/h}$	西	W	2.8
< 0.01 $\mu\text{Sv/h}$	南西	SW	3.5
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	3.0
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	3.4
< 0.01 $\mu\text{Sv/h}$	北西	NW	4.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	3.2
< 0.01 $\mu\text{Sv/h}$	西	W	3.0
< 0.01 $\mu\text{Sv/h}$	北東	NE	2.9
< 0.01 $\mu\text{Sv/h}$	南西	SW	2.1
< 0.01 $\mu\text{Sv/h}$	西	NE	2.5
< 0.01 $\mu\text{Sv/h}$	南西	W	1.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.1
< 0.01 $\mu\text{Sv/h}$	西	W	1.6
< 0.01 $\mu\text{Sv/h}$	西	W	1.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.5
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.3
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.1
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	1.0
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.1
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	1.9
< 0.01 $\mu\text{Sv/h}$	西	W	1.1
< 0.01 $\mu\text{Sv/h}$	南	S	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	0.9
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.5
< 0.01 $\mu\text{Sv/h}$	南	S	0.8
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.8
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	3.5
< 0.01 $\mu\text{Sv/h}$	北	N	1.6
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.5
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.5
< 0.01 $\mu\text{Sv/h}$	北	N	0.7
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	0.6
< 0.01 $\mu\text{Sv/h}$	北東	NE	0.6
< 0.01 $\mu\text{Sv/h}$	北	N	2.2
< 0.01 $\mu\text{Sv/h}$	北東	NE	0.6
< 0.01 $\mu\text{Sv/h}$	北東	NE	0.7
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	0.9
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	0.8
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	0.6

< 0.01 $\mu\text{Sv/h}$	東	ENE	0.9
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	1.1
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	0.6
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	0.6
< 0.01 $\mu\text{Sv/h}$	北東	NE	0.6
< 0.01 $\mu\text{Sv/h}$	北東	NE	0.8
< 0.01 $\mu\text{Sv/h}$	北	N	0.9
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.3
< 0.01 $\mu\text{Sv/h}$	東	E	1.3
< 0.01 $\mu\text{Sv/h}$	東	E	1.5
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.3
< 0.01 $\mu\text{Sv/h}$	東	E	1.5
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.4
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	1.2
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	1.2
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.0
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	1.0
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.5
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.2
< 0.01 $\mu\text{Sv/h}$	東	E	1.2
< 0.01 $\mu\text{Sv/h}$	東	E	1.1
< 0.01 $\mu\text{Sv/h}$	東	E	1.2
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.3
< 0.01 $\mu\text{Sv/h}$	東	E	0.7
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.3
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	1.4
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	1.8
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.5
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	1.4
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.2
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.3
< 0.01 $\mu\text{Sv/h}$	東	E	1.3
< 0.01 $\mu\text{Sv/h}$	南	S	1.1
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.2
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.0
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.1
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.3
< 0.01 $\mu\text{Sv/h}$	東	E	1.5
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.4
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.6
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.7
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.8
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.0
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.6
< 0.01 $\mu\text{Sv/h}$	南	S	1.7
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.8
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.9
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	2.3

< 0.01 $\mu\text{Sv/h}$	南	S	2.1
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	2.0
< 0.01 $\mu\text{Sv/h}$	南	S	1.9
< 0.01 $\mu\text{Sv/h}$	南	S	1.9
< 0.01 $\mu\text{Sv/h}$	南	S	1.7
< 0.01 $\mu\text{Sv/h}$	南	S	1.9
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	2.1
< 0.01 $\mu\text{Sv/h}$	南	S	1.8
< 0.01 $\mu\text{Sv/h}$	南	S	2.0
< 0.01 $\mu\text{Sv/h}$	南	S	1.9
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	2.2
< 0.01 $\mu\text{Sv/h}$	南	S	2.0
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	2.1
< 0.01 $\mu\text{Sv/h}$	南	S	2.1
< 0.01 $\mu\text{Sv/h}$	南西	SW	1.8
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	2.0
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.7
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	2.1
< 0.01 $\mu\text{Sv/h}$	南西	SW	1.7
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	1.6
< 0.01 $\mu\text{Sv/h}$	南	S	2.6
< 0.01 $\mu\text{Sv/h}$	南	S	2.6
< 0.01 $\mu\text{Sv/h}$	南西	SW	2.4
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	1.8
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	1.4
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	1.0
< 0.01 $\mu\text{Sv/h}$	南西	SW	2.0
< 0.01 $\mu\text{Sv/h}$	南西	SW	1.8
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	0.8
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.2
< 0.01 $\mu\text{Sv/h}$	西	W	1.2
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.4
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	1.6
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.0
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.0
< 0.01 $\mu\text{Sv/h}$	西	W	2.2
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.4
< 0.01 $\mu\text{Sv/h}$	西	W	2.4
< 0.01 $\mu\text{Sv/h}$	西	W	2.0
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.0
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.2
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	3.2

< 0.01 $\mu\text{Sv/h}$	西	W	1.2
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.3
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.8
< 0.01 $\mu\text{Sv/h}$	西	W	1.0
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.2
< 0.01 $\mu\text{Sv/h}$	西	W	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	0.8
< 0.01 $\mu\text{Sv/h}$	西	W	1.0
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.3
< 0.01 $\mu\text{Sv/h}$	西	W	0.9
< 0.01 $\mu\text{Sv/h}$	西	W	0.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.9
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.0
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	0.8
< 0.01 $\mu\text{Sv/h}$	西	W	0.6
< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.5
< 0.01 $\mu\text{Sv/h}$	西	W	0.9
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.0
< 0.01 $\mu\text{Sv/h}$	北	N	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	0.6
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	0.5
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.8
< 0.01 $\mu\text{Sv/h}$	西	W	0.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.1
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.1
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.3
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.6
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.9
< 0.01 $\mu\text{Sv/h}$	西	W	0.7
< 0.01 $\mu\text{Sv/h}$	東	E	0.7
< 0.01 $\mu\text{Sv/h}$	東	E	0.8
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	0.7
< 0.01 $\mu\text{Sv/h}$	東	E	1.0
< 0.01 $\mu\text{Sv/h}$	東	E	1.4
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.2
< 0.01 $\mu\text{Sv/h}$	南西	SW	1.1
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.9
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.6
< 0.01 $\mu\text{Sv/h}$	東	E	1.4

< 0.01 $\mu\text{Sv/h}$	東	E	1.2
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	1.0
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	0.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.7
< 0.01 $\mu\text{Sv/h}$	北東	NE	0.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.8
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.9
< 0.01 $\mu\text{Sv/h}$	西	W	1.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.7
< 0.01 $\mu\text{Sv/h}$	西	W	0.7
< 0.01 $\mu\text{Sv/h}$	西	W	1.7
< 0.01 $\mu\text{Sv/h}$	北	N	4.6
< 0.01 $\mu\text{Sv/h}$	北東	NE	5.0
< 0.01 $\mu\text{Sv/h}$	西	W	3.0
< 0.01 $\mu\text{Sv/h}$	西	W	2.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	4.4
< 0.01 $\mu\text{Sv/h}$	北西	NW	4.1
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.1
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.6
< 0.01 $\mu\text{Sv/h}$	西	W	2.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.4
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.5
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.9
< 0.01 $\mu\text{Sv/h}$	北	N	0.8
< 0.01 $\mu\text{Sv/h}$	南西	SW	1.2
< 0.01 $\mu\text{Sv/h}$	北	N	1.5
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.7
< 0.01 $\mu\text{Sv/h}$	東	E	1.5
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	1.1
< 0.01 $\mu\text{Sv/h}$	南東	SE	0.9
< 0.01 $\mu\text{Sv/h}$	西北西	NW	1.9
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.1
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.9
< 0.01 $\mu\text{Sv/h}$	北	N	0.7
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.6
< 0.01 $\mu\text{Sv/h}$	東	E	0.8
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.0
< 0.01 $\mu\text{Sv/h}$	東	E	0.8
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.5
< 0.01 $\mu\text{Sv/h}$	北東	NE	4.3
< 0.01 $\mu\text{Sv/h}$	北東	NE	4.0
< 0.01 $\mu\text{Sv/h}$	北	N	3.7
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.1
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.2
< 0.01 $\mu\text{Sv/h}$	北	N	1.3

< 0.01 $\mu\text{Sv/h}$	北東	NE	3.8
< 0.01 $\mu\text{Sv/h}$	北	N	2.1
< 0.01 $\mu\text{Sv/h}$	北	N	3.8
< 0.01 $\mu\text{Sv/h}$	北東	NE	5.7
< 0.01 $\mu\text{Sv/h}$	北東	NE	6.8
< 0.01 $\mu\text{Sv/h}$	北東	NE	5.8
< 0.01 $\mu\text{Sv/h}$	北東	NE	6.3
< 0.01 $\mu\text{Sv/h}$	北	N	4.9
< 0.01 $\mu\text{Sv/h}$	北東	NE	5.9
< 0.01 $\mu\text{Sv/h}$	北	N	5.7
< 0.01 $\mu\text{Sv/h}$	北東	NE	4.8
< 0.01 $\mu\text{Sv/h}$	東	E	4.9
< 0.01 $\mu\text{Sv/h}$	南	S	0.7
< 0.01 $\mu\text{Sv/h}$	南西	SW	2.5
< 0.01 $\mu\text{Sv/h}$	東	E	3.5
< 0.01 $\mu\text{Sv/h}$	南東	SE	0.9
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	0.7
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	0.5
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	0.7
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	0.5
< 0.01 $\mu\text{Sv/h}$	南東	SE	0.3
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	0.4
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.3
< 0.01 $\mu\text{Sv/h}$	西	W	0.4
< 0.01 $\mu\text{Sv/h}$	西	W	0.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.2
< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.7
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.7
< 0.01 $\mu\text{Sv/h}$	南	S	0.3
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.8
< 0.01 $\mu\text{Sv/h}$	西	W	0.7
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.7
< 0.01 $\mu\text{Sv/h}$	西	W	0.7
< 0.01 $\mu\text{Sv/h}$	西	W	0.7
< 0.01 $\mu\text{Sv/h}$	西	W	0.6
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.6
< 0.01 $\mu\text{Sv/h}$	西	W	0.6
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.5
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.6
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	0.6
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.3
< 0.01 $\mu\text{Sv/h}$	南	S	0.2

< 0.01 $\mu\text{Sv/h}$	西	W	0.3
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.4
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.5
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.5
< 0.01 $\mu\text{Sv/h}$	西	W	0.7
< 0.01 $\mu\text{Sv/h}$	南東	SE	0.4
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.4
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.4
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.4
< 0.01 $\mu\text{Sv/h}$	西	W	0.3
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.6
< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	西	W	0.4
< 0.01 $\mu\text{Sv/h}$	西	W	0.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	1.1
< 0.01 $\mu\text{Sv/h}$	西	W	1.3
< 0.01 $\mu\text{Sv/h}$	西	W	1.1
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.0
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.9
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.9
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.9
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.8
< 0.01 $\mu\text{Sv/h}$	西	W	0.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.5
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	0.4
< 0.01 $\mu\text{Sv/h}$	北	N	2.1
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.1
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.8
< 0.01 $\mu\text{Sv/h}$	西	W	1.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.9
< 0.01 $\mu\text{Sv/h}$	西	W	1.7
< 0.01 $\mu\text{Sv/h}$	西	W	1.6
< 0.01 $\mu\text{Sv/h}$	北	N	1.3
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.3
< 0.01 $\mu\text{Sv/h}$	西	W	1.5
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.3
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.3
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.8

< 0.01 $\mu\text{Sv/h}$	北西	NW	2.0
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.9
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.2
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.8
< 0.01 $\mu\text{Sv/h}$	西	W	1.4
< 0.01 $\mu\text{Sv/h}$	西	W	1.5
< 0.01 $\mu\text{Sv/h}$	西	W	1.4
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.2
< 0.01 $\mu\text{Sv/h}$	西	W	1.1
< 0.01 $\mu\text{Sv/h}$	西	W	1.5
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.3
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.1
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.5
< 0.01 $\mu\text{Sv/h}$	西	W	1.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.3
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.4
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.5
< 0.01 $\mu\text{Sv/h}$	北	N	1.5
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.6
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.7
< 0.01 $\mu\text{Sv/h}$	北	NW	2.2
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.3
< 0.01 $\mu\text{Sv/h}$	西	W	1.7
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.5
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.3
< 0.01 $\mu\text{Sv/h}$	北	N	1.5
< 0.01 $\mu\text{Sv/h}$	北	N	1.4
< 0.01 $\mu\text{Sv/h}$	北	N	1.3
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.3
< 0.01 $\mu\text{Sv/h}$	北	N	1.7
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.4
< 0.01 $\mu\text{Sv/h}$	北	N	1.8
< 0.01 $\mu\text{Sv/h}$	北	N	1.6
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.4
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.5
< 0.01 $\mu\text{Sv/h}$	北	N	2.3
< 0.01 $\mu\text{Sv/h}$	北	N	2.1
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.7
< 0.01 $\mu\text{Sv/h}$	北	N	1.8
< 0.01 $\mu\text{Sv/h}$	北	N	1.6
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.6
< 0.01 $\mu\text{Sv/h}$	北	N	1.2
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.2

< 0.01 $\mu\text{Sv/h}$	北西	NW	0.8
< 0.01 $\mu\text{Sv/h}$	北	N	1.1
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	1.1
< 0.01 $\mu\text{Sv/h}$	東	E	1.2
< 0.01 $\mu\text{Sv/h}$	東	E	0.7
< 0.01 $\mu\text{Sv/h}$	東	E	0.7
< 0.01 $\mu\text{Sv/h}$	南東	SW	0.7
< 0.01 $\mu\text{Sv/h}$	南東	SW	0.6
< 0.01 $\mu\text{Sv/h}$	東	E	0.6
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	0.6
< 0.01 $\mu\text{Sv/h}$	北	N	0.6
< 0.01 $\mu\text{Sv/h}$	南東	SE	0.4
< 0.01 $\mu\text{Sv/h}$	北東	NE	0.4
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	0.5
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.6
< 0.01 $\mu\text{Sv/h}$	西	W	0.9
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.4
< 0.01 $\mu\text{Sv/h}$	西	W	0.6
< 0.01 $\mu\text{Sv/h}$	西	W	0.3
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	0.5
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.3
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.5
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.1
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.5
< 0.01 $\mu\text{Sv/h}$	西	W	0.6
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.9
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	1.0
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.9
< 0.01 $\mu\text{Sv/h}$	西	W	0.8
< 0.01 $\mu\text{Sv/h}$	西	W	0.6
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.4
< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	西	W	0.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.0
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.2
< 0.01 $\mu\text{Sv/h}$	西	W	1.3
< 0.01 $\mu\text{Sv/h}$	西	W	1.1
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	0.9
< 0.01 $\mu\text{Sv/h}$	西	W	1.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.8

< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.6
< 0.01 $\mu\text{Sv/h}$	西	W	4.3
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.5
< 0.01 $\mu\text{Sv/h}$	北東	NE	5.5
< 0.01 $\mu\text{Sv/h}$	北	N	2.4
< 0.01 $\mu\text{Sv/h}$	北東	NE	6.5
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	6.0
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	4.2
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	3.4
< 0.01 $\mu\text{Sv/h}$	北	N	3.3
< 0.01 $\mu\text{Sv/h}$	北	N	3.2
< 0.01 $\mu\text{Sv/h}$	北	N	2.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.8
< 0.01 $\mu\text{Sv/h}$	北	N	2.9
< 0.01 $\mu\text{Sv/h}$	北	N	3.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	3.1
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.9
< 0.01 $\mu\text{Sv/h}$	北	N	2.2
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.3
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.3
< 0.01 $\mu\text{Sv/h}$	北	N	2.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.2
< 0.01 $\mu\text{Sv/h}$	北	N	2.1
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.1
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.4
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.7
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.8
< 0.01 $\mu\text{Sv/h}$	北	N	2.1
< 0.01 $\mu\text{Sv/h}$	北	N	2.1
< 0.01 $\mu\text{Sv/h}$	北	N	1.8
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.1
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.4
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.5
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.5
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.6
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.4
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.1
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.7
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.4
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.6
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.8
< 0.01 $\mu\text{Sv/h}$	北	N	3.0
< 0.01 $\mu\text{Sv/h}$	北	N	2.5
< 0.01 $\mu\text{Sv/h}$	北	N	3.1
< 0.01 $\mu\text{Sv/h}$	北	N	3.2

< 0.01 $\mu\text{Sv/h}$	北北西	NNW	3.5
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	3.9
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	4.4
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	3.1
< 0.01 $\mu\text{Sv/h}$	北	N	3.5
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	3.3
< 0.01 $\mu\text{Sv/h}$	北	N	2.9
< 0.01 $\mu\text{Sv/h}$	北	N	3.4
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	2.5
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	3.1
< 0.01 $\mu\text{Sv/h}$	北	N	2.6
< 0.01 $\mu\text{Sv/h}$	北	N	2.7
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	3.1
< 0.01 $\mu\text{Sv/h}$	北	N	2.9
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.9
< 0.01 $\mu\text{Sv/h}$	北	N	3.1
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	3.0
< 0.01 $\mu\text{Sv/h}$	北	N	2.6
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	2.5
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	2.1
< 0.01 $\mu\text{Sv/h}$	北	N	2.2
< 0.01 $\mu\text{Sv/h}$	北	N	1.5
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.6
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	2.6
< 0.01 $\mu\text{Sv/h}$	西	W	1.6
< 0.01 $\mu\text{Sv/h}$	西	W	1.6
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.5
< 0.01 $\mu\text{Sv/h}$	東	E	1.4
< 0.01 $\mu\text{Sv/h}$	東	E	1.2
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	1.9
< 0.01 $\mu\text{Sv/h}$	北	N	2.0
< 0.01 $\mu\text{Sv/h}$	北	N	1.5
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.3
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.2
< 0.01 $\mu\text{Sv/h}$	北	N	1.4
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.0
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	1.6
< 0.01 $\mu\text{Sv/h}$	東	E	0.9
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	1.6
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	1.7
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.6
< 0.01 $\mu\text{Sv/h}$	北	N	1.5
< 0.01 $\mu\text{Sv/h}$	東	E	1.3
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	1.0
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	1.1
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	0.7
< 0.01 $\mu\text{Sv/h}$	東	E	0.9
< 0.01 $\mu\text{Sv/h}$	南	S	0.9

< 0.01 $\mu\text{Sv/h}$	南東	SE	1.3
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	1.0
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	0.8
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.9
< 0.01 $\mu\text{Sv/h}$	北	N	0.5
< 0.01 $\mu\text{Sv/h}$	東	E	0.6
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.1
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.2
< 0.01 $\mu\text{Sv/h}$	西	W	2.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.5
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	0.9
< 0.01 $\mu\text{Sv/h}$	北	N	2.3
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.1
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.3
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.7
< 0.01 $\mu\text{Sv/h}$	北	N	1.2
< 0.01 $\mu\text{Sv/h}$	北	N	1.4
< 0.01 $\mu\text{Sv/h}$	北	N	0.8
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	0.4
< 0.01 $\mu\text{Sv/h}$	西	W	0.4
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.8
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	0.2
< 0.01 $\mu\text{Sv/h}$	東	E	0.2
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.3
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.3
< 0.01 $\mu\text{Sv/h}$	東	E	0.5
< 0.01 $\mu\text{Sv/h}$	東	E	0.3
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.3
< 0.01 $\mu\text{Sv/h}$	南東	SE	0.5
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	0.3
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.4
< 0.01 $\mu\text{Sv/h}$	西	W	0.4
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.4
< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	西	W	0.4
< 0.01 $\mu\text{Sv/h}$	西	W	0.3
< 0.01 $\mu\text{Sv/h}$	西	W	0.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.5
< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.5
< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	西	W	0.6
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.5
< 0.01 $\mu\text{Sv/h}$	南東	SE	0.4
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.3
< 0.01 $\mu\text{Sv/h}$	南	S	0.4

< 0.01 $\mu\text{Sv/h}$	北	N	0.5
< 0.01 $\mu\text{Sv/h}$	西	W	1.2
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.3
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.6
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.3
< 0.01 $\mu\text{Sv/h}$	北	N	0.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.6
< 0.01 $\mu\text{Sv/h}$	西	W	0.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.3
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.6
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.2
< 0.01 $\mu\text{Sv/h}$	西	W	1.0
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.5
< 0.01 $\mu\text{Sv/h}$	西	W	1.0
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.9
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.6
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.7
< 0.01 $\mu\text{Sv/h}$	西	W	0.9
< 0.01 $\mu\text{Sv/h}$	西	W	1.0
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.5
< 0.01 $\mu\text{Sv/h}$	北	N	0.6
< 0.01 $\mu\text{Sv/h}$	南	S	0.3
< 0.01 $\mu\text{Sv/h}$	北	N	0.2
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.2
< 0.01 $\mu\text{Sv/h}$	西	W	1.2
< 0.01 $\mu\text{Sv/h}$	南東	SE	0.9
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	0.7
< 0.01 $\mu\text{Sv/h}$	南	S	0.6
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	0.8
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.8
< 0.01 $\mu\text{Sv/h}$	西	W	0.7
< 0.01 $\mu\text{Sv/h}$	北	N	0.4
< 0.01 $\mu\text{Sv/h}$	北	N	0.7
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	0.5
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	0.8
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.7
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.9
< 0.01 $\mu\text{Sv/h}$	西	W	1.1
< 0.01 $\mu\text{Sv/h}$	西	W	0.8
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.2
< 0.01 $\mu\text{Sv/h}$	南	S	1.0
< 0.01 $\mu\text{Sv/h}$	南	S	0.8
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.8
< 0.01 $\mu\text{Sv/h}$	南	S	1.2

< 0.01 $\mu\text{Sv/h}$	南	S	1.2
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.7
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.7
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.5
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.8
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	2.5
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.2
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	2.5
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	2.3
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.2
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.6
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.7
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	2.4
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	2.7
< 0.01 $\mu\text{Sv/h}$	南東	SE	22.4
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.8
< 0.01 $\mu\text{Sv/h}$	南	S	2.5
< 0.01 $\mu\text{Sv/h}$	南	S	2.8
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	2.7
< 0.01 $\mu\text{Sv/h}$	南	S	2.5
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	2.7
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	2.9
< 0.01 $\mu\text{Sv/h}$	南	S	3.0
< 0.01 $\mu\text{Sv/h}$	南東	SE	3.0
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.8
< 0.01 $\mu\text{Sv/h}$	南	S	2.5
< 0.01 $\mu\text{Sv/h}$	南	S	3.1
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	3.2
< 0.01 $\mu\text{Sv/h}$	南東	SE	3.1
< 0.01 $\mu\text{Sv/h}$	南	S	3.7
< 0.01 $\mu\text{Sv/h}$	南	S	3.7
< 0.01 $\mu\text{Sv/h}$	南東	SE	3.1
< 0.01 $\mu\text{Sv/h}$	南	S	4.2
< 0.01 $\mu\text{Sv/h}$	南東	SE	3.1
< 0.01 $\mu\text{Sv/h}$	南東	SE	4.1
< 0.01 $\mu\text{Sv/h}$	南東	SE	4.0
< 0.01 $\mu\text{Sv/h}$	南	S	2.3
< 0.01 $\mu\text{Sv/h}$	南	S	1.4
< 0.01 $\mu\text{Sv/h}$	南	S	5.8
< 0.01 $\mu\text{Sv/h}$	南東	SE	4.5
< 0.01 $\mu\text{Sv/h}$	南東	SE	4.4
< 0.01 $\mu\text{Sv/h}$	南	S	4.3
< 0.01 $\mu\text{Sv/h}$	南	S	4.3
< 0.01 $\mu\text{Sv/h}$	南	S	3.8
< 0.01 $\mu\text{Sv/h}$	南	S	4.3
< 0.01 $\mu\text{Sv/h}$	南東	SE	4.5
< 0.01 $\mu\text{Sv/h}$	南	S	4.0
< 0.01 $\mu\text{Sv/h}$	南	S	3.6

< 0.01 μSv/h	南	S	4.3
< 0.01 μSv/h	南	S	3.2
< 0.01 μSv/h	南東	SE	2.5
< 0.01 μSv/h	南東	SE	1.8
< 0.01 μSv/h	南	S	1.7
< 0.01 μSv/h	南西	SW	1.3
< 0.01 μSv/h	南	S	1.3
< 0.01 μSv/h	南	S	1.7
< 0.01 μSv/h	南	S	1.4
< 0.01 μSv/h	南	S	1.3
< 0.01 μSv/h	南南東	SSE	1.0
< 0.01 μSv/h	西	W	0.5
< 0.01 μSv/h	西南西	WSW	0.6
< 0.01 μSv/h	西	W	0.6
< 0.01 μSv/h	西	W	0.8
< 0.01 μSv/h	西南西	WSW	1.0
< 0.01 μSv/h	西	W	0.7
< 0.01 μSv/h	西北西	WNW	1.0
< 0.01 μSv/h	北西	NW	1.3
< 0.01 μSv/h	西	W	1.4
< 0.01 μSv/h	西	W	1.4
< 0.01 μSv/h	北西	NW	0.8
< 0.01 μSv/h	西北西	WNW	0.7
< 0.01 μSv/h	西北西	WNW	1.6
< 0.01 μSv/h	西	W	0.9
< 0.01 μSv/h	西	W	0.7
< 0.01 μSv/h	西北西	WNW	1.2
< 0.01 μSv/h	北西	NW	1.2
< 0.01 μSv/h	北西	NW	1.0
< 0.01 μSv/h	北北西	NNW	0.8
< 0.01 μSv/h	北西	NW	0.4
< 0.01 μSv/h	北	N	0.8
< 0.01 μSv/h	西	W	0.6
< 0.01 μSv/h	西北西	WNW	0.7
< 0.01 μSv/h	北北西	NNW	0.5
< 0.01 μSv/h	北西	NW	0.9
< 0.01 μSv/h	西北西	WNW	1.5
< 0.01 μSv/h	西北西	WNW	1.2
< 0.01 μSv/h	北西	NW	1.0
< 0.01 μSv/h	西北西	WNW	1.6
< 0.01 μSv/h	西北西	WNW	1.5
< 0.01 μSv/h	北西	NW	1.1
< 0.01 μSv/h	北北西	NNW	1.3
< 0.01 μSv/h	北西	NW	0.9
< 0.01 μSv/h	北西	NW	0.9
< 0.01 μSv/h	北西	NW	1.3
< 0.01 μSv/h	西	W	0.8
< 0.01 μSv/h	西	W	0.8

< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.7
< 0.01 $\mu\text{Sv/h}$	西	W	1.0
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.7
< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.5
< 0.01 $\mu\text{Sv/h}$	南西	SW	0.6
< 0.01 $\mu\text{Sv/h}$	西	W	0.6
< 0.01 $\mu\text{Sv/h}$	南東	SE	0.5
< 0.01 $\mu\text{Sv/h}$	南南西	SSW	0.5
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	0.7
< 0.01 $\mu\text{Sv/h}$	西	W	0.5
< 0.01 $\mu\text{Sv/h}$	西南西	WSW	0.5
< 0.01 $\mu\text{Sv/h}$	西	W	0.7
< 0.01 $\mu\text{Sv/h}$	西	W	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	0.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.1
< 0.01 $\mu\text{Sv/h}$	北	N	1.0
< 0.01 $\mu\text{Sv/h}$	西	W	0.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.2
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.1
< 0.01 $\mu\text{Sv/h}$	北	N	0.9
< 0.01 $\mu\text{Sv/h}$	北	N	0.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.9
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	0.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.9
< 0.01 $\mu\text{Sv/h}$	北西	NW	0.9
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.8
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.6
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.5
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.0
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	1.1
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	0.9
< 0.01 $\mu\text{Sv/h}$	西	W	1.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.1
< 0.01 $\mu\text{Sv/h}$	西	W	0.9
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	0.9
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	0.8
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.1
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.3
< 0.01 $\mu\text{Sv/h}$	北	N	1.2
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	1.0
< 0.01 $\mu\text{Sv/h}$	北	N	1.3
< 0.01 $\mu\text{Sv/h}$	北	N	1.6

< 0.01 $\mu\text{Sv/h}$	北	N	1.1
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.1
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	1.4
< 0.01 $\mu\text{Sv/h}$	北	N	1.9
< 0.01 $\mu\text{Sv/h}$	北	N	3.1
< 0.01 $\mu\text{Sv/h}$	北東	NE	2.3
< 0.01 $\mu\text{Sv/h}$	北	N	2.3
< 0.01 $\mu\text{Sv/h}$	東	E	2.2
< 0.01 $\mu\text{Sv/h}$	北東	NE	1.6
< 0.01 $\mu\text{Sv/h}$	東	E	1.7
< 0.01 $\mu\text{Sv/h}$	東北東	ENE	1.7
< 0.01 $\mu\text{Sv/h}$	東	E	2.0
< 0.01 $\mu\text{Sv/h}$	東	E	1.9
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< 0.01 $\mu\text{Sv/h}$	東南東	ESE	2.8
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.9
< 0.01 $\mu\text{Sv/h}$	南東	SE	3.4
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	2.8
< 0.01 $\mu\text{Sv/h}$	南東	SE	3.2
< 0.01 $\mu\text{Sv/h}$	東	E	3.0
< 0.01 $\mu\text{Sv/h}$	南南東	SSE	3.7
< 0.01 $\mu\text{Sv/h}$	南東	SE	3.5
< 0.01 $\mu\text{Sv/h}$	南東	SE	3.3
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< 0.01 $\mu\text{Sv/h}$	東南東	ESE	2.9
< 0.01 $\mu\text{Sv/h}$	南東	SE	3.3
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< 0.01 $\mu\text{Sv/h}$	南東	SE	2.5
< 0.01 $\mu\text{Sv/h}$	南東	SE	3.0
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.7
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.8
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.7
< 0.01 $\mu\text{Sv/h}$	東	E	2.9
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< 0.01 $\mu\text{Sv/h}$	南南東	SSE	2.7
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.6
< 0.01 $\mu\text{Sv/h}$	東	E	2.1
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.5
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< 0.01 $\mu\text{Sv/h}$	南	S	2.2
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.1
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.6
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.8
< 0.01 $\mu\text{Sv/h}$	南	S	2.0
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	2.1
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< 0.01 $\mu\text{Sv/h}$	南東	SE	1.5
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< 0.01 $\mu\text{Sv/h}$	東南東	ESE	1.6
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	1.7
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.3
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	1.6
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	1.7
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.3
< 0.01 $\mu\text{Sv/h}$	北北東	NNE	1.1
< 0.01 $\mu\text{Sv/h}$	東	E	1.1
< 0.01 $\mu\text{Sv/h}$	東南東	ENE	1.0
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.1
< 0.01 $\mu\text{Sv/h}$	東	E	1.0
< 0.01 $\mu\text{Sv/h}$	東	E	1.5
< 0.01 $\mu\text{Sv/h}$	南東	SE	2.8
< 0.01 $\mu\text{Sv/h}$	東南東	ESE	2.2
< 0.01 $\mu\text{Sv/h}$	南東	SE	1.5
< 0.01 $\mu\text{Sv/h}$	北東	NE	0.7
< 0.01 $\mu\text{Sv/h}$	南東	SE	0.7
< 0.01 $\mu\text{Sv/h}$	北	N	0.9
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< 0.01 $\mu\text{Sv/h}$	北西	NW	1.8
< 0.01 $\mu\text{Sv/h}$	西	W	2.5

< 0.01 $\mu\text{Sv/h}$	北西	NW	2.2
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.6
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	3.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	3.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.7
< 0.01 $\mu\text{Sv/h}$	西	W	2.4
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	1.9
< 0.01 $\mu\text{Sv/h}$	北西	NW	3.0
< 0.01 $\mu\text{Sv/h}$	北	N	5.3
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	4.0
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.9
< 0.01 $\mu\text{Sv/h}$	北	N	3.5
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	3.2
< 0.01 $\mu\text{Sv/h}$	北	N	5.0
< 0.01 $\mu\text{Sv/h}$	北	N	5.9
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	3.7
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	3.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	3.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.9
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.6
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.3
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.7
< 0.01 $\mu\text{Sv/h}$	北	N	3.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	6.1
< 0.01 $\mu\text{Sv/h}$	北	N	3.4
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	3.0
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.9
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.5
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.7
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.5
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.2
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.4
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.3
< 0.01 $\mu\text{Sv/h}$	西北西	WNW	2.6
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.8
< 0.01 $\mu\text{Sv/h}$	北西	NW	2.3
< 0.01 $\mu\text{Sv/h}$	北	N	2.9
< 0.01 $\mu\text{Sv/h}$	北北西	NNW	2.7
< 0.01 $\mu\text{Sv/h}$	北	N	2.6

From: Batkin, Joshua
Sent: Friday, April 29, 2011 2:07 AM
To: ET02 Hoc
Subject: Out of Office: April 19 - 2200 EDT One-Pager - Fukushima Daiichi

I am out of the office until May 2nd. Please contact Angela Coggins or John Monninger in the Chairman's office if you need assistance before I return. Thank you, Josh

Wagner, Katie

From: Wagner, Katie
Sent: Monday, March 21, 2011 3:54 PM
To: Santiago, Patricia; Tinkler, Charles
Cc: Schaperow, Jason
Subject: RE: Requests

Pat and Charlie,

To clarify, do actions 1 and 2 both fall under the request from Jennifer Uhle that Jason S. received at 11:30pm last night?

Thanks,
Katie

From: Tinkler, Charles
Sent: Monday, March 21, 2011 3:17 PM
To: Santiago, Patricia; Chang, Richard; Wagner, Katie
Cc: Schaperow, Jason
Subject: Requests

Right now we have 2 actions we are following up

1. Clarification and assessment of potential radiological release source terms for Fukushima Units 3&4 spent fuel pools, earlier estimates were made based on earlier Peach Bottom analyses and followup is needed to address Fukushima and complete dryout and concrete attack, clarification sought by the PMT
2. We have received additional requests from Naval Reactors. These are being put on hold. Discussed with Brian Sheron

Charles Tinkler
Charles.Tinkler@nrc.gov

LLLL/72

Wagner, Katie

From: Wagner, Katie
Sent: Monday, March 21, 2011 4:53 PM
To: Santiago, Patricia
Cc: Lee, Richard
Subject: RE: Requests

Pat – Thanks for the heads up about Mike being out. I'll update the reports tomorrow a.m. and re-distribute. –
Thanks, Katie

From: Santiago, Patricia
Sent: Monday, March 21, 2011 4:51 PM
To: Wagner, Katie
Cc: Lee, Richard
Subject: RE: Requests

Ok
They are separate...FYI Mike Scott will be gone for about 2 weeks and reports should go to Scott Elkins who is acting deputy.
thanks

From: Wagner, Katie
Sent: Monday, March 21, 2011 4:47 PM
To: Santiago, Patricia
Cc: Lee, Richard
Subject: FW: Requests

Pat,

I have printed off today's EOB reports for Kathy and Mike and did not add the two items below because I was not sure if those were already encapsulated in item #22 on the Sharepoint. If those two are separate items, I will add them first thing tomorrow morning and put updated reports on Kathy and Mike's chairs.

Thanks,
Katie

From: Wagner, Katie
Sent: Monday, March 21, 2011 4:14 PM
To: Santiago, Patricia
Cc: Lee, Richard
Subject: RE: Requests

Pat,

If I'm understanding this correctly, the 2 listed action items in the 3:17pm email are **in addition to** this entry:

22	3/20/2011	J. Uhle (RST Director) at Ops Center for Naval Reactors ! NEW	Jennifer.Uhle@nrc.gov	Jason Schaperow x7452 Charlie Tinkler x7496	SPB	The following was requested by Naval Reactors: 1) a written position from the NRC by morning whether we believe fuel debris is likely to eat through the concrete floor of the spent fuel	The following was requested: 1) a written position from the NRC by morning whether we believe fuel debris is likely to eat through the concrete floor of the spent fuel pool and fall into the	Pending
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LL4/73

pool and fall into the
next lower floor of the
reactor building
2) our MELCOR spent
fuel pool input deck for
Fukushima Daiichi Unit 4
and our results of
calculations with this
model
3) the reports we
produced over the last
several years on analysis
of severe spent fuel pool
accidents.

next lower floor of the
reactor building
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Fukushima Daiichi Unit 4
and our results of
calculations with this
model
3) the reports we
produced over the last
several years on analysis
of severe spent fuel pool
accidents.

I just want to make sure I've got everything straight here . . .

Thanks,
Katie

From: Santiago, Patricia
Sent: Monday, March 21, 2011 4:07 PM
To: Wagner, Katie
Cc: Lee, Richard; Gibson, Kathy; Elkins, Scott
Subject: RE: Requests

Katie...add this for Jason/Charlie SPB/DSA.
thanks

From: Tinkler, Charles
Sent: Monday, March 21, 2011 3:17 PM
To: Santiago, Patricia; Chang, Richard; Wagner, Katie
Cc: Schaperow, Jason
Subject: Requests

Right now we have 2 actions we are following up

1. Clarification and assessment of potential radiological release source terms for Fukushima Units 3&4 spent fuel pools, earlier estimates were made based on earlier Peach Bottom analyses and followup is needed to address Fukushima and complete dryout and concrete attack, clarification sought by the PMT
2. We have received additional requests from Naval Reactors. These are being put on hold. Discussed with Brian Sheron

Charles Tinkler
Charles.Tinkler@nrc.gov

Wagner, Katie

From: Wagner, Katie
Sent: Monday, March 21, 2011 11:41 AM
To: Dehn, Jeff
Cc: Bush-Goddard, Stephanie
Subject: FW: [WARNING: MESSAGE ENCRYPTED]FW: C4 all members :Nuclide report from Japan

Jeff - Stephanie meant to cc you on this since it is international. - Katie

-----Original Message-----

From: Bush-Goddard, Stephanie
Sent: Monday, March 21, 2011 11:39 AM
To: Wagner, Katie
Cc: RES_DSA_HEB
Subject: FW: [WARNING: MESSAGE ENCRYPTED]FW: C4 all members :Nuclide report from Japan

Katie W: Request from colleagues on the Committee on Radiation Protection and Public Health Committee.

Steve S. please help with question and send me to me. I will close out with Katie.

Jeff: I was told to put you on cc.

-Stephanie

-----Original Message-----

From: VANDECASTEELE Christian [<mailto:Christian.VANDECASTEELE@FANC.FGOV.BE>]
Sent: Monday, March 21, 2011 7:56 AM
To: david.duchesne@hc-sc.gc.ca; boyd.mike@epa.gov; ali.ghovanlou@hq.doe.gov; r.martincic@iaea.org; j.p.auclair@hc-sc.gc.ca; brian.ahier@hc-sc.gc.ca; f.baciu@iaea.org; Bush-Goddard, Stephanie; ann.heinrich@nnsa.doe.gov; kevin.bundy@cnscccsn.gc.ca; vince.mcclelland@nnsa.doe.gov
Subject: RE: [WARNING: MESSAGE ENCRYPTED]FW: C4 all members :Nuclide report from Japan

Dear Colleagues,
I would very grateful to you if I could obtain information on the contamination in air measured in North America in order to be able to reply with figures to the press wondering about the consequences in Europe of ongoing releases in Japan.
Could you provide me such data or addresses of websites where official information can be found, possibly as tables or graphs.

Thank you very much for your help

C. Vandecasteele
Federal Agency for Nuclear Control
Ravenstein street 36
1000 Brussels

Het FANC is ISO 9001:2000 gecertificeerd - L'AFCN est certifiée ISO 9001:2000.

Aub, denk aan het milieu voordat u deze mail uitprint.
Svp, pensez a notre environnement avant d'imprimer ce mail.

Disclaimer (Fr) - Disclaimer (NI)

Wagner, Katie

From: Wagner, Katie
Sent: Monday, March 21, 2011 12:11 PM
To: Bush-Goddard, Stephanie
Subject: RE: [WARNING: MESSAGE ENCRYPTED]FW: C4 all members :Nuclide report from Japan

Does this response mean this is complete now?

I've logged the new HEB entries now: <http://portal.nrc.gov/edo/res/DSA/Shared%20Documents/JPN-Status-Request.aspx>

-----Original Message-----

From: Schaffer, Steven
Sent: Monday, March 21, 2011 12:03 PM
To: Bush-Goddard, Stephanie; Wagner, Katie
Cc: RES_DSA_HEB
Subject: RE: [WARNING: MESSAGE ENCRYPTED]FW: C4 all members :Nuclide report from Japan

Stephanie,
Here's the daily summary from the EPA's RadNet program. Most of the daily data are gross beta and gross gamma measurements. I can provide graphical representations by station and days if you wish, but that will take more time. Here's the web page address to each west coast and Hawaii sites.

<http://www.epa.gov/japan2011/rert/radnet-data.html#air-monitoring>

Regards,
Steve

Daily Data Summary Last updated on Monday, March 21, 2011 at 11:16:57 AM.

As the Nuclear Regulatory Commission has said, we do not expect to see radiation at harmful levels reaching the U.S. from damaged Japanese nuclear power plants. As part of the federal government's continuing effort to make our activities and science transparent and available to the public, the Environmental Protection Agency (EPA) will continue to keep all RadNet data available in the current online database. EPA is working with its federal partners and has deployed additional monitors to Hawaii, Alaska, Guam and the Northern Mariana Islands.

EPA is utilizing this existing nationwide radiation monitoring system, RadNet, which continuously monitors the nation's air and regularly monitors drinking water, milk and precipitation for environmental radiation. The RadNet online searchable database contains historical data of environmental radiation monitoring data from all fifty states and U.S. territories.

EPA will provide daily data summaries of our radiation air monitoring efforts. We will continue to keep all RadNet data available in the current online database.

March 21, 2011

As of 9:00am (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

March 20, 2011

As of 1:00pm (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

As of 9:00am (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

March 19, 2011

As of 11:30am (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

As of 8:30am (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

March 18, 2011

As of 4:00pm (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

As of 12:00pm (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

March 17, 2011

As of 2:00pm (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

-----Original Message-----

From: Bush-Goddard, Stephanie

Sent: Monday, March 21, 2011 11:39 AM

To: Wagner, Katie

Cc: RES_DSA_HEB

Subject: FW: [WARNING: MESSAGE ENCRYPTED]FW: C4 all members :Nuclide report from Japan

Katie W: Request from colleagues on the Committee on Radiation Protection and Public Health Committee.

Steve S. please help with question and send me to me. I will close out with Katie.

Jeff: I was told to put you on cc.

-Stephanie

-----Original Message-----

From: VANDECASTEELE Christian [mailto:Christian.VANDECASTEELE@FANC.FGOV.BE]

Sent: Monday, March 21, 2011 7:56 AM

To: david.duchesne@hc-sc.gc.ca; boyd.mike@epa.gov; ali.ghovanlou@hq.doe.gov; r.martincic@iaea.org; j.p.auclair@hc-sc.gc.ca; brian.ahier@hc-sc.gc.ca; f.baciu@iaea.org; Bush-Goddard, Stephanie; ann.heinrich@nnsa.doe.gov; kevin.bundy@cnsc-ccsn.gc.ca; vince.mcclelland@nnsa.doe.gov

Subject: RE: [WARNING: MESSAGE ENCRYPTED]FW: C4 all members :Nuclide report from Japan

Dear Colleagues,

I would very grateful to you if I could obtain information on the contamination in air measured in North America in order to be able to reply with figures to the press wondering about the consequences in Europe of ongoing releases in Japan.

Could you provide me such data or addresses of websites where official information can be found, possibly as tables or graphs.

Thank you very much for your help

C. Vandecasteele

Federal Agency for Nuclear Control
Ravenstein street 36
1000 Brussels

Het FANC is ISO 9001:2000 gecertificeerd - L'AFCN est certifiée ISO 9001:2000.

Aub, denk aan het milieu voordat u deze mail uitprint.
Svp, pensez a notre environnement avant d'imprimer ce mail.

Disclaimer (Fr) - Disclaimer (NI)

Wagner, Katie

From: Wagner, Katie
Sent: Monday, March 21, 2011 12:09 PM
To: Dehn, Jeff
Subject: FW: [WARNING: MESSAGE ENCRYPTED]FW: C4 all members :Nuclide report from Japan

FYI

-----Original Message-----

From: Schaffer, Steven
Sent: Monday, March 21, 2011 12:03 PM
To: Bush-Goddard, Stephanie; Wagner, Katie
Cc: RES_DSA_HEB
Subject: RE: [WARNING: MESSAGE ENCRYPTED]FW: C4 all members :Nuclide report from Japan

Stephanie,

Here's the daily summary from the EPA's RadNet program. Most of the daily data are gross beta and gross gamma measurements. I can provide graphical representations by station and days if you wish, but that will take more time. Here's the web page address to each west coast and Hawaii sites.

<http://www.epa.gov/japan2011/rert/radnet-data.html#air-monitoring>

Regards,
Steve

Daily Data Summary Last updated on Monday, March 21, 2011 at 11:16:57 AM.

As the Nuclear Regulatory Commission has said, we do not expect to see radiation at harmful levels reaching the U.S. from damaged Japanese nuclear power plants. As part of the federal government's continuing effort to make our activities and science transparent and available to the public, the Environmental Protection Agency (EPA) will continue to keep all RadNet data available in the current online database. EPA is working with its federal partners and has deployed additional monitors to Hawaii, Alaska, Guam and the Northern Mariana Islands.

EPA is utilizing this existing nationwide radiation monitoring system, RadNet, which continuously monitors the nation's air and regularly monitors drinking water, milk and precipitation for environmental radiation. The RadNet online searchable database contains historical data of environmental radiation monitoring data from all fifty states and U.S. territories.

EPA will provide daily data summaries of our radiation air monitoring efforts. We will continue to keep all RadNet data available in the current online database.

March 21, 2011

As of 9:00am (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

March 20, 2011

As of 1:00pm (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

As of 9:00am (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

March 19, 2011

As of 11:30am (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

As of 8:30am (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

March 18, 2011

As of 4:00pm (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

As of 12:00pm (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

March 17, 2011

As of 2:00pm (EDT) EPA's RadNet radiation air monitors across the U.S. show typical fluctuations in background radiation levels. The levels detected are far below levels of concern.

-----Original Message-----

From: Bush-Goddard, Stephanie

Sent: Monday, March 21, 2011 11:39 AM

To: Wagner, Katie

Cc: RES_DSA_HEB

Subject: FW: [WARNING: MESSAGE ENCRYPTED]FW: C4 all members :Nuclide report from Japan

Katie W: Request from colleagues on the Committee on Radiation Protection and Public Health Committee.

Steve S. please help with question and send me to me. I will close out with Katie.

Jeff: I was told to put you on cc.

-Stephanie

-----Original Message-----

From: VANDECASTEELE Christian [mailto:Christian.VANDECASTEELE@FANC.FGOV.BE]

Sent: Monday, March 21, 2011 7:56 AM

To: david.duchesne@hc-sc.gc.ca; boyd.mike@epa.gov; ali.ghovanlou@hq.doe.gov; r.martincic@iaea.org; j.p.auclair@hc-sc.gc.ca; brian.ahier@hc-sc.gc.ca; f.baciu@iaea.org; Bush-Goddard, Stephanie;

ann.heinrich@nnsa.doe.gov; kevin.bundy@cnsccs.gc.ca; vince.mcclelland@nnsa.doe.gov

Subject: RE: [WARNING: MESSAGE ENCRYPTED]FW: C4 all members :Nuclide report from Japan

Dear Colleagues,

I would very grateful to you if I could obtain information on the contamination in air measured in North America in order to be able to reply with figures to the press wondering about the consequences in Europe of ongoing releases in Japan.

Could you provide me such data or addresses of websites where official information can be found, possibly as tables or graphs.

Thank you very much for your help

C. Vandecasteele

Federal Agency for Nuclear Control

Ravenstein street 36

1000 Brussels

Het FANC is ISO 9001:2000 gecertificeerd - L'AFCN est certifiée ISO 9001:2000.

Aub, denk aan het milieu voordat u deze mail uitprint.

Svp, pensez à notre environnement avant d'imprimer ce mail.

Disclaimer (Fr) - Disclaimer (NI)

Wagner, Katie

From: Wagner, Katie
Sent: Monday, March 21, 2011 1:30 PM
To: Santiago, Patricia
Subject: FW: Op Center request

Pat – Do you want this item (talking w/Brian McDermott) to be marked “Complete” or “Pending” on the Sharepoint page? Based on your reply at 11:27 this morning I made the status “Complete”, but perhaps I did not interpret your email correctly? – Thanks, Katie

From: Santiago, Patricia
Sent: Monday, March 21, 2011 11:27 AM
To: Wagner, Katie
Cc: Lee, Richard
Subject: RE: Op Center request

OK
Note Ghani and Jason schaperow
thanks

From: Wagner, Katie
Sent: Monday, March 21, 2011 11:23 AM
To: Santiago, Patricia
Cc: Lee, Richard
Subject: RE: Op Center request

Pat,

Based on the email below I was going to update the log entry as:

Staff contact: Ghani Zigh
Status: Completed

Please let me know if this is not what you were thinking.

Thanks, Katie

From: Zigh, Ghani
Sent: Monday, March 21, 2011 11:10 AM
To: Santiago, Patricia; Gauntt, Randall O; Navarro, Carlos; Schaperow, Jason; Tinkler, Charles
Cc: Scott, Michael; Lee, Richard; Bixler, Nathan E; Chang, Richard; Wagner, Katie; Pickering, Susan Y
Subject: RE: Op Center request

I just did talk to Brian.

From: Santiago, Patricia
Sent: Monday, March 21, 2011 11:07 AM
To: Gauntt, Randall O; Navarro, Carlos; Schaperow, Jason; Tinkler, Charles
Cc: Scott, Michael; Lee, Richard; Zigh, Ghani; Bixler, Nathan E; Chang, Richard; Wagner, Katie; Pickering, Susan Y
Subject: RE: Op Center request

Jason did you discuss with Brian McDermott and if not, please contact him. Brian's phone number is (301) 415-2334 but you may need to call the opcen.

Thanks again all!

From: Gauntt, Randall O [<mailto:rogaunt@sandia.gov>]

Sent: Monday, March 21, 2011 11:02 AM

To: Navarro, Carlos; Schaperow, Jason; Tinkler, Charles

Cc: Scott, Michael; Santiago, Patricia; Lee, Richard; Zigh, Ghani; Bixler, Nathan E; Chang, Richard; Wagner, Katie; Pickering, Susan Y

Subject: Re: Op Center request

While the nosepieces of the assemblies are under water, the oxidation is in steam - so chemistry is like in-vessel. Most significantly, Ru release is not favored. Under pure air, Ru oxide could be evolved. Late in boildown the Zr outer canisters could air oxidize.

From: Navarro, Carlos [<mailto:Carlos.Navarro@nrc.gov>]

Sent: Monday, March 21, 2011 08:55 AM

To: Schaperow, Jason <Jason.Schaperow@nrc.gov>; Tinkler, Charles <Charles.Tinkler@nrc.gov>; Gauntt, Randall O

Cc: Scott, Michael <Michael.Scott@nrc.gov>; Santiago, Patricia <Patricia.Santiago@nrc.gov>; Lee, Richard <Richard.Lee@nrc.gov>; Zigh, Ghani <Ghani.Zigh@nrc.gov>; Bixler, Nathan E; Chang, Richard <Richard.Chang@nrc.gov>; Wagner, Katie <Katie.Wagner@nrc.gov>

Subject: Op Center request

The Op Center requested a response to the following question to Jennifer Uhle.

"Can someone call Brian McDermott and provide him information about what the chemistry of the emissions is during a zirc fire. Please do so sometime today, preferably before lunch."

Brian's phone number is (301) 415-2334.

Please let us all know if any of you have addressed the question and what was the answer for us to follow up.

Thanks,

C.

Wagner, Katie

From: Wagner, Katie
Sent: Monday, March 21, 2011 9:17 AM
To: Lee, Richard
Subject: RE: TASKING FROM BRIAN SHERON

Richard,

For the purposes of Sharepoint, who is the staff contact assigned for this item? I logged the staff contact as "TBD" for now.

Thanks,
Katie

From: Lee, Richard
Sent: Monday, March 21, 2011 8:03 AM
To: Wagner, Katie
Subject: FW: TASKING FROM BRIAN SHERON

To log in.

From: Scott, Michael
Sent: Saturday, March 19, 2011 9:16 AM
To: Gibson, Kathy; Santiago, Patricia; Lee, Richard; Zigh, Ghani; Coyne, Kevin
Subject: TASKING FROM BRIAN SHERON

Brian advised me yesterday that he would like us to evaluate the risk benefit of pulling spent fuel out of the SFP as soon as the specific assembly heat load permits. The risk reduction could be in terms of time to boiling (I believe that would be small, since by definition fuel old enough to be put in dry storage would not contribute all that much to pool heatup), and with reduced source term in the SFP. He may have already spoken to Ghani about this. He does not want this work to interfere with crisis work, but does want the evaluation done.

Mike

LLLL / 78

Wagner, Katie

From: Wagner, Katie
Sent: Tuesday, March 22, 2011 4:31 PM
To: Jimenez, Juan
Subject: RE: Pls add Additional Status

Awesome, thanks!

From: Jimenez, Juan
Sent: Tuesday, March 22, 2011 2:04 PM
To: Wagner, Katie
Subject: RE: Pls add Additional Status

alright

From: Wagner, Katie
Sent: Tuesday, March 22, 2011 1:59 PM
To: Jimenez, Juan
Subject: Pls add Additional Status

Juan,

Can you please add a "Duplicate" status to the Japan-Related page? I just found out that #29 and #30 are probably duplicates.

Thanks,
Katie

LLLL/79

From: LIA05 Hoc
Sent: Monday, March 21, 2011 3:36 PM
To: Dan Feighert; Andrew Seward; Harry Sherwood; John Simpson; Michelle Ralston;
Steve Horwitz; Tim Greten; Vanessa E. Quinn
Subject: NRC Chairman's Opening Remarks at the Public Meeting
Attachments: 11-054.pdf

Please find the attached.

Bonnie Sheffield Dayshift 0700-1500
Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187



NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION

Office of Public Affairs

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Washington, D.C. 20555-0001

E-mail: opa.resource@nrc.gov Site: www.nrc.gov

Blog: <http://public-blog.nrc-gateway.gov>

No. 11-054

March 21, 2011

OPENING REMARKS OF NRC CHAIRMAN GREGORY B. JACZKO AT TODAY'S COMMISSION MEETING ON THE EVENTS IN JAPAN

Good morning. The Commission meets today to discuss the tragic events in Japan and consider possible actions we may take to verify the safety of the nuclear facilities that we regulate in the United States. This meeting will—without a doubt—be one of the most heavily watched meetings in the history of this agency.

People across the country and around the world who have been touched by the magnitude and scale of this disaster are closely following the events in Japan, and the repercussions in this country and in many other countries. I would first like to offer my condolences to all those who have been affected by the earthquake and tsunami in Japan. Our hearts go out to all who have been dealing with the aftermath of these natural disasters, and we are mindful of the long and difficult road they will face in recovering. We know that the people of Japan are resilient and strong, and we have every confidence that they will come through this difficult time and move forward, with resolve, to rebuild their vibrant country.

I believe I speak for all Americans when I say that we stand together with the people of Japan at this most difficult and challenging time. The NRC is a relatively small agency, with approximately 4000 staff, but we play a critical role in protecting the American people and the environment. We have inspectors who work full-time at every nuclear plant in the country, and we are proud to have world-class scientists, engineers and professionals representing nearly every discipline.

Since Friday, March 11, when the earthquake and tsunami struck, the NRC's headquarters Operations Center has been operating on a 24-hour basis to monitor and analyze events at nuclear power plants in Japan. At the request of the Japanese government, and through the United States Agency for International Development (USAID), the NRC sent a team of its technical experts to provide on-the-ground support, and we have been in continual contact with them. And, within the United States, the NRC has been working closely with other Federal agencies as part of our government's response to the situation.

We have a responsibility to the American people to undertake a systematic and methodical review of the safety of our own domestic nuclear facilities, in light of the natural disaster and the resulting nuclear emergency in Japan. Beginning to examine all available

information is an essential part of our effort to analyze the event and understand its impact on Japan and implications for the United States. Our focus is always on keeping plants and radioactive materials in this country safe and secure.

As this immediate crisis in Japan comes to an end, we will look at any information we can gain from the event and see if there are changes we need to make, to further protect the public. Together with my colleagues on the Commission, we will review the current status and identify the steps we will take to conduct that review. In the meantime, we will continue to oversee and monitor plants to ensure that U. S. reactors remain safe.

On behalf of the Commission, I want to thank all of our staff for maintaining their focus on our essential safety and security mission throughout these difficult days. I want to acknowledge their tireless efforts and their critical contributions to the U.S. response to assist Japan. In spite of the evolving situation, the long hours, and the intensity of efforts over the past week, staff has approached their responsibilities with dedication, determination and professionalism, and I am incredibly proud of their efforts.

The American people also can be proud of the commitment and dedication within the Federal workforce, which is exemplified by our staff every day. Before we begin our meeting with Mr. Borchardt's presentation, would any of my fellow Commissioners like to make opening comments?

###

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From: OST01 HOC
Sent: Thursday, April 28, 2011 5:50 PM
To: LIA08 Hoc
Subject: RE: Item For Tonight's 6:30 Phone Call - DHS Questions

Thanks Mike!

-----Original Message-----

From: LIA08 Hoc
Sent: Thursday, April 28, 2011 5:49 PM
To: PMT_japan Resource
Cc: Hoc, PMT12; OST01 HOC
Subject: Item For Tonight's 6:30 Phone Call - DHS Questions

Japanese Team - PMT Members,

Good morning! The NRC staff was forwarded the questions below from an individual from DHS (Ed Tanzman) who is getting ready to testify to the Illinois State legislature in the coming days about nuclear preparedness issues. He is testifying next Tuesday so we are hoping to find the answers to these questions in the short-term. The question are listed below:

1) Can I get confirmation that radiological emergency planning zone size in Japan is from 8-10 km from reactor sites and that only a single zone exists there? Here are links to a Japanese government publication (Government of Japan, Convention on Nuclear Safety National Report of Japan for the Third Review Meeting (provisional translation), Table 1, p. A3-89 (2004) (available at http://www-ns.iaea.org/downloads/ni/safety_convention/japan_report_041227.PDF)) and an independent article (Organization for Economic Co-operation and Development Nuclear Energy Agency, Short-Term Countermeasures in Case of a Nuclear or Radiological Emergency (ISBN 92-64-02140-X), p. 19 (2003) (available at <http://www.oecd-nea.org/rp/reports/2003/nea3600-short-term.pdf>)) that both report this zone definition. However, the distance is so much smaller than the zone sizes in the United States that it seems wrong. The United States zones are 314 square miles for plume EPZs and 7,850 miles for ingestion EPZs, whereas the Japanese EPZ is 121 square miles, and no ingestion zone pathway EPZ appears to exist at all.

2) Can I get confirmation that the nuclear utilities in Japan write the offsite radiological emergency preparedness plans, rather than the prefecture and municipal governments (analogous to state and local governments in the United States)? Article 7(1) on p. 5 of the attached Japanese Act on Special Measures Concerning Nuclear Emergency Preparedness states that: "A nuclear operator shall, pursuant to the provisions of an ordinance of the competent ministry, prepare a nuclear operator emergency action plan with regard to its measures to prevent nuclear emergency, emergency response measures, and measures for restoration from nuclear emergency and other duties that are necessary for preventing the occurrence and progression (expansion) of a nuclear disaster and for promoting nuclear disaster recovery efforts, with respect to each of its nuclear sites, and review its nuclear operator emergency action plan every year and revise it if revision is found to be necessary." This Act refers extensively to the Basic Act on Disaster Control Measures, but that one does not seem to be available in English. If confirmation is not possible, an English translation of the Basic Act, if available, would allow me to draw my own conclusions.

Thanks in advance for whatever you can do. We will discuss these questions on tonight's 6:30 phone call.

Respectfully,
Michael I. Dudek

Liaison Team Coordinator
US Nuclear Regulatory Commission
email: lia08.hoc@nrc.gov
Desk Ph: 301-816-5185

From: LIA05 Hoc
Sent: Monday, March 21, 2011 7:25 AM
To: OST05 Hoc
Subject: RE: Commission Meeting: Briefing on NRC Response to Recent Nuclear Events in Japan

Thank you

Bonnie Sheffield Dayshift 0700-1500
Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187

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From: OST05 Hoc
Sent: Monday, March 21, 2011 7:10 AM
To: LIA05 Hoc
Subject: FW: Commission Meeting: Briefing on NRC Response to Recent Nuclear Events in Japan

A Commission meeting will be held on Monday, March 21, 2011 at 9:00 am. This is a public meeting and can be viewed via webcast.

Please use the following link to access the webcast.

<http://www.nrc.gov/public-involve/public-meetings/webcast-live.html>

Feel free to notify interested stakeholders.

Thanks,
Cindy Flannery
State Liaison – Liaison Team
NRC Incident Response Center

LLLL/83

From: LIA05 Hoc
Sent: Monday, March 21, 2011 7:37 AM
To: Albert Coons; Bill Webb; Conrad Burnside; Craig Fiore; Dan Feighert; Darrell Hammons; Harry Sherwood; Lisa Hammond; Rebecca Thomson; Ronald McCabe; Steve Colman; Vanessa Quinn; William King
Subject: FW: Commission Meeting: Briefing on NRC Response to Recent Nuclear Events in Japan

Resending because Mr. McCabe notice was returned.

Bonnie Sheffield Dayshift 0700-1500
Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187

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From: LIA05 Hoc
Sent: Monday, March 21, 2011 7:14 AM
To: Dan Feighert; 'Andrew Seward'; 'Harry Sherwood'; John Simpson; 'Michelle Ralston'; 'Steve Horwitz'; 'Tim Greten'; 'Vanessa E. Quinn'; 'Albert Coons'; 'Bill Webb'; 'Conrad Burnside'; 'Craig Fiore'; 'Darrell Hammons'; 'Lisa Hammond'; 'Rebecca Thomson'; 'Ronald McCabe'; 'Steve Colman'; 'William King'
Cc: 'James.Kish@dhs.gov'
Subject: FW: Commission Meeting: Briefing on NRC Response to Recent Nuclear Events in Japan

A Commission meeting will be held on Monday, March 21, 2011 at 9:00 am EST. This is a public meeting and can be viewed via webcast.

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Bonnie Sheffield Dayshift 0700-1500
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From: OST05 Hoc

Sent: Monday, March 21, 2011 7:10 AM

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Subject: FW: Commission Meeting: Briefing on NRC Response to Recent Nuclear Events in Japan

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Feel free to notify interested stakeholders.

Thanks,

Cindy Flannery

State Liaison – Liaison Team

NRC Incident Response Center



NUCLEAR REGULATORY COMMISSION NEWS CLIPS

THURSDAY, APRIL 7, 2011 7:00 AM EDT

WWW.BULLETINNEWS.COM/NRC

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NRC NEWS

Core Of Stricken Reactor Probably Leaked, U.S. Says (NYT)

By Matthew L. Waldand Andrew Pollack

New York Times, April 7, 2011

WASHINGTON — The United States Nuclear Regulatory Commission said Wednesday that some of the core of a stricken Japanese reactor had probably leaked from its steel pressure vessel into the bottom of the containment structure, implying that the damage was even worse than previously thought.

The statement came as the Tokyo Electric Power Company, the operator of the Fukushima Daiichi plant, said it had succeeded in starting to inject nitrogen into the reactor containment vessel of unit No. 1 to prevent a possible explosion.

The Nuclear Regulatory Commission's statement regarded unit No. 2, and the agency underscored that its interpretation was speculative and based on high radiation readings that Tokyo Electric had found in the lower part of unit No. 2's primary containment structure, called the drywell. The statement said that the commission "does not believe that the reactor vessel has given way, and we do believe practically all of the core remains in the vessel."

The agency's statement was issued after Representative Edward J. Markey, Democrat of Massachusetts, told a House hearing on Wednesday morning that the commission had told him that the core had melted through the vessel.

He based that on a question his staff had asked the agency. But the agency responded to him by e-mail on Tuesday without directly addressing possible melting, saying only that it speculated that "part of the Unit 2 core may be out of the reactor pressure vessel and may be in the lower space of the drywell." After the hearing, in response to numerous questions, the agency said that "there are possible leakage paths from the reactor vessel into the drywell."

It did not say whether the fuel was molten or solid. If molten fuel has left the reactor's pressure vessel and reached the drywell in substantial quantities, it raises the possibility that the fuel could escape the larger containment structure, leading to a large-scale release of radioactive material.

A training manual developed by the companies that operate this type of reactor and dated 2009 refers to the possibility of "creep rupture," in which molten core material begins seeping through a hole in the vessel and creates a bigger hole as it works;

the document says the molten core material can “ablate” a bigger hole. It can then burn through the steel at the bottom of the drywell and interact with the concrete, producing carbon monoxide and hydrogen, which could react explosively.

Some engineers have theorized that if a core melted down and concentrated at the bottom of the vessel, it could melt through the vessel and then burn through the concrete of the foundation. One element of such an event would probably be a resumption of the nuclear chain reaction, in a molten mass in which no control would be possible because there would be no control rods to slide smoothly between neatly arrayed bundles of fuel.

Other experts say that a resumption of the chain reaction would be difficult or impossible with the type of fuel in use at Fukushima Daiichi.

Neither the commission’s response to Mr. Markey nor its public statement later in the day outlines such a serious turn of events.

A spokesman for the commission, Scott Burnell, said in an e-mail that a flow of core material out of the reactor vessel to the drywell did not necessarily indicate that the vessel had melted. The vessel, he noted, is penetrated by pipes, and a seal around one might have failed.

The agency did not say when the flow might have occurred. In an e-mail to Mr. Markey on Tuesday, the agency gave a figure for radiation levels in the drywell high enough to cause death within minutes. It is not clear if the radiation is a problem in the emergency efforts to keep the nuclear fuel cool, because that does not require workers to be near the area — but an eventual cleanup probably would.

The commission’s statement said that since it believed the reactor vessel had not given way, “Every available method should be used to add fresh water to the Unit 2 reactor vessel and to continue cooling the core.”

Meanwhile, Japan’s nuclear regulatory agency confirmed early Thursday morning that nitrogen injections had started, to reduce the risk of an explosion from hydrogen gas that might be building up in the plant’s No. 1 reactor. Agency officials said the step was being taken as a precaution, not because an explosion was deemed imminent.

“We do not believe there is a lot of hydrogen in the units,” Hidehiko Nishiyama, deputy director general of the regulatory body, the Nuclear and Industrial Safety Agency, told reporters Wednesday night. But he added that scientists did not know for sure.

This is the first injection of nitrogen into any of the reactors. The same approach might be tried later for the No. 2 and No. 3 reactors, but the No. 1 unit was chosen first because the pressures and temperatures there are higher than in the other two.

Hydrogen explosions occurred in some of the reactors in the days after the March 11 earthquake and tsunami that crippled the nuclear plant. The explosions damaged the outer buildings around the reactors. It was thought that the hydrogen was produced when zirconium from disintegrating fuel rods reacted with steam after cooling water was lost.

Mr. Nishiyama said a concern now was that as the reactors gradually cooled, there would be less steam in the containment vessels, leaving room for oxygen to enter, react with the hydrogen and cause explosions. Injecting nitrogen can reduce the amount of hydrogen and oxygen.

The injection of nitrogen was one of the steps recommended by the Nuclear Regulatory Commission in a confidential assessment dated March 26. Mr. Nishiyama said the recommendation “substantiated and reinforced” an idea already being discussed by the Japanese authorities.

Matthew L. Wald reported from Washington, and Andrew Pollack from Tokyo.

NRC Thinks Japan Unit Pressure Vessel Damaged, Markey Says (BLOOM)

By Jim Snyder And Jim Efstathiou Jr.

Bloomberg News, April 7, 2011

The Nuclear Regulatory Commission thinks the reactor in unit 2 of Japan’s disabled power plant got so hot it “probably melted through the reactor pressure vessel,” U.S. Representative Edward Markey said.

Martin Virgilio, the agency’s deputy director for reactor and preparedness programs, told reporters after a House hearing today that the commission doesn’t think the “core has breached,” which would let radiation escape. The commission gets reports several times a day from agency staff in Japan and none mentioned a breach, he said.

The pressure vessel is one line of defense preventing a larger radiation leak from Fukushima Dai-Ichi’s crippled reactors, where workers have sought to reconnect power to provide a steady supply of water.

“After you lose the vessel, then you are down to one final barrier, that’s the containment,” Virgilio told reporters.

Markey, a Massachusetts Democrat, has pressed for new safety regulations in response to the crisis in Japan, triggered by the 9-magnitude earthquake and resulting tsunami on March 11. Virgilio said workers have yet to stabilize the damaged facility.

Giselle Barry, a spokeswoman for Markey, said information on the status of the unit 2 reactor came from correspondence between his staff and the Nuclear Regulatory Commission.

Markey and Virgilio spoke at a House Energy oversight and investigations subcommittee hearing today on the Japan crisis.

Virgilio said he wasn't aware of an agency report, cited by the New York Times, that said water used to keep fuel from overheating at the Japanese plant makes containment vessels more vulnerable to rupture amid aftershocks that have rattled the region since March 11.

The report raises the possibility of explosions inside containment structures from the release of hydrogen and oxygen in the seawater pumped into the reactors, according to the Times. The assessment doesn't speculate on the risk of new explosions or damage from an aftershock, events that may lead to a more serious release of radiation from the nuclear core, the newspaper reported.

The NRC report, dated March 26, offers a "snapshot" of what U.S. experts considered possible conditions inside the station, the agency said today in a statement. It isn't a reflection of the agency's "understanding of the current situation," according to the statement.

The agency offered recommendations to Tokyo Electric Power Co., owner of the crippled plant, which pursued "an alternative set of strategies to control the plants," according to the statement.

Republicans on the committee today said nuclear power plants are safe, as Democrats said accident models developed by the commission raised questions about the Peach Bottom power plant west of Philadelphia.

The analysis showed a two-day loss of power at Peach Bottom would put the plant within an hour of a meltdown, said Representative Diana DeGette, a Colorado Democrat. The model raises "grave questions about our nation's preparedness to address reactor accidents," she said.

Representative Brian Bilbray, a California Republican, said living along a coast was more dangerous than being near a nuclear power plant, given the deaths caused by the tsunami after the 9-magnitude earthquake.

Deaths in Japan exceeded 12,500 as of today with more than 15,000 people missing, according to website of the National Police Agency in Tokyo. None of those deaths have been linked to radiation releases, Bilbray said.

Representative Tim Murphy, a Pennsylvania Republican, said Peach Bottom is few hundred feet above sea level and wouldn't suffer water damage from a tsunami, which wiped out power systems at Fukushima, triggering the crisis.

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NRC Says Not Clear That Japan Reactor Has Melted Vessel (REU)

Reuters, April 7, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

Japan To Head Off Hydrogen Blast (WSJ)

Nuclear-Plant Operators Begin Injecting Nitrogen Into Reactor, as U.S. Assessment Flags Range of Risks

By Mitsuru Obe And George Nishiyama

Wall Street Journal, April 7, 2011

Full-text stories from the Wall Street Journal are available to Journal subscribers by clicking the link.

Preventing Blasts A Focus At Japan Nuclear Plant (AP)

By Mari Yamaguchi

Associated Press, April 7, 2011

After notching a rare victory by stopping highly radioactive water from flowing into the Pacific, workers at Japan's flooded nuclear power complex turned to their next task early Thursday: injecting nitrogen to prevent more hydrogen explosions.

Nuclear officials said Wednesday there was no immediate threat of explosions like the three that rocked the Fukushima Dai-ichi plant not long after a massive tsunami hit on March 11, but their plans are a reminder of how much work remains to stabilize the complex.

Workers are racing to cool down the plant's reactors, which have been overheating since power was knocked out by the 9.0-magnitude earthquake and tsunami that killed as many as 25,000 people and destroyed hundreds of miles of coastline.

Unable to restore normal cooling systems because water has damaged them and radioactivity has made conditions dangerous, workers have resorted to pumping water into the reactors and letting it gush wherever it can.

Superheated or damaged fuel rods can pull explosive hydrogen from cooling water. If the gas were to combine with oxygen, there could be a blast, but nitrogen reduces that possibility.

Technicians began pumping nitrogen into an area around one of the plant's six reactors in the early hours of Thursday to counteract the hydrogen, said Makoto Watanabe, a spokesman for Japan's Nuclear and Industrial Safety Agency. They want to prevent hydrogen explosions that could spew radiation and damage the reactors.

An internal report from March 26 by the U.S. Nuclear Regulatory Commission warned such explosions could occur.

The nitrogen pumping also has risks, but the nuclear agency approved it as a necessary measure to avoid danger, spokesman Hidehiko Nishiyama said. The injection will take six days and could release radioactive vapor into the environment, but residents within 12 miles (20 kilometers) of the plant have been evacuated.

The government said Wednesday it might consider expanding that zone, though not because of the nitrogen injection. An expansion might not necessarily mean the radiation that has been spewing into the air and water from the plant is getting worse. The effects of radiation are determined by both the strength of the dose and the length of exposure, so the concern is that people farther away might start being affected as the crisis drags on.

"I would imagine residents in areas facing a possibility for long-term exposure are extremely worried," Chief Cabinet Secretary Yukio Edano said. "We are currently consulting with experts so that we can come up with a clear safety standard."

Edano did not say how far the zone might be expanded or how many people might be affected. Tens of thousands have been living in shelters since the tsunami, either because they lost their homes or are in the evacuation zone or both.

Police in hard-hit Fukushima prefecture prepared to launch a full-scale search for bodies in the evacuation zone Thursday. Nearly 250 agents from the Tokyo Metropolitan Police will join local police searching for 4,200 people still missing there.

At the plant, 140 miles (220 kilometers) northeast of Tokyo, workers finally halted the leak of highly contaminated water that raised worry about the safety of seafood caught off the coast.

But even that rare good news came with a caveat. Highly contaminated water pooling around the plant has often made it difficult or impossible for workers to access some areas because of concerns about radiation exposure. Now that the leak has stopped, the pooling could actually get worse because water that had been going into the ocean could back up onto the grounds of the complex.

And the confidential NRC assessment — obtained Wednesday by The Associated Press — noted that plant operator Tokyo Electric Power Co. still faces several challenges. It said that salt from seawater that had been used as a coolant is probably blocking circulation pathways, particularly in reactor 1.

The document — prepared by the U.S. agency's Reactor Safety Team, which is helping the Japanese government and TEPCO — offers new details on the conditions of the damaged cores in the three troubled reactors. For instance, it warned that as engineers pump water into the reactors, their containment structures could fill with water, making them more vulnerable to rupture in an aftershock from the earthquake.

The report is intended for U.S. regulators working with their Japanese counterparts and was first reported by the New York Times. The commission noted Wednesday that it only offers a "snapshot" of the situation at the plant and does not necessarily reflect current understanding.

Damage to containments would cause even more radiation to be released.

When water was still leaking into the ocean, officials said it would quickly dissipate in the vast Pacific, but the mere suggestion that seafood could be at risk stirred worries throughout Japan's fishing industry. Water with lower levels of radioactivity is also being dumped into the sea to make room to store other water with higher levels of contamination on the plant grounds.

In the coastal town of Ofunato, Takeyoshi Chiba, who runs the town's wholesale market, warily watched developments at the plant, about 120 miles (200 kilometers) down the coast.

"There is a chance that the water from Fukushima will come here," he said, explaining that area fishermen still haven't managed to get out to sea again after the tsunami destroyed nearly all of their boats. "If Tokyo decides to ban purchases from here, we're out of business."

This week, the government set its first-ever standard for the amount of radiation allowed in fish after levels in waters near the plant measured several million times the legal limit and elevated levels were found in some fish. The standard is the same as one already in place for vegetables.

Stopping the leak by injecting several chemicals into the area around it seemed to help cut down on radiation. By afternoon, radiation at a point 360 yards (330 meters) off the coast was 280 times the legal limit, down from a high of more than 4,000, although Edano said TEPCO was still watching closely.

Japan Using Gas To Avoid Explosion At Nuke Plant (AFP)

By Harumi Ozawa

AFP, April 7, 2011

TOKYO (AFP) – Workers at Japan's stricken nuclear plant on Thursday pumped nitrogen into a crippled reactor in a bid to prevent a possible explosion and contain the world's worst atomic accident for 25 years.

With the crisis at the Fukushima Daiichi plant approaching the end of its fourth week, operator Tokyo Electric Power said it was concerned a build-up of hydrogen gas at the No. 1 reactor could cause another explosion at the site.

The fresh challenge underscored the fragility of the situation at the stricken plant, after rare progress was seen Wednesday when workers plugged a hole spewing highly radioactive water into the ocean.

TEPCO officials say hydrogen building up in the housing around reactor No. 1 could mix with incoming oxygen, creating an explosion.

Experts say the risk of a detonation could rise as the nuclear fuel rods cool and as the steam inside the containment vessel condenses into water, reducing pressure inside the unit and drawing air in through cracks.

The move came as an assessment by the US Nuclear Regulatory Commission dated March 26 emerged, citing persistent and growing threats at the plant, including the risk of gas build up and explosions.

Workers began pumping in nitrogen, an inert gas abundant in the atmosphere, which they hope will displace the oxygen. The process to inject 6,000 cubic metres (210,000 cubic feet) will take around six days, TEPCO said.

"Workers started injecting nitrogen gas at 1:31 am (1631 GMT Wednesday). Since the pressure level went up, they confirmed that the gas was successfully going into the container," said a spokesman with Japan's nuclear safety agency.

TEPCO said it was also planning to inject nitrogen gas into reactors number 2 and 3 as a protective measure.

In the days after the earthquake and tsunami crippled the plant, large explosions resulted from hydrogen accumulation near the reactors, damaging the outer buildings housing them.

A 20-kilometre (13-mile) exclusion zone around the plant has forced tens of thousands of people to evacuate.

The plant has emitted radioactive material into the air, contaminating drinking water and farm produce, with radioactive iodine above legal limits detected in vegetables, dairy products and mushrooms.

Nuclear concerns continue to distract from the March 11 disaster that has left more than 12,000 dead and over 15,000 missing.

Markets reacted positively to the latest efforts to stabilise the plant.

TEPCO shares gained 1.18 percent to 341 by noon Thursday, having hit all-time closing lows this week amid concerns it faces a huge compensation bill with the situation at its stricken nuclear plant still unresolved.

Shares in Japan's biggest utility have lost around 84 percent of their pre-earthquake March 10 closing value. Prime Minister Naoto Kan last week moved to dismiss speculation the firm may be nationalised.

On Wednesday, the government promised compensation for the fishing industry, a day after increasing unease about the contamination led it to impose a legal limit for radioactive iodine in seafood for the first time.

Levels of radioactive iodine-131 and caesium in seawater immediately outside the plant have spiked, stoking fears over marine life in a country whose diet depends heavily on seafood.

TEPCO has also continued a separate operation to release 11,500 tonnes of lower-level radioactive water into the sea to free up urgently needed storage space for water so toxic that it is hampering crucial repair work.

The water dumping has angered the fishing industry and on Wednesday Ikuhiro Hattori, the head of Japan Fisheries Cooperatives, visited the company's headquarters to protest.

The triple crisis has slashed the number of foreigners travelling to Japan's two main airports by two-thirds to a daily average of just over 5,000.

The wider economic impact from the quake, tsunami and nuclear emergency is likely to drive the country into recession in the coming months, many economists now say.

Engineers Try To Lower Danger Level At Crippled Japanese Nuclear Plant (LAT)

With a leak of radioactive water plugged at Japan's Fukushima nuclear plant, nitrogen gas is pumped into one of the reactors to reduce the risk of another hydrogen explosion. But a U.S. report suggests new problems may lie ahead.

By Thomas H. Maugh II

Los Angeles Times, April 7, 2011

Engineers began injecting nitrogen into one of the reactors at the troubled Fukushima Daiichi nuclear power plant Wednesday evening as radiation levels in seawater near the plant dropped and a new report from the U.S. Nuclear Regulatory Commission suggested that the plant may face even more troubles in the future.

Officials from the United Nations, meanwhile, said that even though the situation in Japan is more serious than the U.S. faced after the Three Mile Island accident in Pennsylvania in 1979, the group does not expect severe health consequences.

Engineers began injecting inert nitrogen gas into the containment vessel of reactor No. 1 at the facility Wednesday evening in an effort to purge hydrogen and oxygen that might have accumulated from the breakdown of seawater in the reactor. Hydrogen is formed when the zirconium cladding on the fuel rods heats up and touches water, causing oxidation that releases the gas from the water.

Accumulations of hydrogen gas led to explosions in three of the reactors in the first four days after the magnitude 9 Tohoku earthquake nearly a month ago. Officials said they did not believe another explosion was imminent, but they did not want to take any chances.

They will also inject nitrogen into reactors No. 2 and No. 3.

Radiation levels in seawater near the plant, owned by Tokyo Electric Power Co., dropped dramatically even before engineers plugged a water leak at the facility on Wednesday, and authorities expect levels to continue falling now that the flow of contaminated water has diminished.

Levels of radioactive iodine had reached 7.5 million times permissible levels directly behind the plant Saturday, but by Tuesday new measurements showed that the amount of radioiodine was only 4% of that amount. That was still nearly 300,000 times the permissible limit, but levels were continuing to decline as the outflow from the plant was being diluted by the ocean.

At a point about 12.5 miles from the plant, iodine levels were down to 1.5 times the limit.

Much of the contaminated water had been entering the ocean from a leak in the tunnels under reactor No. 2. After several failed attempts to halt the leak, engineers finally succeeded Wednesday afternoon by pumping in a silicon-based polymer sometimes referred to as liquid glass. They planned to then pour concrete on top of the polymer to further seal the leak.

Engineers have also been pumping about 11,500 tons of slightly contaminated water out of holding tanks and into the ocean to make room for more highly radioactive water. But the radiation level of the water flowing into the ocean is not high enough to cause severe problems, experts said.

However, a new report from the U.S. Nuclear Regulatory Commission leaked to the New York Times suggests that the continued pumping of water into the plant may be putting a strain on the Fukushima facility that will leave it more susceptible to future earthquakes.

The report from engineers who have visited the site suggests that filling the reactor containment vessels with water that they were not designed to hold may place undue stress on the concrete vessels, leaving them susceptible to breakage if another quake strikes the facility.

The report also suggests that a fourth explosion at the site in the early days after the quake may have occurred in the spent fuel pool at reactor No. 4 and may have scattered some pieces of uranium pellets around the site between the buildings. Workers may have bulldozed dirt over the radioactive pieces in an attempt to contain the radiation, the report said.

In Vienna, Wolfgang Weiss, chairman of the United Nations Scientific Committee on the Effects of Atomic Radiation, said the Fukushima disaster was more severe than the incident at Three Mile Island three decades ago, but less of a problem than the 1986 accident at Chernobyl in Ukraine. "It is in between, in terms of environmental effects, not in terms of health impact," he said.

Asked about its health impact, he said: "From what I have seen now, from the information I have now, I would not expect anything ... serious" except for the effects on workers at the plant.

UN Expert: Fukushima Not As Bad As Chernobyl (AP)

Associated Press, April 7, 2011

VIENNA – A senior U.N. radiation expert ranks the Japanese nuclear accident "in between" those that occurred at Chernobyl and Three Mile Island.

Wolfgang Weiss, chairman of the U.N. Scientific Committee on the Effects of Atomic Radiation, says it's still too early to make a full assessment since the crisis at the Fukushima Dai-ichi plant is still ongoing.

He said Wednesday that radioactivity from the 1979 Three Mile Island incident was largely contained but traces of fallout from Fukushima detected around the world are "much, much, much lower" than traces seen at similar distances after Chernobyl in 1986.

The Fukushima plant was hit by a tsunami triggered by a massive earthquake on March 11.

Japan Nuclear Workers Start Pumping Nitrogen Into Damaged Plant (BLOOM)

By Michio Nakayama, Ichiro Suzuki And Tsuyoshi Inajima

Bloomberg News, April 7, 2011

Workers at Japan's damaged Fukushima Dai-Ichi nuclear plant are pumping nitrogen into a reactor to prevent another explosion, as the U.S. atomic watchdog said a pressure vessel may have been breached.

Tokyo Electric Power Co., the operator of the station, started pumping nitrogen gas into No. 1 reactor container vessel at about 1:30 a.m. today, spokesman Yoshinori Mori said. The process will continue for about six days, he said.

Tepco, as the company is called, is trying to prevent another hydrogen explosion at the plant after the March 11 earthquake and tsunami triggered three blasts, damaging reactor buildings and releasing radiation into the air. The company has been pouring water on the buildings to cool the reactors and spent fuel after the failure of backup generators and cooling systems created the worst nuclear crisis since Chernobyl.

Tepco also plans to feed gas into the Nos. 2 and 3 units to purge hydrogen and oxygen, to prevent explosions that would hamper attempts to cool the reactors.

"It's a bit like locking the stable door after the horse has bolted, but it's a sensible thing to do," said Tony Roulstone, an atomic engineer who directs the University of Cambridge's masters program in nuclear energy. Tepco needs to ensure there is no oxygen left in the reactor, which is "not a simple thing," he said.

There's no immediate danger of a hydrogen explosion, Hidehiko Nishiyama, an official at the Nuclear and Industrial Safety Agency, said yesterday.

The national toll of the number of dead and missing following the earthquake and tsunami was at 27,631 at 8 p.m. local time yesterday, according to the National Police Agency.

A pressure vessel at the station north of Tokyo may have been breached, the U.S. atomic watchdog said, leaving a final barrier to prevent more radiation leaks.

The Nuclear Regulatory Commission thinks the reactor in unit 2 of Japan's Fukushima Dai-Ichi nuclear plant got so hot it "probably melted through the reactor pressure vessel," U.S. Representative Edward Markey said yesterday.

Martin Virgilio, the U.S. agency's deputy director for reactor and preparedness programs, told reporters after a House hearing that the commission doesn't think the "core has breached," which would let radiation escape. The commission gets reports several times a day from agency staff in Japan and none mentioned a breach, he said.

The pressure vessel is one line of defense preventing a larger radiation leak from Fukushima Dai-Ichi's crippled reactors, where workers have sought to reconnect power to provide a steady supply of water.

"After you lose the vessel, then you are down to one final barrier, that's the containment," Virgilio told reporters.

Virgilio said he wasn't aware of an agency report, cited by the New York Times, that said water used to keep fuel from overheating at the Japanese plant makes containment vessels more vulnerable to rupture amid aftershocks that have rattled the region since the main quake.

The report raises the possibility of explosions inside containment structures from the release of hydrogen and oxygen in the seawater pumped into the reactors, according to the Times. The assessment doesn't speculate on the risk of new explosions or damage from an aftershock, events that may lead to a more serious release of radiation from the nuclear core, the newspaper reported.

The NRC report, dated March 26, offers a "snapshot" of what U.S. experts considered possible conditions inside the station, the agency said today in a statement. It isn't a reflection of the agency's "understanding of the current situation," according to the statement.

The agency offered recommendations to Tepco, which pursued "an alternative set of strategies to control the plants," according to the statement.

Tepco started injecting nitrogen into the reactors after plugging a leak of highly radioactive water into the sea from a pit near the No. 2 unit of the power station, which has six reactors and is about 220 kilometers (137 miles) north of Tokyo.

The level of radioactive iodine in seawater sampled yesterday morning near the No. 2 unit fell to 280,000 times the amount allowed by regulators, Tepco said late yesterday.

Samples taken on April 2 at the same location found 7.5 million times the permitted amount, the utility said.

Engineers used sodium-silicate to stop the release of highly radioactive water near the No. 2 reactor. Tepco has previously tried plugging the leak with materials including concrete, sawdust, newsprint and absorbent polymer used in diapers.

Water may be leaking from another part of the station, the country's nuclear safety agency said.

"This isn't a situation where we can be relaxed at all," Chief Cabinet Secretary Yukio Edano told reporters yesterday.

Plutonium was discovered in soil measured at four locations at the nuclear station, Tepco said yesterday. Plutonium-238, plutonium-239 and plutonium-240 were found in soil samples taken on March 25 and 28, Junichi Matsumoto, an official at the utility, said at a news conference yesterday.

Plutonium is produced from uranium in nuclear reactors, according to the U.S. Environmental Protection Agency.

Tepco stock rose 1.8 percent to 343 yen as of 9:27 a.m. in on the Tokyo Stock Exchange, after sliding to a record low 337 yen yesterday. The stock is down 84 percent since the day before Japan was struck by the magnitude-9 earthquake, the country's strongest on record.

The company's 1.155 percent bonds due in Sept. 2020 fell yesterday and were yielding 3.8 percent, or 2.56 percentage points more than government bonds of similar maturity. The bonds were yielding about 0.13 percentage points more than government debt before the earthquake hit.

Japan Nuclear Plant Is Far From Stable: U.S. Report (ABC)

Japan's TEPCO Will Begin Injecting Nitrogen Into Reactors, But NRC Assessment Sees Peril

By Neal Karlinsky And Molly Hunter

ABC, April 7, 2011

After workers successfully plugged the highly radioactive leak seeping into the Pacific Ocean, a new confidential assessment by the Nuclear Regulatory Commission obtained by the New York Times suggests that the damaged Fukushima Daiichi plant is far from stable.

Fragments of incredibly dangerous nuclear fuel were blown out of the reactors "up to one mile from the units," and then simply bulldozed over to protect workers on site, according to the NRC report.

Until now, flooding the damaged reactors with water has been considered the most efficient cooling method but the latest assessment raises concerns that the water may have introduced a new set of dangerous complications. U.S. engineers now worry that the enormous amount of water is actually weakening the containment vessels, making them more vulnerable to possible ruptures.

In an effort to avoid the continued spread of radiation and worse, a hydrogen explosion due to the hydrogen and oxygen present in seawater, plant operator TEPCO announced that it will begin injecting nitrogen into reactor one and likely reactors two and three. Nitrogen is normally present inside the containment that surrounds the reactor core and can prevent highly combustible hydrogen from exploding as it did three times in the early days after the March 11 disaster.

The Associated Press reports that Japan's Nuclear and Industrial Safety Agency (NISA) made clear that TEPCO is erring on the safe side. "The nitrogen injection is being considered a precaution," said NISA spokesman Hidehiko Nishiyama.

ABC News consultant and president of Ploughshares Fund, Joe Cirincione told ABC News that a hydrogen explosion, while not expected, is not totally out of the question.

"A new hydrogen explosion could happen, there could be a failure 'in one of' the fuel ponds that could cause a fire and if so, it could be a major release of radiation," said Cirincione.

Safe Seafood?

While the newest threat is concentrated on land, nearly 11,500 tons of radioactive sea water is slowly diluting in the Pacific Ocean. Many worry that migrating fish such as albacore tuna might be contaminated as they make their way from Japan to the Pacific Northwest. Ken Buesseler, the senior scientist at Woods Hole Oceanographic Institution studies the effects of radiation in the ocean and said the situation is likely not as dangerous as people imagine.

"Eating fish from those offshore sites at concentration factors that people have seen before, over the course of a year for an average citizen might give you a dose equivalent to a CAT scan or something, that's significant, it's not trivial. But it would not be life threatening," said Buesseler.

The U.S. Food and Drug Administration said it will require seafood imported from Japan to be checked for radiation before it enters the food supply but Wenonah Hauter, the executive director of Food and Water Watch, questions the FDA's ability to run those necessary tests.

"I think the concern is, the FDA doesn't have the resources to properly screen and then do laboratory tests. In the best of times, they only test less than 2 percent of seafood that comes from imports," said Hauter.

But even with the new screenings, no one in the U.S. government is saying "stop eating tuna." So far, the FDA said every piece of imported seafood is completely safe.

Japan Tackles Hydrogen Buildup, Cumulative Radiation (REU)

By Mayumi Negishi And Yoko Nishikawa

Reuters, April 7, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

U.S. Sees New And Growing Japan Nuclear Threats (WLTX/USA)

By Tony Santaella

WLTX-TV Columbia, SC, April 7, 2011

A team of experts from the U.S. Nuclear Regulatory Commission warned in a report about a week and a half ago that the very methods being used to try and cool down Japan's stricken nuclear plant may be increasing the risk of explosions or cracks in the reactor buildings, reports The New York Times. According to a report dated March 26 and obtained by the Times, experts warn that the millions of gallons of water

Workers in radiation suits prepare for the decontamination of two nuclear plant workers who were exposed to high levels of radiation at the Fukushima Medical University. (Getty Images)

(CBS) - A team of experts from the U.S. Nuclear Regulatory Commission warned in a report about a week and a half ago that the very methods being used to try and cool down Japan's stricken nuclear plant may be increasing the risk of explosions or cracks in the reactor buildings, reports The New York Times.

According to a report dated March 26 and obtained by the Times, experts warn that the millions of gallons of water – most of it seawater - that have been dumped into the overheating reactors to cool fuel rods adds to pressure on the already-battered surrounding containment structures.

That pressure makes it more likely, according to the report, that future aftershocks could crack the containment structures, leading to cracks from which highly-radioactive water can escape into the environment.

One such crack, which allowed contaminated water to spill directly into the sea for days, was finally plugged by workers on Wednesday.

But in a sign that workers still face several challenges before the overheating reactors are stabilized, Tokyo Electric Power Co. said it plans to inject nitrogen gas into one of the reactors. Nitrogen can prevent highly combustible hydrogen from exploding – as it did three times at the compound in the early days of the crisis.

There is no immediate possibility of an explosion, but the "nitrogen injection is being considered as a cautionary measure," said spokesman Hidehiko Nishiyama of Japan's Nuclear and Industrial Safety Agency.

TEPCO said the process could begin as early as Wednesday evening in Unit 1 – where pressure and temperatures are the highest – according to spokesman Junichi Matsumoto. The same measures will eventually be taken at the other two troubled reactors.

The NRC report obtained by the Times also cited an increased risk of explosions due to the release of hydrogen and oxygen from the overheating fuel rods. Salt from the seawater was caking around the fuel rods as the water evaporated away, making it more difficult for the fresh water being added to circulate around the cores and cool them down.

News Wrap: House Budget Committee Begins Debate On GOP Proposal (PBS)

PBS NewsHour, April 7, 2011

HARI SREENIVASAN: The House Budget Committee began its markup of a GOP proposal to slash nearly \$6 trillion in spending over the next 10 years.

The committee chair, Paul Ryan of Wisconsin, unveiled the plan yesterday. It would restructure Medicare and other federal health-care programs, as well as reduce total spending. Ryan said sky-high deficits made the cuts vital.

Democrat Bill Pascrell of New Jersey denounced it as an attack on health programs for retirees and the poor.

REP. PAUL RYAN, R-Wis., Budget Committee chairman: Let's get through this partisanship, and let's get on to the business of saving this country and getting this debt paid off while we can still do it on our terms. The reforms in this plan are gradual. They're sensible.

This is something we can preempt. This is something we can stop. We owe it to ourselves, we owe it to our children and grandchildren, we owe it to our fellow countrymen to get this debt under control.

REP. BILL PASCRELL JR., D-N.J.: I think that your budget needs a GPS, because it is a road map into the woods, and we're not going to be able to get out. We believe in providing health-care security for more than just the next decade. And we reject the notion that we can balance the budget by privatizing our safety net for seniors, the poor and the disabled.

HARI SREENIVASAN: An analysis by the Congressional Budget Office found under the plan most future retirees would actually pay more for health care. The nonpartisan agency said, when people now 54 and under retire, they would enroll in a voucher-like plan to buy private insurance. And it noted the Medicare benefits package is more expensive to deliver through private insurers.

Opposition forces in the Ivory Coast moved in on the man who will not leave office. But the fighters were repelled by heavy arms fire coming from behind the gates of Laurent Gbagbo's residence in Abidjan. Gbagbo refuses to cede power, despite losing last November's election to Alassane Ouattara.

We have a report narrated by Rohit Kachroo of Independent Television News.

ROHIT KACHROO: The distant evidence of an assault aimed at removing Laurent Gbagbo – as it began, rebel leaders said they were going in to end the comedy. Then they stormed the luxurious compound where he's been hiding.

Gbagbo played the commander-in-chief for state TV cameras. Today, he's cornered at his home in an underground bunker, but still refusing to leave. U.N. strikes forced him close to surrender, but he switched to defiance.

LAURENT GBAGBO, former Ivory Coast president (through translator): I love life. I love life. My voice is not the voice of a martyr. I do not seek death. It's not my goal here to die.

ROHIT KACHROO: Today, his wife emerged and showed that he still has some support in this divided country.

SIMONE GBAGBO, wife of former Ivory Coast president Laurent Gbagbo

(through translator): God is leading our fight. God has already given us the victory.

(CHEERING AND APPLAUSE)

ROHIT KACHROO: But her husband lost the election. It's his former citizens who've lost the most, though, desperate for food and for a solution. Aid agencies report a growing refugee crisis. Others fear revenge killings after Gbagbo goes.

HARI SREENIVASAN: French military officials said their forces were not taking part in today's offensive. French troops are backing up U.N. peacekeepers in Ivory Coast to protect civilians.

Libyan leader Moammar Gadhafi has sent a personal letter to President Obama, calling for an end to airstrikes on his country. The three-page letter written in English was obtained by the Associated Press.

In it, Gadhafi writes that "NATO is waging an unjust war against a small people of a developing country."

In Washington, with the Italian foreign minister, Secretary of State Hillary Clinton said there's no mystery about what the U.S. expects from Gadhafi.

SECRETARY OF STATE HILLARY RODHAM CLINTON: Mr. Gadhafi knows what he must do. There needs to be a cease-fire. His forces need to withdraw from the cities that they have forcibly taken at great violence and human cost. There needs to be a decision made about his departure from power and, as the foreign minister said, his departure from Libya.

HARI SREENIVASAN: A boat that set sail from Libya loaded with 300 migrants has capsized in the Mediterranean. It overturned in rough seas off the coast of a tiny Italian island near North Africa. Rescue crews were battling strong winds in their search for survivors. Fifty-one of the migrants were rescued and brought ashore. Thousands of people have fled to Italy to escape the recent unrest in their home countries.

Unrest in the Middle East continued for another day. Thousands of protesters in Yemen defied a government crackdown and took to the streets of Sanaa to demand president Ali Abdullah Saleh step down. Major rallies were also held in the southern city of Taiz.

Meanwhile, U.S. Defense Secretary Robert Gates traveled to Riyadh, Saudi Arabia, for talks on the spreading unrest in the region.

Japanese engineers turned their focus today to preventing new explosions at the destroyed Fukushima Daiichi nuclear plant. They began injecting nitrogen near the reactor to prevent more hydrogen explosions, like the ones that happened after a tsunami hit last month.

That came as The New York Times reported the United States Nuclear Regulatory Commission sees a host of new threats at the plant, including explosions and growing stresses on containment structures.

Portugal has become the third Eurozone country to request an international financial bailout. The prime minister said the country needs the extra help to tackle skyrocketing debts, amid recent political instability. He said the fact that Parliament rejected austerity measures last month made the request for aid inevitable. Greece and Ireland have already asked for financial assistance.

On Wall Street, stocks closed higher today, as the Dow neared a three-year high. The Dow Jones industrial average gained more than 32 points to close at 12,426. The Nasdaq rose eight points to close above 2,799.

Those are some of the day's major stories.

U.S. Agency Warned Of Risks In Repairs To Japanese Reactors (BLOOM)

By Jim Snyder And Jim Efstathiou Jr.

Bloomberg News, April 7, 2011

The U.S. Nuclear Regulatory Commission warned that fuel at the Fukushima Dai-ichi plant's crippled reactors in Japan had melted and that salt build-up in spray nozzles was probably impeding the flow of cooling water.

The assessment was written on March 26 by the commission's reactor-safety team and sent to its engineers in Japan who are helping stabilize the reactors and spent-fuel pools, which emitted radiation after power was shut off by an earthquake and tsunami on March 11.

The report, labeled "For Official Use" only and obtained today, recommends ways workers at the site should attempt to keep the reactors cool and minimize the risk of further explosions, such as by injecting nitrogen, an inert gas, into containment vessels.

The document, reported by the New York Times on its website yesterday, also said that workers should "consider the water weight on seismic capability of containment." It was a reference to the possibility that an aftershock could wreck reactor containment structures that have been flooded with water in the effort to prevent a meltdown.

The NRC report offered a "snapshot" of possible actions U.S. experts considered at the time, the agency said today in a statement. It isn't a reflection of the agency's "understanding of the current situation," the regulatory agency said.

While the NRC offered recommendations, Tokyo Electric Power Co., owner of the crippled reactors, decided to pursue "an alternative set of strategies to control the plants," according to the statement.

Cleaning Up Japan's Radioactive Water Could Take Decades (LAT)

No one is sure how to safely dispose of millions of gallons of highly radioactive water at the Fukushima Daiichi nuclear plant. 'There is nothing like this, on this scale, that we have ever attempted to do before,' a U.S. expert says.

By Julie Makinen, Ralph Vartabedian, April 7, 2011

Los Angeles Times, April 7, 2011

For nearly four weeks, Japanese emergency crews have been spraying water on the damaged Fukushima Daiichi nuclear reactors, a desperate attempt to avert the calamity of a full meltdown.

Now, that improvised solution to one nuclear nightmare is spawning another: what to do with the millions of gallons of water that has become highly radioactive as it washes through the plant.

The water being used to try to cool the reactors and the dangerous spent fuel rods is leaking through fissures inside the plant, seeping down through tunnels and passageways to the lowest levels, where it is accumulating into a sea of lethal waste.

No one is sure how to get rid of it safely.

"There is nothing like this, on this scale, that we have ever attempted to do before," says Robert Alvarez, a former assistant secretary of the U.S. Energy Department.

Japanese officials estimate that they already have accumulated about 15 million gallons of highly radioactive water. Hundreds of thousands of gallons are being added every day as the plant's operator, the Tokyo Electric Power Co., continues to feed coolant into the leaky structures.

Ultimately, the high-level radioactive substances in the water will have to be safely stored, processed and solidified, a job that experts say will almost certainly have to be handled on a specially designed industrial complex. The process of cleaning up the water could take many years, even decades, to complete. The cost could run into the tens of billions of dollars.

Victor Gilinsky, a former member of the Nuclear Regulatory Commission and longtime advisor on nuclear waste, said the problems facing Japan are greater than even the most highly contaminated nuclear weapons site in the U.S., the Hanford Nuclear Reservation in Washington state.

The Department of Energy is decommissioning eight reactors at Hanford and plans to process about 58 million gallons of radioactive sludge now in leaky underground tanks, all at an estimated cost of \$100 billion to \$130 billion, according to outside estimates. But unlike Fukushima Daiichi, none of the Hanford reactors melted down and virtually all of the site is accessible to workers without risking exposure to dangerous levels of radioactivity.

"It will be a big job, bigger than Hanford," Gilinsky said, though he cautioned that U.S. costs are unnecessarily high and that the Japanese may be able to do the work more economically.

The immediate problem facing the Japanese is how to store all that water until the reactors and the spent fuel pools are brought under control. The plant's main storage tanks are nearly full. To make room, Tokyo Electric Power, known as Tepco, released a couple of million gallons of the least contaminated water into the ocean this week, with the expectation that its radioactive elements would be diluted in the ocean's mass.

But international law forbids Japan from dumping contaminated water into the ocean if there are viable technical solutions available down the road.

So Tepco is considering bringing in barges and tanks, including a "mega float" that can hold about 2.5 million gallons. Japan has also reportedly asked Russia to send a floating radiation treatment plant called the Suzuran that was used to decommission Russian nuclear submarines in the Pacific port of Vladivostok. The Suzuran was built in Japan a decade ago.

Yet even using barges and tanks to temporarily handle the water creates a future problem of how to dispose of the contaminated vessels.

U.S. and Japanese experts say the key to solving the disposal problem involves reducing the volume of water by concentrating the radioactive elements so they can be solidified into a safer, dry form. But waste experts disagree on exactly how to do that.

The difficulty of concentrating and then solidifying the contaminants depends on how much radioactivity is in the water, the type of isotopes and whether the work can be done on the Fukushima site.

UC Berkeley nuclear engineering professor Edward Morse said the water needs to be diverted into a concrete-lined holding pond fairly soon, where natural evaporation can help reduce its volume.

Youichi Enokida, a specialist in nuclear chemical engineering at Nagoya University in Japan, agrees that the material should be put into some type of storage that would concentrate it through evaporation, though Japanese experts generally talk about the need for a sealed pool.

"We must concentrate the liquid," he said.

Even with a pond, it could take up to 10 years before the radioactivity would decay enough for the material to be handled, Morse said. Building a storage pond "buys you time," he said.

But other experts sharply disagree, saying exposing the material to open air could allow radioactive iodine and other volatile substances to blow off the site, adding to the remote contamination that is already spreading dozens of miles from the plant.

A factor that could vastly complicate the problem is the presence of tritium, or heavy water, which is produced during fission. Tritium cannot be filtered out of water, instead requiring an extremely expensive treatment process.

"If the contaminated water has relatively high tritium or tritiated water concentration, then treatment could be more complicated," said Joonhong Ahn, a nuclear waste expert at UC Berkeley.

Nuclear power plants normally have systems in place to treat tritium on site. But the condition and capacity of the Fukushima system is not known.

Enokida and Morse contend that if the water can be concentrated, it can then be put into dry form or even turned into glass, as is planned at Hanford and other contaminated sites around the world. But this process, called vitrification, is expensive and requires a small-scale industrial facility.

The alternative — processing the waste elsewhere in Japan — is likely to be controversial.

"The fishermen will protest; this is inevitable," Enokida said.

Morse said that the plant faces at least six months of emergency stabilization, about two years of temporary remediation and anywhere from two years to 30 years of full-scale cleanup. Furthermore, the high levels of ground contamination at the site are raising concerns about the viability of people working at the site in coming decades.

It will take hundreds or even thousands of workers years or decades to handle the cleanup, experts said.

U.S. officials have not yet discussed the water management problems with their Japanese counterparts. But Nuclear Regulatory Commission spokesman Scott Burnell said the nuclear industry has a long experience with filtering radioactive contamination out of water, though never at a plant that has suffered such damage. At Three Mile Island it was decided to allow the tritium-contaminated water to evaporate, though that meant the tritium escaped as well.

At some point, however, Japan will have to add facilities to existing treatment plants in order to vitrify the radioactive material into glass logs or other dry forms that could be stored in alloy canisters. Those logs or canisters would have to be buried somewhere.

Where that burial ground is built is a question that the Japanese are only beginning to consider.

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Makinen reported from Tokyo and Vartabedian from Los Angeles.

NRC Examines Nuclear Plant Risks In U.S. (USAT)

By Oren Dorell, Usa Today

USA Today, April 7, 2011

Japanese officials took some solace Wednesday in halting leaks of radioactive water from the nation's crippled nuclear plant. But in Washington, internal e-mails from the Nuclear Regulatory Commission revealed doubts within the organization about procedures for U.S. plants in a Fukushima-style event.

"U.S. plants continue to operate safely," Martin Virgilio, deputy executive director of the NRC's reactor and preparedness programs, told a House subcommittee.

The hearing took place as Japanese nuclear workers notched a rare victory by stopping highly radioactive water from flowing into the Pacific Ocean on Wednesday and turned their attention to injecting nitrogen into the reactor cores to prevent more hydrogen explosions.

Japanese nuclear officials said there was no immediate threat of explosions like three that rocked the Fukushima Dai-ichi plant after the earthquake and tsunami, but their plans are a reminder of work that remains to stabilize the complex. "The nitrogen injection is being considered a precaution," said Hidehiko Nishiyama, spokesman for Japan's Nuclear and Industrial Safety Agency.

More than 12,000 people have been confirmed dead from the March 11 disaster.

Virgilio addressed the NRC e-mails, obtained by the Union of Concerned Scientists through the Freedom of Information Act and released Wednesday. In the e-mails, NRC risk analysts questioned an exercise that simulated a catastrophic loss of power at a nuclear plant due to an earthquake, and whether operators should rely on equipment that was not certified to survive an earthquake.

The exercise, played out on a computer model, looked at what would happen at two U.S. power plants, Surry in Virginia and Peach Bottom in Pennsylvania, with new equipment and procedures, called B.5.b, ordered since the 9/11 terror attacks to make nuclear power plants more resistant to attack. One of the hypothetical accidents that were analyzed was a "station blackout" at Peach Bottom where the plant fails to recover power, as happened at Fukushima.

Under the scenario, the plant loses outside power, its diesel backup generators and battery power too, Virgilio said. The new B.5.b strategy would employ new, portable equipment to operate emergency cooling pumps off steam from the reactor core.

One NRC risk analyst questioned how NRC could rely on strategies "that have really not been reviewed to ensure that they will work to mitigate severe accidents."

Questions raised by this and other analysts "will need to be looked at," Virgilio said. But he added that the exercise looked at an unlikely scenario — a major earthquake that knocks out power inside and outside the plant.

U.S. nuclear plants do not sit on geological formations that are susceptible to the same kind of violent earthquakes, he said.

Nuclear Agency Tests Pennsylvania Plant (WSJ)

By Tennille Tracy

Wall Street Journal, April 7, 2011

Full-text stories from the Wall Street Journal are available to Journal subscribers by clicking the link.

US Officials Doubted Nuclear Safety Plans-Watchdog (REU)

By Scott Malone

Reuters, April 7, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

Doubts Raised Over US Atomic Plants (FT)

By FT Reporters And Agencies

Financial Times, April 7, 2011

Full-text stories from the Financial Times are available to FT subscribers by clicking the link.

Pa. Nuclear Reactor Could Come Dangerously Close To Core Damage, Analysis Says (POCREC)

Pocono (PA) Record, April 7, 2011

An analysis of hypothetical severe nuclear accidents conducted by US nuclear officials shows that a reactor in York County comes close to suffering core damage in situations where all power is lost at the plant, House Democrats said Wednesday.

This so-called State-of-the-Art Reactor Consequence Analyses, conducted by the Nuclear Regulatory Commission, analyzes the effects of various accidents at two nuclear reactors: the so-called Peach Bottom plant in Pennsylvania, which has a design similar to the damaged Fukushima Daiichi plant in Japan, and the Surry reactor in Virginia.

Under one scenario, in which a severe station blackout takes out all power, the simulation analysis showed the Peach Bottom reactor "came within one hour of core damage," according to a memo House Democrats released Wednesday.

In a House hearing Wednesday, a top nuclear official responded to the report and said the analysis of nuclear accidents looks at "very unrealistic events."

"We ignore all probabilities" of the events actually taking place, said Martin Virgilio, deputy executive director for reactor and preparedness programs at the Nuclear Regulatory Commission. "We're testing the envelope."

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Renewed Focus On Nuclear Reactors In U.S. (LANERA)

By Ad Crable , Staff Writer

Lancaster (PA) New Era, April 7, 2011

The Peach Bottom and Three Mile Island nuclear plants are undergoing quick-look inspections to make sure a prolonged power disruption couldn't lead to the mess reactors in Japan found themselves in after an earthquake and tsunami.

All commercial reactors will come under near-term and long-term reviews in the wake of power failures and subsequent overheating at the Fukushima Dai-ichi nuclear plant in Japan.

"In the near-term, resident inspectors at all sites, with help from our special inspectors, will look for immediate implications of events in Japan reactors," said Neil Sheehan, a U.S. Nuclear Regulatory Commission spokesman in King of Prussia.

Nuclear plants in the United States, in the event of a blackout, are required to have multiple electricity backups. Power is essential to keep water flowing into the reactor core and a pool of spent uranium fuel.

Three Mile Island, for example, receives electricity from four independent power lines.

If power from the grid is lost, there are diesel generators on hand. If they, too, are lost or don't work, there is a room full of walls of giant batteries.

Still, renewed focus has been placed on U.S. reactors' backup power capabilities to deal with a prolonged power failure because the loss of power has raised such havoc at the crippled reactors in Japan.

Both TMI and Peach Bottom, since 2007, reported to the NRC that electric cables were found improperly submerged in water. No electrical faults occurred, but the cables were not designed to lie in water.

Some have found fault with the NRC's standards that only require nuclear plants to have battery backups of four to eight hours.

In a simulated accident scenario conducted on computers by the NRC in 2009, it was found that in extreme conditions, the Peach Bottom power plant could begin leaking radiation in less than a day if backup systems failed.

Exelon Nuclear's Peach Bottom plant and the Surry plant in Virginia volunteered for the "State-of-the-Art Reactor Consequence Analysis."

David Tillman, Exelon's spokesman at Peach Bottom, said the utility wouldn't be commenting on the analysis because a final report has not yet been released.

But he said Peach Bottom has "numerous and redundant" power backup systems, including four locomotive-sized diesel generators that are fortified and watertight. The storage tanks of diesel fuel are buried underground.

Then there are stored batteries. In addition, he said, there is a dedicated underground power line that could run the plant from the nearby Conowingo hydroelectric dam.

"These are all safety features to allow us to safely operate and shut down the plant if a loss of power occurs," Tillman said.

Peach Bottom also has come in for increased scrutiny because it, and 22 other U.S. plants, have the same Mark 1 radiation containment design as at Fukushima Dai-ichi, where radiation has leaked out.

On that score, the NRC's Sheehan pointed out that there are a number of safety upgrades at Peach Bottom and other Mark 1 plants that were not found at the stricken reactors.

For example, in Japan, a hydrogen explosion led to spent fuel being exposed to the environment.

At U.S. Mark 1s, reactors have vents that allow hydrogen gas to be vented to preclude buildup.

Also, years ago, the NRC required Mark 1 plants to reinforce donut-shaped reservoirs of water that would be needed in an emergency to cool the reactor, Sheehan said.

"But yes," he added, "we will look at Mark 1 again."

In February 2010, an NRC inspection at Peach Bottom noted a violation when it was found that a power cable that feeds a safety-related motor control center had been submerged in a manhole since at least 2002.

In July 2009, an inspection at TMI noted a violation because TMI staff failed to correct repeated flooding of cables. Corroded cable tray supports were observed, the report said.

Looking for submerged cables had been ordered by the NRC after it was found that 23 nuclear plants had experienced electrical cable failures between 1988 and 2004. Neither TMI or Peach Bottom was among the 23.

Ralph DeSantis, Exelon spokesman at TMI, said as a result of the nuclear accident in Japan, Exelon undertook immediate steps to "re-validate our emergency systems that would be used for extreme natural events.

"They are all in top-notch working order," he said.

Read more: <http://articles.lancasteronline.com/local/4/371851#ixzz1lpTh0g61>

E-mails Show US Nuclear Safety Concerns (MSNBC)

Contingency plans at one site have 'not been reviewed to ensure that they will work'

MSNBC, April 7, 2011

U.S. regulators privately expressed doubts some of the nation's nuclear power plants are prepared for a Japan-scale disaster, documents obtained by the Union of Concerned Scientists show.

Obtained via a Freedom of Information Act request by the activist group, the Nuclear Regulatory Commission e-mails and memos questioned the adequacy of the backup plans to keep reactor cooling systems running if offsite power was lost for an extended period.

Those concerns contrast with the confidence U.S. regulators and industry officials have publicly expressed since the crisis began to unfold on March 11, the UCS said Wednesday.

"While the NRC and the nuclear industry have been reassuring Americans that there is nothing to worry about — that we can do a better job dealing with a nuclear disaster like the one that just happened in Japan — it turns out that privately NRC senior analysts are not so sure," Edwin Lyman, a UCS nuclear expert, said in a statement released along with the documents.

Story: Japan faces another dilemma: Radiation-contaminated bodies

Story: Japan plugs radioactive water leak from nuclear plant

Story: What are the odds? US nuke plants ranked by quake risk

The e-mails were part of a federal review of how the operators of nuclear plants in Delta, Penn., and Surry County, Va., would cope with a prolonged power outage that knocked cooling systems offline — as occurred at the Fukushima plant in Japan.

A NRC staffer e-mailed last July 28 that contingency plans for the Peach Bottom nuclear plant in Delta "have really not been reviewed to ensure that they will work to mitigate severe accidents."

Another, undated document said backup plans included just having equipment on the plant grounds that could be useful "when used by knowledgeable operators if post-event conditions allow."

The document went on to note: "If little is known about these post-event conditions, then assuming success is speculative."

The Peach Bottom site, operated by Exelon Corp., uses a General Electric reactor with a similar design to four of the reactors at Fukushima. (GE is a part owner of NBCUniversal, which co-owns msnbc.com through a joint venture with Microsoft.)

Officials at the NRC and Exelon did not immediately respond to calls seeking a comment.

Dems Slam NRC On Nuclear Safety (POLITCO)

By Darius Dixon

Politico, April 7, 2011

House Democrats hammered federal regulators Wednesday on the safety of the U.S. nuclear industry, casting skepticism on the Nuclear Regulatory Commission's assurances that plants here are safe despite the disaster unfolding in Japan.

"Why do we keep finding ourselves here?" asked Rep. Diana DeGette of Colorado, one of several Democrats on the Energy and Commerce investigations subcommittee to suggest that U.S. plants are at greater risk than previously assumed. "It seems, time and time again, we hear: 'Don't worry. It's safe.' And: 'Oh, but that would never happen.'"

Massachusetts Democrat Ed Markey likened the Japanese authorities' desperate efforts at the Fukushima Daiichi plant to a BP-style "nuclear junk shot," adding: "Yet the Nuclear Regulatory Commission insists that our systems are safe, even before beginning, let alone completing, its review of our reactors and spent fuel pools."

Markey also complained that existing U.S. regulations don't fully account for the risk of earthquakes, while requirements for backup battery power here "are generally less stringent than what the Fukushima reactors were equipped with."

But the subcommittee split along party lines, with Chairman Cliff Stearns telling his colleagues that "there should be no question about the experience and responsiveness of America's nuclear power system."

"As we examine the Fukushima incident, we should not confuse what is happening in Japan with our own preparedness and assume they are one in the same," the Florida Republican said. "We should not make unsupported assumptions about risks and response measures or get ahead of the facts."

"Radiological releases from the facility have been much less than feared," Stearns said, citing data released Monday by the Energy Department.

The Japanese reactors have suffered from explosions, partial meltdowns and releases of radioactivity into the air and the ocean, resulting in minuscule amounts of radioactive substances being detected in milk and ground water in the United States.

DeGette, the subcommittee's ranking member, invoked last year's BP spill to raise questions about assurances from the nuclear industry and its regulators.

"Less than a year ago, many of us sat together at hearing after hearing investigating the terrible crisis of the Deepwater Horizon spill," she said. "And then, disturbingly, we learned an entire industry was quite simply unprepared for the failure of numerous failsafe methods."

DeGette added. "This seems like an ideal time to remind many of my colleagues across the aisle that regulation is not a bad word."

This article first appeared on POLITICO Pro at 12:14 p.m. on April 6, 2011.

Democrats Probe Worst Fears For U.S. Nuclear Power (REU)

By Roberta Rampton And Ayesha Rascoe

Reuters, April 7, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

UW-Madison Professor To Testify Before Congressional Committee About US Nuclear Plant Safety (CHIT)

Associated Press, April 6, 2011

MADISON, Wis. (AP) — A Wisconsin professor is set to testify in front of a congressional committee about Japan's nuclear crisis

Michael Corradini is an engineering physics professor at the University of Wisconsin-Madison and a member of the U.S. Nuclear Regulatory Commission's advisory committee on reactor safeguards. He's scheduled to testify before the House Energy and Commerce Committee's oversight and investigation's subcommittee on Wednesday morning.

Corradini plans to talk about the effects of last month's earthquake and ensuing tsunami on Japan's nuclear plants and what the domestic nuclear industry can learn from the disaster.

U.S. Nuclear Regulator Split On Yucca Report Release (REU)

By Roberta Rampton And Ayesha Rascoe

Reuters, April 7, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

More Yucca Mountain Turmoil At Nuclear Regulatory Commission (LVSRJ)

By Steve Tetreault

Las Vegas Review-Journal, April 7, 2011

Full-text stories from this source currently cannot be included in this document. You may, however, click the link above to access the story.

A Single Site For Nuclear Waste (SLPD)

By John Shimkus

St. Louis Post-Dispatch, April 7, 2011

The March 11 earthquake in Japan led to a tsunami that crippled the Fukushima Daiichi nuclear power plant. While a similar situation is not likely at any U.S. nuclear plant, we must use this to look at our country's lack of a central storage facility for nuclear waste.

The first commercial nuclear power plant began operating in the United States in 1960. In 1982, the Nuclear Waste Policy Act made the federal government responsible for collecting nuclear waste.

In 1987, Yucca Mountain was named the sole site for a permanent repository of nuclear waste. The Department of Energy confirmed the scientific side of this decision in 1994. In 2002, Congress and the president approved Yucca Mountain again. In 2008, DOE filed a license application with the Nuclear Regulatory Commission to build Yucca Mountain.

Obviously, the decision to move forward with a national nuclear waste repository has been supported by Republican and Democratic-controlled Congresses and Republican- and Democrat presidents over all these years.

I have visited Yucca Mountain. It is located on federal property. The storage site would be 1,000 feet below ground in a remote desert location. Earthquakes have had little impact on this area and are even less an impact underground.

Today, we store nuclear waste at each of the 121 sites in 39 states. Nuclear power provides over 20 percent of our nation's electricity. That number is closer to 50 percent in Illinois.

In Illinois, eight pools house spent nuclear fuel rods from the 13 nuclear power plants, 11 of which still are operating. Two pools are within 40 miles of downtown Chicago. Is that really where we want to store nuclear waste?

In testimony before the Senate on March 30, Massachusetts Institute of Technology physics professor Dr. Ernest Moniz called for these spent fuel rods to be stored in "dry" casks at regional government facilities. Senator Dianne Feinstein, D-Calif., agreed.

While I agree with the government following its own law and taking control of nuclear waste, I question why we should throw away the \$14.5 billion already spent on Yucca Mountain. We don't need regional sites; we already have designated a consolidated government storage site.

Also on March 30 President Obama called for an increase in nuclear power as part of a clean energy standard. While I may not agree with a mandated standard, I know that nuclear power will continue to be vital in our nation's electricity portfolio.

Unfortunately President Obama and his administration have unilaterally halted work on Yucca Mountain. They would rather see nuclear waste stored all over the country instead of in Nevada — home of Senate Majority Leader Harry Reid.

I believe the administration is failing to carry out the current federal law. In order to find out exactly why the administration halted work on Yucca Mountain, under our oversight authority House Energy and Commerce Committee, chairman Fred Upton, R-Michigan, and I are proceeding with an investigation. On March 31, we sent letters to the secretary of Energy and to the chairman of the Nuclear Regulatory Commission.

In addition, as part of our oversight and responsibility to ratepayers and taxpayers, I will be leading a delegation of legislators to tour Yucca Mountain later this month.

Past Congresses and administrations have approved Yucca Mountain. While it has taken too long to become reality, this administration cannot rewrite the law or pull already issued permits away from it.

In order to expand nuclear power, Yucca Mountain must become a reality.

U.S. Rep. John Shimkus, R-Collinsville, is chairman of the House Energy and Commerce Subcommittee on Environment and the Economy, which has jurisdiction over federal nuclear waste policy.

Yucca Mountain Won't Lessen Risks (RENONR)

By Richard Bryan

Reno News & Review, April 7, 2011

Nuclear industry spokespeople and some in Congress have been very of late suggesting that the nuclear accident in Japan requires restarting the defunct Yucca Mountain nuclear waste repository program. They assert that moving spent fuel to a Nevada repository is needed to eliminate or reduce the risks associated with failures of spent fuel cooling pools at U.S. nuclear power plants. The refrain one hears is that it's safer to move spent fuel out of these cooling pools at 100-plus reactor sites to a single, isolated location in Nevada.

The problem with this assertion is that it's entirely wrong and misleading. There could be 100 Yucca Mountains up and operating, and the risks involved with spent fuel pools at reactor sites would still be there. Wherever there is a nuclear reactor, there must be a water-filled pool to cool the spent fuel for five years or more after it's removed from the reactor. Whether there is a repository at Yucca Mountain or anywhere else will have no effect on spent fuel pool risks. The only way to avoid this risk would be to shut down all the reactors.

Fortunately, the answer to minimizing risks posed by cooling pools is simple and straightforward. Utility companies that operate nuclear power plants should be required to do what many already do—move spent fuel that is more than five years old and is capable of being taken out of the cooling pool to safe, passive dry storage at reactor sites. This virtually eliminates any chance that the spent fuel will overheat due to water leaks in the pool or cooling system malfunctions.

Dry storage is 100 percent passive, relies on natural air circulation to cool the fuel, and requires no moving parts and no active monitoring. Containers are large stainless steel cylinders placed in steel and concrete overpacks or vaults. They are lined up on concrete pads within the security perimeters of the reactor sites. Pads can even be recessed into the ground for added security. Dry storage virtually eliminates risks of the type we are seeing in Japan, where spent fuel is burning due to overheating. And unlike a repository—at Yucca Mountain or elsewhere—dry storage can be done immediately, as opposed to waiting decades before a disposal or storage location could be ready.

So why haven't U.S. utility companies already maximized the use of dry storage at reactor sites? Again, the answer seems relatively simple, and it's a four-letter word: C-O-S-T. Regardless of the risks, it's cheaper for utilities to maintain the status quo, loading more and more spent fuel into pools and keeping it there longer than necessary because it's less expensive to do it that way.

Instead of disingenuously using the disaster in Japan in an attempt to stampede Congress into restarting the failed Yucca project, the nuclear industry should be using its considerable influence to require utility companies to make maximum use of dry storage technologies.

Group Petitions NRC To Halt Review Of Westinghouse Reactor Design (PITTR)

By Jeremy Boren And Thomas Olson

Pittsburgh Tribune-Review, April 7, 2011

A southern environmental protection group said today it filed a petition that raises safety concerns about Westinghouse Electric Co.'s proposed AP1000 nuclear reactor design and asks the Nuclear Regulatory Commission to halt its review.

North Carolina Waste Awareness and Reduction Network, a nonprofit known as NC Warn, represents more than a dozen nuclear energy watchdog groups that expressed new concerns about the reactor design in the wake of the disaster at Japan's earthquake-ravaged Fukushima Daiichi reactor.

Environmental groups in North Carolina, Georgia and Florida have scrutinized the AP1000 because at least six are under contract to be built in those states.

"(We're) calling for the U.S. Nuclear Regulatory Commission to suspend its fast-track approval process until design problems are resolved and the lessons from Japan can be fully and openly analyzed," said Jim Warren, NC Warn's executive director.

"We believe industry pressure has rushed the long-delayed preliminary approval of the AP1000 that was announced in February by the NRC," he said.

Based in Cranberry, Westinghouse employs about 6,000 people in Western Pennsylvania, all engaged in the nuclear power business. The company is owned by Toshiba Corp.

"We dispute any allegation that would imply that the AP1000 is anything other than an extremely safe nuclear energy plant," said Westinghouse spokesman Vaughn Gilbert.

"Westinghouse wants to emphasize the AP1000 takes safety to the highest levels," he said. "Based on conservative computer modeling, it's 200 times safer than Nuclear Regulatory Commission requirements.

Westinghouse CEO Aris Candris told the Tribune-Review in an interview earlier today that the company expects to get the NRC's final approval of the AP1000 "by late summer," after the public comment period.

NC Warn filed the petition now because a 75-day public review period on the reactor design ends May 10.

Warren said the legal challenge wasn't prompted by the Fukushima disaster alone. The group raised potential weaknesses in the AP1000 "shield building," which would be part of a structure protecting the radioactive core from earthquakes, storms and airplane strikes, and the proposed reactor's passive, gravity-fed cooling system.

John Runkle, an attorney for NC Warn, said there is precedent that supports the group's petition to delay AP1000's final approval. After the Three Mile Island accident in 1978, the commission suspended "all licensing" until investigators traced the source of the problem, he said.

Warren noted that Dr. John Ma, a top structural reviewer with the NRC, in November filed a "non-concurring" opinion with the commission that said the concrete shield building, as proposed, would be too brittle and could shatter "like a glass cup" if it was hit by an earthquake, object propelled by a tornado or a plane.

"The shield containment building is incredibly robust," said Westinghouse's Gilbert.

The AP1000 design was reviewed and "deemed safe by the NRC's Advisory Committee on Reactor Safeguards, the NRC itself and numerous experts in other organizations," added Gilbert.

Southeast Groups: Delay Approval For AP1000 Reactor (CLTBIZJ)

By John Downey

Charlotte (NC) Business Journal, April 7, 2011

Critics of Westinghouse's AP1000 reactor have petitioned the Nuclear Regulatory Commission to suspend proceedings to approve the reactor in the wake of the nuclear crisis in Japan.

That would probably delay construction of at least two nuclear projects in the Southeast — Southern Co.'s two units at its Vogtle nuclear plant and Scana's V.C. Summer expansion. It could also delay Duke Energy's plans for its Lee Nuclear Station in Gaffney, S.C.

But a group of environmental and public-policy advocates calling itself the AP1000 Oversight Group says it is the commission's duty to delay proceedings for safety considerations. Preliminary approval

The group contends it is unreasonable to proceed with the approval process until regulators learn what went wrong at Japan's crippled Fukushima plant. The nuclear industry and regulators will also need time to review those lessons and implement new design requirements to protect against problems in future reactors, the group says.

The NRC gave its preliminary approval of the Westinghouse design Feb. 18. The commission plans final action on the design 30 days after a 75-day comment period ends this spring.

Westinghouse spokesman Vaughn Gilbert says there is no need for a delay. He says the passive emergency cooling system that is a key part of the AP1000 design operates without backup power. Ready to start construction

Such a system could have averted the crisis in Japan, Gilbert contends. The potential for nuclear disaster there developed when the Fukushima emergency backup systems lost power after a March earthquake and tsunami badly damaged the reactors.

"The AP1000 design would have shut down and cooled the reactors without the need for backup power," Gilbert says. "We take safety to the highest level with this design."

The AP1000 group disagrees. Representatives held a press conference Wednesday to announce the petition. The group says it makes no sense to approve plants such as Vogtle and Summer, which are ready to begin construction, then change the design later once the failures at Fukushima are clearly understood. Precedent cited

John Runkle, attorney for the N.C. Waste Awareness and Reduction Network, cited the precedent of the 1970 disaster at Three Mile Island. At that time, he said, the NRC suspended all licensing and approval proceedings. "They clearly have the authority to do it," he said.

NCWARN is one of the 12 organizations that make up the AP1000 group. Others include the Blue Ridge Environmental Defense League, the Green Party of Florida, the Southern Alliance for Clean Energy and the Friends of the Earth. 'Comprehensive review'

The NRC is preparing to approve the design even as Westinghouse continues to work on design changes already mandated by the commission. Runkle expects a court challenge if the commission approves the plant before all the design changes are resolved.

The petition filed Wednesday calls on the commission to immediately postpone the rule-making proceedings for AP1000 certification.

And it calls on the commission to "initiate a comprehensive review of the Fukushima accident to develop lessons learned for new reactor designs" and implement "new regulatory safeguards to protect public health and safety."

Environmental Groups Seek Delay In New U.S. Nuclear Plants (REU)

By Jim Brumm

Reuters, April 7, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

Groups Want Licensing Of Reactors Suspended (AUGC)

By Rob Pavey

Augusta Chronicle, April 7, 2011

Environmental groups opposed to the Nuclear Regulatory Commission's plan to license two new AP1000 reactors to be built at Plant Vogtle filed a new petition Wednesday asking the commission to suspend the licensing process until more is known about the evolving Japan disaster.

"It is apparent that while little is known definitively about the cause and impacts of what occurred at Fukushima, many aspects of the accident have grave consequences for U.S. nuclear plants, including the AP1000 reactors," said the petition, filed by the AP1000 Oversight Group, comprised of 12 environmental groups.

Southern Nuclear, which plans to use the Westinghouse reactor design at Vogtle, risks potential cost overruns if it moves ahead too quickly on the \$14.8 billion project, said Sara Barczak, the program director of the Southern Alliance for Clean Energy.

"The original Vogtle project was the poster child for cost overruns," she said, noting that additional regulatory requirements inflated the original \$660 million cost to more than \$8 billion.

"To us, it doesn't appear much has changed today. Odds are that the lessons learned from Japan may very well drive costs up."

Southern Nuclear is in the final stages of its quest for a combined operating license that would authorize both the construction and operation of the new units in Burke County.

The AP1000 has been touted as the newest and safest of all reactor designs with a unique, passive cooling system that includes a reservoir of cooling water stored above the reactor.

In the event of an emergency, cooling water can flow into the system by gravity without electric or diesel powered pumps whose tsunami-induced failure contributed to the Japan crisis.

Jim Warren of the North Carolina Waste Awareness and Reduction Network said Westinghouse also must resolve lingering issues with the AP1000 shield building design, which the NRC said could not meet impact standards associated with aircraft strikes or natural disasters, such as a tornado-propelled object.

The group also raised questions about the spent fuel storage plan, which Warren claimed was changed to higher-density storage to cut costs, despite a 2005 National Academy of Sciences warning that such "high density racking" makes the fuel storage pools more vulnerable to degradation or fire if there is even a partial loss of cooling water.

Southern Nuclear spokeswoman Beth Thomas said the company has no plans to postpone its Vogtle project.

"As it relates to the recent events in Japan, Southern Nuclear supports a safety review and incorporating lessons learned," she said. "We remain, however, fully committed to the Plant Vogtle construction project. We plan to have Unit 3 operational in 2016 and Unit 4 in 2017."

Legal Action Seeks To Slow Rush To Build New Nuclear Reactors Across The South (FS)

By Sue Sturgis

Facing South, April 7, 2011

A coalition of public-interest groups filed a legal challenge today with the U.S. Nuclear Regulatory Commission seeking to halt the fast-track approval process for the Westinghouse AP1000 reactor that utilities are planning to build across the South.

Filed directly with the NRC's five commissioners rather than agency staff, the petition [pdf] calls for suspension of the design approval process to consider safety concerns raised by experts – and to allow time for the lessons of the Japanese nuclear disaster to be absorbed.

"There is no cause to rush the design certification for the AP1000," says John Runkle, attorney for the AP1000 Oversight Group. "Well before the emergency in Japan, serious shortcomings with the Westinghouse model had been identified. The events at Fukushima redouble the need for a careful and transparent review of the AP1000 relating to both safety and cost."

The motion notes that the NRC spent a year and a half after the 1979 Three Mile Island accident studying the disaster's implications. That effort led to regulatory changes making both existing and proposed reactors safer.

The Westinghouse AP1000 is the design chosen for construction of 14 reactors at seven sites across the Southeast. The companies seeking to build those reactors are Duke Energy, Florida Power & Light, Progress Energy, SCANA, Southern Company and TVA. Westinghouse is majority-owned by Japan's Toshiba Corp. Last year the Obama administration awarded the project at Southern Company's Plant Vogtle in Georgia an \$8.2 billion federal loan guarantee.

The AP1000 Oversight Group charges that industry pressure caused NRC to skip testing of key aspects of the AP1000 design. Dr. John Ma, the NRC's lead structural engineer charged with evaluating the reactor's shield building, filed a formal nonconcurrency against approval of the design last November. He cited concerns that the new concrete material being used in the building is so brittle it could shatter "like a glass cup."

Other problems the coalition points to include high storage density in the spent fuel pools and a weak containment structure. In addition, NRC science advisers have warned that potential clogging in the reactor's passive emergency cooling system could dramatically increase the risk of a meltdown.

The petitioners acknowledge fundamental differences between the AP1000 design and the GE-Hitachi boiling water reactors used at Fukushima and many sites across the United States. However, they also point out that the Fukushima accident has direct implications for the AP1000 design and operation.

"Accidents with catastrophic consequences that were once considered to be of extremely low probability have occurred," the motion states. "Now the ramifications of those accidents must be dealt with and resolved safely before new designs are reviewed and certified, and new reactors are licensed."

In February, the NRC announced its preliminary approval of the AP1000 design. It required public comments to be filed in 75 days, and for the NRC staff to finalize approval 30 days after that.

The members of the AP1000 Oversight Group are the Bellefonte Efficiency and Sustainability Team, Blue Ridge Environmental Defense League, Citizens Allied for Safe Energy (Miami), Friends of the Earth, Georgia Women's Action for New Directions, Green Party of Florida, Mothers Against Tennessee River Radiation, NC WARN: Waste Awareness and Reduction Network, Nuclear Information and Resource Service, Nuclear Watch South, Sierra Club's South Carolina Chapter, and the Southern Alliance for Clean Energy.

Westinghouse CEO Touts Reactors' Safety (PITTR)

By Thomas Olson

Pittsburgh Tribune-Review, April 7, 2011

Westinghouse Electric Co.'s new generation of nuclear reactors could have withstood the earthquake and tsunami that crippled a nuclear plant in Japan, and that disaster might help the company secure contracts to build them, CEO Aris Candris said on Wednesday.

Although an environmental protection group yesterday petitioned the Nuclear Regulatory Commission to halt its review of Westinghouse's AP1000 design, Candris said he expects the agency to grant final approval in late summer and, by year's end, to license utilities in the Southeast planning to build six of the reactors.

"We've upgraded the design and done significant testing," Candris said in an interview with the Tribune-Review. Computer modeling reviewed by the NRC and its independent experts shows the AP1000 is about 200 times safer than the regulator's requirements, according to Westinghouse.

The Cranberry-based company expects to finalize agreements with China this fall to build 10 power plants with Westinghouse AP1000 nuclear reactors, Candris said. That's in addition to four, multibillion-dollar AP1000s under construction in China. Candris expects to win more contracts there after that.

"If anything, the number of AP1000s that will be built in China will go up as a result of the (disaster) in Japan," Candris said. He predicts that 60 of the more than 100 nuclear power plants China intends to build by 2025 "are probably going to be AP1000s," though it's undetermined how much of that work Westinghouse employees would do, versus a Chinese company under Westinghouse license.

AP1000 stands for "advanced passive" reactors with at least 1,000 megawatts of generating capacity, or enough to power 800,000 homes. In a serious plant malfunction, they would let water percolate from a 300,000-gallon water tank above the reactor vessel to cool the reactor core.

The design differs significantly from General Electric Co.-designed reactors ravaged by Japan's March 11 quake and tsunami. That design relies on generators and pumps to send cooling water to a reactor. The tsunami knocked out the GE equipment, allowing the reactors to overheat and emit radiation.

The natural disaster "would have been a nonevent for the AP1000," Candris said.

Michael Kruse, a principal and energy expert with global management consulting firm Arthur D. Little, agrees.

"The AP1000 probably would have prevented the plant from running into severe core-cooling" problems, said Kruse, reached by phone in Frankfurt.

Still, nuclear power opponents continue to take aim at the industry and Westinghouse.

North Carolina Waste Awareness and Reduction Network, a nonprofit known as NC WARN that represents more than a dozen watchdog groups, filed its petition because a 75-day public review period on the reactor design ends May 10.

"(We're) calling for the U.S. Nuclear Regulatory Commission to suspend its fast-track approval process until design problems are resolved and the lessons from Japan can be fully and openly analyzed," said Jim Warren, executive director of NC WARN. "Industry pressure" rushed the long-delayed approval of the AP1000, he said.

Warren said the legal challenge wasn't prompted solely by the disastrous events at Japan's Fukushima Daiichi reactor. The group questioned potential weaknesses in the AP1000 shield building – part of a structure protecting the radioactive core – and the reactor's passive, gravity-fed cooling system.

Environmental groups in North Carolina, Georgia and Florida scrutinized the AP1000 because utilities there contracted to build reactors that would come on line starting in 2016.

The NRC directed Westinghouse in October 2009 to modify the AP1000 design to make sure the outer building shielding the reactor vessel could withstand the impact of a jetliner, an earthquake, a hurricane or tornado.

"We will get the final approval on these changes in late summer," Candris said, and U.S. utilities that chose AP1000s will get NRC licenses "toward the end of the year."

John Runkle, an attorney for NC WARN, said precedent supports the group's request to delay final approval. After the Three Mile Island accident in 1978, the commission suspended licensing until investigators traced the source of the problem, he said.

Westinghouse won a \$5.3 billion contract with China in 2007 to build four reactors. The first two are expected to come online in 2013. Construction continues "on schedule and on budget, and will continue that way. There's no pause," Candris said.

Owned by Toshiba Corp., Westinghouse employs about 6,000 people in Western Pennsylvania, all in the nuclear power business. The company employs 15,000 overall. It has about 1,000 people in Japan, including at a facility that makes nuclear fuel for the General Electric reactors.

U.S. Nuclear Regulator Meshes Physics And Politics (REU)

By Roberta Rampton

Reuters, April 7, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

US Radiation Study Sparks Debate : Nature News (NATNEWS)

Researchers divided on how best to probe any possible link to cancer.

By Gwyneth Dickey Zakaib

Nature News, April 7, 2011

Japan's ongoing nuclear emergency has intensified discussion on a simmering issue: the potential cancer risk from living near a reactor that is operating normally.

Last year, long before the crisis in Japan, the US Nuclear Regulatory Commission (NRC) asked the National Academy of Sciences (NAS) to examine this cancer question, prompted in part by long-standing public unease. The NAS is now consulting with experts about how to design a study, with the next public meetings on the effort scheduled for 18–19 April in Chicago, Illinois. Already, however, some researchers have questioned the study's feasibility and expressed doubt over whether it will produce meaningful results.

According to the NRC, less than 1% of a person's total annual background-radiation exposure comes from living near nuclear power plants. Much more comes from natural sources in the earth and air, and from some medical exams. Even so, "there are recurrent concerns among the public about increased cancer risks", says Terry Brock, the NRC's project manager for the Analysis of Cancer Risk in Populations Near Nuclear Facilities study. "We want the most current and most scientifically valid information to respond."

The last US-wide study, which found no evidence of a problem, was published by the National Cancer Institute in 1990. Now the NRC aims to update this effort by taking advantage of two decades of improvements in data and technology. For example, whereas the 1990 study considered only cancer deaths, better record-keeping means that researchers can now look for suspect patterns in cancer diagnoses. The previous study also lumped people by county, regardless of their actual distance from a nuclear plant. Global positioning systems, which can pinpoint where people live in relation to a reactor, should now help provide more meaningful results. A further step would be including estimates of radiation doses and looking for correlations with cancer incidence.

But Edward Maher, president of the US-based Health Physics Society, says that even if the study takes all of those factors into account, its statistical power will be too low.

"They may make the public feel better, but they're not going to see very low-dose effects."

"We feel that those studies don't have a lot of value," says Maher. "They may make the public feel better, but they're not going to see very low-dose effects." The money would be better spent on more laboratory research, he adds, where confounding factors such as the presence of other carcinogens can be effectively controlled.

Other experts say that the NAS should build on and improve a 2008 German study (C. Spix et al. *Eur. J. Cancer* 44, 275–284; 2008), which found a roughly 1.5-fold increase in cancers in children younger than 5 living within 5 kilometres of nuclear power plants. The authors concluded that plant emissions were too low to explain the effect, and similar studies done later in France and Britain failed to show any cancer increase, but some researchers have challenged their interpretation of the data.

Nevertheless, Steve Wing, an epidemiologist from the University of North Carolina at Chapel Hill, says that if there is an effect, it will be easiest to see in children and fetuses. Their rapidly dividing cells make them more sensitive to radiation than adults, and they haven't been exposed to as many possible carcinogens. Wing and his colleagues wrote an article on how best to design the NAS study in the 1 April issue of *Environmental Health Perspectives* (S. Wing et al. *Environ. Health Perspect.* doi:10.1289/ehp.1002853; 2011). Among other things, they emphasize the need to obtain radiation-dose estimates for the populations under study.

In the upcoming April meetings, the NAS committee will discuss nuclear power plant emission monitoring and hear study design suggestions. After a series of additional meetings, the committee aims to complete recommendations by the end of 2011, after which they will be posted online for public comment. If the committee decides to move forward with the study, another committee will be appointed next year to carry it out.

Some experts think that there is no effect for the study to find. Antone Brooks, a radiation toxicologist at Washington State University Tri-cities in Richland, says that DNA repair mechanisms and selective suicide of damaged cells are adequate to handle DNA damage below a certain dose threshold.

"We've lived in a sea of radiation throughout evolution," says Brooks. "The body knows how to handle low doses."

Others believe that the risk never vanishes. DNA repair mechanisms don't work perfectly 100% of the time, and even small amounts of radiation confer some risk, says Bill Morgan, the director of radiation biology and biophysics at Pacific Northwest National Laboratory in Richland. "It's a tremendous debate," he says.

Some will argue that if no effect is found, there isn't a problem, says David Brenner, director of the Center for Radiological Research at Columbia University in New York. "But the fact that you can't measure a risk in an epidemiological study doesn't mean that the risk isn't there."

Owners Of Mass. Nuclear Plant Say Facility Is Safe (BOSH/AP)

Associated Press, April 7, 2011

The owners of the Pilgrim Nuclear Power Station in Plymouth, Mass. offered reassurances to state lawmakers Wednesday that the plant is safe, even as Japan continues to reel from the aftermath of a nuclear power disaster.

Entergy Corp. officials said that while Pilgrim's design is similar to that of the Fukushima plant, theirs have backup systems that the Japanese plant lacked, including extra diesel generators and better venting systems.

The comments came as Gov. Deval Patrick and top legislative leaders sent a letter to the U.S. Nuclear Regulatory Commission urging that it hold off on Pilgrim's relicensing request.

"We ... encourage you not to proceed with any steps toward relicensing until we can all be sure that we have learned what we need to from the experience in Japan," Patrick wrote in the letter, which was also signed by fellow Democrats Senate President Therese Murray, whose district includes Plymouth, and House Speaker Robert DeLeo of Winthrop.

Murray and state Attorney General Martha Coakley, both of whom testified at Wednesday's public hearing, urged federal officials to require the owners of Pilgrim to adopt a dry-cask method of storing spent fuel rods.

The plant currently relies on wet storage, similar to the Japanese plant.

Entergy officials said they are planning to move to a dry fuel storage system. They said plans are already under way and fuel rods could begin moving into the new \$65 million facility by 2013.

Even when the new system is in place, officials cautioned, spent fuel rods must still sit in water for five years to continue cooling down before they can be safely moved to dry storage.

Overall, they said, Pilgrim has greater safety measures than the Fukushima plant.

"We have two emergency diesel generators, each of which is redundant to one another and then we have a third redundant diesel generator that we refer to as the station blackout diesel," said Michael Balduzzi, senior vice president and chief operating officer of Entergy's northeast region.

The diesel generators are designed to deliver power for seven days, he said. The plant also has batteries designed to last eight hours.

New Orleans-based Entergy also owns the Vermont Yankee plant, which already has dry fuel storage, officials said.

Coakley faulted the federal government for continuing to collect ratepayer dollars for a national repository for spent nuclear fuel while failing to create the depository.

"Our residents, as ratepayers, have contributed to a \$24 billion fund that should have been used to make our communities safer almost 20 years ago," Coakley said. "They also continue to incur \$10 million a year for the cost of onsite storage at decommissioned sites."

Before the hearing, dozens of sign-holding activists chanted "no more nukes" during a rally on the front steps of the Statehouse.

Speakers at the rally said no new plants should be built in the U.S. and no existing ones relicensed until after a number of safety concerns are addressed.

Among those concerns, activists said, was what they described as the unsafe storage of spent fuel rods and submerged electrical cables at plants such as Pilgrim and New Hampshire's Seabrook that have been degraded by moisture as they age. They pointed out that the Fukushima accident was caused in part by the loss of electricity to the complex.

Officials from Entergy said they have tested submerged cables and found they were safe.

Paul Blanch, a retired Navy nuclear engineer, told the gathering that he was not opposed to the nuclear industry but believed regulation of commercial plants was lacking.

While it was unlikely that Massachusetts would be hit by a tsunami, nuclear plants could be compromised by other events such as hurricanes, tornadoes, floods and terrorist attacks, Blanch said.

"Can it happen here?" he said. "We all know that Pilgrim is about the same design as the Fukushima plants, and it can happen here."

Future Of New England Nuclear Power Center Stage On Beacon Hill Today (QPL)

By Nancy Reardon Stewart

Quincy (MA) Patriot Ledger, April 7, 2011

Future of New England nuclear power center stage on Beacon Hill today

GateHouse Media, Inc.

Wednesday, April 06, 2011 12:00 AM

The future of nuclear power is a center-stage topic today on Beacon Hill, and not just the power produced by the Pilgrim plant in Plymouth.

Legislators are expected to hear from nuclear watchdog groups, industry experts, state health and environmental officials, and executives from the companies that own the three active nuclear plants in New England during an oversight hearing conducted by members of four joint committees – health, environment, public safety and energy.

State lawmakers do not have any real authority over the local nuclear plants, which are regulated federally by the Nuclear Regulatory Commission.

The hearing has been pitched as an opportunity for lawmakers to ask questions about safety concerns and procedures, and to gain a better understanding of the region's preparedness for a meltdown or some other nuclear-related disaster.

The NRC is considering Pilgrim's request for a 20-year extension of its operating license, which is to expire next year.

Today's hearing is expected to kick off with remarks by Attorney General Martha Coakley, who has been urging federal officials to take action concerning spent fuel stored at all three of New England's plants: Pilgrim, Vermont Yankee and Seabrook in New Hampshire.

The spent fuel has been kept at all three plants since they opened – since 1972, in the case of Pilgrim – and there are concerns about whether the storage is safe.

Mary Lampert, a Duxbury resident and founder of Pilgrim Watch, plans to focus her remarks on the dangers of storing spent fuel in a pool of water. This type of "wet" storage system has prevented officials in Japan from bringing the Fukushima Dai-ichi nuclear plant under control since the earthquake and tsunami that occurred March 11.

Lampert also plans to make several safety recommendations that state officials could implement, including enlarging the emergency zone around the Pilgrim plant. The zone currently extends 10 miles from the plant; Lampert advocates an increase to 25 miles.

The Nuclear Regulatory Commission has recommended that American citizens who are within 50 miles of the Dai-ichi plant evacuate the area.

Lampert also urges lawmakers to join the state's congressional delegation in asking President Barack Obama to enforce a 2002 law requiring the distribution of potassium iodide to people within 20 miles of a nuclear reactor and to conduct unannounced training exercises – ones that include schools – to make sure everyone is prepared.

Meeting Scheduled To Discuss Nuclear Plants (WMUR)

WMUR-TV Manchester, NH, April 6, 2011

Lawmakers on Beacon Hill will shine a spotlight on two local nuclear power plants.

Hearings are scheduled Wednesday to discuss the safety of New Hampshire's Seabrook plant and the Pilgrim Nuclear Power Plant in Plymouth, Mass.

Massachusetts Senate President Therese Murray said she wants the public to know about the safety systems already in place and wants to hear from plant officials about what more could be done.

A rally is scheduled for 1:30 p.m. at the Statehouse in Massachusetts, followed by a public hearing.

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Antinuclear Sentiment Regains Its Voice At State House Rally (BOS)

By Beth Daley

Boston Globe, April 7, 2011

A long-muted antinuclear movement in New England regained its voice today as more than 75 people held a State House rally to protest the region's aging nuclear plants and the increasing stockpile of radioactive spent fuel rods at them.

The protest was held shortly before a State House hearing where legislators were scheduled to hear representatives of the region's three nuclear plants – Pilgrim in Plymouth, Vermont Yankee in Vernon near the Massachusetts line, and Seabrook in New Hampshire – talk about the safety of their reactors in the wake of the unraveling Japanese nuclear crisis.

"We have lessons to learn here," said Mary Lampert of Pilgrim Watch, a group opposing an application by Pilgrim to extend its operating life by 20 years once its initial 40-year license expires next year. "Spent fuel is being stored in our reactors in an unsafe manner." Spent fuel rods stored at one of the troubled reactors in Japan caught fire and released radiation after last month's powerful earthquake and tsunami knocked out power and caused the plant's cooling system to fail.

Vermont Yankee and Pilgrim have designs similar to the crippled Japanese nuclear plant. Vermont Yankee received approval for a 20-year license renewal the day before the earthquake struck. Pilgrim is still waiting for approval, and Seabrook, which has a license that will expire in 2030, has applied for a 20-year extension.

Protesters held signs that read, "Safe Energy Saves Lives" and "Solar/Wind no Toxic Waste."

"It's not a time to panic but it's a great time to reconsider nuclear power's risk and our own safety," said Representative Lori Ehrlich, a Marblehead Democrat. "We need to make sure we can safely coexist with the energy generation on which we depend."

Activists Rally Against Nuclear Energy (WWLP)

By Christine Lee

WWLP-TV Springfield (MA), April 6, 2011

BOSTON, Mass. (WWLP) - Energy and environmental groups rallied on Beacon Hill Wednesday, voicing concerns over nuclear energy in the aftermath of Japan's nuclear disaster.

Demonstrators say nuclear power plants in Plymouth, New Hampshire and Vermont are based on old and risky technology similar to Japan's Fukushima nuclear power plant. They're asking that no new reactors be built in the U.S. and that all licenses for existing plants be denied until all safety concerns are fully addressed.

Energy Consultant Paul Blanch says that while New England may not have tsunami fears, nuclear disaster could happen if there were ever an electrical power blackout.

"These events can be caused by hurricanes, tornadoes, floods, terrorist attacks," said Blanch, "and [Plymouth's] Pilgrim [nuclear power station] cannot survive core damage for more than four to eight hours."

Demonstrators are further concerned by the global impact of nuclear energy. Last week State Public Health Officials announced that low concentrations of radiation, originating from Japan, were found in a rainwater sample in Massachusetts.

"This is one of the things that's so crazy about nuclear power," said Environment Massachusetts Energy Advocate Ben Wright. "It is so risky that a disaster that happens actually on the other side of the world has effects here in Massachusetts."

The rally was held before a legislative hearing at the State House. Nuclear power plant owners from Plymouth's Pilgrim, Vermont Yankee and Seabrook in New Hampshire are scheduled to testify before lawmakers on their safety procedures.

Nuclear Protesters Take To Mass. State House (WBUR)

WBUR-FM Boston, April 6, 2011

THE STATE HOUSE — State lawmakers held a hearing Wednesday afternoon to examine potential risks at the three nuclear plants in and near Massachusetts.

Before the hearing, several dozen people from various environmental groups held a rally in front of the State House, expressing their concerns about nuclear power. Groups including Environment Massachusetts, Clean Water Action and Pilgrim Watch are calling on the Nuclear Regulatory Commission to delay re-licensing for the Pilgrim Nuclear Power Plant in Plymouth.

Mary Lampert of Pilgrim Watch said one of the biggest worries is spent nuclear fuel being stored in containment pools at Pilgrim.

"We cannot take that risk," Lampert said. "We don't need that risk. We must push for on-site dry cast storage of this waste, until there's an off-site repository."

Critics say the plant in Plymouth is susceptible to disaster since it is the same design as the stricken Fukushima plant in Japan.

Marblehead state Rep. Lori Ehrlich, who has toured the area around the 1980s' Chernobyl disaster, said lawmakers are aware of the risks associated with nuclear power.

"It's not time to panic, but it's certainly time to reconsider nuclear power's risk and our own safety," she said, adding later, "We must do everything we can to make sure catastrophe like Chernobyl or Fukushima, Japan, never happens here."

NRC Says 2 Illinois Nuclear Plants Undergoing Special Inspections Over Equipment Concerns (AP)

Associated Press, April 7, 2011

CHICAGO (AP) — The U.S. Nuclear Regulatory Commission

says it's conducting special inspections of equipment issues at two Illinois nuclear power plants.

The agency said Wednesday that a special inspection team will review backup water pumps at the Byron and Braidwood generating stations. NRC inspectors in February raised concerns about whether the pumps would be able to cool the reactors if the normal system wasn't working.

The plants' operator, Exelon Corp., initially said the pumps would work, but later concluded they wouldn't.

The NRC says it'll also review the loss of alarms on control room equipment at the Braidwood plant during maintenance.

The agency says none of the issues posed an immediate threat to the public and have been resolved.

Exelon spokesman Marshall Murphy says the company supports the investigation as it proceeds.

U.S. Nuclear Regulator Reviewing 2 Illinois Plants (REU)

Reuters, April 7, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

Extra Inspections At The Byron Nuclear Plant (WIFR)

WIFR-TV Rockford (IL), April 7, 2011

BYRON (WIFR) — Special inspections will soon be taking place at the Byron Nuclear Plant due to concerns with the water pumps' backup system.

The U.S. Nuclear Regulatory Commission is investigating whether the pumps would be able to cool the reactors if the normal system wasn't working. This comes after the plants' operator Exelon Corp. initially said the pumps would work, but later concluded they wouldn't.

U.S. nuclear plants are now being looked at more closely due to the nuclear meltdown in Japan.

Public Meeting April 13 On Peach Bottom Power Plant Inspection Report (EXHARCO)

By Bryna Zumer

Explore Harford County, April 7, 2011

Residents can hear about Peach Bottom nuclear power plant's inspection report at a public meeting to be held by the U.S. Nuclear Regulatory Commission April 13.

The commission holds such meetings annually at all its power plants to update the community about safety status, spokeswoman Diane Screnci said.

The meeting will be held at 6 p.m. at the Peach Bottom Inn, 6805 Delta Road in Delta, Pa., several miles from the plant. Attendees will have a chance to ask the NRC staff any questions about the plant's performance.

According to a press release from the commission, Peach Bottom operated safely during 2010 and had no performance indicators other than "green," the safest level, and no inspection findings greater than green. The NRC spent 5,500 hours inspecting the facility during 2010, including two major team inspections.

Two resident inspectors from the commission routinely check the plant.

The areas being studied this year are emergency preparedness; radioactive material handling, storage and transportation; the dry cask storage of spent nuclear fuel; and the plant's problem identification and resolution program.

"Our annual assessment reviews allow us to step back and gauge whether the nuclear power plants we regulate are on the right track in terms of performance and adhering to the highest levels of safety," Bill Dean, administrator of NRC's Region 1 office, said in a press release.

Beaver Nuke Plant Was Cited For Having Submerged Cables (BEAVCT)

By Patrick O'Shea

Beaver County (PA) Times, April 7, 2011

SHIPPINGPORT - The Beaver Valley Nuclear Power Station was cited in a December report from the Nuclear Regulatory Commission for having electrical cables to safety systems the previous year in an environment where they could be submerged in water, which could cause the cables to fail.

However, a representative of FirstEnergy Corp., operator of the Shippingport plant, said the company already has modified its safeguards for the cable system to comply with federal requirements.

Todd Schneider of FirstEnergy said Wednesday that the NRC reviewed the situation during the plant's most recent license renewal process and gave its approval.

Beaver Valley was one of nine plants since 2007 that were found to have cables that were improperly submerged in water, based on the NRC report, listed in a recent legal filing from the nuclear watchdog group The New England Coalition, according to The Associated Press. The coalition has been fighting the license renewal of a plant in Vermont that also was on the list.

Neil Sheehan, spokesman for the NRC, said his agency has been concerned about maintenance of underground electric cables at U.S. nuclear plants for many years and issued a generic letter in 2007 asking plant operators to gather information on cable failures. Information from the responses was included in last year's report, which noted 269 cable failures throughout the country. Beaver Valley did not report any cable failures.

Sheehan said a major factor in the cable failures were submergence in water or exposure to moisture. The NRC is concerned about cable failures because they can lead to losses of safety system backups and possible plant shutdowns, he said.

It was a loss of power to Japan's Fukushima nuclear plant that led to the release of radiation that has been seen throughout the world, including low levels of radioiodine-131, a byproduct of nuclear fission, in the atmosphere over several U.S. states, including Pennsylvania.

Sheehan said Beaver Valley was given a notice of violation after an Aug. 4, 2009, inspection in which inspectors said the plant failed to maintain safety-related cables in an environment for which they were designed. According to the violation notice, the cables affected were those for Unit 1 river water and Unit 2 service water.

Schneider said the cables at the Shippingport plant are suitable for underwater use, but he said FirstEnergy has made changes. He said a system is in place to remove water automatically from the mechanical maintenance manholes where water gathers, and the manholes now give off an alarm if water accumulates. Schneider added that the integrity of cables also is routinely tested.

New York On Nuclear: What's Plan B? (POLITCO)

By Darius Dixon

Politico, April 7, 2011

For years, Andrew Cuomo has been part of a chorus urging the shutdown of the Indian Point nuclear power plant north of New York City, calling it an unacceptable danger to the 17 million people who live within 50 miles of its reactors.

Now, as governor, Cuomo stands to preside over the plant's potential retirement. But so far, he has yet to spell out a proposal for how the state would cope without Indian Point, which produces about 12 percent of the state's power and provides a quarter of New York City's electricity.

Cuomo has had reasons to be otherwise preoccupied, including a state budget fight that was resolved only last week, but the hole in his energy strategy is frustrating both supporters and opponents of Indian Point. It also leaves him just a brief window in which to propose serious changes to the state's energy portfolio or walk back his many years of opposition to the plant.

"Whether Indian Point shuts down tomorrow or not, it needs to be alleviated because the plant's not immortal," said David Lochbaum, a nuclear safety expert with the Union of Concerned Scientists, a group that opposes nuclear power. "It's going to shut down at some point, so some planning needs to be done."

Others, such as New York City Mayor Michael Bloomberg, maintain that the city still needs the power plant.

"Short term, we have to have power if we are going to grow," Bloomberg said in March, "and Indian Point at the moment is a big part of that."

The debate has gained new urgency in light of the nuclear disaster in Japan, although a vocal and powerful opposition force was targeting Indian Point well before Sept. 11 drew attention to the two reactors' vulnerability to terrorist attacks. Opponents note that the people living within 50 miles of Indian Point make up almost 6 percent of the U.S. population — the highest concentration in the country for any nuclear plant.

At the same time, the state's Independent System Operator said in its annual reliability report in September that allowing both Indian Point reactors to retire would jeopardize the reliability of the electricity grid and create transmission choke points.

The initial 40-year licenses for the plant's two reactors are set to expire in 2013 and 2015. Even if the Nuclear Regulatory Commission offers extensions, the plant still has to deal with other environmental regulations and contend with the governor's bully pulpit.

In 2007, as state attorney general, Cuomo championed an effort with then-Gov. Eliot Spitzer to block relicensing of Indian Point.

"We cannot continue to roll the dice with the operation of Indian Point — there is simply too much at stake," Cuomo said in a statement at the time. He added, "The NRC has repeatedly ignored the danger that Indian Point poses to New Yorkers — from its vulnerability to a terrorist attack, to its incapability to withstand potential earthquakes, to its lack of a plausible evacuation plan in the event of a catastrophe."

Current Attorney General Eric Schneiderman has gladly taken the mantle and, although he's fallen short of targeting the plant for closure, has led perhaps the most vigorous legal assault on it so far — challenging everything from the NRC's onsite waste storage rules to Indian Point's fire-safety provisions.

But nobody has laid out a detailed plan to replace the lost electricity.

Although Cuomo campaigned partly on a promise to close Indian Point, his energy proposals ran thin on what would replace the plant. His "Power NY" agenda merely said repeatedly that "We must find and implement alternative sources of energy generation and transmission to replace the electricity now supplied by the Indian Point facility."

The most commonly floated strategy is one that rests on building transmission lines that would bring in hydroelectric power from Canada.

"More than planning, you have to build infrastructure," said Lochbaum, of the Union of Concerned Scientists. "There are already resources up in upstate New York and Canada. It's getting them to where all the users are."

On the other hand, he said, "no one wants the transmission lines in their backyard." So on whether Cuomo could build the lines before both reactors would close, Lochbaum said, "I wouldn't bet on that."

The plant's supporters say it would be foolish to shut down the reactors without a program to work around their loss.

"What is the alternative?" asked Matt Nelligan, director of the state Senate's Energy and Telecommunications Committee, whose Republican chairman, George Maziarz, supports keeping Indian Point open. "What's the impact on electricity prices in the state? People should be concerned about that."

"New York has some of the most diverse generation assets in the country, and nuclear is a part of that mix," Nelligan added. "It's very hard to figure out, given the parameters here, how you would replace 2,000 megawatts of power."

Environmentalists, though concerned about nuclear power in general, have also grown weary of the state's lack of progress in developing a workaround for the plant.

Cuomo "really should make it a priority to develop and implement, basically, a non-Indian Point energy plan," said Phillip Musegaas, an attorney and researcher for Riverkeeper. He said he's seen other governors make similarly lofty promises, only to leave them incomplete.

Riverkeeper filed a lawsuit against the EPA to make it enforce a section of the Clean Water Act requiring plant operators — like those at Indian Point — to install cooling water systems that are less harmful to aquatic creatures and avoid sucking them into the plant.

The increased awareness of the hazards of nuclear power in light of the Fukushima Daiichi crisis makes this the best time for the state to leap on the issue if it is serious about closing Indian Point, Musegaas said.

"Its location, more than anything else, just cries out for somebody to address this. And now is the time to do that, whatever the outcome," he said. "Even if they work on a plan and they come back and say, 'We can't do it without this plant,' I think the public deserves an honest assessment."

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Clearwater Conducts "Power Sail" To Discuss Indian Point (MIDHUD)

Mid-Hudson News, April 7, 2011

Hudson River Sloop Clearwater, the organization, assembled environmentalists, scientists, public officials and students to take to the Hudson River aboard their famed schooner Clearwater and discuss the Indian Point nuclear power plant and alternative forms of energy production.

The sail was full of visual imagery as the boat passed in front of the nuclear plant as song and discussion continued.

Clearwater Executive Director Jeff Rumpf noted the nuclear plant disaster in Japan is what brought the Indian Point safety issue to the surface.

"There is a tragedy unfolding in Japan and we feel and we respect the horrors that are going on over there," he said. "Coming here today is related to that. There are real risks associated with Indian Point. Many of these risks are not even being considered by the NRC."

Speakers including representatives from the Lamont-Doherty-Earth Institute, environmental groups, and former Congressman John Hall.

Among the concerns expressed were the possibility of earthquake and the 10 mile radius evacuation zone around Indian Point.

U.S. Nuclear Output Declines To Lowest Level In Almost 17 Months (BLOOM)

By Colin McClelland

Bloomberg News, April 7, 2011

U.S. nuclear-power output fell to the lowest level in almost 17 months as Entergy Corp. (ETR) shut the Waterford 3 reactor in Louisiana, the Nuclear Regulatory Commission said.

Power generation nationwide decreased by 411 megawatts, or 0.5 percent, from yesterday to 75,774 megawatts, or 75 percent of capacity, the smallest amount since Nov. 9, 2009, according to a report today from the NRC and data compiled by Bloomberg. Twenty-four of the nation's 104 reactors were offline.

Entergy Corp. idled the 1,157-megawatt Waterford 3 reactor about 25 miles (40 kilometers) west of New Orleans. The unit was operating at about 85 percent of capacity since Feb. 21 because of high vibration on a feedwater pump, the NRC said.

The Tennessee Valley Authority started the 1,104-megawatt Browns Ferry 2 reactor in Alabama. It was operating at 1 percent of capacity.

Two other reactors at the site, the 1,065-megawatt Unit 1 and the 1,115-megawatt Unit 3, are operating at full power. The plant is 84 miles north of Birmingham.

Duke Energy Corp. (DUK) boosted the 1,100-megawatt McGuire 2 in North Carolina to 55 percent of capacity from 10 percent yesterday. The 1,100-megawatt McGuire 1, is operating at full power at the site 15 miles north of Charlotte.

Southern Co. (SO) increased output from the 1,109-megawatt Vogtle 1 reactor in Georgia to 94 percent of capacity from 87 percent yesterday. The unit is returning from an outage that began March 7.

The plant is 26 miles southeast of Augusta. Another reactor at the site, the 1,127-megawatt Vogtle 2, is at full capacity.

Some reactors close for maintenance and refueling during the spring and fall in the U.S., when demand for heating and cooling is lower. The outages can increase consumption of natural gas and coal to generate electricity.

The average U.S. reactor refueling outage lasted 41 days in 2009, according to the Nuclear Energy Institute.

Residents Learn About Local Nuclear Plant Safety (CLHRLD)

By Andrew Mitchell

Clinton (IA) Herald, April 7, 2011

CORDOVA, Ill. — The Exelon-owned nuclear power plant continued its public relations effort Tuesday night with an open house at the Cordova Civic Center.

Randy Gideon, vice president of the Quad-Cities Generating Station in Cordova, said that with the crisis in Japan still fresh in the public's mind, they wanted to show people how the plant along the Mississippi River is a safe and well-maintained facility.

"As an industry, we haven't done a good job educating the public," he said. "It's like, you've got atomic bombs over here and power plants over there. They're very different things."

Davenport resident Dwayne Luebke said the crisis at Japan's Fukushima power plant is part of why he attended the open house. But he also has family living in Cordova, and he wanted to ease his mind about the plant's safety.

"I'm mainly concerned about spent fuel," he said.

Representatives from the federal Nuclear Regulatory Commission were also on hand to answer questions and inform those within the plant's 10-mile radius what to do should an emergency at the plant occur.

The commission regularly comes to Cordova to hold public meetings like the one Tuesday. Gideon said this meeting was the most well-attended one in years.

"Usually, it's just us and the NRC," he said.

Both he and communications manager Bill Stoermer, as well as NRC officials, reiterated their confidence in the plant's safety, and the extreme unlikelihood of a disaster like that of Japan's to hit Cordova.

Lawmakers in Iowa and Illinois have been debating whether to allow an expansion of nuclear power since the disaster, with some saying it's a vital and under-utilized source of dependable energy. Opponents say they are still worried about safety and environmental impact. Copyright 2011 The Clinton Herald, Clinton, Iowa. All rights reserved. This material may not be published, broadcast, rewritten or redistributed.

NRC In Surry To Discuss Nuclear Plant Safety (WAVY-TV)

WAVY-TV Norfolk, VA, April 7, 2011

The U.S. Nuclear Regulatory Commission held a public meeting Wednesday night to discuss the safety performance of Dominion Virginia Power's Surry nuclear power plant.

Officials say the agency found that both units at the Surry plant met all safety objectives in 2010 and was at a level that results in no additional oversight.

"I've been here most of my life and they haven't had any major incidents," resident Lawrence Weller said. "I guess they're okay. But like I say, the Nuclear Regulatory Commission passing anything doesn't give you a lot of comfort because it's another bureaucracy."

A letter sent from the NRC to plant officials addresses the plant's performance is available by clicking [here](#).

The agency works to ensure plants are being operated in a way that protects the environment and nearby residents.

"Each year, the NRC evaluates the safety performance of nuclear plants in a detailed and systematic way," NRC Region II Administrator Victor McCree said. "The inspections and oversight at Surry ensure that the plant is operated in a way that protects people near the plant as well as the environment."

But recent events regarding Japan's Fukushima Dai-ichi nuclear power plant have some Surry residents concerned.

"That could possibly be us one day," Paula Walker told WAVY.com. "That could happen here at some point, but that's kind of the chance we take."

"We constantly look to see if there are things they can do better," said Roger Hannah with the U.S. Nuclear Regulatory Commission.

Still other residents who watched the disaster in Japan admit they are worried.

"We could have the same thing other countries have, said Clarence Fields. " We could have a major disaster that could cause the nuclear power plant to go out of control and so I worry about that."

"I think it's on people's minds," said Judy Little. "What if? We all can say 'what if.'"

Plant officials say inspectors checked the plant from top to bottom and they say the Surry reactors are safe. They're now looking at Japan, to see what could have been done differently.

"Are there things that happened there?" Hannah asked. "Are there methods that can be used that could apply to plants in this country? The bottom line is that at this point we don't know."

The Surry nuclear power plant is about 17 miles northwest of Newport News. It contains two nuclear reactors. According to Dominion's website, Unit 1 began commercial operation in December 1972 and Unit 2 began operating in May 1973.

Report: Surry Nuclear Plant Deemed Safe, No Additional Oversight Needed (NWPRTNWZ)

Newport News (VA) Daily Press, April 7, 2011

WAVY.com is reporting that a safety meeting held Wednesday night that dealt with safety issues at the Surry nuclear plant found that the plant met objectives in 2010.

According to the report, the U.S. Nuclear regulatory commission did not recommend any additional oversight for the plant. Fears of nuclear plant safety have arisen after the recent crisis in Japan involving their nuclear plant. For the complete report, click here to visit WAVY.com.

Interest In Surry Nuclear Safety Is Heightened (VAPILOT)

By Linda McNatt

Hampton Roads Virginian-Pilot, April 7, 2011

Every spring, the U.S. Nuclear Regulatory Commission holds public information meetings to advise the public about the safety of nuclear power plants.

About two or three people show up.

This year, Gerald McCoy of the NRC said the agency seems to be operating under an increased public interest, likely because of the nuclear disaster in Japan.

"I've seen more response than I've ever seen before," McCoy said of the handful of people at Wednesday night's meeting in Surry County, where the nearby Surry Nuclear Power Station has operated since 1972.

In Virginia's North Anna power station community a few days ago, McCoy said 42 people showed up.

At the Surry meeting, several people aired concerns.

Two women who live on Hog Island Road, the rural roadway that leads to the power station, wanted to know how long they would have to get out of their home should a nuclear disaster occur at Surry.

Maybe they shouldn't leave their homes, the NRC staff told them. Maybe they would be safer inside, just as the people in Japan were instructed to do.

Both of Virginia's nuclear power plants currently have a safety ranking code of "green," meaning they are at the safest of four levels.

The most recent inspection at North Anna uncovered some concerns that briefly changed its safety ranking to "white," the second level. One concern had to do with a lightning strike, another with incorrect computer software, McCoy said.

Once the concerns were corrected, North Anna was considered back at green.

Surry has been green since its most recent inspection was completed. The first of its two reactors went on line in 1972, the second in 1973. They have a potential life expectancy of 60 years. The plant recently had its license extended through 2012.

NRC representatives are now in Japan, McCoy said.

"We're taking this as an opportunity to learn," he said.

Nobody can say yet just how serious the Japanese disaster might be because it's far too soon to get close, he said.

"We're going to take what we've learned and take our own look at it. We'll continue to build on that."

The good news is that neither North Anna or Surry are likely to experience either an earthquake or a tsunami.

Energy Secretary Steven Chu: 'Imprudent' To Close US Nuclear Plants (CSM)

By Dave Cook, Staff writer

Christian Science Monitor, April 7, 2011

Energy Secretary Steven Chu had a distinguished scientific career before joining Barack Obama's cabinet. He shared the 1997 Nobel Prize in Physics, was a professor at Stanford University, and ran the Lawrence Berkeley National Laboratory. He was the guest speaker at the April 1 Monitor breakfast in Washington, D.C. Skip to next paragraph

Progress dealing with the damaged reactors at Japan's Fukushima Daiichi complex:

"They are making headway, but [in one reactor] ... there [are] significant levels of radiation that impede progress."

Nuclear energy's continuing role in US energy policy:

"We still believe that that has to be part of our energy mix.... We do not want to be generating our electricity from one source.... We want to have a diversified source as the renewables pick up ... steam, as the price drops and they become cost [competitive] without subsidy."

Calls to close nuclear plants close to population centers like New York City:

"It is premature to say that these plants have to shut down. New York State, in partnership with the nuclear regulatory agency, is reviewing the issue.... It would be imprudent to say we have 20 percent of our energy [from nuclear] so shut them all down. That's like saying you have a major gas leak somewhere and an explosion kills a lot of people – we don't want to use natural gas anymore."

The impact of Republicans' proposed cuts in his department's clean-energy R&D budget:

"I would hope Congress would appreciate the fact that the research-and-development budget is vital for our future prosperity.... This is a very competitive world out there.... You turn off the spigot for this research and ideas, you will be saying, 'All right, United States, you are not in the race anymore.' And that would be tragic."

Climate change and the transition to cleaner energy:

"There are two very good reasons for transitioning to clean energy and a more energy-efficient economy. One of them ... is the climate imperative. There are risks as we go forward; each year, we are learning more about those risks. The evidence is getting stronger and stronger. And there is a very compelling case. But there is another reason. And the other reason is: The world is beginning to realize that they will need to transition to clean energy, they want clean-energy sources, and those clean-energy sources – we believe within the coming decade or decades, but not too many – will become competitive with fossil fuel."

Analyst: No VY Shutdown In 2012 (BRATBORO)

By Bob Audette

Brattleboro Reformer (VT), April 7, 2011

BRATTLEBORO – According to Jefferies, an investment advising company, Entergy will continue to operate Vermont Yankee nuclear power plant in Vernon beyond the March 2012 cut-off date.

"That would force the state to file a lawsuit in federal court seeking a shutdown of the plant," stated the report, which was issued on Tuesday.

Entergy has a strong defense it can present in court, stated the report, in claiming that Vermont is attempting to pre-empt federal law and regulation.

"We believe it is presumptuous to assume that the plant will be shut down or that Entergy would lose the lawsuit," states the report.

"It does look like a showdown is coming," said Patrick Parenteau, professor of law and senior counsel at the Environmental and Natural Resources Law Clinic at the Vermont Law School.

However, he added, the state may have a pair of trump cards in its back pocket.

"The first is that the state doesn't have to go to court to shut Yankee down," said Parenteau. "It can simply order (Vermont Electric Company) to disconnect the plant from the grid."

Velco maintains the state's transmission lines and runs the power switchyard that connects Yankee to the New England power grid.

Kerrick Johnson, a spokesman for Velco, said it would not speculate on litigation that has not yet been enjoined.

"I would simply say that Velco will continue to follow all applicable federal and state laws," said Johnson.

Secondly, said Parenteau, "Entergy would be crazy to keep operating in open defiance of state law. That would put Entergy in the worst possible posture before the federal court. If Entergy wants to challenge the constitutionality of the state law, it would be better advised to seek a declaratory ruling from the court before the expiration date arrives."

Entergy recently received a new license from the Nuclear Regulatory Commission to operate Yankee for another 20 years past March 2012, its original expiration date.

However, when Entergy purchased the power plant in 2002, it signed a memorandum of understanding with the state that it would abide by the Vermont Public Service Board's decision on whether it should receive a certificate of public good, which is required for continued operation.

In 2006, the Vermont Legislature passed Act 160, giving itself the power to forbid the PSB from issuing a CPG without the Legislature's approval.

In January of 2010, the Vermont Senate voted 26 to 4 against allowing the PSB to issue a certificate of public good.

Parenteau also said that if Entergy continues the operation of Yankee, it is placing "a hefty wager on its legal theory that it is not bound by the contract it signed in 2002," because one of the conditions of the NRC's relicensing is that Entergy spend hundreds of millions of dollars on the replacement of the plant's condensers, which cool reactor water.

"And of course, there's still the business about 'misleading' the PSB about the tritium pipes," he added.

The Vermont Attorney General's office is in the process of investigating whether Entergy representatives knowingly gave false or misleading information to the state in 2009 about the status of buried and underground pipes at Yankee.

Sarah Hofmann, the deputy commissioner of the Vermont Department of Public Service, said the state expects Entergy to abide by its memorandum of understanding.

"If Entergy wants to operate the station after that time, it needs an affirmative vote by the Vermont General Assembly and a new certificate of public good from the Public Service Board," she said.

Vermont Attorney General William Sorrell said that, according to Act 160, which is Vermont law enacted by the Legislature, Entergy can't continue to operate without a certificate.

"Not without a big fight," he said. "We will do all in our power to see that Vermont law is obeyed."

The Senate has already stated "very vehemently" when it voted 26 to 4 that it is against the plant's continued operation, said Sorrell.

"Consequently, there is no permission from the state for Yankee to operate beyond 2012 unless the Legislature changes its course," he said.

In its report, Jefferies noted that the state cannot refuse to issue a certificate based on radiological safety issues, which falls under the NRC's purview.

The state can only base its decision on the reliability of the plant and any impacts its operations might have on the environment.

"As for the plant reliability issue," stated the report, "Vermont Yankee has had an average capacity factor of more than 94 percent in the past five years ..."

The plant's National Pollution Discharge Elimination System permit will soon be up for review by the Vermont Agency of Natural Resources. It is unclear how that might affect the plant's operation. It's also not clear if the review will even be completed by March 2012.

Entergy might also have an argument in court based on a clause in the MOU that states operation of the plant has to "promote the general welfare" of the state.

"Our legal contact at the Vermont Department of Public Service noted that there is no standard in the law that defines 'general welfare,'" stated the report.

The report pointed out that Entergy was unable to finalize new 20-year power purchase agreements with Central Vermont Public Service and Green Mountain Power "because of the uncertain political environment."

Steve Costello, spokesman for CVPS, said both CVPS and GMP agreed on "a lot of things (with Entergy) but we never got a deal we thought we could get approval for."

And even if the two utilities had reached a tentative agreement with Entergy, "We wouldn't sign a contract without Vermont's backing," he said.

Last week, Entergy announced it had presented a proposal to sell 10 megawatts for 20 years to the Vermont Electric Cooperative in northern Vermont.

VEC's board of directors will vote on the proposal at the end of this month; however the company's president said many board members are hesitant to approve the contract in light of the ongoing nuclear crisis in Fukushima, Japan, and because of the storage of nuclear waste on-site in Vernon.

At the time the proposal was announced, CVPS and GMP both said they would not sign a contract to purchase electricity from Yankee unless Entergy sold the plant and it received a certificate of public good from the state. Bob Audette can be reached at raudette@reformer.com, or at 802-254-2311, ext. 160.

Nuclear Opponents Worry About Vt. Yankee Decommissioning Costs (WCAXTV)

By Susie Steimle

WCAX-TV Burlington, VT, April 7, 2011

Opponents of nuclear power want to make sure Vermont Yankee sets aside enough money to safely dismantle the plant.

Three advocates led a discussion Tuesday night in Rutland focusing on the post-Yankee era. The plant could be forced to shut down next year.

Citizen's Awareness executive director Deb Katz says she's seen three nuclear reactors shut down in New England and worries about how much it will cost to close Vermont Yankee.

"The reality is all of the funds for decommissioning for all the nuclear reactors are underfunded because the NRC doesn't require them to have fully funded decommissioning and they're underestimated," Katz said.

Yankee may not shut down in 2012 despite Vermont lawmakers voting against a new license. The federal government OK'd a license for the plant. And Yankee officials say one option is to stay open without state approval.

UPDATE 1-Japan Crisis Casts Pall Over Nuclear Fuel Meeting (REU)

By Nick Carey And Eileen O'Grady

Reuters, April 7, 2011

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Nuclear Plant To Hold Emergency Drill (OCR)

By Pat Brennan

Orange County Register, April 6, 2011

The San Onofre nuclear plant will simulate an emergency next week in one of the largest drills of its kind, involving federal, state and local officials whose responses will be graded by the Federal Emergency Management Agency.

The three-day drill begins for San Onofre on April 12, when plant employees' pagers will be activated with news of the "emergency."

It is one of several regularly scheduled drills held at the plant each year, according to spokesmen for Edison and the California Emergency Management Agency.

"This is not something being precipitated by events in Japan," said Cal EMA spokesman Jay Alan. "But obviously, it takes on added interest."

This year, FEMA officials will evaluate how the agencies respond to the press.

The public affairs team for the San Onofre plant, run by Southern California Edison, will set up a mock information station on site, while a variety of agencies send representatives to an "emergency information center" in Irvine, also offering briefings to journalists.

The drill scenario is not being revealed in advance to employees to better duplicate real-world conditions, Edison spokesman Gil Alexander said.

The Irvine center, Edison's Saddleback Service Center on Bake Parkway, will be a hive of activity, with emergency responders from Orange and San Diego counties, the Camp Pendleton Marine Base and a number of cities on hand.

Cities and agencies taking part include San Clemente, Dana Point, San Juan Capistrano and the state Department of Parks and Recreation, among others.

San Onofre Emergency Readiness To Be Tested Next Week (SDUT)

Long-planned drill to simulate release of radioactivity

By Onell R. Soto

San Diego Union-Tribune, April 7, 2011

Even as a badly damaged nuclear plant across the ocean pours radioactive water into the Pacific, federal, state and local officials want to know how ready we are for an accident at the San Onofre nuclear plant.

Beginning April 12 and concluding April 14, state, federal and local officials will simulate the release of radioactivity from the plant.

Inside the plant, located in the northern reaches of San Diego County, workers will be simulating how to shut the plant down and secure radioactive fuel, said Gil Alexander, a spokesman for Southern California Edison, which runs the plant.

"There are a total of about 200 of us associated with the plant that will drill," he said. "At least half of those are focused on the plant."

The others will be working on communicating what's happening inside with the outside world, including government officials, news media and the public.

State law mandates these tests every few years.

The drill was planned by the California Emergency Management Agency months ago, long before the March 11 earthquake and tsunami that crippled Japan's Fukushima Daiichi nuclear complex.

There, a quake much larger than thought possible launched a tsunami that overran the oceanfront nuclear plant. In the weeks since, there have been explosions, meltdowns and radiation releases.

At San Onofre, federal officials will be observing how community leaders react in the face of a potential catastrophe, said John Hamill, a spokesman with the Federal Emergency Management Agency.

They will rate how they work and look for places to improve.

FEMA and the U.S. Nuclear Regulatory Commission will discuss what they find at a public meeting at 4 p.m. April 15 at the Capistrano Unified School District Education Center, 33122 Valle Road, San Juan Capistrano.

In addition to plant workers and state and federal officials, the exercise will also include representatives of Los Angeles, Orange, Riverside, San Bernardino and San Diego counties, and the cities of Dana Point, San Clemente and San Juan Capistrano, and the Capistrano Unified School District.

San Onofre Power Plant Plans Mock Radiation Drill (SFC)

San Francisco Chronicle, April 7, 2011

The San Onofre nuclear power plant will test its emergency preparedness next week with a drill that will simulate the release of radioactivity.

The exercise, scheduled for April 12 through 14, was planned long before Japan's Fukushima Dai-ichi (deye-ee-chee) nuclear complex was crippled by a magnitude-9 earthquake and tsunami.

The California Emergency Management Agency planned the drill, which is required of nuclear plants every few years.

Southern California Edison, which runs San Onofre, says workers will simulate how to shut down the plant and secure radioactive fuel.

More Seismic Studies Expected By SONGS (SANCT)

By Stacie N. Galang

San Clemente (CA) Times, April 6, 2011

Southern California Edison, the owner of San Onofre Nuclear Generating Station, expects to conduct further studies of seismic activity near the power plant.

SCE spokesman Gil Alexander said the utility company hopes to submit its request to the California Public Utility Commission "very soon." He would not be more specific about the date.

The requested study follows on SCE's February 2 report evaluating seismic conditions near the power plant. The earlier report included seismic and tsunami hazard evaluations "based on the latest research."

The additional studies to be requested would be conducted by the power plant itself and would include 2-D and 3-D imaging and further tsunami analysis.

SCE had planned to propose the study prior to the events in Japan but has since made some changes in light of new concerns, Alexander said.

"Edison is very close," he said. "We wanted to review this proposal in light of the initial information we're gathering from Japan. However, we did not want to wait on all of the lessons because that will take months."

When preparing the original request, the cost to complete the research had been estimated at between \$25 to \$30 million but that could change with proposal revisions. The cost will be passed on, in part, to ratepayers.

"The final price tag is still under review," the spokesman said.

Once SCE submits its request to the CPUC, the commission must vet and approve it before the utility can go forward with the research. Edison hopes to start within about six months.

San Onofre Plans Major Emergency Test (KPBS)

By Dwane Brown

KPBS-TV San Diego, CA, April 6, 2011

One of the largest emergency tests in years will be conducted at the San Onofre nuclear power plant next week. Operators want to know if we're prepared for a natural disaster.

About 200 workers will be simulating how to shutdown the plant north of San Diego and secure radioactive fuel. Gil Alexander is with Southern California Edison the company in charge of San Onofre. He said this will be the largest drill of its kind to insure public safety.

"We believe the plant is safe (from) any type of natural disaster," he said.

State law requires nuclear plants be tested every few years in California. The two-day drill begins on Tuesday. It was planned long before the nuclear crisis in Japan.

Energy experts from California and the federal government will observe and grade the exercises.

A former San Onofre plant manager filed a lawsuit against the company last month. He claims he was fired because he spoke up about safety concerns his workers had.

San Onofre Nuclear Plant Concerns (ABSCNBTBTV)

By Yong Chavez

ABS-CBN TV, April 6, 2011

LOS ANGELES – Los Angeles County has the biggest Filipino community in America.

Many pinoy live and work within driving distance to the San Onofre Nuclear Power Plant in San Clemente, California. The nuclear crisis in Japan has made people who live near power plants to be very worried.

CBS News recently came out with a report that had ex-employees alleging serious safety violations against the plant that generates electricity for southern Californians.

A spokesperson for Southern California Edison, the company that runs the plant says there's no reason to panic.

Gil Alexander, Spokesperson for Southern California Edison said, "For 42 years there hasn't been a single serious injury or death from radiation."

But he advised people to always be prepared.

Alexander added, "We live in California and we should be aware that this is a state that can experience earthquakes. We should all have an emergency plan with our families."

Despite assurances, Jay Fermin still worries about San Onofre because his daughter regularly travels to the city where it's located.

Fermin, a member of Los Angeles Fire Department's Community Emergency Response Team, attended the disaster preparedness seminar organized by the Philippine Disaster Relief Organization and the L.A. consulate.

There are 104 nuclear plants operating in the country, two are in southern California.

James Featherstone, General Manager for Los Angeles Emergency Management said, "Nuclear facilities, San Onofre and Diablo Canyon, I'm sure they're re-assessing what they would do to the communities proximal to their locations in the event they have something like that."

Fermin added, "If there's a problem in that plant, there's only two options, you find a shelter or you get the hell out of the way".

For more information contact Yong Chavez at ybchabs@yahoo.com

U.S. Homeland Security Holds Drill In N.J., N.Y., Connecticut To Test Terrorist Threat Response (NSL)

By Richard Khavkine

Newark (NJ) Star-Ledger, April 7, 2011

A five-day drill involving several levels of law enforcement and overseen by the U.S. Department of Homeland Security began in New Jersey, New York and Connecticut today, the federal agency announced.

The purpose of the full-scale exercise is to evaluate and hone a program that guards against possible future threats of illicit radiological and nuclear weapons and materials, a department release said. The exercise is not related to a specific threat.

First responders and law-enforcement officers from 150 agencies in all three states are participating in the so-called Securing the Cities program.

In Essex County, roadside checkpoints will be set up on Saturday in Belleville and Nutley to test law enforcement readiness in case of a true emergency, the prosecutor's office said. The county sheriff's department is also participating.

"The Securing the Cities program is a key component of the Department's efforts to protect the nation from terrorist threats," the head of the Homeland Security agency, Janet Napolitano, said. "The STC pilot program has helped build a capability among first responders to help detect illicit radiological and nuclear weapons or materials in a major metropolitan area that simply did not exist four years ago."

The program began in 2006 as a pilot project for the New York City region, providing equipment, tools and training through cooperative agreements to the New York City Police Department, the lead agency for the STC program, federal officials said. That department in turn distributes grant money to other participating agencies.

In all, STC has provided more than 5,800 pieces of detection equipment, trained nearly 11,000 personnel, and conducted more than a hundred drills.

Hanford Nuclear Plant Due Back On Line This Summer (AP)

A 78-day refueling outage that began Wednesday at the Columbia Generating Station will keep the Hanford nuclear power plant off line until the end of June.

Associated Press, April 7, 2011

A 78-day refueling outage that began Wednesday at the Columbia Generating Station will keep the Hanford nuclear power plant off line until the end of June.

Energy Northwest says it will be the largest and longest outage in the 26-year history of the plant, which is located on the Hanford nuclear reservation in southeast Washington.

Spokesman John Dobken told KONA more than 1,800 outage workers were hired from across the country for the \$154 million project. They'll be replacing 244 of 764 fuel assemblies and replacing the condenser, which turns steam from the turbines back into water for reuse.

Spring was selected for the outage because the Bonneville Power Administration is getting plenty of electricity from hydroelectric dams this time of year.

Supervisors Want To See County Evacuation Plans (SANTAMAR)

By April Charlton

Santa Maria (CA) Times, April 7, 2011

Despite the best-laid plans to deal with natural disasters or a nuclear crisis, San Luis Obispo County emergency services officials were reminded this week that planning for human behavior is next to impossible.

Office of Emergency Services staff briefed the Board of Supervisors Tuesday on the county's emergency planning and management process, which includes specific plans for earthquakes, tsunamis and nuclear power plant crises.

The briefing followed a local tsunami warning issued March 11 for low-lying coastal areas after a magnitude-9.0 earthquake rocked Japan and a subsequent tsunami badly damaged the Fukushima Daiichi nuclear power plant.

Although a large portion of the Office of Emergency Services' presentation focused on how an emergency at Diablo Canyon Power Plant would be handled, staff didn't present a comprehensive overview of the county's evacuation plans.

And the supervisors want to see those plans and discuss any improvements that could be made to the process of getting county residents and visitors out of harm's way.

"Plans can look good on paper," said Chairman Adam Hill. "But human panic isn't something that you can really drill for."

Hill acknowledged it would be almost impossible to simulate a mass-scale evacuation in the county but noted that's what people are most concerned about — getting to safety in the event of a disaster.

"We can't assess what we need to do better unless we do it," Hill added.

Because Diablo Canyon Power Plant is located up the coast from Avila Beach, the county receives reimbursement funding from Pacific Gas and Electric Co. for its emergency-planning program.

The Office of Emergency Services has about a \$1.5 million annual budget, with the bulk of the funding coming from PG&E, which owns and operates the nuclear facility on the coast.

"It allows us to have a very robust emergency-planning program ... and to do a tremendous amount of training and planning," said Jim Grant, Office of Emergency Services director.

In addition to emergency-preparedness training, the Office of Emergency Services also is required to participate in regular emergency-preparedness exercises, such as simulating a radioactive plume released from Diablo Canyon.

Almost 7,000 training hours were logged last year, officials said.

Emergency Services also is responsible for developing and implementing the county's various evacuation plans that would be triggered if there was a radiation leak at Diablo Canyon or a major earthquake happened on the Central Coast.

Plans direct motorists to leave the county using either Highway 101 or Highway 1 or to be sheltered in place. The Sheriff's Department and California Highway Patrol help implement traffic control in the event of an evacuation, Grant said.

Staff is expected to present the county's evacuation plans in detail at a future meeting.

SLO County Discusses Emergency Evacuations (SLOT)

By David Middlecamp

San Luis Obispo Tribune, April 7, 2011

Concerns about how and whether people would be able to evacuate if there were a radiation leak at Diablo Canyon nuclear power plant emerged at an emergency preparedness discussion by the county Board of Supervisors on Tuesday.

The county's emergency plans call for residents in danger of exposure to radiation from a Diablo Canyon leak to either evacuate or create a shelter where they are, known as sheltering in place. Supervisor Adam Hill said he is concerned about traffic congestion on Highway 101, noting that even a car show in Pismo Beach can cause highway slowdowns.

"We have plans on paper, but when you have panic, it's not something you can train for," he said.

Several members of the public agreed, saying that a radiation leak at Diablo Canyon would most likely be caused by an earthquake, which could damage roads as well. The disastrous earthquake, tsunami and nuclear accident in Japan last month showed how difficult it is to plan for multiple large-scale disasters.

"This problem is unsolvable," Linda Seeley of San Luis Obispo said.

Supervisors agreed to schedule a full discussion of evacuation planning at a later meeting. Tuesday's discussion was the first in what is likely to be a series of overviews of emergency preparedness in the aftermath of the tragedy in Japan.

County Administrator Jim Grant, who also heads the county's Office of Emergency Services, said local officials would benefit from the fact that Diablo Canyon is surrounded by a six-mile buffer zone that could allow some extra time to implement evacuation plans.

One challenge of evacuation planning is the fact that officials cannot hold a full-scale drill with some people actually leaving the area.

"It would be incredibly disruptive, and I don't know how we would do that," Grant said.

The disaster in Japan unfolded gradually, which gave emergency officials and residents there some time to react, Grant said.

Tracey Vardas, an emergency planner at Diablo Canyon, said studies have shown that panic can be avoided if the public receives clear, timely and accurate emergency information from trusted officials.

Officials had an opportunity to use their emergency protocols for real March 11 when a series of small tsunamis spawned by the Japanese quake rolled ashore. Campers were evacuated from beaches and a reverse 911 system was used to alert residents in low-lying coastal areas, said Ron Alsop, county emergency services coordinator.

Because of Diablo Canyon, San Luis Obispo County has much better emergency planning than other counties of comparable size, Grant said. The county's emergency planning budget is \$1.5 million, with PG&E supplying nearly three-quarters of that amount.

Federal rules require that emergency plans be developed for a 10-mile radius around nuclear plants. State and local authorities decided to expand the emergency planning zone around Diablo Canyon. Diablo Canyon's zone extends from 18 to 22 miles, said Kelly Van Buren, a county emergency services planner. The larger zone allows more agencies to be brought into the planning process, she said.

Nuclear Plant Bill Passes Senate Committee (STLBIZ)

By Kelsey Volkman

St. Louis Business Journal, April 7, 2011

The Missouri Senate Commerce, Consumer Protection, Energy and the Environment Committee approved legislation Tuesday that would allow Ameren and other utilities to pass on to customers the \$45 million cost of a site permit for a new nuclear plant in Callaway County.

The measure passed out of committee with a 7-2 vote.

Irl Scissors, director of Missourians for a Balanced Energy Future, a pro-nuclear energy group that supported the legislation, lauded the bill's passage.

"Thousands of people from across the state have made their voices heard and demonstrated to our lawmakers just how serious Missouri is about keeping nuclear power — and the jobs, economic investment and clean, affordable energy that come with it — an option for our state," he said. "... Now the responsibility for moving this bill forward falls to Senate Pro Tem Rob Mayer, who has previously delayed this legislation. We urge him to allow this bill to have a fair and open debate and an up or down vote on the Senate floor — and to bring it to a vote soon. Without action from Senate Pro Tem Mayer, nuclear power will no longer be an option in Missouri — we urge him to act in favor of this critical legislation."

Some consumer advocates and business customers blasted the measure, saying it does not contain enough protections against cost overruns and lacks any guarantee that a plant will be built.

The Missouri Coalition for the Environment said Senate Bill 48 repeals part of a consumer protection law that saved Missouri ratepayers nearly \$400 million after the completion of Ameren's first Callaway nuclear reactor.

The legislation lacks "a true hard cap, a true rebate provision and true assessment funding for the Office of Public Counsel," said the Fair Energy Rate Action Fund, which represents some of Ameren's biggest customers, including AARP, Anheuser-Busch, Consumers Council of Missouri, Ford Motor Co., the Missouri Association for Social Welfare, Missouri Retailers Association and Noranda Aluminum.

"It is unfortunate adequate provisions were not added that will protect consumers who are being forced to pay for this early site permit, especially with no guarantee a new plant is built," said Chris Roepe, director of FERAF. "Consumers took a big hit today and this legislation would overall weaken the (Public Service Commission) process and hurt ratepayers."

Activists: Nuclear Waste Danger For Asheville Area (ASHCT)

By James Shea

Asheville (NC) Citizen-Times, April 7, 2011

High-level nuclear waste could be transported through Western North Carolina if a plant in South Carolina is used to store nuclear waste, experts told a crowd at UNC Asheville on Tuesday.

The Savannah River Site in Aiken, S.C., is being considered as a place to store waste from nuclear power plants around the country.

The waste is currently stored at nuclear plants across the country. Business owners near the Savannah River Site have embraced the proposal, making the site a viable option, said Mary Olson of the anti-nuclear power Nuclear Information and Resource Service and a member of a federal commission examining the waste issue. There are 103 operating nuclear power plants in the U.S., and they create 95 percent of the high-level nuclear waste in the country, Olson said.

"The biggest 600-pound gorilla in the room is what to do with this nuclear waste," Olson said.

She said the transportation of waste on highways carries risk, Olson said. The containers could leak, and an accident is always possible, Olson said. The trucks, however, could travel through Atlanta or other routes.

But the experts at the meeting were skeptical. They thought the relatively sparsely populated mountains would be the preferred route.

"We have less population in Western North Carolina," Olson said.

A nuclear waste depository was considered in the 1970s for Sandy Mush. The site was rejected by the Department of Energy, but Olson said the site could be reconsidered because it has the preferred geology.

"The problem with our granite is that it is closest to the Savannah River Site," Olson said.

Paul Gallimore helped fight the original proposal in Sandy Mush.

He wants the community to be aware that it remains a possibility and to express opposition to storing nuclear waste in Buncombe County.

He said the United States should be looking at other energy options besides nuclear power.

"That is the overriding question," Gallimore said. "What kind of energy options are we going to have in the 21st century? Let's not limit our options."

Ned Doyle, host of "Our Southern Community" radio show, said nuclear energy is not a viable option economically.

He said the nuclear industry is heavily subsidized by the federal government, and the government will have to pay for the disposal of the waste.

"All forms of sustainable energy are more affordable than nuclear power," Doyle said.

State, Energy Officials: Oyster Creek Better Equipped Than Japanese Plant To Withstand Disaster (RHNNJ)

By Salvador Rizzo

Record and Herald News (NJ), April 7, 2011

State, energy officials: Oyster Creek better equipped than Japanese plant to withstand disaster

Their blueprints may be similar, but New Jersey's Oyster Creek nuclear power plant can withstand a disaster better than Japan's troubled Fukushima Daiichi plant due to safety upgrades built in over the years, state officials and energy industry executives told lawmakers Wednesday.

Three Assembly committees jointly heard testimony from the state's top environmental officer, the state director of Homeland Security, and nuclear plant executives from Exelon and PSE&G, who said a disaster like the one besetting Japan is unlikely to strike any of New Jersey's four nuclear plants.

"I think the public does not have to concern itself that what happened in Japan could happen in New Jersey," said Charles McKenna, state director of Homeland Security.

Officials said President Obama has ordered comprehensive reviews of all nuclear facilities, in addition to the regular evaluations plants must undergo by law. Oyster Creek in Lacey Township was found to be safe by the federal government at its last review in October 2009, and Hope Creek in Lower Alloways Creek Township will be inspected on May 22, McKenna said.

PSE&G implemented "over 100 procedures" after 9/11 to ensure its plants could still run safely in the event of a disaster such as a plane crash, said Bill Levis, president of PSE&G Power. He said the company is also looking at what to do in the event of two disasters striking at the same time. Experts say the Fukushima reactors withstood the 9.0-magnitude earthquake but not the tsunami that followed.

DEP Commissioner Bob Martin disclosed that milk and water samples taken in New Jersey showed no signs of radiation stemming from the Japanese disaster. Air and rainwater samples were also found to be safe, though they contained trace amounts of radiation "far below" the level of concern.

The panelists said New Jersey reactors similar to the ones in Japan have received safety enhancements, such as water-tight doors, improved ventilation systems, longer battery capacity to keep the reactors' cooling systems running during a power outage, and strengthened infrastructure.

But environmentalists said those upgrades were done decades ago, and many safety issues still gave cause for concern.

"I think (the hearing) was designed to say, 'Everything's fine, we're doing all these things,' when they haven't learned anything about what happened in Japan or Chernobyl," said Jeff Tittel, New Jersey director for the Sierra Club. "It's all about public relations rather than public policy."

He said Oyster Creek, the nation's oldest nuclear reactor, had corrosion problems and radioactive leaks recently because of its age.

Tittel also criticized the lack of independent analysts at the hearing, which heard testimony only from state officials and industry representatives. Assemblyman Upendra Chivukula (D-Somerset), one of three lawmakers chairing the hearing, said "this was more of a briefing rather than a hearing; we can always bring independent professors at a later date."

Martin said a nuclear review task force created by Governor Christie met for the first time last week. It will analyze emergency communications and power supply, and evaluate the minimum evacuation radius of 10 miles from a nuclear incident. The panelists said that may increase to up to 50 miles.

Salvador Rizzo: (609) 989-0341 or srizzo@starledger.com

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NRC: Japan No Reason To De-license NJ Nuke Plant (AP)

By Wayne Parry

Associated Press, April 7, 2011

TRENTON, N.J. (AP) – The U.S. Nuclear Regulatory Commission says nothing it has learned from the Japanese nuclear disaster warrants revoking the license of the nation's oldest nuclear power plant in New Jersey.

The agency filed its response Tuesday to a federal appeals court that had asked if the Japanese crisis should lead to a rethinking of the Oyster Creek Nuclear Generating Station's current 20-year license that was awarded two years ago.

The agency says that while it is studying the ongoing crisis in Japan, it remains confident of the safety of U.S. nuclear plants.

"Licensed nuclear power reactors in the United States are currently safe and may continue to operate under NRC's comprehensive scheme of safety regulations and inspections, pending development of any new safety measures that emerge," the agency wrote.

A coalition of anti-nuclear groups is challenging Oyster Creek's 2009 license renewal. It asked the appeals court to reconsider whether Oyster Creek's license should have been renewed, citing concerns about its age and wear and tear on the plant, which went online in 1969.

The New Jersey Sierra Club says the NRC has not learned anything from the Japanese disaster.

"NRC stands for No Regulatory Commission," said Jeff Tittel, the group's director. "The agency is a cheerleader for industry and looks the other way it comes to relicensing, especially around issues of public safety."

"The NRC should be saying license renewals across the country should be on hold while we reevaluate the safety of these facilities," said Tittel. "This brief shows the NRC will not learn any lessons from Japan, just as they did not learn any lessons from Three Mile Island or Chernobyl. Given what we are learning about Japan, it does not make any sense and could be outright dangerous to keep Oyster Creek open."

The NRC noted in its response that it adopted new standards and practices following Three Mile Island, and the Sept. 11, 2001, terrorist attacks.

"As with the post-TMI and post-9/11 regulatory enhancements, any lessons learned from the Fukushima Daiichi event will be applied generically to all reactors, including Oyster Creek, as appropriate to their location, design, construction, and operation," the agency wrote. "No safety, technical, or policy justification exists to single out particular reactors for different treatment just because of their place in the licensing queue or status on judicial review."

Oyster Creek's license allows it to operate until 2029. But its owners, Chicago-based Exelon Corp., struck a deal with New Jersey in December to shut Oyster Creek 10 years early, in 2019. In return, the state dropped its insistence that Oyster Creek

build costly cooling towers to drastically reduce the number of fish and small aquatic creatures the plan's operations kill each year.

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Oyster Creek Nuclear Power Plant Almost Identical To Fukushima, So Why Do Residents Support It? (WPIX)

WPIX-TV New York (NY), April 7, 2011

Even though it's the oldest nuclear power plant in the country and its reactor is virtually identical those which exploded in Japan , the Oyster Creek Nuclear Power Plant in New Jersey is safe to operate.

That's what the Nuclear Regulatory Commission said in a brief filed this week in a federal case that seeks to have the court review Oyster Creek's license in the wake of the Japanese nuclear emergency. Some of the people who live within sight of the New Jersey reactor agree with the NRC, despite the similarities between the New Jersey and Japanese facilities.

The Fukushima Daiichi reactors were designed and built by General Electric in 1971, two years after it built the Oyster Creek nuclear power generating facility. Oyster Creek is seventy miles south of New York City, in Lacey Township. Nearly four weeks after the Fukushima emergency, some Lacey Township residents like Joe McLaughlin call their potentially radioactive neighbor "a mixed blessing, particularly so now."

He says he's just being realistic, and is not insulting his town. In fact, he and his wife Mary Jane are arguably like the official emblem of the township where they live. The Lacey Township crest prominently features a drawing of an atom, representing nuclear power as part of the way of life in Lacey Township.

The McLaughlins own a historic Victorian home that faces a marina, but as Joe McLaughlin points out, the home also faces something else. "The plant is about a mile (away)," he told PIX 11 News as he pointed south from his front porch. "You can see the stack and the light flashing on top, across the line of trees across the (marina) here."

In the wake of Japan's tragedy, they're among residents paying a bit more attention to having to get away from the Oyster Creek Plant in an emergency. Even though the power plant's safety record shows that a catastrophic event is highly unlikely, Mary Jane McLaughlin is skeptical that an evacuation could be carried out smoothly if an emergency were to occur. "If we were to leave here by car, I think it would be a slow process," she said.

Lacey Township Police Chief William Nally, however, says that emergency responders are prepared for the worst, pointing out that every year his department joins state and federal emergency managers in a major emergency drill. "(It) always involves a radiological emergency at the power plant, through various emergency sources, a storm, flooding, a fire."

The chief says that the drill includes a mock evacuation of the 27,000 people who live in the township. However, anyone who has ever been to down to the Jersey Shore in the summer knows that tourists can more than double the population, and in the process transform emergency evacuation routes like U.S. Route 9 into virtual parking lots.

Despite that, last month's Fukushima emergency gives Chief Nally confidence about evacuating his township. "As we've seen in Japan," the chief says, "These kinds of situations, like a crisis at the power plant, would take time to develop."

The chief feels that time is on his side. It took a full day for any reactor at the Fukushima plant to go from being damaged to leaking radiation, and two more days after that to erupt and destroy containment buildings.

Also working in local emergency managers' favor in a crisis are extra resources they have been able to acquire to help move people away from the plant. Ironically, they got those resources as a result of the plant being in Lacey Township in the first place.

"We've acquired close to a million dollars in assorted equipment through various grants related to the fact that we host the power plant," Chief Nally told PIX 11 News.

If an emergency were to happen, the department and its 43 officers would need every bit of equipment it can get its hands on, particularly since about a third of the homes in the township are on an island on which the plant sits as well. Those homes have only one paved road in and out, Beach Boulevard.

Then again, being on an island, some may consider doing the same thing as the McLaughlins in case the worst happens. "We could leave by boat," Mary Jane McLaughlin says, "and we have a boat across the street."

That sort of access to an oceangoing emergency route is a hidden benefit of the nautical lifestyle that attracts many people to settle in Lacey Township. One reason they can afford that lifestyle is that the nuclear facility is required by the state of New Jersey to pay them \$11.1 million a year, as Lacey Township's mayor said in an interview.

"The energy tax... covers 40 percent of the municipal budget," Mayor Gary Quinn told PIX 11 News. "It does allow us to keep the tax rate significantly lower than other townships in the area."

But people in those other townships aren't too happy that Lacey gets benefits for having the Oyster Creek plant, while its neighbors get no benefits, but still have to cope with its dangers.

"The townships, about 20 of them, passed resolutions for a shutdown of Oyster Creek," Jersey Shore Nuclear Watch chairperson Edith Gbur tells PIX 11 News, referring to actions some local governments took in the months after 9/11. Looking ahead, she says, "I think it's a matter for the people in Lacey Township feeling that there are other alternatives to keeping the plant open."

That plant will close in 2019, ten years earlier than its license allows. The early closure is the result of an agreement the facility's operator, Exelon Corporation, made with the state of New Jersey late last year. In exchange for Exelon not having to install cooling towers at the plant, as the state required, it agreed to cut its 20-year federally licensed operating period in half. Exelon Corporation did not respond to interview requests by PIX 11 News in relation to this story.

In the eight years that remain in the plant's power-generating life, township leaders hope to attract another energy plant, possibly a natural gas or wind facility, to the Oyster Creek site. Critics of the nuclear plant hope that no nuclear emergency occurs in the meantime.

More Fallout From Japan Detected In Tennessee (TENN)

Tennessean, April 7, 2011

Air monitoring in the state has shown slight amounts of a radioactive isotope linked to the nuclear power plant in Japan that was damaged by an earthquake and tsunami, according to the Tennessee Department of Environment and Conservation.

The amounts of Iodine-131 are extremely low and don't present a health risk, according to an agency email.

Routine monitoring detected the substance from air samples taken March 29 from near the Sequoyah and Watts Bar nuclear power plants, as well as a monitor in Dayton, Tenn.

"We can detect these isotopes at extremely low levels," Environment and Conservation Commissioner Bob Martineau said. "These levels do not indicate a health concern of any kind, and we will continue to monitor."

The results range from 0.044 to 0.089 picoCuries per cubic meter of air. These levels are within the range expected and are far below levels of public health concern.

Rainwater samples at three sites in Oak Ridge also showed slight amounts of I-131, according to EPA information. Similar results are seen in some nearby states.

Radiation Detected Is 'Far Below' Health Concern (KNOXNS)

By Frank Munger

Knoxville News Sentinel (TN), April 7, 2011

The Tennessee Department of Environment and Conservation reported Wednesday that air samples at multiple sites had confirmed the presence of iodine-131 linked to the crippled Japanese nuclear facility. But state officials emphasized that the levels of radioactivity are very low and of no health concern to Tennesseans.

In information released to the news media, TDEC said the air samples were collected March 29 from fixed monitors near TVA's Sequoyah and Watts Bar power plants, as well as from a monitor in Dayton. The state said the I-131 levels ranged from 0.044 to 0.089 picocuries per cubic meter of air.

"These levels are within the range expected and are far below levels of public health concern," the statement said.

TDEC Commissioner Bob Martineau said the state monitors for radiation in the environment on a regular basis.

"We can detect these isotopes at extremely low levels. These levels do not indicate a health concern of any kind, and we will continue to monitor," Martineau said in a statement.

Meanwhile, Oak Ridge National Laboratory also said it had confirmed the slightly elevated presence of I-131 at four air monitors near the lab.

Joe Herndon, director of environment, health, safety and quality at ORNL, said the average of the four results was 0.0529 picocuries per cubic meter of air. Those levels are of no health significance, he said.

"I'm just happy the numbers are so low," Herndon said. "That's next to nothing."

Senior writer Frank Munger may be reached at 865-342-6329.

Japan Radiation Found At Sequoyah (CHTNGA)

By Pam Sohn

Chattanooga Times Free Press, April 7, 2011

Air samples collected at the Sequoyah and Watts Bar nuclear plants last week detected radioactive isotopes from the Fukushima Dai-ichi nuclear crisis in Japan, but local officials say there has been no threat to public health.

Tisha Calabrese-Benton, spokeswoman for the Tennessee Department of Environment and Conservation, said routine monitoring has turned up very low levels of iodine-131, an isotope linked to the Japanese power plant.

"These detections are 1,000 to 10,000 times below any levels of concern," Calabrese-Benton said. "They are within the range expected and are far below levels of public health concern."

She said a different set of real-time air monitors would alert officials of radioactive levels that might require immediate action.

The samples were taken March 29, and analysis took about a week, Calabrese-Benton said.

"We have also sent some rainwater samples [for analysis], but we're still waiting for those results," she said.

Within hours of the announcement, state Health Commissioner Susan R. Cooper issued a news release, saying residents have no need to purchase or take potassium iodide. The compound provides short-term protection for the thyroid gland in people exposed to radioactive iodine, one of many radioactive materials that may be released from a nuclear power plant.

"The state has a supply of [potassium iodide], but only to be used if there is an emergency or a risk of harm to Tennesseans," Cooper said. "There is neither a cause of concern nor a risk to public or individual health."

The state also is collecting air and rainwater samples in Knoxville, Nashville and Oak Ridge for the EPA's nationwide RadNet program, which collects air, precipitation, drinking water and milk samples to check for radioactivity.

EPA officials have said they are monitoring the air carefully because of the leaks and explosions at the Fukushima nuclear plant following a 9.0 earthquake and tsunami in mid-March.

Several EPA air monitors across the nation have detected very low levels of radioactive material, consistent with estimated releases from the damaged nuclear reactors, according to www.epa.gov.

EPA also has stepped up monitoring of precipitation, milk and drinking water, and officials said radioactivity detected has been far below levels of public health concern.

EPA's website states that "even an infant would have to drink almost 7,000 liters of this water to receive a radiation dose equivalent to a day's worth of the natural background radiation exposure we experience continuously from natural sources of radioactivity in our environment."

TDEC Commissioner Bob Martineau said a statement that the department regularly monitors for radiation in the environment.

"And we will continue to monitor," he said.

about Pam Sohn...

Pam Sohn has been reporting or editing Chattanooga news for 25 years. A Walden's Ridge native, she began her journalism career with a 10-year stint at the Anniston (Ala.) Star. She came to the Chattanooga Times Free Press in 1999 after working at the Chattanooga Times for 14 years. She has been a city editor, Sunday editor, wire editor, projects team leader and assistant lifestyle editor. As a reporter, she also has covered the police, ...

State Detects Non-threatening Radiation From Japan (MDNJ)

Murfreesboro Daily News Journal, April 7, 2011

NASHVILLE - The Tennessee Department of Environment and Conservation reports that results from air monitoring for radioactive isotopes confirm that no threat to public health exists related to the incident at the Fukushima Daiichi nuclear power plant in Japan.

Routine and ongoing air monitoring performed by the state indicates the presence of very low levels of Iodine-131, an isotope linked to the Japanese power plant, the state news release states. Tennessee's results are consistent with sampling results reported by federal agencies, licensees and neighboring states.

"The Department of Environment and Conservation monitors for radiation in the environment as a regular course of business," Environment and Conservation Commissioner Bob Martineau said in the news release. "We can detect these isotopes at extremely low levels. These levels do not indicate a health concern of any kind, and we will continue to monitor."

Environment and Conservation's air samples being reported today were collected on March 29 from fixed monitors near the Sequoyah and Watts Bar power plants, as well as a monitor in Dayton, Tenn. The results range from 0.044 to 0.089 picoCuries per cubic meter of air. These levels are within the range expected and are far below levels of public health concern.

In addition to its own monitoring, the department collects air and rainwater samples in Knoxville, Nashville and Oak Ridge for the U.S. Environmental Protection Agency's RadNet program. The Tennessee Department of Agriculture collects milk samples for RadNet as well. All of those samples are sent to an EPA laboratory for analysis, and the results are available on EPA's website at www.epa.gov.

No Raised Radiation Found In NJ Air, Milk Samples (AP)

Associated Press, April 7, 2011

TRENTON, N.J. (AP) - New Jersey's top environmental official says samples of air and milk show no sign of elevated radiation from the Japan nuclear disaster.

Environmental Protection Commissioner Bob Martin says rainwater samples show trace amounts of Iodine-131, but not enough to cause any concern.

Martin was among five environment and security experts to testify at a briefing on nuclear power plant safety and emergency preparedness at the Statehouse on Wednesday.

The most densely populated state has four nuclear reactors, including Oyster Creek, the nation's oldest.

The review was prompted by the disaster unfolding in Japan after an earthquake and tsunami severely damaged four reactors there.

2 of Japan's damaged reactors are a design similar to Oyster Creek and Hope Creek in Salem County.

Officials: Trace Amounts Of Radioactive Iodine-131 Found In Rainwater, Air (DLYRCD)

By Jason Method

Daily Record (NJ), April 7, 2011

New Jersey officials have found trace amounts of radioactive material from Japan's nuclear accident in rainwater and air samples, but no contamination has been found in milk or drinking water.

Bob Martin, commissioner of the state Department of Environmental Protection, said Wednesday that rainwater samples had shown small amounts of iodine-131, a radioactive byproduct of nuclear fission, similar to results reported in states across the country.

Officials also have tested milk and drinking water, but not found the iodine-131, Martin said.

DEP spokesman Larry Ragonese said in an interview Wednesday that minute traces of radiation were found in water collected late last week by the Middlesex Water Co. at a sampling site on the Delaware and Raritan Canal. After laboratory analysis, the DEP confirmed that find.

Very small traces of iodine-131 also were found in rainwater collected late last week, and subsequently analyzed, from the roof of a state laboratory in the Trenton area, Ragonese added.

Ragonese said the radiation levels, just above what is normally found in nature, do not pose a health problem. The iodine-131 isotope dissipates in eight days.

Martin and other officials appeared Wednesday before a collection of three Assembly committees holding a hearing on how New Jersey should respond to the nuclear meltdown crisis in Japan that has riveted world attention.

Deputy Assembly Speaker John F. McKeon said he was concerned about storage of spent fuel rods at the Oyster Creek nuclear power plant in Lacey, which he noted had greater amounts than at the Fukushima Daiichi plant in Japan, which was breached as a result of an earthquake, tsunami and the resulting malfunctions.

McKeon, D-Essex, also said he was worried about how well state residents could be evacuated from Long Beach Island in the event of an emergency, especially during the summer.

"Anyone who's had a New Jersey experience knows it's hard to move (traffic) under normal circumstances," McKeon said in comments afterward.

State officials said there are 4,000 emergency responders trained to react to a nuclear emergency. The state expects that it would evacuate the area around the Oyster Creek plant within 9 1/2 hours by reversing inbound car lanes and moving all traffic out of the vicinity.

Assemblyman Joseph R. Malone III, R-Burlington, who also represents parts of Ocean and Monmouth counties, said there was little chance here of a major earthquake or other event causing a crisis similar to what has occurred in Japan.

"I want the public to understand that the chances of what's happened there happening here are slim to none," Malone said.

State emergency response teams will be tested in September at the Oyster Creek plant as regularly scheduled, officials said.

State Police Lt. Thomas Scardino said the Federal Emergency Management Agency conducts the drill by announcing a fictional scenario to state emergency officials. Those involved in the drill must then react to that situation. A FEMA drill is scheduled for next spring at the nuclear power plant in Salem County.

On March 25, Gov. Chris Christie created a Nuclear Review Task Force to apply lessons learned from the Japan events. Martin said the first meeting was held last week and findings are expected to be issued by the end of May.

Bellefonte Decision Won't Be Made In April (SDS)

The Tennessee Valley Authority Board of Directors at its April 14 meeting in Chattanooga will not be asked to make a decision on completing a reactor at the Bellefonte Nuclear Plant near Scottsboro.

Scottsboro (AL) Daily Sentinel, April 7, 2011

The Tennessee Valley Authority Board of Directors at its April 14 meeting in Chattanooga will not be asked to make a decision on completing a reactor at the Bellefonte Nuclear Plant near Scottsboro.

"The good news is we're not stopping on Bellefonte," TVA President and Chief Executive Officer Tom Kilgore said in an interview with The Daily Sentinel Wednesday. "Our engineers are continuing their work at Bellefonte without pause."

Kilgore earlier expected to ask the TVA Board for formal approval to complete the Unit 1 reactor at Bellefonte. That recommendation is being delayed due to ongoing problems at the Fukushima Dai-ichi plant in Japan.

"The challenges at the Fukushima Dai-ichi plant call for a studious and thoughtful review of the Japanese experience," Kilgore said. "The prudent steps will be to listen, learn, incorporate those lessons into our designs, and be in a position to proceed more confidently in the near future."

The Japanese plant was hit by a magnitude 9 earthquake on March 11 followed by a tsunami with 40-foot waves. The natural disaster has rendered the plant useless and workers are trying to minimize health and environmental damage from the still leaking reactors.

Jackson County Economic Development Authority President and CEO Goodrich "Dus" Rogers said he was pleased Kilgore personally visited with local governmental leaders to discuss the future of Bellefonte.

"I thought that it was a class act that Tom Kilgore came to Scottsboro and met with local leaders personally to tell us the plan," Rogers said. "I appreciate TVA taking a pause and stepping back to understand lessons learned and apply best practices to this project. It will help them find out what changes need to be made to have a safe nuclear fleet."

Approximately 500 workers remain on site at Bellefonte doing engineering work on the proposed reactor. Kilgore does not anticipate any layoffs or work stoppages and says the utility already has a considerable investment in the facility.

TVA recently located its nuclear training facility that is used by contractors and employees from all of its plants in Jackson County. Kilgore said that decision demonstrates the utility's commitment to nuclear power and to the future of the immediate area. He said the tentative start-up date for the "several billion-dollar" Bellefonte facility remains in the 2018-2019 timeframe.

"As we digest and learn from the Japanese situation I know there will be some things we change," Kilgore said. "We will harden the plant. We are evaluating what we need to do."

TVA, other utility companies, trade associations and the Institute for Nuclear Power Operations are providing assistance to the Japanese. While some of the assistance has been technical in nature, the group has supplied personal dosimeters (for measuring radiation exposure), borated water (used to control the splitting or fission of uranium atoms) and protective clothing. Observers are also on the ground providing assistance and learning in the process.

"We're all trying to help," Kilgore said.

TVA is committed to providing clean nuclear power as part of its energy mix for the future. Construction continues at its Watts Bar Unit 2, which is scheduled to be on line by 2013 and its newly formulated integrated resource plan reinforces the use of nuclear power generation and energy efficiency among its main components.

On Wednesday an alliance, called the AP1000 Oversight Group, entered a challenge contesting the approval of the new Westinghouse AP1000 reactor by the Nuclear Regulatory Commission. The alliance consists of a number of environmental and nuclear watchdog groups.

Kilgore said the move would have no immediate impact on TVA though the utility continues to work toward finishing the original design of a proposed project at Bellefonte. "The AP1000 is way in the future."

"TVA does take seriously any accidents and safety issues discovered anywhere in the world. They always consider how to make operations better," Rogers said. "They take pride in their work. I trust them to do the right thing."

Kilgore, an Ider native and 1966 graduate of Ider High School in nearby DeKalb County, stressed that safety is a top priority for the community and TVA's work force.

"We are evaluating what we need to do," he said. "We want the people to have confidence in us to do the right thing and to feel safe about living by a nuclear power plant. The one thing that is more important than building of the Bellefonte Nuclear Plant is for us to operate it safely over its entire life."

AREVA, a global energy company focused in large part on nuclear power, is completing the majority of engineering and development work at Bellefonte as part of the utility's long-range design, planning, licensing and procurement process. It is also developing a new state-of-the-art instrumentation and control system for the facility.

"We are delighted to continue our partnership with TVA to help expand America's supply of safe, reliable, carbon-free nuclear energy to meet the country's growing demands," Mike Rencheck, COO of AREVA North America said when the contract was announced in October 2010. "This agreement reinforces our position as a world leader in clean energy solutions."

"Bellefonte is a good design. It is spacious," Kilgore said. "Bellefonte has the potential to be the best nuclear plant we have."

Editorial: Look At Nuclear Power Without Fear, Passion (RMA)

The Republican (MA), April 6, 2011

The Nuclear Regulatory Commission is looking toward tomorrow – just as it used to do.

It has been more than 30 years since the NRC approved construction of a new nuclear power plant in the United States. The accident at Three Mile Island in 1979 turned the tide. Citizens, power companies and federal regulators took a very long time-out.

But over the decades, events began to work in favor of at least reconsidering nuclear energy. Three Mile Island began to fade into memory even as the very real dangers from other types of conventional energy became increasingly obvious. Oil sometimes gets spilled. Coal mines can collapse. Gas plants can blow up. And emissions are of increasing concern.

Those who instead banked on alternative energy sources ran right up against stark realities: Power from the sun and the wind and the tides was simply not plentiful enough, or financially viable. So many big plans turned out to provide neither heat nor light. Maybe, just maybe, nuclear power deserved a second look.

It was slow in coming, and its full embrace was anything but assured.

And then came Japan. The ongoing nuclear disaster that followed the tsunami that followed the gigantic earthquake has left everyone in shock.

But the right time to make policy is not in the middle of a crisis. That's when those with an agenda to push try to make hay. But cooler heads must prevail.

The NRC has given preliminary approval to the construction of two new nuclear power plants near Augusta, Ga. We applaud the decision. Our nation should not be setting its nuclear agenda based on what happened in Japan. We should instead be looking at the facts at hand — and to the future — which is exactly what the NRC is doing.

IN THE BLOGS

Chemistry 201: Why Is Fukushima So Gassy? (NYT)

By Matthew L. Wald

New York Times, April 7, 2011

As my colleagues report in The Times, American experts are concerned about the possibility of new explosions at the Fukushima Daiichi nuclear plant in Japan and have urged the Tokyo Electric Power Company to fill the air space in the primary containments of the reactors there with nitrogen gas to avert this. Andrew Pollack, a colleague in Tokyo, reported a few hours later that the company was moving toward that goal.

2:10 p.m. | Updated The injection of nitrogen has begun.

An explosion would be powered by a combination of oxygen and hydrogen. Where are those gases coming from?

Water, H₂O, is always a source. An American expert who was not involved in the reported advice to the Japanese, Charles W. Forsberg, the executive director of M.I.T.'s Nuclear Fuel Cycle Project, notes that if you simply put a teacup of water in a microwave oven, some of the water molecules will come apart. But there are reasons, he and others say, that Fukushima is particularly vulnerable.

One is its recent use of seawater to cool the reactors' fuel rods and cores. In addition to the oxygen in water molecules, cold seawater can hold a great deal of dissolved oxygen gas. But warm water cannot; so as the seawater was heated in the reactor, the dissolved oxygen emerged and gathered in the empty space above the water.

(Ordinary reactor cooling water has had the oxygen removed from it by plant operators to reduce the possibility of rust.)

In addition, gamma radiation from the nuclear fuel in the reactor would continuously produce small amounts of hydrogen and oxygen by breaking up water molecules — and the normal method of recombining these elements into water at such plants in a controlled fashion is no longer available.

Plants of the Fukushima variety usually have catalytic converters that accomplish that at the point where steam has run through the turbine and is condensed back into water for another trip through the reactor. But that path has been closed since the plant lost power at the moment of the March 11 earthquake.

"If the reactors are producing any steam, the steam will push the hydrogen and oxygen into the pressure suppression pool," Mr. Forsberg warned. (The reactor is vented into the pool, he explained.) One solution would be to keep the area in a nitrogen atmosphere.

Hydrogen can also emerge from the zirconium metal used as fuel cladding. One of the lessons of the Three Mile Island accident in 1979 near Harrisburg, Pa., is that when the cladding comes into contact with steam rather than water, it goes through a reaction that is akin to rusting; it picks up oxygen from the water molecule and gives off hydrogen.

This only happens at high temperatures, but uncertainty reigns at the moment about temperatures in the Fukushima reactor cores. With some cooling channels blocked, they are likely to have hot spots.

By design, boiling water reactors like these have far more zirconium metal in them than pressurized water reactors do. They boil water directly in the core, covering the fuel assemblies with a water/steam mixture rather than keeping them immersed in water. The water has to be directed to each individual fuel assembly and therefore each sits in its own zirconium box.

All of that zirconium is available for an oxidation reaction with steam in which the metal absorbs oxygen from water and turns to a powdery rust, releasing hydrogen.

INTERNATIONAL NUCLEAR NEWS

Energy Agency Head: Reconsider Nuclear Power (BSWK)

BusinessWeek, April 7, 2011

The head of a new international agency designed to promote renewable energy says consumers are beginning to look again at alternative sources of power in the wake of Japan's nuclear crisis.

The International Renewable Energy Agency's director-general, Adnan Amin, said Tuesday all countries need to examine their needs to determine whether nuclear plants should be part of their energy mix.

He made clear that the agency's clean-energy mandate does not include promotion of nuclear power. That puts it at odds with the United Arab Emirates, the host nation for its headquarters, which is making atomic power a centerpiece of its energy policy.

Amin spoke at the end of the agency's first assembly meeting in Abu Dhabi.

Keep Faith On Nuclear, Says IEA (NAT)

By April Yee

The National, April 7, 2011

Nuclear technology needs to remain part of the energy mix despite safety concerns following the disaster in Japan, says a top International Energy Agency (IEA) official.

An earthquake and tsunami on March 11 crippled three reactors at Japan's Fukushima plant and led to radiation leakages from spent fuel-storage tanks. That should not stop countries from considering nuclear power, said Richard Jones, the deputy executive director of the IEA, the organisation that represents 28 energy-consuming nations.

"The problem is if you start betting on any one technology, then something can happen and derail that technology," he said on the sidelines of an energy ministers' meeting yesterday in Abu Dhabi.

"Every technology has its Achilles' heel, and in the nuclear case the safety issue has been raised. But if you look at it, this plant survived a 9 [magnitude] earthquake without a core breach. It wasn't an accident, it was a natural disaster. There's a big difference."

He spoke a month after Abu Dhabi broke ground on the proposed site of its US\$20 billion (Dh73.45bn) first nuclear plant, part of the emirate's plan to diversify its energy mix and free-up more fossil fuels for lucrative export.

Mr Jones was in the capital to present a report on progress in renewable energy adoption to energy officials from the US, the UAE and other nations.

In the past decade coal has met 47 per cent of new power demand, and to meet targets to combat climate change the efficiency of such plants needs to be improved, he told ministers.

Governments should also back the adoption of hybrid vehicles and at least 100 projects in carbon capture and storage technology in the next decade, in which carbon dioxide emissions from industrial plants or power stations are buried underground, added Mr Jones.

Yesterday, the price of Brent crude, the European benchmark, hit a two-and-a-half year high, reaching \$122.75 a barrel in intraday trading.

A civil war in Libya that has halted crude shipments, and continuing political unrest in other parts of the region, have caused oil prices to soar and forced producers - including Saudi Arabia and the UAE - to increase production.

The price of oil has also been pushed upward by concerns over the future of nuclear power. Countries around the world have launched safety reviews or imposed halts on nuclear power production at older plants in response to public safety concerns sparked by Fukushima.

"I think with confidence that these problems can be dealt with," said Mr Jones, a US career diplomat. "More likely what it'll mean is more of a delay while countries reassess their policies and look at the safety of their existing plants, they look at emergency response capabilities, and they decide whether to licence new plants, whether or not they want to wait for new technologies.

"The problem with nuclear is that it's such a capital-intensive technology that it really depends on what the interest rates are when you make the investment, so it's the capital costs that drive the overall cost of nuclear.

"But you know right now capital costs are low, so it's a good time to build nuclear power plants from a cost perspective. Now, we have these other concerns, obviously," Mr Jones said.

Iran Criticizes Saudi Arabia's Involvement In Bahrain (WT)

Says kingdom should go after Israel instead

By Ben Birnbaum, The Washington Times

Washington Times, April 7, 2011

About 200 members of Iran's parliament on Wednesday condemned Saudi Arabia's military intervention in Bahrain and urged the Persian Gulf kingdom to use its forces against Israel instead.

"The Saudi Army has learnt nothing from the Islamic culture because had it been really powerful, it should have stood up to the crimes of the Zionist regimes against defenseless people of Palestine," they said in a statement, according to Iran's state-run Islamic Republic News Agency.

Saudi Arabia and other members of the six-nation Gulf Cooperation Council (GCC) sent more than 1,000 troops into Bahrain on March 14 to help that nation's Sunni royal family quell a month-old uprising by the nation's Shiite majority.

Iran has backed the protesters since they took to the streets Feb. 14, though the regime's rhetoric has escalated in recent days. On Monday, Iranian President Mahmoud Ahmadinejad said "the Saudis did an ugly thing to deploy troops," and "the Bahraini government also did an ugly work to kill its own people."

At rallies Wednesday in the Iranian cities of Qom and Masshad, senior clerics accused the GCC troops of committing "savage crimes" in Bahrain, while protesters chanted "Death to Zionist Saudis" and called Bahrain's king "an enemy to Prophet [Mohammed]."

In telephone interviews with The Washington Times, senior pro-government lawmakers in Bahrain blasted Iran's interference.

"I would like to ask the Iranians a question," said Adel al-Moawda, second deputy chairman of Bahrain's Representative Council. "Why are they using this language now? The GCC troops entered Bahrain two weeks ago."

Mr. Moawda speculated that Iran was trying to divert attention from the news of Kuwait's dismantling of an alleged Iranian spy ring.

Gamal Fakhro, first deputy chairman of Bahrain's Consultative Council, called Iranian allegations of a violent crackdown "total rubbish" and said they revealed the regime's hypocrisy.

"We have seen what they have done with Mir Hossein Mousavi and Mehdi Karroubi," he said, referring to the two opposition leaders who were imprisoned by the regime in February. "[Other anti-government activists] have either been jailed or kept under house arrest. Rather than focusing on the internal affairs of Bahrain, Iran needs to focus on its own affairs."

Events in Bahrain have been seen as a regional conflict between an emboldened Iran and its Arab neighbors, particularly those with large Shiite populations.

Jasim Hussain, a senior lawmaker from Bahrain's opposition Wefaq bloc, told The Times that he was "not surprised" by the Iranian rhetoric and said it confirmed his fears that the Saudi-led intervention would provoke a response from Tehran.

"We don't want Bahrain to become a place where regional powers try to settle their accounts and make Bahrain a place for their proxy war," he said.

Wagner, Katie

From: Wagner, Katie
Sent: Tuesday, March 22, 2011 11:51 AM
To: Lee, Richard
Cc: Zigh, Ghani
Subject: RE: BWR Zr-fire report

Richard – Is this complete or still pending? – Thanks, Katie

From: Lee, Richard
Sent: Tuesday, March 22, 2011 8:05 AM
To: Elkins, Scott
Cc: Zigh, Ghani; Wagner, Katie; Gibson, Kathy; Scott, Michael
Subject: BWR Zr-fire report

Refn: Brain Sheron's request for the SAND report on BWR Zr-fire.

Scott: Ghani knows the SAND report on BWR Zr-fire.

Ghani: Please provide the report or the ADAMS # to Scott.

Katie: Please log in this action

From: ET07 Hoc
Sent: Tuesday, March 22, 2011 8:49 PM
To: Devercelly, Richard
Subject: FW: PACKAGE TO BE DELIVERED TO HQ OPS CENTER FROM JAPAN

Importance: High

From: ET02 Hoc
Sent: Tuesday, March 22, 2011 8:48 PM
To: ET07 Hoc
Cc: MAILSVC Resource; Poland, Timothy
Subject: PACKAGE TO BE DELIVERED TO HQ OPS CENTER FROM JAPAN
Importance: High

Bill Gott:

Per your request, the address for NRC Ops Center is as follows:

U.S. Nuclear Regulatory Commission
HQ Operations Center, T-4B5
11545 Rockville Pike
Rockville, MD 20852-2738

I am sending a cc to the mail services staff as a heads up to let them know that a package will be arriving from Japan sometime in the next couple of days which will need to be delivered asap to the Operations Center. This package is being sent from the NRC responders working in Japan. Thanks very much...karen

Wagner, Katie

From: Wagner, Katie
Sent: Tuesday, March 22, 2011 1:10 PM
To: Lee, Richard
Subject: RE: NRC N6306 SOARCA \$200K Urgent Funds & Mod

Ok

From: Lee, Richard
Sent: Tuesday, March 22, 2011 1:04 PM
To: Wagner, Katie
Subject: RE: NRC N6306 SOARCA \$200K Urgent Funds & Mod

This is not our contract. We are starting a new one. I will be sending you the tasks to be written.

From: Wagner, Katie
Sent: Tuesday, March 22, 2011 12:56 PM
To: Lee, Richard
Subject: RE: NRC N6306 SOARCA \$200K Urgent Funds & Mod

Richard,

To clarify, am I supposed to be writing a new contract (or mod for SOARCA/Japan Incident) or just be the PM for it once it goes through?

Thanks,
Katie

From: Lee, Richard
Sent: Tuesday, March 22, 2011 12:51 PM
To: Wagner, Katie
Subject: FW: NRC N6306 SOARCA \$200K Urgent Funds & Mod

fyi

From: Santiago, Patricia
Sent: Tuesday, March 22, 2011 12:14 PM
To: McClellan, Yvonne
Cc: Ghosh, Tina; Chang, Richard; Lee, Richard; Bowlin, Elizabeth; Schaperow, Jason
Subject: FW: NRC N6306 SOARCA \$200K Urgent Funds & Mod

Yvonne
Please work with Tina today if there is request for work off this contract mod.
thanks

From: Bowlin, Elizabeth
Sent: Tuesday, March 22, 2011 12:06 PM
To: Santiago, Patricia; Ghosh, Tina
Subject: FW: NRC N6306 SOARCA \$200K Urgent Funds & Mod

Hello Pat/Tina,
Sent SOARCA mod to SNL today. Yvonne McClellan has copy.

From: Bowlin, Elizabeth
Sent: Tuesday, March 22, 2011 9:41 AM
To: 'Collingsworth, Samantha Marie'; 'IAADMIN@sandia.gov'
Cc: Chang, Richard; 'McClellan, Yvonne'
Subject: NRC N6306 SOARCA \$200K Urgent Funds & Mod

Hello Samantha,

Attached are SOEW 112038 & urgency statement, modification to SOW, and T&C.

Extends POP through 12/31/2011, includes \$200K urgent funds for April, and has SOW modification detailing increase in LOE and adding Task 15, Technical Assistance for Emergency Issues.

Thanks,
Elizabeth

Elizabeth Bowlin, MS
RES/DSA Mgmt Analyst
NRC Mail Stop C3A7M
301-251-7955

Wagner, Katie

From: Wagner, Katie
Sent: Tuesday, March 22, 2011 2:15 PM
To: Bush-Goddard, Stephanie
Subject: Japan-Related Sharepoint Page

Stephanie,

Is this still pending or completed? Also, who is the staff contact for this?

25	3/17/2011	Edward LAZO ! NEW	Edward.LAZO@oecd.org	TBD	HEB	Request for information on whether the [US] government has made recommendations with regard to [US] citizens in Japan, with regard to food or goods coming from Japan, with regard to [US] citizens going to Japan. Also requesting information regarding [other] [US] published governmental positions.	Information regarding published U.S. governmental positions.	Pending
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Thanks,
Katie

Wagner, Katie

From: Wagner, Katie
Sent: Tuesday, March 22, 2011 3:46 PM
To: Lee, Richard
Cc: Bowlin, Elizabeth
Subject: RE: NEW SOW for SNL to perform analysis and technical assistances related to Fukushima

Richard,

I just met with Elizabeth Bowlin, Eddie Colon, and Maria Schofer regarding this contract (R. Chang set up the meeting) at 3pm today. Elizabeth and I are already working on getting everything together.

I know our branch is assigned to Sarah but apparently since the money is coming from SPB (something to that effect) Richard Chang made the meeting with Elizabeth.

I just wanted to keep you in the loop on this.

Thanks,
Katie

From: Lee, Richard
Sent: Tuesday, March 22, 2011 2:56 PM
To: Wagner, Katie
Subject: NEW SOW for SNL to perform analysis and technical assistances related to Fukushima

Dear Katie:

Attached is the draft tasks for the said SOW that we were asked to prepare. You are the PM, and the PI at SNL is Randy Gauntt.

Besides you (and other administrative staff). Others who should be receiving the monthly reports are: Hossein Esmaili, Mike Salay, Jason Schaperow, and Charles Tinkler.

Please work with Sarah to have this in place very soon.

Thanks,
Richard

LLLL/90

From: LIA07 Hoc
To: Borchardt, Bill; Bradford, Anna; Cohen, Shari; Cooper, LaToya; Dyer, Jim; Flory, Shirley; Gibbs, Catina; Haney, Catherine; Hudson, Sharon; Johnson, Michael; Leeds, Eric; Loyd, Susan; Pace, Patti; Schwarz, Sherry; Sheron, Brian; Speiser, Herald; Taylor, Renee; Virgilio, Martin; Walls, Lorena; Weber, Michael
Subject: Update for Go Books - 1800 EDT, March 22, 2011
Date: Tuesday, March 22, 2011 6:20:44 PM
Attachments: [ET Chronology 3-22-11 600pm.pdf](#)
[Talking Points QA for B.5.b issues 2-22-11.pdf](#)
[TEPCO Press Release 110.pdf](#)
[TEPCO Press Release 111.pdf](#)
[TEPCO Press Release 112.pdf](#)
[TEPCO Press Release 113.pdf](#)
[TEPCO Press Release 114.pdf](#)
[TEPCO Press Release 115.pdf](#)
[TEPCO Press Release 116.pdf](#)
[TEPCO Press Release 105.pdf](#)
[TEPCO Press Release 106.pdf](#)
[TEPCO Press Release 107.pdf](#)
[TEPCO Press Release 108.pdf](#)
[TEPCO Press Release 109.pdf](#)
[TEPCO Press Release 100.pdf](#)
[TEPCO Press Release 101.pdf](#)
[TEPCO Press Release 102.pdf](#)
[TEPCO Press Release 103.pdf](#)
[TEPCO Press Release 104.pdf](#)
[USNRC Earthquake-Tsunami Update.032211.1800EDT.pdf](#)
[March 22, 1500EDT one pager.docx](#)

Please find attached updated information for the "Go Books".

The updates include:

- The 1800 EDT, 03/22/11 Status Update
- The latest ET Chronology
- The latest TEPCO Press Releases (Numbers 100-116)
- NRC Talking Points/Q&A for B.5.b issues
- The 1500 EDT, 03/22/11 "One Pager"

Please let me know if you have any questions or concerns.

-Sara

Sara Mroz
Communications and Outreach
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
Sara.Mroz@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

LLL/91

1. What mitigative measures are required in the event of large fires at a plant?

Following the events of Sept. 11, 2001, NRC required all nuclear plant licensees to take additional steps to protect public health and safety in the event of a large fire or explosion. In accordance with NRC regulations, all nuclear power plants are required to maintain or restore cooling for the reactor core, containment building, and spent fuel pool under the circumstances associated with a large fire or explosion. These requirements include using existing or readily available equipment and personnel, having strategies for firefighting, operations to minimize fuel damage, and actions to minimize radiological release to the environment. In general, mitigative strategies are plans, procedures, and pre-staged equipment whose intent is to minimize the effects of adverse events. If needed, these mitigative strategies could also be used during natural phenomena such as earthquakes, tornadoes, floods, and tsunamis.

2. When did these mitigative measures become required?

After the Sept. 11, 2001 attacks, NRC issued an Interim Compensatory Measures Order that required all nuclear plant licensees to take additional steps to protect public health and safety in the event of a large fire or explosion. After completing the NRC rulemaking process, the requirements of this NRC Order were formally converted to regulations in 10 CFR 50.54(hh)(2). The regulations took effect in March 2009.

3. How do we know these will work/be effective?

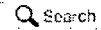
The NRC performed a comprehensive review that looked at what could happen in the event of a large fire or explosion at a nuclear power plant. As part of this review, the NRC conducted detailed engineering studies of a number of nuclear power plants. These studies included national experts from Department of Energy laboratories, who used state-of-the-art experiments, structural analyses, and fire analyses. The studies performed during this review confirmed that current operating nuclear plants are robust. In addition, operating reactor licensees were required to assess site-specific conditions and develop mitigation strategies to protect the reactor core, containment building, and spent fuel pool at each nuclear power plant. The NRC evaluated the strategies for each operating reactor licensee and issued a safety evaluation report to document the commitments to implement these mitigation strategies. Due to the highly sensitive nature for plant security contained in these reports, they are not available to the public.

4. Has any plant ever had to employ them?

The NRC is not aware of any plant that has needed to employ these mitigative measures in response to an actual event.

5. Are they regularly tested/inspected?

All mitigative measures have been implemented by nuclear plant licensees and were inspected by the NRC before the end of 2008. In accordance with NRC regulations, all nuclear plants are required to maintain equipment and procedures that support these mitigative measures. A variety of routine NRC inspections address selected aspects of these mitigative measures, but the most comprehensive NRC inspection of this area is a triennial fire protection inspection program. Every 3 years, NRC inspectors who are knowledgeable in the areas of fire protection and reactor operations conduct an onsite inspection of the storage, maintenance, and testing of equipment related to these mitigative measures.



Press Releases

Press Release (Mar 22, 2011) Plant Status of Fukushima Daini Nuclear Power Station (as of 3:00 pm March 22nd)

No New Developments since 12:00 pm, 22nd March

Unit Status

- 1
 - Reactor cold shutdown, stable water level, offsite power is available.
 - No cooling water is leaked to the reactor containment vessel.
 - Maintain average water temperature at 100°C in the pressure restraint.
- 2
 - Reactor cold shutdown, stable water level, offsite power is available.
 - No cooling water is leaked to the reactor containment vessel.
 - Maintain average water temperature at 100°C in the pressure restraint.
- 3
 - Reactor cold shutdown, stable water level, offsite power is available.
 - No cooling water is leaked to the reactor containment vessel.
 - Maintain average water temperature at 100°C in the pressure restraint.
- 4
 - Reactor cold shutdown, stable water level, offsite power is available.
 - No cooling water is leaked to the reactor containment vessel.
 - Maintain average water temperature at 100°C in the pressure restraint.

Other N.A.

The next information in regard to the plant is planned to be released at 6:00 pm, today.

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Press Releases

Press Release (Mar 22, 2011) Plant Status of Fukushima Daiichi Nuclear Power Station (as of 6:00 PM Mar 22nd)

*new items are underlined>

All 6 units of Fukushima Daiichi Nuclear Power Station have been shut down.

Unit 1 (Shut down)

- Reactor has been shut down. However, the explosive sound and white smoke were confirmed after the big quake occurred at 3:36PM Mar 12th. It was assumed to be hydrogen explosion.
- We have been injecting sea water into the reactor pressure vessel.

Unit 2 (Shut down)

- Reactor has been shut down and the level of reactor coolant had dropped and the reactor pressure had increased because the Reactor Core Isolation Cooling System stopped. Measures were taken to lower the pressure within the Reactor Containment Vessel and to inject sea water into the Reactor while carefully confirming safety. The level of reactor coolant and the pressure of the Reactor resumed.
- At approximately 6:00AM on March 15th, 2011, an abnormal noise began emanating from nearby Pressure Suppression Chamber and the pressure within this chamber decreased.
- We completed receiving electricity from the external transmission line up to the auxiliary transformer. We installed the power cable from the transformer to the temporary power panel. At 3:46 PM, March 20th, we started energizing the load-side power panel.
- At 6:20 on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm
- We have been injecting sea water into the reactor pressure vessel.

Unit 3 (Shut down)

- Reactor has been shut down. However, the explosive sound and white smoke were confirmed at 11:01AM Mar 14th. It was assumed to be hydrogen explosion.
- At 8:30AM on March 16th, fog like steam was confirmed arising from the reactor building.
- At approximately 6:15AM on March 17th the pressure of the Suppression Chamber has temporarily increased. We were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside now. We will continue to monitor the status of the pressure of the reactor containment vessel.
- We are working on receiving external power supply to Units 3 and 4.
- At approximately 4:00 pm, March 21st, light gray smoke was confirmed arising from the floor roof of the Unit 3 building. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.
- We have been injecting sea water into the reactor pressure vessel.

Unit 4 (outage due to regular inspection)

- Reactor has been shut down. However, at approximately 6AM on March 15th. We have confirmed the explosive sound and the sustained damage around the 5th floor rooftop area of the Nuclear Reactor Building.
- On March 15th and 16th, we respectively confirmed the outbreak of fire at the 4th floor of the northwestern part of the Nuclear Reactor Building. We immediately reported this matter to the fire department and the related authorities. TEPCO employees confirmed that each fire had already died down by itself.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.

Unit 5 (outage due to regular inspection)

- Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
- At 5 AM, March 19th, we started the Residual Heat Removal System Pump (C) in order to cool the spent fuel pool.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
- At 2:30 PM, March 20th, the reactor achieved reactor cold shutdown.

Unit 6 (outage due to regular inspection)

- Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
- We are working on receiving external power supply to Units 5 and 6. We completed the repair work on the emergency diesel generator (A).

- At 10:14 pm, March 19th, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
- At 7:27 PM, March 20th, the reactor achieved reactor cold shutdown.

Cooling of spent fuel pools

- In Unit 3, water discharge by Self-Defense Force's helicopters was conducted from 9:48 AM in the morning on March 17th. Also water discharge by the riot police's high-pressure water cannon trucks and Self-Defense Force's fire engines was conducted from 7PM on March 17th and finished at 8:09PM.
- In Unit 3, water discharge by Self-Defense Force's fire engines and US army's fire engines was conducted from 2 PM and completed a quarter to 3 PM.
- After that, from 0:30 AM, Mar 19th, water discharge by Tokyo Fire Department's Hyper Rescue was conducted to Unit 3 and completed at 1:10 AM. At around 2:10PM, water discharge by Tokyo Fire Department's Hyper Rescue to Unit 3 was conducted once again. At approximately 3:40 am, they had finished water discharge.
- At approximately 8:21 am, March 20th, water discharge to Unit 4 by fire engine has started with the cooperation of Self-Defense Forces and finished at approximately 9:40 am. At approximately 6:45 pm, March 20th water discharge to Unit 4 by Self-Defense's water cannon trucks was conducted and finished at approximately 7:45 pm.
- From 3: 05 PM to 5: 20 PM on March 20th, 40 tons of seawater was injected into Unit 2 by TEPCO employees.
- From 9:30 PM on March 20th, water discharge by Tokyo Fire Department's Hyper Rescue was conducted to Unit 3 and completed at approximately 4:00 AM today.
- At approximately 6:30 AM today,, water discharge to Unit 4 was started by Self-Defense Force's fire engines and US army's fire engines and was finished at approximately 8:40 AM.
- From 4:07 PM on March 22nd, 40 tons of seawater was injected into Unit 2 by TEPCO employees.
- From 3:10 PM on March 22nd, water discharge into Unit 3 by Tokyo Fire Department's Hyper Rescue was conducted and completed at approximately 3:59 PM today. From 5:17 PM on March 22nd, water discharge into Unit 4 from the concrete pumping vehicle was conducted.
- We are considering further water discharge at other units and others subject to the conditions of spent fuel pools.


Casualty

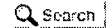
- 2 workers of cooperative firm were injured at the occurrence of the earthquake, and were transported to the hospital on March 11th.
- 4 workers were injured and transported to the hospital after explosive sound and white smoke were confirmed around the Unit 1 on March 11th.
- Presence of 2 TEPCO employees at the site is not confirmed on March 11th.
- 1 TEPCO employee who was not able to stand by his own holding left chest with his hand, was transported to the hospital by an ambulance on March 12th.
- 1 subcontract worker at the key earthquake-proof building was unconscious and transported to the hospital by an ambulance on March 12th.
- The radiation exposure of 1 TEPCO employee, who was working inside the reactor building, exceeded 100mSv and he was transported to the hospital on March 12th.
- 2 TEPCO employees felt bad during their operation in the central control rooms of Unit 1 and 2 while wearing full masks, and were transferred to Fukushima Daiichi Power Station for consultation with a medical advisor on March 13th.
- 11 workers were injured and transported to Fukushima Daiichi Nuclear Power Station etc. after explosive sound and white smoke were confirmed around the Unit 3. One of the workers was transported to the FUKUSHIMA Medical University Hospital on March 14th.

Others

- We measured radioactive materials (iodine etc.) inside of the nuclear power station area (outdoor) by monitoring car and confirmed that radioactive materials level is getting higher than ordinary level. As listed below, we have determined that specific incidents stipulated in article 15, clause 1 of Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) have occurred.
 - Determined at 4:17 PM Mar 12th (Around Monitoring Post 4)
 - Determined at 8:56 AM Mar 13th (Around Monitoring Post 4)
 - Determined at 2:15 PM Mar 13th (Around Monitoring Post 4)
 - Determined at 3:50 AM Mar 14th (Around Monitoring Post 6)
 - Determined at 4:15 AM Mar 14th (Around Monitoring Post 2)
 - Determined at 9:27 AM Mar 14th (Around Monitoring Post 3)
 - Determined at 9:37 PM Mar 14th (Around main entrance)
 - Determined at 6:51 AM Mar 15th (Around main entrance)
 - Determined at 8:11 AM Mar 15th (Around main entrance)
 - Determined at 4:17 PM Mar 15th (Around main entrance)
 - Determined at 11:05 PM Mar 15th (Around main entrance)
 - Determined at 8:58 AM Mar 19th (Around MP5)
- From now on, if the measured figure fluctuates and goes above and below 500 micro Sv/h, we deem that as the continuous same event and will not regard that as a new specific incidents stipulated in article 15, clause 1 of the Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) has occurred. In the interim, if we measure a manifestly abnormal figure and it is evident that the event is not the continuous same event, we will determine and notify.
- The national government has instructed evacuation for those local residents within 20km radius of the periphery and evacuation to inside for those residents from 20km to 30km radius of the periphery, because it's possible that radioactive materials are discharged.
- At approximately 10AM on March 15th, we observed 400mSv/h at the inland side of the Unit 3 reactor building and 100mSv/h at the inland side of the Unit 4 reactor building.
- We checked the status of spent fuel in the common pool, and confirmed that the water level secured. We are planning to conduct a detailed

- inspection.
- We found no signs of abnormal situation for the casks by visual observation during the patrol activity. A detailed inspection is under preparation.
 - At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit.
 - In total 12 fire engines are lent for the water discharge to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department.
 - *: Koriyama Fire Department, Iwaki Fire Brigade Headquarters, Fire Headquarters of Sukagawa District Wide Area Fire-fighting Association, Yonezawa City Fire Headquarters, Utsunomiya City Fire Headquarters, Fire Headquarters of Aizu-Wakamatsu wide area municipal association, Saitama City Fire Bureau, and Niigata City Fire Bureau.
 - On March 21st and 22nd, we detected cobalt, iodine and cesium from the seawater around discharge canal of Unit 1, 2, 3 and 4.
 - We will continue to take all measures to ensure the safety and to continue monitoring the surrounding environment around the Power Station.

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Press Releases

Press Release (Mar 22, 2011) Plant Status of Fukushima Daini Nuclear Power Station (as of 6:00 pm March 22nd)

No New Developments since 3:00 pm, 22nd March

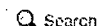
Unit Status

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 - No cooling water is leaked to the reactor containment vessel.
 - Maintain average water temperature at 100°C in the pressure restraint.

Other N.A.

The next information in regard to the plant is planned to be released at 9:00 pm, today.

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Press Releases

Press Release (Mar 22, 2011) Implementation Plan of Rolling Blackouts on and after March 23, 2011

Due to the power supply-demand balance, TEPCO has been implementing rolling blackout since Monday, March 14. We sincerely regret causing anxiety and inconvenience to our customers and the society. We appreciate your cooperation in conserving electricity consumption. For customers who will be subject to rolling blackouts, please be prepared for the announced blackout periods. Also, for the customers who are not subject to blackouts, we would appreciate your continuous cooperation in reducing electricity usage by turning off unnecessary lightings and electrical appliances. We would like to inform the implementation plan of rolling blackouts on and after March 23, 2011 as follows.

◦Implementation plan of rolling blackout on March 23 (Wed.)
Considering today's electricity supply-demand and tomorrow's weather, regional group and time periods for the planned blackout are as follows.

Group 1 6:20-10:00
Group 2 9:20-13:00

...Rolling blackout will not be implemented.

Group 4 15:20-19:00
Group 5 18:20-22:00

...Rolling blackout will be implemented.

Group 3 12:20-16:00
Group 1 13:50-17:30
Group 2 16:50-20:30

...The necessity of the rolling blackouts will be judged depending on the supply-demand balance, and will be informed 2 hours before the start of blackouts.

- The actual blackout period for each group is planned to be maximum of 3 hours during the relevant scheduled time period.
- Starting and ending time of blackout periods may slightly differ.
- Depending on the supply-demand balance of the day, planned blackouts may not be carried out. In case the electricity supply-demand balance becomes tighter than expected, we will reconsider the rolling blackout plan and inform you accordingly before we implement the revised plan.
- A blackout may occur in the adjacent areas where the planned blackouts are carried out.

◦Implementation plan of rolling blackouts from Thursday, March 24 to Tuesday, March 29

Please refer to the "exhibit" for detailed plan.

- The actual blackout period for each group is planned to be maximum of about 3 hours during the relevant scheduled time period.
- Starting and ending time of blackout periods will slightly differ day by day.
- Depending on the supply-demand balance hereafter, planned blackouts may not be carried out. Moreover, in case the electricity supply-demand balance becomes tighter than expected, we will reconsider the rolling blackout plan and inform you accordingly before we implement the revised plan.
- A blackout may occur in the adjacent areas where the planned blackouts are carried out.

[Others]

- In order to prevent fires, please make sure to switch off electric appliances such as hair driers when you leaving home.
- Please carefully pay attention to the traffic at the crossings in case the traffic lights are suddenly turned off.
- As for the building and apartment, please be aware that equipment and facility such as elevator, automatic door, automatic lock, and multilevel parking lot will not function. In particular, please avoid using elevators during the blackout.

◦Reference>


◦Prediction of demand and supply on March 22
Estimated Demand 37,000 MW (18:00-19:00)
Supply Capacity 37,000 MW

◦Prediction of demand and supply on March 23
Estimated Demand 38,000 MW (18:00-19:00)
Supply Capacity 37,500 MW

*Estimated demand and supply capacity may change depending on the

situation of the day.

.....
attachment2:Weekly Rolling Blackout Plan(EDF 13.0KB)

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Press Releases

Press Release (Mar 22, 2011) The improvement of implementation of rolling blackout -subdivision of each group-

TEPCO has been implementing the rolling blackout since March 14 due to the tightening power supply-demand balance caused by the Tohoku-Taiheiyu-Oki Earthquake. We sincerely regret causing anxiety and inconvenience to our customers and the society. We appreciate your cooperation in conserving electricity consumption.

At present, we have divided the area subject to the rolling blackout into 5 groups and announcing the schedule of blackout based on such groups. Hereafter we plan to ramify each existing group further into 5 sub groups. (target implementation date: March 26 (Sat))

This is to enable our customer to predict the blackout more accurately as the blackout is currently implemented within the group entirely and partially depending on the actual demand-supply balance.

For example, blackout will be implemented to entire group when the demand-supply balance is tightening, while only part of the group will be subject to the blackout when the balance has improved. Temporary improvement in the demand-supply balance is expected during the spring time.

Sub groups take turn for the blackout so that the unequal treatment among customers will be avoided.

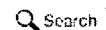
TEPCO plans to introduce additional measures to improve our operation such as the following example for the better announcement of blackout forecast. (actual introduction will be determined after successfully installing the group ramification.)

[forecast mark: example]

*blackout is scheduled, *there is a possibility of blackout,
*NO blackout is scheduled

TEPCO will continue to do its utmost to secure the stable supply of electricity. We apology for the inconvenience caused and appreciate your continuous cooperation in conservation of electricity and your understanding for the rolling blackout.

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Press Releases

Press Release (Mar 22,2011)

March 23rd (Wed): Group 4 (Original Schedule: 15:20 - 19:00)

-Blackout Period: Approximately 3 hours (15:20 -19:00)
 -Expected Number of Customers: Approximately 1,950,000
 -Applicable Region: Saitama pref., Kanagawa pref., Tokyo, Yamanashi pref., Gunma pref., Tochigi pref.

No.A

Kawaguchi City, Soka City, Yashio City, Warabi City

No.B

Saitama City (Urawa Ward, Minuma Ward, Sakura Ward, Nishi Ward, Omiya Ward, Chuo Ward, Minami Ward, Kita Ward, Midori Ward), Toda City, Kawaguchi City, Warabi City

No.C

Kiyokawa village, Isehara City, Ebina city, Atsugi City, Zama City, Sagamihara City (Chuo Ward, Minami Ward, Midori Ward), Machida City, Akawa Town

No.D

Saitama city (Iwatsuki Ward), Okegawa City, Kazo City, Kuki City, Satte City, Ageo City, Miyashiro Town, Shiraoka Town, Ina Town, Hasuda City

No.F

Inagi City, Kunitachi City, Akishima City, Hino City, Hachioji City, Tachikawa City

No.G

Yokohama City (Tsurumi Ward), Kawasaki City (Saiwai Ward, Kawasaki Ward, Nakahara Ward)

No.H

Saitama City (Minuma Ward, Nishi Ward, Omiya Ward, Chuo Ward, Kita Ward), Fujimino City, Okegawa City, Sayama City, Kumagaya City, Kounosu City, Sakado City, Ageo City, Niiza City, Fukaya City, Kawagoe City, Yorii Town, Yokoze Town, Minano Town, Nagatoro Town, Higashichichibu Village, Chichibu City, Asaka City, Tsurugashima City, Higashimatsuyama City, Hidaka City, Ogose Town, Moroyama Town, Iruma City, Hanno City, Tokigawa Town, Namegawa Town, Yoshimi Town, Ogawa Town, Kawajima Town, Hatoyama Town, Ranzan Town, Fujimi City, Wako City

No.I

Koshu City, Kofu City, Yamanashi City, Ichikawamisato Town, Chuo City, Showa Town, Fuefuki City

No.J

Isesaki City, Ota City, Chiyoda Town, Oizumi Town, Oura Town, Kumagaya City

No.K

Midori City, Isesaki City, Kiryu City, Ota City, Honjo City, Ashikaga City

No.L

Saitama City (Urawa Ward, Minami Ward, Midori Ward), Toda City, Warabi City, Kawaguchi City

No.M

Saitama City (Urawa Ward, Omiya Ward, Minami Ward, Midori Ward), Toda City, Kawaguchi City, Hatogaya City, Warabi City, Adachi Ward

No.N

Odawara City, Hadano City, Yugawara Town, Hakone Town, Kaisei Town, Yamakita Town, Matsuda Town, Ooi Town, Nakai Town, Minamiashigara City, Oyama Town¹

No.O

Iwafune Town, Tatebayashi City, Sano City, Ashikaga City, Tochigi City, Chiyoda Town, Itakura Town, Meiwa Town, Oura Town

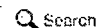
*No. is based on each substation's coverage area.

- Start time and end time may slightly differ in each Group.
- Depending upon the demand-supply conditions during the designated day, additional blackout may occur at other than the scheduled time.
- We will make maximum efforts to continue supplying electricity to the railroad services and may not carry out the rolling blackout to them.
- The blackout may only be applied to certain areas within the group.

*1 Newly appointed areas due to operation changes in the substations.

However, those areas could be out of the list when they are reenergized due to the operational reasons in the future.

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Press Releases

Press Release (Mar 22, 2011)
March 23rd (Wed): Group 5 (Original Schedule 18:20 - 22:00)

-Blackout Period: Approximately 3 hours (18:20 - 22:00)
-Customers (planned): approximately 2,720,000
-Areas: Saitama Pref., Yamanashi Pref., Shizuoka Pref., Kanagawa Pref.,
Tochigi Pref., Gunma Pref., Chiba Pref.

No.A
Misato City, Soka City, Yashio City

No.B
Koshu City, Yamanashi City, Otsuki City, Tsuru City, Yamanakako Village,
Nishikatsura Town, Oshino Village, Fujikawaguchiko Town,
Narusawa Village, Fujiyoshida City, Kosuge Village, Uenohara City¹,
Fuefuki City¹

No.C
Ito City, Izunokuni City, Izu City, Shimoda City, Kawazu Town,
Matsuzaki Town, Nishi-izu Town, Higashi-izu Town, Minami-izu Town,
Mishima City, Numazu City, Kannami Town, Atami City

No.D
Hiratsuka City, Oiso Town, Ninomiya Town, Isehara City, Chigasaki City,
Atsugi City, Hadano City, Ebina City, Samukawa Town

No.E
Utsunomiya City, Nikko City, Yaita City, Shioya Town

No.F
Annaka City, Shimonita Town, Kanra Town, Nanmoku Village, Takasaki City,
Tamamura Town, Kamisato Town, Kamikawa Town, Misato Town, Fukaya City,
Kanna Town, Chichibu City, Fujioka City, Tomioka City, Honjo City

No.G
Koshigaya City, Arakawa Ward, Misato City, Kawaguchi City, Soka City,
Adachi Ward, Yashio City

No.H
Yokohama City (Aoba Ward, Tsuzuki Ward), Kawasaki City (Miyamae Ward,
Takatsu Ward)

No.I
Isesaki City, Kusatsu Town, Nakanojo Town, Naganohara Town,
Tsumagoi Village, Takasaki City, Tamamura Town, Shibukawa City,
Maebashi City

No.J
Aikawa Town, Uenohara City, Sagami-hara City (Chuo Ward, Minami Ward,
Midori Ward), Machida City, Doshi Village

No.K
Utsunomiya City, Sakura City (Tochigi pref.), Nasukarasuyama City,
Yaita City, Otawara City, Nakagawa Town, Ichikai Town, Motegi Town,
Kaminokawa Town, Shioya Town

No.L
Numazu City, Fujinomiya City, Fuji City

No.M
Yokohama City (Isogo Ward, Sakae Ward, Totsuka Ward, Konan Ward,
Izumi Ward, Minami Ward), Kamakura City, Fujisawa City

No.N
Abiko City, Kamagaya City, Matsudo City, Kashiwa City, Shiroy City,
Noda City, Nagareyama City

No.O
Kumagaya City, Gyoda City, Fukaya City, Honjo City

No.P
Ichikawamisato Town, Minobu Town, Nanbu Town, Fujikawa Town,
Fujinomiya City, Fuji City

No.Q
Hiratsuka City, Kiyokawa Village, Zama City, Isehara City, Atsugi City,
Hadano City, Ebina City

No.R

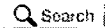
Funabashi City, Urayasu City, Kamagaya City, Ichikawa City

*No. is based on each substation's coverage area.

- Start time and end time may slightly differ in each Group.
- Depending upon the demand-supply conditions during the designated day, additional blackout may occur at other than the scheduled time.
- We will make maximum efforts to continue supplying electricity to the railroad services and may not carry out the rolling blackout to them.
- The blackout may only be applied to certain areas within the group.

*Newly appointed areas due to operation changes in the substations.
However, those areas could be out of the list when they are reenergized due to the operational reasons in the future.

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Press Releases

Press Release (Mar 22 2011) Status of TEPCO's Facilities and its services after Tohoku-Taiheiyu-Oki Earthquake (as of 0:00PM)

Due to the Tohoku-Taiheiyu-Oki Earthquake which occurred on March 11th 2011, TEPCO's facilities including our nuclear power stations have been severely damaged. We deeply apologize for the anxiety and inconvenience caused.

Below is the status of TEPCO's major facilities.

*new items are underlined

[Nuclear Power Station]

Fukushima Daiichi Nuclear Power Station:

Units 1 to 3: **shutdown due to earthquake**

(Units 4 to 6: outage due to regular inspection)

* The national government has instructed to evacuate for those local residents within 20km radius of the site periphery and to remain indoors for those local residents between 20km and 30km radius of the site periphery.

* Unit 1

The explosive sound and white smoke was confirmed near Unit 1 when the big quake occurred at 3:36pm, March 12th.

We have started injection of sea water at 8:20 pm and then boric acid which absorbs neutron into the reactor afterwards.

* Unit 2

At 1:25 pm, March 14th, since the Reactor Core Isolation Cooling System has failed, it was determined that a specific incident stipulated in Clause 1, Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness occurred (failure of reactor cooling function).

At 5:17 pm, while the water level in the reactor reached the top of the fuel rod, we have restarted the water injection with the valve operation.

At approximately 6:14 am, March 15th, the abnormal sound was confirmed near the suppression chamber and the pressure inside the chamber decreased afterwards. It was determined that there is a possibility that something happened in the suppression chamber. While sea water injection to the reactor continued, TEPCO employees and workers from other companies not in charge of injection work started tentative evacuation to a safe location.

Sea water injection to the reactor is still under operation.

On March 18th, power was delivered up to substation for backup power through offsite transmission line. We completed laying cable further to unit receiving facility in the building, and at 3:46 pm, March 20th the load-side power panel of the receiving facility started to be energized. From 3:05 pm to 5:20 pm on March 20th, 40 tons of seawater was injected into Unit 2 by TEPCO employees.

At 6:20 on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm.

* Unit 3

At 6:50 am, March 14th, while water injection to the reactor was under operation, the pressure in the reactor containment vessel increased to 530 kPa. As a result, at 7:44 am, it was determined that a specific incident stipulated in article 15, clause 1 occurred (abnormal increase of the pressure of reactor containment vessel). Afterwards, the pressure has gradually decreased (as of 9:05 am, 490 kPa).

At approximately 11:01 am, March 14th, an explosion followed by white smoke occurred near Unit 3. 4 TEPCO employees and 3 workers from other companies (all of them are conscious) have sustained injuries and they were already taken to the hospital by ambulances.

As the temperature of water in the spent fuel pool rose, spraying water by helicopters with the support of the Self Defense Force was considered, however the operation on March 16th was cancelled.

At 6:15 am, March 17th, the pressure of the Suppression Chamber temporarily increased, but currently it is stable in a certain range. On March 20th, we were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside. We will continue to monitor the status of the pressure of the reactor containment vessel. Monitoring will

be continued.

In order to cool spent fuel pool, water was sprayed by helicopters on March 17th with the cooperation of Self-Defense Forces. At approximately past 7:00 pm, March 17th, Self-Defense Forces and the police had started spraying water by water cannon trucks upon our request for the cooperation. At 8:09 pm, March 17th, they had finished the operation.

At 2:00 pm, March 18th, spraying water by fire engines was started with the cooperation of Self-Defense Forces and the United States Armed Forces. At 2:45 pm, March 18th, they had finished the operation.

At approximately 0:30 am, March 19th, spraying water was started with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department started spraying water. At approximately 1:10 am, March 19th, they finished the operation. They resumed spraying water at 2:10 pm. At approximately 3:40 am, March 20th, they finished the operation.

At approximately 9:30 pm, March 20th, spraying water was started with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department. At approximately 3:58 am, March 21st, they finished the operation.

At approximately 3:55 pm, March 21st, light gray smoke was confirmed arising from the southeast side of the 5th floor roof of the Unit 3 building, and the situation was reported to the fire department at approximately 4:21 pm. The parameters of reactor pressure vessel, reactor containment vessel, and monitored environmental data remained at the same level. However, employees working around Unit 3 evacuated to a safe location. It is observed the smoke has been decreasing. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.

* Unit 4

At approximately 6:00 am, March 15th, an explosive sound was heard and the damage in the 5th floor roof of Unit 4 reactor building was confirmed. At 9:38 am, the fire near the north-west part of 4th floor of Unit 4 reactor building was confirmed. At approximately 11:00 am, TEPCO employees confirmed that the fire was off.

At approximately 5:45 am, a TEPCO employee discovered a fire at the northwest corner of the Nuclear Reactor Building. TEPCO immediately reported this incident to the fire department and the local government and proceeded with the extinction of fire.

At approximately 6:15 am, TEPCO staff confirmed at the site that there are no signs of fire.

At approximately 8:21 am, March 20th, spraying water by fire engines was started with the cooperation of Self-Defense Forces and they finished the operation at approximately 9:40 am. At approximately 6:45 pm spraying water was started by Self-Defenses' water cannon trucks and finished at approximately 7:45 pm.

At approximately 6:30 am, March 21st, spraying water by fire engines was started with the cooperation of Self-Defense Forces and the United States Armed Forces. At approximately 8:40 am, March 21, they had finished the operation.

As of March 21st, cabling has been completed from temporary substation to the main power center.

* On March 18th, regarding the spent fuel in the common spent fuel pool, we have confirmed that the water level of the pool is secured. A detailed inspection is under preparation.

* common spent fuel pool: a spent fuel pool for common use set in a separate building in a plant site in order to preserve spent fuel which are transferred from the spent fuel pool in each Unit building.

* On March 17th, we patrolled buildings for dry casks and found no signs of abnormal situation for the casks by visual observation. A detailed inspection is under preparation.

* dry cask: a measure to store spent fuel in a dry storage casks in storages. Fukushima Daiichi Nuclear Power Station started to utilize the measure from August 1995.

* The restoration work of electricity supply from external source for Units 3, 4, 5 and 6 are being implemented. At 11:36 am, March 21, the service power supplied by emergency diesel generators in Units 5 was partially restored through transmission line (Yonomori-line) using a power receiving facility of Unit 6.

* At 5 am, Mar 19th, we started the Residual Heat Removal System Pump (C) of Unit 5 in order to cool the spent fuel pool. At 10:14 pm, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.

* Unit 5 has been in reactor cold shutdown since 2:30 pm on March 20th. Unit 6 has been in reactor cold shutdown since 7:27 pm on March 20th.

* At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit

* In total 12 fire engines are lent for spraying water to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department.

* On March 21st, we detected cobalt, iodine and cesium from the seawater around discharge canal of Unit 1, 2, 3 and 4.

* We will continuously endeavor to securing safety, and monitoring of the surrounding environment.

Fukushima Daiichi Nuclear Power Station:

Units 1 to 4: shutdown due to earthquake

* The national government has instructed evacuation for those local residents within 10km radius of the periphery.

* In order to achieve cold shutdown, reactor cooling function was restored and cooling of reactors was conducted. As a result, all reactors achieved cold shutdown: Unit 1 at 5:00 pm, March 14th, Unit 2 at 6:00 pm, March 14th, Unit 3 at 0:15 pm, March 12th, Unit 4 at 7:15 am, March 16th.

* Since March 12th, we had been preparing measures for reducing the pressure of reactor containment vessels (partial discharge of air containing radioactive materials to outside), but on March 17th, we released such preparation in all Units.

* (Unit 1)

As it is confirmed that the temperature of the Emergency Equipment Cooling Water System *1 has increased, at 3:20 pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 4:25 pm, March 15th, after replacing the power facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

* (Unit 4)

As it is confirmed that the pressure at the outlet of the pumps of the Emergency Equipment Cooling Water System*1 has been decreased, at 8:05 pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 9:25 pm, March 15th, after replacing the relevant facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

*1: emergency water system in which cooling water (pure water) circulates which exchanged the heat with sea water in order to cool down bearing pumps and/or heat exchangers etc.

Kashiwazaki Kariwa Nuclear Power Station:

Units 1, 5, 6, 7: normal operation

(Units 2 to 4: outage due to regular inspection)

[Thermal Power Station]

Hirono Thermal Power Station Units 2 and 4: shutdown due to earthquake
Hitachinaka Thermal Power Station Unit 1: shutdown due to earthquake
Kashima Thermal Power Station Units 2, 3, 5, 6: shutdown due to earthquake
Higashi-Ogishima Thermal Power Station Unit 1: shutdown due to earthquake

[Hydro Power Station]

* All the stations have been restored.

[Transmission System, etc.]

All substation failed due to the earthquake have been restored.

[Blackout in TEPCO's Service Area]

All the blackouts are resolved.

[Supply and Demand Status within TEPCO's Service Area to Secure Stable Power Supply]

Backup supply from Shinshinano Conversion Station: 600MW
Backup supply from Sakuma Conversion Station: 300MW
Backup supply from Higashi Shimizu Conversion Station: 100MW
Backup supply from Hokkaido-Honshu Interconnection Facilities: 60MW

Considering the critical balance of our power supply capacity and expected power demand forward, in order to avoid unexpected blackout, TEPCO has been implementing rolling blackout (planned blackout alternates from one area to another) since Mar 14th. We will make our utmost to secure the stable power supply as early as possible.

For customers who will be subject to rolling blackout, please be prepared for the announced blackout periods. Also for customers who are not subject to blackouts, TEPCO appreciates your continuous cooperation in reducing electricity usage by avoiding using unnecessary lighting and electrical equipment.

[Others]

Please do NOT touch cut-off electric wires.

In order to prevent fire, please make sure to switch off the electric appliances such as hair drier and to shut down the breaker of distribution board when you leave your house.

For the customer who has in-house power generation, please secure fuel for generator.

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Press Releases

Press Release (Mar 22,2011) Plant Status of Fukushima Daiichi Nuclear Power Station (as of 0:00 PM Mar 22st)

*new items are underlined

All 6 units of Fukushima Daiichi Nuclear Power Station have been shut down.

Unit 1 (Shut down)

- Reactor has been shut down. However, the explosive sound and white smoke were confirmed after the big quake occurred at 3:36PM Mar 12th. It was assumed to be hydrogen explosion.
- We have been injecting sea water into the reactor pressure vessel.

Unit 2 (Shut down)

- Reactor has been shut down and the level of reactor coolant had dropped and the reactor pressure had increased because the Reactor Core Isolation Cooling System stopped. Measures were taken to lower the pressure within the Reactor Containment Vessel and to inject sea water into the Reactor while carefully confirming safety. The level of reactor coolant and the pressure of the Reactor resumed.
- At approximately 6:00AM on March 15, 2011, an abnormal noise began emanating from nearby Pressure Suppression Chamber and the pressure within this chamber decreased.
- We completed receiving electricity from the external transmission line up to the auxiliary transformer. We installed the power cable from the transformer to the temporary power panel. At 3:46 PM, March 20th, we started energizing the load-side power panel.
- At 6:20 on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm
- We have been injecting sea water into the reactor pressure vessel.

Unit 3 (Shut down)

- Reactor has been shut down. However, the explosive sound and white smoke were confirmed at 11:01AM Mar 14th. It was assumed to be hydrogen explosion.
- At 8:30AM on March 16th, fog like steam was confirmed arising from the reactor building.
- At approximately 6:15AM on March 17th the pressure of the Suppression Chamber has temporarily increased. We were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside now. We will continue to monitor the status of the pressure of the reactor containment vessel.
- We are working on receiving external power supply to Units 3 and 4.
- At approximately 4:00 pm, March 21st, light gray smoke was confirmed arising from the floor roof of the Unit 3 building. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.
- We have been injecting sea water into the reactor pressure vessel.

Unit 4 (outage due to regular inspection)

- Reactor has been shut down. However, at approximately 6AM on March 15th. We have confirmed the explosive sound and the sustained damage around the 5th floor rooftop area of the Nuclear Reactor Building.
- On March 15th and 16th, we respectively confirmed the outbreak of fire at the 4th floor of the northwestern part of the Nuclear Reactor Building. We immediately reported this matter to the fire department and the related authorities. TEPCO employees confirmed that each fire had already died down by itself.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.

Unit 5 (outage due to regular inspection)

- Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
- At 5 AM, March 19th, we started the Residual Heat Removal System Pump (C) in order to cool the spent fuel pool.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
- At 2:30 PM, March 20th, the reactor achieved reactor cold shutdown.

Unit 6 (outage due to regular inspection)

- Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
- We are working on receiving external power supply to Units 5 and 6. We completed the repair work on the emergency diesel generator (A).
- At 10:14 pm, March 19, we started the Residual Heat Removal System Pump

- (B) of Unit 6 in order to cool the spent fuel pool.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
- At 7:27 PM, March 20th, the reactor achieved reactor cold shutdown.

Cooling of spent fuel pools

- In Unit 3, water discharge by Self-Defense Force's helicopters was conducted from 9:48 AM in the morning on March 17th. Also water discharge by the riot police's high-pressure water cannon trucks and Self-Defense Force's fire engines was conducted from 7PM on March 17th and finished at 8:09PM.
- In Unit 3, water discharge by Self-Defense Force's fire engines and US army's fire engines was conducted from 2 PM and completed a quarter to 3 PM.
- After that, from 0:30 AM, Mar 19th, water discharge by Tokyo Fire Department's Hyper Rescue was conducted to Unit 3 and completed at 1:10 AM. At around 2:10PM, water discharge by Tokyo Fire Department's Hyper Rescue to Unit 3 was conducted once again. At approximately 3:40 am, they had finished water discharge.
- At approximately 8:21 am, March 20th, water discharge to Unit 4 by fire engine has started with the cooperation of Self-Defense Forces and finished at approximately 9:40 am. At approximately 6:45 pm, March 20th water discharge to Unit 4 by Self-Defense's water cannon trucks was conducted and finished at approximately 7:45 pm.
- From 3: 05 PM to 5: 20 PM on March 20th, 40 tons of seawater was injected into Unit 2 by TEPCO employees.
- From 9:30 PM on March 20, water discharge by Tokyo Fire Department's Hyper Rescue was conducted to Unit 3 and completed at approximately 4:00 AM today.
- At approximately 6:30 AM today,, water discharge to Unit 4 was started by Self-Defense Force's fire engines and US army's fire engines and was finished at approximately 8:40 AM.
- We are considering further water discharge at Unit 3 and others subject to the conditions of spent fuel pools.

Casualty


- 2 workers of cooperative firm were injured at the occurrence of the earthquake, and were transported to the hospital on March 11th.
- 4 workers were injured and transported to the hospital after explosive sound and white smoke were confirmed around the Unit 1 on March 11th.
- Presence of 2 TEPCO employees at the site is not confirmed on March 11th.
- 1 TEPCO employee who was not able to stand by his own holding left chest with his hand, was transported to the hospital by an ambulance on March 12th.
- 1 subcontract worker at the key earthquake-proof building was unconscious and transported to the hospital by an ambulance on March 12th.
- The radiation exposure of 1 TEPCO employee, who was working inside the reactor building, exceeded 100mSv and he was transported to the hospital on March 12th.
- 2 TEPCO employees felt bad during their operation in the central control rooms of Unit 1 and 2 while wearing full masks, and were transferred to Fukushima Daiichi Power Station for consultation with a medical advisor on March 13th.
- 11 workers were injured and transported to Fukushima Daiichi Nuclear Power Station etc. after explosive sound and white smoke were confirmed around the Unit 3. One of the workers was transported to the FUKUSHIMA Medical University Hospital on March 14th.

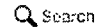
Others

- We measured radioactive materials (iodine etc.) inside of the nuclear power station area (outdoor) by monitoring car and confirmed that radioactive materials level is getting higher than ordinary level. As listed below, we have determined that specific incidents stipulated in article 15, clause 1 of Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) have occurred.
 - Determined at 4:17 PM Mar 12th (Around Monitoring Post 4)
 - Determined at 8:56 AM Mar 13th (Around Monitoring Post 4)
 - Determined at 2:15 PM Mar 13th (Around Monitoring Post 4)
 - Determined at 3:50 AM Mar 14th (Around Monitoring Post 6)
 - Determined at 4:15 AM Mar 14th (Around Monitoring Post 2)
 - Determined at 9:27 AM Mar 14th (Around Monitoring Post 3)
 - Determined at 9:37 PM Mar 14th (Around main entrance)
 - Determined at 6:51 AM Mar 15th (Around main entrance)
 - Determined at 8:11 AM Mar 15th (Around main entrance)
 - Determined at 4:17 PM Mar 15th (Around main entrance)
 - Determined at 11:05 PM Mar 15th (Around main entrance)
 - Determined at 8:58 AM Mar 19th (Around MP5)
- From now on, if the measured figure fluctuates and goes above and below 500 micro Sv/h, we deem that as the continuous same event and will not regard that as a new specific incidents stipulated in article 15, clause 1 of the Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) has occurred. In the interim, if we measure a manifestly abnormal figure and it is evident that the event is not the continuous same event, we will determine and notify.

- The national government has instructed evacuation for those local residents within 20km radius of the periphery and evacuation to inside for those residents from 20km to 30km radius of the periphery, because it's possible that radioactive materials are discharged.
- At approximately 10AM on March 15th, we observed 400mSv/h at the inland side of the Unit 3 reactor building and 100mSv/h at the inland side of the Unit 4 reactor building.
- We checked the status of spent fuel in the common pool, and confirmed that the water level secured. We are planning to conduct a detailed inspection.
- We found no signs of abnormal situation for the casks by visual observation during the patrol activity. A detailed inspection is under preparation.
- At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the

- reactor building for each unit.
- In total 12 fire engines are lent for the water discharge to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department.
*: Koriyama Fire Department, Iwaki Fire Brigade Headquarters, Fire Headquarters of Sukagawa District Wide Area Fire-fighting Association, Yonezawa City Fire Headquarters, Utsunomiya City Fire Headquarters, Fire Headquarters of Aizu-Wakamatsu wide area municipal association, Saitama City Fire Bureau, and Niigata City Fire Bureau.
 - On March 21st, we detected cobalt, iodine and cesium from the seawater around discharge canal of Unit 1, 2, 3 and 4.
 - We will continue to take all measures to ensure the safety and to continue monitoring the surrounding environment around the Power Station.

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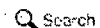
Press Release (Mar 22, 2011) Plant Status of Fukushima Daiichi Nuclear Power Station (as of 0:00 am March 22st)

No New Developments since 9:00 am, 22st March

Unit	Status
1	<ul style="list-style-type: none">Reactor cold shutdown, stable water level, offsite power is available.No cooling water is leaked to the reactor containment vessel.Maintain average water temperature at 100°C in the pressure restraint.
2	<ul style="list-style-type: none">Reactor cold shutdown, stable water level, offsite power is available.No cooling water is leaked to the reactor containment vessel.Maintain average water temperature at 100°C in the pressure restraint.
3	<ul style="list-style-type: none">Reactor cold shutdown, stable water level, offsite power is available.No cooling water is leaked to the reactor containment vessel.Maintain average water temperature at 100°C in the pressure restraint.
4	<ul style="list-style-type: none">Reactor cold shutdown, stable water level, offsite power is available.No cooling water is leaked to the reactor containment vessel.Maintain average water temperature at 100°C in the pressure restraint.
other	N.A.

The next information in regard to the plant is planned to be released at 3:00 pm, 22nd March.

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Press Releases

Press Release (Mar 22, 2011)

Start-up of posting "Graph of status of electric power use" on our website

Due to the power supply-demand balance, TEPCO has been implementing rolling black out since March 14 because of the occurrence of the Tohoku-Taiheiyou-Oki Earthquake. We sincerely regret causing anxiety and inconvenience to our customers and the society.

We appreciate your cooperation in conserving electricity consumption.

We start posting "Graph of status of use of electric power" on our website today. We plan to display a current result of electric power use per hour, availability of power supply, and a result of electric power use per hour of the previous day in our service area and widely announce status of electric power use which reflects cooperation of our customers in conserving electricity consumption and rolling blackout.

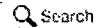
We take our utmost effort for restoration in order to make stable electric power supply as early as possible. We would like to ask for your cooperation in saving electricity consumption and understanding as to rolling blackout, although we inconvenience you.

TEPCO website "Graph of status of electric power use"

Japanese <http://www.tepco.co.jp/en/press/corp-com/release/11032207-j.html>

English <http://www.tepco.co.jp/en/press/corp-com/release/11032207-e.html>

2011.3.22 15:51



Press Releases

Press Release (Mar 22, 2011)

Detection of radioactive materials from the seawater around the discharge canal of Fukushima Daiichi Nuclear Power Station(2nd release)

On March 21st 2011, radioactive materials were detected from the seawater around the discharge canal (south) of Fukushima Daiichi Nuclear Power Station which was damaged by the 2011 Tohoku-Taiheiyou-Oki Ocean Earthquake.

This is the result of the sampling survey of radioactive materials in the seawater which was implemented as a part of monitoring of surrounding environment.

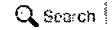
TEPCO had informed the result to Nuclear and Industrial Safety Agency (NISA) and Fukushima prefecture. (previously announced)

We had conducted re-sampling survey in the wide range of area to examine the effect of radioactive materials in the seawater. TEPCO had informed the result to Nuclear and Industrial Safety Agency (NISA) and Fukushima prefecture as radioactive material were detected. Details are as follows;

We will continue to conduct same kind of sampling survey.

attachment: The result of seawater nuclide analysis (PDF 52.5KB)

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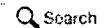
Press Release (Mar 22, 2011) Plant Status of Fukushima Daini Nuclear Power Station (as of 0:00 am March 22st)

No New Developments since 9:00 am, 22st March

Unit	Status
1	<ul style="list-style-type: none">Reactor cold shutdown, stable water level, offsite power is available.No cooling water is leaked to the reactor containment vessel.Maintain average water temperature at 100°C in the pressure restraint.
2	<ul style="list-style-type: none">Reactor cold shutdown, stable water level, offsite power is available.No cooling water is leaked to the reactor containment vessel.Maintain average water temperature at 100°C in the pressure restraint.
3	<ul style="list-style-type: none">Reactor cold shutdown, stable water level, offsite power is available.No cooling water is leaked to the reactor containment vessel.Maintain average water temperature at 100°C in the pressure restraint.
4	<ul style="list-style-type: none">Reactor cold shutdown, stable water level, offsite power is available.No cooling water is leaked to the reactor containment vessel.Maintain average water temperature at 100°C in the pressure restraint.
other	N.A.

The next information in regard to the plant is planned to be released at 3:00 pm, 22nd March.

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Press Releases

Press Release (Mar 22,2011) Plant Status of Fukushima Daiichi Nuclear Power Station (as of 0:00 PM Mar 22st)

*new items are underlined

All 6 units of Fukushima Daiichi Nuclear Power Station have been shut down.

Unit 1 (Shut down)

- Reactor has been shut down. However, the explosive sound and white smoke were confirmed after the big quake occurred at 3:36PM Mar 12th. It was assumed to be hydrogen explosion.
- We have been injecting sea water into the reactor pressure vessel.

Unit 2 (Shut down)

- Reactor has been shut down and the level of reactor coolant had dropped and the reactor pressure had increased because the Reactor Core Isolation Cooling System stopped. Measures were taken to lower the pressure within the Reactor Containment Vessel and to inject sea water into the Reactor while carefully confirming safety. The level of reactor coolant and the pressure of the Reactor resumed.
- At approximately 6:00AM on March 15, 2011, an abnormal noise began emanating from nearby Pressure Suppression Chamber and the pressure within this chamber decreased.
- We completed receiving electricity from the external transmission line up to the auxiliary transformer. We installed the power cable from the transformer to the temporary power panel. At 3:46 PM, March 20th, we started energizing the load-side power panel.
- At 6:20 on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm
- We have been injecting sea water into the reactor pressure vessel.

Unit 3 (Shut down)

- Reactor has been shut down. However, the explosive sound and white smoke were confirmed at 11:01AM Mar 14th. It was assumed to be hydrogen explosion.
- At 8:30AM on March 16th, fog like steam was confirmed arising from the reactor building.
- At approximately 6:15AM on March 17th the pressure of the Suppression Chamber has temporarily increased. We were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside now. We will continue to monitor the status of the pressure of the reactor containment vessel.
- We are working on receiving external power supply to Units 3 and 4.
- At approximately 4:00 pm, March 21st, light gray smoke was confirmed arising from the floor roof of the Unit 3 building. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.
- We have been injecting sea water into the reactor pressure vessel.

Unit 4 (outage due to regular inspection)

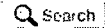
- Reactor has been shut down. However, at approximately 6AM on March 15th. We have confirmed the explosive sound and the sustained damage around the 5th floor rooftop area of the Nuclear Reactor Building.
- On March 15th and 16th, we respectively confirmed the outbreak of fire at the 4th floor of the northwestern part of the Nuclear Reactor Building. We immediately reported this matter to the fire department and the related authorities. TEPCO employees confirmed that each fire had already died down by itself.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.

Unit 5 (outage due to regular inspection)

- Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
- At 5 AM, March 19th, we started the Residual Heat Removal System Pump (C) in order to cool the spent fuel pool.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
- At 2:30 PM, March 20th, the reactor achieved reactor cold shutdown.

Unit 6 (outage due to regular inspection)

- Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
- We are working on receiving external power supply to Units 5 and 6. We completed the repair work on the emergency diesel generator (A).
- At 10:14 pm, March 19, we started the Residual Heat Removal System Pump



Press Releases

Press Release (Mar 22, 2011)

Status of TEPCO's Facilities and its services after Tohoku-Taiheiyu-Oki Earthquake (as of 0:00PM)

Due to the Tohoku-Taiheiyu-Oki Earthquake which occurred on March 11th 2011, TEPCO's facilities including our nuclear power stations have been severely damaged. We deeply apologize for the anxiety and inconvenience caused.

Below is the status of TEPCO's major facilities.

*new items are underlined

[Nuclear Power Station]

Fukushima Daiichi Nuclear Power Station:

Units 1 to 3: **shutdown due to earthquake**

(Units 4 to 6: outage due to regular inspection)

* The national government has instructed to evacuate for those local residents within 20km radius of the site periphery and to remain indoors for those local residents between 20km and 30km radius of the site periphery.

* Unit 1

The explosive sound and white smoke was confirmed near Unit 1 when the big quake occurred at 3:36pm, March 12th.

We have started injection of sea water at 8:20 pm and then boric acid which absorbs neutron into the reactor afterwards.

* Unit 2

At 1:25 pm, March 14th, since the Reactor Core Isolation Cooling System has failed, it was determined that a specific incident stipulated in Clause 1, Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness occurred (failure of reactor cooling function).

At 5:17 pm, while the water level in the reactor reached the top of the fuel rod, we have restarted the water injection with the valve operation.

At approximately 6:14 am, March 15th, the abnormal sound was confirmed near the suppression chamber and the pressure inside the chamber decreased afterwards. It was determined that there is a possibility that something happened in the suppression chamber. While sea water injection to the reactor continued, TEPCO employees and workers from other companies not in charge of injection work started tentative evacuation to a safe location.

Sea water injection to the reactor is still under operation.

On March 18th, power was delivered up to substation for backup power through offsite transmission line. We completed laying cable further to unit receiving facility in the building, and at 3:46 pm, March 20th the load-side power panel of the receiving facility started to be energized. From 3:05 pm to 5:20 pm on March 20th, 40 tons of seawater was injected into Unit 2 by TEPCO employees.

At 6:20 on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm.

* Unit 3

At 6:50 am, March 14th, while water injection to the reactor was under operation, the pressure in the reactor containment vessel increased to 530 kPa. As a result, at 7:44 am, it was determined that a specific incident stipulated in article 15, clause 1 occurred (abnormal increase of the pressure of reactor containment vessel). Afterwards, the pressure has gradually decreased (as of 9:05 am, 490 kPa).

At approximately 11:01 am, March 14th, an explosion followed by white smoke occurred near Unit 3. 4 TEPCO employees and 3 workers from other companies (all of them are conscious) have sustained injuries and they were already taken to the hospital by ambulances.

As the temperature of water in the spent fuel pool rose, spraying water by helicopters with the support of the Self Defense Force was considered, however the operation on March 16th was cancelled.

At 6:15 am, March 17th, the pressure of the Suppression Chamber temporarily increased, but currently it is stable in a certain range. On March 20th, we were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside. We will continue to monitor the status of the pressure of the reactor containment vessel. Monitoring will

be continued.

In order to cool spent fuel pool, water was sprayed by helicopters on March 17th with the cooperation of Self-Defense Forces. At approximately past 7:00 pm, March 17th, Self-Defense Forces and the police had started spraying water by water cannon trucks upon our request for the cooperation. At 8:09 pm, March 17th, they had finished the operation.

At 2:00 pm, March 18th, spraying water by fire engines was started with the cooperation of Self-Defense Forces and the United States Armed Forces. At 2:45 pm, March 18th, they had finished the operation.

At approximately 0:30 am, March 19th, spraying water was started with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department started spraying water. At approximately 1:10 am, March 19th, they finished the operation. They resumed spraying water at 2:10 pm. At approximately 3:40 am, March 20th, they finished the operation.

At approximately 9:30 pm, March 20th, spraying water was started with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department. At approximately 3:58 am, March 21st, they finished the operation.

At approximately 3:55 pm, March 21st, light gray smoke was confirmed arising from the southeast side of the 5th floor roof of the Unit 3 building, and the situation was reported to the fire department at approximately 4:21 pm. The parameters of reactor pressure vessel, reactor containment vessel, and monitored environmental data remained at the same level. However, employees working around Unit 3 evacuated to a safe location. It is observed the smoke has been decreasing. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.

* Unit 4

At approximately 6:00 am, March 15th, an explosive sound was heard and the damage in the 5th floor roof of Unit 4 reactor building was confirmed. At 9:38 am, the fire near the north-west part of 4th floor of Unit 4 reactor building was confirmed. At approximately 11:00 am, TEPCO employees confirmed that the fire was off.

At approximately 5:45 am, a TEPCO employee discovered a fire at the northwest corner of the Nuclear Reactor Building. TEPCO immediately reported this incident to the fire department and the local government and proceeded with the extinction of fire.

At approximately 6:15 am, TEPCO staff confirmed at the site that there are no signs of fire.

At approximately 8:21 am, March 20th, spraying water by fire engines was started with the cooperation of Self-Defense Forces and they finished the operation at approximately 9:40 am. At approximately 6:45 pm spraying water was started by Self-Defenses' water cannon trucks and finished at approximately 7:45 pm.

At approximately 6:30 am, March 21st, spraying water by fire engines was started with the cooperation of Self-Defense Forces and the United States Armed Forces. At approximately 8:40 am, March 21, they had finished the operation.

As of March 21st, cabling has been completed from temporary substation to the main power center.

* On March 18th, regarding the spent fuel in the common spent fuel pool, we have confirmed that the water level of the pool is secured. A detailed inspection is under preparation.

* common spent fuel pool: a spent fuel pool for common use set in a separate building in a plant site in order to preserve spent fuel which are transferred from the spent fuel pool in each Unit building.

* On March 17th, we patrolled buildings for dry casks and found no signs of abnormal situation for the casks by visual observation. A detailed inspection is under preparation.

* dry cask: a measure to store spent fuel in a dry storage casks in storages. Fukushima Daiichi Nuclear Power Station started to utilize the measure from August 1995.

* The restoration work of electricity supply from external source for Units 3, 4, 5 and 6 are being implemented. At 11:36 am, March 21, the service power supplied by emergency diesel generators in Units 5 was partially restored through transmission line (Yonomori-line) using a power receiving facility of Unit 6.

* At 5 am, Mar 19th, we started the Residual Heat Removal System Pump (C) of Unit 5 in order to cool the spent fuel pool. At 10:14 pm, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.

* Unit 5 has been in reactor cold shutdown since 2:30 pm on March 20th. Unit 6 has been in reactor cold shutdown since 7:27 pm on March 20th.

* At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit

* In total 12 fire engines are lent for spraying water to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department.

* On March 21st, we detected cobalt, iodine and cesium from the seawater around discharge canal of Unit 1, 2, 3 and 4.

* We will continuously endeavor to securing safety, and monitoring of the surrounding environment.

Fukushima Daiichi Nuclear Power Station:
Units 1 to 4: shutdown due to earthquake

* The national government has instructed evacuation for those local residents within 10km radius of the periphery.

* In order to achieve cold shutdown, reactor cooling function was restored and cooling of reactors was conducted. As a result, all reactors achieved cold shutdown: Unit 1 at 5:00 pm, March 14th, Unit 2 at 6:00 pm, March 14th, Unit 3 at 0:15 pm, March 12th, Unit 4 at 7:15 am, March 16th.

* Since March 12th, we had been preparing measures for reducing the pressure of reactor containment vessels (partial discharge of air containing radioactive materials to outside), but on March 17th, we released such preparation in all Units.

* (Unit 1)

As it is confirmed that the temperature of the Emergency Equipment Cooling Water System *1 has increased, at 3:20 pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 4:25 pm, March 15th, after replacing the power facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

* (Unit 4)

As it is confirmed that the pressure at the outlet of the pumps of the Emergency Equipment Cooling Water System*1 has been decreased, at 8:05 pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 9:25 pm, March 15th, after replacing the relevant facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

*1: emergency water system in which cooling water (pure water) circulates which exchanged the heat with sea water in order to cool down bearing pumps and/or heat exchangers etc.

Kashiwazaki Kariwa Nuclear Power Station:

Units 1, 5, 6, 7: normal operation

(Units 2 to 4: outage due to regular inspection)

[Thermal Power Station]

Hirono Thermal Power Station Units 2 and 4: shutdown due to earthquake
Hitachinaka Thermal Power Station Unit 1: shutdown due to earthquake
Kashima Thermal Power Station Units 2, 3, 5, 6: shutdown due to earthquake
Higashi-Ongishima Thermal Power Station Unit 1: shutdown due to earthquake

[Hydro Power Station]

* All the stations have been restored.

[Transmission System, etc.]

All substation failed due to the earthquake have been restored.

[Blackout in TEPCO's Service Area]

All the blackouts are resolved.

[Supply and Demand Status within TEPCO's Service Area to Secure Stable Power Supply]

Backup supply from Shinshinano Conversion Station: 600MW

Backup supply from Sakuma Conversion Station: 300MW

Backup supply from Higashi Shimizu Conversion Station: 100MW

Backup supply from Hokkaido-Honshu Interconnection Facilities: 60MW

Considering the critical balance of our power supply capacity and expected power demand forward, in order to avoid unexpected blackout, TEPCO has been implementing rolling blackout (planned blackout alternates from one area to another) since Mar 14th. We will make our utmost to secure the stable power supply as early as possible.

For customers who will be subject to rolling blackout, please be prepared for the announced blackout periods. Also for customers who are not subject to blackouts, TEPCO appreciates your continuous cooperation in reducing electricity usage by avoiding using unnecessary lighting and electrical equipment.

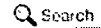
[Others]

Please do NOT touch cut-off electric wires.

In order to prevent fire, please make sure to switch off the electric appliances such as hair drier and to shut down the breaker of distribution board when you leave your house.

For the customer who has in-house power generation, please secure fuel for generator.

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Press Releases

Press Release (Mar 22,2011) Plant Status of Fukushima Daini Nuclear Power Station (as of 9:00 am March 22st)

No New Developments since 9:00 pm, 21st March

Unit Status

- 1
 - Reactor cold shutdown, stable water level, offsite power is available.
 - No cooling water is leaked to the reactor containment vessel.
 - Maintain average water temperature at 100°C in the pressure restraint.
- 2
 - Reactor cold shutdown, stable water level, offsite power is available.
 - No cooling water is leaked to the reactor containment vessel.
 - Maintain average water temperature at 100°C in the pressure restraint.
- 3
 - Reactor cold shutdown, stable water level, offsite power is available.
 - No cooling water is leaked to the reactor containment vessel.
 - Maintain average water temperature at 100°C in the pressure restraint.
- 4
 - Reactor cold shutdown, stable water level, offsite power is available.
 - No cooling water is leaked to the reactor containment vessel.
 - Maintain average water temperature at 100°C in the pressure restraint.

other N.A.

The next information in regard to the plant is planned to be released at 0:00 pm, 22nd March.

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Press Releases

Press Release (Mar 22,2011) Plant Status of Fukushima Daiichi Nuclear Power Station (as of 9:00 AM Mar 22st)

*new items are underlined>

All 6 units of Fukushima Daiichi Nuclear Power Station have been shut down.

Unit 1 (Shut down)

-Reactor has been shut down. However, the explosive sound and white smoke were confirmed after the big quake occurred at 3:36PM Mar 12th. It was assumed to be hydrogen explosion.

-We have been injecting sea water into the reactor pressure vessel.

Unit 2 (Shut down)

-Reactor has been shut down and the level of reactor coolant had dropped and the reactor pressure had increased because the Reactor Core Isolation Cooling System stopped. Measures were taken to lower the pressure within the Reactor Containment Vessel and to inject sea water into the Reactor while carefully confirming safety. The level of reactor coolant and the pressure of the Reactor resumed.

-At approximately 6:00AM on March 15, 2011, an abnormal noise began emanating from nearby Pressure Suppression Chamber and the pressure within this chamber decreased.

-We completed receiving electricity from the external transmission line up to the auxiliary transformer. We installed the power cable from the transformer to the temporary power panel. At 3: 46 PM, March 20th, we started energizing the load-side power panel.

-We have been injecting sea water into the reactor pressure vessel.

Unit 3 (Shut down)

-Reactor has been shut down. However, the explosive sound and white smoke were confirmed at 11:01AM Mar 14th. It was assumed to be hydrogen explosion.

-At 8:30AM on March 16th, fog like steam was confirmed arising from the reactor building.

-At approximately 6:15AM on March 17th the pressure of the Suppression Chamber has temporarily increased. We were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside now. We will continue to monitor the status of the pressure of the reactor containment vessel.

-We are working on receiving external power supply to Units 3 and 4.

-We have been injecting sea water into the reactor pressure vessel.

Unit 4 (outage due to regular inspection)

-Reactor has been shut down. However, at approximately 6AM on March 15th. We have confirmed the explosive sound and the sustained damage around the 5th floor rooftop area of the Nuclear Reactor Building.

-On March 15th and 16th, we respectively confirmed the outbreak of fire at the 4th floor of the northwestern part of the Nuclear Reactor Building. We immediately reported this matter to the fire department and the related authorities. TEPCO employees confirmed that each fire had already died down by itself.

-At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.

Unit 5 (outage due to regular inspection)

-Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.

-At 5 AM, March 19th, we started the Residual Heat Removal System Pump (C) in order to cool the spent fuel pool.

-At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.

-At 2:30 PM, March 20th, the reactor achieved reactor cold shutdown.

Unit 6 (outage due to regular inspection)

-Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.

-We are working on receiving external power supply to Units 5 and 6. We completed the repair work on the emergency diesel generator (A).

-At 10:14 pm, March 19, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.

-At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.

-At 7:27 PM, March 20th, the reactor achieved reactor cold shutdown.

Cooling of spent fuel pools

-In Unit 3, water discharge by Self-Defense Force's helicopters was

conducted from 9:48 AM in the morning on March 17th. Also water discharge by the riot police's high-pressure water cannon trucks and Self-Defense Force's fire engines was conducted from 7PM on March 17th and finished at 8:09PM.

- In Unit 3, water discharge by Self-Defense Force's fire engines and US army's fire engines was conducted from 2 PM and completed a quarter to 3 PM.
- After that, from 0:30 AM, Mar 19th, water discharge by Tokyo Fire Department's Hyper Rescue was conducted to Unit 3 and completed at 1:10 AM. At around 2:10PM, water discharge by Tokyo Fire Department's Hyper Rescue to Unit 3 was conducted once again. At approximately 3:40 am, they had finished water discharge.
- At approximately 8:21 am, March 20th, water discharge to Unit 4 by fire engine has started with the cooperation of Self-Defense Forces and finished at approximately 9:40 am. At approximately 6:45 pm, March 20th water discharge to Unit 4 by Self-Defense's water cannon trucks was conducted and finished at approximately 7:45 pm.
- From 3:05 PM to 5:20 PM on March 20th, 40 tons of seawater was injected into Unit 2 by TEPCO employees.
- From 9:30 PM on March 20, water discharge by Tokyo Fire Department's Hyper Rescue was conducted to Unit 3 and completed at approximately 4:00 AM today.
- At approximately 6:30 AM today,, water discharge to Unit 4 was started by Self-Defense Force's fire engines and US army's fire engines and was finished at approximately 8:40 AM.
- We are considering further water discharge at Unit 3 and others subject to the conditions of spent fuel pools.

Casualty

- 2 workers of cooperative firm were injured at the occurrence of the earthquake, and were transported to the hospital on March 11th.
- 4 workers were injured and transported to the hospital after explosive sound and white smoke were confirmed around the Unit 1 on March 11th.
- Presence of 2 TEPCO employees at the site is not confirmed on March 11th.
- 1 TEPCO employee who was not able to stand by his own holding left chest with his hand, was transported to the hospital by an ambulance on March 12th.
- 1 subcontract worker at the key earthquake-proof building was unconscious and transported to the hospital by an ambulance on March 12th.
- The radiation exposure of 1 TEPCO employee, who was working inside the reactor building, exceeded 100mSv and he was transported to the hospital on March 12th.
- 2 TEPCO employees felt bad during their operation in the central control rooms of Unit 1 and 2 while wearing full masks, and were transferred to Fukushima Daiichi Power Station for consultation with a medical advisor on March 13th.
- 11 workers were injured and transported to Fukushima Daiichi Nuclear Power Station etc. after explosive sound and white smoke were confirmed around the Unit 3. One of the workers was transported to the FUKUSHIMA Medical University Hospital on March 14th.

Others

- We measured radioactive materials (iodine etc.) inside of the nuclear power station area (outdoor) by monitoring car and confirmed that radioactive materials level is getting higher than ordinary level. As listed below, we have determined that specific incidents stipulated in article 15, clause 1 of Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) have occurred.
- Determined at 4:17 PM Mar 12th (Around Monitoring Post 4)
- Determined at 8:56 AM Mar 13th (Around Monitoring Post 4)
- Determined at 2:15 PM Mar 13th (Around Monitoring Post 4)
- Determined at 3:50 AM Mar 14th (Around Monitoring Post 6)
- Determined at 4:15 AM Mar 14th (Around Monitoring Post 2)
- Determined at 9:27 AM Mar 14th (Around Monitoring Post 3)
- Determined at 9:37 PM Mar 14th (Around main entrance)
- Determined at 6:51 AM Mar 15th (Around main entrance)
- Determined at 8:11 AM Mar 15th (Around main entrance)
- Determined at 4:17 PM Mar 15th (Around main entrance)
- Determined at 11:05 PM Mar 15th (Around main entrance)
- Determined at 8:58 AM Mar 19th (Around MP5)

From now on, if the measured figure fluctuates and goes above and below 500 micro Sv/h, we deem that as the continuous same event and will not regard that as a new specific incidents stipulated in article 15, clause 1 of the Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) has occurred. In the interim, if we measure a manifestly abnormal figure and it is evident that the event is not the continuous same event, we will determine and notify.

- The national government has instructed evacuation for those local residents within 20km radius of the periphery and evacuation to inside for those residents from 20km to 30km radius of the periphery, because it's possible that radioactive materials are discharged.
- At approximately 10AM on March 15th, we observed 400mSv/h at the inland side of the Unit 3 reactor building and 100mSv/h at the inland side of the Unit 4 reactor building.
- We checked the status of spent fuel in the common pool, and confirmed that the water level secured. We are planning to conduct a detailed inspection.
- We found no signs of abnormal situation for the casks by visual observation during the patrol activity. A detailed inspection is under preparation.
- At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit.
- In total 12 fire engines are lent for the water discharge to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department.
- *: Koriyama Fire Department, Iwaki Fire Brigade Headquarters, Fire Headquarters of Sukagawa District Wide Area Fire-fighting Association, Yonezawa City Fire Headquarters, Utsunomiya City Fire Headquarters, Fire Headquarters of Aizu-Wakamatsu wide area municipal association, Saitama City Fire Bureau, and Niigata City Fire Bureau.

-On March 21st, we detected cobalt, iodine and cesium from the seawater around discharge canal of Unit 1, 2, 3 and 4.
-We will continue to take all measures to ensure the safety and to continue monitoring the surrounding environment around the Power Station.

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Wagner, Katie

From: Wagner, Katie
Sent: Wednesday, March 23, 2011 10:19 AM
To: Ghosh, Tina
Subject: RE: when you get the chance

Hi Tina,

I think the 3/17 entry you're thinking of is this one:

13	3/17/2011	NEI	None given.	Ghani Zigh x7505	DSA	Requested a list of reports that a relevant to SFP zirc fire.	Decide what to release and to whom.	Request Denied
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I never got NEI contact info for this entry, but perhaps you could get that from Ghani Zigh if you're still looking?

Hope this helps,
Katie

From: Ghosh, Tina
Sent: Tuesday, March 22, 2011 5:17 PM
To: Wagner, Katie
Subject: when you get the chance

Hi Katie,

When you have a chance... I found another entry from NEI on 3/17/2011 in the spreadsheet, with scope of request, "Requested a list of reports relevant to SFP zirc fire."
Is there an NEI contact/e-mail associated with that entry?

No big rush – FYI, I won't be at the office until ~10:30am probably because I have a meeting in OWF earlier in the morning.

Thanks so much for any help,
Tina
251-7984

From: OST01 HOC
Sent: Thursday, April 28, 2011 5:36 AM
To: Tracy, Glenn
Subject: FOR YOUR REVIEW: draft Japan One Pager 0700 EDT 4-28-11
Attachments: draft Japan One Pager 0700 EDT 4-28-11.docx

PLEASE REVIEW

Wagner, Katie

From: Wagner, Katie
Sent: Wednesday, March 23, 2011 11:09 AM
To: Armstrong, Kenneth
Cc: Rubin, MichaelB
Subject: FW: NRC Operations Center Watchbill for Japan Event
Attachments: MASTER RESPONDER SCHEDULE - JAPAN EARTHQUAKE2.pdf; MASTER RESPONDER SCHEDULE - JAPAN EARTHQUAKE1.pdf

FYI

From: Gibson, Kathy
Sent: Saturday, March 19, 2011 4:18 PM
To: Gavrilas, Mirela; RES_DSA
Subject: Fw: NRC Operations Center Watchbill for Japan Event

Operations Center is looking for support. Please see the attached watchbill and if there is a position you can fill, let the ops center (and your supervisor) know.

Thanks!

From: OST02 HOC
To: Abrams, Charlotte; Adams, John; Afshar-Tous, Mugeh; Alemu, Bezakulu; Alter, Peter; Anderson, James; Ashkeboussi, Nima; Athey, George <george.athey@nrc.gov>; Baker, Stephen; Bergman, Thomas; Berry, Rollie; Bhachu, Ujagar; Bloom, Steven; Blount, Tom; Boger, Bruce; Borchardt, Bill; Bower, Anthony; Bowman, Gregory; Brandon, Lou; Brandt, Philip; Brock, Kathryn; Brown, Cris; Brown, David; Brown, Eva; Brown, Frederick; Brown, Michael; Bukharin, Oleg; Camper, Larry; Carpenter, Cynthia; Carter, Mary; Case, Michael; Casto, Greg; Cecere, Bethany; Cervera, Margaret; Chazell, Russell; Chen, Yen-Ju; Cheok, Michael; Chokshi, Niles; Chowdhury, Prosanta; Circle, Jeff; Clement, Richard; Clinton, Rebecca; Coggins, Anita <anita.coggins@nrc.gov>; Collins, Frank; Cool, Donald; Costa, Richard; Crutchley, Mary Glenn; Cruz, Zahira; Cutaiar, Robert <robert.cutaiar@nrc.gov>; Dacus, Eugene; DeCicco, Joseph; Decker, David; Dembek, Stephen; Devlin, Stephanie; Doane, Margaret; Dorman, Dan; Dorsey, Cynthia; Dozier, Jerry; Droggitis, Spiros; Dube, Donald; Dudes, Laura; Eads, Johnny; Emche, Danielle; English, Lance; Erlanger, Craig; Esmaili, Hossein; Figueroa, Roberto; Fiske, Jonathan; Floyd, Daphene; Foggie, Kirk; Foster, Jack; Fragoyannis, Nancy; Franovich, Rani; Frazier, Alan; Freshwater, David <david.freshwater@nrc.gov>; Fuller, Edward; Galletta, Thomas; Gambone, Kimberly; Gibson, Kathy; Glitter, Joseph; Gilmer, James; Gordon, Dennis; Gott, William; Grant, Jeffery; Grimes, Kelly; Grobe, Jack; Gulla, Gerald; Hale, Jerry; Hardesty, Duane; Harris, Tim; Hart, Ken; Hart, Michelle; Harvey, Brad; Hasselberg, Rick; Henderson, Karen; Hiland, Patrick; Holahan, Patricia; Holahan, Vincent; Holian, Brian; Howard, Tabitha; Huffert, Anthony; Hurd, Sapna; Huyck, Doug; Isom, James; Jackson, Karen; Jacobson, Jeffrey; Jessie, Janelle; Johnson, Michael; Jolicoeur, John; Jones, Andrea; Jones, Cynthia; Kahler, Carolyn; Kammerer, Annie; Karas, Rebecca; Khan, Omar; Kolb, Timothy; Kotzalas, Margie; Kowalczyk, Jeffrey; Kratchman, Jessica; Kugler, Andrew; Lamb, Christopher; Lane, John; Larson, Emily; Laur, Steven; LaVie, Steve; Lewis, Robert; Li, Yong; Lising, Jason; Lombard, Mark; Lubinski, John; Lui, Christiana; Lynch, Jeffery; Mamish, Nader; Manahan, Michelle; Marksberry, Don; Marshall, Jane; Masao, Nagai <nagai.masao@nrc.gov>; Maupin, Cardilia <cardilia.maupin@nrc.gov>; Mayros, Lauren; Mazaika, Michael; McConnell, Keith; McCoppin, Michael; McDermott, Brian; McGinty, Tim; McGovern, Denise; McMurtray, Anthony; Merritt, Christina; Meyer, Karen; Miller, Charles; Miller, Chris; Milligan, Patricia; Mohseni, Aby; Moore, Scott; Morlang, Gary; Morris, Scott; Mroz (Sahm), Sara; Munson, Clifford; Murray, Charles; Nerret, Amanda; Nguyen, Carolyn <carolyn.nguyen@nrc.gov>; Norris, Michael; Norton, Charles; Ordaz, Vonna; Owens, Janice; Padovan, Mark; Parillo, John; Patel, Jay; Perin, Vanice; Pope, Tia; Powell, Amy; Purdy, Gary; Quinlan, Kevin; Ragland, Robert; Ragland, Randolph; Ralph, Melissa; Ramsey, Jack; Reed, Elizabeth; Reed, Sara <sara.reed@nrc.gov>; Reed, Wendy; Reis, Terrence; Resner, Mark; Riley (OCA), Timothy; Riner, Kelly; Rini, Brett; Robinson, Edward; Rodriguez-Luccioni, Hector; Rosenberg, Stacey; Ross-Lee, MaryJane; Roundtree, Amy; Ruland, William; Salay, Michael; Salter, Susan; Salus, Amy; Sanfilippo, Nathan; Scarbrough, Thomas; Schaperow, Jason; Schmidt, Duane; Schmidt, Rebecca; Schoenebeck, Greg; Schrader, Eric; Schwartzman, Jennifer; Seber, Dogan; See, Kenneth; Shane, Raeann; Shea, James; Shepherd, Jill; Sheron, Brian; Skeen, David; Sloan, Scott; Smiroldo, Elizabeth; Smith, Brooke; Smith, Theodore; Stahl, Eric; Stang, Annette; Steger (Tucci), Christine; Stieve, Alice; Stone, Rebecca; Stransky,

Robert; Sturz, Fritz; Sullivan, Randy; Sun, Casper; Tappert, John; Temple, Jeffrey; Thaggard, Mark; Thomas, Eric; Thorp, John; Tobin, Jennifer; Trefethan, Jean <jean.trefethan@nrc.gov>; Tschiltz, Michael; Turtill, Richard; Uhle, Jennifer; Valencia, Sandra; Vaughn, James; Vick, Lawrence; Virgilio, Martin; Virgilio, Rosetta; Ward, Leonard; Wastler, Sandra; Watson, Bruce; Webber, Robert; Weber, Michael; White, Bernard; Wiggins, Jim; Williams, Donna; Williams, Joseph; Williamson, Linda; Willis, Dori; Wimbush, Andrea; Wittick, Brian; Wray, John; Wright, Lisa (Gibney); Wright, Ned; Wunder, George; Young, Francis; Zimmerman, Roy

Sent: Sat Mar 19 06:23:06 2011

Subject: NRC Operations Center Watchbill for Japan Event

Good morning,

Attached is the schedule for Ops Center Watchbill March 18-26 and March 26 – April 1. You will be receiving updated copies as the schedule continues to change. We do recognize that some positions do not have full staffing. We are looking to fill those. If you know anyone who would want to fill them, have them contact OPS Center at 816-5100.

Thanks

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 26-April 1

Position	Date	Time	Staff
Executive Team			
ET Director			
Fri-Sat	3/25-3/26	11pm-7am	
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	
ET Response Advisor			
Fri-Sat	3/25-3/26	11pm-7am	
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE

MARCH 26-April 1

ET Rx Prot Measures & State Coordinator			
Fri-Sat	3/25-3/26	11pm-7am	C. Carpenter
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	P. Holahan
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	P. Holahan
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	P. Holahan
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	P. Holahan
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	
Executive Briefing Team			
EBT Admin. Assistant			
Fri-Sat	3/25-3/26	11pm-7am	Sapna Hurd
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	Carolyn Kahler/Sapna Hurd
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	Carolyn Kahler/Sapna Hurd
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	Sapna Hurd
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	Sapna Hurd
Fri-Sat	4/1-4/2	11pm-7am	

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 26-April 1

EBT Coordinator			
Fri-Sat	3/25-3/26	11pm-7am	Jim Anderson
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	
Executive Support Team			
EST Status Officer			
Fri-Sat	3/25-3/26	11pm-7am	Jeff Grant
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 26-April 1

EST Actions Officer			
Fri-Sat	3/25-3/26	11pm-7am	Jonathan Fiske
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	
EST Coordinator			
Fri-Sat	3/25-3/26	11pm-7am	Clyde Ragland
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 26-April 1

EST Chronology Officer			
Fri-Sat	3/25-3/26	11pm-7am	Thomas Scarbrough
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	
EST Response Ops Mgr			
Fri-Sat	3/25-3/26	11pm-7am	Roberto Figueroa
Sat	26-Mar	7am - 3pm	Omar Khan
Sat	26-Mar	3pm-11pm	Cris Brown
Sat-Sun	3/26-3/27	11pm - 7am	Roberto Figueroa
Sun	27-Mar	7am - 3pm	Omar Khan
Sun	27-Mar	3pm-11pm	Cris Brown
Sun-Mon	3/27-3/28	11pm - 7am	Karen Jackson
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	
EST Admin. Assistant			

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE

MARCH 26-April 1

Fri-Sat	3/25-3/26	11pm-7am	Michelle Manahan ?
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	Linda Williamson
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	Mary Glenn Crutchley
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	Mary Glenn Crutchley
Wed-Thur	3/30-3/31	11pm - 7am	Linda Williamson
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	Tabitha Howard
Thur-Fri	3/31-4/1	11pm - 7am	Linda Williamson
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	Tabitha Howard
Fri-Sat	4/1-4/2	11pm-7am	

Liason Team

LT Director			
Fri-Sat	3/25-3/26	11pm-7am	Milt Murray
Sat	26-Mar	7am - 3pm	Nathan SanFilippo
Sat	26-Mar	3pm-11pm	Rani Franovich
Sat-Sun	3/26-3/27	11pm - 7am	Milt Murray
Sun	27-Mar	7am - 3pm	Nathan SanFilippo
Sun	27-Mar	3pm-11pm	Rani Franovich
Sun-Mon	3/27-3/28	11pm - 7am	Milt Murray
Mon	28-Mar	7am - 3pm	Nathan SanFilippo
Mon	28-Mar	3pm-11pm	Rani Franovich
Mon-Tue	3/28-3/29	11pm - 7am	Janelle Jesse
Tue	29-Mar	7am - 3pm	Nathan SanFilippo
Tue	29-Mar	3pm-11pm	Rani Franovich
Tue-Wed	3/29-3/30	11pm - 7am	Janelle Jesse
Wed	30-Mar	7am - 3pm	Nathan SanFilippo
Wed	30-Mar	3pm-11pm	Rani Franovich
Wed-Thur	3/30-3/31	11pm - 7am	Janelle Jesse
Thur	31-Mar	7am - 3pm	Milt Murray
Thur	31-Mar	3pm-11pm	Jeff Temple
Thur-Fri	3/31-4/1	11pm - 7am	Rani Franovich
Fri	1-Apr	7am - 3pm	Jeff Temple
Fri	1-Apr	3pm-11pm	Janelle Jesse
Fri-Sat	4/1-4/2	11pm-7am	Rani Franovich

LT Coordinator			
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JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE

MARCH 26-April 1

Fri-Sat	3/25-3/26	11pm-7am	Milt Murray/Janelle Jessie
Sat	26-Mar	7am - 3pm	Nathan Sanfilippo
Sat	26-Mar	3pm-11pm	Rani Franovich
Sat-Sun	3/26-3/27	11pm - 7am	Milt Murray
Sun	27-Mar	7am - 3pm	Nathan Sanfilippo
Sun	27-Mar	3pm-11pm	Rani Franovich
Sun-Mon	3/27-3/28	11pm - 7am	Milt Murray/Janelle Jessie
Mon	28-Mar	7am - 3pm	Nathan Sanfilippo
Mon	28-Mar	3pm-11pm	Rani Franovich
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	Nathan Sanfilippo
Tue	29-Mar	3pm-11pm	Rani Franovich
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	Nathan Sanfilippo
Wed	30-Mar	3pm-11pm	Jeff Temple
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	Milt Murray
Thur	31-Mar	3pm-11pm	Jeff Temple
Thur-Fri	3/31-4/1	11pm - 7am	Rani Franovich
Fri	1-Apr	7am - 3pm	Jeff Temple
Fri	1-Apr	3pm-11pm	Janelle Jessie
Fri-Sat	4/1-4/2	11pm-7am	Rani Franovich
LT State Liaison			
Fri-Sat	3/25-3/26	9pm-7am	Ryan/Turtill (ON CALL ONLY)
Sat	26-Mar	7am-2pm	Ryan/Turtill (ON CALL ONLY)
Sat	26-Mar	2pm-9pm	Ryan/Turtill (ON CALL ONLY)
Sat-Sun	3/27-3/27	9pm-7am	
Sun	27-Mar	7am-2pm	
Sun	27-Mar	2pm-9pm	
Sun-Mon	3/27-3/28	9pm-7am	
Mon	28-Mar	7am-2pm	
Mon	28-Mar	2pm-9pm	
Mon-Tue	3/28-3/29	9pm-7am	
Tue	29-Mar	7am-2pm	
Tue	29-Mar	2pm-9pm	
Tue-Wed	3/29-3/30	9pm-7am	
Wed	30-Mar	7am-2pm	
Wed	30-Mar	2pm-9pm	
Wed-Thur	3/30-3/31	9pm-7am	
Thur	31-Mar	7am-2pm	
Thur	31-Mar	2pm-9pm	
Thur-Fri	3/31-4/1	9pm-7am	
Fri	1-Apr	7am-2pm	
Fri	1-Apr	2pm-9pm	
Fri-Sat	4/1-4/2	9pm-7am	
LT Federal Liason (2)			

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE

MARCH 26-April 1

Fri-Sat	3/25-3/26	11pm-7am	
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	Jerry Hale
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	

LT Congressional Liason (2)

Sat	26-Mar	7am - 3pm	Steve Bloom/Lance English
Sat	26-Mar	3pm-11pm	Janice/Jenny Tobin
Sun	3/26-3/27	11pm - 7am	Elizabeth Smiroldo/
Sun	27-Mar	7am - 3pm	Jill/karen
Mon	27-Mar	3pm-11pm	Nancy/Jenny
Mon	3/27-3/28	11pm - 7am	Steve Baker/Brian
Tue	28-Mar	7am - 3pm	Jill/karen
Tue	28-Mar	3pm-11pm	Nancy
Wed	3/28-3/29	11pm - 7am	Steve Baker/Brian
Wed	29-Mar	7am - 3pm	Jill/karen
Thur	29-Mar	3pm-11pm	Nancy
Thur	3/29-3/30	11pm - 7am	Steve Baker/Brian
Fri	30-Mar	7am - 3pm	Eric/Lauren
Fri	30-Mar	3pm-11pm	Danielle/Mugeh
	3/30-3/31	11pm - 7am	Jen Schwartzman/Charlotte Abrams
	31-Mar	7am - 3pm	Danielle/Lauren
	31-Mar	3pm-11pm	Eric/Mugeh
	3/31-4/1	11pm - 7am	Jen Schwartzman/Charlotte Abrams

LT International Liason (2)

Fri-Sat	3/25-3/26	11pm-7am	
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 26-April 1

Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	

Protective Measures Team

PMTR Director			
Fri-Sat	3/25-3/26	11pm-7am	Randy Sullivan
Sat	26-Mar	7am - 3pm	Terry Reis
Sat	26-Mar	3pm-11pm	Cindy Jones
Sat-Sun	3/26-3/27	11pm - 7am	Randy Sullivan
Sun	27-Mar	7am - 3pm	Don Cool
Sun	27-Mar	3pm-11pm	V. Holahan
Sun-Mon	3/27-3/28	11pm - 7am	John Tappert
Mon	28-Mar	7am - 3pm	Don Cool
Mon	28-Mar	3pm-11pm	V. Holahan
Mon-Tue	3/28-3/29	11pm - 7am	John Tappert
Tue	29-Mar	7am - 3pm	Terry Reis
Tue	29-Mar	3pm-11pm	V. Holahan
Tue-Wed	3/29-3/30	11pm - 7am	Patricia Milligan
Wed	30-Mar	7am - 3pm	Terry Reis
Wed	30-Mar	3pm-11pm	V. Holahan
Wed-Thur	3/30-3/31	11pm - 7am	Patricia Milligan
Thur	31-Mar	7am - 3pm	Randy Sullivan
Thur	31-Mar	3pm-11pm	Terry Reis
Thur-Fri	3/31-4/1	11pm - 7am	Christiana Lui
Fri	1-Apr	7am - 3pm	Randy Sullivan
Fri	1-Apr	3pm-11pm	Don Cool
Fri-Sat	4/1-4/2	11pm-7am	Christiana Lui

PMTR Coordinator			
Fri-Sat	3/25-3/26	11pm-7am	
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 26-April 1

Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	
PMTR Prot Actions Asst Dir			
Fri-Sat	3/25-3/26	11pm-7am	Greg Casto
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	Greg Casto
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	Greg Casto
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	Greg Casto
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	Greg Casto
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	Greg Casto
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	
PMTR RAAD			
Fri-Sat	3/25-3/26	11pm-7am	
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 26-April 1

Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	
PMTR Dose Assessment (RASCAL)			
Fri-Sat	3/25-3/26	11pm-7am	John Parillo
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	
PMTR GIS Analyst			
Fri-Sat	3/25-3/26	11pm-7am	
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE

MARCH 26-April 1

Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	

PMTR Meteorologist

Fri-Sat	3/25-3/26	11pm-7am	
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	

Reactor Safety Team

RST Director			
Fri-Sat	3/25-3/26	11pm-7am	Brian Holian
Sat	26-Mar	7am - 3pm	Pat Hiland
Sat	26-Mar	3pm-11pm	Bill Ruland
Sat-Sun	3/26-3/27	11pm - 7am	Mike Case
Sun	27-Mar	7am - 3pm	Pat Hiland
Sun	27-Mar	3pm-11pm	Fred Brown
Sun-Mon	3/27-3/28	11pm - 7am	Mike Case

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE

MARCH 26-April 1

Mon	28-Mar	7am - 3pm	Pat Hiland
Mon	28-Mar	3pm-11pm	Fred Brown
Mon-Tue	3/28-3/29	11pm - 7am	Mike Case
Tue	29-Mar	7am - 3pm	Jennifer Uhle
Tue	29-Mar	3pm-11pm	Fred Brown
Tue-Wed	3/29-3/30	11pm - 7am	Mike Case
Wed	30-Mar	7am - 3pm	Jennifer Uhle
Wed	30-Mar	3pm-11pm	Fred Brown
Wed-Thur	3/30-3/31	11pm - 7am	Dave Skeen
Thur	31-Mar	7am - 3pm	Jennifer Uhle
Thur	31-Mar	3pm-11pm	Bill Ruland
Thur-Fri	3/31-4/1	11pm - 7am	Dave Skeen
Fri	1-Apr	7am - 3pm	Jennifer Uhle
Fri	1-Apr	3pm-11pm	Bill Ruland
Fri-Sat	4/1-4/2	11pm-7am	Dave Skeen
RST Coordinator			
Fri-Sat	3/25-3/26	11pm-7am	Frank Collins
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	
Severe Accident/PRA			
Fri-Sat	3/25-3/26	11pm-7am	
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE

MARCH 26-April 1

Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	
BWR Expertise			
Fri-Sat	3/25-3/26	11pm-7am	
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	
RST Comm/ERDS Operator			
Fri-Sat	3/25-3/26	11pm-7am	
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE

MARCH 26-April 1

Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	
RST Support (Seismology Q&A)			
Fri-Sat	3/25-3/26	11pm-7am	
Sat	26-Mar	7am - 3pm	
Sat	26-Mar	3pm-11pm	
Sat-Sun	3/26-3/27	11pm - 7am	
Sun	27-Mar	7am - 3pm	
Sun	27-Mar	3pm-11pm	
Sun-Mon	3/27-3/28	11pm - 7am	
Mon	28-Mar	7am - 3pm	
Mon	28-Mar	3pm-11pm	
Mon-Tue	3/28-3/29	11pm - 7am	
Tue	29-Mar	7am - 3pm	
Tue	29-Mar	3pm-11pm	
Tue-Wed	3/29-3/30	11pm - 7am	
Wed	30-Mar	7am - 3pm	
Wed	30-Mar	3pm-11pm	
Wed-Thur	3/30-3/31	11pm - 7am	
Thur	31-Mar	7am - 3pm	
Thur	31-Mar	3pm-11pm	
Thur-Fri	3/31-4/1	11pm - 7am	
Fri	1-Apr	7am - 3pm	
Fri	1-Apr	3pm-11pm	
Fri-Sat	4/1-4/2	11pm-7am	

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Exemption #2 - Internal Staffing

Position	Date	Time	Staff
Executive Team			
ET Director			
Fri-Sat	3/18-3/19	11pm-7am	Roy Zimmerman
Sat	19-Mar	7am - 3pm	Jim Wiggins
Sat	19-Mar	3pm-11pm	Brian Sheron
Sat-Sun	3/19-3/20	11pm - 7am	Mike Johnson
Sun	20-Mar	7am - 3pm	Jim Wiggins
Sun	20-Mar	3pm-11pm	Brian Sheron
Sun-Mon	3/20-3/21	11pm - 7am	Mike Johnson
Mon	21-Mar	7am - 3pm	Mike Weber
Mon	21-Mar	3pm-11pm	Jim Wiggins
Mon-Tues	3/21-3/22	11pm - 7am	Mike Johnson
Tues	22-Mar	7am - 3pm	Mike Weber
Tues	22-Mar	3pm-11pm	Jim Wiggins
Tues-Wed	3/22-3/23	11pm - 7am	Bruce Boger
Wed	23-Mar	7am - 3pm	Mike Weber
Wed	23-Mar	3pm-11pm	Roy Zimmerman
Wed-Thur	3/23-3/24	11pm - 7am	Bruce Boger
Thur	24-Mar	7am - 3pm	Mike Weber
Thur	24-Mar	3pm-11pm	Roy Zimmerman
Thur-Fri	3/24-3/25	11pm - 7am	Bruce Boger
Fri	25-Mar	7am - 3pm	Mike Weber
Fri	25-Mar	3pm-11pm	Roy Zimmerman
Fri-Sat	3/25-3/26	11pm-7am	
ET Response Advisor			
Fri-Sat	3/18-3/19	11pm-7am	Scott Morris
Sat	19-Mar	7am - 3pm	Brian McDermott
Sat	19-Mar	3pm-11pm	Mary Jane (MJ) Ross-Lee
Sat-Sun	3/19-3/20	11pm - 7am	Scott Morris
Sun	20-Mar	7am - 3pm	Chris Miller
Sun	20-Mar	3pm-11pm	Mary Jane (MJ) Ross-Lee
Sun-Mon	3/20-3/21	11pm - 7am	Scott Morris
Mon	21-Mar	7am - 3pm	Brian McDermott
Mon	21-Mar	3pm-11pm	Chris Miller
Mon-Tues	3/21-3/22	11pm - 7am	Scott Morris
Tues	22-Mar	7am - 3pm	Mary Jane (MJ) Ross-Lee
Tues	22-Mar	3pm-11pm	Chris Miller
Tues-Wed	3/22-3/23	11pm - 7am	Scott Morris
Wed	23-Mar	7am - 3pm	Brian McDermott
Wed	23-Mar	3pm-11pm	Chris Miller
Wed-Thur	3/23-3/24	11pm - 7am	Scott Morris
Thur	24-Mar	7am - 3pm	Mary Jane (MJ) Ross-Lee
Thur	24-Mar	3pm-11pm	Brian McDermott
Thur-Fri	3/24-3/25	11pm - 7am	Chris Miller
Fri	25-Mar	7am - 3pm	Mary Jane (MJ) Ross-Lee
Fri	25-Mar	3pm-11pm	Brian McDermott
Fri-Sat	3/25-3/26	11pm-7am	
ET Rx Prot Measures & State Coordinator			

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Fri-Sat	3/18-3/19	11pm-7am	Scott Moore
Sat	19-Mar	7am - 3pm	Larry Camper
Sat	19-Mar	3pm-11pm	P. Holahan
Sat-Sun	3/19-3/20	11pm - 7am	K. McConnell
Sun	20-Mar	7am - 3pm	Vonna Ordaz
Sun	20-Mar	3pm-11pm	Larry Camper
Sun-Mon	3/20-3/21	11pm - 7am	Rob Lewis
Mon	21-Mar	7am - 3pm	Charlie Miller
Mon	21-Mar	3pm-11pm	Larry Camper
Mon-Tues	3/21-3/22	11pm - 7am	Rob Lewis
Tues	22-Mar	7am - 3pm	Charlie Miller
Tues	22-Mar	3pm-11pm	P. Holahan
Tues-Wed	3/22-3/23	11pm - 7am	C. Carpenter
Wed	23-Mar	7am - 3pm	Charlie Miller
Wed	23-Mar	3pm-11pm	P. Holahan
Wed-Thur	3/23-3/24	11pm - 7am	C. Carpenter
Thur	24-Mar	7am - 3pm	Charlie Miller
Thur	24-Mar	3pm-11pm	Larry Camper
Thur-Fri	3/24-3/25	11pm - 7am	C. Carpenter
Fri	25-Mar	7am - 3pm	Charlie Miller
Fri	25-Mar	3pm-11pm	P. Holahan
Fri-Sat	3/25-3/26	11pm-7am	C. Carpenter

Executive Briefing Team

EBT Admin. Assistant			
Fri-Sat	3/18-3/19	11pm-7am	Sapna Hurd
Sat	19-Mar	7am - 3pm	Carolyn Kahler
Sat	19-Mar	3pm-11pm	Annette Stang
Sat-Sun	3/19-3/20	11pm - 9am	Sapna Hurd
Sun	20-Mar	9am - 7pm	Annette Stang
Sun	3/20-3/21	7pm-7am	Carolyn Kahler
Sun-Mon	21-Mar	7am - 3pm	A. Stang (7-11) / Sapna Hurd (11-3)
Mon	21-Mar	3pm-11pm	Tia Pope
Mon	3/21-3/22	11pm - 7am	Christina Merritt
Mon-Tues	22-Mar	7am - 3pm	Carolyn Kahler/Sapna Hurd
Tues	22-Mar	3pm-11pm	Jon Fiske
Tues	3/22-3/23	11pm - 7am	Tia Pope
Tues-Wed	23-Mar	7am - 3pm	Jon Fiske
Wed	23-Mar	3pm-11pm	Annette Stang
Wed	3/23-3/24	11pm - 7am	Christina Merritt
Wed-Thur	24-Mar	7am - 3pm	Carolyn Kahler/Sapna Hurd
Thur	24-Mar	3pm-11pm	Andrea Wimbush
Thur	3/24-3/25	11pm - 7am	Tia Pope
Thur-Fri	25-Mar	7am - 3pm	Annette Stang
Fri	25-Mar	3pm-11pm	Carolyn Kahler
Fri	3/25-3/26	11pm-7am	Sapna Hurd
EBT Coordinator			
Fri-Sat	3/18-3/19	11pm-7am	Christine Steger
Sat	19-Mar	7am - 3pm	Caroline Nguyen
Sat	19-Mar	3pm-11pm	Sara Mroz

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Sat-Sun	3/19-3/20	11pm - 7am	Jim Anderson
Sun	20-Mar	7am - 3pm	Yen Chen
Sun	20-Mar	3pm-11pm	Caroline Nguyen
Sun-Mon	3/20-3/21	11pm - 7am	Jim Anderson
Mon	21-Mar	7am - 3pm	Yen Chen
Mon	21-Mar	3pm-11pm	Sara Mroz
Mon-Tues	3/21-3/22	11pm - 7am	Jim Anderson
Tues	22-Mar	7am - 3pm	Yen Chen
Tues	22-Mar	3pm-11pm	Sara Mroz
Tues-Wed	3/22-3/23	11pm - 7am	Jim Anderson
Wed	23-Mar	7am - 3pm	Yen Chen
Wed	23-Mar	3pm-11pm	Sara Mroz
Wed-Thur	3/23-3/24	11pm - 7am	Jim Anderson
Thur	24-Mar	7am - 3pm	Yen Chen
Thur	24-Mar	3pm-11pm	Sara Mroz
Thur-Fri	3/24-3/25	11pm - 7am	Jim Anderson
Fri	25-Mar	7am - 3pm	Yen Chen
Fri	25-Mar	3pm-11pm	Sara Mroz
Fri-Sat	3/25-3/26	11pm-7am	Jim Anderson

Executive Support Team

EST Status Officer			
Fri-Sat	3/18-3/19	11pm-7am	Doug Huyck
Sat	19-Mar	7am - 3pm	Craig Erlanger
Sat	19-Mar	3pm-11pm	John Jolicoeur
Sat-Sun	3/19-3/20	11pm - 7am	Doug Huyck
Sun	20-Mar	7am - 3pm	Craig Erlanger
Sun	20-Mar	3pm-11pm	John Jolicoeur
Sun-Mon	3/20-3/21	11pm - 7am	Doug Huyck
Mon	21-Mar	7am - 3pm	Jane Marshall
Mon	21-Mar	3pm-11pm	Bill Gott
Mon-Tues	3/21-3/22	11pm - 7am	Jeff Grant
Tues	22-Mar	7am - 3pm	Jane Marshall
Tues	22-Mar	3pm-11pm	Bill Gott
Tues-Wed	3/22-3/23	11pm - 7am	Jeff Grant
Wed	23-Mar	7am - 3pm	Jane Marshall
Wed	23-Mar	3pm-11pm	Bill Gott
Wed-Thur	3/23-3/24	11pm - 7am	Jeff Grant
Thur	24-Mar	7am - 3pm	Jane Marshall
Thur	24-Mar	3pm-11pm	Bill Gott
Thur-Fri	3/24-3/25	11pm - 7am	Jeff Grant
Fri	25-Mar	7am - 3pm	Jane Marshall
Fri	25-Mar	3pm-11pm	Bill Gott
Fri-Sat	3/25-3/26	11pm-7am	Jeff Grant

EST Actions Officer			
Fri-Sat	3/18-3/19	11pm-7am	Amy Roundtree
Sat	19-Mar	7am - 3pm	Bezakulu Alemu
Sat	19-Mar	3pm-11pm	Melissa Ralph
Sat-Sun	3/19-3/20	11pm - 7am	Jonathan Fiske
Sun	20-Mar	7am - 3pm	Melissa Ralph

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Sun	20-Mar	3pm-11pm	Jonathan Fiske
Sun-Mon	3/20-3/21	11pm - 7am	Dori Votolato-Willis
Mon	21-Mar	7am - 3pm	Melissa Ralph
Mon	21-Mar	3pm-11pm	Amanda Nerret
Mon-Tues	3/21-3/22	11pm - 7am	Kelly Grimes
Tues	22-Mar	7am - 3pm	Melissa Ralph
Tues	22-Mar	3pm-11pm	Dori Votolato-Willis
Tues-Wed	3/22-3/23	11pm - 7am	Kelly Grimes
Wed	23-Mar	7am - 3pm	Melissa Ralph
Wed	23-Mar	3pm-11pm	Dori Votolato-Willis
Wed-Thur	3/23-3/24	11pm - 7am	Kelly Grimes
Thur	24-Mar	7am - 3pm	Wendy Reed
Thur	24-Mar	3pm-11pm	Dori Votolato-Willis
Thur-Fri	3/24-3/25	11pm - 7am	Jonathan Fiske
Fri	25-Mar	7am - 3pm	Amanda Nerret
Fri	25-Mar	3pm-11pm	Melissa Ralph
Fri-Sat	3/25-3/26	11pm-7am	Jonathan Fiske
EST Coordinator			
Fri-Sat	3/18-3/19	11pm-7am	Rebecca Stone
Sat	19-Mar	7am - 3pm	Clyde Ragland
Sat	19-Mar	3pm-11pm	Tony Bowers
Sat-Sun	3/19-3/20	11pm - 7am	Rebecca Stone
Sun	20-Mar	7am - 3pm	Clyde Ragland
Sun	20-Mar	3pm-11pm	Tony Bowers
Sun-Mon	3/20-3/21	11pm - 7am	Rebecca Stone
Mon	21-Mar	7am - 3pm	Tony McMurtray
Mon	21-Mar	3pm-11pm	Tony Bowers
Mon-Tues	3/21-3/22	11pm - 7am	Rebecca Stone
Tues	22-Mar	7am - 3pm	Tony McMurtray
Tues	22-Mar	3pm-11pm	Tony Bowers
Tues-Wed	3/22-3/23	11pm - 7am	Rebecca Stone
Wed	23-Mar	7am - 3pm	Tony McMurtray
Wed	23-Mar	3pm-11pm	Clyde Ragland
Wed-Thur	3/23-3/24	11pm - 7am	Rebecca Stone
Thur	24-Mar	7am - 3pm	Tony McMurtray
Thur	24-Mar	3pm-11pm	Clyde Ragland
Thur-Fri	3/24-3/25	11pm - 7am	Steve Campbell
Fri	25-Mar	7am - 3pm	Tony McMurtray
Fri	25-Mar	3pm-11pm	Clyde Ragland
Fri-Sat	3/25-3/26	11pm-7am	Steve Campbell
EST Chronology Officer			
Fri-Sat	3/18-3/19	11pm-7am	Dennis Gordon
Sat	19-Mar	7am - 3pm	Vanice Perrin
Sat	19-Mar	3pm-11pm	Rebecca Karas
Sat-Sun	3/19-3/20	11pm - 7am	Cynthia Dorsey
Sun	20-Mar	7am - 3pm	James Vaughn
Sun	20-Mar	3pm-11pm	Rebecca Karas
Sun-Mon	3/20-3/21	11pm - 7am	Mark Resner
Mon	21-Mar	7am - 3pm	Hector Rodriguez-Luccioni
Mon	21-Mar	3pm-11pm	Rebecca Karas

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Mon-Tues	3/21-3/22	11pm - 7am	Thomas Scarbrough
Tues	22-Mar	7am - 3pm	Hector Rodriguez-Luccioni
Tues	22-Mar	3pm-11pm	Rebecca Karas
Tues-Wed	3/22-3/23	11pm - 7am	Thomas Scarbrough
Wed	23-Mar	7am - 3pm	James Vaughn
Wed	23-Mar	3pm-11pm	Rebecca Karas
Wed-Thur	3/23-3/24	11pm - 7am	Nick Ballam
Thur	24-Mar	7am - 3pm	Hector Rodriguez-Luccioni
Thur	24-Mar	3pm-11pm	Rebecca Karas
Thur-Fri	3/24-3/25	11pm - 7am	Thomas Scarbrough
Fri	25-Mar	7am - 3pm	Hector Rodriguez-Luccioni
Fri	25-Mar	3pm-11pm	Rebecca Karas
Fri-Sat	3/25-3/26	11pm-7am	Thomas Scarbrough
EST Response Ops Mgr			
Fri-Sat	3/18-3/19	11pm-7am	Omar Khan
Sat	19-Mar	7am - 3pm	Cris Brown
Sat	19-Mar	3pm-11pm	Bob Stransky
Sat-Sun	3/19-3/20	11pm - 7am	Jean Trefethan
Sun	20-Mar	7am - 3pm	Karen Jackson
Sun	20-Mar	3pm-11pm	Roberto Figueroa
Sun-Mon	3/20-3/21	11pm - 7am	Jean Trefethan
Mon	21-Mar	7am - 3pm	Bob Stransky
Mon	21-Mar	3pm-11pm	Omar Khan
Mon-Tues	3/21-3/22	11pm - 7am	Cris Brown
Tues	22-Mar	7am - 3pm	Bob Stransky
Tues	22-Mar	3pm-11pm	Karen Jackson
Tues-Wed	3/22-3/23	11pm - 7am	Roberto Figueroa
Wed	23-Mar	7am - 3pm	Bob Stransky
Wed	23-Mar	3pm-11pm	Jean Trefethan
Wed-Thur	3/23-3/24	11pm - 7am	Cris Brown
Thur	24-Mar	7am - 3pm	Karen Jackson
Thur	24-Mar	3pm-11pm	Omar Khan
Thur-Fri	3/24-3/25	11pm - 7am	Roberto Figueroa
Fri	25-Mar	7am - 3pm	Jean Trefethan
Fri	25-Mar	3pm-11pm	Cris Brown
Fri-Sat	3/25-3/26	11pm-7am	Roberto Figueroa
EST Admin. Assistant			
Fri-Sat	3/18-3/19	11pm-7am	Tabitha Howard
Sat	19-Mar	7am - 3pm	Karen Meyer
Sat	19-Mar	3pm-11pm	Amy Salus
Sat-Sun	3/19-3/20	11pm - 7am	Chris Lamb
Sun	20-Mar	7am - 3pm	Karen Meyer
Sun	20-Mar	3pm-11pm	Linda Williamson
Sun-Mon	3/20-3/21	11pm - 7am	Chris Lamb
Mon	21-Mar	7am - 3pm	Karen Meyer
Mon	21-Mar	3pm-11pm	Mary Glenn Crutchley
Mon-Tues	3/21-3/22	11pm - 7am	Andrea Wimbush
Tues	22-Mar	7am - 3pm	Amy Salus
Tues	22-Mar	3pm-11pm	Mary Glenn Crutchley
Tues-Wed	3/22-3/23	11pm - 7am	Michelle Manahan

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Wed	23-Mar	7am - 3pm	Karen Meyer
Wed	23-Mar	3pm-11pm	Mary Glenn Crutchley
Wed-Thur	3/23-3/24	11pm - 7am	Andrea Wimbush
Thur	24-Mar	7am - 3pm	Amy Salus
Thur	24-Mar	3pm-11pm	Mary Glenn Crutchley
Thur-Fri	3/24-3/25	11pm - 7am	Tabitha Howard
Fri	25-Mar	7am - 3pm	Karen Meyer
Fri	25-Mar	3pm-11pm	Mary Glenn Crutchley
Fri-Sat	3/25-3/26	11pm-7am	Michelle Manahan
Liason Team			
LT Director			
Fri-Sat	3/18-3/19	11pm-7am	Tom Blount
Sat	19-Mar	7am - 3pm	Tom Bergman
Sat	19-Mar	3pm-11pm	Bob Webber
Sat-Sun	3/19-3/20	11pm - 7am	John Adams
Sun	20-Mar	7am - 3pm	Tom Bergman
Sun	20-Mar	3pm-11pm	Bob Webber
Sun-Mon	3/20-3/21	11pm - 7am	John Adams
Mon	21-Mar	7am - 3pm	Tom Bergman
Mon	21-Mar	3pm-11pm	Bob Webber
Mon-Tues	3/21-3/22	11pm - 7am	John Adams
Tues	22-Mar	7am - 3pm	Tom Bergman
Tues	22-Mar	3pm-11pm	Bob Webber
Tues-Wed	3/22-3/23	11pm - 7am	John Adams
Wed	23-Mar	7am - 3pm	Michael Tschiltz
Wed	23-Mar	3pm-11pm	Joe Glitter
Wed-Thur	3/23-3/24	11pm - 7am	Tim McGinty
Thur	24-Mar	7am - 3pm	Michael Tschiltz
Thur	24-Mar	3pm-11pm	Joe Glitter
Thur-Fri	3/24-3/25	11pm - 7am	Tim McGinty
Fri	25-Mar	7am - 3pm	Michael Tschiltz
Fri	25-Mar	3pm-11pm	Joe Glitter
Fri-Sat	3/25-3/26	11pm-7am	Tim McGinty
LT Coordinator			
Fri-Sat	3/18-3/19	11pm-7am	Janelle Jessie
Sat	19-Mar	7am - 3pm	Jeff Temple
Sat	19-Mar	3pm-11pm	Rani Franovich
Sat-Sun	3/19-3/20	11pm - 7am	Janelle Jessie
Sun	20-Mar	7am - 3pm	Jeff Temple
Sun	20-Mar	3pm-11pm	Nathan Sanfilippo
Sun-Mon	3/20-3/21	11pm - 7am	Milt Murray
Mon	21-Mar	7am - 3pm	Jeff Temple
Mon	21-Mar	3pm-11pm	Nathan Sanfilippo
Mon-Tues	3/21-3/22	11pm - 7am	Milt Murray
Tues	22-Mar	7am - 3pm	Rani Franovich
Tues	22-Mar	3pm-11pm	Nathan Sanfilippo
Tues-Wed	3/22-3/23	11pm - 7am	Milt Murray
Wed	23-Mar	7am - 3pm	Rani Franovich
Wed	23-Mar	3pm-11pm	Jeff Temple

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Wed-Thur	3/23-3/24	11pm - 7am	Milt Murray
Thur	24-Mar	7am - 3pm	Rani Franovich
Thur	24-Mar	3pm-11pm	Jeff Temple
Thur-Fri	3/24-3/25	11pm - 7am	Milt Murray
Fri	25-Mar	7am - 3pm	Janelle Jessie
Fri	25-Mar	3pm-11pm	Rani Franovich
Fri-Sat	3/25-3/26	11pm-7am	Milt Murray
LT State Liaison			
Thur-Fri	3/17-3/18	9pm-7am	Ryan/Turttil (ON CALL ONLY)
Fri	18-Mar	7am-2pm	Lukes/Flannery
Fri	18-Mar	2pm-9pm	Turttil/Maupin
Fri-Sat	3/18-3/19	9pm-7am	Ryan/Turttil (ON CALL ONLY)
Sat	19-Mar	7am-2pm	Ryan/Turttil (ON CALL ONLY)
Sat	19-Mar	2pm-9pm	Ryan/Turttil (ON CALL ONLY)
Sat-Sun	3/19-3/20	9pm-7am	Ryan/Turttil (ON CALL ONLY)
Sun	20-Mar	7am-2pm	Ryan/Turttil (ON CALL ONLY)
Sun	20-Mar	2pm-9pm	Ryan/Turttil (ON CALL ONLY)
Sun-Mon	3/20-3/21	9pm-7am	Ryan/Turttil (ON CALL ONLY)
Mon	21-Mar	7am-2pm	Flannery (Riveria-On Call)
Mon	21-Mar	2pm-9pm	Easson (Turttil-On Call)
Mon-Tue	3/21-3/22	9pm-7am	Ryan/Turttil
Tue	22-Mar	7am-2pm	Flannery (Riveria-On Call)
Tue	22-Mar	2pm-9pm	Easson (Turttil-On Call)
Tue-Wed	3/22-3/23	9pm-7am	Ryan/Turttil
Wed	23-Mar	7am-2pm	Maupin (Lukes-On Call)
Wed	23-Mar	2pm-9pm	Rivera (Easson-On Call)
Wed-Thur	3/23-3/24	9pm-7am	Ryan/Turttil
Thur	24-Mar	7am-2pm	Lukes (Flannery-On Call)
Thur	24-Mar	2pm-9pm	Maupin (Riveria-On Call)
Thur-Fri	3/24-3/25	9pm-7am	Ryan/Turttil
Fri	25-Mar	7am-2pm	Ryan (Maupin-On Call)
Fri	25-Mar	2pm-9pm	Turttil (Riveria-On Call)
Fri-Sat	3/25-3/26	9pm-7am	Ryan/Turttil (ON CALL ONLY)
LT Federal Liaison (2)			
Fri-Sat	3/18-3/19	11pm-7am	Scott Sloan
Sat	19-Mar	7am - 3pm	Russ Chazell
Sat	19-Mar	3pm-11pm	Jeff Lynch
Sat-Sun	3/19-3/20	11pm - 7am	Scott Sloan
Sun	20-Mar	7am - 3pm	Ned Wright
Sun	20-Mar	3pm-11pm	Jerry Hale
Sun-Mon	3/20-3/21	11pm - 7am	Lisa Wright
Mon	21-Mar	7am - 3pm	Beth Reed/Ted Smith
Mon	21-Mar	3pm-11pm	Ned Wright
Mon-Tues	3/21-3/22	11pm - 7am	Lisa Wright
Tues	22-Mar	7am - 3pm	Beth Reed/Ted Smith
Tues	22-Mar	3pm-11pm	Ned Wright
Tues-Wed	3/22-3/23	11pm - 7am	Lisa Wright
Wed	23-Mar	7am - 3pm	Jerry Hale/
Wed	23-Mar	3pm-11pm	Ted Smith
Wed-Thur	3/23-3/24	11pm - 7am	Lisa Wright

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Thur	24-Mar	7am - 3pm	/Ted Smith
Thur	24-Mar	3pm-11pm	Jerry Hale
Thur-Fri	3/24-3/25	11pm - 7am	
Fri	25-Mar	7am - 3pm	/Ted Smith
Fri	25-Mar	3pm-11pm	Jerry Hale
Fri-Sat	3/25-3/26	11pm-7am	
LT Congressional Liason (2)			
Sat	19-Mar	7am - 2pm	Spiros Droggitis
	19-Mar	2pm-9pm	Tim Riley
Sun	20-Mar	7am - 2pm	Rebecca Schmidt
	20-Mar	2pm-9pm	Reanne Shane
Mon	21-Mar	7am - 2pm	Spiros Droggitis
	21-Mar	2pm-9pm	Tim Riley
Tues	22-Mar	7am - 2pm	Tim Riley
	22-Mar	2pm-9pm	Spiros Droggitis
Wed	23-Mar	7am - 2pm	Gene Dacus
	23-Mar	2pm-9pm	Raeann Shane
Thur	24-Mar	7am - 2pm	Spiros Droggitis
	24-Mar	2pm-9pm	Raeann Shane
Fri	25-Mar	7am - 2pm	Gene Dacus
	25-Mar	2pm-9pm	Amy Powell
LT International Liason (2)			
Fri-Sat	3/18-3/19	11pm-7am	Elizabeth Smirolodo/Danielle Emche
Sat	19-Mar	7am - 3pm	Lance English/Steve Bloom
Sat	19-Mar	3pm-11pm	Jenny Tobin/Jill Shephard
Sat-Sun	3/19-3/20	11pm - 7am	Elizabeth Smirolodo/Danielle Emche
Sun	20-Mar	7am - 3pm	Karen/Steve Baker
Sun	20-Mar	3pm-11pm	Eric Stahl/Nancy
Sun-Mon	3/20-3/21	11pm - 7am	Elizabeth Smirolodo/Jenny Tobin
Mon	21-Mar	7am - 3pm	Jen Schwartzman/Charlotte Abrams/Nancy (12-3
Mon	21-Mar	3pm-11pm	Danielle Emche/Lauren Mayros
Mon-Tues	3/21-3/22	11pm - 7am	Eric Stahl/Mugeh
Tues	22-Mar	7am - 3pm	Jen Schwartzman/Charlotte Abrams/Nancy (12-3
Tues	22-Mar	3pm-11pm	Danielle Emche/Lauren Mayros
Tues-Wed	3/22-3/23	11pm - 7am	Eric Stahl/Mugeh
Wed	23-Mar	7am - 3pm	Jen Schwartzman/Charlotte Abrams/Nancy (12-3
Wed	23-Mar	3pm-11pm	Danielle Emche/Lauren Mayros
Wed-Thur	3/23-3/24	11pm - 7am	Eric Stahl/Mugeh
Thur	24-Mar	7am - 3pm	Steve Bloom/Lance English
Thur	24-Mar	3pm-11pm	Janice/Jenny Tobin
Thur-Fri	3/24-3/25	11pm - 7am	Andrea/Elizabeth Smirolodo
Fri	25-Mar	7am - 3pm	Steve Bloom/Lance English
Fri	25-Mar	3pm-11pm	Janice/Jenny Tobin
Fri-Sat	3/25-3/26	11pm-7am	Andrea/Elizabeth Smirolodo
Protective Measures Team			
PMTR Director			
Fri-Sat	3/18-3/19	11pm-7am	Kathy Gibson
Sat	19-Mar	7am - 3pm	John Lubinski

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Sat	19-Mar	3pm-11pm	Don Cool
Sat-Sun	3/19-3/20	11pm - 7am	Kathy Gibson
Sun	20-Mar	7am - 3pm	John Lubinski
Sun	20-Mar	3pm-11pm	Don Cool
Sun-Mon	3/20-3/21	11pm - 7am	Kathy Gibson
Mon	21-Mar	7am - 3pm	John Lubinski
Mon	21-Mar	3pm-11pm	Don Cool
Mon-Tues	3/21-3/22	11pm - 7am	John Tappert
Tues	22-Mar	7am - 3pm	John Lubinski
Tues	22-Mar	3pm-11pm	Don Cool
Tues-Wed	3/22-3/23	11pm - 7am	John Tappert
Wed	23-Mar	7am - 3pm	Terry Reis
Wed	23-Mar	3pm-11pm	Cindy Jones
Wed-Thur	3/23-3/24	11pm - 7am	Randy Sullivan
Thur	24-Mar	7am - 3pm	Terry Reis
Thur	24-Mar	5pm-11pm	Cindy Jones
Thur-Fri	3/24-3/25	11pm - 7am	Randy Sullivan
Fri	25-Mar	7am - 3pm	Terry Reis
Fri	25-Mar	5pm-11pm	Cindy Jones
Fri-Sat	3/25-3/26	11pm-7am	Randy Sullivan
PMTR Coordinator			
Fri-Sat	3/18-3/19	11pm-7am	Mike Norris
Sat	19-Mar	7am - 3pm	Duane Hardesty
Sat	19-Mar	3pm-11pm	Jay Patel
Sat-Sun	3/19-3/20	11pm - 7am	Lou Brandon
Sun	20-Mar	7am - 3pm	Nima Ashkeboussi
Sun	20-Mar	3pm-11pm	Jay Patel
Sun-Mon	3/20-3/21	11pm - 7am	Lou Brandon
Mon	21-Mar	7am - 3pm	Prosanta Chowdhury (8 am)
Mon	21-Mar	3pm-11pm	Jay Patel
Mon-Tues	3/21-3/22	11pm - 7am	Lou Brandon
Tues	22-Mar	7am - 3pm	Prosanta Chowdhury (8 am)
Tues	22-Mar	3pm-11pm	Nima Ashkeboussi
Tues-Wed	3/22-3/23	11pm - 7am	Mike Norris
Wed	23-Mar	7am - 3pm	John Wray (volunteer from OE)
Wed	23-Mar	3pm-11pm	Nima Ashkeboussi
Wed-Thur	3/23-3/24	11pm - 7am	Mike Norris
Thur	24-Mar	7am - 3pm	John Wray (volunteer from OE)
Thur	24-Mar	3pm-11pm	Nima Ashkeboussi
Thur-Fri	3/24-3/25	11pm - 7am	Mike Norris
Fri	25-Mar	7am - 3pm	Duane Hardesty
Fri	25-Mar	3pm-11pm	Jay Patel
Fri-Sat	3/25-3/26	11pm-7am	
PMTR Prot Actions Asst Dir			
Fri-Sat	3/18-3/19	11pm-7am	Greg Casto
Sat	19-Mar	7am - 3pm	Kathryn Brock
Sat	19-Mar	3pm-11pm	Kevin Williams
Sat-Sun	3/19-3/20	11pm - 7am	Greg Casto
Sun	20-Mar	7am - 3pm	Kathryn Brock
Sun	20-Mar	3pm-11pm	Tim Harris

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Sun-Mon	3/20-3/21	11pm - 7am	Greg Casto (Jessica Kratchman - to shadow)
Mon	21-Mar	7am - 3pm	Kathryn Brock
Mon	21-Mar	3pm-11pm	
Mon-Tues	3/21-3/22	11pm - 7am	Jessica Kratchman
Tues	22-Mar	7am - 3pm	Kathryn Brock
Tues	22-Mar	3pm-11pm	Tim Harris
Tues-Wed	3/22-3/23	11pm - 7am	Jessica Kratchman
Wed	23-Mar	7am - 3pm	Sandra Wastler
Wed	23-Mar	3pm-11pm	
Wed-Thur	3/23-3/24	11pm - 7am	Jessica Kratchman
Thur	24-Mar	7am - 3pm	Sandra Wastler
Thur	24-Mar	3pm-11pm	
Thur-Fri	3/24-3/25	11pm - 7am	Jessica Kratchman
Fri	25-Mar	7am - 3pm	Kathryn Brock
Fri	25-Mar	3pm-11pm	
Fri-Sat	3/25-3/26	11pm-7am	Greg Casto
PMTR RAAD			
Fri-Sat	3/18-3/19	11pm-7am	Randy Sullivan
Sat	19-Mar	7am - 3pm	Bruce Watson
Sat	19-Mar	3pm-11pm	Michelle Hart
Sat-Sun	3/19-3/20	11pm - 7am	Patricia Milligan
Sun	20-Mar	7am - 3pm	Eric Schrader
Sun	20-Mar	3pm-11pm	Steve LaVie
Sun-Mon	3/20-3/21	11pm - 7am	Randy Sullivan
Mon	21-Mar	7am - 3pm	Bruce Watson
Mon	21-Mar	3pm-11pm	Michelle Hart/Steve Lavie
Mon-Tues	3/21-3/22	11pm - 7am	Boby Abu-Eid
Tues	22-Mar	7am - 3pm	Bruce Watson
Tues	22-Mar	3pm-11pm	Steve LaVie
Tues-Wed	3/22-3/23	11pm - 7am	Boby Abu-Eid
Wed	23-Mar	7am - 3pm	Bruce Watson
Wed	23-Mar	3pm-11pm	Michelle Hart/Steve Lavie
Wed-Thur	3/23-3/24	11pm - 7am	Patricia Milligan
Thur	24-Mar	7am - 3pm	Bruce Watson
Thur	24-Mar	3pm-11pm	Steve LaVie
Thur-Fri	3/24-3/25	11pm - 7am	Cynthia Barr
Fri	25-Mar	7am - 3pm	Randy Sullivan
Fri	25-Mar	3pm-11pm	Michelle Hart/Steve Lavie
Fri-Sat	3/25-3/26	11pm-7am	Cynthia Barr
PMTR Dose Assessment (RASCAL)			
Fri-Sat	3/18-3/19	11pm-7am	Duane Schmidt/Tony Huffert
Sat	19-Mar	7am - 3pm	Casper Sun
Sat	19-Mar	3pm-11pm	Margaret Cervera
Sat-Sun	3/19-3/20	11pm - 7am	Kimberly Gambone/John Parillo
Sun	20-Mar	7am - 3pm	Casper Sun
Sun	20-Mar	3pm-11pm	Margaret Cervera
Sun-Mon	3/20-3/21	11pm - 7am	Kimberly Gambone/John Parillo
Mon	21-Mar	7am - 3pm	Eric Schrader/Rich Clement
Mon	21-Mar	3pm-11pm	Margaret Cervera/Tony Huffert
Mon-Tues	3/21-3/22	11pm - 7am	John Parillo

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Tues	22-Mar	7am - 3pm	Eric Schrader/Rich Clement
Tues	22-Mar	3pm-11pm	Gary Purdy/Casper Sun
Tues-Wed	3/22-3/23	11pm - 7am	Margaret Cervera/Tony Huffert
Wed	23-Mar	7am - 3pm	Eric Schrader/Rich Clement
Wed	23-Mar	3pm-11pm	Kimberly Gambone/Casper Sun
Wed-Thur	3/23-3/24	11pm - 7am	Tony Huffert/John Parillo
Thur	24-Mar	7am - 3pm	Eric Schrader/Rich Clement
Thur	24-Mar	3pm-11pm	Kimberly Gambone/Casper Sun
Thur-Fri	3/24-3/25	11pm - 7am	Tony Huffert/John Parillo
Fri	25-Mar	7am - 3pm	Eric Schrader/Rich Clement
Fri	25-Mar	3pm-11pm	Gary Purdy/Casper Sun
Fri-Sat	3/25-3/26	11pm-7am	John Parillo
PMTR GIS Analyst			
Fri-Sat	3/18-3/19	11pm-7am	Stephanie Devlin
Sat	19-Mar	7am - 3pm	Nebiyu Tirah
Sat	19-Mar	3pm-11pm	Yong Li
Sat-Sun	3/19-3/20	11pm - 7am	Alice Stieve
Sun	20-Mar	7am - 3pm	Phil Brandt
Sun	20-Mar	3pm-11pm	Ken See
Sun-Mon	3/20-3/21	11pm - 7am	Alice Stieve
Mon	21-Mar	7am - 3pm	Nebiyu Tirah
Mon	21-Mar	3pm-11pm	Stephanie Devlin
Mon-Tues	3/21-3/22	11pm - 7am	Alice Stieve
Tues	22-Mar	7am - 3pm	Yong Li
Tues	22-Mar	3pm-11pm	Stephanie Devlin
Tues-Wed	3/22-3/23	11pm - 7am	Alice Stieve
Wed	23-Mar	7am - 3pm	Allen Gross
Wed	23-Mar	3pm-11pm	Stephanie Devlin
Wed-Thur	3/23-3/24	11pm - 7am	
Thur	24-Mar	7am - 3pm	Yong Li
Thur	24-Mar	3pm-11pm	Stephanie Devlin
Thur-Fri	3/24-3/25	11pm - 7am	Dogan Seber
Fri	25-Mar	7am - 3pm	Hosang Ahn
Fri	25-Mar	3pm-11pm	Stephanie Devlin
Fri-Sat	3/25-3/26	11pm-7am	Phil Brandt
PMTR Meteorologist			
Fri-Sat	18-Mar	3pm-11pm	Mike Mazaika
Sat	3/18-3/19	11pm-7am	Dave Brown
Sat	19-Mar	7am - 3pm	Kevin Quinlan
Sat-Sun	19-Mar	3pm-11pm	Mike Mazaika
Sun	3/19-3/20	11pm - 7am	David Brown
Sun	20-Mar	7am - 3pm	Kevin Quinlan
Sun-Mon	20-Mar	3pm-11pm	Mike Mazaika
Mon	3/20-3/21	11pm - 7am	David Brown
Mon	21-Mar	7am - 3pm	Mike Mazaika
Mon-Tues	21-Mar	3pm-11pm	
Tues	3/21-3/22	11pm - 7am	
Tues	22-Mar	7am - 3pm	
Tues-Wed	22-Mar	3pm-11pm	
Wed	3/22-3/23	11pm - 7am	

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Wed	23-Mar	7am - 3pm	
Wed-Thur	23-Mar	3pm-11pm	
Thur	3/23-3/24	11pm - 7am	
Thur	24-Mar	7am - 3pm	
Thur-Fri	24-Mar	3pm-11pm	
Fri	3/24-3/25	11pm - 7am	
Fri	25-Mar	7am - 3pm	
Fri-Sat	25-Mar	3pm-11pm	
	3/25-3/26	11pm-7am	

Reactor Safety Team

RST Director			
Fri-Sat	3/18-3/19	11pm-7am	Jennifer Uhle
Sat	19-Mar	7am - 3pm	Laura Dudes
Sat	19-Mar	3pm-11pm	Dave Skeen
Sat-Sun	3/19-3/20	11pm - 7am	Jennifer Uhle
Sun	20-Mar	7am - 3pm	Laura Dudes
Sun	20-Mar	3pm-11pm	Dave Skeen
Sun-Mon	3/20-3/21	11pm - 7am	Jennifer Uhle
Mon	21-Mar	7am - 3pm	Fred Brown
Mon	21-Mar	3pm-11pm	Dave Skeen
Mon-Tues	3/21-3/22	11pm - 7am	Jennifer Uhle
Tues	22-Mar	7am - 3pm	Fred Brown
Tues	22-Mar	3pm-11pm	Dave Skeen
Tues-Wed	3/22-3/23	11pm - 7am	Brian Holian
Wed	23-Mar	7am - 3pm	Fred Brown
Wed	23-Mar	3pm-11pm	Bill Ruland
Wed-Thur	3/23-3/24	11pm - 7am	Brian Holian
Thur	24-Mar	7am - 3pm	Fred Brown
Thur	24-Mar	3pm-11pm	Bill Ruland
Thur-Fri	3/24-3/25	11pm - 7am	Brian Holian
Fri	25-Mar	7am - 3pm	Pat Hiland
Fri	25-Mar	3pm-11pm	Bill Ruland
Fri-Sat	3/25-3/26	11pm-7am	Brian Holian
Sat	26-Mar	0700 -1500	Pat Hiland
Sat	26-Mar	1500 - 2300	Bill Ruland
Sat	3/26-27/2011	2300 - 0700	Mike Case

RST Coordinator			
Fri-Sat	3/18-3/19	11pm-7am	Rollie Berry
Sat	19-Mar	7am - 3pm	Scott Sloan
Sat	19-Mar	3pm-11pm	Oleg Bukharin
Sat-Sun	3/19-3/20	11pm - 7am	Frank Collins
Sun	20-Mar	7am - 3pm	Peter Alter
Sun	20-Mar	3pm-11pm	Eric Thomas
Sun-Mon	3/20-3/21	11pm - 7am	Mike Morlang
Mon	21-Mar	7am - 3pm	Peter Alter
Mon	21-Mar	3pm-11pm	Greg Schoenebeck
Mon-Tues	3/21-3/22	11pm - 7am	Frank Collins

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Tues	22-Mar	7am - 3pm	Rick Hasselberg
Tues	22-Mar	3pm-11pm	Mike Morlang
Tues-Wed	3/22-3/23	11pm - 7am	Oleg Bukharin
Wed	23-Mar	7am - 3pm	Eric Thomas*
Wed	23-Mar	3pm-11pm	Greg Schoenebeck
Wed-Thur	3/23-3/24	11pm - 7am	Frank Collins
Thur	24-Mar	7am - 3pm	Rick Hasselberg
Thur	24-Mar	3pm-11pm	Brett Rini
Thur-Fri	3/24-3/25	11pm - 7am	Tom Boyce (RES)
Fri	25-Mar	7am - 3pm	Eric Thomas*
Fri	25-Mar	3pm-11pm	Brett Rini
Fri-Sat	3/25-3/26	11pm-7am	Frank Collins
Severe Accident/PRA			
Fri-Sat	3/18-3/19	11pm - 7am	Don Marksberry
Sat	19-Mar	7am - 3pm	Len Ward
Sat	19-Mar	3pm-11pm	Ed Fuller
Sat-Sun	3/19-3/20	11pm - 7am	Mike Salay
Sun	20-Mar	7am - 3pm	John Lane
Sun	20-Mar	3pm-11pm	Jim Gilmer
Sun-Mon	3/20-3/21	11pm - 7am	Don Dube
Mon	21-Mar	7am - 3pm	Jeff Circle
Mon	21-Mar	3pm-11pm	Hossein Esmaili
Mon-Tues	3/21-3/22	11pm - 7am	Jim Gilmer
Tues	22-Mar	7am - 3pm	Ed Fuller
Tues	22-Mar	3pm-11pm	Len Ward
Tues-Wed	3/22-3/23	11pm - 7am	
Wed	23-Mar	7am - 3pm	Jeff Circle
Wed	23-Mar	3pm-11pm	Jerry Dozier
Wed-Thur	3/23-3/24	11pm - 7am	Mike Salay
Thur	24-Mar	7am - 3pm	Jeff Circle
Thur	24-Mar	3pm-11pm	Steve Laur
Thur-Fri	3/24-3/25	11pm - 7am	
Fri	25-Mar	7am - 3pm	Jerry Dozier ?
Fri	25-Mar	3pm-11pm	Steve Laur
Fri-Sat	3/25-3/26	11pm-7am	
BWR Expertise			
Fri-Sat	3/18-3/19	11pm-7am	Mike Brown
Sat	19-Mar	7am - 3pm	Peter Alter
Sat	19-Mar	3pm-11pm	Chuck Norton
Sat-Sun	3/19-3/20	11pm - 7am	John Kauffman
Sun	20-Mar	7am - 3pm	Larry Vick
Sun	20-Mar	3pm-11pm	Chuck Norton
Sun-Mon	3/20-3/21	11pm - 7am	Mike Brown
Mon	21-Mar	7am - 3pm	Gerry Gulla (OE volunteer)
Mon	21-Mar	3pm-11pm	Chuck Norton
Mon-Tues	3/21-3/22	11pm - 7am	Mike Brown
Tues	22-Mar	7am - 3pm	Tom Boyce (RES)
Tues	22-Mar	3pm-11pm	Chuck Norton
Tues-Wed	3/22-3/23	11pm - 7am	Mike Brown
Wed	23-Mar	7am - 3pm	Larry Vick

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Wed	23-Mar	3pm-11pm	Chuck Norton
Wed-Thur	3/23-3/24	11pm - 7am	Eva Brown
Thur	24-Mar	7am - 3pm	
Thur	24-Mar	3pm-11pm	Chuck Norton
Thur-Fri	3/24-3/25	11pm - 7am	Eva Brown
Fri	25-Mar	7am - 3pm	
Fri	25-Mar	3pm-11pm	
Fri-Sat	3/25-3/26	11pm-7am	Eva Brown
RST Comm/ERDS Operator			
Fri-Sat	3/18-3/19	11pm-7am	Andy Kugler
Sat	19-Mar	7am - 3pm	Joseph Williams
Sat	19-Mar	3pm-11pm	John Thorp
Sat-Sun	3/19-3/20	11pm - 7am	Ujagav Bhachu
Sun	20-Mar	7am - 3pm	Denise McGovern
Sun	20-Mar	3pm-11pm	Donna Williams
Sun-Mon	3/20-3/21	11pm - 7am	Ujagav Bhachu
Mon	21-Mar	7am - 3pm	Joseph Williams
Mon	21-Mar	3pm-11pm	
Mon-Tues	3/21-3/22	11pm - 7am	Bill Rogganbrodt
Tues	22-Mar	7am - 3pm	Steve Bloom
Tues	22-Mar	3pm-11pm	Jim Isom
Tues-Wed	3/22-3/23	11pm - 7am	Bill Rogganbrodt
Wed	23-Mar	7am - 3pm	Joseph Williams
Wed	23-Mar	3pm-11pm	Ken Hart
Wed-Thur	3/23-3/24	11pm - 7am	Bill Rogganbrodt
Thur	24-Mar	7am - 3pm	John Thorp
Thur	24-Mar	3pm-11pm	Ken Hart
Thur-Fri	3/24-3/25	11pm - 7am	Bill Rogganbrodt
Fri	25-Mar	7am - 3pm	Donna Williams
Fri	25-Mar	3pm-11pm	Jim Isom
Fri-Sat	3/25-3/26	11pm-7am	Bill Rogganbrodt
RST Support (Seismology Q&A)			
Fri-Sat	3/18-3/19	11pm-7am	Off (On Call)
Sat	19-Mar	7am - 3pm	Off (On Call)
Sat	19-Mar	3pm-11pm	Off (On Call)
Sat-Sun	3/19-3/20	11pm - 7am	Off (On Call)
Sun	20-Mar	7am - 3pm	Off (On Call)
Sun	20-Mar	3pm-11pm	Off (On Call)
Sun-Mon	3/20-3/21	11pm - 7am	Off (On Call)
Mon	21-Mar	7am - 3pm	Off (On Call)
Mon	21-Mar	3pm-11pm	Off (On Call)
Mon-Tues	3/21-3/22	11pm - 7am	Off (On Call)
Tues	22-Mar	7am - 3pm	Off (On Call)
Tues	22-Mar	3pm-11pm	Off (On Call)
Tues-Wed	3/22-3/23	11pm - 7am	Off (On Call)
Wed	23-Mar	7am - 3pm	Off (On Call)
Wed	23-Mar	3pm-11pm	Off (On Call)
Wed-Thur	3/23-3/24	11pm - 7am	Off (On Call)
Thur	24-Mar	7am - 3pm	Off (On Call)
Thur	24-Mar	3pm-11pm	Off (On Call)

JAPAN EARTHQUAKE - ERO STAFFING SCHEDULE
MARCH 18-26

Thur-Fri	3/24-3/25	11pm - 7am	Off (On Call)
Fri	25-Mar	7am - 3pm	off (On Call)
Fri	25-Mar	3pm-11pm	Off (On Call)
Fri-Sat	3/25-3/26	11pm-7am	Off (On Call)

Wagner, Katie

From: Camper, Larry
Sent: Wednesday, March 23, 2011 12:49 PM
To: Dorman, Dan
Cc: Deegan, George; RST01 Hoc; Bowman, Gregory; Hickman, John
Subject: Decommissioning Type Information

Dan,
Greetings! Trust you are holding up well over there! Regarding your message of earlier today, we will be able to provide feedback on Question number 6 today by the 18:00 timeframe. Questions 6,8 and 9 will require a bit of review and interface with RES but we will start that process today. Standby for a better timeline on those. The staff did some work on the entombment issue via a couple of SECY's but the approach died out because it became clear that industry was not going to utilize it in the US. Of course, the situation in Japan is quite different etc. Regardless, our earlier work should be of some benefit but we just have to resurrect it and review etc. In thinking ahead just a bit, I suspect that we will need to put together some sort of Task Force or think tank type group to analyze possible paths forward for the overall decommissioning of the site and for the related waste management etc. Of course, we have some time to think about this issue but not too long etc.

Wagner, Katie

From: Wagner, Katie
Sent: Wednesday, March 23, 2011 2:13 PM
To: Lee, Richard
Subject: RE: Ops Center Action Item for Ticketing

Richard,

I talked with John V. about who he thought would be able to answer the 4 questions. He suggested talking to Allan N. about #6 and Mourad about #8. When I asked Allan about #6 he felt it was a question best answered about the Structural Branch in RES/DE.

I was sure what to do, so I emailed Mourad already about #8 (you're cc'ed).

Hope this helps,
Katie

From: Gibson, Kathy
Sent: Wednesday, March 23, 2011 1:53 PM
To: Lee, Richard; Wagner, Katie
Subject: FW: Ops Center Action Item for Ticketing

More info

From: Bowman, Gregory
Sent: Wednesday, March 23, 2011 1:45 PM
To: Richards, Stuart
Cc: Case, Michael; Gibson, Kathy; Scott, Michael; Rini, Brett
Subject: RE: Ops Center Action Item for Ticketing

Sorry if my e-mail wasn't clear...we only need a response to the four questions from the 11:23 am e-mail from RST01 Hoc.

I would recommend coordinating with George Deegan and Larry Camper in FSME. I was CC'd on the attached e-mail from Larry a little while ago, and it looks like they might be best equipped to cover most (or all) of the questions.

From: Richards, Stuart
Sent: Wednesday, March 23, 2011 1:07 PM
To: Bowman, Gregory
Cc: Case, Michael; Gibson, Kathy; Scott, Michael
Subject: RE: Ops Center Action Item for Ticketing
Importance: High

Greg

Are we trying to respond to all of the issues in Dan Dorman's e-mail, or just the items highlighted in the 11:23 am e-mail from RST01 Hoc ?

Thanks
Stu

From: Bowman, Gregory
Sent: Wednesday, March 23, 2011 12:08 PM
To: Case, Michael; Richards, Stuart; Gibson, Kathy; Scott, Michael
Subject: FW: Ops Center Action Item for Ticketing
Importance: High

FYI – I just sent this information request from the Ops Center to Brett. I sent it to him because I wasn't sure which division in RES would be the right one to help with this, but I figured I'd pass it along to you, as well, given that the Ops Center is looking for a response by the end of the day.

From: Bowman, Gregory
Sent: Wednesday, March 23, 2011 11:51 AM
To: Rini, Brett; Deegan, George
Cc: Frazier, Alan; Brock, Kathryn
Subject: FW: Ops Center Action Item for Ticketing
Importance: High

Brett and George,

We got the request below from the Ops Center. We think there should be one coordinated response back to the Ops Center from RES and FSME, but none of us are sure which division would be best able to respond. Can you help with this? Note that the Ops Center has asked for a response by 18:00 tonight.

Greg

From: RST01 Hoc
Sent: Wednesday, March 23, 2011 11:23 AM
To: Andersen, James; Muessle, Mary
Cc: Brown, Frederick
Subject: Ops Center Action Item for Ticketing

Jim and Mary,

Per Fred Brown, RST Director here in the Ops Center, Please ticket the following item to RES and FSME:

"Respond to Dan Dorman's email on long-term issue questions from Japan. Provide responses or estimates of when the responses can be expected to Dan by 18:00 EDT. If additional information is needed, let the site team know of any questions that can be brought back to NISA.

-Regarding the best type of enclosure for the plant, does NRC have any thoughts? Do we have any regulations applicable to this condition or thoughts on the role of the regulatory authority in this decision?

-What licensing requirements apply to decommissioning and regulatory review of the decommissioning plan?

-What should the Japanese be considering with respect to criticality prevention and decay heat removal during the entombment period?

-The NRC's TMI fact sheet notes that the first manned entry into the Unit 2 reactor building occurred after a venting of Krypton in July 1980 (16 months after the accident). What actions occurred during those 16 months that could inform their planning?"

Dan Dorman's email pasted below:

From: Dorman, Dan
Sent: Tuesday, March 22, 2011 3:05 AM
To: OST01 HOC; Casto, Greg; Monninger, John; ET07 Hoc
Subject: RE:

Additional tasks from meeting with NISA et al this morning. Lower priority than the Cabinet level issues we just discussed on the phone, but any responses available by 1800 EDT on 3/22 would be greatly appreciated along with an estimate of when the remainder may be expected. If you need additional info, please identify any questions we can bring back to NISA (keeping in mind please that their plant data is also very limited, i.e., keep your data expectations modest).

1. Sea water injection continues to reactors 1-3. NISA is concerned about the radiolytic disassociation of H2 and O2. NISA would like NRC's perspective on the significance of this concern and how to treat this concern as they transition to freshwater injection.
2. At what point does salt deposits become a problem for flow during pending freshwater injection?
3. NISA is conducting simulations to project the extent of damage to fuel in the reactors. Has NRC developed any views on the extent of fuel damage?
4. NISA is interested to obtain any reference material regarding core-concrete interaction (not because they think they have a current issue but against that eventuality) including the conditions under which that occurs and any associated data.
5. In addition to the H2/O2 disassociation in item 1 above, they are concerned that there may be residual H2 in the containments and welcome NRC's thoughts on how to treat such a condition.

NISA is beginning to look at long term issues and has the following Qs in this area (note some of these may only apply to Japan's regulatory framework, but if we have insights from our post-TMI actions they would be greatly appreciated):

6. Regarding the best type of enclosure for the plant, does NRC have any thoughts? Do we have any regulations applicable to this condition or thoughts on the role of the regulatory authority in this decision?
7. What licensing requirements apply to decommissioning and regulatory review of the decommissioning plan?
8. What should they be considering with respect to criticality prevention and decay heat removal during the entombment period?
9. The NRC's TMI Fact Sheet notes that the first manned entry into the Unit 2 reactor building occurred after a venting of Krypton in July 1980 (16 months after the accident). What actions occurred during those 16 months that could inform their planning?

Regarding the spent fuel pools, NISA asserted that the Unit 1 SFP is above TAF with over 20 days margin due to low decay heat. They are not injecting to the Unit 1 SFP. For Unit 2, they are injecting seawater to the SFP via installed piping. For Units 3 and 4, they are spraying from pumper trucks within the RBs to put water on the top of the pools (In response to a question, they indicated that these sprays were put in place after the explosive events in those buildings.) Based on this information, NISA is assuming that the SFPs are all below 100C. The team here has questions relative to the latter buildings and other information available, for example, lack of visual evidence of steaming on Unit 4. We would appreciate HQ's thoughts on the SFPs and apparent inconsistencies with the status provided by NISA.

Dan Dorman

Thanks,
Eric Thomas
RST Coordinator

Wagner, Katie

From: Wagner, Katie
Sent: Wednesday, March 23, 2011 3:35 PM
To: Santiago, Patricia
Subject: FW: NEW URGENT REQUEST -- SNL BWR tests - (OUO-Privileged Information)

This is part of what I have on this . . .

From: Zigh, Ghani
Sent: Tuesday, March 22, 2011 9:37 AM
To: Santiago, Patricia; Navarro, Carlos
Cc: Lee, Richard; Wagner, Katie; Gibson, Kathy; Elkins, Scott
Subject: RE: NEW URGENT REQUEST -- SNL BWR tests - (OUO-Privileged Information)

Scott passed by my office and talked to me.
He said that he is going to talk to Brian and see if he wants those numbers in the report taken out.
If he does, then we will take out those numbers on the hard copy and hand it Brian.

From: Santiago, Patricia
Sent: Tuesday, March 22, 2011 9:04 AM
To: Zigh, Ghani; Navarro, Carlos
Cc: Lee, Richard; Wagner, Katie; Gibson, Kathy; Elkins, Scott
Subject: RE: NEW URGENT REQUEST -- SNL BWR tests - (OUO-Privileged Information)

Once the redaction is done, can you provide it to Brian with copy to all.

Can you let Scott know when this will be done so he can let Brian know what to say to NEI.

Thanks Ghani and Carlos!

From: Zigh, Ghani
Sent: Tuesday, March 22, 2011 8:43 AM
To: Santiago, Patricia; Gibson, Kathy; Elkins, Scott
Cc: Navarro, Carlos; Lee, Richard
Subject: RE: NEW URGENT REQUEST -- SNL BWR tests - (OUO-Privileged Information)

The document has information that need to be taken out.
That is how we agreed with the OECD partners for the PWR Zirc fire project.
These information include the power used to get zirc fire and the location of the zirc fire for both parts of the experiment.

From: Santiago, Patricia
Sent: Tuesday, March 22, 2011 8:39 AM
To: Gibson, Kathy; Elkins, Scott
Cc: Zigh, Ghani; Navarro, Carlos; Lee, Richard
Subject: RE: NEW URGENT REQUEST -- SNL BWR tests - (OUO-Privileged Information)

Thanks

Via this email can I ask ---

Richard Lee -- I will ask you to find out from OGC if we can release OUO to NEI unless you already know.

Carlos/Ghani – let me know what you determine on release (Carlos an agreement?)
thanks

From: Gibson, Kathy
Sent: Tuesday, March 22, 2011 8:37 AM
To: Santiago, Patricia; Elkins, Scott
Cc: Zigh, Ghani; Navarro, Carlos; Lee, Richard
Subject: Re: NEW URGENT REQUEST -- SNL BWR tests - (OUO-Privileged Information)

Check with Richard. He has lead for document requests and has been in contact with OGC on this topic.

From: Santiago, Patricia
To: Elkins, Scott; Gibson, Kathy
Cc: Zigh, Ghani; Navarro, Carlos
Sent: Tue Mar 22 08:31:47 2011
Subject: FW: NEW URGENT REQUEST -- SNL BWR tests - (OUO-Privileged Information)

FYI I believe this is what Brian wants for NEI. It is OUO. I talked to Carlos and he was going to follow with Ghani. Carlos believes we have some agreement or will check to see if we can release OUO to NEI.
thanks

From: Santiago, Patricia
Sent: Friday, March 18, 2011 6:36 PM
To: Tadesse, Rebecca
Cc: Bubar, Patrice; Sheron, Brian; Rini, Brett; Uhle, Jennifer; Gibson, Kathy; Scott, Michael; Bowman, Gregory; Zigh, Ghani; Navarro, Carlos
Subject: NEW URGENT REQUEST -- SNL BWR tests - (OUO-Privileged Information)

Rebecca,

I believe the attached report is what you are requesting ---- Final BWR Sandia Fuel Project (SFP) Sandia Report.

We also have a time lapse video (OUO as well) that we can make a copy and provide Monday.

If you have additional questions, Ghani Zigh is the best person to assist.

Thanks
Pat

Wagner, Katie

From: Wagner, Katie
Sent: Wednesday, March 23, 2011 3:30 PM
To: Zigh, Ghani
Cc: Lee, Richard
Subject: Items completed?

Good Afternoon Ghani,

Could you please let me know if the following items are "Completed" or still "Pending"?

30	3/22/2011	Brian Sheron for NEI ! NEW	301-251-7400	Carlos Navarro x7485 Ghani Zigh x7505	SPB/DSA	Brian Sheron requests the BWR results from 2007 be sent to NEI. Report(s) may require redaction.	Send BWR report(s).	Pending
31	3/22/2011	S. Durbin for DOE/NE (Patrick Scwab) ! NEW	sdurbin@sandia.gov	Carlos Navarro x7485 Ghani Zigh x7505	SPB/DSA	A request was received from DOE/NE (Patrick Scwab) for two executive test videos and the BWR SFP Final report.	Transmit executive test videos and the BWR SFP Final report, if allowable and redact as necessary.	Pending

Thanks,
Katie

Wagner, Katie

From: Wagner, Katie
Sent: Wednesday, March 23, 2011 3:41 PM
To: Tinkler, Charles
Cc: Lee, Richard
Subject: Item completed?

No!

Good Afternoon Charlie,

Could you please let me know if this item is "Completed" or still "Pending"?

34	3/22/2011	Brian Sheron on behalf of Cathy Haney <small>NEW</small>	301- 251- 7400	Charlie Tinkler x7496	DSA	Request that Charlie go with Cathy to the Rep. Hamilton briefing on the 28th on SFPs. If Charlie can accompany Cathy, he is requested to call Cathy and get the particulars regarding what the representative's issue are, what she wants to hear about, etc. Let B. Sheron know the outcome.	Request that Charlie go with Cathy to the Rep. Hamilton briefing on the 28th on SFPs. If Charlie can accompany Cathy, he is requested to call Cathy and get the particulars regarding what the representative's issue are, what she wants to hear about, etc. Let B. Sheron know the outcome.	Pending
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Thanks,

Katie Wagner
General Engineer
U.S. Nuclear Regulatory Commission
(301) 251.7917
Katie.Wagner@nrc.gov

LLLL/99

From: Greten, Timothy <Timothy.Greten@dhs.gov>
Sent: Wednesday, March 23, 2011 8:43 PM
To: LIA05 Hoc
Subject: Out of Office AutoReply: Inquires related to U.S procedure during Nuclear Emergency

I will be out of office until 0900 Friday, March 25. Please cc urgent issues to Vanessa.quinn@dhs.gov and harry.sherwood@dhs.gov.

Thank you!
Tim

Wagner, Katie

From: Wagner, Katie
Sent: Wednesday, March 23, 2011 4:50 PM
To: Lee, Richard
Subject: RE: RST Requested Evaluations to be Performed by RES

Richard - Is the item below "Completed" or still "Pending"? - Thanks, Katie

36	3/23/2011	Ops Center (RST) NEW	Email: RST01 Hoc	Richard Lee x7526	FSTB	To investigate the topics related to queries 1, 3, and 4 from the NRC Site Team located over in Japan. 1. Sea water injection continues to reactors 1-3. NISA is concerned about the radiolytic disassociation of H2 and O2. NISA would like NRC's perspective on the significance of this concern and how to treat this concern as they transition to freshwater injection. 3. NISA is conducting simulations to project the extent of damage to fuel in the reactors. Has NRC developed any views on the extent of fuel damage? 4. NISA is interested to obtain any reference material regarding core-concrete interaction (not because they think they have a current issue but against that eventuality) including the conditions under which that occurs and any associated data.	Respond with answers to the 3 questions raised.	Pending
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From: Lee, Richard
Sent: Wednesday, March 23, 2011 11:07 AM
To: RST01 Hoc
Cc: Wagner, Katie
Subject: RE: RST Requested Evaluations to be Performed by RES

This is the response to item 4. Please forward this to our team in Japan. If we get more information on this subject, we will send them later.

From: RST01 Hoc
Sent: Wednesday, March 23, 2011 5:39 AM
To: Lee, Richard
Cc: Gibson, Kathy; RST01 Hoc
Subject: FW: RST Requested Evaluations to be Performed by RES

From: Hoc, RST16
Sent: Wednesday, March 23, 2011 5:37 AM
To: RST01 Hoc
Subject: RST Requested Evaluations to be Performed by RES

RST Coordinator,

Please forward the e-mail text below to Richard Lee and cc: Kathy Gibson from RES.

Thank you,

RST Communicator

LLLL/101

Dear Mr. Lee,

The Reactor Safety Team (RST) in the Operations Center has been given your name as the lead Point of Contact (POC) for the Office of Research to manage all incoming requests from the RST.

As such, here is a request to investigate the topics related to queries 1, 3, and 4 from our Site Team located over in Japan. FYI, this request was entered into the WEB EOC Task Tracker software as Record # 2098 on 3/22/2011 @ 11:42 AM. Items 2 and 5 have been evaluated by our team and other sources and have been determined to be complete and require no further action.

Per Site Team e-mail, they would like RST to provide input on the following:

1. Sea water injection continues to reactors 1-3. NISA is concerned about the radiolytic disassociation of H₂ and O₂. NISA would like NRC's perspective on the significance of this concern and how to treat this concern as they transition to freshwater injection.
2. At what point does salt deposits become a problem for flow during pending freshwater injection?
3. NISA is conducting simulations to project the extent of damage to fuel in the reactors. Has NRC developed any views on the extent of fuel damage?
4. NISA is interested to obtain any reference material regarding core-concrete interaction (not because they think they have a current issue but against that eventuality) including the conditions under which that occurs and any associated data.
5. In addition to the H₂/O₂ disassociation in item 1 above, they are concerned that there may be residual H₂ in the containments and welcome NRC's thoughts on how to treat such a condition.

The RST requests an progress update via e-mail, at least once daily in order for us to be able to track your progress for each of the three issues.

Thank you for your time and consideration.

Bill Roggenbrodt
RST Communicator
301-816-5504

From: OST01 HOC
Sent: Tuesday, April 26, 2011 5:19 AM
To: FOIA Response.hoc Resource
Subject: FW: Draft Risk Evaluation on Reactors
Attachments: Fukushima Risk Analysis.pptx

-----Original Message-----

From: RST01 Hoc
Sent: Tuesday, April 26, 2011 5:19 AM
To: Hiland, Patrick; Skeen, David
Cc: RST02 Hoc; OST01 HOC; Johnson, Michael; Uhle, Jennifer; Carpenter, Cynthia; Casto, Chuck; Reynolds, Steven; Kokajko, Lawrence; Correia, Richard; Tracy, Glenn; Dudes, Laura; RST01 Hoc
Subject: FW: Draft Risk Evaluation on Reactors

Pat,

FYI, attached is a draft risk analysis of Fukushima Daiichi Units 1,2,and 3 performed by Jeff Mitman, currently with the Japan Site Team. This draft risk analysis was developed to provide insights on the gross importances of equipment and operator actions needed to accomplish stability conditions at the affected units. There is no formal tasking requirement to review this draft risk analysis at this time.

RST01, See-Meng Wong, Kirby Scales.

-----Original Message-----

From: Garchow, Steve
Sent: Monday, April 25, 2011 6:05 PM
To: RST01 Hoc
Subject: FW: Draft Risk Evaluation on Reactors

Don't know if we sent this to you or not. This is a draft risk analysis model Jeff Mitman put together and we will be discussing today with the Japanese.

Steve

-----Original Message-----

From: Mitman, Jeffrey
Sent: Monday, April 25, 2011 3:59 AM
To: 'Gard, Lee A (INPO)'
Cc: Garchow, Steve; Reynolds, Steven
Subject: Draft Risk Evaluation on Reactors

Lee, attached is the draft risk assessment. This is a starting point analysis based on the available information. I expect the analysis to change as insights are factored into the results. Let me know if you have any questions.

Jeff Mitman

DRAFT

Fukushima Units 1 to 3 Risk Analysis

US Nuclear Regulatory Commission

April 24, 2011

~~DRAFT~~

~~Official Use Only~~

Assumptions

- Analysis is on per reactor bases
 - Each unit is expected to have similar risk profile – it is recognized that Units 1, 2 and 3 have varying amounts of core damage and different status of reactor pressure vessels (RPV) and containments
- No analysis has been completed for spent fuel pools yet
- End state is large release (LR) caused by inadequate cooling of core material in reactor and/or containment
- Assumed time to LR is 10 hours
 - Based on estimated time without cooling that core material in RPV could melt through RPV bottom head
- Analysis performed using SAPHIRE code (version 8.0.7.13)
- Human Reliability Analysis (HRA) based on SPAR-H methodology

DRAFT

~~Official Use Only~~

Initiating Events Evaluated

- “Normal” water supply source ($1.9\text{E-}2/\text{year}$) – see next slide
- Pump failure ($5\text{E-}1/\text{year}$)
- Hoses connecting pumps and injection piping ($1\text{E-}1/\text{year}$)
- Injection pipe failure ($1.1\text{E-}2/\text{year}$)
 - Feedwater pipe on Unit 1
 - Low pressure core injection or recirculation piping on Units 2 and 3
- RCS vent path ($1\text{E-}2/\text{year}$)
 - This is significant contributor and
 - If RPV is breached then failure probability is zero
 - If RPV is not breached then probability of unknown vent failing is difficult to estimate
- Loss of “normal” AC power ($10/\text{year}$)
 - Based on 1 event in 6 weeks
- Second tsunami ($1.8\text{E-}3/\text{year}$)
 - Based on 2 event in 1100 years

DRAFT

~~Official Use Only~~

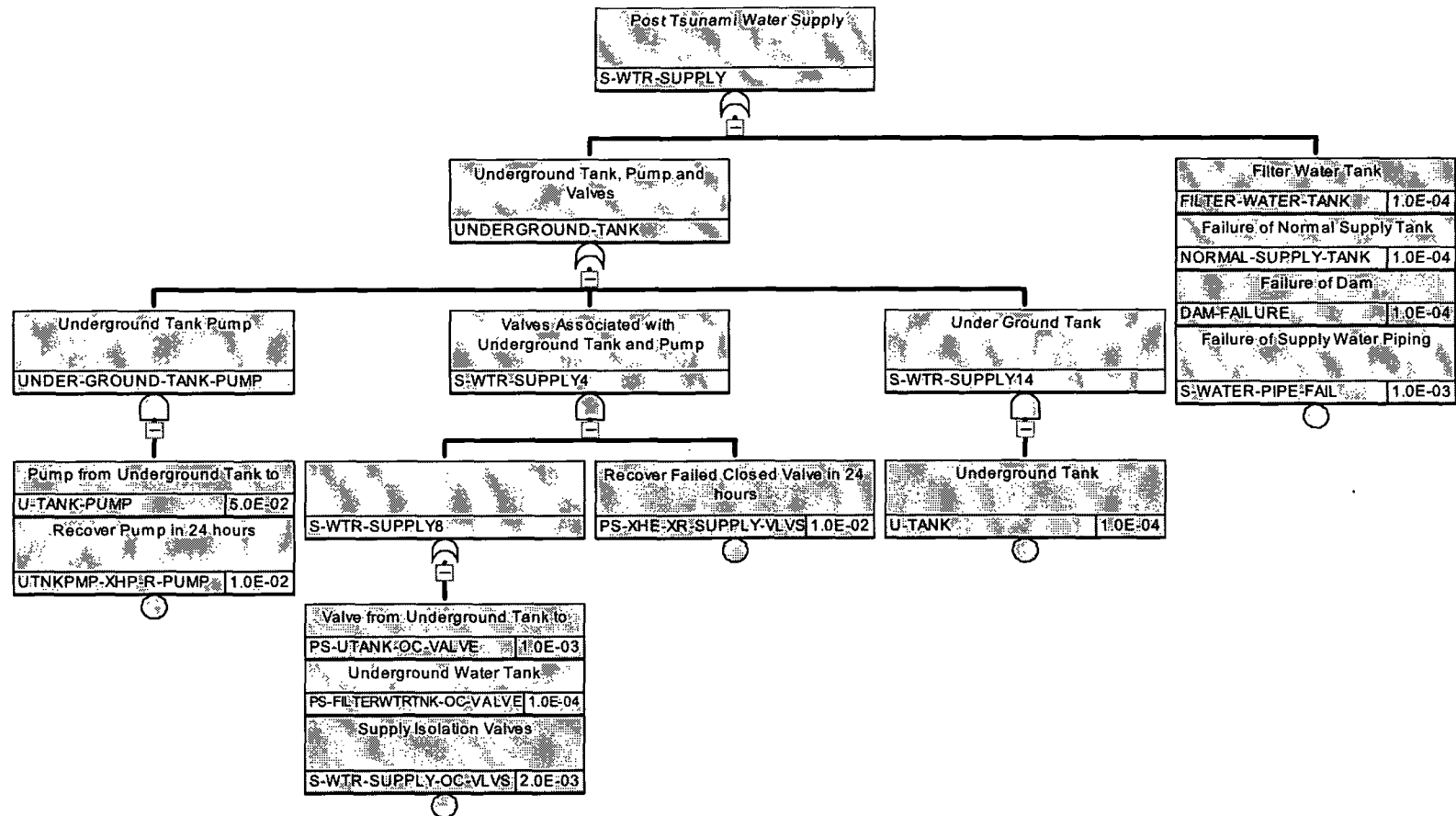
“Normal” Water Supply from Dam to Pumps

- This is frequency (events per year) estimation of losing supply water to currently running injection pumps
- Equipment associated with initiating event frequency (IEF) estimation includes:
 - Dam
 - Underground tank
 - Underground tank pump and valves
 - Filter tank
 - Supply tank
- Result: 1.9E-3 per year

DRAFT

~~Official Use Only~~

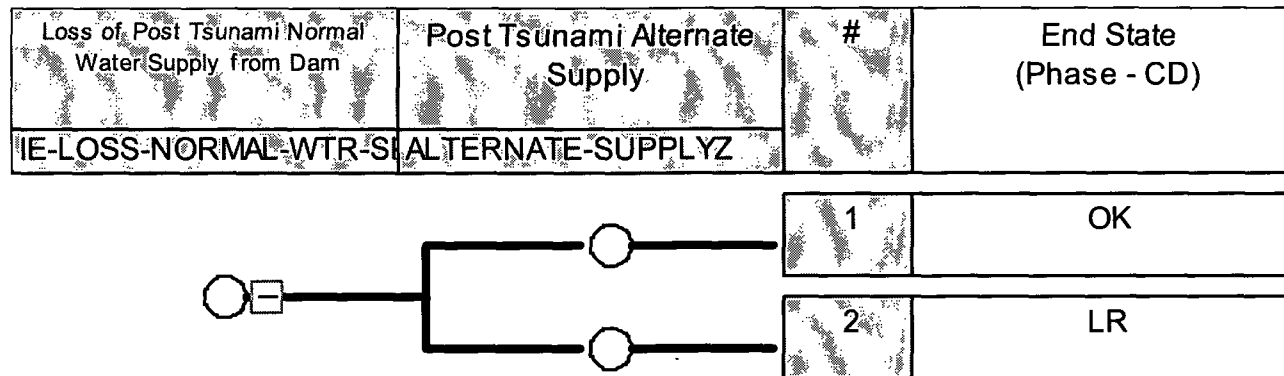
FT for Estimating IEF for Loss of Water Supply



DRAFT

Official Use Only

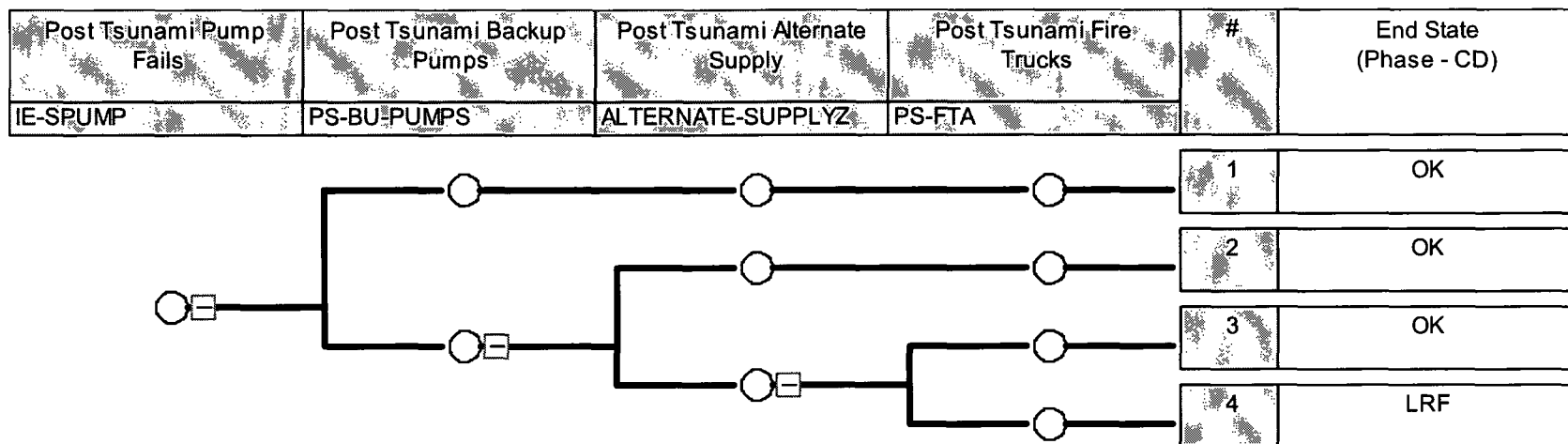
Failure of Normal Water Supply



DRAFT

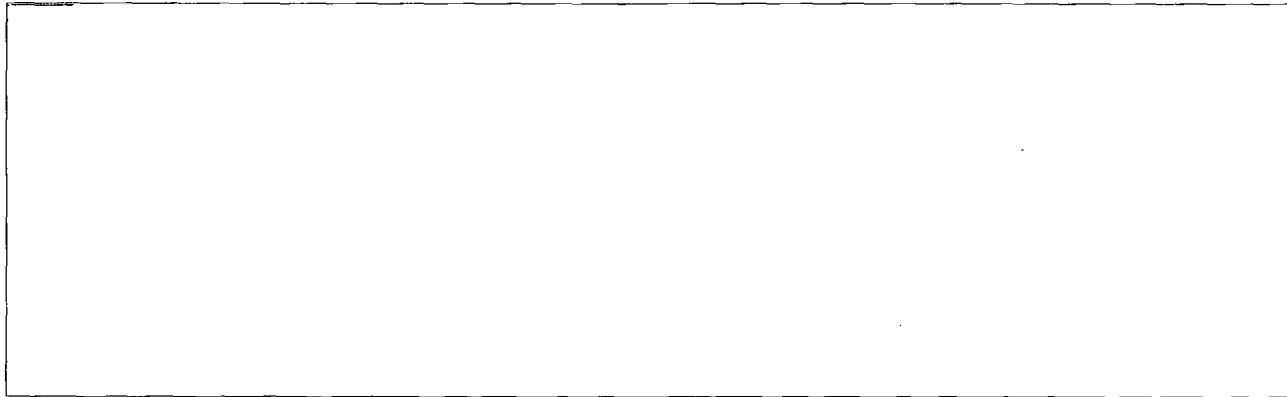
~~Official Use Only~~

Loss of Running Injection Pump



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 Official Use Only

Failure of Hose from Pump to Pipe

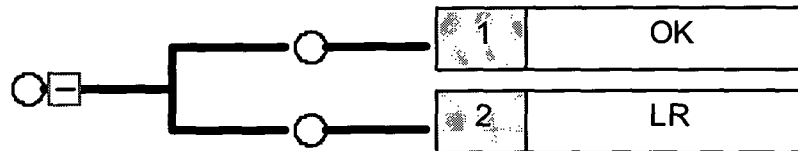


DRAFT

~~Official Use Only~~

Failure of Pipe to RPV

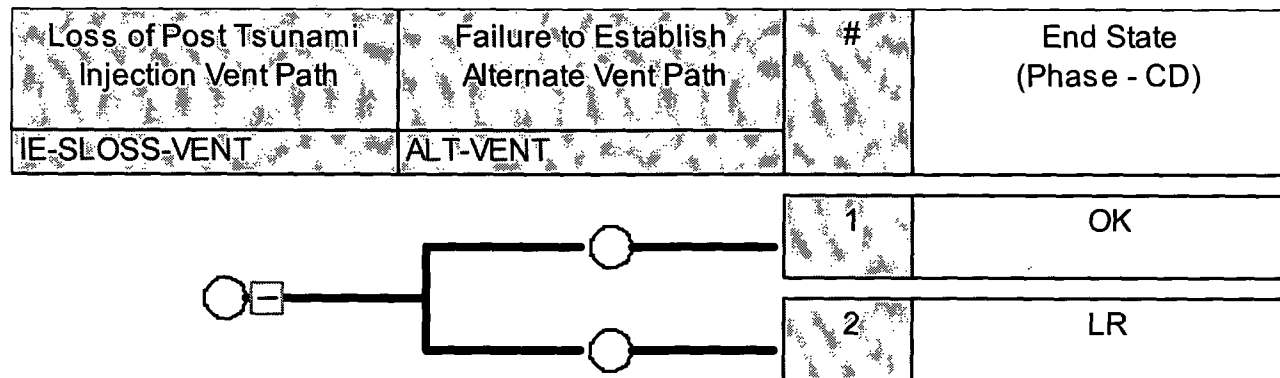
Post Tsunami Injection Path Pipe Failure	Failure of Alternate Injection Path	#	End State (Phase - CD)
IE-PIPE-FAIL	ALT-INJ-PATH		



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~~Official Use Only~~

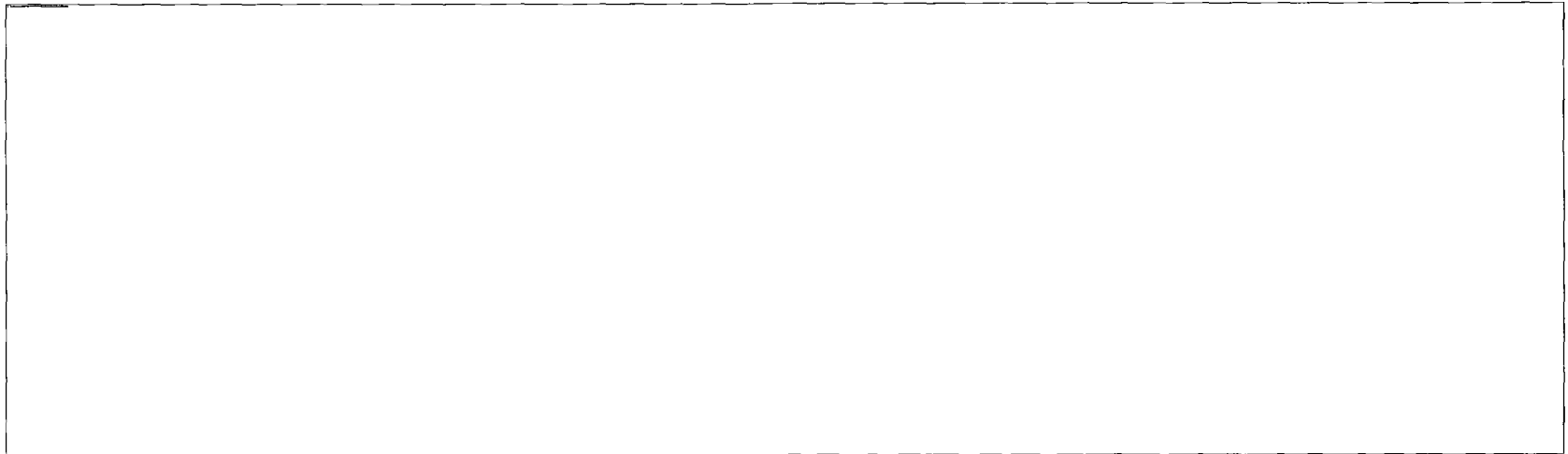
Failure of RPV Vent Path



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~~Official Use Only~~

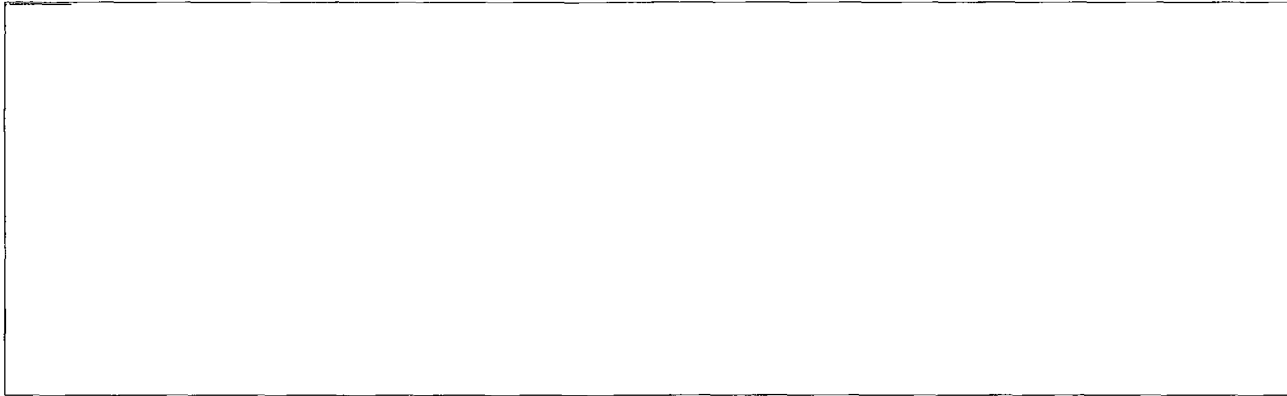
Failure of Electrical Power



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~~Official Use Only~~

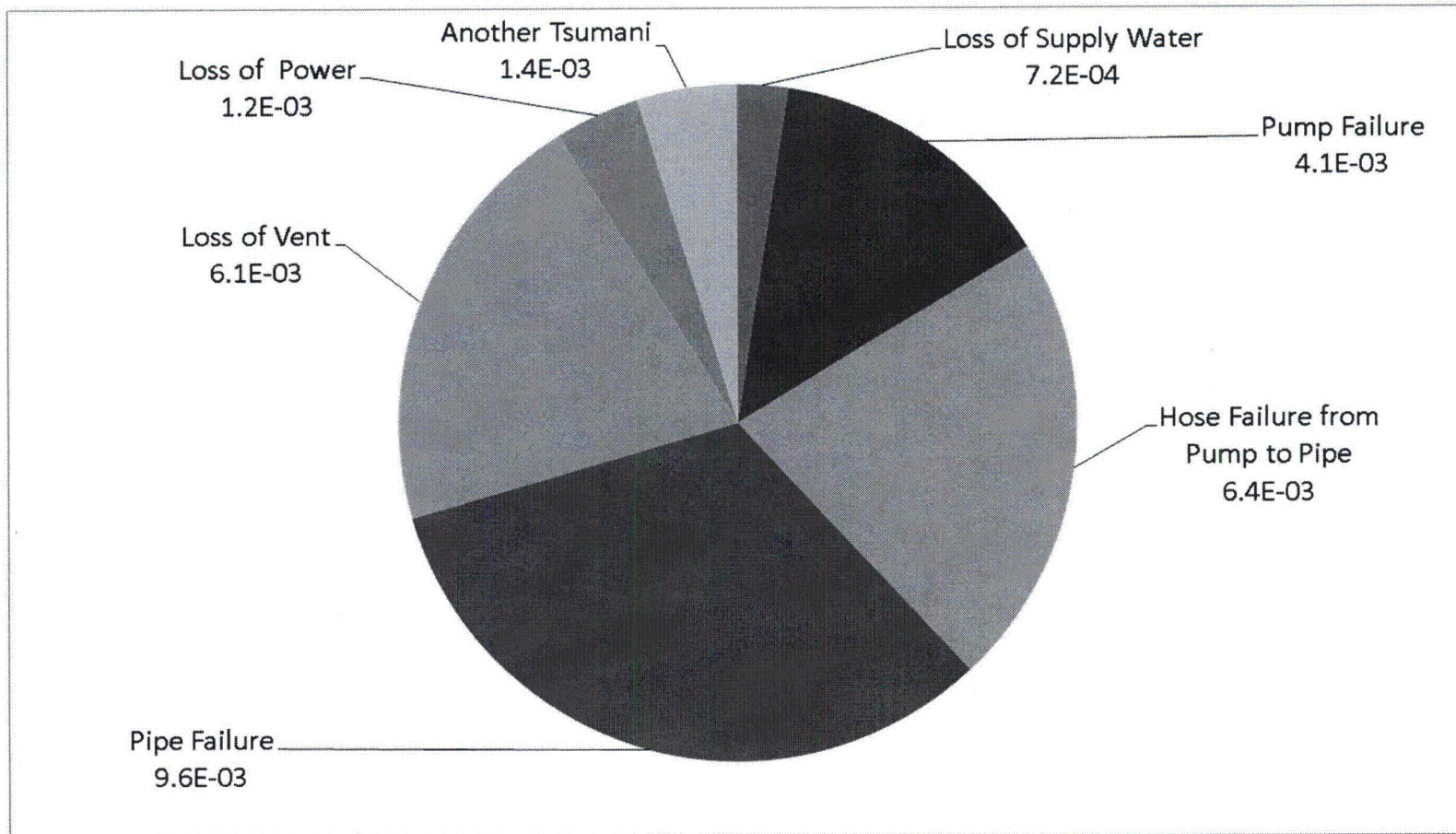
Second Tsunami



DRAFT

~~Official Use Only~~

Results: Risk of Large Release from Each Reactor = 3.1% per year



DRAFT

~~Official Use Only~~

Insights from Results

- Precision of results is not important
- Risk results do give insights to vulnerabilities and where to allocate resources

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Largest Risk Contributors

- Injection pipe failure
 - Injection hose failure
 - Human actions
 - Vent failure
-
- See next slide for ranking

DRAFT

~~Official Use Only~~

Risk Significant Contributors

Name	Probability	Risk Reduction Ratio	Description
IE-PIPE-FAIL	1.10E-02	1.50	Post Tsunami Injection Path Pipe Failure
IE-HOSE	1.00E-01	1.30	Failure of Hose from Pump to Pipe
PS-XHE-XM-PSFT	1.50E-01	1.30	Operator Fails to Align Post Tsunami Fire Truck
PS-XHE-XM-PSFT-BU	7.50E-01	1.30	Operator Fails to Align Backup Fire Trucks
HOSE-REPLACE1	5.50E-02	1.20	Operator Identifies Broken Hose, How to Isolate and Replaces
IE-SLOSS-VENT	1.00E-02	1.20	Loss of Post Tsunami Injection Vent Path
IE-SPUMP	5.00E-01	1.20	Post Tsunami Pump Fails
PS-XHE-XM-ALT-SUPPLY	3.80E-01	1.20	Operator Fails to Initiate Alternate Supply (Ocean Side) Pumps
PS-XHE-XM-PIPEALIGN	7.50E-01	1.20	Align Alternate Pipe Path
ALT-VENT1	5.00E-01	1.10	Alternate Vent Path Available
IE-SLOOP	1.00E+01	1.10	Seismic Induced Loop (10/year)
OEP-XHE-XL-NR10H	5.10E-02	1.10	OPERATOR FAILS TO RECOVER OFFSITE POWER IN 10 HOURS
PS-XHE-XM-BUP	7.50E-02	1.10	Operator Fails to Start Backup Pump
PS-XHE-XM-PSEDG-MOBILE	1.50E-01	1.10	Operator Fails to Start Post Tsunami Mobile EDG
PS-XHE-XM-PSEDG-STATIONA	1.50E-01	1.10	Operator Fails to Start Post Tsunami Stationary EDG

DRAFT

~~Official Use Only~~

Wagner, Katie

From: Wagner, Katie
Sent: Thursday, March 24, 2011 12:03 PM
To: Bush-Goddard, Stephanie
Subject: RE: Public health: another issue that needs near-term action; I-131 counting.

Stephanie,

I saw your email saying you would respond in 10 minutes and that Kathy and you were emailing back and forth last night. Are the items below "Complete" or still "Pending"?

38	3/23/2011	Per F. Peterson ! NEW	peterson@nuc.berkeley.edu	Stephanie Bush-Goddard x7528	HEB	Provide thoughts on measuring I-131 in Japanese and U.S. West Coast populations (to collect a large data set) possibly with DOE assistance.	Provide thoughts on measuring I-131 in Japanese and U.S. West Coast populations (to collect a large data set) possibly with DOE assistance.	Pending
25	3/17/2011	Edward Lazo	Edward.LAZO@oecd.org	TBD	HEB	Request for information on whether the [US] government has made recommendations with regard to [US] citizens in Japan, with regard to food or goods coming from Japan, with regard to [US] citizens going to Japan. Also requesting information regarding [other] [US] published governmental positions.	Information regarding published U.S. governmental positions.	Pending

Thanks,
Katie

-----Original Message-----

From: Bush-Goddard, Stephanie
Sent: Wednesday, March 23, 2011 5:37 PM
To: Wagner, Katie
Subject: RE: Public health: another issue that needs near-term action; I-131 counting.

Yes that sounds good.

Did you get my answer to complete the action???

Thanks

-----Original Message-----

From: Wagner, Katie
Sent: Wednesday, March 23, 2011 3:22 PM
To: Bush-Goddard, Stephanie
Subject: FW: Public health: another issue that needs near-term action; I-131 counting.

Stephanie - I just logged this on the Sharepoint (which I print out and give to DSA management at least once per day) . . . could you let me know if the scope and deliverable I inputted sound ok? - Thanks, Katie

Sharepoint: <http://portal.nrc.gov/edo/res/DSA/Shared%20Documents/JPN-Status-Request.aspx>

-----Original Message-----

From: Gibson, Kathy

Sent: Wednesday, March 23, 2011 3:02 PM
To: Wagner, Katie
Cc: Bush-Goddard, Stephanie
Subject: FW: Public health: another issue that needs near-term action; I-131 counting.

Add to the item for Stephanie

-----Original Message-----

From: Sheron, Brian
Sent: Wednesday, March 23, 2011 2:42 PM
To: Gibson, Kathy; Bush-Goddard, Stephanie
Cc: Uhle, Jennifer
Subject: FW: Public health: another issue that needs near-term action; I-131 counting.

More.....

-----Original Message-----

From: Per F. Peterson [mailto:peterson@nuc.berkeley.edu]
Sent: Wednesday, March 23, 2011 2:27 PM
To: Richard L Garwin
Cc: Brinkman, Bill; Hurlbut, Brandon; Sheron, Brian; Poneman, Daniel; McFarlane, Harold; Adams, Ian; John Holdren; Kelly, John E (NE); Grossenbacher, John (INL); Owens, Missy; Per F. Peterson; Lyons, Peter; Finck, Phillip; rgarwin@ostp.eop.gov; RJBudnitz@lbl.gov; ronaldo.szilard@inl.gov; SCHU; Aoki, Steven; Koonin, Steven; Steven_A._Fetter@ostp.eop.gov; Binkley, Steve; DAgostino, Thomas
Subject: Re: Public health: another issue that needs near-term action; I-131 counting.

Dick,

Good idea.

Also, I just spoke with Jim Conca, who directed the CEMRC facility for many years. He advises that a more accurate, and logistically simpler method to measure I-131 is by collecting urine samples. Collecting a quart or more, recording the time over which the collection occurred, and adding nitric acid to acidify (which prevents precipitation on the container walls and biological action that can pressurize the container), and then performing gamma counting, provides the most sensitive way to assay for I-131. Clearly this is logistically much easier to implement as well.

I'm not sure whether there are hand-held detectors that can give the spectral resolution needed to detect I-131, but since it would be the only source of significant radiation in the chest region, simple counting might suffice. Whole body counts still provide a direct measure of intake, so could be valuable to perform for some fraction of the people. Everyone who goes through a whole-body count should also be counted with a hand-held device and urine assay as well, I would assume.

An important point for doing this in the U.S., and probably in Japan, is that the protocols must receive approval by a Human Subjects Committee.

If one were to initiate an effort to perform whole body counting at LLNL and PNNL, the human subjects review can likely be done faster if it is initially for lab employees who would volunteer to be counted. Screening lab employees could provide baseline data to use in deciding/planning counting for the public as well.

Again, collecting statistically useful data on uptake of I-131 and other radionuclides on the U.S. west coast and in Japan could be very valuable in the longer term, when many people may begin to believe that the Fukushima accident is the cause of a variety of health problems.

-Per

>Right on, Per!

>

>But it seems to me that one could promptly validate the use of a single

>counter near the thyroid gland for detecting I-131, in comparison to

>whole body counting, since the thyroid is so efficient in concentrating

>iodine. And if thyroid counting is adequate, the whole process would

>be quicker and cheaper.

>

>Dick Garwin

--

Per F. Peterson
Professor and Chair
Department of Nuclear Engineering
University of California
4153 Etcheverry Hall
Berkeley, California 94720-1730
peterson@nuc.berkeley.edu
Office: (510) 643-7749 Fax: (510) 643-9685
http://www.nuc.berkeley.edu/People/Per_Peterson

From: LIA08 Hoc
Sent: Thursday, April 28, 2011 7:54 PM
To: Hoc, PMT12
Subject: RE: Bullet train

Categories: FOIA Forwarded

Jessie,

Here is my first take on the Bullet Train issue, realizing that the audience is the public. Wordsmithing at its finest! ☺

Japanese Officials have reported that normal transportation between Tokyo and Sendai will resume within the next week. This includes two primary methods of transportation, the Bullet Train and the National Route 4 Highway. These travel routes have been deemed as essential thoroughfare between these two cities, without which travel between Tokyo and Sendai can take over 10 hours. As a precautionary note to US travelers, however, it should be observed that both transportation methods contain segments that are within the recommended US citizen 50 mile (80 km) evacuation zone, but outside 18.6 mi (30 km) zone.

The U.S. Department of Energy has performed radiation readings along these two transportation routes and has reported that measured external dose rates in the immediate areas are not high enough to warrant concern. It is the recommendation that American citizens that choose to use these forms of transportation do not stop in the evacuation zones and travel directly through the area to minimize the exposure. By minimizing the time spent in these zones, and exposure to radiation is minimal and well below U.S. Environmental Protection Agency limits and is not a major health concern.

American citizens should also heed Japanese warnings in these areas. If you have any questions or concerns regarding travel to/ from Tokyo and Sendai, please do not hesitate to call the U.S. Embassy at XXX-XXX-XXXX.

From: LIA05 Hoc
Sent: Thursday, March 24, 2011 7:28 PM
To: Dan Feighert; John Simpson; Andrew Seward; Harry Sherwood; Michelle Ralston; Steve Horwitz; Tim Greten; Vanessa E. Quinn
Subject: FW: USNRC Earthquake-Tsunami Update.032411.1800EDT
Attachments: USNRC Earthquake-Tsunami Update.032411.1800EDT.pdf

FYI,

For those who did not receive this update.

Bonnie Sheffield Dayshift 0700-1500
Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187

*******FOR OFFICIAL USE ONLY*******
DO NOT RELEASE OUTSIDE OF THE FEDERAL FAMILY

From: LIA07 Hoc
Sent: Thursday, March 24, 2011 7:20 PM
To: LIA05 Hoc
Subject: FW: USNRC Earthquake-Tsunami Update.032411.1800EDT

From: LIA07 Hoc
Sent: Thursday, March 24, 2011 5:55 PM
To: LIA07 Hoc; OST04 Hoc
Subject: USNRC Earthquake-Tsunami Update.032411.1800EDT

LLLL/105

From: LIA06 Hoc
Sent: Friday, March 25, 2011 1:38 PM
To: Blamey, Alan
Subject: RE: REVISED Message and attachments for call

Thanks.. feel free to be an active participant!

Liaison Team Director
U.S. Nuclear Regulatory Commission
Operations Center

From: Blamey, Alan
Sent: Friday, March 25, 2011 1:32 PM
To: LIA06 Hoc
Subject: RE: REVISED Message and attachments for call

Got it. 2:30 PM EST. I will be on the call in an hour.

From: LIA06 Hoc
Sent: Friday, March 25, 2011 1:24 PM
To: Blamey, Alan
Subject: FW: REVISED Message and attachments for call

Alan.. please let me know that you received this.

Mike

Liaison Team Director
U.S. Nuclear Regulatory Commission
Operations Center

From: LIA11 Hoc
Sent: Friday, March 25, 2011 1:19 PM
To: Aoki, Steven; Blount, Tom; Boger, Bruce; Casto, Chuck; Dorman, Dan; ET01 Hoc; ET05 Hoc; FOIA Response.hoc Resource; Glitter, Joseph; Good, Charles; Hoc, PMT12; HOO Hoc; LIA01 Hoc; LIA06 Hoc; LIA08 Hoc; LIA11 Hoc; Lyons, Peter; McDermott, Brian; McGinty, Tim; Miller, Chris; Monninger, John; Morris, Scott; OST02 HOC; Pentagon Japan Crisis Team J-4 Desk; Ross-Lee, MaryJane; RST01 Hoc; RST01B Hoc; Sal Golub; Tom Vavoso; Virgilio, Martin; Weber, Michael; Webster, William ; Wiggins, Jim; Zimmerman, Roy
Subject: REVISED Message and attachments for call

{message omitted in previous}

I have attached the list of "discussion items" from the most recent Cabinet meeting in Japan. My understanding of the process (as it is evolving) is that the industry consortium should provide a list of equipment that can satisfy the request. Up to this point my understanding is that in prior situations where the Japanese govt. has been interacting with DOE to satisfy these types of requests, DOE has provided a catalog type list of equipment with a description of capabilities for the Japanese to choose from.

It is still unclear how funding is to be provided and who will provide logistical support for the transport of the equipment. It may be useful, for the equipment being supplied by the industry consortium, to have a price listed as well.

It not clear the role that DOD will play in logistics in the support of equipment transport to Japan. There has been a suggestion from DOE that support from OSD may be useful (in the form of a small cell to the DART) to provide logistical support.

For the 14:30 call I have attached a proposed agenda with a bridge number and pass code. I have also attached a draft meeting summary from the 1st cabinet meeting that the US NRC Team Leader attended as well as the Govt of Japan (GOJ) Request . The minutes from the second meeting will not be available until sometime later this evening.

Thanks for your help.
Mike Tschiltz
Liaison Team Director
U.S. Nuclear Regulatory Commission
Operations Center

From: RMTPACTSU_ELNRC <RMTPACTSU_ELNRC@ofda.gov>
Sent: Friday, March 25, 2011 2:40 PM
To: ET07 Hoc
Subject: RE: REVISED Message and attachments for call

This looks like it...at least what it has become. This seems to have become a much less formalized than what the Chairman intended. USAID folks are very concerned that this will not be resolved prior to them ending the mission. I am going to listen in on the call.

From: ET07 Hoc [mailto:ET07.Hoc@nrc.gov]
Sent: Friday, March 25, 2011 2:31 PM
To: RMTPACTSU_ELNRC
Subject: FW: REVISED Message and attachments for call

FYI – we may have found the elusive group we were looking for...

From: ET02 Hoc
Sent: Friday, March 25, 2011 1:27 PM
To: ET07 Hoc
Subject: FW: REVISED Message and attachments for call

From: ET01 Hoc
Sent: Friday, March 25, 2011 1:19 PM
To: ET02 Hoc
Subject: FW: REVISED Message and attachments for call

From: LIA11 Hoc
Sent: Friday, March 25, 2011 1:19:20 PM
To: Aoki, Steven; Blount, Tom; Boger, Bruce; Casto, Chuck; Dorman, Dan; ET01 Hoc; ET05 Hoc; FOIA Response.hoc Resource; Giitter, Joseph; Good, Charles; Hoc, PMT12; HOO Hoc; LIA01 Hoc; LIA06 Hoc; LIA08 Hoc; LIA11 Hoc; Lyons, Peter; McDermott, Brian; McGinty, Tim; Miller, Chris; Monninger, John; Morris, Scott; OST02 HOC; Pentagon Japan Crisis Team J-4 Desk; Ross-Lee, MaryJane; RST01 Hoc; RST01B Hoc; Sal Golub; Tom Vavoso; Virgilio, Martin; Weber, Michael; Webster, William ; Wiggins, Jim; Zimmerman, Roy
Subject: REVISED Message and attachments for call
Auto forwarded by a Rule

{message omitted in previous}

I have attached the list of "discussion items" from the most recent Cabinet meeting in Japan. My understanding of the process (as it is evolving) is that the industry consortium should provide a list of equipment that can satisfy the request. Up to this point my understanding is that in prior situations where the Japanese govt. has been interacting with

DOE to satisfy these types of requests, DOE has provided a catalog type list of equipment with a description of capabilities for the Japanese to choose from.

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Thanks for your help.

Mike Tschiltz

Liaison Team Director

U.S. Nuclear Regulatory Commission

Operations Center

From: RST01 Hoc
Sent: Friday, March 25, 2011 11:25 PM
To: Huckaby, Thomas S.(INPO); Garchow, David F.(INPO); jheishman@epri.com; hernando.madronero@ge.com; GE.HitachiNuclearResponseTeam@ge.com; INPOERCTech; ET07 Hoc; Hoc, PMT12; HOO Hoc; LIA11 Hoc; Versluis, Rob
Cc: Karas, Rebecca
Subject: High Resolution Pictures of Fukushima-Daiichi

All,

The NRC has received a set of high resolution pictures of Fukushima-Daiichi from TEPCO that may be useful in performing evaluations of site conditions. We have burned the pictures to CD and have them at the NRC Incident Response Center. These pictures should be handled on a need-to-know basis and should not be distributed outside your organization without NRC consent. If you would like a copy, we can provide one to you at NRC Headquarters, or we could mail one to you.

Please reply to this address if you are interested in a copy of the pictures.

Regards,

RST Coordinator

From: Zimmerman, Roy
Sent: Saturday, March 26, 2011 12:07 PM
To: LIA07 Hoc
Cc: Jones, Cynthia; Virgilio, Martin
Subject: RE: 0430 EDT (March 26, 2011) USNRC Earthquake/Tsunami Status Update

Follow Up Flag: Follow up
Flag Status: Flagged

Good Afternoon, page 5 of the status update indicates reentry guide provided to in-country team for their review. last night around 10:00pm I requested the PMT also sent the draft reentry guide to DOE and OSTP for their review. This was a commitment from a SVTC earlier in the week. If that has been done, suggest the status update reflect that action, thx, Roy

From: LIA07 Hoc
Sent: Saturday, March 26, 2011 4:43 AM
To: LIA07 Hoc
Subject: 0430 EDT (March 26, 2011) USNRC Earthquake/Tsunami Status Update

Attached, please find a 0430 EDT (March 26, 2011) status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami.

Please note that this information is "Official Use Only" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Jim

Jim Anderson
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
LIA07.HOC@nrc.gov (Operations Center)
James.anderson@nrc.gov

From: RST01 Hoc
Sent: Saturday, March 26, 2011 4:29 AM
To: ET02 Hoc; ET07 Hoc
Subject: FW: Speculative containment flooding assessment
Attachments: Containment flooding assessment.doc

From: RST09 Hoc
Sent: Saturday, March 26, 2011 4:09 AM
To: RST01 Hoc
Subject: Speculative containment flooding assessment

Frank,

Please provide to the folks on the 3 AM (EDT) call...for their review and comment...

Thanks!

Don

NRC Reactor Safety Team speculative assessment of containment flooding for Units 1-3

Information from GRS chronology from 3-26-11 (which provides 3-25-11 data):

(Values that are known to have significantly changed have been updated based on 3/26 NISA data)

Unit #	SP pressure, psi (kPa)	Drywell pressure, psi (kPa)	Temp @ lower head (C)	Temp @ FW nozzle (C)	Rad level in SP (rem/hr)	Rad level in drywell (rem/hr)	Assessment
1	?	43 (295)	172 (148 from later NISA reading)	218 (198 from later NISA reading)	2580	4090	Elevated drywell pressure indicates intact containment. Lower head and feedwater nozzle temperatures above the saturation temperature suggests they are not submerged (no containment flooding to that level). Rad levels suggest SP is not completely flooded.
2	"below measuring range"	17.5 (120)	105	100	136	4770	SP pressure assumed to have failed. Rad levels suggest a flooded SP (submerged rad monitor). Lower head and FW temperatures at ~ saturation suggests containment has been flooded above the FW nozzle and the entire system has heated to saturation.
3	28 (194)	15.6 (107)	156 (111 from later NISA reading)	66	145	5330	Differential pressure between SP and drywell of roughly 1 atm suggests a hydrostatic head of water (i.e., containment flooded). High rad level in drywell with significantly lower rad level in SP corroborates this (suggests SP is completely flooded). Lower head and feedwater temperatures at saturation suggest containment has been flooded to above feedwater nozzle).

From: LIA07 Hoc
Sent: Saturday, March 26, 2011 7:35 AM
To: Borchardt, Bill; Bradford, Anna; Cohen, Shari; Cooper, LaToya; Dyer, Jim; ET07 Hoc; Flory, Shirley; Gibbs, Catina; Haney, Catherine; Hudson, Sharon; Jaczko, Gregory; Johnson, Michael; Leeds, Eric; Loyd, Susan; Pace, Patti; Schwarz, Sherry; Sheron, Brian; Speiser, Herald; Sprogeris, Patricia; Taylor, Renee; Virgilio, Martin; Walls, Lorena; Weber, Michael
Subject: Update for Go Books - 0700 EDT, March 26, 2011
Attachments: March 26 0700 EDT one pager _3_.pdf

Please find attached updated/**corrected** information for the "Go Books".

The update include:

- "One Pager" (0700 EDT, 03/26/11) – **Corrected that RST provided recommendations to the NRC Site Team.**

Please let me know if you have any questions or concerns.

Yen

Yen Chen
US Nuclear Regulatory Commission
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From: LIA05 Hoc
Sent: Saturday, March 26, 2011 3:47 PM
To: Dan Feighert; Andrew Seward; Harry Sherwood; John Simpson; Lisa Hamilton;
Michelle Ralston; Rebecca Fontenot; Steve Horwitz; Tim Greten; Vanessa E. Quinn
Subject: NRC Clips from Yesterday
Attachments: NRCClips110325.doc

Please find the attached.

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LLLL/112



NUCLEAR REGULATORY COMMISSION NEWS CLIPS

FRIDAY, MARCH 25, 2011 7:00 AM EDT

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NRC NEWS:

Investigator: Defects At Nuclear Plants Unreported (AP)

By Matthew Daly, Associated Press
Associated Press, March 25, 2011

WASHINGTON – Companies that operate US nuclear power plants are not telling the government about some equipment defects that could create safety risks, according to a report released Thursday.

An audit by the inspector general of the Nuclear Regulatory Commission also raised questions about the agency's oversight, saying reporting guidelines for the nuclear industry are "contradictory and unclear."

Reflecting that confusion, the report said the NRC has not levied any civil penalties or significant enforcement actions against nuclear plant operators for lapses in reporting equipment defects in at least eight years.

The study comes as questions are raised about the safety of US nuclear facilities in the wake of the nuclear crisis in Japan. The NRC voted Wednesday to conduct two safety reviews of the 104 nuclear reactors operating in the US

Unless the NRC takes steps to improve its reporting guidelines, "the margin of safety for operating reactors could be reduced," the IG report said.

NRC inspectors found at least 24 instances where possible equipment defects were identified but not reported to the agency from December 2009 through September 2010, according to the study.

Eliot Brenner, a spokesman for the agency, said utilities and NRC inspectors both have procedures to identify and report manufacturing defects. The IG report mostly addresses how these defects are reported to the government, he said.

"The NRC has a variety of other regulations that effectively encompass reporting all defects, and the NRC continues to conclude plants are operating safely," Brenner said.

The agency will look at the report to see if its reporting systems can be strengthened, he added.

In its 18-page report, the inspector general said the NRC's baseline inspection program does not require inspectors to review an operator's reporting on equipment defects.

Confusion over the regulations "could reduce the margin of safety for operating nuclear power reactors, as NRC may remain unaware of component failures that have resulted from manufacturing defects," the report said.

For example, an operator might not report a basic component that failed due to a design defect. As a result, other operators that use the same component — and even component manufacturers — may be unaware of the problem, the report said. Without knowledge of specific manufacturing defects, the NRC could miss crucial trends, the report said.

Rep. Edward Markey, D-Mass., called the report troubling and said it raises questions about the self-policing allowed at commercial nuclear plants.

"While there are no specific examples listed in the report, it is apparent that confusion and omissions regarding the reporting of defects at nuclear facilities are commonplace," Markey said.

A spokesman for the Nuclear Energy Institute, an industry group, cautioned that the report did not identify any actual safety problems.

Reporting possible equipment defects, while important, "is one sliver within a much broader regulatory regimen that shows US nuclear power plants are operating at high margins of safety," spokesman Steve Kerekes said.

Kerekes cited annual NRC reports dating to 2005 that show no "abnormal occurrences" throughout the US nuclear energy industry. Abnormal occurrences are events that the agency considers threats to public health or safety.

IG: Some Defects At Nuclear Plants Go Unreported (AP)

Associated Press, March 25, 2011

WASHINGTON — A new report says companies that operate US nuclear power plants are not reporting some equipment defects that could create safety risks.

The report by the inspector general at the Nuclear Regulatory Commission also raises questions about the agency's oversight, saying reporting guidelines for the nuclear industry are "contradictory and unclear."

The report, released Thursday, says that unless the NRC takes steps to improve its reporting guidelines, "the margin of safety for operating reactors could be reduced."

The report says NRC inspectors found at least 24 instances where possible equipment defects were identified but not reported to the agency from December 2009 through September 2010.

NRC staff reviewed a draft of the report but opted not to provide formal comments. An NRC spokesman declined to comment.

A Quarter Of US Nuclear Plants Not Reporting Equipment Defects, Report Finds (WP)

By Steven Mufson and Jia Lynn Yang

Washington Post, March 25, 2011

More than a quarter of US nuclear plant operators have failed to properly tell regulators about equipment defects that could imperil reactor safety, according to a report by the Nuclear Regulatory Commission's inspector general.

Operators of US nuclear power plants are supposed to tell the NRC when pieces of equipment “contain defects that could create a substantial safety hazard,” regulations say.

Although the report doesn’t assert that any imminent danger resulted from the lapses, many experts said the lack of communication could make it harder for other nuclear reactor operators to learn about flaws in their own equipment, because many similar parts are used in other reactors.

“If it happens in this one, maybe it’s a faulty part that’s in another plant and they should know,” said Diane Curran, a lawyer who has represented citizens groups and state and local governments in cases related to nuclear plants. “If you don’t report on this, the other licensees can’t look in their books and say, ‘Oh, do I have this one?’ and ‘Maybe I should switch it out.’ ”

The NRC inspector general’s report appeared at a time of heightened concern about nuclear safety as workers in Japan battled to control radiation leaks, fire, power outages and explosions at a series of reactors.

The inspector general’s office did not describe the defects, and that frustrated lawmakers, who said the report on unreported problems did not say what those problems were.

Rep. Edward J. Markey (Mass.), the ranking Democrat on the House Natural Resources Committee, issued a statement saying that “this troubling study . . . raises serious questions about the self-policing allowed at nuclear facilities with regard to reporting of safety concerns.”

Markey said that “it is apparent that confusion and omissions regarding the reporting of defects at nuclear facilities are commonplace.”

The inspector general blames the failures on uncertainty about when to report defects. Operators said they thought they needed to report only when an “event” took place and backup systems did not prevent a breakdown — or in bureaucratic lingo, an “actual loss of safety function.” In fact, the rules require them to report any defect, even if backup systems kicked in.

The inspector general said there was confusion about the rule among at least 28 percent of the nation’s 104 nuclear reactors, based on interviews done from mid-2009 to mid-2010.

The IG’s report worried some experts who said the NRC was missing critical information that could prevent bigger accidents.

“If there is a bad patch of parts, you want to be aware of that and fix it,” said David Lochbaum, a nuclear engineer with the Union of Concerned Scientists, which released a report last week criticizing the NRC’s performance.

Government watchdogs have raised alarms before about defective parts at nuclear plants. In 1990, the Government Accountability Office released a report saying that utilities had installed counterfeit or substandard parts at about 64 percent of the country’s plants.

Paul Gunter, with the group Beyond Nuclear, said: “You could have two reactors that have faulty circuit breakers and though the part turns out to be defective, if it doesn’t necessarily cause an event like a reactor shutdown, it may be reported at one reactor, but not at another. But circuit breakers and fuses are . . . not trivial pieces of equipment.”

The industry said its overall safety record is still laudable.

“We agree there’s room to clarify and simplify the regulations,” said Steve Kerekes, a spokesman for the Nuclear Energy Institute. “It’s important to keep in mind the broader picture here, which is that this particular reporting area is one sliver of a much broader regulatory regimen, which shows that US nuclear plants are operating at very high levels of safety.”

The NRC said that the study focuses on a subset of defects caused by manufacturing and that the central issue is “administrative.” The agency said there are still other processes for catching and reporting defects.

Separately, an employee for a subcontractor working at the Tennessee Valley Authority’s Watts Bar Nuclear Plant has been charged with lying about power system inspections, the Associated Press reported Thursday.

Prosecutors said Matthew David Correll, a 31-year-old electrician, lied last August about measuring cables that would supply power to a safety system at the reactor site. His attorney declined comment, the AP said.

Rules Faulted For Poor Data On Failures At Reactors (NYT)

By Elizabeth A. Harris And Kim Severson

New York Times, March 25, 2011

Nuclear power plants in the United States are not reporting some equipment failures to the government because of badly written rules, the inspector general of the Nuclear Regulatory Commission has warned.

Those rules, which are often contradictory, leave the commission without the muscle to enforce the federal law requiring the reporting of such problems, the inspector general said in a report issued Wednesday.

From December 2009 to September 2010, the report said, the commission found 24 instances in which equipment problems were not properly reported. If the rules are not improved, it said, they “could reduce the margin of safety for operating nuclear power reactors.”

The commission, which operates independently of the inspector general, countered in a statement that it “has a variety of other regulations that effectively encompass reporting all defects.” It added, “The N.R.C. continues to conclude plants are operating safely.”

The inspector general’s office said it was concerned about equipment involving safety features — for instance, systems that measure pressure in a reactor’s coolant. But the report did not detail any specific lapses in reporting equipment problems.

R. K. Wild, a senior analyst in the inspector general’s office, said Thursday that full reporting of equipment defects was crucial to ensuring that problems were not duplicated at other plants. When a plant operator reports a problem, the government can take the information to the manufacturer and determine where similar parts are in use.

Nuclear power generation in the United States has come under more scrutiny since an earthquake and tsunami struck a nuclear plant in Japan, setting off a crisis that continues to unfold. At the request of President Obama, the Nuclear Regulatory Commission voted Wednesday to set up a task force to review the safety of the 104 nuclear reactors operating across the United States.

In another development, federal authorities announced Thursday that a subcontractor at the Watts Bar nuclear plant under construction in Tennessee had been accused of lying about making crucial measurements on cables that carry power to safety systems there. The contractor, Matthew David Correll, 31, was charged with making false statements, the United States attorney in Knoxville, Tenn., said.

The reactor, the second at the Watts Bar plant, is the only one now being built in the nation.

Warning On US Reactor Safety (FT)

By Shannon Bond

Financial Times, March 25, 2011

Full-text stories from the Financial Times are available to FT subscribers by clicking the link.

Nuclear Plants Fail To Report Safety Defects (WSJ)

Industry Confusion Over Rules Could Keep Regulators From Spotting Troubling Trends at Facilities, Federal Study Finds

By Tennille Tracy

Wall Street Journal, March 25, 2011

Full-text stories from the Wall Street Journal are available to Journal subscribers by clicking the link.

UPDATE 3-US Nuclear Plants Not Reporting All Defects-report (REU)

By Roberta Rampton And Ayesha Rascoe

Reuters, March 25, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

Report: Nuke Plant Component Defects Elude Regulators (HILL)

By Ben Geman

The Hill, March 25, 2011

Operators of US nuclear plants are failing to report component defects that could cause “substantial” safety hazards, according to a new report by the Nuclear Regulatory Commission’s inspector general.

The report comes amid heightened scrutiny of US nuclear safety as a result of Japan’s reactor crisis.

The report released Thursday says “contradictory and unclear” NRC regulations are a major cause of plant operators’ failure to notify regulators in multiple cases.

It warns that, absent NRC improvements to the reporting program, “the margin of safety for operating reactors could be reduced.”

NRC staff said findings “will be helpful in adding clarity” to commission regulations, the report states.

A spokesman for the Nuclear Energy Institute, a major trade group, said the issue needs to be resolved, but also said the report must be viewed in the broader context of the industry’s strong safety record.

“Our actual operating performance demonstrates that we are operating at high margins of safety,” spokesman Steve Kerekes said. “It should not diminish from our larger safety record, which is excellent.” Kerekes also noted that the component reporting program is just one element of a far broader NRC safety program.

But Rep. Edward Markey (D-Mass.), a senior member of the Energy and Commerce Committee, called the report a warning sign.

"This troubling study by the NRC's Inspector General raises serious questions about the self-policing allowed at nuclear facilities with regard to reporting of safety concerns. While there are no specific examples listed in the report, it is apparent that confusion and omissions regarding the reporting of defects at nuclear facilities are commonplace," said Markey, a longtime nuclear critic, in a statement.

The report notes confusion between separate NRC rules for reporting component defects — known as the Part 21 rules — and reporting events at plants that reduce safety.

It's possible to have component failures that do not trigger an official "loss of safety" event due to redundant systems at power plants.

"Based on interviews and analysis, [the inspector general] determined that licensees representing at least 28 percent of the operating reactor fleet do not, as standard practice, notify NRC of defects under Part 21 unless they are reportable under event reporting regulations," the report states.

The inspector general conducted the study between July and December of 2010 and provided the report in draft form to the NRC in mid-January. The inspector general met with NRC officials in February and solicited their comments en route to completing the study.

US Plant Operators Failing To Report Some Equipment Defects -- NRC Audit (EPPM)

By Hannah Northey

E&ENews PM, March 25, 2011

Almost 30 percent of US nuclear reactor operators are failing to report certain defects in plant equipment, a situation that could lead to serious safety hazards, federal regulators said in a report released today.

The Nuclear Regulatory Commission's Office of Inspector General (OIG) said reactor operators are confused about what they are required to report and are failing to report some equipment defects.

Specifically, the report says, operators failed to report at least 24 defects in reactor components that could have caused a substantial safety hazard from December 2009 to September 2010, as well as 11 additional defective components between June 2009 and June 2010.

NRC requires licensees to report defects in installed equipment that could create safety hazards or result in the loss of functions that ensure the reactor can function properly or shut down during an emergency.

Confusing to operators is Part 21 of the law, which requires operators to report defects that can cause a loss of safety functions, while a separate section requires operators to report only actual losses of safety functions, the inspector general wrote. The report recommends that the commission clarify which defects must be reported.

"Based on interviews and analysis, OIG determined that licensees representing at least 28 percent of the operating reactor fleet do not, as standard practice, notify NRC of defects under Part 21 unless they are reportable under event reporting regulations," the report says.

NRC has also failed to levy any civil penalties or take significant enforcement actions for such reporting lapses in the past eight years, the report says.

Steve Kerekes, a spokesman for the Nuclear Energy Institute, said it is important to remember that the issue raised by the OIG is just a "sliver" of a larger regulatory framework that nuclear reactor operators must abide by.

"While the report language suggest this is an area of reporting that could have safety implications, we need to keep in mind that the facts we have in hand demonstrate our plants are operating at a very high margin of safety," Kerekes said.

But Rep. Ed Markey (D-Mass.), ranking member on the House Natural Resources Committee, said the report highlights serious questions about the self-policing that regulators allow on reporting safety problems at nuclear plants.

"While there are no specific examples listed in the report, it is apparent that confusion and omissions regarding the reporting of defects at nuclear facilities are commonplace," Markey said.

Lobbyists' Long Effort To Revive Nuclear Industry Faces New Test (NYT)

By Eric Lichtblau

New York Times, March 25, 2011

WASHINGTON — One flash point in the remarkable revival of interest in nuclear energy here — a revival now threatened by the calamity in Japan — came almost by accident at a late-night brainstorming session in a senator's office in 1997.

Pete V. Domenici, then a Republican senator from New Mexico, was looking for an issue to claim as his own. One staff member, a former scientist at the Los Alamos nuclear lab, tossed out an idea that seemed dead on arrival: a renewed commitment to nuclear energy.

"Are you serious?" Mr. Domenici remembers asking the aide incredulously. After Three Mile Island and Chernobyl, nuclear energy had fallen into disfavor, development had stalled, and many politicians ran from the issue like it was a toxic cloud.

But with industry backing, Mr. Domenici overcame his skepticism and became one of the driving forces in a decade-long renaissance of nuclear energy — a resurgence that began in earnest under President George W. Bush and has led President Obama to seek a \$36 billion expansion in loan guarantees to finance reactors at a time when other programs are being slashed.

Now, however, the future of nuclear energy in the United States is in doubt, with advocates on all sides bracing for a fierce debate over whether the disaster in Japan should slow or even derail the planned expansion of America's 104 nuclear reactors.

Mr. Obama has shown no sign of backing away — a testament to the success of an expensive multiyear campaign by the nuclear energy industry, advocates in Congress and the executive branch.

Nuclear executives, girding for a fight, have already held 20 briefings for Washington lawmakers and others about the events in Japan and the potential lessons learned at home. They have been putting out guidance on increased safeguards for reactors, and giving reporters tours of nuclear plants.

The message: Despite the events in Japan, nuclear is a safe, affordable and "clean" energy source that does not spew harmful carbons into the environment or rely on foreign producers.

"We surely should avoid a rush to judgment," Jeff Merrifield, a former member of the Nuclear Regulatory Commission, said in one of a series of videos that the Nuclear Energy Institute, the leading trade group, has put out on its Web site since this month's tsunami crippled Japan's reactors. The United States, he said, should "continue to move forward with building those plants because it's the right thing for our nation."

But with polls in the last two weeks showing dimmed support for nuclear power, opponents are hoping to use the events in Japan to slow the industry's political momentum and challenge what the industry maintains is a long record of safety.

"The risk is just so great if there's a screw-up," said David Hamilton, director of energy programs for the Sierra Club, which opposes the expansion of nuclear energy. "The nuclear renaissance was already hanging by a thread, and the Japanese disaster may have cut the thread."

But even the critics acknowledge that the industry's backers have managed to jump-start nuclear energy in a way that few thought possible a decade ago.

One turning point, people on both sides of the issue agree, was that proponents took advantage of the public concern over climate change and carbon-producing fuels beginning in the early 2000s and were able to recast themselves — first to fence-sitting lawmakers, then to the public as a whole — as a "clean" alternative that would not harm the environment.

"It was a brilliant campaign," said Tyson Slocum, an energy expert at Public Citizen, which opposes nuclear energy because of concerns about its safety, security and cost.

"While everyone was focused on shutting down coal plants, they had a couple of years to themselves to just talk to the American public in very sophisticated ad campaigns and to reintroduce a generation of Americans to nuclear power," he said. "That was very powerful."

Nuclear industry firms and their employees also contributed more than \$4.6 million in the last decade to members of Congress — both Republicans and Democrats, including Mr. Obama, then a senator, and his presidential campaign — as the industry's political fortunes were rising, according to an analysis by MAPLight.org, a Washington research group that tracks money and politics.

And the industry has spent tens of millions more lately on lobbying. Last year, electric utilities, trade groups and other backers spent \$54 million hiring lobbyists, including former members of Congress, to make their case, according to a separate analysis by the Sunlight Foundation, which also tracks money and politics.

As a senator, Mr. Domenici was a big beneficiary of the industry's largess, collecting more than \$1.25 million over his 20-year career from political donors affiliated with the energy sector.

Months after he committed himself to promoting nuclear energy, he gave a talk on the topic in 1997 at Harvard University called "A New Nuclear Paradigm." Nuclear energy proponents called it a seminal moment in the shift of public opinion.

"I wanted to put nuclear power in its proper perspective," said Mr. Domenici, who left the Senate in 2009 and serves as a senior fellow at the Bipartisan Policy Center in Washington.

"You have this resource just sitting there saying, 'Are you going to use me or not?'" Mr. Domenici said in an interview last week. "People were stirring up fears of another Three Mile Island, but I believe the reality of nuclear power has now become much better known."

Mr. Domenici's position as a senior member of both the Senate Energy and Appropriations Committees gave him a particularly influential role in helping the industry. He was at Mr. Bush's side in 2005, when the president signed a major bill that encouraged the building of new nuclear plants. Work has now begun on four new plants.

Mr. Domenici's former aides have gone on to play critical roles in the debate as well.

Pete Lyons, a nuclear scientist and the former Domenici aide who first suggested the nuclear energy idea to the senator at his 1997 brainstorming session, went on to serve on the Nuclear Regulatory Commission and has been nominated by Mr. Obama to run the Energy Department's civilian nuclear program. Alex Flint, another Domenici aide at the meeting, now is the chief federal lobbyist for the Nuclear Energy Institute. And a third aide at the meeting, Steve Bell, assists Mr. Domenici's work on a presidential panel on nuclear waste.

Mr. Flint said the senator's staff did not expect to succeed when Mr. Domenici began proposing modest appropriations for nuclear research and programming in the late 1990s.

"We were going against the conventional wisdom," Mr. Flint said. "We expected a pushback, but we didn't get it. And it just grew from there."

Within the Energy Department, meanwhile, a 2003 study by the Massachusetts Institute of Technology on the future of nuclear energy helped forge a consensus within the government, even among skeptical policy makers, officials said. The study concluded that while nuclear power was facing "stagnation and decline," it should remain an important way to provide carbon-free energy at relatively low cost.

"That really moved my thinking, and that kind of analysis was very influential," said Daniel B. Poneman, deputy secretary at the Energy Department.

Today, there is no doubt about where the Energy Department stands.

Its Web site extols the value of nuclear energy as providing "low-cost, carbon-free electricity to help drive the American economy and preserve the environment," and it even includes a special page for children called "the Power Pack," featuring a sci-fi journey through nuclear energy.

For critics urging a go-slow approach to building reactors, the enthusiasm is all a bit much.

"The industry has really embedded itself in the political establishment," said Mr. Slocum at Public Citizen. "They've had reliable friends from George Bush to Barack Obama, and the government has really just become cheerleaders for the industry."

Whether events in Japan change the political calculus in Washington "is what everyone is waiting to see," he said. "We don't want to be seen as exploiting a tragedy, but it's prudent to talk about the implications here. The best and the brightest can't see around every corner."

Federal News Radio 1500 AM: Thursday Morning Federal Newscast (FEDNEWSRAD)

FederalNewsRadio, March 25, 2011

Federal regulators voted Wednesday to review safety measures at all of the US's nuclear power plants, in the wake of the nuclear crisis in Japan. The Nuclear Regulatory Commission has launched a two

The Morning Federal Newscast is a daily compilation of the stories you hear Federal Drive hosts Tom Temin and Amy Morris discuss throughout the show each day. The Newscast is designed to give FederalNewsRadio.com users more information about the stories you hear on the air.

IRS tax assistance centers are poorly located help Americans rushing to finish their taxes. That according to an new Inspector General's report. The report found that while there are more than 400 tax assistance centers around the nation, more than a third of taxpayers have to travel at least half an hour to find one. The centers are supposed to provide a way for people to get in-person help from the IRS. But the report finds the agency hasn't kept up with geographic and demographic changes.

The US Postal Service is expected to detail today how it plans to cut about 7,500 administrative jobs. The job eliminations are expected to impact about 2,000 postmasters - and another 5,500 supervisors and administrative staffers. Cutting postmasters may prompt USPS to close the post offices they operate. On average, about 22,000 postal workers leave the agency through attrition. The Washington Post reports Postmaster General Patrick R. Donahoe says between attrition and cuts his goal is to have 30,000 fewer employees working for the Postal Service by the end of its fiscal year, but that buyouts are "an option on the table."

The Pentagon is expected to issue a stop-work order on the second engine for the F-35 Joint Strike Fighter later today. The alternate engine is made by General Electric and Rolls-Royce, and the Pentagon has labeled the project unnecessary and wasteful. Today's Defense reports funding for the alternate engine has been eliminated in the 2011 and 2012 budgets, but because of continuing resolutions of the 2010 budget, the project has continued to receive funding.

The Securities and Exchange Commission has decided to extend its lease in Alexandria. The Washington Business Journal reports about 600 SEC workers will fill the nearly 150,000 square foot space, known as the agency's "Ops Center." This

latest decision will replace the plan to move the workers to DC. The agency has not yet determined how many workers will fill its remaining 340,000 square feet in Constitution Center.

Federal regulators voted Wednesday to review safety measures at all of the US's nuclear power plants, in the wake of the nuclear crisis in Japan. The Nuclear Regulatory Commission has launched a two-step review process. A task force made up of senior staff and former NRC experts, will conduct short-term and long-term analyses of lessons learned from Japan. Their reports will then address how those lessons can be applied to the 104 US nuclear reactors. NRC Chairman Gregory Jaczko said it was important to examine the crisis caused by the earthquake and tsunami to determine whether policy changes are needed in this country. The short-term review is to be completed within three months, with updates after 30 days and 60 days. The longer review should be completed by the end of the year.

The Justice Department has given 20 companies a license to hunt for more than a billion dollars in technology contracts. The vendors are the winners of the IT Support Services-Four contract. Under ITSS-Four, the businesses will compete for task orders to provide all aspects of the system's lifecycle, including the development, support, training and cybersecurity. It is a year-long contract with six one-year options.

Earthquake Risks Must Be Reanalyzed For US Reactors (GWIRE)

By Hannah Northey And Anne C. Mulkern

Greenwire, March 25, 2011

All of the nation's 104 nuclear reactors will need to undergo analysis using cutting-edge technology and the most recent data to assess how well they can withstand earthquakes, the Nuclear Regulatory Commission says.

Plant operators will be required to study the safety of their facilities using a new seismic risk model created by the NRC, Electric Power Research Institute (EPRI) and US Geological Survey, which should be available later this year.

The modeling is expected to give clearer indications of the risks facing each of the plants, providing details on the ground shaking that plant operators can expect at any given site, NRC spokesman Scott Burnell said. Plant operators must then show the commission their facilities are equipped to handle the worst-case scenarios the model generates.

The NRC will likely start with 27 reactors in the eastern and central United States. Data in past USGS reports for those facilities have shown the "largest increase in seismic risk," Burnell said, while acknowledging the risk is slight and still covered by the plants' designs. Using the new model for those facilities is expected to show "areas where the plants can improve what is already an acceptable response to seismic events," he said.

"There's been some talk about these being the first 27," NRC spokeswoman Beth Hayden said. "But we may just look at all of them."

But even as it analyzes risks at nuclear plants, the NRC acknowledges it has challenges in identifying the risks that reactors face from seismic activity, which cannot always be pinpointed to a fault line or seismic region. It's particularly difficult in the eastern and central United States, the NRC and geologists say, because quakes are less frequent there than on the West Coast.

"One of the questions which has come up repeatedly is which of the plants are near faults or how many plants are in moderate or high seismicity regions," Annie Kammerer, senior seismologist and earthquake engineer in the NRC's Office of Nuclear Regulatory Research, told the commission at a meeting Monday.

"That's a very challenging question to answer because these seismic zones are not well-defined boundaries."

The review was proceeding before safety concerns were piqued in the wake of the March 11 earthquake and tsunami that crippled a nuclear plant in northeast Japan. Burnell said the review is "in no shape or form a response" to events in Japan.

27 reactors

The NRC will first review the following plants: Farley 1 and 2 in Alabama; Crystal River 3 and St. Lucie 1 and 2 in Florida; Dresden 2 and 3 in Illinois; Duane Arnold in Iowa; Wolf Creek in Kansas; River Bend in Louisiana; Seabrook in New Hampshire; Indian Point 2 and 3 in New York; Perry 1 in Ohio; Limerick 1 and 2 and Peach Bottom 2 and 3 in Pennsylvania; Oconee 1, 2 and 3 and Summer in South Carolina; Sequoyah 1 and 2 and Watts Bar 1 in Tennessee; and North Anna 1 and 2 in Virginia.

The NRC has been reviewing the strength of plants since 2005, and in 2008 the commission began applying new seismic information from EPRI into the design of new nuclear power plants, as well as USGS findings for existing eastern and central reactor sites. Western reactors, the NRC said in 2008, had already taken into account the greater seismic activity within that region.

The USGS in its 2008 report, which updated a 2002 report, presented updated information on how ground shaking is likely to be as a result of earthquakes. Because temblors of different magnitudes generate different amounts of force, the USGS presents the potential movement as g force, or acceleration relative to free fall.

The USGS report estimates the likelihood that a particular amount of force will happen over a certain time period. In a region, for example, it might warn that there is a 10 percent chance of getting a force equal to 20 percent of g or larger over the next 50 years, said Arthur Frankel, a USGS research seismologist.

The 2008 report included new information on faults and earthquakes developed since the USGS's 2002 analysis. Because there are not many quakes in the eastern and central United States, USGS also used models, Frankel said. There were new models created between 2002 and 2008, he said.

Calculating risks

Ninety percent of all the earthquakes occur at the boundaries of the Earth's tectonic plates, said Christopher Scholtz, a professor of geophysics at Columbia University. One of the best-known of those areas is between the West Coast of the United States and the east coast of Asia.

"Most of the earthquakes occur in the places where we expect them to occur," which are the areas with active faults, said Larry Ruff, a professor in University of Michigan's geological sciences department.

But three major earthquakes in the range of magnitude 7 in the early 1800s struck near the town of New Madrid, Mo. The epicenter of that quake has never been located, the NRC said.

A fault line responsible for a magnitude 7.3 quake in Charleston, S.C., in 1886 also has never been located, several geology experts said.

There also is the risk posed by undiscovered faults in earthquake-prone areas. In California, the 1994 Northridge and 1987 Whittier Narrows quakes both happened on fault lines that were mostly undiscovered. They occurred on "blind thrust" faults, which are buried beneath the top layers of rock in the Earth's crust, so there is no evidence on the surface that they exist.

Because there are fewer quakes in the eastern and central United States than on the West Coast, there is less opportunity to gather information about faults, experts said. Quakes help scientists study the potential for new temblors.

"There's probably places where there's faults lurking ... where there are large faults we don't know about yet," said Frankel of USGS.

Experts disagreed about the chances for a major quake on an unknown fault in the country's central-eastern region.

A major quake would need to happen on a large fault line, and those would be visible, Ruff said.

The magnitude 9.5 earthquake in Chile in 1960 happened on a fault equal in size to the area of California, Ruff said.

"That's not something you hide in the San Fernando Valley," Ruff said, referring to a region of Southern California known for earthquakes.

"It's easy to hide, and therefore have an unknown fault, something that's small," Ruff said. "It's hard to hide a fault that's as large as you need to have a magnitude 9."

Scholtz disagreed. The New Madrid quake of 1811, he said, happened on a fault line unknown at that time. And even though today's technology is far more advanced, "we wouldn't have any special reason to make a study of them to know there was a fault there unless there was an earthquake," Scholtz said. "It's an unlikely place to look."

USGS in its seismic hazards report tries to account for the uncertainty posed by unknown faults, Frankel said. It also studies potential evidence of past earthquakes like sand deposits in the ground. Those indicate there were New Madrid quakes in A.D. 1450 and 900, he said.

Japan Spawns A Fresh Look At Disaster Planning On US-Mexico Border (GWIRE)

By John McArdle

Greenwire, March 25, 2011

White House Council on Environmental Quality Chairwoman Nancy Sutley discussed the future of nuclear energy at a meeting this morning of a federal advisory committee that studies environmental issues along the US-Mexico border.

"Clearly the events in Japan remind us ... that safety is the most important thing we have to keep in mind when dealing with nuclear energy," Sutley told the members of the Good Neighbor Environmental Board. But, she also emphasized that President Obama continues to believe that nuclear energy "is an important part of our energy mix right now."

The subject was of particular interest not just because of the ongoing crisis in Japan. The Southwest border region is home to a handful of nuclear power plants, and disaster planning along the US-Mexico border has been a subject of concern for the board for several years.

In its most recent report to the White House and Congress, the board noted that coordination and communication impediments as well as US efforts to halt illegal immigration could slow the response of government agencies to hazardous material emergencies and natural disasters.

"Unlike non-border communities, border communities must attempt to coordinate emergency response with their neighbors across the border, often through informal channels," states the report, which was issued last summer. And "maintaining a tightly

controlled border for enhanced security may hinder the ability to cross the border quickly to provide assistance in the event of a chemical emergency or natural disaster."

In a brief interview after her remarks, Sutley, who has previously served as a member of the Good Neighbor Environmental Board, said that CEQ is working with a variety of agencies to address the many recommendations the group made in last year's 13th annual report.

When it comes to emergency planning, those recommendations include an effort to train Mexican first responders and provide needed emergency response equipment as well as developing effective procedures to speed the entry and exit of emergency responders during incidents along the border.

As for the nuclear plants along the border in Arizona and California, Sutley said those facilities will be included in the comprehensive review that the federal government is undertaking for all US nuclear facilities.

"The president last week asked the Nuclear Regulatory Commission to go back and look at all the operating nuclear power plants including those two plants, which I know are close to the border," Sutley said. "I think the administration is working hard to ensure that we have a secure border but that we recognize both the environmental and public health challenges of these shared communities."

Sutley emphasized that the administration continues to believe that there are opportunities to develop safe nuclear energy in the United States but said that the Southwest border region is also a hotbed for opportunities to develop power from renewable sources.

She noted that the Department of Energy is currently in the process of mapping out potential wind resources in the region and the board has made the economic and environmental impacts of renewable energy the topic of the annual report that will be delivered to the president and Congress this year.

"The Southwest border does present tremendous opportunity in solar and wind and geothermal," Sutley said. "These resources are important for our energy security and our energy future and as part of clean energy package."

Japan Disaster Raises Questions About Backup Power At US Nuclear Plants (NYT)

By Mike Soraghan

New York Times/Greenwire, March 25, 2011

The batteries that back up power at most US nuclear plants are required to last about as long as the average cellphone battery – four hours.

The Nuclear Regulatory Commission says that's enough. The agency's critics say it's not. And those critics are pointing to the Fukushima Daiichi plant in Japan, which is teetering on the brink of meltdown because it lost power.

"Most of our plants have far less than what the Japanese had," said David Lochbaum, a nuclear engineer with the Union of Concerned Scientists who has long criticized US nuclear protections as inadequate. "So, we're more vulnerable to a situation where we lose primary power and the backup."

US regulators also allow plants to operate without backup power for the controls monitoring spent nuclear fuel. These ponds often do not have containment, and in the United States they contain more of the highly radioactive material than in Japan.

NRC says it has adequate safeguards in place for battery backup and spent-fuel pools.

"All US plants have in place additional resources and procedures to deal with situations where significant portions of the plant have been rendered inoperable," NRC spokesman Scott Burnell said. "The NRC has inspected those arrangements and the agency finds them capable of continuing to protect the public after severe events."

And industry officials say US plants have layers of safety backups not reflected by rules about power blackouts. There are multiple sources of power from offsite facilities, extra generators and equipment that can be shared with other plants in crisis. In addition, plants have prepared for specific catastrophes that go beyond their overall safety requirements, such as a plane crash.

"There's layer upon layer of protection," said Alex Marion, vice president of nuclear operations for the Nuclear Energy Institute, the nuclear industry's policy arm.

Of the country's 104 reactors, 11 are required to have eight hours of battery backup. But Marion said most plants have eight hours of backup even though they might be required to have only four.

As an island nation on the Pacific Ocean's "Ring of Fire," a zone of active volcanoes, Japan appears particularly vulnerable to the earthquake-tsunami combination that killed thousands and crippled the Fukushima Daiichi plant. The earthquake cut off-site power to the plant, and the tsunami flooded its generators. That constitutes what nuclear experts call "station blackout." Eight hours of backup power proved woefully inadequate.

But there are different threats that could cause similar problems with reactors in the United States, according to groups that act as watchdogs to the nuclear industry and NRC's regulatory approach.

"Many of our reactors are in situations where earthquakes or hurricanes in the Gulf or ice storms in the Northeast or a tree in Cleveland can cause an extensive blackout that puts us in a very similar situation," Lochbaum said.

"So, I think battery capacity and ... what we do when the batteries go dim may be an area that we need to shore up, so that our plants aren't as vulnerable as Japan was."

For example, a 1998 tornado knocked out power to the Davis-Besse plant near Toledo, Ohio, for more than a day. An NRC analysis (pdf) of the event said that the outage brought the plant perilously close to meltdown.

Battery backup requirements, NRC's Burnell said, are evaluated on a site- and design-specific basis. Plants must convince NRC that their individual approaches meet federal requirements.

"The NRC continues to conclude that existing battery backups at every plant are sufficient and acceptable for that plant's situation," Burnell said.

Concerns about spent-fuel pools

Since NRC began monitoring nuclear plants' emergency backup capacity, the number, duration and severity of power outages has steadily decreased.

Still, regulators were alarmed by a blackout that hit the northeastern United States in 2003, cutting power to nine reactors and prompting a wide-ranging review (pdf) by NRC.

And in 1992, Hurricane Andrew caused the Turkey Point Nuclear Reactor near Miami to lose access to the grid for more than six days.

Station blackout at a nuclear facility can account for as much as 88 percent of the chance of reactor core damage in a year, according to NRC records. The average, though, for US plants is about 23 percent.

A 2005 NRC report (pdf) shows there were 24 "loss of offsite power" events between 1997 and 2004, including the nine in the Northeast blackout.

Some nuclear critics say the situation is even more dangerous with spent fuel — uranium-bearing rods that no longer produce enough energy to sustain a nuclear reaction in the reactor.

In the United States, most spent fuel remains on site at nuclear plants because the country has not developed a facility to store it.

The United States has 71,862 tons of the waste, according to a recent analysis by the Associated Press (Greenwire, March 23).

Three-quarters of that waste is stored in water-filled cooling pools like those at the Japanese plant, stored outside the thick concrete containment barriers that block the release of radioactive material in an accident. The rest is encased in "dry casks" constructed of steel and thick concrete.

"The spent-fuel pools are currently holding, on the average, four times more than their designs intended," said Robert Alvarez of the left-leaning Institute for Policy Studies.

By contrast, Japan reprocesses spent nuclear fuel, turning much of it into new fuel.

Spent-fuel pools, NRC's Burnell said, must be built to withstand the strongest earthquake at their site and are therefore as robust as any structures at a reactor.

"These factors preclude the need for specific containment structures for the pools," he said.

The Union of Concerned Scientists' Lochbaum says the federal government should require spent fuel rods to be stored in dry casks. He said it could take a terrorist attack or other catastrophe to expose the danger of keeping so much spent fuel at the plants to get policymakers to act.

"Why don't we do it now," he said, "and skip the step where a bunch of Americans get killed?"

Glitches Hamper Radiation Warning System In California (LAT)

Half of the 12 EPA detectors in California have problems that could delay alerts.

By Jack Dolan And Rong-gong Lin li,

Los Angeles Times, March 25, 2011

The federal government's radiation alert network in California is not fully functional, leaving the stretch of coast between Los Angeles and San Francisco without the crucial real-time warning system in the event of a nuclear emergency.

Six of the Environmental Protection Agency's 12 California sensors — including the three closest to the Diablo Canyon nuclear power plant near San Luis Obispo — are sending data with "anomalies" to the agency's laboratory in Montgomery, Ala., said Mike Bandrowski, manager of the EPA's radiation program.

The problem delays from 30 minutes to several hours the updating of a database that would be critical for warning the public in case of a sudden radiation danger from air wafting to the United States from a foreign country, for example, or from a radiation leak at a domestic nuclear facility.

The lag has not been a concern during the Japanese nuclear crisis because the minuscule amounts of radiation that have reached California have posed no threat to human health, and the plume of irradiated air from Japan is so widespread that other equipment from Washington to Los Angeles has been able to monitor it in real time, Bandrowski said.

The agency's critics, however, say the weakness in the EPA system could pose a public health concern.

"The unreliability of the EPA monitoring effort revealed by this event raises troubling questions about whether Californians would receive timely warning to evacuate, or take other protective actions, in case of a nuclear accident here," said Dan Hirsch, a nuclear policy lecturer at UC Santa Cruz and president of the Committee to Bridge the Gap, an anti-nuclear group.

The troubled transmissions are part of the federal RadNet system, which is "designed to protect the public by notifying scientists, in near real time, of elevated levels of radiation so they can determine whether protective action is required," according to a recent press release from the agency.

Without immediate information from RadNet, state and local emergency managers would be dependent on the private owners of nuclear power facilities to alert them in the first hours of a dangerous radiation leak from a domestic source.

"I believe the utilities monitor the sensors; they're good about reporting things," said David McIntyre, a spokesman for the Nuclear Regulatory Commission, which oversees nuclear reactors in the US. He added that federal regulations require nuclear plant operators to report small problems that could lead to a release of radiation, so it's unlikely such an event would come as a surprise.

Paul Flake, a spokesman for Pacific Gas & Electric's Diablo Canyon plant, said late Thursday that he did not have details at hand about the company's monitoring system and warning protocols.

Tokyo Electric Power Co., which runs the stricken Fukushima nuclear power plant in Japan, was widely criticized for failing to provide timely, accurate data about the pending danger to the Japanese government, which was reliant on the company for such information.

"There's a natural reluctance to reporting something embarrassing," said Arjun Makhijani, president of the Institute for Energy and Environmental Research.

The California Department of Public Health maintains two of its own sensors at each of the state's nuclear power plants — at Diablo Canyon and at San Onofre near San Clemente — but data from those devices are collected every 48 hours, said Jordan Scott, a spokesman with the California Emergency Management Agency. Before the accident in Japan, data was collected once a week, Scott said.

There are other detectors spread across the United States, including some at universities and some deployed by the Department of Homeland Security in large cities when a terrorist threat is received. But none of those transmits data in real time to a dedicated early-warning system, officials said.

The Comprehensive Nuclear-Test-Ban Treaty Organization, based in Vienna, has four real-time radiation monitors in the continental US. The one in Sacramento, operated by the US Department of Energy, was the first to detect traces of radiation from Japan in California.

But that system is designed to detect evidence of nuclear bomb tests, not to notify the US public to evacuate or take other precautions if elevated levels of radiation are detected.

At the outset of the Japanese crisis, environmentalists noticed that a map on the Environmental Protection Agency's website showing the locations of the monitors nationwide indicated that only about half were "running." Most of the others were producing data that was "undergoing quality review."

The website has since been updated to say that data from the problematic monitors "is being reviewed at EPA's National Air and Radiation Environmental Laboratory" and that the sensors are still collecting data.

Bandrowski said the data from those sensors, transmitted via satellite to the Alabama lab every hour, arrive with problems that mean it can't be added to the database automatically. Instead, a staff member has to manually review the information, a process that can take up to several hours.

"That's the nature of satellite transmissions," Bandrowski said. "There's always going to be glitches."

Feds Charge Worker At TVA Nuclear Site In Tenn. (AP)

By Bill Poovey, Associated Press

Associated Press, March 25, 2011

KNOXVILLE, Tenn. — A subcontractor employee at the Tennessee Valley Authority's Watts Bar Nuclear Plant has been charged with lying about power system inspections at the only site in the nation where a reactor is being built, prosecutors said Thursday.

Matthew David Correll, 31, of Hixson was charged in a two-count indictment with making false statements. Prosecutors said Correll lied about measuring cables that would supply power to a safety system at the reactor site.

The indictment shows the charges, which officials said would not delay the reactor's construction, stem from paperwork filed in August 2010.

Correll, an electrician, appeared Thursday before a federal magistrate in Chattanooga and was released pending a May 23 trial. His attorney, Myrlene Marsa, declined comment.

A conviction carries a maximum possible penalty of five years in prison and a \$250,000 fine on each count.

US Attorney Bill Killian at a news conference in Knoxville declined to discuss a motive and said details would be presented in court when the case goes to trial. He would not say if the investigation was continuing or if there might be other arrests. He and TVA officials said the case poses no harm to the public.

Killian did not mention the nuclear emergency in Japan — where a massive earthquake and resulting tsunami severely damaged a nuclear reactor — other than to say the allegations took place long before the earthquake. TVA has said since the earthquake that its six reactors, including the Watts Bar Unit 1 reactor that came online in 1996, are safe.

TVA nuclear executive Ashok Bhatnagar said at the news conference that the falsified paperwork was found during normal reviews of the employee's work at the plant, where a Unit 2 reactor is about 70 percent completed near Spring City, between Knoxville and Chattanooga.

He declined to speculate about what might have happened if the phony paperwork had not been discovered.

Correll works for Williams Specialty Services, a subcontractor on the \$2.5 billion, 1,200-megawatt reactor project expected to be finished by October 2012. The company's location and contact information could not be found, and TVA could not immediately provide it.

The charges single out one worker, and the company as a whole is doing good work, Bhatnagar said. He said TVA would continue working with the subcontractor.

TVA spokesman Mike Bradley said Correll's employer has about 80 workers at the Watts Bar project. He said the criminal case would not interrupt construction.

"It's not anticipated to slow the pace at all," he said.

The arrest comes two months after an unrelated Nuclear Regulatory Commission letter cited TVA "errors and omissions" in a Watts Bar project fire protection report and excessive delays in providing information. The letter called on TVA to promptly supply information for its review of an application for a reactor operating license.

Soon after the letter was received, site vice president Masoud Bajestani abruptly left his job overseeing the construction project. TVA wouldn't provide details about his departure, calling it a personnel matter, but the utility has contended it wasn't related to the NRC letter.

TVA said in February that it was addressing the NRC concerns and still expected to have the reactor done on time.

TVA, the nation's largest public utility, supplies power to customers in Tennessee, Alabama, Mississippi, Kentucky, Georgia, North Carolina and Virginia.

TVA Officials: Federal Charges Coming Over Watts Bar Nuclear Site Where Reactor Is Being Built (AP)

Associated Press, March 25, 2011

KNOXVILLE, Tenn. — Federal prosecutors are filing charges related to the only US nuclear site where a reactor is under construction.

Tennessee Valley Authority spokesman Scott Brooks says the charges relate to the Watts Bar facility in Spring City, north of Chattanooga. He said he didn't know the specifics.

A US Attorney's office statement said prosecutors won't discuss the case until a news conference later Thursday in Knoxville. The TVA inspector general is expected to attend.

TVA has one reactor at Watts Bar and is building another.

A Nuclear Regulatory Commission letter in January cited TVA "errors and omissions" in a project fire protection report and excessive delays in providing information. The letter called on TVA to promptly supply information for its review of an application for a reactor operating license.

US Man Charged In False Nuclear Inspection (AFP)

AFP, March 25, 2011

CHICAGO (AFP) — A Tennessee man pleaded not guilty Thursday to falsifying safety inspection reports during the construction of a nuclear power plant, officials said.

The charges come a day after the Nuclear Regulatory Commission launched a two-pronged review of US nuclear power plant safety amid the crisis at a Japanese complex hit by an earthquake and tsunami.

Matthew David Correll, 31, was working as an electrician for a subcontractor at a new nuclear power plant at the Watts Bar Nuclear facility in eastern Tennessee when he allegedly falsified the inspection reports.

He is accused of failing to measure and inspect cables intended to supply energy to safety systems and then falsifying two reports to cover up his failure.

"Cutting corners on the construction of our nuclear power plants is a serious matter," US attorney Bill Killian said in a statement. "Our prosecution will be vigorous and thorough."

Correll faces up to five years in prison and a \$250,000 fine if convicted. He was released on bail pending his trial set for May 23.

Feds Charge Worker At TVA Nuclear Site In Tennessee (AP)

Associated Press, March 25, 2011

A subcontractor employee at the Tennessee Valley Authority's Watts Bar Nuclear Plant has been charged with lying about power system inspections at the only site in the nation where a reactor is being built, prosecutors said Thursday.

Matthew David Correll, 31, of Hixson was charged in a two-count indictment with making false statements. Prosecutors said Correll lied about measuring cables that would supply power to a safety system at the reactor site.

The indictment shows the charges, which officials said would not delay the reactor's construction, stem from paperwork filed in August 2010.

Correll, an electrician, appeared Thursday before a federal magistrate in Chattanooga and was released pending a May 23 trial. His attorney, Myrlene Marsa, declined comment.

A conviction carries a maximum possible penalty of five years in prison and a \$250,000 fine on each count.

US Attorney Bill Killian at a news conference in Knoxville declined to discuss a motive and said details would be presented in court when the case goes to trial. He would not say if the investigation was continuing or if there might be other arrests. He and TVA officials said the case poses no harm to the public.

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TVA said in February that it was addressing the NRC concerns and still expected to have the reactor done on time.

TVA, the nation's largest public utility, supplies power to customers in Tennessee, Alabama, Mississippi, Kentucky, Georgia, North Carolina and Virginia.

Feds: Worker At Nuke Reactor Lied On Inspections (AP)

Associated Press, March 25, 2011

A sub-contractor employee has been charged with lying about inspections at the Tennessee Valley Authority's Watts Bar Nuclear Plant, federal prosecutors said Thursday. The site is the only one in the US where a nuclear reactor is under construction.

The US attorney in Knoxville said Matthew David Correll, 31, of Hixson has been charged in a two-count indictment with making false statements. A news release said Correll lied about measuring cables that were intended to supply energy to safety systems that were to be built at the plant.

Correll appeared Thursday before a federal magistrate in Chattanooga and has been released pending a May 23 trial.

US Attorney Bill Killian declined to discuss any motive.

Review of 104 US nuclear power sites approved

TVA nuclear executive Ashok Bhatnagar said the falsified paperwork was found in the checks and balances procedures at the plant near Spring City, between Knoxville and Chattanooga. Bhatnagar said that the system worked as it should and that there is no danger at the site.

TVA spokesman Scott Brooks said the case is not directly related to the abrupt departure of the former construction site manager at Watts Bar.

A Nuclear Regulatory Commission letter in January had cited TVA "errors and omissions" in a project fire protection report and excessive delays in providing information. The letter called on TVA to promptly supply information for its review of an application for a reactor operating license.

Soon after the letter was received, site vice president Masoud Bajestani abruptly left his job overseeing the construction project. TVA wouldn't provide details about his departure, calling it a personnel matter, but the utility has contended it wasn't related to the NRC letter.

TVA said in February that it was addressing the NRC concerns and still expected to have the reactor completed on time in 2012.

TVA is spending \$2.5 billion over five years to build the 1,200-megawatt reactor, which is expected to supply electricity to 650,000 homes. The Watts Bar Unit 1 reactor started operating in 1996.

TVA, the nation's largest public utility, supplies power to customers in Tennessee, Alabama, Mississippi, Kentucky, Georgia, North Carolina and Virginia.

Nuclear Plant Employee Charged With Lying On Inspection Reports (CBS)

By Ellis

CBS, March 25, 2011

A worker at a Tennessee nuclear power plant was indicted this week for lying on inspection reports, according to Eastern Tennessee US Attorney's office.

Court papers filed March 22 allege that Matthew David Correll, 31, willingly lied on documents last August in which he stated he had measured safety system cables intended for a new nuclear power plant to be constructed at the Watts Bar Nuclear Facility in Spring City even though he did not perform this inspection.

"The falsification of records is a serious matter, particularly when the records in question involve safety cables at a nuclear power plant," David Lochbaum, Director of the Nuclear Safety Project for the Union of Concerned Scientists told CBS News.

The cables Correll is charged with lying about inspecting were intended to provide electric power to operate safety systems and other equipment in a nuclear power plant being constructed by the Bechtel Power Corporation.

In court today in Chattanooga, Tenn., Correll pleaded not guilty to the charges levied against him. A woman who answered the phone at his residence declined to discuss the charges when contacted this afternoon by CBS News.

Correll's indictment is the result of an investigation initiated by the Tennessee Valley Authority Office of the Inspector General and the US Attorney's Office.

Scott Brooks, a spokesman for the Tennessee Valley Authority, told CBS News, "I couldn't speculate on what his motivation was. We're just glad the system worked the way it was supposed to and it was uncovered."

Correll had been employed by Williams Specialty Services, a subcontractor for the Bechtel Power Corporation, at the time he allegedly falsified inspection reports but his employment with the company ended in September.

"Williams learned of the indictment today and was unaware that federal prosecutors were pursuing this action," Anne Bryant, a spokesperson for Williams Specialty Services told CBS News.

Feds Indict Man On Charges Of Making False Statements About TVA's Watts Bar Nuclear Reactor (TENN)

By Paine

Tennessean, March 25, 2011

A Chattanooga man has been indicted for making false statements about nuclear power plant electrical safety systems at TVA's Watts Bar nuclear reactor that is under construction.

Matthew David Correll, 31, of Hixson, Tenn., has been indicted by a federal grand jury and appeared in court today, entering a not guilty plea to the charges.

Correll was released pending trial May 23, 2011 in US District Court in Chattanooga, according to the United States Attorney's Office there.

He was working for Williams Specialty Services, which is a subcontractor for Bechtel on the project.

The indictment alleges that about August 16 of last year, Correll filled out paperwork saying falsely that he had measured cables that would supply energy to safety systems at the facility.

According to the charges, Correll did not take the measurements, nor make the inspections, and falsely completed the TVA-required forms. The indictment also alleges that he did not perform these measurements.

If convicted, he faces a term of maximum term of five years in prison, a \$250,000 fine and up to three years of supervised release on each count.

"We always take the falsification of federal records very seriously, especially given the nature of these records at these facilities," US Attorney Bill Killian said in an emailed announcement.

"Cutting corners on the construction of our nuclear power plants is a serious matter. Our prosecution will be vigorous and thorough."

The charges come as the nuclear industry struggles to convince the country that nuclear power is safe despite the disaster taking place in Japan where an earthquake and tsunami have resulted in explosions, radioactive releases and concerns about possible meltdowns.

Ashok S. Bhatnagar, Senior Vice President, TVA Nuclear Generation Development & Construction, said that TVA discovered the problem during routine inspections of the man's work. He said the actions show the public power producer's focus on making nuclear plants safe.

The investigation had been conducted by TVA's Office of Inspector General.

(Page 2 of 2)

"This action today is an example of TVA's systems and procedural safeguards working as designed," Bhatnagar said.

"Concerns were discovered and investigated by TVA and, in accordance with procedures, investigated by the Inspector General's Office and other authorities. The system worked."

TVA has been criticized on some of its work related to the construction project.

The Nuclear Regulatory Commission had sent a letter to TVA in January chastising the power producer for "errors and omissions" in the documents it provided on fire safety at its Watts Bar reactor construction project.

The \$2.5 billion project that involves building a second reactor at its Watts Bar plant along the Tennessee River about 60 miles southwest of Knoxville has been scheduled to open in 2012.

Issues with "the timeliness and quality of submittals continue to arise, and these issues are impacting the schedule for completing the licensing review," wrote Eric Leeds, director of the NRC's nuclear reactor regulation office.

"TVA's difficulty in providing the necessary and sufficient supporting information," was among their concerns related to fire safety.

In some cases only partial or no responses were provided by TVA on key matters, including spent fuel pool cooling.

These pools, where the highly radioactive rods of fuel pellets are placed after they are no longer of use in the reactor, have been central to problems at the Japanese reactors after the earthquake and tsunami.

The Japanese have struggled to keep enough water in at least one of the exposed pools there so that a major release of cesium 137 and radioactive iodine does not occur.

Leeds said that the staff felt the delays were "excessive and have disrupted the review process."

TVA officials said at the time that they would take care of any NRC concerns and that the reactor would remain on schedule.

The NRC letter had been sent the day before the head of the building project, Masoud Bajestani, had suddenly left the job. TVA officials have maintained that his departure was unrelated to the NRC's concerns.

According to court documents, Bajestani had told lies on personal financial matters last year in a divorce proceeding and also in dealings several years earlier with a contract employee who he fired after the man reported safety problems.

Bajestani admitted he withdrew \$1.5 million from his deferred compensation account with TVA in 2007 claiming a hardship he didn't have. He and his then wife had wanted the money to invest in property in their native Iran, where much of the money was sent.

Bajestani had fired Robert Klock, a lead startup engineer on the first Watts Bar reactor project, on July 5, 1994, after Klock had reported safety problems with the reactor.

TVA Subcontractor Facing Charges Of "Falsifying Information" (WBIR)

By Brittany Bailey

WBIR-TV, March 25, 2011

The US Attorney's Office has charged a 31-year-old Hixson man with lying about work he performed for the Tennessee Valley Authority's Watts Bar Nuclear Plant, where Unit 1 is under construction.

Federal officials announced the charges Thursday following an indictment released Tuesday.

Matthew David Correll faces two counts of falsifying information. He pleaded not guilty in a Hamilton County federal courtroom on Thursday morning. He faces a maximum of five years for each charge if convicted and \$500,000 in fines.

Officials say Correll lied about measurements he took of power cables that would have been used in the nuclear power-making process.

"Mr. Correll did not take the measurements, nor make the inspections and falsely completed the forms required by TVA, providing them with the false measurements for the cables," Bill Killian of the US Attorney's Office said. "In the event of a nuclear containment problem, these electrical cables help power the safety and containment area."

TVA officials say they hired Bechtel to perform work on the Watts Bar Unit 2 construction project. Bechtel then hired the company Williams Specialty Services as a subcontractor to perform electrical work. Correll was an employee of Williams Specialty Services.

Correll's alleged crimes were caught by TVA's internal checking process, according to leaders there. They also pointed out that, those incorrect measurements could have caused massive issues at the nuclear plant, but stressed that the internal checking process worked, which is exactly why it is in place.

"We have multiple checks and balances that we've put into our system and through one of these checks after the work was completed, we discovered the discrepancy," Ashok Bhatnagar, TVA's Senior Vice President of Nuclear Generation, Development, and Construction said.

Bhatnagar declined to say what impact having the wrong size cables could have in a nuclear emergency situation at the plant.

Those are hypothetical questions we don't need to get into," he said.

The Southern Alliance for Clean Energy, a group calling for no additional nuclear power facilities applauds the Tennessee Valley Authority for catching the alleged problem.

However, SACE does have some concerns that potential problem employees could have access and work so closely with equipment used in emergency safety situations.

The group says nuclear power plants are not inherently unsafe but they are inherently unforgiving.

"The fundamental question here is, you have to get everything right with a nuclear power plant because there is no room for error. The fact that you have somebody on the worksite, working with critical safety systems, falsifying records— that has got to raise a lot of red flags," Stephen Smith, the Southern Alliance for Clean Energy's Executive Director said.

TVA then contacted the US Attorney's Office and Nuclear Regulatory Commission.

The US Attorney's Office has not said whether anyone else was involved or if there could be any additional charges.

Tied To TVA's Watts Bar Nuclear Site (WATE)

By Kim

WATE-TV Knoxville, TN, March 25, 2011

A worker at the Tennessee Valley Authority's Watts Bar plant in Spring City has been charged with lying about measurements taken at the nuclear facility.

Federal prosecutors say Matthew David Correll, 31, of Hixson, is charged with making false statements. He appeared before a judge Thursday and pleaded not guilty.

TVA is not charged in the case. Correll worked for Williams Specialty Services as an electrician.

Williams is a sub-contractor company working with Bechtel Corp., the lead contractor of the Watts Bar construction project.

The indictments say Correll provided false information about electrical cables at the Watts Bar plant, the only US site where a nuclear reactor is under construction.

Prosecutors said an investigation that led to the indictment began in August 2010 after TVA inspectors found problems with the wiring.

The indictment says Correll filled out paperwork saying he had measured cable that was intended to supply energy to safety systems at the new facility, but in fact had not done the work.

The incident happened in the early stages of the construction project before any installation had begun.

Prosecutors would not say what motive Correll had for giving false information.
If Correll is convicted he could face a sentence of up to five years in prison.
TVA has one reactor at the site north of Chattanooga and is building another.
Prosecutors said Homeland Security officials were not involved in the investigation.

TVA Sub-contractor Arrested For Falsifying Documents (WRCB)

WRCB-TV Chattanooga, TN, March 25, 2011

A sub-contractor with the Watts Bar nuclear site was arrested by federal authorities for falsifying documents at the construction site.

The indictment says last August, 31-year-old Matthew Correll of Hixson completed paperwork saying he measured cables that were intending to supply energy to safety systems, but an investigation revealed he didn't take the measurements, nor make the proper inspections.

Jack Bailey, a Vice President of Nuclear Development with TVA says he was aware of the situation with Correll Thursday Morning and assured members of the Chattanooga Rotary Club no corners were cut during the plant's construction.

Bailey said U-S safety standards are much higher than Japan's and a catastrophic meltdown isn't likely.

Bailey said, "The real question is what happened over and why did it happen and do we have the same vulnerabilities in our plants or not."

The answer depends on how severe a "bad" situation is.

Most nuclear plants are engineered to withstand the worst conditions, and after Japan's tragedy, nuclear power companies in Japan are relaying information to the us on how to avoid such tragedies.

Bailey said, "If there is anything we missed with all the work we have done then we can."

Right now it's too early to call, but Bailey said all the TVA can do is prepare now for any type of danger should disaster strike.

"Right now our only indications are that if you have a design for your plant, you always have to think what if something is different than that or beyond," Bailey said.

If convicted Correll can face up to five years in prison and a \$250,000 dollar fine.

He is due in court in May 23rd.

Feds Charge TVA Contractor At Nuclear Reactor Site (WVL)

WVLT-TV Knoxville, TN, March 25, 2011

The US Attorney for the Eastern District of Tennessee, Bill Killian, personally announcing at a press conference Monday criminal charges against Matthew Correll over construction of TVA's newest nuclear reactor at Watts Bar.

"The indictment charges Mr. Correll with knowingly and willfully making false statements," said Killian. In documents submitted to the TVA. Prosecutors say Correll lied about measuring cables used to power safety systems and performing inspections at the reactor. "And falsely completed the forms required by TVA, providing them with false measurements for the cables," Killian said.

Prosecutors say the falsification is very serious because in the event of a problem at the reactor, the cables would power containment equipment. "My office will prosecute anyone who violates federal law by cutting corners in the construction, maintenance, or operation of nuclear facilities."

As for TVA, the massive power company says multiple layers of checks and balances exposed the shoddy work. But also says failure to detect this problem could've posed a significant danger.

"It could've been, but that's all hypothetical. We actually have processes in place that are designed to do exactly this," said Ashok Bhatnagar, TVA vice president of nuclear construction.

This isn't the first problem at Watts Bar. The Nuclear Regulatory Commission in January raised concerns over errors in documents TVA submitted on fire safety at the site. Still, Killian says the public should rest easy.

"TVA has assured me that these deficiencies have been discovered and remedied, and that there's no harm to the general public."

Latest Comments

Posted by: mary b. Location: sevier co. on Mar 24, 2011 at 12:35 PM

Oh boy, here comes more raising of our rates- what with the public paying for the ash spill instead of TVA taking responsibility and sucking up the cost, the public is going to be gouged again for yet another TVA *oversight*.

TVA Faces Federal Charges Tied To Watts Bar (WTVG-TV)

By Sarah Jennings

WTVC-TV Chattanooga, TN, March 25, 2011

A sub-contractor employee has been charged with lying about inspections at the Tennessee Valley Authority's Watts Bar Nuclear Plant, federal prosecutors said Thursday. The site is the only one in the US where a nuclear reactor is under construction.

The US attorney in Knoxville said Matthew David Correll, 31, of Hixson has been charged in a two-count indictment with making false statements.

Prosecutors say on or about August 16, 2010, Correll completed paperwork and lied about measuring cables that were intending to supply energy to safety systems at the Watts Bar Nuclear plant. Prosecutors say "Correll did not take the measurements, nor make the inspections, and falsely completed the forms required by TVA."

If convicted, Correll faces five years in prison and a \$250,000 fine on each count.

US Attorney Bill Killian said, "We always take the falsification of federal records very seriously, especially given the nature of these records at these facilities. Cutting corners on the construction of our nuclear power plants is a serious matter. Our prosecution will be vigorous and thorough."

Killian however declined to discuss any motive.

This indictment is the result of an investigation by Tennessee Valley Authority Office of the Inspector General.

FULL TVA STATEMENT:

TVA is grateful to those who identified these concerns and those who investigated them. This action today is an example of TVA's systems and procedural safeguards working as designed. Concerns were discovered and investigated by TVA and, in accordance with procedures, investigated by the Inspector General's Office and other authorities. The system worked.

TVA Nuclear construction and operations have a strict focus on compliance with the highest standards, and we do not tolerate any untrustworthy conduct. We have rigorous procedures in place to check and double-check all critical work and testing of critical systems to assure compliance with all laws and regulations. Those procedures help find infractions and mistakes and correct them in a timely and appropriate manner.

In addition, TVA has been reviewing work performed by the individual alleged to be involved to assure similar issues do not exist. The lessons learned will be used to enhance and modify existing processes and procedures.

Electrician At Nuclear Power Site In Tenn. Charged With Making False Claims : The Two-Way : NPR (NPR)

NPR, March 25, 2011

A subcontractor at the site of a nuclear power plant now under construction in Tennessee falsely claimed to have "measured cables that were intending to supply energy to safety systems," The US Attorney for the Eastern District of Tennessee alleged today.

Matthew David Correll, 31, of Hixson, Tenn., was indicted Tuesday on two charges. He has pleaded not guilty.

According to a statement issued by the US Attorney's office:

"The indictment alleges that on or about August 16, 2010, Correll completed paperwork falsely indicating that he had measured cables that were intending to supply energy to safety systems to be constructed in a new nuclear power plant at the Watts Bar Nuclear facility. As alleged in the indictment, Mr. Correll did not take the measurements, nor make the inspections, and falsely completed the forms required by TVA. The indictment also alleges that he did not perform these measurements. Each count concerns a document with false information."

As the Knoxville News Sentinel reports, the Tennessee Valley Authority "is spending \$2.5 billion over five years to build the 1,200-megawatt reactor, which is expected to supply electricity to 650,000 homes. The Watts Bar Unit 1 reactor started operating in 1996."

Tennessee Man Charged With Falsifying Nuclear Reports (REU)

By Tim Ghianni

Reuters, March 25, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

Chattanooga-area Man Indicted For False Statements On Nuclear Plant Safety Systems (CHTNGA)

By Pam Sohn

Chattanooga Times Free Press, March 25, 2011

A federal grand jury in Chattanooga has returned a two-count indictment against Matthew David Correll, 31, of Hixson, for making false statements that he had measured cables intending to supply energy to safety systems at Watts Bar Nuclear Plant.

The Tennessee Valley Authority is building a new and second nuclear reactor at the Spring City, Tenn., plant.

If convicted, Correll faces a term of maximum term of five years in prison, a \$250,000 fine and up to three years of supervised release on each count.

"We always take the falsification of federal records very seriously, especially given the nature of these records at these facilities," US Attorney Bill Killian said. "Cutting corners on the construction of our nuclear power plants is a serious matter. Our prosecution will be vigorous and thorough."

about Pam Sohn...

Pam Sohn has been reporting or editing Chattanooga news for 25 years. A Walden's Ridge native, she began her journalism career with a 10-year stint at the Anniston (Ala.) Star. She came to the Chattanooga Times Free Press in 1999 after working at the Chattanooga Times for 14 years. She has been a city editor, Sunday editor, wire editor, projects team leader and assistant lifestyle editor. As a reporter, she also has covered the police, ...

Hixson Man Indicted For Falsifying Statements At Nuclear Plant (CHATNOOG)

The Chattanooga, March 25, 2011

Federal prosecutors have indicted a Hixson man for falsifying documents related to an inspection at the TVA Watts Bar Facility, north of Chattanooga. Matthew David Correll, 31, was indicted on two counts of making false statements.

Watts made false statements that he had measured cables for a safety system at the plant.

"We always take the falsification of federal records very seriously, especially given the nature of these records at these facilities. Cutting corners on the construction of our nuclear power plants is a serious matter. Our prosecution will be vigorous and thorough," said US Attorney Bill Killian.

Ashok S. Bhatnagar, senior vice president, TVA Nuclear Generation Development & Construction, issued the following statement regarding the results of the investigation conducted by TVA's Office of Inspector General:

"TVA is grateful to those who identified these concerns and those who investigated them. This action today is an example of TVA's systems and procedural safeguards working as designed. Concerns were discovered and investigated by TVA and, in accordance with procedures, investigated by the Inspector General's Office and other authorities. The system worked.

"TVA Nuclear construction and operations have a strict focus on compliance with the highest standards, and we do not tolerate any untrustworthy conduct. We have rigorous procedures in place to check and double-check all critical work and testing of critical systems to assure compliance with all laws and regulations. Those procedures help find infractions and mistakes and correct them in a timely and appropriate manner.

"In addition, TVA has been reviewing work performed by the individual alleged to be involved to assure similar issues do not exist. The lessons learned will be used to enhance and modify existing processes and procedures."

Correll appeared in court earlier today before US Magistrate Judge Susan Lee and entered a plea of not guilty to the charges in the indictment. He was released pending trial, which has been set for May 23 in US District Court in Chattanooga before Judge Curtis Collier.

The indictment alleges that on or about Aug. 16, 2010, Correll completed paperwork falsely indicating that he had measured cables that were intending to supply energy to safety systems to be constructed in a new nuclear power plant at the Watts Bar Nuclear facility. As alleged in the indictment, Correll did not take the measurements, nor make the inspections, and falsely completed the forms required by TVA. The indictment also alleges that he did not perform these measurements. Each count concerns a document with false information.

If convicted, Correll faces a term of maximum term of five years in prison, a \$250,000 fine and up to three years of supervised release on each count.

The indictment is the result of an investigation by Tennessee Valley Authority Office of the Inspector General. Assistant US Attorney James T. Brooks will represent the United States.

Electrician At Tennessee Nuclear Power Plant Charged With Falsifying Inspections (Fox)

FOX Atlanta, March 25, 2011

Electrician at Tennessee Nuclear Power Plant Charged With Falsifying Inspections

Thursday, March 24, 2011 12:00 AM

(NewsCore) - Federal prosecutors in Knoxville, Tenn., charged a sub-contractor, hired to work on the Tennessee Valley Authority's (TVA) Watts Bar Nuclear Plant, for lying about inspections, WBIR-TV reported Thursday.

Matthew David Correll, 31, a subcontractor hired to perform electrical work on the plant that is currently under construction, pleaded not guilty to two counts of falsifying information. He faces a possible maximum sentence of five years on each charge if he is convicted.

Federal officials claim he lied about the measurements he took of power cables that would have been used in the power plant. The incorrect figures could have led to serious problems at the nuclear plant, but the TVA added its internal checking process caught the mistake.

The US Attorney did not say whether law enforcement was able to determine a motive for falsifying the information.

Read more: WBIR

Hixson Man Faces Federal Charges For Watts Bar Work (WDEF_TV)

By Bill Mitchell

WDEF-TV Chattanooga (TN), March 25, 2011

Hixson Man Faces Federal Charges For Watts Bar Work

Submitted on March 24, 2011 - 5:46pm.

As the nuclear drama continues in Japan, there is only one reactor under construction right now in the United States.

And it's at the Watts Bar plant in Spring City.

The U-S Attorney's office has announced federal charges against a sub-contractor doing work on the new reactor.

The alleged incident at the Watts Bar construction site happened last August, and the Inspector General says it was because the subcontractor completed false paperwork.

It indicated he had measured cables that supply energy to safety systems.

To the layman, that may not appear to be an offense that could send someone to jail for 5 years, but it is.

TVA says it has a system in place to catch such problems.

ASHOK BHATNAGAR, TVA EXECUTIVE "we already have processes in place that are designed exactly to do this..as work is completed, you go through multiple checks..and these checks found this, and will find other issues..and make sure they are corrected."

The prosecutors office did not provide a photo of 31-year old Matthew David Correll of Hixson, but he appeared before US Magistrate Susan Lee Thursday morning to plead not guilty. Correll was released pending a May 23rd trial in Federal District Court.

Specifically, Correll is charged with failing to measure the important cables, and with lying about inspections.

Work is now underway on completing Unit 2 which about 80% complete when it was halted in 1988.

Construction on Unit one at Watts Bar was started in 1973 and completed in 1996.

The original project was plagued by welding concerns and whistle-blower investigations.

TVA says this incident presented no danger.

BILL KILLIAN, US ATTORNEY "As a result of that, I'm told there is no danger that occurred throughout the course of the investigation and not now."

Watts Bar near Spring City, is the nation's only reactor construction site.

Work was re-started in 2007.

Nuclear Industry, Activists At Odds Over Safety Claims (AP)

By Bill Poovey

Associated Press, March 25, 2011

HUNTSVILLE, Ala. — Two executives with the Tennessee Valley Authority said their information and analysis indicate the utility's six reactors would have weathered a powerful earthquake like that which prompted Japan's nuclear emergency, a claim that drew skepticism from an environmental activist.

TVA's senior nuclear communications manager Ray Golden and chief nuclear officer Preston Swafford discussed Japan's nuclear emergency with reporters in Huntsville in describing safeguards at TVA's nuclear plants along the Tennessee River in Tennessee and Alabama. Swafford said some of the differences with Japan's plants stem from "redundant" safety and power systems installed at nuclear plants in the United States after the September 2001 terrorist attack.

TVA has invited the media to a Friday tour at its Browns Ferry Nuclear Plant in Athens, Ala., which has boiling water reactors similar to the malfunctioning reactors in Japan. TVA has said the Browns Ferry Plant was designed to withstand a 6.0-magnitude quake based on its distance from the New Madrid fault.

The TVA's Watts Bar Nuclear Plant at Spring City, Tenn., and its Sequoyah plant at Soddy-Daisy, Tenn., are designed to withstand a 5.8-magnitude quake based on an 1897 tremor at Giles County, Va., officials said.

On Tuesday, Swafford said he and others at TVA "expect to learn a lot from the Japan event" in which the magnitude 9.0 quake touched off a devastating tsunami along a wide swath of Japanese coastline.

Swafford said no TVA nuclear plant is vulnerable to a flooding emergency from a break of any dam or multiple dams.

Stephen Smith, director of the Southern Alliance for Clean Energy, said of TVA's claim: "Without some documentation of the assumptions that were made to come to that conclusion, talk is cheap."

"They should put that documentation up on their web site and let it be examined," Smith said in a telephone interview. "Maybe it's true."

Smith said the nuclear industry is "in full-scale damage control mode right now."

Swafford said TVA has invited the media to a Friday tour at the Browns Ferry Plant, where one of the reactors is currently idle.

Days after the disaster in Japan, TVA called off a long-scheduled media tour at its Watts Bar plant that is the site of a second unit that is the nation's only reactor under construction.

The TVA board at its April meeting in Chattanooga, Tenn., is expected to discuss committing funds to future nuclear projects.

Golden said changing the pace of the utility's nuclear plans would be "up to the board."

TVA, the country's largest public utility, supplies power to about 9 million people in Tennessee, Alabama, Mississippi, Kentucky, Georgia, North Carolina and Virginia.

Tennessee Valley Authority Says Its Nuclear Plants More Robust Than Japan's (BOSH)

Boston Herald, March 25, 2011

Tennessee Valley Authority says its nuclear plants more robust than Japan's

The Tennessee Valley Authority is moving ahead with construction and planning for more nuclear reactors despite the explosion and ongoing radiation leaks at one of Japan's largest nuclear plants.

TVA Chief Operating Officer Bill McCollum Jr. said Wednesday that the federal utility established a centralized response center in Chattanooga to assess the accident at Japan's Fukushima Dai-ichi plant -- which was damaged by an earthquake and tsunami -- and to evaluate TVA plants' vulnerability to natural or manmade disasters.

While some equipment, training and operating changes are likely at TVA nuclear facilities, McCollum insisted the plants are safe. He said suspending work on new plants would only inflate costs and possibly impede their successful completion.

"I think it's premature, given that we haven't gotten all of the information about the events in Japan, to make any changes," McCollum said during a media briefing in Chattanooga.

Since the Japanese nuclear disaster, Russia, China and Germany have announced plans to suspend work on new nuclear projects. Nuclear opponents have called for a similar moratorium on new nuclear projects by TVA.

The utility is spending nearly \$1 million a day to finish building a second reactor at its Watts Bar Nuclear Plant near Spring City, Tenn. It's the only active nuclear plant now under construction in America and the projected completion date is 2013. TVA also is spending nearly as much -- \$248 million in the current fiscal year -- for engineering studies on the possibility of finishing an incomplete unit at its Bellefonte Nuclear Plant near Scottsboro, Ala., as soon as 2018.

Nuclear Moratorium

Glenn Carroll, coordinator of the anti-nuclear power group Nuclear Watch South, said TVA's Sequoyah and Watts Bar plants are "the most vulnerable reactors to containment failure" because of their less robust ice condensers.

Three of the six reactors at the crippled Japanese plant share the General Electric boiling-water reactor design used at TVA's Browns Ferry Nuclear Plant and 29 other US reactors.

"The time is ripe to build momentum to stop construction of new reactors and shut down old reactors," Carroll said.

Edwin Lyman, senior scientist for the Union of Concerned Scientists, said utilities and regulators need to reconsider their assumptions and design criteria after the failure of so many safety systems at Fukushima.

Lyman said the lack of any nuclear plant accident since Three Mile Island in 1979 "has made regulators and operators too casual about the severe accident risks at a nuclear plant."

But McCollum said TVA's nuclear plants are designed, built and operated to withstand earthquakes and flooding and are less likely to be crippled by such disasters than the Fukushima plant.

"It's important to understand that the designs of the Japanese plants are somewhat different and there are features built into our plants that make them more robust in terms of being able to deal with these sorts of natural disasters," he said.

TVA plants have hardened vents to prevent the type of hydrogen gas explosions that damaged four of Fukushima's reactors, he said. TVA also has put in more backup power and steam-generating pumps than in the Japanese plant so water will keep circulating even if the power fails.

The main source of backup power — diesel generators that can start up in a matter of seconds — are designed to withstand major floods or storms and are less likely to fail than Japanese equipment did in the tsunami, he said.

The risks of a major earthquake or sudden flooding in the Tennessee Valley also are far lower than in Japan, McCollum said.

To see more of the Chattanooga Times Free Press, or to subscribe to the newspaper, go to <http://www.timesfreepress.com>. Article URL: <http://www.bostonherald.com/news/national/south/view.bg?articleid=1325766>
Angela Merkel calls for nuclear power changes

TVA Assures Its Nuclear Power Plants Are Safe (CNN)

WSFA, March 25, 2011

NASHVILLE (CNN) - In the wake of nuclear crisis in Japan, the Tennessee Valley Authority (TVA) is assuring residents that its three nuclear power plants are safe.

TVA Executive Vice President Preston Swafford said his company's facilities are built to withstand a natural disaster or terrorist attack.

"Our designs are robust," he said. "These are safe nuclear power plants. We have been in this business for quite some time."

Swafford said additional security measures were put in place following the Three Mile Island accident in 1979 and the 9/11 terror attacks.

"We will never let our guard down," Preston said. "We will treat each day with the same seriousness as the day before."

TVA's three nuclear plants provide electricity to about 3 million homes across the Tennessee Valley.

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Official: Maury County equipped to cope with nuclear emergency (CDHTN)

By Swisher

Columbia (TN) Daily Herald, March 25, 2011

The Maury County Courthouse is only about 60 miles away from a nuclear power plant containing reactors similar to the ones that prompted a nuclear crisis in Japan.

But Mark Blackwood, director of the Maury County Office of Emergency Management, said authorities are prepared for a nuclear incident at nearby Browns Ferry Nuclear Plant in Athens, Ala.

He described the chances of a nuclear disaster, such as the one caused by the tsunami and earthquake in Japan, as being minimal.

"There are hazards in anything, but there are many things that we do that are a lot more statistically likely to hurt us than a nuclear incident," Blackwood said. "That would probably include driving through evening traffic in Columbia, Tennessee."

Blackwood said authorities are equipped with radiation-detection devices and would be able to monitor levels and act accordingly. Given Columbia's distance from the plant, authorities expect Maury County's chief challenge in the event of a nuclear incident would be accommodating evacuees.

REACTORS CONCERNS

The Tennessee Valley Authority is working to assure the public that Browns Ferry's reactors are safe, offering reporters an opportunity to tour the plant Friday.

The Alabama plant has three General Electric Mark I boiling water reactors, the same kind of reactor used in the Fukushima Daiichi in Japan. There are 20 other Mark I reactors in the United States.

TVA officials say the reactors at the Browns Ferry plant could withstand a 6.0 magnitude quake. The plant was built to those specifications based on its location from the New Madrid Seismic Zone. The Japan quake, which occurred in a much more geologically active area, measured 9.0 on the Richter scale.

TVA officials also said none of their plants are susceptible to flooding in the event of a dam break.

"Our plants are designed to be very robust against all types of occurrences — natural occurrences as well as others," TVA CEO Bill McCollum Jr. said in a video posted on the authority's website.

TVA operates six nuclear reactors at three nuclear plants that supply about 30 percent of electricity to customers in its seven-state service area.

Mary Olson, director of the Southeast office of the Nuclear Information and Resource Service, said she is skeptical of TVA's statements that the Mark 1 reactors are safe.

"We are calling for an immediate shutdown of the Mark 1s, because they do not have any more robust protections in the United States than they do in Japan," she said.

Her group, which has been critical of nuclear energy, says top US safety officials at the Atomic Energy Commission and later the Nuclear Regulatory Commission have warned for years of safety shortcomings in the Mark 1 reactors.

GE developed the reactors in the 1960s.

In 1972, Stephen H. Hanauer, a safety official with the Atomic Energy Commission, recommended the Mark 1 reactor be discontinued because its smaller containment mechanism made it more susceptible to an explosion.

GE officials have defended the reactors, saying they have a 40-year track record of success. The company said the reactors were modified and retrofitted over the years to reflect technological advances.

RADIATION DETECTORS AND HIPPIE COMMUNES

As TVA defends the safety of nuclear power, one local company is seeing a boom in business as a result of the nuclear crisis in Japan.

Summertown-based SE International Inc. is a designer, manufacturer and distributor of radiation detectors. The company hired an additional employee and moved a part-time position into full-time as a result of the nuclear crisis in Japan.

"Everybody is in overtime," said Beth Cramer, director of sales. "We are back-ordered at least six-to-eight weeks on products. When they come off the line, we are shipping them."

Cramer said she has been sending radiation detectors to Japan and has also fielded hundreds of calls from US residents worried about radiation exposure. That's despite assurances from authorities that the nuclear crisis in Japan will not pose a health hazard in the United States.

Prices for radiation detectors for sale online vary from \$150 to thousands of dollars.

SE International was founded in 1979 by members of the Farm, a hippie commune that was established on 1,750 acres in Lawrence County during the early '70s. About 200 people, including SE's employees, still live on the farm, which is now operated as a cooperative. "We just wanted to be in the business for safety purposes for people, so we started the company," Cramer said. "We did it communally. We were just making it for people to be safe."

Story created Mar 24, 2011 - 16:00:59 EDT.

Slim Nuke Danger Here, But ... (CHTNGA)

Chattanooga Times Free Press, March 25, 2011

Slim nuke danger here, but ...

Since a massive earthquake and tsunami created a radiation danger at nuclear power-generating facilities in Japan, some Americans have anxiously asked whether a similar catastrophe might pose the threat of a nuclear meltdown here.

Fortunately, Tennessee Valley Authority officials do not believe there is a comparable danger at TVA's Sequoyah Nuclear Plant near Soddy-Daisy, the Watts Bar Nuclear Plant near Spring City, Tenn., or at other nuclear facilities in our region.

To provide information, and allay any fears, TVA Chief Operating Officer Bill McCollum, joined by other officials from the public utility, came to the Times Free Press on Wednesday.

First of all, they noted, it is extremely unlikely, judging from history, that the immediate area would be hit by a quake nearly as severe as the recent one in Japan.

Even so, "What if?"

Well, in case of earthquake, any threatened nuclear generator would immediately and safely shut down, the TVA officials said.

Off-site power then would provide electricity needed to continue cooling reactors.

But if needed, multiple on-site, heavily fortified emergency diesel generators would keep the cooling water flowing.

As a subsequent backup, steam power produced by the heat of the nuclear energy itself would be used to circulate water.

Beyond that, in the very unlikely event that it were necessary, smaller, self-contained, diesel-driven cooling equipment could be employed, as could a battery-powered system that can be charged from outside sources.

Of course, all that is in addition to extensive training of TVA workers to respond nimbly in emergencies.

TVA officials pointed out that their reactors have continued to operate safely — and that nuclear power is a vital component of providing the energy we need.

They properly acknowledged, however, that there is no room to be "complacent or arrogant" when it comes to nuclear power. The stakes are simply too high. And they said they are re-examining their programs for responding to disasters — rather than waiting for regulators to make suggestions.

TVA's — and indeed our entire nation's — nuclear plants have a long and commendable record of efficient and safe operations.

It is natural that questions have arisen in response to the tragedy in Japan. But we have confidence that TVA will help keep the United States' record of safe nuclear energy production going.

Capps: Nix CA Nuke Plant's License Renewal Review (AP)

Associated Press, March 25, 2011

LOS ANGELES (AP) – A California congresswoman wants federal regulators to stop considering a license renewal for the Diablo Canyon nuclear plant until earthquake threats are thoroughly reviewed.

Rep. Lois Capps said Thursday that it's irresponsible to consider extending the life of the coastal plant's twin reactors until earthquake faults near the plant are thoroughly and independently studied -- especially since the nuclear crisis in Japan.

Pacific Gas and Electric Co. has asked the Nuclear Regulatory Commission to renew its license to operate the reactors near San Luis Obispo, which expire in 2024 and 2025.

The company says the plants are safe.

But the Democratic congresswoman says there are too many unanswered questions about potential earthquakes and plant safety for the NRC to continue consideration of possible 20-year extensions.

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Capps Calls For Halt Of Diablo Canyon Renewal (PACBT)

Pacific Coast Business Times, March 25, 2011

US Rep Lois Capps, D-Santa Barbara, has asked the Nuclear Regulatory Commission to suspend relicensing of the Diablo Canyon Nuclear plant near San Luis Obispo and is seeking an independent review of potential earthquake risk to the area.

The NRC and Diablo Canyon owner PG&E are mid-way through a relicensing process that would extend the 2,300-megawatt generating station's life from 2024-2025 to 2045. Diablo Canyon represents about 10 percent of California's electric generation capacity, and PG&E has said it believes the plant can operate safely.

But the Fukushima Daiichi nuclear plant disaster in Japan has raised new questions about whether a one-two punch of earthquake and tsunami can deliver a blow that is outside the current design standards for any nuclear power station located in an earthquake zone.

"After much consideration, I am calling on the Nuclear Regulatory Commission to stay the license renewal process of the Diablo Canyon Nuclear Power Plant until independent, peer-reviewed advanced studies for all onshore and offshore faults in the area are performed and reviewed by a panel of federal and state agency experts," Capps wrote in a letter to NRC Chairman Gregory B. Jaczko. "We know the Central Coast is subject to earthquake activity and it's critical this process go forward only after the region's seismic concerns are addressed," she added.

PG&E said it plans to keep pursuing the license extension.

"License renewal is a long and rigorous process with many opportunities for public involvement and interaction with our regulated and elected officials," PG&E spokesman Kory Raftery told the Business Times. "We will continue to move through the NRC process because it is the prudent thing to do for our customers, and we will continue to provide any information requested by the NRC."

The NRC has ordered a quick review of all 104 US nuclear plants. In a hearing earlier this week, State Sen. Sam Blakeslee, R-San Luis Obispo, also raised questions about the safety of Diablo Canyon.

Capps Calls For Halt To Diablo License Renewal (EDHAT)

Santa Barbara (CA) Edhat, March 25, 2011

Today Rep. Lois Capps (D-Calif) requested in a letter to the US Nuclear Regulatory Commission that it stay the license renewal for the Diablo Canyon Nuclear Power Plant and work in collaboration with other oversight and regulatory agencies to provide an independent and thorough review of the area's seismic issues.

"After much consideration, I am calling on the Nuclear Regulatory Commission to stay the license renewal process of the Diablo Canyon Nuclear Power Plant until independent, peer-reviewed advanced studies for all onshore and offshore faults in the area are performed and reviewed by a panel of federal and state agency experts. We know the Central Coast is subject to earthquake activity and it's critical this process go forward only after the region's seismic concerns are addressed.

"After the energy industry catastrophes we've seen during the last year that cost lives and billions of dollars in economic and environmental damages, we cannot accept with blind faith any industry's assurances that it can prevent, or respond to, a disaster involving earthquakes.

"Nothing is more important than the health and safety of our communities. There are simply too many unanswered questions on seismic activity, as well as plant safety and preparedness, for this relicensing process to move forward," said Capps.

A copy of the letter to the Nuclear Regulatory Commission is below.

March 24, 2011

The Honorable Gregory B. Jaczko Chairman
US Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Chairman Jaczko:

I am writing to request the Nuclear Regulatory Commission immediately stay the license renewal process for the Diablo Canyon Nuclear Power Plant until further studies demonstrate the plant's design and operations can withstand an earthquake and other potential threats.

As you are well aware, a 2008 California Energy Commission report found very clear warnings of potential new seismic threats surrounding the Diablo Canyon plant. The report also determined that the newly discovered Shoreline earthquake fault should be taken into consideration as part of the license renewal process. In addition to the concerns raised by the California Energy Commission, the California Public Utilities Commission and the California Coastal Commission have filed comments in the license renewal proceedings indicating that many seismic uncertainties remain unstudied and unresolved.

I am very concerned the NRC has not taken action to address the warnings in the Energy Commission's report, nor has it seriously considered the concerns raised by these state agencies and the public. Moreover, the NRC continues to support its evaluation of the Shoreline earthquake fault on an early report based on preliminary findings. Therefore, I request that you also reconsider my earlier request to ensure the NRC is collaborating with other federal and state agencies by creating a joint panel to peer review, upon their completion, independent advanced seismic studies for all onshore and offshore faults in the area as requested by our state regulators and legislature. The urgency of resolving the state's seismic concerns necessitates the formation of such a panel of experts. Furthermore, given that the plant's current operating licenses do not expire for more than a decade, the completion and review of these studies prior to consideration of any relicensing would not impede any process affecting its ongoing operation.

The NRC has a responsibility to maintain both the reliability and economic viability of nation's nuclear energy plants, and to ensure the public's health and safety in surrounding communities is protected. For plants located in seismically active areas, like Diablo Canyon, it is imperative they are designed with sufficient levels of resiliency against the sort of earthquakes experts predict they could experience. Additionally, from what we witnessed in Japan-an earthquake, tsunami and nuclear accident all occurring in sequence-it is more important than ever that the NRC demonstrate that it has taken all appropriate steps to safeguard against a similar occurrence at any US facility. These safety issues continue to be of great concern to me and my constituents based on a history of incomplete and faulty NRC oversight of the Diablo Canyon plant. While Pacific Gas & Electric has put into place safety measures to address some potential hazards at the plant, there are simply too many unanswered questions on seismic activity and emergency preparedness for this licensing renewal process to move forward. Failure to address this issue in a forthright and transparent manner prior to relicensing is unwise and irresponsible. It will feed public uncertainty about the oversight and safety of nuclear energy and could cost taxpayers billions of dollars to once again belatedly address issues that should have been dealt with beforehand.

Mr. Chairman, you and I agree that nothing is more important than the health and safety of our communities. For that reason, I request the NRC immediately stay the license renewal process until it can fully resolve the state's seismic concerns and adopt whatever lessons are to be learned from the disaster in Japan. My constituents deserve the Diablo Canyon Nuclear Power Plant be as safe as possible and they are looking to the NRC to do everything within its power to ensure such a nuclear tragedy does not occur in our community.

I look forward to working with you to ensure that is the case.

Sincerely,

LOIS CAPPS

Member of Congress

Congresswoman Capps Wants Diablo Canyon Nuclear Plant Relicensing Put On Hold (SCPR)

Southern California Public Radio, March 25, 2011

Congresswoman Capps wants Diablo Canyon nuclear plant relicensing put on hold

A Democratic congresswoman from the central California coast has asked the Nuclear Regulatory Commission to suspend the license renewal of Diablo Canyon nuclear power plant.

With new questions being raised about the safety of nuclear power plants in seismically active areas, Congresswoman Lois Capps wants the US Nuclear Regulatory Commission to put the current renewal process on hold, pending an independent study of all faults in the area.

She says Pacific Gas and Electric's Diablo Canyon was built to withstand a 7.5 magnitude quake. "But that was before the present fault line that has been discovered, and I have believed for a long time that we need to have very many questions answered, and I'm concerned about a secondary power ability should the generator go out."

The lack of electricity at quake-and-tsunami-damaged Japanese plants has made it difficult to cool spent fuel rods. PG&E had no comment on the request for a freeze on Diablo Canyon's license renewal.

Earlier this week, the NRC declared that the Diablo Canyon and San Onofre nuclear power plants are in the riskiest quake zones in the country.

Capps Calls For Delay In Diablo Relicensing (KEYT)

KEYT-TV Santa Barbara (CA), March 25, 2011

Following a recent tour of the Diablo Canyon Nuclear Power Plant in Avila Beach, Congresswoman Lois Capps is asking the Nuclear Regulatory Commission to stop the relicensing process for the plant.

In a letter to the NRC Capps said, "We know the Central Coast is subject to earthquake activity and it's critical this process go forward only after the region's seismic concerns are addressed."

The safety and ability of California's nuclear power plants to withstand a large quake has fallen under scrutiny after a 9.0 earthquake and devastating tsunami caused a partial meltdown at the Daiichi Nuclear Power Plant in Fukushima, Japan.

Both Capps and Senator Diane Feinstein toured PG&E's Diablo site earlier this week.

Capps is asking for independent and peer-reviewed advanced studies be completed for all onshore and offshore faults in the area, and that the results of these studies be reviewed by a panel of federal and state agency experts.

On Monday, State Senator Sam Blakeslee expressed concern over the relicensing process of the plant amid seismic concerns for the area.

Calif. Lawmaker Joins Calls For Nuclear Reviews (REU)

By Emily Stephenson

Reuters, March 25, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

Pressure Builds On NRC To Halt License Review For Calif. Reactor (EPPM)

By Colin Sullivan

E&ENews PM, March 25, 2011

A California congresswoman today pressed the Nuclear Regulatory Commission to immediately halt the review of a license application for Pacific Gas and Electric Co.'s Diablo Canyon nuclear power facility, citing uncertainty over offshore seismic risks.

In a letter to NRC Chairman Gregory Jaczko, Rep. Lois Capps, a Democrat whose district is home to the plant, cited the recent discovery of an offshore fault close to the 2,240-megawatt plant that she believes should be studied in detail before the renewal application process proceeds.

The plant sits on the coast at Avila Beach near San Luis Obispo in the central part of the state and was built to withstand a 7.5 magnitude earthquake. The biggest seismic threat to the facility is from the onshore San Andreas Fault, with offshore earthquakes long considered less of a concern (Greenwire, March 15).

But Capps wants regulators to look more closely at the newly discovered Shoreline Fault, which was cited in a 2008 study by the California Energy Commission that acknowledged an examination of Shoreline had not been completed.

"I am very concerned the NRC has not taken action to address the warnings in the Energy Commission's report, nor has it seriously considered the concerns raised by these state agencies and the public," wrote Capps, calling on the agency to create a state-federal panel to assess seismic risks.

PG&E's licenses for the plant's two reactors expire in 2024 and 2025. A renewal would let the utility operate the facility through 2045.

Capps' letter, the first from a federal lawmaker to demand review suspension for Diablo Canyon, follows a March 16 letter from California Sens. Dianne Feinstein and Barbara Boxer that urged NRC to thoroughly investigate the vulnerability of the plants. The Democrats asked Jaczko to review both Diablo Canyon and California's other active reactor, Southern California Edison's San Onofre plant in San Clemente.

The senators noted that 7.4 million people live within 50 miles of San Onofre and about 424,000 live within 50 miles of Diablo Canyon.

The pressure on NRC has also picked up back in California. Several state lawmakers have called on NRC to freeze the review for Diablo Canyon, led by Republican state Sen. Sam Blakeslee, a geophysicist and a San Luis Obispo resident. Blakeslee has accused PG&E of blatantly disregarding any new risk assessments following the earthquake crisis in Japan.

"PG&E is now rushing to relicense Diablo Canyon a full 13 years before their current licenses expire, continuing to dismiss any concerns about the safety of the facility," he wrote in a recent editorial. "PG&E confidently maintain that the facility is not vulnerable to a seismic event. The people of Japan were told the same thing."

Blakeslee went on to note that PG&E has not committed to studying the new offshore fault. The utility did not respond to a call seeking comment.

[Click here to see Capps' letter.](#)

Sullivan is based in San Francisco.

Rep. Capps Calls On NRC To Suspend License Renewal Of Diablo Canyon (KSBY)

By Bethany Tucker

KSBY-TV San Luis Obispo (CA), March 25, 2011

Local Congresswoman Lois Capps (D) is calling on the Nuclear Regulatory Commission to suspend the license renewal process at Diablo Canyon Nuclear Power Plant in San Luis Obispo County.

In a letter sent to the NRC Thursday, Capps says she wants the agency to "immediately stay the license renewal process for the Diablo Canyon Nuclear Power Plant until further studies demonstrate the plant's design and operations can withstand an earthquake and other potential threats."

Critics have called on PG&E, the operator of Diablo Canyon, to perform better seismic studies around the plant. Recent seismic maps show there are two fault lines near the plant. But, PG&E says Diablo was built to withstand a magnitude 7.5 earthquake and that the nearby faults aren't capable of generating that large of a temblor.

In a statement today, Representative Capps says, "After the energy industry catastrophes we've seen during the last year that cost lives and billions of dollars in economic and environmental damages, we cannot accept with blind faith any industry's assurances that it can prevent, or respond to, a disaster involving earthquakes."

The licenses for Diablo Canyon Nuclear Power Plant expire in 2024 and 2025.

Board Of Supervisors To Discuss Diablo Canyon Safety On Tuesday (SLOT)

By Bob Cuddy

San Luis Obispo (CA) Tribune, March 25, 2011

A barrage of requests that the Board of Supervisors address safety at the Diablo Canyon nuclear power plant has led Chairman Adam Hill to set aside time to talk about the issue on Tuesday.

In a news release late Thursday, Hill wrote that the public's "overwhelming response" to the crisis in Japan has persuaded him that the board needs to say more.

He is not likely to be the only one speaking. Local activists have been sending around an email telling people to come Tuesday and speak out against PG&E's relicensing of the power plant during the public comment period.

One such "action alert" says "halt licensing now" and is subtitled "Diablo Canyon/Flying Blind in the Seismic Zone MUST STOP - NOW! IT'S UP TO US."

The alert's authors want the board to send letters to the Nuclear Regulatory Commission, the California Public Utilities Commission, and "all federal and state representatives and agencies" telling them to stop the relicensing process "until the 3-D seismic mapping of adjacent fault systems ... is completed and independently reviewed."

In his news release, Hill noted that the Board of Supervisors sent a letter last year to the NRC asking them to delay relicensing the power plant until seismic studies have been completed and include a third-party review.

However, that letter went out before the tragedy in Japan. Many local residents want the board to, at a minimum, restate their position.

Hill said he has been meeting with Rep. Lois Capps, state Sen. Sam Blakeslee and PG&E senior executives about the plant's safety.

The meeting will begin at 9 a.m. at the Board of Supervisors chambers in the county government center, 1055 Monterey St., San Luis Obispo.

Building Nuclear Plants To Get Harder (ATLBIZ)

By Carla Caldwell

Atlanta Business Chronicle, March 25, 2011

Fears following Japan's nuclear crisis will make it more difficult for US power companies to finance construction of new nuclear reactors. Getting permits and loan guarantees from the government is already hard, but the process is expected to get even more complicated, according to the Wall Street Journal.

Companies planning nuclear projects can expect higher financing costs and less political support for government loan guarantees, nuclear experts say. In a note to investors last week, Standard & Poor's said events in Japan renewed fears regarding nuclear power risks.

President Barack Obama and top administration officials continue to support nuclear power, and still support a budget proposal for another \$36 billion in loan guarantees for nuclear plant construction, the newspaper reported. However, the president did express concern following the crisis at the Fukushima plant in Japan and ordered safety checks at all US facilities.

Several US companies have applied for federal loan guarantees, but the Energy Department has extended only one commitment. The department in 2010 offered an \$8.3 billion guarantee to Southern Company (NYSE: SO) to build two reactors near Waynesboro, Ga., about 30 miles from August. However, the Nuclear Regulatory Commission has not yet agreed to the company's project.

If the Southern Company project is approved, it will be the first new license granted in the US in more than 30 years, according to the WSJ.

UPDATE 1-US Nuclear Industry Unable To Quantify Quake Costs (REU)

By Eileen O'Grady

Reuters, March 25, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

Jaczko, Morris, Crane Own Words On US Nuclear Power (BLOOM)

Bloomberg News, March 25, 2011

March 25 (Bloomberg) -- US Nuclear Regulatory Commission Chairman Gregory Jaczko, American Electric Power Co. Chief Executive Officer Michael Morris and NRG Energy Inc. CEO David Crane speak about the future of nuclear power in the US in the wake of the nuclear crisis in Japan. This report also includes comments from Shaw Group Inc.'s Jeffrey Merrifield, Constellation Energy Group Inc.'s Michael Wallace, Bloomberg New Energy Finance's Chris Gadomski and Council on Foreign Relations' Michael Levi. (Source: Bloomberg)

What NRC Nuclear Documents Do You Want To See? Here's Our List (MSNBC)

By Bill Dedman

MSNBC, March 25, 2011

The Japanese nuclear emergency has, of course, raised interest in nuclear power in the United States. The federal Nuclear Regulatory Commission's public records staff says it is "experiencing a larger than normal volume" of requests for public records under the federal Freedom of Information Act. To put it mildly, perhaps.

"Due to the high volume of FOIA requests received as a result of the unexpected events in Japan, response times to requests may be longer than normal," the NRC staff says on its FOIA request page.

At msnbc.com we continue to pursue several reporting angles on this story. Here are the FOIA requests that we've filed with the NRC. We'll let you know what we find.

The daily calendar for each of the NRC commissioners for the past year. PDF file.

Any letters or memos documenting exemptions to NRC regulations at a nuclear facility. PDF file.

The NRC personnel roster showing the full name of each employee, date hired, job title, division and branch, and rate of pay. PDF file.

Any e-mail or electronic messages sent or received during the week after the Japan earthquake by any of the senior staff of the NRC. We have 45 people on our list. PDF files here and here.

Any e-mail or electronic messages sent or received during the two weeks after the quake by the 22 key NRC staff involved in seismic issues. PDF file.

What records would you like to see from the NRC? If you're an industry insider with knowledge of a particular situation, what document would you like to see us request?

US Public Support For More Nuclear Power Slips (REU)

By Christopher Doering

Reuters, March 25, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

Should NY Shutter The Indian Point Nuclear Plant? (CRNYBIZ)

Crain's New York Business, March 25, 2011

As the US reviews the seismic risk of its existing nuclear reactors in light of Japan's earthquake-related near meltdown, Gov. Andrew Cuomo says federal regulators have promised to make the Indian Point nuclear plant their top priority. Mr. Cuomo says that because nearly 6% of the US population lives within 50 miles of the plant, the area can not be evacuated fast enough in an emergency, and he wants the plant to cease operations.

Ken Hall Reports: Time To Rethink Indian Point Evacuation Plans (MTWNHER)

By Ken Hall

Middletown (NY) Times Herald-Record, March 25, 2011

There's a long list of questions I can't answer about the Indian Point nuclear power plants.

If they close, I have no idea how New York will replace the power they provide. If the earth rumbles, I have no idea how much damage it will cause or how that damage will affect the safety systems inside. If somebody finally finds a place to store all that spent fuel piling up at Indian Point and elsewhere, I have no idea if it would reduce the local risk to any extent.

There are many other questions.

On the overall subject of nuclear power plant safety, something that everybody seems to have an opinion on these days, I only have one area of expertise. I know something about evacuations, a tiny bit of knowledge from one incident many years ago. If I apply it to the potential task of getting 15 million people in a 50-mile radius to head out in case of an emergency at Indian Point, I have an idea about how it would work.

My lesson starts with a fire one evening in a nursing home, the kind of fire that never threatened to bring down the building, but produced enough smoke to make staying inside unhealthy for the residents. This home, Eden Park in Brattleboro, Vt., was across the street from Brattleboro Memorial Hospital, very convenient for health care and even better for getting people to fresh air and safety.

Those who could walk and those in wheelchairs could be escorted across the street. Those in beds had to be moved more slowly, so the local ambulance squad and some vehicles from the fire department came to help. It was a quiet night on the emergency front so ambulances from nearby communities joined in the effort.

As the hours went by, most of us who were there observing or helping came to two conclusions.

First, this was a smooth operation, a good example of how all these organizations could work together quickly and efficiently.

Second, we better start rethinking those plans for moving people in case something bad happened at the Vermont Yankee Nuclear Power Plant six miles away.

You could reduce it to a formula.

It took that many members of that many squads that many hours to move that many people across the street. So how many members of how many squads would take how many hours to move how many people with varying degrees of mobility how far in what direction?

Most of those who showed up to help would be working in their own communities. Most of those who were stopping traffic occasionally on Canal Street would be needed on other roads. How would those remaining manage to evacuate those in other nursing homes and hospitals and where would they go?

When it comes to nuclear power plants, a lot of people became big fans of prevention that night because a glimpse of the alternative showed that the numbers don't add up.

NY Pols Sound New Alarms On Indian Point (NYPOST)

By Bill Sanderson

New York Post, March 25, 2011

The federal agency that oversees nuke plants is not properly assessing the safety of the twin Indian Point reactors just 35 miles from the heart of Manhattan, two New York members of Congress said yesterday.

The Nuclear Regulatory Commission is "not required to take into account factors like population, national security and evacuation plans in determining the relicensing of aging nuclear power plants like Indian Point," said Rep. Nita Lowey (D-Westchester).

She and Rep. Eliot Engel (D-Bronx) want congressional hearings into how the NRC licenses nuclear reactors.

It's unclear if the House's GOP leaders will grant the Democrats' request.

Columbia University seismologists determined in 2008 that Indian Point sits near the intersection of two earthquake fault lines – information that wasn't known when the first Indian Point reactor opened in 1962.

But the NRC decided not to consider the Columbia study as it relicenses the plants, saying there was no proof the new information was relevant.

Engel, Lowey Call For Congressional Hearings On IP Risks, Calhoun Says It Is Safe (MIDHUD)

Mid-Hudson News, March 25, 2011

BUCHANAN – House Members Eliot Engel (D- Westchester/Rockland) and Nita Lowey (D- Westchester) Wednesday called on the House energy and Commerce Committee to hold hearings on the licensing of nuclear facilities located within an evacuation area containing a high population.

The Indian Point nuclear power plant is in Buchanan and since the Japanese earthquake and tsunami wreaked havoc on nuclear facilities in that country, there has been much concern about the safety of Indian Point since it is close to the City of New York and located near a fault area.

State Assemblywoman Nancy Calhoun (R- Blooming Grove), has toured Indian Point several times and says it is safe. She noted there is a difference between the Japanese plants and Indian Point and said the tsunami, not the earthquake, is what began the chain of events in Japan.

"That was because the facilities were all very much underground. So, when they lost their generating facility, their ability to protect their spent rods and such was curtailed." Calhoun said Indian Point doesn't have that problem but it "should definitely be reviewed. She said people should not panic over the nuclear power plant safety issue.

Calhoun also noted Indian Point generates 30 percent of the electric power for New York City and in the short term, there would be no way to make up for the loss if the nuclear plant was shut down.

Experts: Impact Of Japan Radiation Low Here (AR)

By Ryan Randazzo

Arizona Republic, March 25, 2011

The nuclear disaster in Japan has raised concerns about the nuclear industry and struck fear globally, but its impact has been minimal, according to experts from Arizona State University.

The massive March 11 earthquake and tsunami that knocked out power to the reactors and spent-fuel ponds at the Fukushima Dai-ichi power plant have prompted nations to reconsider nuclear as a viable energy source.

Researchers assembled Thursday by ASU's Global Institute of Sustainability said the event serves as a critical test for nuclear energy, which they said will remain a major part of the world's energy supply, especially if the containment structures keep the plant from a full meltdown despite the devastation from the natural disasters.

"The Japanese event is looked at as a worst-case scenario, and if they can get through it with no loss of containment, that is a very positive statement for what we have in technology," said Kenneth Mossman, a health-physics professor. "If there is a loss of containment, then maybe nuclear power has to be looked at all over again. From a technological perspective, it is very much a test."

The US gets about 20 percent of its electricity from nuclear-power plants, and Japan gets about 27 percent of its electricity from nuclear, according to the Department of Energy.

Students at the ASU presentation asked if the designs for new nuclear reactors being planned today would have fared better against the natural disasters than the decades-old reactors in Japan.

Officials said the problems at the reactors stem from the total loss of backup power and electricity from the power grid, which was not planned for in even a worst-case scenario.

Without any power, the plant's operators struggled to keep the fuel rods cool with a constant supply of water, which is needed even when nuclear plants go into automatic shutdown, as occurred during the earthquake and tsunami.

"I don't suppose that up-to-date control systems would have done anything if power were not available," said Peter Rez, a physics professor.

He said that for all the talk of renewable energy, like solar and wind, utilities essentially need either nuclear power or coal power to supply energy round-the-clock when other resources are not available.

"You have to make choices," Rez said. "You have to cut down your energy usage and have a hotter room in the summer. Or you have two choices: coal or nuclear."

He concurred with Mossman that although the deaths from the earthquake and tsunami are tragic, the nuclear scare has had more psychological impact than actual physical harm.

"Nobody has died, and nobody is likely to die (from radiation exposure)," Rez said.

"Even in this case, where the unexpected happened, nothing really bad has happened (at the nuclear plant), nor is it likely to. If you want that baseline energy load, you are going to have to accept that nuclear power is here to stay."

Three agencies in Arizona are tracking the plume of radiation from Japan as it is carried by air currents over the US

But the Arizona Radiation Regulatory Agency, Department of Emergency and Military Affairs and Department of Health Services so far have said that there is no threat to health in the state from the disaster.

The Radiation Regulatory Agency reports that trace amounts of iodine-131 radioactive material associated with releases from the reactors in Japan have been detected west of metro Phoenix.

The average background radiation can range from 100 to 300 millirems per year, according to the agency. Radiation is measured in millirems.

"The amount of additional radiation we are seeing in Arizona is less than 0.1 millirem," agency Director Aubrey Godwin said. "Such low concentrations of iodine-131 do not pose a public-health threat to Arizonans."

The ADHS has said that taking the health supplement potassium iodide, which can prevent thyroid cancer in severe cases of radiation exposure, is not advised in Arizona now because it can have negative side effects and is not necessary.

"(The radiation from Japan) is very localized around the nuclear plant," Rez said. "Once you are 40 to 50 kilometers away, you are down to background levels. Worrying about it coming to the US is silly. It has a large ocean to cross, and the heavy elements will fall out."

He brushed off a question from the crowd regarding semiconductors and electronics imported from Japan and whether they would need to be decontaminated before being brought to the US

"The best place to be in the event of radioactive fallout would be a (semiconductor) cleanroom," he said. "The impact would be zero. It would not be high on my worries."

Even if the nuclear reactors are contained and have no further problems, the event has sparked concern in Arizona.

The Arizona Corporation Commission, which regulates utilities in the state, will hold a special meeting Tuesday to discuss the safety of the Palo Verde Nuclear Generating Station, 50 miles west of downtown Phoenix.

The US Nuclear Regulatory Commission has launched a review of nuclear power-plant safety in the US

"Examining all the available information from Japan is essential to understanding the event's implications for the United States," commission Chairman Gregory Jaczko said.

"We will perform a systematic and methodical review to see if there are changes that should be made to our programs and regulations to ensure protection of public health and safety."

Durbin, Kirk Vow Tough Questions At Nuclear Forum (CHIT/AP)

By Tammy Webber, Associated Press

Chicago Tribune, March 25, 2011

CHICAGO

Illinois Sens. Dick Durbin and Mark Kirk vowed Thursday to ask a panel of nuclear experts some tough questions about the safety of the state's reactors -- especially the four that are almost identical to those involved in Japan's nuclear crisis -- during a forum that will resemble a congressional hearing.

Representatives from the US Nuclear Regulatory Commission, the Illinois Emergency Management Agency, Argonne National Laboratory and Exelon Corp., which operates Illinois' nuclear reactors, have been asked to participate in the forum in Chicago on Friday. Illinois has six nuclear plants, with a total of 11 reactors, more than any other state.

"Because Illinois is the most nuclear state in America, we should take this opportunity for a common-sense review of safety procedures and lessons learned," from Japan's crisis, Kirk said.

He and Durbin said they're interested in the state's ability to respond to a nuclear emergency, the storage of spent fuel rods and the safety of Exelon's four Mark I boiling-water reactors, which are the same model and about the same age as those at the Fukushima Daiichi plant in Japan. The reactors -- at the Dresden and Quad Cities generating stations -- all have surpassed their original 40-year lifespans and have been granted 20-year license extensions.

Nuclear watchdog and environmental groups have criticized those extensions, saying Mark I reactors are more susceptible to problems in the event of a natural or man-made disaster because spent fuel rods are stored above and outside of the reactor containment chamber instead of at ground level, and the containment system is too small and could allow pressure to build quickly in the event of an emergency.

Exelon officials have said all their reactors are safe.

Even so, Durbin said, "As we go through this experience with Japan, I have no reason believe (the US is in) imminent danger but we have to be vigilant and careful."

He and Kirk also said they're concerned about the storage of spent fuel rods at the state's nuclear plants, some of which are close to heavily populated areas and important waterways. At the shuttered Zion Generating Plant on Lake Michigan north of Chicago, for example, spent rods are stored in a ground-level cooling pool about 100 yards from the lake.

But Kirk said he also wants to determine if fuel rods stored in the higher pools at the Mark I reactors should be moved to another facility with separate power and containment systems. He said he worries that if there was an accident at one of those reactors, it would be difficult to get to the coolant pond -- like in Japan. He also wants to know if there are redundant systems to cool the cache of spent rods and the reactors, and whether there is adequate power back-up for the reactors.

Ultimately, though, he said he would like all nuclear waste moved out of Illinois, perhaps reviving a stalled plan to bury it in Nevada's Yucca Mountain. The United States has no long-term plans to dispose of its nuclear waste.

"The federal government made a grievous error in stopping construction of Yucca," Kirk said Thursday. "The safety of the nation will be enhanced if we moved the waste to Yucca."

David Kraft, director of Illinois' Nuclear Energy Information System, said he wants to know what it would take to ensure that the Mark I reactors are either retrofitted to incorporate the pool of spent fuel rods into the reactor containment system or relocate the pool.

"I don't care if it's within standards anymore," Kraft said. "They were within the standards in Japan."

Howard Learner, executive director of the Chicago-based Environmental Law & Policy Center, said he also is concerned about Exelon plans "uprate" the Mark I reactors, squeezing out more power from them.

President Barack Obama ordered a review of the nation's nuclear reactors, and Illinois Gov. Quinn ordered state emergency management officials to do the same thing. He also said he wants to impose higher fees on Exelon to help pay for oversight of the company's nuclear plants, in addition to the 2 percent increase he already proposed in his 2012 fiscal year budget. The company current pays about \$20 million a year to the state and hasn't had a fee increase in eight years.

Neither Quinn nor the state's Emergency Management Agency can say yet how much more they need or how exactly it will be used.

Illinois has on-site inspectors at all six of its nuclear plants.

AP-WF-03-25-11 0040GMT

Exelon, Largest US Reactor Owner, Seeks To Reassure (NYT)

By Matthew L. Wald

New York Times, March 25, 2011

WASHINGTON — Exelon, the largest operator of nuclear power plants in the United States, sought to reassure investors and the public about the safety of its 17 reactors on Thursday. The company's chief executive, John W. Rowe, declared that the company was well prepared to "respond to emergencies not contemplated in the original design."

Nevertheless, Mr. Rowe said that he expected that American regulators would impose new safety requirements on nuclear plants after the Japanese crisis. That is likely to add pose "significant costs" to the utilities that operate the plants, he said in a conference call with investors.

Mr. Rowe's comments echo those of others in the nuclear industry, who have said that the 104 American reactors are safe and generally do not face the same earthquake and tsunami risks that played an important role in the problems at the Fukushima Daiichi complex in Japan.

Two utilities planning to break ground on new nuclear plants in Georgia and South Carolina say they are committed to proceeding with their projects despite the accident in Japan. Another nuclear project, proposed in Texas by NRG, was already facing financing problems and is likely to encounter further hurdles in the new environment.

Mr. Rowe, whose company has no new plants in the planning stages right now, is focusing on upgrading the output of Exelon's existing plants. "I believe that there is little opening for new nuclear plants in the near future," he said. "But that view has come from economics, not from safety."

Christopher M. Crane, Exelon's president and chief operating officer, said that American plants had several design features that he did not believe were present at Fukushima Daiichi, including a system to control hydrogen buildup and a hardened vent system to safely remove such gas from the building, both of which would help prevent the type of explosions that apparently occurred in Japan.

In addition, diesel fuel for the emergency generators at American plants is generally kept in buried tanks so it cannot be swept away, as it was in Japan.

None of the 10 Exelon plant sites is in a zone of high seismic activity, the company said. Its only unit near the coast is Oyster Creek, on Barnegat Bay, in central New Jersey, and that plant is 23 feet above sea level and five miles from the ocean.

The effect of the Fukushima disaster on the American nuclear renaissance is hard to measure. Existing plants will most likely face new rules, but the financial impact is still unknown.

As for new reactors, their near-term prospects were already quite limited in the United States. The most advanced project is the Southern Company's Vogtle 3 and 4 units, near Augusta, Ga. The utility has broken ground there, and expects to receive a combined construction and operating license later this year. It is building a new model of reactor that is expected to receive approval by the Nuclear Regulatory Commission later this year despite the events in Japan. Two days after the tsunami, Southern said it "remains committed to completing the new Vogtle units on schedule and on budget."

"Japan is seismically very active and the Vogtle site is not," the company said. And Southern's plant is 130 miles from the coast, at an elevation of 220 feet, and thus not likely to see a tsunami.

Across the river in from Augusta in South Carolina, South Carolina Electric and Gas is moving ahead with two reactors at its V. C. Summer site. Kevin B. Marsh, the president of the company's parent, Scana, noted that the site was not seismically active and was 400 feet above sea level.

"Our intent is to remain on schedule," he said. One complication is that Scana's partner, Santee Cooper, is seeking to sell power or part of its ownership stake.

NRG is seeking to add two new reactors at its South Texas Project with a partner, Toshiba. But NRG said on Tuesday that it was "reducing the scope of development" to give the Nuclear Regulatory Commission time to assess the lessons from Japan.

While NRG said it did not expect any changes in the design it planned to use, it faces other issues. Last May, Tokyo Electric Power Company, which owns Fukushima Daiichi, took a 9 percent stake in the Texas project and said it might increase that to 18 percent. It is unclear whether the Japanese company can still afford the American commitment given the multibillion-dollar cost of the Japan disaster.

Even before that crisis, the South Texas Project was having trouble lining up customers to agree to buy power — a crucial requirement of the Energy Department before it will guarantee the construction loan.

The final project in the advanced stage of planning, an additional reactor at Calvert Cliffs, Md., about 60 miles from Washington, stalled last year. Constellation Energy, which owns the first two reactors at Calvert Cliffs, was in a partnership with Électricité de France to build the third reactor, but Constellation pulled out after complaining that the government's fee for a loan guarantee was too high. The French utility then said it would seek another partner.

UPDATE: Exelon: Nuclear Plants Safe, But Industry Costs To Rise (WSJ)

By Naureen S. Malik

DOW JONES NEWSWIRES, March 25, 2011

Full-text stories from the Wall Street Journal are available to Journal subscribers by clicking the link.

Exelon Nuclear Fleet 'Safe,' Will Review Fukushima Lessons: CEO (PLATTS)

Platts, March 25, 2011

Exelon nuclear fleet 'safe,' will review Fukushima lessons: CEO

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Exelon's nuclear fleet continues to operate safely and no immediate changes are needed to address issues raised by the ongoing crisis at Japan's Fukushima I plant, Exelon Chairman and CEO John Rowe said Thursday.

"I believe that there is little opening for new nuclear plants in the near future, but that view has come from economics, not safety," Rowe said on a webcast for Exelon investors and analysts. "I believe that plants in the US are safe, especially those at Exelon, and we continue to give safety number-one priority."

Exelon owns and operates 17 nuclear power units, the nation's largest commercial fleet.

Some enhancements will surely be made as a result of reviews being conducted of the Fukushima accident, but "we're not seeing any cost disaster for our nuclear fleet here," Rowe said.

Operators are conducting walkdowns and reviewing safety systems at Exelon's nuclear units, Rowe said, and the US Nuclear Regulatory Commission and nuclear industry are conducting their own reviews.

Rowe said the cost of upgrades that might be required cannot be estimated, even to within an order of magnitude, "because we simply don't know what kind of changes are being talked about for what plants, and indeed no one knows at the moment."

Exelon should have a better sense of what actions might be required "in about six months," when some of these reviews have been completed, Chris Crane, president and chief operating officer at Exelon, said on the webcast.

Exelon said in 2009 that it did not plan to build new nuclear units and would focus instead on capacity uprates at its existing nuclear plants. It said at the time the uprates were expected to add from 1,300 MW to 1,500 MW of capacity over the next several years, the equivalent of one large new nuclear unit.

The company does not expect at this point to change its power uprate plans, though it will review lessons learned from the accident at Fukushima and incorporate changes if and as needed, Rowe said.

Lessons learned from reviews of the Fukushima events will be available before Exelon must apply to US NRC for approval of the more significant capacity increases, so-called "extended power uprates," Rowe said.

Seven of Exelon's reactors are GE-design boiling water reactors, with so-called Mark I containments, similar to the Japanese reactors that were crippled March 11 following an earthquake and tsunami. Those Exelon units are Dresden-2 and -3 and Quad Cities-1 and -2 in Illinois, Oyster Creek in New Jersey, and Peach Bottom-2 and -3 in Pennsylvania.

Mark I BWRs in the US implemented "extensive modifications" in the early 1990s at the request of the NRC, "including design changes to control hydrogen and pressure through venting the containment," Crane said. Hydrogen buildup is believed to have caused explosions last week that destroyed three secondary reactor containment buildings at Fukushima.

Tokyo Electric Power Co. operators lost the ability to cool the Fukushima reactors and spent fuel pools after the earthquake cut offsite power to the plants and, about an hour later, the tsunami washed away fuel tanks for emergency diesel generators, leaving the plant without AC power. By contrast, fuel tanks for generators at Exelon's Mark I BWRs are buried underground or enclosed in vaults, Crane said. The Exelon units also have two different sources of offsite power, he said.

"None of Exelon's plants are in major earthquake zones," and the plants are "designed to withstand [the] highest level of seismic activity for that location, with additional margin," Exelon said in slides accompanying the webcast. None of Exelon's nuclear units are in areas in danger of tsunamis, but the plants are designed to withstand severe flooding, Crane said.

Exelon has various means to replenish water in spent fuel pools at its reactors, even if their cooling systems were to be compromised, Chip Pardee, chief operating officer at Exelon Generation, said on the webcast.

—Steven Dolley, steven_dolley@platts.com

Similar stories appear in Nucleonics Week. See more information at <http://bit.ly/NucleonicsWeek>

CEO Confident Exelon's 17 Nuclear Reactors Are Safe (PHILLY)

By Andrew Maykuth, Inquirer Staff Writer

Philadelphia Inquirer, March 25, 2011

Exelon Corp., which operates 20 percent of the nation's nuclear-power plants, including the reactors closest to Philadelphia, said Thursday that it anticipates US regulators will launch a wide-scale review of the industry in the aftermath of Japan's unfolding nuclear catastrophe.

John W. Rowe, Exelon's chairman and chief executive, told investors in a conference call that the company is confident of the safety of its 17 reactors at 11 sites.

"I think there is nothing obvious to us that needs to be changed," Rowe said.

But he said the company will face undetermined costs to respond to an anticipated review by the Nuclear Regulatory Commission following the tsunami-induced accidents at several Japanese reactors.

Rowe said Exelon believes the NRC's attention will concentrate on the viability of the 10-mile emergency-planning zone surrounding each reactor - the area plant operators and emergency-response officials would evacuate during an accident.

The review would focus on each plant's preparation for seismic events, the on-site maintenance of spent fuel, and the adequacy of the General Electric Mark 1 reactor involved in the accidents at Fukushima nuclear plant.

"We expect to have new hassles and new costs, but we will meet them thoroughly," he said.

Rowe, Exelon president Christopher M. Crane, and Charles G. "Chip" Pardee, chief operating officer of Exelon Generation, said US reactors incorporated additional security measures following the attacks of Sept. 11, 2001, that are not incorporated in the Japanese plants.

"I am confident our plants are safe," said Crane.

Exelon's reactors include the Limerick Generating Station in Montgomery County; the Peach Bottom Atomic Power Station in York County, Pa.; the Oyster Creek Generating Station in Forked River, N.J., and Three Mile Island Unit 1 in Middletown, Pa.

The Oyster Creek plant and the two Peach Bottom units are similar to the Japanese reactors.

Rowe said the Japanese disaster is not as serious as the 1986 Chernobyl accident in Ukraine, but it "is clearly worse than the 1979 accident" at Three Mile Island.

"It is a very serious incident indeed, and we at Exelon are treating it accordingly," he said.

Exelon Corp. also is the parent of Philadelphia's Peco Energy Co.

Exelon's Rowe: 'Significant Costs' Ahead As Nuke Scrutiny Follows Japan Crisis (CRCHIBIZ)

Reuters, March 25, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

Oldest US Nuclear Reactor: A 'Disaster' In Waiting? (AFP)

By Karin Zeitvogel

AFP, March 25, 2011

LACEY, New Jersey — A sleepy New Jersey town has popped onto people's radar screens because it has the oldest running nuclear power plant in the United States -- and, some say, the most dangerous.

Named for a Revolutionary War general, Lacey is the kind of American town that few from outside the seaside settlement knew much about before the earthquake and tsunami in Japan triggered a nuclear crisis.

Down the road from the 1950s-style diner and across from the bridge that locals use as a fishing pier stands the Oyster Creek nuclear plant.

It uses a GE Mark I Boiling Water reactor identical to those that lost power at Japan's Fukushima plant in the March 11 earthquake and then was struck by a tsunami that knocked out its backup generators, causing reactor cooling functions to fail.

US anti-nuclear activists and many residents of Lacey and surrounding Jersey shore townships worry that a similar nuclear disaster could happen at Oyster Creek, and it wouldn't need an earthquake or tsunami to trigger it.

Oyster Creek has been dogged by problems including a corroding liner in the carbon steel containment unit; leaks that allow radioactive tritium to seep into drinking water; and huge volumes of stocked spent fuel rods.

"We have 40 years of radiation on site -- two-and-a-half to three times more than in Japan," anti-nuclear activist Jeff Brown told AFP.

"You also have that tremendously stupid design to start with where the spent fuel rods are sitting on top of the reactor," he said, raising a fear among residents that the reactor could be an easy target for a terrorist attack.

"At the very least, we need a no-fly zone over Oyster Creek. We have a no-fly zone over Disney World but not here," said Peggi Sturfels, a program organizer at the New Jersey Environmental Federation.

Oyster Creek is owned and operated by Exelon Corporation, which employs 700 people at the plant. The company disputes the charges by activists, insisting the reactor is safe.

"Nuclear power stations in general are the most hardened and well-protected industrial facilities in existence. Oyster Creek is no exception," Exelon spokesman Craig Nesbitt told AFP.

Half a million people live within what would be the evacuation zone if Oyster Creek were ever to have a radiation accident. In the summer, the population swells with beach-goers heading to the Jersey shore.

The town is 85 miles (137 kilometers) south of New York and 55 miles (88 kilometers) east of Philadelphia.

New Jersey is not in a seismically active zone but meteorologists say the coastal state is long overdue for a Category Five hurricane.

"One good storm surge, and Oyster Creek's backup generators are swamped. It's Japan all over again," Sturfels said.

Nesbitt rejects such assessments, saying the plant is five miles (eight kilometers) off the Atlantic coast, protected by barrier islands, and 23 feet (seven meters) above sea level, far higher than the largest recorded storm tide of seven feet, in 1962.

He also said Oyster Creek "is constantly evaluated and improved," and that more than \$1 billion has been spent on plant upgrades since operations began in 1969.

The Nuclear Regulatory Commission extended Oyster Creek's license for another 20 years in 2009.

The NRC not only gives out nuclear licenses but is the industry safety watchdog. That's a conflict of interest, say critics who liken the situation to the regulation of the oil industry prior to last year's devastating Gulf of Mexico oil spill.

Under pressure from state officials, Oyster Creek's license was rolled back to 10 years, and the plant is now due to close for good in 2019.

Even that's too late, say some residents.

"I don't like it. They should close it sooner," retiree Barbara Murrofsky told AFP as she shopped at a local hardware store.

"What's happening in Japan has made us more aware of the problems we have in our own backyard," she said. "There are so many people who live near here that an accident would be a major disaster. They should shut it down now."

But another local, Rick Gifford, looked philosophically at Oyster Creek.

"It's been running for 40 years with no problem, there's no reason it should start having problems now," he said.

Greg Auriemma, a lawyer for the Sierra Club environmental group, said Gifford's stance was not unusual in Lacey.

"There's a sense of complacency because while the plant has had a lot of negative publicity, no major disaster has occurred. So people look at it and say, 'It's been running for 40 years, what's the big deal?'"

But, Auriemma said, as Japan showed, one tragic event can dramatically change the situation. "There's a potential disaster that could happen right here in our backyard," he told AFP.

Last week, President Barack Obama ordered a "comprehensive review" of US nuclear safety and vowed to learn lessons from Japan's atomic accident.

The NRC on Wednesday launched its review of the nation's 24 US reactors, saying a full report and recommendations will be published in six months.

A federal court hearing a case brought in 2009 by environmental groups against the NRC on Monday asked the nuclear watchdog to advise if Japan's unfolding crisis impacted "the propriety" of renewing Oyster Creek's license.

On the same day, the NRC extended for 20 years the license of another Mark 1 reactor, in the state of Vermont.

The Vermont Yankee reactor has had tritium leaks, a cooling tower collapse and even a fire in the plant's transformer.

Another Look At Oyster Creek (ASBPP)

Asbury Park Press, March 23, 2011

Somebody's listening.

Finally.

And all it took was a devastating earthquake and tsunami a world away.

The Third Circuit Court of Appeals, in a letter dated Monday, asked the US Nuclear Regulatory Commission if events at the Fukushima Daiichi reactor site have changed the agency's thinking about the wisdom of granting a license extension for the Oyster Creek nuclear power plant in Lacey.

The court, which is considering an appeal of the relicensing by a coalition of activists, wants the NRC to explain "what impact, if any, the damages from the earthquake and tsunami at the Fukushima Daiichi Nuclear Power Station have on the propriety of granting the license renewal application for the Oyster Creek Generating Station."

Basically, they're asking the NRC to justify relicensing a boiling water reactor of the same design as those at Fukushima — particularly in light of the questions about whether the containment vessel surrounding the reactor at Oyster Creek is corroding.

The NRC license renewal enabled Oyster Creek owner Exelon Corp. to operate the plant until 2029. But Exelon struck a deal with Gov. Chris Christie to close the plant by 2019, under pressure from state environmental officials who wanted cooling towers built to reduce the plant's daily draw of water from Barnegat Bay.

While the NRC is preparing its defense for having relicensed Oyster Creek, the court also should consider the agency's decision to grant Exelon a fire safety exemption in 2009. The NRC requires certain fire safety features and procedures in order to operate. Citing the cost, Exelon asked for exemptions and the NRC granted them.

Given the age of Oyster Creek, the 550 metric tons of radioactive waste on top of its rusting drywell and a host of other factors, a cascading series of events could place the public at grave risk.

If the NRC can't adequately justify its relicensing decision when it appears before the Philadelphia appellate court in less than two weeks, the plant should go dark. Obviously, shutting down a nuclear plant is not simply a matter of turning out the lights and hanging a "Gone Fission" sign on the door. But the sooner the reactor is closed and fully decommissioned, the sooner New Jerseyans can rest a bit more easily.

US Nuclear Output Little Changed As Entergy Boosts FitzPatrick (BLOOM)

By Colin McClelland

Bloomberg News, March 25, 2011

US nuclear-power output was little changed as Entergy Corp. (ETR) boosted the FitzPatrick reactor in New York and Public Service Enterprise Group Inc. (PEG) slowed Salem 2 in New Jersey, the Nuclear Regulatory Commission said.

Power generation nationwide increased by 209 megawatts from yesterday to 85,393 megawatts, or 84 percent of capacity, according to a report today from the NRC and data compiled by Bloomberg. Seventeen of the nation's 104 reactors were offline.

Entergy Corp. increased output its 852-megawatt FitzPatrick reactor to full power from 55 percent of capacity yesterday. The plant is located 6 miles (10 kilometers) northeast of Oswego.

Public Service reduced power from the 1,130-megawatt Salem 2 reactor to 75 percent of capacity from 90 percent yesterday. The plant is about 18 miles south of Wilmington, Delaware.

Some reactors close for maintenance and refueling during the spring and fall in the US, when demand for heating and cooling is lower. The outages can increase consumption of natural gas and coal to generate electricity.

The average US reactor refueling outage lasted 41 days in 2009, according to the Nuclear Energy Institute.

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Nuclear Boogeyman Or Boon? Why America Has Conflicting Fears, Appreciation For The Mighty Atom (WP/AP)

Associated Press, March 25, 2011

WASHINGTON — Nuclear radiation, invisible and insidious, gives us the creeps.

Even before the Japanese nuclear crisis, Americans were bombarded with contradictory images and messages that frighten even when they try to reassure. It started with the awesome and deadly mushroom cloud rising from the atomic bomb, which led to fallout shelters and school duck-and-cover drills.

On screen, Bert, the ever-alert turtle of the government civil-defense cartoons, told us all we needed to do was shield our eyes when the bomb exploded and duck under our desks. Jane Fonda in "The China Syndrome" told us to be worried about nuclear power accidents, and just days later, Three Mile Island seemed to prove her right. Now bumbling nuclear plant worker Homer Simpson, Blinky, the radiation-mutated, three-eyed fish, and evil nuclear power plant owner Montgomery Burns make us giggle and wince.

The experts tell us to be logical and not to worry, that nuclear power is safer than most technologies we readily accept. Producing and burning coal, oil and gas kill far more people through accidents and pollution each year.

But our perception of nuclear issues isn't about logic. It's about dread, magnified by arrogance in the nuclear industry, experts in risk and nuclear energy say.

"Whereas science is about analysis, risk resides in most of us as a gut feeling," said University of Oregon psychology professor and risk expert Paul Slovic. "Radiation really creates very strong feelings of fear — not really fear, I would say more anxiety and unease."

Some experts contend that when a disaster has potentially profound repercussions, we should pay attention to emotions as much as logic.

Nuclear energy hits all our hot buttons when we judge how risky something is: It's invisible. It's out of our control. It's manmade, high-tech and hard to understand. It's imposed on us, instead of something we choose. It's associated with major catastrophes, not small problems. And if something goes wrong, it can cause cancer — an illness we fear far more than a bigger killer like heart disease.

Thirty years ago, before the 1986 Chernobyl nuclear disaster, Slovic took four groups of people and asked them to rate 30 risks. Two groups — the League of Women Voters and college students — put nuclear power as the biggest risk, ahead of things that are deadlier, such as cars, handguns and cigarettes. Business club members ranked nuclear power as the eighth risk out of 30. Risk experts put it at 20.

The only fear that Slovic has seen as comparable in his studies to nuclear power is terrorism.

A Pew Research Center poll after the Japanese nuclear crisis found support for increased nuclear power melting down. Last October the American public was evenly split over an expansion of nuclear power; now it's 39 percent in favor and 52 percent opposed.

"Nuclear radiation carries a very powerful stigma. It has automatic negative associations: cancer, bombs, catastrophes," said David Ropeik who teaches risk communications at Harvard University. You can't separate personal feelings from the discussion of actual risks, said Ropeik, author of the book "How Risky Is it, Really?"

But Ropeik, who has consulted for the nuclear industry, said those fears aren't nearly as justified as other public health concerns. He worries that the public will turn to other choices, such as fossil fuels, which are linked to more death and climate change than the nuclear industry is. He cites one government study that says 24,000 Americans die each year from air pollution and another that says fossil fuel power plants are responsible for about one-seventh of that.

At the same time, health researchers have not tied any US deaths to 1979's Three Mile Island accident. United Nations agencies put the death toll from Chernobyl at 4,000 to 9,000, with anti-nuclear groups contending the number is much higher.

Since 2000, more than 1,300 American workers have died in coal, oil and natural gas industry accidents, according to federal records. Radiological accidents have killed no one at US nuclear plants during that time, and nuclear power has one of the lowest industrial accident rates in the country, said Nuclear Energy Institute spokesman Steve Kerekes.

Alan Kolaczowski, a retired nuclear engineer, consulted with the Nuclear Regulatory Commission on specific probabilities of accidents at nuclear plants. He estimates the risk of a disaster at a given plant at 1 in 100,000 — about the same as your chance of being killed by lightning over your lifetime. For comparison, an American's odds of dying in a car crash are 1 in 88; being shot to death, 1 in 306; and dying from bee stings, 1 in 71,623, according to the National Safety Council. The council

couldn't come up with the odds of dying from radiation because it lists zero people dying in the United States from radiation in 2007, the most recent year for which these cause-of-death figures are available.

Ropeik calls this mismatch between statistics and feelings "a classic example of how public policy gets made — not about the numbers alone, but how we feel about them, and it ends up doing us more harm."

Kolaczowski faulted his own industry.

"Those in the industry believe it is so complex it cannot be explained to the general public, so as a result, the industry has a trust-me attitude and that only goes so far," he said. "We're all afraid of the unknown, the ghosts under the bed."

David Lochbaum of the Union of Concerned Scientists, a group that presses for safer nuclear plants, is a former plant engineer. He likens the public's fears to unjustified worries about shark attacks: The risks and deaths are small, but the attention and fears are big.

"It may be an irrational fear, but I don't think it's one that can be educated away," Lochbaum said.

However, calling these fears irrational isn't justified, said Georgetown University law professor and former Environmental Protection Agency associate administrator Lisa Heinzerling. She said people's concerns have been unjustly trivialized.

People have been trained to think about and prepare for low-probability, catastrophic events like the earthquake and tsunami that caused the Japanese nuclear disaster, Heinzerling said. She pointed to homeowner's insurance. Most people won't have a fire that destroys their home, but "we worry about really big things even if they are improbable because we will be wiped out."

Americans also have long had an ambivalence toward new technology, going back to worries about the introduction of electric lights in homes 130 years ago, said University of Detroit Mercy history professor John Staudenmaier,

"Americans overreact with adulation and awe, then overreact with fear and anxiety," said Staudenmaier, editor emeritus of the academic journal *Technology and Culture*.

Trying to explain the fears, nuclear industry spokesman Kerekes said, "There's a perception gap that exists." But he adds: "Other industries haven't had to do deal with an animated cartoon series that lasted, what, 25 years?"

That would be "The Simpsons." Producer Al Jean said the show, which has been on the air since 1989, reflects America's real feelings.

"There is something that taps into people's view of big business, and in particular, nuclear power, which is giving profit-minded people complete control over life and death. It is a scary thought, and I think that is a topic for satire," Jean said.

Jean recognizes that nuclear plant workers aren't really like Homer Simpson and radiation doesn't "put a cute third eye on a fish." But he thinks his show is accurate with its portrayal of the greedy, conniving nuclear power plant owner Montgomery Burns: "Mr. Burns may be representative of some people in the nuclear industry — not just nuclear, but all industries — who seem like they're more interested in getting the money rather than doing what's safe. I think that's what resonates in the public."

Yet, Jean takes pride in noting that the Springfield nuclear power plant has never blown up.

The lack of transparency in the nuclear industry— including Tokyo Electric Power Co. — has caused some of the problems, said Baruch Fischhoff, a professor of decision sciences at Carnegie Mellon University. It is a charge Kerekes disputes.

"The nuclear industry has behaved in a way that is untrustworthy, both in the sense of not telling people the truth and not having the competence to manage their own affairs," Fischhoff said. He added that industry is too quick to brush off people's fears: "Telling the public that they are idiots is certainly not a way of making friends."

Online:

Paul Slovic's Decision Research: <http://www.decisionresearch.org/>

The Nuclear Energy Institute: <http://www.nei.org/>

The Union of Concerned Scientists: http://www.ucsusa.org/nuclear_power/

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For Safer Nuclear Power Plants, Leave The '70s Era Behind (CSM)

Christian Science Monitor, March 25, 2011

For safer nuclear power plants, leave the '70s era behind

The Christian Science Monitor

There's much to not like about nuclear power. In an ideal world people wouldn't rely on it. But the crisis at the Fukushima Daiichi nuclear power plant in Japan shouldn't cloud what should be a clear-eyed view of the global energy future: The world needs nuclear in the mix.

Yes, renewables such as solar, wind, and geothermal will play a growing role. The oil price shock and Fukushima Daiichi bear witness to the need to get them online more quickly. But renewables now produce only a tiny fraction of the world's energy needs. They are far from ready to shoulder the load as a major generator of electricity.

Today's workhorse fuel for making electricity is coal. But it's dangerous to mine. Burning it emits particulates into the atmosphere believed to cause about 10,000 premature deaths per year in the United States alone. It's also a significant source of carbon-dioxide emissions, which contribute to climate change, including the acidification of oceans. These downsides add up to their own potential slow-motion disaster.

Nuclear power has a familiar list of concerns. Unanswered questions include how to protect plants from terrorists, how to prevent spread of nuclear materials that could be made into bombs, and how to permanently dispose of nuclear waste. These issues are likely to persist and may long defy completely satisfying solutions.

Yet nuclear power today provides about 20 percent of the electricity in the US and about 14 percent worldwide. Shutting it down would leave a void that would be difficult to fill. One country that recognizes this is China, which is moving ahead with building nuclear plants while simultaneously pushing hard to develop renewable energy and, unfortunately, also building new coal-fired power plants.

If the US and the world can't afford to abandon nuclear power, how can it be made safer?

It starts with a safety review of the 104 US nuclear power plants by the Nuclear Regulatory Commission (NRC) begun this week. Plant safety training, systems, and equipment, along with evacuation plans, need to be subjected to fresh assessments. The NRC also should welcome close outside scrutiny of itself, to see if it is adequately performing its watchdog role.

Longer term, safety means "building a new generation of safe, clean nuclear power plants," as President Obama said in his January State of the Union address. Existing US plants, planned or built in the 1970s, before half of today's Americans were born, are beginning to exceed their planned lifetimes. Yet they will need to stay online for many more years – as long as they can be kept safe.

New designs operate on the simple-is-better principle, with the idea of making them "walkaway safe." That means plants shut themselves down safely in an emergency even if their power is cut and their human operators are forced to evacuate.

One new design stores cooling water above the reactor, eliminating the need to pump water to the reactors, which has proved to be a problem at Fukushima Daiichi. It is expected to be 100 times safer than today's reactors.

Other nuclear plant technologies show promise, including small modular reactors that might be used to power a single industrial factory, gas-cooled (not water) graphite reactors, and the pebble-bed reactor, in which small balls of radioactive material are covered by a graphite coating, making a meltdown highly unlikely. Though many countries have looked at the pebble-bed design, China is leading its development.

Americans today don't rely on 1970s technology in many aspects of their lives. They communicate on smart phones and tablet PCs, watch high-definition TV and 3D movies, and drive cars with hybrid engines and GPS guidance systems.

Why should America's crucial nuclear power plants be trapped in the bell-bottom era of technology?

Imagining The US Without Nuclear Power (NPR)

By Jennifer Ludden

NPR, March 25, 2011

It's been nearly two weeks since reactors at Japan's Fukushima Dai-ichi nuclear power plant first threatened a full meltdown. The crisis lead countries around the world to rethink their use of nuclear energy. In Germany, Chancellor Angela Merkel last week reversed course. She imposed a moratorium on nuclear power and says she hopes to phase it out for good. In this country, the US Nuclear Regulatory Commission has announced a safety review of all American nuclear power reactors, but President Obama remains a supporter of nuclear power, touting it as a relatively clean energy source that will help cut down on the nation's greenhouse gas emissions.

Still, the crisis in Japan raises the question: Should this country go without nuclear power? And if it did, what would fill the gap? Later in the hour, with pressure rising across the Middle East, what's at stake in Yemen? But first, should the US live without nuclear energy? Give us a call. Our number in Washington is 800-989-8255. Our email address is talk@npr.org, and you can join the conversation at our website. Go to npr.org and click on TALK OF THE NATION.

Joining me now to imagine a US without nuclear power is Michael Levi. He's senior fellow for energy and the environment at the Council on Foreign Relations and director of their program on energy security and climate change. He joins us from the studio at the Council on Foreign Relations. Welcome to TALK OF THE NATION.

Dr. MICHAEL LEVI (Council on Foreign Relations): Good to be with you.

LUDDEN: First, can you just establish for us how significant is nuclear energy in this country?

Dr. LEVI: Nuclear energy supplies roughly 20 percent of US electricity, so that's a big share. It's roughly equivalent to the amount supplied by natural gas and about half of the amount supplied by coal. Their balance is made up mostly by hydro-electricity and also by renewables like wind and solar.

The one part of the economy where nuclear isn't a player is, of course, in transportation, which makes up a huge fraction of our energy demands.

LUDDEN: Right. So am I correct, 104 nuclear power plants in the US?

Dr. LEVI: That's correct. One hundred and four nuclear power plants. The last one came online in 1996, but the last one to be approved for new construction was in the late 1970s.

LUDDEN: And generally speaking, where are they?

Dr. LEVI: They're all over the country, from California to New York State. In the Southeast, they are particularly dependant on them, but they are scattered throughout.

LUDDEN: And you said the last one approved was in the '70s? So I'm hearing Three Mile Island - was that kind of a big factor in our energy - nuclear policy?

Dr. LEVI: It's tricky to disentangle the pieces. Nuclear was already on its way down before Three Mile Island. Costs were going up, both to build the plants and to finance that construction. Might those costs have come down in the 1980s? Perhaps. We'll never know because Three Mile Island really killed off nuclear, and killed off public appetite for nuclear, while cost was already doing it in.

And that's going to be a question now again. We've still not resolved the cost question. So if we sort out the safety side, we still don't know whether people will want to build these.

LUDDEN: But now the Bush administration had hoped to increase use of nuclear power and President Obama has invested funds to expand it further. Tell us about that.

Dr. LEVI: There has been growing interest in nuclear power across the political spectrum. Republicans have traditionally been enthusiastic about nuclear and President Bush's position reflects that. Democrats have become increasingly positive toward nuclear because of their concern about climate change. We have a variety of options, of possibilities down the road, for zero carbon, zero emissions generation. But right now nuclear is the only one that's established at scale and at a cost comparable to fossil fuels.

And so President Obama, along with a lot of other moderate Democrats, has turned to nuclear as a significant part of their climate change strategy. I don't see these people as being particularly enthusiastic about nuclear, but they've increasingly come to be able to live with it.

LUDDEN: And 8.3 billion in funds just last year for two reactors in Georgia. Is that correct? What's...

Dr. LEVI: So the US government provides support for nuclear power in a variety of ways. The most prominent is a backstop on insuring the reactors and loan guarantees that provide some insulation from risk in financing these plants. There's so much risk in construction and cost escalation, but also in regulatory challenges and in public approval, that in order at least to get a few plants out there, the government decided that it needed to provide these backstops.

The idea was to demonstrate that plants could be built and then to take off the training wheels, as it were, and allow the industry to grow on its own. But there are a variety of other supports. Nuclear is eligible for a small but non-trivial tax credit for production for the first eight years that the plant operates. And there are other pieces, particularly on the research and development side, in helping develop next generation technologies that might be safer and more resistant to nuclear proliferation.

LUDDEN: So how many new plants then are kind of in the works, and where would they be built if that happens?

Dr. LEVI: There are roughly a couple dozen plants that have been proposed, at least on paper. There are none that are really in the - in the substantial stages of construction yet. They're still being pulled together. The proposals extend across the country. I can't list them off for you. But right now the fundamental question facing all of these, aside from the safety issue that's come up recently, is cost.

Two things were driving nuclear as of a few years ago - high natural gas prices and the prospect of climate legislation that would have pushed generation away from coal. Now you have natural gas prices that have cratered, so gas is the cheap alternative and climate legislation has moved to the back burner, which means that gas and coal in particular are much less likely to be penalized in the near term.

It's a perfect storm against nuclear right now.

LUDDEN: Huh. Interesting. Now, you wrote for Slate this week. You asked about what phasing out nuclear energy would mean for the US, but you started by pointing out some things that would not change dramatically, and the first of that being electricity prices. Why is that?

Dr. LEVI: If we phase out nuclear for the United States over an extended period of time, we would be replacing it with generation that's not any more expensive. Now, nuclear that is already established and already out there is relatively cheap. What costs money is building the plants. The fuel is relatively inexpensive. So if you switch very rapidly, you're taking something that's close to free and replacing it with something that costs money.

But over time you replace it with other generation as nuclear - as established nuclear plants become more expensive to operate and you don't have a big change. Now, if we wiped out the US nuclear capacity overnight, yes, rates would go way up, in particular in order to cut demand. That's not the kind of thing that any policy maker is considering. So when we look at nuclear, electricity prices are not the are not the crux on which we should be basing our decisions.

LUDDEN: Okay. One thing that people do talk about is the environment, the trade-off of carbon emissions and so forth. Let's bring someone else in. Frank Zeman is a professor in the School of Engineering and Computing Science at the New York Institute of Technology. He's an expert in carbon management, energy management and environmental engineering, and he joins us now by phone from Kingston, Ontario. Welcome to you.

Dr. FRANK ZEMAN (New York Institute of Technology): Welcome. Thank you very much.

LUDDEN: So proponents of nuclear power will say it's an important part of, you know, reducing our carbon footprint and reliance on fossil fuels like coal and natural gas. And some say it would even be impossible to meet energy needs without - and reduce carbons emissions without nuclear power. Do you agree, and what would the impact be on greenhouse gas emissions if we scale back the nuclear power?

Dr. ZEMAN: Well, I don't agree that it would be impossible. As was stated by the other speaker, it's a big chunk of our existing power supply - in fact, two-thirds of our non-CO2-emitting power supply. So it's not impossible, but it would have to be done as, as he said, gradually and phasing in a lot of renewable capacity.

LUDDEN: What would - if we had no nuclear power anymore in the US, 20 percent of our electricity no longer came from nuclear power, how would that impact carbon emissions?

Dr. ZEMAN: Well, depends what you replace it with. Right now we have a huge excess of natural gas generating capacity. In fact, the capacity factor, which is really how much a natural gas plant is used, on average in the States is somewhere around 22 percent. So that means we have this large amount of excess capacity - more than enough to make up for the current production of nuclear power.

So the emissions would go up somewhere between five to six percent for the US economy as a whole if we replaced all of nuclear with natural gas. So it wouldn't be a big emissions increase. The question is, can you find that gas and how much do you have to pay for it?

LUDDEN: OK. And so would it impact global - I mean, anything that we can say would impact global climate change? Or is that just impossible to really guess?

Dr. ZEMAN: Well, any emission impacts climate change. But when the US is producing roughly six billion metric tons a year, adding, you know, 322 more isn't going to really make a big deal.

LUDDEN: OK, Michael Levi?

Dr. LEVI: If we move along our current course when it comes to greenhouse gas generation, frankly, this change on the margin with nuclear would be quite inconsequential. The bigger question is if we decide to take a serious go at reducing our emissions, will we need to rely on nuclear? And that's an open question right now. The nuclear, like I said before, is the only near-zero carbon source of electricity that's being demonstrated at scale. We have, and at a reasonable price, we have possible alternative options. We have renewables if we can develop the systems for storage and if we can get the costs down. We may have carbon capture and sequestration, where we take the emissions from coal and gas and bury them underground.

Those may materialize at a reasonable cost and at a reasonable scale. They may not. And so we can't constantly predict whether we will need nuclear in order to meet aggressive greenhouse gas reduction objectives 10, 20, 30 years down the road.

LUDDEN: Frank Zeman, what about - you know, existing capacity could not then pick up the slack?

Dr. ZEMAN: Our existing renewable capacity, you mean?

LUDDEN: Yes.

Dr. ZEMAN: No, we don't have - I mean, wind power is the main sort of - what people think of as renewable on the market. And it's only one-third of the nameplate capacity of nuclear power. And then its capacity factor - because the wind doesn't blow all the time - is much, much lower than a nuclear plant, which runs virtually all the time.

So you could do it but you'd have to increase our wind power by almost a factor 20 in capacity to do that.

LUDDEN: All right. We're talking with Michael Levi of the Council on Foreign Relations and Frank Zeman with the New York Institute of Technology. And we'll take your calls as well. Should the US phase out nuclear power? What would replace it? We'll get to more of your calls. 800-989-8255, or you can send us an email, talk@npr.org. I'm Jennifer Ludden and this is TALK OF THE NATION from NPR News.

(Soundbite of music)

LUDDEN: This is TALK OF THE NATION. I'm Jennifer Ludden in Washington.

Workers at the Fukushima Dai-ichi nuclear plant in Japan made progress today in bringing the damaged reactors under control. The lights are back on in the control room of unit number one. Engineers can now see what needs to be fixed. But the cooling pumps are still not working and two people at the plant were hurt when they walked in radioactive material. Both were being treated at a hospital.

The ongoing crisis in Japan has made many countries rethink their use of nuclear power. Switzerland and Taiwan are looking into reducing their reliance on nuclear power and ramping up renewable energy from sources like wind and solar.

We'll talk more about that in a moment. Should the US live without nuclear energy? Give us a call. Our number is 800-989-8255. The email address is talk@npr.org. Or join the conversation at our website. Go to NPR.org and click on TALK OF THE NATION.

Our guests are Michael Levi, director of the Council on Foreign Relations Program on Energy Security and Climate Change. He also wrote the book "On Nuclear Terrorism." And Frank Zeman, an expert in carbon management - energy management and renewable energy. He directs the New York Institute of Technology's Center for Metropolitan Sustainability.

Michael Levi, I just want to ask you about some of the other countries that have been rethinking their policy. Germany really has taken this very seriously and made quite a shift in its policy. Tell us about that.

Dr. LEVI: There was already an alignment of political forces in Germany pushing things away from nuclear power. Germany has swung back and forth in its policy toward nuclear power over the years. That can be explained in substantial part because it has a Green Party that carries a lot of political weight, particularly given its peculiar parliamentary system. And so the chancellor was in some ways looking for an opportunity to move in a political season away from nuclear, and this provided her with an opportunity.

You've seen in contrast with that, in France the public is generally pro-nuclear and the alternative options are quite limited because France already relies on nuclear for 80 percent of its electricity. There hasn't been a significant change and you wouldn't expect there to be one.

LUDDEN: And why - I'm just curious why France does rely on it so much. At what point was that decision made and was there not much opposition to it?

Dr. LEVI: I actually don't have a good answer for you on that. But the reason that France has been able to build that much nuclear is because it's essentially a state-run enterprise. So the risks and costs are socialized. You don't have the same problems of uncertainty and regulatory issues and financial issues that you do in this country.

It's also been part of a broader industrial strategy. France is not into this only for domestic electricity production but also for exports of nuclear technology.

LUDDEN: All right. Do you see other countries out there where some serious rethinking is happening and could actually change where policy really could change?

Dr. LEVI: Well, clearly we'll watch Japan. Japan has other things to focus on right now. There are places where people will take another look at their regulatory systems. China has a pause on new approvals in order to revisit its regulatory system. I'm sure India will take a look, and nuclear is politically controversial in India.

One place I'll be interested in watching is the UK, where there is a governing coalition between the - essentially between the right the liberal left. One of the key points of disagreement when they entered that coalition was over the future of nuclear power. They agreed to disagree. It will be interesting to see whether they can continue to do that.

LUDDEN: All right. Let's bring some callers in. Nat is on the line from Buffalo, New York. Hi, Nat.

NAT (Caller): Hi, how are you?

LUDDEN: Go right ahead. Good. Go right ahead.

NAT: OK. Well, I think, environmentally speaking, phasing out nuclear energy would be very dangerous for us, where I feel that nuclear plants should(ph) provide us with carbon-free energy, especially in the short term, while we, you know, spend more time and time money putting research and development into making solar more efficient and cost effective, especially on the individual scale, where people can buy it, put it in their home and kind of go off-grid.

You know, the US has one of the largest Kraytons, I think, on the planet and stability and safety-wise, you know, we could place these nuclear plants in areas where, you know, they're not on a faultline or at risk of tsunami flooding. I just think it would be very irresponsible for us and hysterically wrong to phase out a nuclear program in the US

LUDDEN: All right. Thanks for the call. Frank Zeman, would you agree with that? Or...

Dr. ZEMAN: Well, I think it's he's - the caller is correct. It's always wrong to act in hysterics, but I don't think it's wrong to phase it out on the sense of replacing it with renewables because it is in fact only 20 percent of our power. Even though that's a

large number, we do have the natural gas backup existing and we do have the land mass to produce - wind essentially is the only thing that's near market.

So I don't think it's wrong to consider phasing it out because these plants are getting old, and even if we started to full bore construct nuclear plants, could we keep up with the pace that the old ones have to be decommissioned?

And where's the waste going to go? Nobody's answered that question.

LUDDEN: Right. Waste is a big question. Before we get to waste, is there an age limit on these plants? I mean, what's their lifespan?

Dr. ZEMAN: I don't know. That's a tough question. I mean, the plant in Japan was 40 years old, to my knowledge, and as Mr. Levi said, the last plant commissioned in the States was in the '70s, so you're approaching that limit. But concrete itself, roughly speaking, is about 60 years. So what happens to the concrete?

LUDDEN: Is there a 60-year-old plant in the world, in the US?

Dr. ZEMAN: Sorry?

LUDDEN: Is there a 60-year-old nuclear plant anywhere that we know? We don't have a precedent for this?

Dr. ZEMAN: I can't answer that question. I don't know.

LUDDEN: All right. Let me ask you then about the waste. Where does the waste go and how much is that a factor in figuring out what to do next? Either one of you can go ahead.

Dr. LEVI: I can quickly address the lifetime issue.

LUDDEN: Sure.

Dr. LEVI: Plants are initially licensed for 40 years. They then apply for extensions on 20-year periods. So far roughly half of the operating reactors in the United States have been re-licensed for another 20 years. And analysts tend to assume - or have tended to assume that after 60 years these plants might actually be re-licensed for 20 years more. The lifetime matters a lot because a power plant, a nuclear plant, is very expensive to build. So the longer period of time you can spread that capital cost over, the lower the average price of electricity, the more competitive the plant.

With age comes some other issues. There's a design issue. Newer designs tend to be better and safer. But there are also structural issues, and whatever the lifetime of concrete is in a normal situation, you also have exposure to radiation and to other corrosive chemicals that cause concerns and that are addressed in the re-licensing process.

Right now with waste we do have a big issue. We have waste basically stored onsite in cooling pools like has been the case in Japan. And a lot of the attention in Japan has been focused on the safety of those spent fuel pools. We have a stalled debate on a long-term repository. Yucca Mountain was supposed to be the destination but it has been consistently blocked. In the interim we do have a prudent, sensible step we can take. We can rearrange the pools in order to make accidents less likely. And after a short period of cooling we can move spent fuel into what's called dry cast storage above ground, where fires are less likely and are easier to put out. That's been recommended for several years. It's been resisted. It is a relatively inexpensive step that we could take in the near term that has been done elsewhere in order to improve safety and provide at least a medium-term way of addressing the waste challenge.

LUDDEN: Frank Zeman, what about - are you confident in long-term plans for dealing with waste?

Dr. ZEMAN: Well, I don't doubt that geologically you can find a place that's relatively stable. Nothing is perfect and I think that's where the risk comes in. Even if the chance of something going wrong is infinitesimal, people are going to feel uncomfortable with it. Keeping things onsite is an interesting option because what do you do with the reactor if it's radioactive itself? If you're going to have to entomb the reactor and you can't get the rods off-site because nobody wants them there, what about leaving them just on the site itself, creating a giant tomb like they did at Chernobyl?

LUDDEN: All right. Let's bring another caller in. Michael is in Hermosa, South Dakota. Go right ahead.

MICHAEL (Caller): Hello. I have a two-part question. First, about the environmental costs of mining uranium, and then also about how much fuel is available in the world, especially compared with the amount of fuel in solar and wind.

LUDDEN: So you want to know cost to the consumer?

MICHAEL: No, the environmental costs of mining uranium.

LUDDEN: OK. Frank? And then Michael. Go right ahead.

Dr. ZEMAN: Oh, well, the environmental costs with uranium mining really have to do with two things. One, tailings disposal, and tailings is the sort of leftover material after you get the ore out. And modern mines tend to build dams to keep them keep the tailing wet so that they don't fly around in the dust. And the second is at the shaft. Do you have water leaking into the shaft and then flowing out?

So I mean, mining isn't perfect and you tend to make a big mess. That's why they tend to be in far-flung places. So it's a very localized cost in some ways, but it adds up, is what I would say.

LUDDEN: And Michael Levi, is there plenty of uranium out there?

Dr. LEVI: There is plenty of uranium out there. Look, we're going to run out of uranium sooner than we run out of the sun and the wind. But at current plans we are going to have economical resources of uranium for many decades. And we can move to recycling techniques which are unwise right now, by which might make sense considerably further down the road if we have limited resources.

Obviously the amount available at a reasonable price will depend on how quickly the nuclear fleet grows. But for all plausible growth scenarios, people are not concerned about hitting economic limits on recoverable uranium supplies.

LUDDEN: Okay, Michael. Thanks for the call. Terry is in Robbins, Tennessee. Go right ahead.

TERRY (Caller): Thank you, Jennifer and your guests. How many wind turbines could you build for the price of one nuclear power plant? Also wind turbines and solar panels. And how much faster can they be online versus the nuclear plant? And there's a lot of costs involved in nuclear that's never been touched.

LUDDEN: Frank Zeman.

Dr. ZEMAN: Well, it's a trick question, I think, because nobody actually knows what nuclear power costs, because the government - we all know how much waste disposal is going to cost yet; the government provides insurance at a discount. So - I mean, to get an actual cost for nuclear would be, I think, at best a guess at this point, so we don't really know.

I mean, the wind turbines have the - and solar panels have the advantage of being mass produced. So you can build a factor that produces parts and they're shipped to the site. So I think it's doable. The cost - you know, solar panels tend to be, you know, three to four times the cost of wind. So it would probably be smarter to start with wind, but it's certainly doable. It's really above what people want to pay for and whether they want to see their power.

The nice thing about nuclear power is you have a giant facility producing a gigawatt of electricity instead of 1,000 one-megawatt wind turbines on the landscape. So it's about what people want to see in some parts.

LUDDEN: Hmm. Michael Levi?

Dr. LEVI: It's essentially impossible to do a head-to-head comparison, not necessarily for the reasons that Frank identifies, but because nuclear provides a different sort of power service from wind and solar. Nuclear provides what we call base load power, that's that consistent, steady level of power that you need at all times. Wind and solar provide what we call peaking power. So they provide inconsistent power that, if well-designed, delivers energy at times when demand is higher. So there's this matching to load that makes comparison very difficult.

You generally compare wind and solar with natural gas, which is also able to vary with time. And right now wind is not competitive with gas at its current price. But if gas got a little bit more expensive, there might be a more competitive situation. And solar is simply uncompetitive with other resources.

There are some solar technologies that might deliver competitive power with nuclear well down the road. We talked about something called solar thermal that allows you to smooth out that power delivery over time.

And if we could add storage, we might change the equation too. But we have no idea how expensive that storage would be, which makes it essentially impossible for us to predict the net price.

LUDDEN: All right. Terry...

Dr. ZEMAN: I would just jump in there quickly and say you could actually consider a wind system with 100 percent gas backup. And that would allow you to provide a base load-type scenario, especially given the fact that nuclear is only a fifth of our power. So it's a large chunk again. I don't want to underestimate the size of the nuclear power. But you could conceivably price out a gas backup...

LUDDEN: All right. Terry...

Dr. ZEMAN: ...you can have this capacity.

LUDDEN: ...thanks for that phone call. We're talking about whether the US should reduce its use of nuclear power. You're listening to TALK OF THE NATION from NPR News.

We've got an email from Steven in San Rafael, California, who asks: Besides the waste, another issue I never hear discussed is the amount of cooling water these plants use and the hot water they emit back to the environment. Is this an environmental problem, especially if the plant uses fresh water? Michael or Frank?

Dr. LEVI: It's certainly part of the equation. One of the challenges you've seen recently is that on particularly hot days, when electricity demand happens to be high, that's when the thresholds you need to set for discharge of hot water from nuclear plants are the strictest, because bodies of water are already close to the thresholds that you don't want to cross. So certainly hot water discharge is part of it. But as many people have pointed out, there are environmental risks associated with all conventional forms of electricity generation, whether it's coal, natural gas, hydro or nuclear. You need to decide which poison you want to pick.

LUDDEN: All right. We've got a caller from Cleveland, Ohio. Hi there, Jeff.

JEFF (Caller): Hi. Good afternoon. I served in the nuclear navy in the '70s. I lived on top of two reactors for four years, had no problems with it whatsoever. In the military environment, nuclear power is extremely safe. The moment you make it part of the

profit equation, the safety goes out the window. And we can see that in the Japanese reactors, in that the corporation that owns those reactors hesitated to use salt water to immediately cool them down because they feared damaging their equipment permanently.

LUDDEN: Hmm.

JEFF: You can't trust a corporation to do this.

LUDDEN: Well, thanks for the call there. Frank Zeman, how about that idea?

Dr. ZEMAN: Well, again, I would go back to saying nuclear is not all that corporate in the sense that the corporations just would never take this on on their own and would never seek insurance on the competitive markets for this type of thing. So...

LUDDEN: So all the ones in the United States are - I don't even know this -government administered?

Dr. ZEMAN: No. They're run by corporations, but the corporations run them. They don't build them and insure them, and they haven't - the liability for the waste disposal isn't on their books, as far as I know.

LUDDEN: Huh. Okay.

Dr. LEVI: The corporations pay into a fund for waste disposal. The whole insurance backup question is very complicated. You have a similar situation for offshore drilling. There are two separate issues. One is whether you can price the risk and it seems that you can't. The other is whether there's any insurance company big enough to absorb the blow if something bad happens. If you have a very low probability, very high consequence event, it's almost always impossible for private actor - for private insurance companies to insure that, even if the net risk - probability times consequences - is quite low. So there's potentially a legitimate role for the government there that shouldn't be considered a subsidy, as long as the government charges the right amount to those companies for providing that extra insurance backstop itself.

LUDDEN: All right. We just have a few seconds left, but let's wrap up. I'd like to ask each of you, what do you think, if anything - what impact will the Japan crisis have on our own nuclear policy here? Frank Zeman?

Dr. ZEMAN: I'm not sure it'll have much. I think it'll slow things down, and everybody will be more cautious and review everything. But trying to get a plant built in the US, even before this happened was going to be a really big challenge, and I don't think it's really going to change much. It'll delay it a bit.

LUDDEN: Michael Levi?

Dr. LEVI: Well, first, let's see what actually happens in Japan. This isn't over yet. And the exact consequences will certainly have an impact on how people in the United States react. If we look at the polls a year from now, I wouldn't be surprised if public opinion had shifted, but not all that much. The question will be, what happens to those moderates who had become accepting of nuclear power because of the climate benefits?

LUDDEN: All right.

Dr. LEVI: Will they stick with that position or change?

LUDDEN: Michael Levi of the Council on Foreign Relations, and Frank Zeman at the New York Institute of Technology, thanks so much.

Coming up, what's at stake in Yemen.

I'm Jennifer Ludden. It's TALK OF THE NATION from NPR News.

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PSEG Nuclear Monitors Fukushima Reactor Crisis While South Jersey Nuke Plan Proceeds (NJN)

By Joe Tyrrell

New Jersey Newsroom, March 25, 2011

Crisis conditions at the damaged Fukushima reactor complex in Japan are giving PSEG Nuclear more to consider as it decides whether to build another power plant in South Jersey.

Like the rest of the industry and its regulators, the company is looking for more information on the Japanese situation, according to spokesman Joe Delmar.

"We're still trying to get an understanding of what has or has not happened there," in the wake of a massive earthquake coupled with a tsunami, he said.

But given the different conditions in Japan and New Jersey, the events abroad have not affected the regulatory process here, he said. By the time regulators and the company are ready to decide whether to go ahead with the new reactor, market conditions are likely to weigh more heavily than the current crisis.

In August, the Nuclear Regulatory Commission agreed to review PSEG Nuclear's application for an early site plan permit for the new reactor in Lower Alloways Creek near its existing Salem and Hope Creek plants.

"Nothing's changed" with the application, Delmar said. "It's about a 40-month review process, and there are no milestones associated with it at this time."

The company is not expecting an NRC decision until 2013, and that is just one step, he said. The permit would be valid for 20 years, and if necessary the company would be able to apply for a 10-to-20-year extension. In all, the NRC likely would take five to eight years to decide on an operating permit for a new plant.

President Barack Obama is committed to increasing nuclear power in the United States, but that is likely to be a harder sell in the wake of the spread of radiation in Japan from the damaged reactors.

Last year, the administration failed to get US Senate approval for an energy policy including a so-called "cap and trade" system for polluting power plants. The proposal would have created a marketplace where plants that beat pollution standards could sell credits to those that exceed them.

That would have improved the financial outlook for nuclear power, whose plants are expensive to build but release far less air pollution than coal- and oil-fired plants, which have been required to buy the credit.

Uncertainty about the costs and returns of the proposed nuclear plant is "the big thing" PSEG Nuclear must resolve before deciding whether to build, Delmar said. "That, and natural gas prices."

While natural gas prices have risen slightly in the wake of the Japan disasters and the turmoil in the Middle East, the United States has been insulated by steadily increasing domestic production. That situation makes natural gas cheaper than new nuclear capacity.

But the gas industry's expansion into new areas has spurred concern about environmental damage from hydraulic fracturing or "fracking," the high-pressure injection of liquid into shale formations to free gas.

That has been a particular issue in the Delaware River basin, publicized by Josh Fox' Oscar-nominated documentary "Gasland." Last month, 39 New Jersey legislators asked the Delaware River Basin Commission to maintain a moratorium on natural gas drilling until the US Environmental Protection Agency completes a study next year.

Nuclear power proponents cite its cleanliness compared to coal and oil, and the good safety records of many plants around the world, which supply an estimated 14 percent of the globe's electrical needs.

Skeptics point to the localized environmental damage from many plants, which can use vast amounts of water for cooling and return it still warm to surrounding waterways. There is also the possibility of a catastrophe if something does go wrong.

A Japanese government spokesman said today it will review its nuclear policy because "public confidence... has greatly changed" as nuclear workers battle to regain control of the reactors and stop releases of hazardous radiation.

Tokyo supermarkets were hit by runs on bottled water this week after residents were advised not to give tap water to babies less than a year old because of unsafe radiation levels.

That followed earlier findings of radiation exceeding safety standards in milk and vegetables from the Fukushima area. The United States, Hong Kong, and Australia restricted food imports from the area, while Canada increased screening.

Japan's 55 nuclear reactors supply about 30 percent of the country's electrical power. Already one of the higher percentages in the world, that was scheduled to grow to 50 percent through an expansion program over the next 25 years.

But New Jersey has already surpassed that mark. Nuclear power supplies 55 percent of electricity generated in the state, which ranks second in the United States after Vermont.

That total stands to drop if PSEG Nuclear does not go ahead with its new project. In December, the Christie Administration reached a deal with the Exelon Corp. which had threatened to close its Oyster Creek nuclear plant in 2019 if required to add a cooling tower. Under the deal, the cooling tower was dropped but the company is still scheduled to close plant, the oldest in the country.

PSEG Nuclear expects to hear from the NRC by June on license renewals for its Salem and Hope Creek plants, Delmar said. The two plants are built to withstand earthquakes of 6.5 on the Richter scale.

That is far smaller than the monster 8.9 Japanese quake, but well beyond anything recorded in this region, he said. Each full point on the Richter scale represents ten times more shaking amplitude.

Hope Creek uses a General Electric boiling water reactor like those in Fukushima, so the PSEG Nuclear will consider whether the disaster raises any design issues, Delmar said. But a fact sheet released by the company in the wake of the Japanese disaster says systems at Hope Creek offer six different ways to supply cooling water to the reactor in the event of an emergency.

The statement points out the Salem/Hope Creek complex withstood a small 2.8 earthquake in July 2009 with no effects. The location along the Delaware River is better buffered from a tsunami than an ocean site, according to the company. The plants are built to withstand floods of 22.9 feet, while the highest recorded was 8.5 feet, again according to the company.

Joe Tyrrell may be reached at This e-mail address is being protected from spambots. You need JavaScript enabled to view it

South Texas Nuke Plant Delays Lead To Layoffs (HOUBIZ)

By Casey Wooten

Houston Business Journal, March 25, 2011

At least 60 positions at Bay City's South Texas Project nuclear plant will be eliminated because of a plan to slow down the facility's expansion.

Nuclear Innovation North America LLC said on March 22 it is scaling back plans to add an additional two nuclear reactors to the facility, which already operates two reactors.

Nuclear Innovation a joint partnership between New Jersey-based NRG Energy Inc. (NYSE: NRG) and Toshiba Corp.

One hundred employees, some staff members of the South Texas Project Plant, some contract workers, were working on expansion plans.

Some of the South Texas Project employees will be transferred to other parts of the plant, said David Knox, spokesman for NRG Energy.

Official: Disaster Risk Very Low From Spent Big Rock Fuel (PETOSKY)

Petoskey (MI) News-Review, March 25, 2011

While much of the world watches as officials in Japan try to get a handle on the crisis at a nuclear power plant brought on by a recent earthquake and tsunami, experts in this country have said there is no reason to fear radiation from the disaster area on the West Coast of the US much less here in the Michigan.

Although grave, the accident in Japan is two orders of magnitude lower than the 1986 Chernobyl incident, Dr. Wolfgang Bauer, chairperson of the department of physics and astronomy at Michigan State University told the Petoskey News-Review in an interview last week.

"With the amount of radiation that's released right now from there (Japan), even with the most sensitive equipment, you would not be able to measure anything here (in Michigan)," said Bauer.

While most area residents may take comfort in knowing the disaster half a world away won't likely affect us here, some may wonder about the risk of a natural disaster causing a similar problem with the spent nuclear fuel that is still stored just a few miles north of town on the site of where the Big Rock Nuclear Power Plant once stood.

The short answer is: It's just about as unlikely as radiation from Japan reaching us here.

Although part of the problem crews in Japan's nuclear power plants are facing is keeping water on spent nuclear fuel rods, there's a big difference between that spent fuel and what's stored near Big Rock Point, a spokesman for the company that now owns the Big Rock site said.

Mark Savage, a spokesman at for Entergy Corporation based at its Palisades nuclear energy plant near South Haven said the spent fuel at the Big Rock site was once stored in pools just like the spent fuel in danger at the plants in Japan. However, that's where the similarities end.

While the fuel at the plant in Japan is still giving off enough heat that it must be cooled by water to avoid overheating, the spent fuel at the Big Rock site has cooled enough that the heat that it still gives off can be dissipated just by the air that flows through the dry casks in which it is now stored.

"This is a completely passive system with no moving parts, pumps or motors involved. Radiation energy is blocked by the dense steel and concrete containers that make up the system," Savage said in an e-mailed response to questions from the Courier last week.

As for natural disasters, even though Northern Michigan is not prone to earthquakes or tsunamis like Japan and other parts of the US, Savage said, "The cask system is designed to withstand a host of natural disasters, including a tornado and anomalies on Lake Michigan such as storm surges and seiches. The storage system was designed with these worst-case scenarios built in."

He also noted that the storage pad site (also known as an independent spent fuel storage installation) is fenced and protected 24/7 by a security force.

The spent fuel stored at Big Rock Point is expected to remain on the site until the federal government's nuclear waste storage facility becomes available, which likely will be many years from now.

Fermi's Safety (WINDSTAR)

Windsor Star, March 23, 2011

Nuclear reactors are easy targets for criticism these days, and to some degree that's understandable. The explosions and radiation leaks at the Fukushima power plant have contributed to a nightmare scenario for Japan - already reeling from the impact of a devastating earthquake and tsunami.

Anyone in the shadow of a nuclear reactor -and that includes the Windsor region -will be thinking about the issue of safety.

However, local NDP MP Joe Comartin's recent fingerpointing at the Fermi 2 nuclear plant in Monroe, Mich., seems more intent on playing on people's fears than encouraging a constructive discussion.

"I've always had a sense that Fermi was a plant not at the top of the list for guaranteeing safety," Comartin said last week. "When you are faced with that history, if there ever were a natural disaster, you'd have to be highly suspicious of their ability to respond in an effective way."

But Guy Cerullo, a spokesman for DTE Energy, owner of the Fermi 2 plant, disagreed with Comartin's assessment.

"We deal in fact rather than senses and feelings," he said.

According to DTE, Fermi was designed to withstand a 6.1 magnitude earthquake, even if the epicentre was beneath it. DTE says that's 10 times higher than anything seen in Michigan since the 1800s.

Jack Davis, senior vice-president of nuclear operations for DTE, has said that although the Fermi plant design is similar to the Fukushima reactors, it's a newer design and has better protection for safety systems. The plant is also specifically designed to deal with waves and lake surges.

Davis said the backup emergency diesel generators are in concrete bunkers that could not be flooded, so that power to reactor control systems can be maintained. And pathways to vent any pressure from the reactor are much sturdier than the Fukushima plant, minimizing the chances that pressure buildup would cause the kind of building explosions that were witnessed in Japan.

A little more balanced perspective on the part of the MP from Windsor-Tecumseh would have been more helpful.

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FPL Eager To Expand Nuclear Capacity, Suppress Alternatives (PALMBEACHP)

By Stan Smilan

Palm Beach Post (FL), March 25, 2011

The nuclear disaster in Japan has focused attention on the risks of nuclear power as a means to obtain energy independence. Meanwhile, Florida Power & Light is pursuing a license application to build two more nuclear reactors south of Miami - using a creative financing plan that relies on loans guaranteed by the federal government and advance-construction payments extracted from residents and businesses.

In 2007, Congress voted to provide 100 percent guarantees for loans to promote nuclear-power construction. More recently, Florida's Legislature authorized the Public Service Commission to allow the electric utility to charge upfront construction costs to consumers - thereby, providing FPL with the equity portion of the investment. Simply put, FPL will get all the upside profits while shifting the risks to a gullible and unsuspecting public. In effect we are being required to co-sign the loan, and accept all liability if something goes wrong with the project.

However, the PSC balked at the scheme. In response, FPL used political pressure and court proceedings in attempts to oust PSC members - such as Nathan Skop and Chairwoman Nancy Argenziano, who resigned in protest.

At Ms. Argenziano's Oct. 12 news conference announcing her resignation, she said former state Senate President Jeff Atwater, now the state's chief financial officer, had been responsible for inserting the scheme to have ratepayers cover advance construction costs for FPL's nuclear projects.

Unlike Japan, Florida may not be in imminent danger from earthquakes; hurricanes, however, pose a threat to nuclear power. In 2004, following Hurricane Frances, the St. Lucie nuclear plant was shut down, and without power from the grid, diesel generators were the only source of power for circulating water to the reactor and cooling ponds. Hutchinson Island was evacuated, two bridges were immobilized, and 120 National Guard troops were deployed to guard the nuclear plant on the barrier island.

On July 15, 2010, I appeared at a Nuclear Regulatory Commission meeting in Homestead and requested that FPL be required to furnish an EPA statement with a comprehensive assessment of the consequences and costs that could result from a terrorist attack on the two additional nuclear reactors FPL wants to build there. I called the NRC's attention to the official 9/11 commission report that stated the initial Al-Qaeda plot was to hijack 10 to 12 airplanes and attack nuclear power-plants in addition to such national symbols as the World Trade Center.

Additionally, I stated that, "without a comprehensive assessment of the consequences of a terrorist attack on the nuclear facility, no meaningful cost-benefit analysis can be made to obtain informed public consent for FPL's proposed \$20 billion nuclear project."

To date, the NRC refuses to require an assessment of the consequences of a terrorist attack. I noted for the NRC record that 80 percent of Florida's reactors already were concentrated on a 135-mile stretch of coastline in Southeast Florida and that Mohamed Atta and members of his Al-Qaeda cell had been living in Delray Beach prior to the 9/11 attacks .

I noted that a safer alternative to nuclear power was the decentralized cogeneration technology used by the Massachusetts Institute of Technology that doubles energy efficiency providing 21 megawatts of electric power, heating and cooling for the entire campus . The Texas Medical Center in Houston also has an on-site cogeneration power plant that produces 100 megawatts of electricity.

FPL presently sends 60 percent of its energy up the smokestack for discharge as waste . So only 40 percent is useful energy. Remarkably, FPL's survival as a growth company hinges on a strategy of expanding nuclear power and suppressing competition from alternative energy sources such as decentralized cogeneration.

Stan Smilan is a retired airline pilot and former candidate for the Florida Legislature. He lives in Lake Worth.

GE-Hitachi Reactor Design Advances In US Agency Review (BLOOM)

By Simon Lomax

Bloomberg News, March 25, 2011

A reactor designed by a venture of General Electric Co. (GE) and Hitachi Ltd. (6501) is a step closer to winning approval for use in the US, the Nuclear Regulatory Commission said.

The NRC proposed certifying GE-Hitachi Nuclear Energy's boiling-water reactor design after finding the unit meets safety requirements, according to a statement posted today on the agency's website. The agency will seek comments for 75 days.

The NRC is reviewing the design as Japan seeks to avert a meltdown of 1970s-era boiling-water reactors at Tokyo Electric Power Co.'s Fukushima Dai-ichi plant. The reactors' cooling systems were knocked out by a magnitude-9 earthquake and tsunami on March 11. Helicopters and firetrucks have doused the crippled reactors with water as utility workers and government officials restore power to the plant.

The GE-Hitachi design, known as an Economic Simplified Boiling-Water Reactor, "includes passive safety features that would cool down the reactor after an accident without the need for human intervention," the NRC said. Detroit Edison Co., a subsidiary of DTE Energy Co. (DTE), may build a GE-Hitachi unit at its Fermi nuclear plant in Newport, Michigan, if the design is approved, the NRC said.

The final safety report on the GE-Hitachi design, which was submitted for review in 2005, was completed on March 9, two days before the Japanese earthquake, according to the NRC's website. The NRC is aiming to make a final decision in September, according to the website.

GE rose 11 cents, or 0.6 percent, to \$19.64 at 12:22 p.m. in New York Stock Exchange composite trading.

NRC Requests Public Comment On New GE Reactor Design (GWIRE)

By Jenny Mandel

Greenwire, March 25, 2011

The Nuclear Regulatory Commission is seeking public comment on a proposal to certify a new reactor designed by GE-Hitachi, a milestone for the company that carries less promise for new sales in light of recent events.

The company's Economic Simplified Boiling-Water Reactor (ESBWR) passed a staff review earlier this month with a technical determination that the design was safe (E&ENews PM, March 9).

In this next step, NRC will accept public comments for 75 days on a proposed rule to certify the design for use in the United States. When finalized, that rule will allow a utility to apply for a license to operate the reactor without having to independently defend its safety.

The regulator's documentation for the ESBWR reactor also includes an environmental assessment that looks at potential design alternatives designed to mitigate severe accidents, officials said.

The ESBWR is drafted to be significantly safer than the existing fleet of commercial reactors, all of which are decades old. It includes "passive" safety features that are intended to function without external power, which could help to address scenarios like the one unfolding in Fukushima, Japan, where loss of power has led to loss of control at the plant.

Passive safety features on the ESBWR design include a taller reactor vessel, shorter core and improved water flow, all of which are designed to improve natural water circulation and a gravity-powered cooling system intended to maintain water levels if reactor pressure drops.

Final design approval for the ESBWR is expected this fall, though GE expects the first sales to be overseas via ongoing talks in India and Europe, company officials have said. DTE Energy Co. has also selected the design for a new project next to its existing Fermi 2 plant south of Detroit, and NRC is reviewing an application for that Fermi 3 plant.

But the fate of new nuclear buildout remains unknown as stakeholders await resolution of the emergency at the Daiichi plant in Japan, which uses a much older GE design, the Boiling Water Reactor Mark 3. Even once the reactors and spent-fuel ponds are brought fully under control and the immediate crisis ends, it will likely be years before an autopsy of the reactors reveal the full extent and nature of the damage.

[Click here for the Federal Register notice of the public comment period.](#)

NRC Seeks Comment On New GE-Hitachi Nuclear Design (REU)

By Scott DiSavino

Reuters, March 25, 2011

Full-text stories from Reuters currently cannot be included in this document. You may, however, click the link above to access the story.

NRC Officials Cite Problems At SC Nuclear Reactor (AP)

By Page Ivey

Associated Press, March 25, 2011

HARTSVILLE, S.C. -- Federal nuclear regulators and Progress Energy officials said Thursday they were disappointed with last year's performance at the company's reactor in north-central South Carolina.

The Nuclear Regulatory Commission held a public hearing to discuss issues at the H.B. Robinson plant that drew a larger-than-usual crowd, in part because of the problems at Robinson last year and the Japanese nuclear facilities swamped by a tsunami and earthquake this month.

"This has gotten attention at the highest levels of the NRC," agency division director Richard Croteau told company executives during the meeting. "We were disappointed with the regulatory performance at H.B. Robinson last year."

Incidents last year included two fires, a faulty breaker on an emergency generator and inadequate procedures and training for plant operators. Those issues led to four unplanned outages.

"We found we had let our internal standards slip over time," said Robert Duncan, Progress Energy (CPWLP.OB - news - people) vice president for the Robinson plant.

Duncan said it had made changes to leadership, increased training, filled open positions and increased staffing.

None of the issues reported by Progress Energy or found during inspections created a safety threat to the public, NRC officials said. The incidents were categorized as the second-lowest level of concern. Overall, they said, the plant performed safely last year.

But Robinson will be under heightened regulatory scrutiny for at least a year while the issues are addressed.

A few dozen people attended the meeting, some students of Coker College where the meeting was held, some were older residents and others were there representing organizations that oppose nuclear power plants.

Peggy Brown with the Florence chapter of the Sierra Club questioned why Robinson was relicensed last year to operate another 20 years following its original 40-year licensing period.

Of the nine white-level incidents reported at the nation's 104 nuclear reactors last year, three of them were at Robinson.

"I think that's a high-risk for this area," Brown said. "I think this is an old plant that needs scrutiny."

"What happened to the inspection process to pick up some of those failures."

The NRC said it would be reviewing its on-site inspection methods that did not pick up some issues last year before they became problems.

Robinson's age is a factor in one issue - employee training.

"Progress Energy's been operating this plant for 40 years, there's starting to be a turnover there, their experience level is dropping," said Randall Musser, who is in charge of onsite inspectors at Robinson.

The procedures the plant has used for decades worked fine with more experienced workers, he said. "Now we have newer people in those places and the procedures don't work as well for the newer people."

Part of the increased turnout at the public hearing was attributed to issues going on in the Japanese nuclear industry and it showed. People asked about whether the Robinson plant was the same design as the Japanese plants - it's not - and whether seismic activity in an area is considered when plants are licensed - it is.

Croteau said while the issues in Japan will be studied to see whether changes need to be made in the operation of US plants, he said those problems haven't had an impact yet on the next generation of nuclear power plants waiting for regulatory

approval from the NRC. Some of those plants, including two reactors proposed for the V.C. Summer nuclear site near Jenkinsville, could get a public hearing as early as this year, Croteau said.

Nuclear Regulatory Commission Officials Disappointed With SC's Robinson Nuclear Power Plant (AP)

Associated Press, March 25, 2011

HARTSVILLE, S.C. — Nuclear Regulatory Commission officials say they are disappointed in the performance of Progress Energy's South Carolina nuclear reactor near Hartsville.

Regional director Richard Croteau said Thursday that problems at the H.B. Robinson Nuclear Power Plant had gained attention at the highest levels of the agency.

Incidents last year included two fires, a faulty breaker on an emergency generator and inadequate training for workers.

Those issues led to four unplanned outages at the plant. Progress Energy vice president Robert Duncan says the company had let internal standards slip, but was taking corrective action.

NRC Disappointed In Hartsville Plant Performance : News : CarolinaLive.com (WPDE)

By Tonya Brown

WPDE-TV, March 25, 2011

The Nuclear Regulatory Commission says its disappointed in the 2010 safety performance of Progress Energy's HB Robinson Nuclear Plant near Hartsville.

Commissioners made the statement during their annual public meeting to review and discuss the plant's safety performance Thursday at Coker College in Hartsville.

"Their level of performance was not what we expect. Some of the issues that they had the even in March of last year was a fairly significant event. We expect better performance. They did not meet the regulatory requirements that we set forth," said Rick Croteau, NRC. The NRC did say Robinson operated in a manner that preserved public health and safety,

In March, a high voltage power cable failed at the Robinson plant causing a fire. Several hours after that fire was put out, workers re-energized the cable that had started the first fire. The cable was still in failure and ignited a second fire.

Then in October, an electrical problem in the cooling pump led to a shutdown of the plant.

In its follow up inspections, the NRC found three areas of concern at the plant that centered around inadequate procedures, operator training and human performance.

As a result, the NRC has increased oversight and will conduct a series inspections at the plant.

Thursday's meeting held by the NRC was attended by dozens of people, including Peggy Peck, who lives very close to the plant "Being so close you don't want to turn to toast," she said, "You want to know what's going on. My neighbors want to know what's going on. We're really ignorant when it comes to this type of thing and we want to learn more about it."

Commissioners told the crowd that the two March fires, and the cooling pump failure in October presented a low to moderate safety significance but had a common theme of inadequate procedures.

That's alarming to Peck. "That's very scary because it's human failure and humans makes mistakes."

Progress Energy, which operates the Robinson plant, says they've already started to resolve the issues.

Robert Duncan is Vice President of the Robinson plant. "We went through quite a bit of procedural upgrades. We went through operator training and equipment performance. So, we made some modifications at the plant that were vital to safety of the plant and we continue to assess these."

The NRC's Rick Croteau says they don't just take the company's word for it. "We have detailed inspections, with many inspectors scheduled to come out here once they're ready in late May or early June to satisfy ourselves, they've taken the corrective actions."

Peck appreciates that Progress Energy owned up to the failures cited by the NRC but says she feels safer knowing the NRC is watching Robinson closely.

Last year, the NRC spent nearly 5,000 hours inspecting the Robinson plant. Two NRC inspectors actually work at the facility every day.

Storage Of Nuclear Waste Gets New Scrutiny (WSJ)

By Stephen Power

Wall Street Journal, March 25, 2011

Full-text stories from the Wall Street Journal are available to Journal subscribers by clicking the link.

Nuclear Waste, And Worries, Fester At US Site (AFP)

By Shaun Tandon

AFP, March 25, 2011

RICHLAND, Washington (AFP) – It sounded like a good idea at the time. Racing to build an atomic bomb during World War II, US authorities sealed off a pristine desert and created the first-ever plutonium reactor.

But 68 years later, Hanford remains off limits. Not because of weapons work, which has long ago ceased, but because it is the Western hemisphere's most contaminated nuclear site with 53 million gallons (200 million liters) of radioactive waste stored in aging tanks.

With billions of dollars a year invested in cleanup, there is little palpable fear of a catastrophe among residents here in the northwestern state of Washington. Some 12,000 people work at Hanford, which at 586 square miles (1,518 square kilometers) is twice the size of Singapore.

But with a crisis in Japan raising global alarm about nuclear safety, some people are calling for a new sense of urgency to cleaning up Hanford which has been hit by delays, cost overruns and charges of causing illness.

"It's a ticking time-bomb sitting there. Sooner or later, something's going to happen," said Walt Tamosaitis, a top engineer at the plant until last year.

"It would be monumental if those tanks cracked," he told AFP. "They would have no way in heck of ever stopping it."

Tamosaitis, who had 40 years experience, said he was removed after he raised concerns about the design. He said a contractor once even voiced hope that he would choke on cherries offered at a meeting – a joke, but one he said showed management's thinking.

"Their attitude is, why should we worry?" Tamosaitis said. "It's like driving a car with the tires worn down. You didn't have a flat tire for the first 30,000 miles, but that doesn't mean you won't have one as soon as you back out of your driveway."

Officials declined to speak in detail about Tamosaitis' case because he has filed a lawsuit. But they said they put a top priority on safety and were making concrete progress on disposal of the waste.

The key part of the cleanup is turning the waste into glass -- a state-of-the-art process that involves heating toxic sludge the consistency of peanut butter to 2,100 Fahrenheit (1,150 Celsius) and placing it in eternal storage. Managers hope to complete the plant in 2016 and start operating it in 2019.

"Operations are within our reach and I think that there is some excitement here. We are seeing some momentum," said J.D. Dowell, an official at the US Energy Department. "This is a national commitment."

Managers also said they were making progress on protections to the Columbia River, which flows past Hanford to Portland, Oregon, and pointed to the recent demolition of two powerhouses that had been operated when the site was active.

Tamosaitis said he raised a number of technical questions including the design of an instrument to move sludge as well as a decision to try to manage small hydrogen explosions in the pipes instead of avoiding them altogether.

Tamosaitis said that, in a sense, Japan's ill-fated Fukushima nuclear plant was better prepared. Its design was functional, but it was hit by an unprecedented whammy of a 9.0-magnitude earthquake and tsunami.

In Hanford, "we don't even have the design down adequately," he said.

Dowell said that a comparison between Fukushima and Hanford was like "apples and oranges." The Japanese plant involved active nuclear reactors, while Hanford is a long-term clean-up.

Hanford does have a Japanese connection, however. The plutonium produced here built the bomb that the United States dropped on Nagasaki, killing 70,000 people in the world's second and last nuclear attack.

Tom Carpenter, executive director of the advocacy group Hanford Challenge, said that the waste posed a constant risk due to the possibility of terrorists or other disturbed people entering the site.

"I don't know that governments last forever. Will there be someone here in 100 or 1,000 years to assure that the materials are protected, intruders don't get in and the groundwater isn't contaminated?" he said.

He also warned of a grave stakes if a natural disaster struck. The Pacific Northwest coast is overdue for a major earthquake, although the area near Hanford is only known to experience small tremors. Hanford is also home to a functioning nuclear power station.

The safety concerns are not just theoretical. Until the 1960s, Hanford poured some of its waste into the open. The government has acknowledged that at least one million gallons (3.8 million liters) of toxic material leaked from tanks, some entering the groundwater.

In 2005, a jury awarded damages to two people who said they suffered thyroid cancer due to Hanford. Residents have also filed a class action suit seeking broader compensation.

"We had a garden all growing up, and I lived right in town, so I was right in the immediate vicinity," said Gloria Wise, 67, who was awarded \$317,251 in 2005.

"I'm sure it got onto our food. Plus, we had a dairy that was delivered when I was a baby, you'd drink that milk and, I mean, I learned all these things, they didn't tell us what was going on," she said.

The lawsuits were filed against chemical giant Dupont and General Electric Co., which were major players in Hanford.

Multiple companies have also been involved in the cleanup. In 2000, the United States awarded Bechtel an 11-year, \$4.3 billion-dollar contract to spearhead the cleanup after previous British designers rose cost projections.

A 2006 report to Congress found that under Bechtel, the project has also run over goals for completion and financing -- due to technical challenges but also "the contractor's performance shortcomings" and Energy Department management problems.

With the United States now seeking to cut spending, some Hanford watchers feared there would be corner-cutting.

"We're very concerned that the cleanup momentum is going to stall with the 2012 budget," said Susan Leckband, who heads the Hanford Advisory Board which brings together stakeholders.

Richard Fleming, 57, grew up near Hanford and said he worked there until he fell ill. He believed that managers' overriding concern was political -- a desire for the project to appear to be going smoothly.

"I know every square inch," he said. "I know what's out there. I know how dangerous these things are."

"We're talking about the most complicated machine probably ever built. And we don't even know if it's going to work."

NM Nuclear Waste Site May Get Different Waste (AP)

By Sara A. Carter

Associated Press, March 25, 2011

A nuclear waste repository in southeastern New Mexico could be burying an additional type of low-level radioactive waste in the future.

The US Department of Energy is eyeing the Waste Isolation Pilot Plant east of Carlsbad and other sites around the country for waste known as greater-than-Class C low-level radioactive waste and greater-than-Class C-like waste.

Such material consists of low-level radioactive waste generated by various activities, including electricity production by nuclear power plants, producing and using radioisotopes to diagnose and treat disease, oil and gas exploration, and other industrial uses, the DOE said.

It does not include spent nuclear fuel or high-level waste.

The Energy Department has issued a draft environmental impact statement on the possible disposal sites -- WIPP, Los Alamos National Laboratory in northern New Mexico, the Hanford Site in Washington state, the Idaho National Laboratory, the Nevada National Security Site and the Savannah River Site in South Carolina. The impact statement does not list a preferred site.

WIPP, which opened in 1999, buries defense-related radioactive waste in rooms mined from an ancient salt formation 2,150 feet below the desert floor.

The DOE plans hearings on the document in New Mexico next month: April 26 in Carlsbad, April 27 in Albuquerque and April 28 in Santa Fe.

"They are coming out here for the public meetings, but in this case, WIPP is not a 'preferred alternative' for the disposal of the waste," said Deb Gill of the DOE's Carlsbad Field Office.

Information from: Carlsbad Current-Argus, <http://www.currentargus.com/>

DOE Eyes WIPP For Disposing Different Kind Of Waste (ALBQJ)

Hearings set next month on proposal to dispose of Greater-Than-Class C low-level radioactive waste.

Albuquerque Journal, March 25, 2011

The US Department of Energy has issued a draft environmental impact statement on using the Waste Isolation Pilot Plant near Carlsbad as a possible site for disposing of an additional type of low-level radioactive waste, the Carlsbad Current-Argus reported.

The DOE would like to use WIPP to dispose of Greater-Than-Class C low-level radioactive waste, which consists of a small volume of waste generated by activities licensed by the Nuclear Regulatory Commission, including electricity production by nuclear power plants, production and use of radioisotopes for disease diagnosis and treatment, oil and gas production and other industrial uses, according to DOE documents.

The draft EIS also includes Greater-Than-Class C-like waste, which consists of DOE-owned or generated waste and non-defense transuranic waste for which no disposal facility currently exists, the Current-Argus said.

Neither category of waste includes spent nuclear fuel or high-level waste, according to the Current-Argus.

WIPP is currently authorized for the disposal of defense-generated transuranic waste and prohibits the disposal of commercial, low-level and high-level radioactive waste, the paper reported.

A public hearing on the draft EIS is scheduled for 5:30-9:30 p.m. April 26 at the Pecos River Village Conference Center in Carlsbad, with additional hearings set for April 27 and 28 in Albuquerque and Santa Fe, the Current-Argus said.

Several sites besides WIPP are under consideration, including the Hanford Site in Washington state, the Idaho National Laboratory, Los Alamos National Laboratory, the Nevada National Security Site and the Savannah River Site in South Carolina, according to the paper.

Protection of US nuclear arsenal faulted by experts (GOVEXEC)

Government Executive, March 25, 2011

The federal agency charged with protecting the country's nuclear weapons arsenal is not effectively securing its facilities, according to a report released on Thursday by the National Research Council.

The report faulted the National Nuclear Security Administration, a semi-autonomous agency within the Energy Department, for lacking a comprehensive understanding of different enemy attack scenarios that could threaten NNSA storage facilities, and warned that security at the agency's sites would remain "out of balance" without strengthened agency leadership and a "major shift in approach."

NNSA leaders also do not understand the full extent of the "interactions and dependencies among security [systems]," NRC asserted. Sarah Case, the NRC program officer who was study director of the report, declined to elaborate on the security interactions and dependencies referenced in the report, citing the full report's classified status. The public report noted some recommendations "that were judged too sensitive to reproduce" were left out of the abridged public version.

The Senate Appropriations Committee requested the report in 2008 to address ballooning security costs at NNSA, which have grown from \$550 million in fiscal 2002 to more than \$900 million in fiscal 2010. NNSA management has been questioned by the Government Accountability Office. In January, NNSA received a program management award from the nonprofit Project Management Institute for IT work relating to President Obama's Global Threat Reduction Initiative.

The NRC report warned against using a quantitative strategy -- which NRC was specifically tasked to evaluate -- to better assess security risks while keeping an eye on overall costs. "There is no comprehensive analytical basis for defining the attack strategies that a malicious, creative and deliberate adversary might employ," the report concluded. But it was acknowledged that a "rigorous assessment of security risk" would prove useful to NNSA.

In part, the report restated a line familiar to outside evaluators of NNSA: Serious communication and information issues within the agency continue to hinder its ability to manage projects and fulfill its mission.

To secure its facilities more efficiently, NNSA should better integrate its own security efforts and better coordinate with cooperating agencies, the report said: "Coordination, communication and joint exercises that include all relevant security organizations are necessary" to improve NNSA facility security.

An NNSA spokesman did not respond by publishing time to a request for comment.

Hoag Named Y-12 Site Office Deputy Manager (OAKR)

Oak Ridger, March 25, 2011

OAK RIDGE, Tenn. —

Daniel K. Hoag has been named deputy manager for the National Nuclear Security Administration's Y-12 Site Office.

In his new position, according to a news release issued this morning, Hoag serves as the federal chief operating officer at Y-12 and will assist in program oversight, contract and administrative management, technical evaluation and assessment.

YSO is responsible for ensuring the safe, secure, and cost-effective operation of the Y-12 National Security Complex (Y-12), a key facility in the U.S Nuclear Security Enterprise.

More on this story in Friday morning's print edition of The Oak Ridger, your source for local news.

Weekly Standard: Against A Fossil Fuel Renaissance (NPR)

Op-ed

By Steven F. Hayward

NPR, March 25, 2011

Steven F. Hayward is the F. K. Weyerhaeuser fellow at the American Enterprise Institute and author of the Almanac of Environmental Trends.

The catastrophe at Japan's Fukushima Daiichi nuclear power plant is being regarded as the atomic power equivalent of the Deepwater Horizon oil spill in the Gulf of Mexico, which set back offshore oil drilling just as it appeared on the brink of a substantial expansion. This means we've now come full circle, as critics of offshore drilling compared the Gulf oil spill to Chernobyl. At the very least the events in Japan are going to reinforce the reluctance of Wall Street to invest in new nuclear power in the United States, deter insurance companies from covering nuclear plants, and increase resistance on Capitol Hill to extending the loan guarantees the nuclear industry says are essential to kick-starting more nuclear installations.

The big winner in the short and intermediate term will be fossil fuels — especially coal and natural gas — which will be used to fill the breach in Japan and elsewhere to generate electricity. Which means that the biggest loser is ironically the environmental community, which had been slowly abandoning its longtime opposition to nuclear power because it offered an important component in reducing greenhouse emissions linked to climate change. Although many environmentalists are enjoying an "I-told-you-so" moment, the new cloud over nuclear power means that global carbon dioxide emissions will go up faster. Germany, for example, is shutting down several of its nuclear reactors for several months as a precaution, even though they are not vulnerable to tsunamis. One early estimate is that German carbon dioxide emissions will rise by as much as 4 percent this year because of the nuke shutdown. Japanese CO₂ emissions will surely rise by more than this as the country replaces its lost nuclear capacity with coal, gas, and even oil in a few old oil-fired power plants it will be forced to bring online. The Kyoto Protocol emissions targets for 2012, already doubtful, can be tossed on a nuclear waste pile.

But unlikely as it may seem at the moment, the final irony is that if we keep our heads, the aftermath of this disaster may give us a clear view of how a new generation of nuclear power might be possible. As of press time it is still difficult to know exactly what is happening at the reactors, as contradictory and tentative information pours forth on an hourly basis. It will be weeks or months before we have an accurate understanding of what has occurred. The Department of Energy, the Nuclear Regulatory Commission, and the private-sector Nuclear Energy Institute were reluctant to comment all week because of the fast-moving situation.

Two aspects seem certain as of now. First, the reactors themselves appear to have survived intact an earthquake 40 times the size they were designed to withstand. It was the failure of the backup diesel generators necessary to keep the cooling systems operating, swamped by the 33-foot tsunami, that touched off the crisis and subsequent explosions. But for this arguable lack of foresight, the reactors might have come through unscathed. Plainly the first task for operators of ocean-side reactors, such as California's San Onofre and Diablo Canyon plants, is to ensure their backup power systems are not similarly vulnerable, even though the tsunami risk to these plants is much lower than the Japanese plants. Second, the necessary decision to flood the reactors with corrosive seawater means the reactors will be a total loss, costing Japan billions in cleanup costs and lost power capacity. A third aspect is likely to become evident over time: The radiation risks — even in the worst-case scenario of a total breach of the containment structures — will turn out to be more modest than the media hype would have you believe.

This is not to make light of a very serious situation at the reactors or the health risks to the courageous workers on the site who may be exposed to dangerous levels of radiation when new explosions and breaches occur. But the media coverage of the whole episode is a textbook example of the inability to gauge risks, weigh trade-offs, and put a story in its proper perspective. Instead the media have done what they do best: generate panic.

The prize for the most egregious treatment belongs to Germany's Die Welt newspaper, which said that Japan's nuclear catastrophe will have the same political and psychological consequences as 9/11. Japan lost probably more than 10,000 people to the immediate quake and tsunami, and thousands more face much more acute risks than radiation in the coming weeks from cold weather, shortages of water, and failing sanitation systems. But these risks make for boring news copy. Instead we are treated to breathless media reports, recycled from the glory days of Three Mile Island, the nuclear accident that caused zero health impacts on local residents, according to follow-up studies, and Chernobyl, whose health effects turned out to be less than one-tenth as large as the initial estimates. At the time of Chernobyl in 1986, most accounts suggested the accident would lead to at least 50,000 deaths (since the Soviets, unlike the Japanese, failed to evacuate the nearby population in a timely way); subsequent studies have placed the number closer to 4,000. By contrast, the Environmental Protection Agency estimates that 21,000 Americans contract lung cancer every year from radon exposure in their homes, and another 50,000 Americans succumb to premature deaths from air pollution from fossil fuel energy. Both are probably overestimates, but even if they overestimate the toll from radon and air pollution by a factor of ten, it is clear that nuclear power poses lower health risks than other energy sources.

There is no question that this is nuclear energy's worst moment. Will we have the maturity to learn from this catastrophe and move forward, as we did after Apollo 1 and the two space shuttle disasters and the early failures of commercial jet aircraft design like the British Comet of the 1950s? Over the last decade opinion polls have shown steadily rising public support for nuclear power in the United States following two decades of strong public opposition. The aftermath of the Japanese nuclear crisis will reveal how robust this shift is.

An additional irony of Japan's disaster is that had we not abandoned nuclear power 30 years ago, we might have begun deploying new-generation nuclear designs, such as small modular thorium reactors or light pressurized water reactors that either can't melt down or have passive redundancy features that do not depend on human action to shut down in the event of earthquakes or other disasters. Instead, we have extended the use of the large old light-water reactors, like the Fukushima Daiichi, long after their intended life span.

In 1980, science writer Ron Bailey points out, the US government thought we might have as many as 1,000 nuclear reactors up and running in the United States by now, instead of the 104 aging plants we do have. Our nuclearphobia led us to build hundreds of coal- and gas-fired power plants instead.

Unlike the administration reaction to the Gulf oil spill last year, President Obama and Secretary of Energy Steven Chu have reiterated their support for nuclear power even in the face of the unfolding disaster in Japan, an encouraging sign. Obama and Chu could go one step better, though, and give a major address when the Japan crisis is over, calmly laying out all the facts and making the case to carry on.

Vestas Sees Asia Adding Wind Farms After Japan Nuclear Crisis (BLOOM)

By Rakteem Katakey And Dinakar Sethuraman

Bloomberg News, March 25, 2011

Vestas Wind Systems A/S, the world's largest maker of wind turbines, said demand for wind projects may increase after Japan's worst earthquake triggered a nuclear crisis.

Asia Pacific nations installed about 19 gigawatts of wind power including 16.7 gigawatts by China last year and this year's additions may be higher, Sean Sutton, president of Vestas' Asia-Pacific business, said in an interview in Singapore yesterday. Nations excluding China may add 4 gigawatts of wind power this year, he said.

"We don't have a rush of orders since the earthquake but the possibilities are there," said Sutton, who oversees Asia Pacific, excluding China. "I project a growth in wind after what happened in Japan."

Japan is trying to prevent a meltdown at the Fukushima Dai- Ichi nuclear complex after cooling systems were knocked out by a 9.0-magnitude earthquake and tsunami on March 11, prompting nations including Germany and China to review their plans to expand nuclear power. Financing for wind projects in the Asia- Pacific region may increase as policy changes in Australia and India draw lenders, Sutton said Nov. 3.

India added 2.1 gigawatts in wind-power capacity last year compared with 1.2 gigawatts in 2009, Sutton said.

"India should exceed 3 gigawatts a year in additions soon," Sutton said.

China, planning to build more nuclear reactors than any other country, said on March 16 it suspended approval of all new atomic projects until a safety review is carried out. The country's existing reactors use second-generation technology, the official Xinhua News Agency said on July 22.

German Chancellor Angela Merkel has put plans to extend the life of Germany's reactors on hold for three months while the implications of events at Fukushima are examined. The British government ordered a review of nuclear safety, and Swiss policy makers put projects to renew three of their country's five nuclear power stations on hold, the Environment Ministry said on March 14 in an e-mailed statement.

Investment in the wind sector slowed since the end of 2008 as the global credit crisis prompted banks to restrict loans to wind-energy developers and a sovereign debt crisis limited prospects for economic growth in Europe, the world's biggest wind market by region.

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IN THE BLOGS:

Iranian Hackers Suspected In Recent Security Breach (NYT)

By Riva Richmond

New York Times (blog), March 25, 2011

The internet security firm Comodo Group said it had been victim to a hacker attack that appeared to have been part of a larger scheme to eavesdrop on encrypted e-mail and chat communications that may have been sponsored by Iran.

Comodo, a digital certificate authority and security software maker, said on Wednesday that it unwittingly issued fraudulent digital certificates for Web sites operated by Google, Yahoo, Microsoft, Skype and Mozilla. Digital certificates are used to vouch for the authenticity of a site owner and facilitate encrypted communications between sites and their users. Comodo revoked all of the certificates immediately upon discovery of the incident and notified the site owners, the major browser makers and relevant government authorities, it said.

The firm described the attack as well-planned and deployed with “clinical accuracy” from computers located mainly in Iran, though it pointed out in a company blog post that those computers could have been used to “lay a false trail.” But it said that the characteristics of the attack, and the fact that Iran has sought to penetrate online communication services in the past, led it to “one conclusion only” — that the attack was likely to be “state-driven.”

The Iranian government, like others in the Middle East facing opposition movements leveraging the Internet to organize protests and press for democratic change, has aggressively sought to restrict and monitor Internet access by its citizens.

With the certificates, a hacker would be able to set up server computers that would appear to work for the targeted Web sites. A government that controls Internet traffic inside its country would be able to use such a server to gain access to encrypted e-mail and chat conversations and collect user names and passwords for individuals’ accounts, said Mikko H. Hypponen, chief research officer at the security firm F-Secure, in a blog post.

Even without a grip on Internet traffic, a hacker could lure dissidents or other Web users to the rogue server and then intercept their communications and account details, said Roel Schouwenberg, a senior researcher at the security firm Kaspersky. “You can ‘own’ a target without having to compromise anything at the target’s end,” he said. “It might not be easier, but it might be ‘cleaner.’”

The fraudulent certificate for Mozilla, which was for its Firefox add-on site, might have allowed the attacker, posing as Mozilla, to install malware on targeted PCs or to block the installation of Firefox extensions that help users bypass government-imposed censorship filters, Mr. Hypponen said.

“Everything points to this being an intelligence operation,” Mr. Schouwenberg said, noting that theft of certificates has become a favored tactic among governments.

The Stuxnet worm that targeted Iranian nuclear installations last year also made use of stolen certificates, though those certificates were stolen from hardware companies who owned and used them to “sign” their products, not the certificate authorities that issued them.

In this recent attack, Comodo, one of several companies with the authority to issue digital certificates to Web sites, said one of its partners in Southern Europe, a so-called registration authority, which acts as an intermediary between it and some Web-site customers, suffered a security breach on March 15. That breach allowed the hacker to set up a bogus account and quickly prompt Comodo to generate the nine certificates.

News of the breach led to calls for increased scrutiny of the entire certificate system.

“This should serve as a wake up call to the Internet,” wrote Jacob Appelbaum in a blog post for Tor Project, a nonprofit group that makes free software that dissidents, journalists and other privacy-conscious people use to surf the Web anonymously and defeat online monitoring. “We need to research, build, and share new methods for ensuring trust, identity, authenticity, and confidentiality on the Internet,” he wrote.

Comodo said it has evidence that the hacker tried to use one bogus certificate for Yahoo, but no evidence of use for the other companies singled out. Yahoo said it was aware of the incident and “will continue to monitor this closely.”

Skype also said it was monitoring the situation and had taken steps to mitigate an attack on its service. “We do not expect any issues as a result,” Skype added in a statement.

Google said it had not detected any use of fraudulent Google certificates.

The major browser makers have all issued updates for their software to block the bogus certificates. Google pushed out an update to users of its Chrome browser on March 17. Mozilla said in a blog post Tuesday that it issued an update to its Firefox browser and urged users to download it. Microsoft did the same on Wednesday.

Hack Obtains 9 Bogus Certificates For Prominent Websites; Traced To Iran (WIRED)

By Kim Zetter

Wired (blog), March 25, 2011

In a fresh blow to the fundamental integrity of the internet, a hacker last week obtained legitimate web certificates that would have allowed him to impersonate some of the top sites on the internet, including the login pages used by Google, Microsoft and Yahoo e-mail customers.

The hacker, whose March 15 attack was traced to an IP address in Iran, compromised a partner account at the respected certificate authority Comodo Group, which he used to request eight SSL certificates for six domains: mail.google.com, www.google.com, login.yahoo.com, login.skype.com, addons.mozilla.org and login.live.com.

The certificates would have allowed the attacker to craft fake pages that would have been accepted by browsers as the legitimate websites. The certificates would have been most useful as part of an attack that redirected traffic intended for Skype, Google and Yahoo to a machine under the attacker's control. Such an attack can range from small-scale Wi-Fi spoofing at a coffee shop all the way to global hijacking of internet routes.

At a minimum, the attacker would then be able to steal login credentials from anyone who entered a username and password into the fake page, or perform a "man in the middle" attack to eavesdrop on the user's session.

Comodo CEO Melih Abdulhayoglu calls the breach the certificate authority's version of the Sept. 11 terror attacks.

"Our own planes are being used against us in the C.A. [certificate authority] world," Abdulhayoglu told Threat Level in an interview. "We have to up the bar and react to these new threat models. This untrusted DNS infrastructure cannot be what drives the internet going forward. If DNS was trusted, none of this would have been an issue."

Comodo says the attacker was well prepared, and appeared to have a list of targets at the ready when he logged into the company's system and began requesting certificates.

In addition to the bogus certificates, the attacker created a ninth certificate for a domain of his own under the name "Global Trustee," according to Abdulhayoglu.

Abdulhayoglu says the attack has all the markings of a state-sponsored intrusion rather than a criminal attack.

"We deal with [cybercriminals] all day long," he said. But "there are zero footprints of cybercriminals here."

"If you look at all these domains, every single one of them are communications-related," he continued. "My personal opinion is that someone is trying to read people's e-mail communications. [But] the only way for this attack to work [on a large scale] is if you have access to the DNS infrastructure. The certificates on their own are no use, unless they have access to the DNS infrastructure itself, which a state would."

Though he acknowledges that the attack could have originated anywhere, and been routed through Iranian servers as a proxy, he says Iranian president Mahmoud Ahmadinejad's regime is the obvious suspect.

Out of the nine fraudulent certificates the hacker requested, only one — for Yahoo — was found to be active. Abdulhayoglu said Comodo tracked it, because the attackers had tried to test the certificate using a second Iranian IP address.

All of the fraudulent certificates have since been revoked, and Mozilla, Google and Microsoft have issued updates to their Firefox, Chrome and Internet Explorer browsers to block any websites from using the fraudulent certificates.

Comodo came clean about the breach this week, after security researcher Jacob Appelbaum noticed the updates to Chrome and Firefox and began poking around. Mozilla persuaded Appelbaum to withhold public disclosure of the information until the situation with the certificates could be resolved, which he agreed to do.

Abdulhayoglu told Threat Level that his company first learned of the breach from the partner that was compromised.

The attacker had compromised the username and password of a registration authority, or R.A., in southern Europe that had been a Comodo Trusted Partner for five or six years, he said. Registration authorities are entities that are authorized to issue certificates after conducting a due-diligence check to determine that the person or entity seeking the certificate is legitimate.

"We have certain checks and balances that alerted the R.A. [about the breach], which brought it to our attention," he said. "Within hours we were alerted to it, and within hours we revoked everything."

It's not the first time that the integrity of web certificates has come into question.

Security researcher Moxie Marlinspike showed in 2009 how a vulnerability in the way that web certificates are issued by authorities and authenticated by web browsers would allow an attacker to impersonate any trusted website with a legitimately issued certificate.

INTERNATIONAL NUCLEAR NEWS:

Nuclear Crew Returns To Reactor As Tokyo Dispenses Water (BLOOM)

By Tsuyoshi Inajima And Aki Ito

Bloomberg News, March 24, 2011

Engineers at Japan's damaged nuclear plant resumed work on reconnecting power as Tokyo authorities prepared to hand out bottled water to families after determining that tap water may be unsafe for babies.

City officials will hand out 240,000 bottles today to 80,000 families, according to the local government. Radioactive iodine levels taken two days ago at a treatment facility in Katsushika ward were double the recommended limit for infants.

Restoring power is key to ending a nuclear crisis sparked by the March 11 earthquake and tsunami, including radiation leakage into the sea and air. Revelations of contamination in water and food have triggered bulk buying at supermarkets even as the government says that health risks are minimal.

"This is an evolving crisis and we don't know whether the problem of radiation has reached its peak," said Yoshimasa Maruyama, senior economist in Tokyo at Itochu Corp. (8001), an Osaka-based trading company that gets about 30 percent of its sales from food. "The challenge will be whether the government can continue to manage the situation to keep people from panicking."

Workers at the Tokyo Electric Power Co.'s Fukushima Dai-ichi power plant, located 220 kilometers (135 miles) from Tokyo, resumed attempts to restore power to the No. 3 reactor at 4:50 a.m., said Takeo Iwamoto, a spokesman for the utility. Power is required to help circulate cooling water to the units. The company is investigating the source of steam and smoke seen at the No. 2 and No. 4 reactors, he said.

The plant will attempt to restore power to the No. 5 reactor's pump today, Hidehiko Nishiyama, a spokesman for Japan's nuclear safety agency, said today. That unit was shut down for maintenance when the quake hit and is considered less of a radiation threat.

The Nikkei 225 (NKY) Stock Average fell 0.2 percent as of 10:58 a.m. in Tokyo trading. The gauge slumped 1.7 percent yesterday after Tokyo issued the water advisory.

"It's hard to tell people they're ingesting radiation in any way that won't provoke a panic," said Jeff Kingston, director of Asian Studies at Temple University's Tokyo campus. "But the government has been far more transparent than in any case I can recall."

Levels of iodine-131 in Tokyo's tap water rose to 210 Becquerels per kilogram (2.2 pounds) two days ago, according to the Tokyo city government. The recommended limit is 300 for adults and 100 for infants.

The Health Ministry yesterday advised against eating leafy vegetables produced near the disaster site. The degree of contamination detected isn't harmful, Chief Cabinet Secretary Yukio Edano said at a Tokyo briefing. While parents shouldn't use tap water to mix baby formula, it can be drunk safely by adults and children, he said.

Hong Kong, Singapore and Australia banned imports of vegetables and fruits harvested in five quake-stricken prefectures in Japan. Singapore suspended imports of milk and milk products, seafood and meat from those areas of Japan. Indonesia will temporarily stop importing fish and other aquaculture products from Japan, Investor Daily Indonesia reported, citing Maritime and Fisheries Minister Fadel Muhammad.

Water filters made by Panasonic Corp. (6752) and Toray Industries Inc. (3402) aren't designed to eliminate iodine, spokesmen for both companies said in telephone interviews yesterday. Children are susceptible to radiation poisoning from iodine, which can accumulate in the thyroid and cause cancer, according to the World Health Organization.

The death toll from Japan's worst postwar disaster climbed to 9,487 yesterday, with 15,617 people missing, according to the National Police Agency in Tokyo. The magnitude-9 earthquake and tsunami devastated the country's northern coastline and forced several hundred thousand people to evacuate.

The maximum radiation reading reported so far at the nuclear plant is 500 millisieverts per hour, meaning a worker in the vicinity would receive the maximum recommended lifetime dose in 30 minutes.

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Smoke Stops, Work Resumes At Troubled Japanese Nuclear Plant (CNN)

CNN, March 25, 2011

(CNN) – One day after black smoke prompted an evacuation, workers returned Thursday to the Fukushima Daiichi nuclear plant – employing myriad methods to try to prevent more radiation from seeping into the atmosphere.

After several days of setbacks and billowing smoke, authorities Thursday addressed issues at each of the facility's six reactors.

"We are working to resume (operations)," Japanese Chief Cabinet Secretary Yukio Edano said. "We cannot be too optimistic, and we are still taking cautious measures."

Japan Atomic Industrial Forum, an industry trade group, reported Thursday that – despite previous fears to the contrary – the No. 3 reactor's containment vessel was "not damaged."

This news came the same morning that smoke stopped rising above the reactor, according to Hidehiko Nishiyama, an official with Japan's Nuclear and Industrial Safety Agency.

He said the cause of the smoke remains unknown, speculating it may have come from burning oil or machinery nearby.

On Wednesday, the same day the black smoke appeared, Edano said three workers were exposed to water contaminated by radioactive material while laying cable in the No. 3 reactor's turbine building. They stepped into the water, which seeped into the shoes of two of the men, according to Tokyo Electric Power Company.

All three men were exposed to between 173 and 181 millisieverts of radiation, and two went to a hospital for treatment, a Tokyo Electric Power Co. official said.

A person in an industrialized country is naturally exposed to 3 millisieverts a year. But Japan's health ministry recently raised the maximum level of exposure for a person working to address the crisis at the nuclear plant from 100 millisieverts to 250 millisieverts per year.

The three workers reached the highest level of millisieverts recorded so far, Tokyo Electric said. The two admitted to the hospital were a man in his 30s who was exposed to 180.7 millisieverts, and a man in his 20s who tested at 179.37 millisieverts. The third man, who was exposed to 173 millisieverts, did not go to the hospital, as his boots were high enough to cover his skin, Tokyo Electric said.

Seventeen workers so far have been exposed to radiation at levels over 100 millisieverts, Tokyo Electric said Thursday, including the three involved in the water incident.

By Thursday, work had resumed at that reactor. Beginning shortly after 5:30 a.m., crews began injecting about 500 tons of seawater into it, Nishiyama said.

Authorities intend to eventually switch to fresh water, he said, without providing an explanation as to why or a timetable.

In addition, firefighters from Tokyo and Yokohama are preparing to spray another 500 tons of water toward that reactor's nuclear spent fuel pool, which Nishiyama said could happen Thursday or Friday.

These pools contain fuel rods that, if not cooled down, can overheat and, in the process, release radioactive vapors into the air.

Edano said Thursday "there has been no spike in temperatures" at the No. 3 reactor.

The secretary also downplayed concerns about white smoke reportedly rising from other reactors.

The "vapor" rising near the No. 1 reactor at the plant is "only natural" and not a cause for alarm, he said, especially since water is now in that unit's nuclear spent fuel pool.

He added that the temperature at the No. 1 reactor "right now is going down."

Nishiyama added that by decreasing the rate of water being pumped into the reactor early Thursday, authorities had also decreased pressure that had earlier been rising.

Previous buildups of hydrogen gas have contributed to at least three explosions -- several of which caused injuries and coincided with spikes in radiation -- at the power plant's Nos. 1, 2 and 3 units.

Light was restored Thursday in the No. 1 reactor's central control room, a Tokyo Electric Power Co. official told CNN.

But it was just a partial restoration, as workers continued to try to get electricity going for control panels and cooling system pumps at the reactor. Nishiyama said that the hope is to begin cooling the unit's spent fuel pool Friday using outside power.

While describing the No. 2 unit as "quite stable," Nishiyama did note -- but did not explain -- "high radiation readings" nearby.

Seawater continues to be pumped in an effort to cool down nuclear fuel rods and prevent the further emission of radioactive material into the atmosphere.

Members of Japan's self-defense forces Thursday doused the nuclear spent fuel pool at the No. 4 reactor. Nishiyama estimated that this effort should wrap up Friday.

And Nos. 5 and 6 reactors appear safe for now, the nuclear safety official said.

The temperatures at both units are relatively low, though that could change after their cooling system gave out Wednesday.

Nishiyama said workers hope to get that machinery back into working order soon.

"Until we get power restored to the power plant, continuing doing what they have been doing for the last 12 days is, quite honestly, the only game in town," Michael Friedlander, a former senior operator at three US nuclear power plants who has been following the situation at the Fukushima Daiichi plant, said Wednesday.

"It's absolutely essential that they keep the reactor covered with water as well as continuing to refill it," he said. "But getting the power restored and getting the equipment moving so they can get back on track is essential. At that point, we can determine the emergency is in the final stages."

He predicted power would be restored gradually to the plant over the next few days. "The power source is going to the main control room because that is the main nerve center of the entire plant," he said. "Once they get that restored, then we have some instrumentation and we can figure out what's going on in the power plant that up to this point has been almost impossible to figure out."

Once that is done, he said, power will be sent to individual pieces of equipment and the situation will be analyzed. He estimated it could take two weeks or more to get the plant "in a stable, cold shut-down configuration."

Lake Barrett, a nuclear engineer who led the initial cleanup and response of the Three Mile Island plant in Pennsylvania following a partial core nuclear meltdown in 1979, said there's likely no saving the plant -- though much can, and still needs, to be done to keep the crisis under control.

"It is an industrial catastrophe," Barrett said. "It's a huge plant, and it's been basically destroyed internally and has high contamination levels inside. There are areas in the building where no human is going to go for a long time."

But Barrett said the situation should be controlled and the radioactive fallout limited enough such that the long-term repercussions for the public health will be relatively minimal.

"It's also not a health catastrophe -- as long as the people follow the instructions from the government, they're going to be safe in Japan," he said.

Meanwhile, Japanese authorities added another vegetable to the list of restricted foods originating in prefectures near the Fukushima plant. On Wednesday, health officials said they found high levels of radioactive substances in the mizuna, or potherb mustard, shipped to Kyoto from Ibaraki Prefecture. While there was no immediate health risk, authorities instructed distributors and buyers to remove the vegetable from stores. Consuming 20 grams of the vegetable would be the equivalent of 1/400th the radiation of a stomach X-ray, officials said.

CNN's Whitney Hurst contributed to this report.

2 Japanese Nuclear Workers Hospitalized For Radiation Exposure (LAT)

Two men working at reactor No. 3 of Japan's Fukushima Daiichi nuclear power plant are hospitalized after radiation-contaminated water seeps into their boots.

By Julie Makinen, March 25, 2011

Los Angeles Times, March 25, 2011

As Japan marked two weeks since the giant earthquake and tsunami, the number of people dead or missing grew to more than 27,000, with at least 200,000 others in shelters and radioactivity from a stricken nuclear plant continuing to cast a pall over daily life.

Two workers at Japan's hobbled Fukushima Daiichi nuclear facility were hospitalized for radiation exposure Thursday after stepping into contaminated water during repair operations, officials at the nation's nuclear safety agency said. A third exposed worker did not require hospitalization.

The two hospitalized workers received a dose of 170 to 180 millisieverts of radiation while laying electrical cables in the basement of the building housing reactor No. 3, officials said. The average American, by comparison, is exposed to 6.2 millisieverts of radiation a year from natural sources, according to the US Environmental Protection Agency.

Water used in the cooling process seeped into the workers' boots and came into contact with their skin, authorities reported. The third worker was protected by his clothing. All three were equipped with radiation-detection devices, which sounded an alarm, but they continued to work, officials with Tokyo Electric Power Co. said. That revelation prompted Japanese nuclear officials Friday to call for a review of safety procedures at the site.

Water-spraying operations at reactor No. 3, interrupted Thursday by an evacuation, were expected to resume Friday.

Tokyo Electric Power Co., which operates the facility about 150 miles north of Tokyo, said 17 workers have been exposed to more than 100 millisieverts of radiation since the March 11 earthquake and tsunami disabled the cooling systems at the nuclear complex.

Meanwhile, in Tokyo, consumers continued to clear store shelves of bottled water a day after the government warned that infants should not be allowed to consume tap water because elevated levels of radioactive iodine from Fukushima were detected at a municipal treatment plant.

The levels of radioactive iodine-131, which had been double the level considered safe for infants under 12 months, later dropped to safe levels, prompting a cancellation of the warning. But the government continued distributing bottled water to 80,000 households with infants less than a year old.

Kakuzo Shiokawa bought four small bottles of water Thursday at the Ecchu-ya convenience store in Tokyo's Ginza district, saying she didn't grab more so that "other customers could have some too." She said her daughter-in-law was two months pregnant and was worried about consuming tap water.

"It's quite a panic," Shiokawa said.

The US Embassy in Tokyo advised pregnant women, and children under 3, to avoid tap water. Elevated levels of radioactive iodine were reported Thursday in tap water in Chiba prefecture. The government has found elevated levels of

radiation in vegetables from several prefectures near the nuclear plant and imposed a shipment ban. On Friday, officials said they had detected contamination on vegetables grown in a government research facility in Tokyo.

Data compiled by the Mainichi newspaper suggest the cumulative amount of radiation in the air of Fukushima city, 40 miles from the plant, for the week of March 14-21 would have exceeded the average yearly radiation exposure for Japanese citizens. Although the data assumed a person would remain outside that entire time, the calculations raised questions about the long-term effects on those living near the plant.

The death toll climbed past 10,000, with 17,541 missing, the National Police Agency said Friday. About 220,000 people remain in emergency shelters.

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Times staff writer Thomas H. Maugh II in Los Angeles contributed to this report. Times wire services were also used.

More Japanese Crew Exposed To Radiation (FT)

By Jonathan Soble, Tokyo

Financial Times, March 25, 2011

Full-text stories from the Financial Times are available to FT subscribers by clicking the link.

Lack Of Data From Japan Distresses Nuclear Experts (LAT)

Nuclear scientists and policy experts say the quality and quantity of information coming out of Fukushima has left gaping holes in their understanding of the nuclear disaster nearly two weeks after it began.

By Ralph Vartabedian

Los Angeles Times, March 25, 2011

How did Japanese workers at the crippled Fukushima nuclear plant jury-rig fire hoses to cool damaged reactors? Is contaminated water from waste pools overflowing into the Pacific Ocean? Exactly who is the national incident commander?

The answers to these and many other questions are unclear to US nuclear scientists and policy experts, who say the quality and quantity of information coming out of Japan has left gaping holes in their understanding of the disaster nearly two weeks after it began.

At the same time, they say, the depth of the crisis has clearly been growing, judging by releases of radioactivity that by some measures have reached half the level of those released in the Chernobyl accident of 1986, according to new analysis by European and American scientists.

Photos: Japan's earthquake, tsunami and nuclear crisis

The lack of information has led to growing frustration with Tokyo Electric Power Co., known as Tepco, and the Japanese government, which has parceled out information with little context, few details and giant blind spots. It has left the international community confused about what is happening and what could come next.

"Information sharing has not been in the culture of Tepco or the Japanese government," said Najmedin Meshkati, a USC engineering professor who has advised federal agencies on nuclear safety issues. "This issue is larger than one utility and one country. It is an international crisis."

Almost every step of the way, the problems at the Fukushima Daiichi plant have been understated by those in charge in Japan, outside experts say, leaving observers scrambling to analyze the situation as best they can from afar.

The public health concern is growing with news that the radiation has spread, leading to advisories on food and water. An Austrian meteorological institute, the Central Institute for Meteorology and Geodynamics, said this week that computer models showed the emissions of radioactive cesium from the plant might already amount to 50% of what was released from Chernobyl, and that releases of radioactive iodine could be 20% of the Chernobyl total.

Edwin Lyman, a physicist with the Union of Concerned Scientists in Washington, said Thursday that his own modeling of the data had confirmed the Austrian analysis, suggesting that Japan might ultimately have to exclude humans from a large area and face a remediation effort more costly than thought.

"Confusion seems to be growing," Lyman said.

But Masaru Tamamoto, a professor of Asian and Middle Eastern studies at the University of Cambridge in Britain, said the handling of the crisis by Japanese government and corporate authorities is consistent with a culture that carefully guards information from the public and leaves decisions in the hands of anonymous bureaucrats.

Japan, Tamamoto said, lacks a nonprofit sector of government watchdog organizations that work closely with the news media to investigate and publicize government coverups. It leaves the public comfortably reliant on official pronouncements, he said.

"The public lives this way every day, and that's the way things are," Tamamoto said. "Even if you demanded the information, nobody has the information. Even the prime minister blurted out at one point that he didn't have information."

Tamamoto said that even significant nuclear contamination in the country might not be enough to prompt a change in this highly controlled and guarded bureaucracy, adding, "If this doesn't do it, I can't imagine what else would do it."

Experts contrast the events at Fukushima with the US handling of the Deepwater Horizon oil spill in the Gulf of Mexico last year. Even though American watchdogs were highly critical of the accuracy of information, the national incident commander overseeing the crisis provided daily televised briefings. A video of oil leaking at the bottom of the gulf was put on the Internet.

By contrast, critics say, until recent days few detailed photographs of the equipment or the personnel working at the Fukushima plant have been made public.

It remains unclear whether there is an incident commander managing the day-to-day crisis and exactly who holds the authority for the operations at the plant. Tepco officials have never said whether water poured onto the reactors and the pools of still-radioactive spent fuel are draining directly into the Pacific or flooding the sub-basements of the reactor buildings.

"I have this image that they are forcing seawater through the piping somehow," said Frank N. von Hippel, a Princeton University physicist. Von Hippel said he wasn't quite sure how the repair efforts were accomplished, but added, "I have a lot of sympathy for these people."

It's also unclear how hydrogen gas escaped from the reactors and exploded. And though Japanese officials have said there may be a breach in one of the reactors, they have offered no details, photographs or data about it.

Even US government agencies, including the Energy Department and the Nuclear Regulatory Commission, have been circumspect about what's going on at Fukushima, saying they are there at the invitation of Japan and cannot become the primary source of information.

But in at least two instances, US officials have asserted an independent voice and offered candid warnings and explicit data. The NRC last week advised US citizens to evacuate from within a 50-mile zone around the plant, more than double what Japanese citizens had been told to do. And this week the agency released radioactivity data that showed a highly radioactive plume on the ground extending northwest of the plant.

Nuclear experts have sharply criticized the International Atomic Energy Agency, which promotes the peaceful use of nuclear energy and reports to the United Nations, for not taking a more aggressive role in the crisis.

"The IAEA has been missing in action," said Meshkati, the USC professor. He testified before a U.N. commission in 1993, calling on the IAEA to adopt an international capability to respond to nuclear emergencies, a proposal he said fell on deaf ears.

"We don't have an international mechanism to deal with a nuclear crisis," Meshkati said. "We are still in the same place we were all these years after Chernobyl."

On Wednesday, when black smoke was seen rising from one of the Fukushima reactors, US scientists had to speculate about whether it was coming from a motor that caught fire or a reactor that was sending up radioactive particulates. The answer was not forthcoming from sources in Japan.

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Radiation In Tokyo's Water Has Dropped, Japan Says (NYT)

By David Jolly

New York Times, March 25, 2011

TOKYO — Levels of a radioactive isotope found in Tokyo's water supply fell by more than half on Thursday, testing below the country's stringent maximum for infants, even as three workers at a stricken nuclear plant in northern Japan suffered radiation burns as they struggled to make emergency repairs.

The lower readings in Tokyo's water were made hours after Yukio Edano, the chief cabinet secretary, said the isotope, iodine 131, had been detected in the water supply of Kawaguchi City, just north of Tokyo, as well as in those of two of Tokyo's neighboring prefectures, Chiba and Saitama. On Wednesday, the authorities cautioned those in the affected areas not to give infants tap water.

The problem is not likely to end soon; nuclear workers will have to keep venting radioactive gases from the damaged reactors, adding to the plume of emissions carried by winds and dispersed by rain. The public has been warned not to consume food and milk from the area near the plant.

Mr. Edano said the three injured workers had sustained radiation burns to their legs while dragging an electrical cable through contaminated water in an effort to restore a crucial pump at Reactor No. 3 at the crippled plant, the Fukushima Daiichi Nuclear Power Station. The workers were burned as contaminated water poured over the tops of their boots, soaking their feet and ankles, the Asahi Shimbun newspaper reported, citing sources with the Tokyo Electric Power Company, the plant's operator.

Two workers were taken to Fukushima Medical University Hospital and were expected to be transferred to the National Institute of Radiological Sciences in Chiba City. Hiro Hasegawa, a Tokyo Electric spokesman, said that the third man had not been hospitalized.

The three were employed by a subcontractor of Tokyo Electric, Mr. Edano said, and were trying to connect a cable in the basement of the turbine building next to Reactor No. 3. They were exposed to more than 170 millisieverts of radiation, he said. That is more than the old maximum of 100 millisieverts for workers but less than the new maximum of 250 millisieverts instituted in the days after the disaster. The injuries would appear to raise questions about whether the new maximum was too high.

Linda Gunter, a spokeswoman for the power company, said Friday that the two hospitalized workers would remain under observation. The third man had been wearing higher boots and had not gotten his legs wet; he will take a rest day and return to work, she said.

"It's not a good thing to get a dose of this size," she said, adding that "it still doesn't exceed the limit." She said that one chest X-ray accounted for about 20 millisieverts of radiation.

Halting progress was reported in the efforts to restart cooling systems at the plant that were knocked out in the earthquake and tsunami on March 11.

A Tokyo Electric official said workers had managed to restore lighting in the central control room of Reactor No. 1, an important step toward restarting its cooling system. The temperature in the reactor pressure vessel has been showing a worrisome increase, and Mr. Edano said efforts were being focused on resolving the problem.

Officials of Japan's Nuclear and Industrial Safety Agency said Reactors No. 1 and No. 4 were giving off white smoke, but repair work had not stopped.

The warning on Wednesday over the heightened levels of iodine 131, which can accumulate in the thyroid and cause cancer, set off widespread anxiety and a run on bottled water in Tokyo. On Thursday morning, the authorities were distributing water to an estimated 80,000 children and were considering importing bottled water.

Emissions from the damaged plant have largely blown east; elevated levels of iodine 131 and another dangerous isotope, cesium 137, were found 18 miles off the coast, according to the International Atomic Energy Agency.

Japan's limits on iodine 131 are far lower than those of the international agency.

Reporting was contributed by Chika Ohshima and Ayasa Aizawa from Tokyo, and by Keith Bradsher and Kevin Drew from Hong Kong.

Japan Radiation Levels Uncertain: Should Evacuation Zone Be Bigger? (CSM)

Christian Science Monitor, March 25, 2011

Conflicting data on radiation levels is making it difficult to judge the dangers posed by the damaged Fukushima Daiichi nuclear plant – and heightening anxiety among average Japanese. Skip to next paragraph

On Thursday, store shelves across Tokyo were bare of bottled water one day after authorities warned that the level of radioactive iodine in tap water was twice the allowable level for infants. But follow-up tests conducted Thursday showed the iodine level had fallen back below acceptable limits.

Some nearby cities were showing elevated levels of radioactive iodine 131 in their municipal water supplies, however. And new estimates from Japan's Nuclear Safety Technology Center seemed to indicate that atmospheric radiation levels might be too high for infants at some spots outside the 12-mile evacuation zone surrounding the Fukushima Daiichi nuclear complex.

"There is continuing scattered information about contamination exposures that is not entirely consistent," said Edward Lyman, a senior staff scientist at the Union for Concerned Scientists, a nuclear watchdog group in Washington. "Confusion seems to be growing."

Given the scale of the crisis, such confusion is to be expected, said Dr. Lyman. Similar problems would occur anywhere multiple reactors suffered total power blackouts and apparent fuel rod damage.

Why is it so hard to measure radiation? It is not like measuring temperature, or barometric pressure, or some other easily-discernable weather variable. Emissions from Fukushima have been a mix of different kinds of radioactive materials, which disseminate into the atmosphere differently, and travel in the air in different ways.

Though the analogy is not exact, it is somewhat like trying to map the spread of different aromas released from the same general area, taking into account wind, rain, and other environmental factors.

Plus, some of the measurements released so far measure things over different time frames. Others are projections or the results of computer monitoring.

For instance, the city of Fukushima itself had a radiation level of .00685 milliSieverts (mSv) per hour at 7 p.m. local time on Tuesday, according to Japanese authorities.

Given that an average person receives 2.4 mSv per year from sunlight and other natural sources, that particular Fukushima reading does not sound so bad.

But that is per hour, remember. At times during the crisis, it has spiked considerably higher.

Estimates from the Japanese Nuclear Safety Technology Center, in contrast, were an attempt to figure out possible cumulative doses that might have affected people in the path of a radiation plume.

According to these estimates, an infant just outside the 12-mile evacuation zone around the Fukushima plant could theoretically have absorbed more than 100 mSv of radiation since the crisis began.

To accumulate a worrisome dose, an infant would have had to be outdoors constantly since last the earthquake on March 11, noted Japanese Cabinet Secretary Yukio Edano. Buildings shield humans from some of radiation's effects.

Edano said that it remains unnecessary to expand the 12-mile exclusion zone.

"As a precautionary measure, I would like to recommend that if people [near the exclusion zone] are on the leeward of the nuclear power plant, they close their windows and stay indoors inside sealed buildings as [much] as possible," he said.

The US has recommended that US citizens within 50 miles of the Fukushima complex evacuate to a safer place. Lyman believes the Japanese government should follow suit, at least for children and pregnant women.

"It looks like there are going to be areas considerably further than the 12-mile zone that are going to require significant decontamination or condemnation," he said Thursday.

Tokyo Shoppers Clean Store Shelves Of Basic Goods (AP)

By Shino Yuasa And Tomoko A. Hosaka, Associated Press

Associated Press, March 25, 2011

TOKYO — Nearly two weeks of rolling blackouts, distribution problems and contamination fears prompted by a leaking, tsunami-damaged nuclear plant have left shelves stripped bare of some basic necessities in stores across Tokyo. Some people are even turning to the city's ubiquitous vending machines to find increasingly scarce bottles of water.

At the source of the anxiety — the overheated, radiation-leaking nuclear plant — there was yet another setback Thursday as two workers were injured when they stepped into radiation-contaminated water. The two were treated at a hospital.

Supplies of bottled water grew scarce in Tokyo, one day after city officials warned that the level of radioactive iodine in the tap water was more than twice what is considered safe for babies to drink. Tests conducted Thursday showed the levels in the city's water fell to acceptable limits for infants, but they were up in neighboring regions.

Frightened Tokyo residents hoping to stock up on bottled water and other goods flocked to shops across the city, some of which tried to prevent hoarding by imposing buying limits.

"The first thought was that I need to buy bottles of water," said Reiko Matsumoto, a real estate agent and mother of a 5-year-old, who rushed to a nearby store to stock up on supplies. "I also don't know whether I can let her take a bath."

The shortages were mainly limited to basic staples, such as rice, instant noodles and milk. Vegetables, meat and tofu, meanwhile, were readily available in most places.

Japan has been grappling with an avalanche of miseries that began with a massive, 9.0-magnitude earthquake on March 11. That triggered a violent tsunami, which ravaged the northeast coast, killed an estimated 18,000 people and left hundreds of thousands homeless. The quake and tsunami also damaged the critical cooling system at the Fukushima Dai-ichi plant, which overheated and began spewing radiation into the environment.

Workers have been struggling to get the cooling system operating again, but their efforts have been hampered by explosions, fires and radiation scares. Lighting was restored Thursday to the central control room at Unit 1 for the first time since the quake and tsunami.

But two workers were hospitalized after stepping into contaminated water while laying electrical cables in one unit, nuclear and government officials said. The water seeped over the top of their boots and onto their legs, said Takashi Kurita, spokesman for plant owner Tokyo Electric Power Co.

The two likely suffered "beta ray burns," Tokyo Electric said, citing doctors. They tested at radiation levels between 170 to 180 millisieverts, well below the maximum 250 millisieverts allowed for workers, said Fumio Matsuda, a spokesman for the Nuclear and Industrial Safety Agency.

The men will be transferred to a radiology medical institute Friday, said Hidehiko Nishiyama, another nuclear agency spokesman. Their injuries were not life-threatening.

More than two dozen people have been injured trying to bring the plant, located 140 miles (220 kilometers) northeast of Tokyo, under control.

The death toll from the earthquake and tsunami continued to rise, meanwhile, with more than 9,800 bodies counted and more than 17,500 people listed as missing. Those tallies may overlap, but police from one of the hardest-hit prefectures, Miyagi, estimate that the deaths will top 15,000 in that region alone.

The crisis has stoked fears about the safety of Japan's food and water supply. Radiation has been found in raw milk, seawater and 11 kinds of vegetables, including broccoli, cauliflower and turnips, grown in areas around the plant.

The US and Australia halted imports of Japanese dairy and produce from the region, Hong Kong said it would require that Japan perform safety checks on meat, eggs and seafood, and Canada said it would upgrade controls on imports of Japanese food products. Singapore, too, has banned the sale of milk, produce, meat and seafood from areas near the plant.

Concerns also spread to Europe. In Iceland, officials said they measured trace amounts of radioactive iodine in the air but assured residents it was "less than a millionth" of levels found in Europe in the wake of the 1986 Chernobyl disaster — the world's worst nuclear accident.

Radioactive iodine is short-lived, with a half-life of eight days — the length of time it takes for half of it to break down harmlessly. However, experts say infants are particularly vulnerable to radioactive iodine, which can cause thyroid cancer.

In Tokyo, government spokesman Yukio Edano pleaded for calm over the water contamination, and said the government was considering importing bottled water from other countries to cover any shortages. Officials urged residents to avoid panicked stockpiling and the city began distributing 240,000 bottles — enough to give each of the 80,000 children under age 1 three small bottles of water.

New readings Thursday showed the city's tap water was back to levels acceptable for infants, but the relief was tempered by elevated levels of the isotope in two neighboring prefectures: Chiba and Saitama. A city in a third prefecture, just south of the plant, also showed high levels of radioactive iodine in tap water, officials said.

Tap water in Kawaguchi City in Saitama, north of Tokyo, contained 210 becquerels of radioactive iodine — well above the 100 becquerels considered safe for babies but below the 300-becquerel level for adults, Health Ministry official Shogo Misawa said.

In Chiba prefecture, the water tested high for radiation in two separate areas, said water safety official Kyoji Narita. The government there warned families in 11 cities in Chiba not to give infants tap water.

"The high level of iodine was due to the nuclear disaster," Narita said. "There is no question about it."

Radiation levels also tested dangerously high in Hitachi in Ibaraki prefecture, about 70 miles (120 kilometers) south of the Fukushima plant, city water official Toshifumi Suzuki said, adding that officials were distributing bottled water.

The limits refer to sustained consumption rates, and officials said parents should stop using tap water for baby formula, although it was OK for infants to consume small amounts.

Despite the appeals, shelves were bare in many stores across Tokyo.

Maruetsu supermarket in the city center sought to impose buying limits on specific items to prevent hoarding: only one carton of milk per family, one 5-kilogram (11-pound) bag of rice, one package of toilet paper, one pack of diapers. Similar notices at some drug stores told women they could only purchase two feminine hygiene items at a time.

Maruetsu spokeswoman Kayoko Kano acknowledged that the earthquake and tsunami resulted in delays of some products.

Some frustrated shoppers have turned to the city's many vending machines as an alternative. The machines are found everywhere in the city and one can feature about three dozen different beverages — ranging from hot coffee and green tea to power drinks and juice. A 500-milliliter bottle of imported water costs about 100 yen (about \$1.25).

A spokesman for Procter & Gamble Japan said its plant was fully operational but that rolling blackouts in Tokyo may be affecting distribution. "Consumers are nervous, and they may be buying up supplies," Noriyuki Endo added.

Worse hardships continued in the frigid, tsunami-struck northeast. Some 660,000 households still do not have water, the government said. Electricity has not been restored to some 209,000 homes, Tohoku Electric Power Co. said. Damage is estimated at \$309 billion, making it the most costly natural disaster on record.

In one bright spot of economic news, Toyota Motor Corp. — which had suspended production due to damage to suppliers' factories and power shortages in the quake zone — said it will soon resume production of the Prius and two other hybrid models.

But rival Honda Motor Co. said the suspension of car production at its Saitama and Suzuka factories will be extended to April 3.

The economic woes spawned by the disasters were especially painful for farmers in the region near the nuclear plant.

Sumiko Matsuno, a 65-year-old farmer in Fukushima, spent Thursday frantically harvesting vegetables from her fields.

"We are digging up all our carrots and onions as fast as we can. We can't sell them but we need them ourselves for food," she said. "We are really worried about our future. If this goes on, it is going to really hurt us."

Associated Press writers Eric Talmadge in Fukushima, and Mari Yamaguchi, Elaine Kurtenbach, Yuri Kageyama, Kaori Hitomi, Jean H. Lee and Ian Mader in Tokyo contributed to this report.

Anxiety Grows Over Japan's Food And Water Supply (WP)

By Chico Harlan And David Nakamura

Washington Post, March 25, 2011

TOKYO — At a downtown grocery store, a line of anxious mothers cleaned the shelves of bottled water seven minutes after the doors opened. At an organic farm on the city's outskirts, a group tested spinach with a hand-held radiation detector. And at the prime minister's headquarters, the chief cabinet secretary announced that Japan is considering importing drinking water.

As emergency crews battled Thursday to contain nuclear fallout from the badly damaged Fukushima Daiichi power plant in northeast Japan, a nervous uncertainty spread as far away as Tokyo, 150 miles to the southwest, as radiation was reported in parts of the food chain and millions tried to understand the implications.

In Vienna, the International Atomic Energy Agency reported Thursday that Japanese scientists have found "measurable concentrations" of radioactive iodine-131 and cesium-137 in samples of seawater collected off the coast from the Fukushima plant.

"The iodine concentrations were at or above Japanese regulatory limits, and the cesium levels were well below those limits," the IAEA said on its Web site. The samples were gathered Tuesday and Wednesday at several points 18.6 miles from shore, the U.N. nuclear watchdog agency said.

A day after Tokyo officials warned of elevated iodine levels in the city's tap water and the national government restricted shipment of 11 leafy vegetables in several prefectures, residents scrambled to stock up on the essentials, which are now in short supply.

Tokyo officials distributed 240,000 bottles of water to households with infants, who are more susceptible to radioactive iodine-131. The US Embassy handed out to American citizens potassium iodide pills, which can block radioactive iodine from building up in the thyroid gland.

"If the situation isn't better in one week, I actually might have to move in with my parents," said Yuki Ochiai, 32, mother of an 8-month-old girl who was among two dozen customers in line at the Tokyu grocery store 20 minutes before it opened. "My husband is already encouraging me to leave."

As residents fretted, the casualty rate continued to mount. Two weeks after the March 11 earthquake and tsunami, the number of deaths from the catastrophe officially topped 10,000, the National Police Agency reported. More than 17,000 people remain missing.

Meanwhile, the struggle to prevent more radiation from escaping the nuclear plant continued. Engineers successfully hooked up lighting to a control room at the unit 1 reactor — an incremental, but hopeful, step toward cooling overheated spent fuel rods. At the unit 3 reactor, workers prepared to test a cooling pump that would allow them to pour in fresh rainwater instead of less effective seawater.

But there were setbacks. Three workers suffered radiation burns after stepping in contaminated water while attempting to lay electrical wiring at one of the buildings. Two of the workers, exposed to 170 to 180 millisieverts of radiation, were hospitalized, said Chief Cabinet Secretary Yukio Edano, who did not disclose the status of the third employee. The Associated Press quoted Fumio Matsuda, a spokesman for the Nuclear and Industrial Safety Agency, as saying that radiation levels of 170 to 180 millisieverts were well below the maximum 250 millisieverts allowed for workers.

It was a day that required people to sift through information about a complicated and rapidly changing problem. In Chiba and Saitama, two prefectures neighboring Tokyo, officials discovered iodine levels exceeding the legal limit for infants. Yet Tokyo's water, which had tested high a day earlier, showed a decrease Thursday.

For some, the brief water warning was a tipping point, a sign that the environment had become a threat. At the Tokyu grocery, an employee opened the store doors at 10 a.m. and a half-dozen pregnant women and young mothers rushed to the far aisle.

Within seven minutes, all 80 two-liter bottles were gone. Ochiai, cradling her daughter, held two of them. Her parents, who live in Hokkaido, a northern island, were sending 12 more bottles of water by airmail, she confided.

"I actually feel sorry standing here with my two bottles of water," Ochiai said. "All these other mothers are here now, and they are too late."

As mothers fretted over supply, farmers worried about demand for their food, tainted by the government's advisory that residents not eat 11 leafy vegetables grown in prefectures near the Fukushima facility, citing elevated levels of radioactive materials in them.

The advisory has left farmers nationwide wondering about the effect on their livelihood as consumers weigh the risks.

At a spinach farm in Chiba, about 1 1 / 2 hours outside Tokyo, the proprietor, Masayuki Kumate, 45, looked on as Sumito Hatta, a food researcher, used a dosimeter to take a radioactivity reading of a lone row of green plants sprouting from the dark brown soil.

Kumate shook his head. Although Chiba officials had not banned any produce, Kumate said he has "been worried since Day One" of the disaster.

"It's so clear what was going to happen," he said of the nuclear fallout. "For Fukushima farmers, it is impossible [to recover]. The soil is contaminated. They will have to get rid of that before they start again. It takes a very long time. It will be a very big problem."

Hatta and a friend, Shinya Takeda, launched a blog and Facebook page dedicated to informing the Japanese people and the world about the plight facing Japan's farmers and asking for donations.

Japan's Ministry of Agriculture, Forestry and Fisheries sent a letter to banks this week encouraging them to provide loans to farmers seeking to rebuild. And the government has pledged that the Tokyo Electric Power Co., which operates the nuclear plant, will provide stipends to farmers whose crops have been contaminated.

"The farmlands that were soaked with saltwater will not be revived as farmland," the Facebook page reads. "This reality is another destruction for the farmers. . . . Now people in Japan are buying up all food at supermarkets and oil at gas stations due to the anxiety. Our food sovereignty is in great danger."

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Special correspondents Akiko Yamamoto and Kyoko Tanaka contributed to this report.

Japanese Jittery Over Shortages, Food Safety (USAT)

By Peter Eisler, Usa Today

USA Today, March 25, 2011

Residents in Tokyo and other major Japanese cities scrambled to find bottled water and basic foodstuffs Thursday amid changing reports about tap water and produce tainted by radiation from the country's crippled nuclear reactors.

New public advisories said that radioactive iodine in Tokyo's tap water no longer exceeded safety thresholds for consumption by infants — a warning that had been issued the previous day. The news was tempered by reports that contamination levels remained elevated in three neighboring prefectures, or districts. The government still insists the contamination levels pose no immediate risk to infants, but it has advised families to stop using tap water for baby formula.

Stores in many communities were running out of bottled water, milk and food supplies as a jittery public struggled with the water warnings and ongoing bans on the distribution or sale of milk or produce from areas near the stricken Fukushima Dai-ichi nuclear power plant.

"The current situation is not drastic, and they're being prudent in what they're doing" with the government restrictions, said Jeff Patterson, a radiation expert with Physicians for Social Responsibility and professor at the University of Wisconsin School of Medicine and Public Health.

The extent of contamination in areas around the plant remains unclear, Patterson said, and that has led to some confusion on what precautions are necessary to protect the public. "They are truly trying to manage the unmanageable," he added, "so there are no hard and fast answers on what the truly correct response is."

The crisis at the nuclear plant began March 11, when Japan suffered the worst earthquake in its recorded history, a magnitude-9.0 quake that triggered an almost immediate tsunami. The one-two punch ravaged the country's northeast coastline, wiping out communities. So far, the death toll has risen to more than 10,000, with 17,440 missing.

The disaster knocked out primary and backup power at the nuclear plant. That shut down systems used to cool the nuclear fuel in the plant's six reactors and prevent their cores from melting into a highly radioactive mass that could spread radiation into the environment. It also knocked out systems that circulate water through pools that store reactors' used or "spent" fuel, which must be sealed off from the atmosphere and kept at specific temperatures to prevent radiation-spewing fires.

In the ensuing days, the plant suffered explosions and fires as fuel rods in its reactors and the storage pools overheated. Radioactive steam and smoke vented into the atmosphere, dispersed by wind currents before settling back to Earth, in some cases over crops and water supplies.

Engineers continued to restore power at the plant Thursday and said reactor temperatures had stabilized at safe levels. They also have been restoring water levels in the plant's spent-fuel pools. Both situations remained fluid, and more releases of steam had not been ruled out.

Assessing contamination could take months.

Radioactive iodine, a chief component of the radiation released from the plant, dissipates in days. Other radiation types, such as cesium, can linger in the environment for hundreds of years.

"A lot of (the impact) depends on how much of this stuff blew out over the Pacific and how much blew over land," said Arjun Makhijani, an engineer specializing in nuclear fusion and president of the Institute for Energy and Environmental Research. "I don't think anybody can say at this point how much contamination has occurred."

Global Food Scare Widens From Japan Nuclear Plant (AFP)

By Karyn Poupee

AFP, March 25, 2011

TOKYO (AFP) – Countries across the world have shunned Japanese food imports as radioactive steam leaked from a disaster-struck nuclear plant, straining nerves in Tokyo.

The grim toll of dead and missing from Japan's monster earthquake and tsunami on March 11 topped 26,000. Hundreds of thousands remained huddled in evacuation shelters and fears grew in Tokyo over water safety.

The damage to the Fukushima nuclear plant from the tectonic calamity and a series of explosions has stoked global anxiety. The United States and Hong Kong have already restricted Japanese food, and France wants the European Union to do the same.

Russia ordered a halt to food imports from four prefectures – Fukushima, Gunma, Ibaraki and Tochigi – near the stricken plant some 250 kilometres (155 miles) northeast of Tokyo.

Moscow also quarantined a Panama-flagged cargo ship that had passed near the plant and put its 19 crew under medical supervision after detecting radiation levels three times the norm in the engine room.

Australia banned produce from the area, including seaweed and seafood, milk, dairy products, fresh fruit and vegetables.

It said, however, that Japanese food already on store shelves was safe, as it had shipped before the quake, and that "the risk of Australian consumers being exposed to radionuclides in food imported from Japan is negligible".

Canada implemented enhanced import controls on products from the four prefectures.

Singapore suspended imports of milk products and other foodstuffs from the same four prefectures, as well as all food products from two more – Chiba and Ehime.

The city-state's move came after officials found "radioactive contaminants" in four samples of vegetables from Japan, though the authorities stressed the radiation levels in the produce were still very low.

The Philippines banned Japanese chocolate imports, and Indonesia asked that Japan certify its exported processed foods as radiation-free.

"Food safety issues are an additional dimension of the emergency," said three UN agencies in a joint statement issued in Geneva, pledging they were "committed to mobilising their knowledge and expertise" to help Japan.

Japan was taking the right actions, said the International Atomic Energy Agency, World Health Organization, and Food and Agriculture Organization.

In greater Tokyo, an urban sprawl of more than 30 million people, strong aftershocks served as uncomfortable reminders that Japan's capital itself is believed to be decades overdue for a mega-quake.

The anxiety was compounded by the Tokyo government's revelation Wednesday that radioactive iodine in the drinking water was more than twice the level deemed safe for infants, although it remained within safe adult limits.

The news triggered a run on bottled water in shops and the city's ubiquitous vending machines, while the Tokyo government started to give families three 550-millilitre (18.5-ounce) bottles of water per infant.

A measurement on Thursday was in the safe zone for infants again, officials said, but this was not enough to calm all parents of young children and many bought up what bottled water they could.

Authorities in Chiba, Tochigi urged parents not to give infants tap water after finding levels of radioactive iodine breached the safe limit for babies.

Japan's government has also halted shipments of untreated milk and vegetables from Fukushima and three adjoining prefectures, and stepped up radiation monitoring at another six, covering an area that borders Tokyo.

The health ministry has detected 82,000 becquerels of radioactive caesium – 164 times the safe limit – in the green vegetable kukitachina, and elevated levels in another 10 vegetables, including cabbage and turnips.

At the source of the radiation – the Fukushima plant located on the Pacific coast – white smoke was seen wafting from four of the six reactors.

Fire engines again aimed high-pressure water jets at the number three reactor, a day after a plume of dark smoke there forced workers to evacuate, in a bid to avert a full meltdown that would release greater radiation.

Highlighting the risks taken by the emergency crew, three workers were exposed to high radiation -- at least 170 millisieverts.

Two of them were sent to hospital after they stepped into a puddle of water that reached the skin on their legs despite their radiation suits.

Engineers have now linked up an external electricity supply to all six reactors and are testing system components and equipment in an effort to restart the tsunami-hit cooling systems and stabilise the reactors.

On Thursday, they partially restored power to the control room at reactor number one.

The grim statistics from Japan's worst post-war disaster kept on rising, with 9,811 now confirmed dead and 17,541 listed as missing by national police.

Scientists at the Port and Airport Research Institute meanwhile found that the tsunami that swallowed entire towns was even bigger than first thought. In devastated Ofunato, Iwate prefecture, it topped 23 metres (76 feet).

Japan: The Business Aftershocks (WSJ)

From Chips to Banks, Companies Scramble

By Andrew Dowell

Wall Street Journal, March 25, 2011

Full-text stories from the Wall Street Journal are available to Journal subscribers by clicking the link.

Japan Will Rebuild From Quake But Faces Other Daunting Tests (WSJ)

By John Bussey

Wall Street Journal, March 25, 2011

Full-text stories from the Wall Street Journal are available to Journal subscribers by clicking the link.

Police: More Than 10,000 Dead From Japan Disaster (AP)

Associated Press, March 25, 2011

TOKYO – Japan's police agency says the death toll from the earthquake and tsunami two weeks ago has topped 10,000.

The National Police Agency said Friday that more than 17,440 people are listed as missing.

Japan Faces Its Next Chore: Cleaning Up (AP)

By Tim Sullivan, Associated Press

Associated Press, March 25, 2011

HIGASHIMATSUSHIMA, Japan – Where do you even start?

Do you start by carting away the Chokai Maru, the 150-foot (45-meter) ship that was lifted over a pier and slammed into a house in this port town? Do you start with the thousands of destroyed cars scattered like discarded toys in the city of Sendai? With the broken windows and the doorless refrigerators and the endless remnants of so many lives that clutter the canals?

In the first days after a tsunami slammed into Japan's northeast coast on March 11, killing well over 10,000 people, it seemed callous to worry about the cleanup. The filth paled beside the tragedy. Now, nearly two weeks later, hundreds of communities are finally turning to the monumental task ahead.

The legacy of Hurricane Katrina, which devastated the US Gulf of Mexico coastline in 2005, gives an idea of both the immensity of the job and the environmental hazards Japan could face for years to come.

"In Katrina, you had debris that had seawater, sewage, chemicals, gasoline, oil, that was all mixed together in a toxic soup," said David McEntire, a disaster expert at the University of North Texas. "And you're going to have similar problems with the disaster in Japan."

Three years after Katrina, which spawned enough debris to cover Britain, the US government had said the mess was not even close to being cleaned up.

The mess looks endless in Japan, and hauling it away seems unimaginable. The cost? No one really knows, though the crisis is emerging as the world's most expensive natural disaster on record, with Japanese officials saying losses could total up to 25 trillion yen (\$309 billion). The World Bank says reconstruction could take five years.

So there's nothing to do but start.

Mayumi Hatanaka began with the knee-high mud that had flooded into her little seafood restaurant in the small seaside city of Shiogama.

"It's been four days, and we've been working, working," she said, standing beneath a sign that promised food "Straight From The Fishery To You."

She and her daughter were scraping the muck down their driveway and into the street. The thick, dark goo looked almost volcanic. Workers hired by the city used a gargantuan truck-mounted vacuum, normally used for well-drilling, to hose it up. The noise of the pump and the sucking splutter of the hose nearly drowned out her voice, and she had to shout to be heard.

Simply carving out an aisle in the restaurant took three days, Hatanaka said, so she has no idea when she'll be able to reopen. "I think we'll never finish," she said, only briefly willing to set aside her shovel before getting back to work.

Much of the official cleanup effort so far has been to support rescue teams. Soldiers and city crews have cleared streets of debris so rescuers can get through, and some buildings have been pulled apart in search of survivors.

Now, with little chance left of finding anyone still alive, the concern is to avoid accidentally clearing away corpses with the debris.

Takashi Takayama is a city official in Higashimatsushima, a port town brutalized by the tsunami, leaving nearly 700 people dead. He said the city, where the Chokai Maru ship was thrown ashore, is still cleaning up — and footing the bill — from a major earthquake in 2003.

"I don't know how long it will take," he said. "The last time it was just parts of houses that were destroyed. Now it's the whole house. So I don't know how we'll do it."

With city workers desperately overworked, officials turned to a local association of construction companies to help. Those private contractors helped clear the roads and have started piling up debris in small hills, soon to be small mountains, on city land near the port.

Japan is a country where separating trash into its various components is almost sacrosanct: There are the burnables, the food items, the array of different recyclables. Takayama is already dreading the arguments when disaster-weary residents refuse to categorize their garbage properly.

"Sorting everything out will be the first challenge," he said.

A 2004 tsunami, which killed 230,000 people in 14 Asian and African countries, left thousands of cities and towns facing a task similar to Japan's today.

In Indonesia, the United Nations employed 400,000 workers to clear 1.3 million cubic yards (1 million cubic meters) of debris just from the urban areas of the hard-hit city of Banda Aceh.

Many of the countries affected by that disaster were less developed than Japan and lacked sophisticated waste disposal systems. In the initial cleanups, some burned debris in the open air, dumped it in makeshift landfills and used other environmentally risky methods, polluting wells, inland waterways and the nearby seas.

Japan will presumably use state-of-the-art incinerators and sanitary landfills, though technological prowess doesn't guarantee there won't be problems. In the United States, there were allegations of corruption by cleanup companies after Hurricane Katrina, including claims that hazardous debris was improperly dumped in landfills.

Associated Press writers Joji Sakurai in Tokyo and Denis Gray in Bangkok contributed to this report.

Extent Of Damage To Japan's Infrastructure Still Unclear (NYT)

By Henry Fountain

New York Times, March 25, 2011

Nearly two weeks after the earthquake and tsunami struck Japan, engineers still do not know the full extent of damage to roads, bridges, rail lines and other infrastructure.

While much attention has been focused on the crisis at the Fukushima Daiichi nuclear plant, only fragmentary information has become available about damage to other large complexes, like water distribution and sewage treatment plants.

Even Japanese government agencies and professional engineering groups appear to have limited knowledge of the scope of the destruction along the northeastern coast of Honshu Island, where the tsunami hit on March 11, and further inland, where the quake damaged buildings and other structures and caused landslides.

"We don't understand the real situation," Hiroyuki Yanagawa of the Japan Society of Civil Engineers wrote in an e-mail. "We cannot investigate the area." The group is based in Tokyo, far from the affected region, where entry has been restricted largely to emergency vehicles.

In the United States, earthquake engineers who often travel to the scene of a major quake within days have been unable to go to Japan because of concerns about radiation.

Stephen Mahin, a structural engineering professor at the University of California, Berkeley, and the director of the Pacific Earthquake Engineering Research Center, said that he and others had been planning to go but that the university had canceled their travel insurance.

He now expects to go next week, but will most likely be limited to Tokyo, about 140 miles from the damaged reactors.

"Inspecting earthquake damage is a risk, but it is a risk we know about," Dr. Mahin wrote in an e-mail. "Being dependent on public release of information on radiation hazards (or evacuation orders) that we have little control over is a different thing entirely."

The National Science Foundation, which finances field research after disasters and supported an engineering team that went to New Zealand after the recent earthquake there, said it was accepting proposals for Japan. The review process takes several weeks.

Some information about infrastructure damage is now trickling out. Incomplete as it is, the information helps explain why the Japanese government says that apart from the damage caused by the problems at the nuclear plant, recovery will take five years and cost hundreds of billions of dollars.

The Japanese Ministry of Land, Infrastructure, Transport and Tourism, which had been posting limited information about road and rail service since the quake, now says all expressways in the region are passable, and that high-speed rail service has been restored on all but two lines that have long stretches with damage to rails or to overhead electric lines. All airports are open to commercial traffic except the one in Sendai, where video cameras recorded a wall of water reaching as high as the jetways.

The ministry reported damage to about 50 sewage treatment plants. Other agencies reported that gas and water distribution had improved, though there were still many towns with limited or no service. None of the reports outlined the degree of damage to specific facilities.

Other assessments have been cobbled together by engineers based on reports from local agencies, photographs and, in some cases, personal observations. Engineers at the University of Tokyo listed 17 bridges that had been washed away by the tsunami; five sewage plants either damaged or destroyed; flooding at one damaged dam; and dozens of landslides and deposits of debris that have closed roads. In one case, they reported tsunami damage along an 18-mile stretch of coastal roads south of Iwaki.

A report by an engineer at Tokai University in Shizuoka, south of Tokyo, was more anecdotal, with photographs of roads blocked by landslides or warped as the ground underneath them subsided; rail lines tossed about like strands of spaghetti; collapsed electrical pylons; sewage plants buried in debris; and, in Sendai, huge storage tanks toppled over at a brewery.

A few engineers who study tsunamis lived through the disaster and described the destruction around them. Shunichi Koshimura, a researcher at the tsunami engineering laboratory at Tohoku University, and others reported that the lab was effectively destroyed and that much of the university was heavily damaged.

A day after the quake, Dr. Koshimura, who published a study last year about coastal effects of the 2004 Indian Ocean tsunami, tried to conduct a field study by car of the damage in the flatlands around Sendai but was turned back by debris and water.

Kit Miyamoto, an earthquake engineer born in Tokyo and living in San Francisco, was in Tokyo when the quake occurred. His flight home delayed and able to obtain the necessary permits, he drove up to the affected coast.

In an interview, Dr. Miyamoto described coastal rail lines that were swept away by the tsunami, and said the vast majority of the buildings that were destroyed were made of wood. "Almost all concrete and steel structures survived," he said, though they were often heavily damaged.

Dr. Miyamoto said some infrastructure in the area appeared to make the disaster worse. In the city of Rikuzentakata, one of the worst hit, a concrete channel funneled the tsunami surge, increasing its speed, height and destructive power.

"Construction like that makes things more dangerous," he said.

Key Supplier For Capacitor Makers Closes Plant On Nuclear Leak (BLOOM)

By Toshiro Hasegawa

Bloomberg News, March 25, 2011

Shares of Japan's capacitors makers may fall further after a key supplier was forced to abandon its factory near the damaged Fukushima Dai-ichi nuclear plant.

Production of a chemical solution used in the production of aluminum-electrolytic capacitors has been halted at Tomiyama Pure Chemical Industries Ltd.'s plant north of Tokyo, according to the company's general manager, after workers were evacuated following a 9.0 earthquake that struck the nation and crippled the nearby nuclear plant. The manager declined to give his name.

"The supply chain from chemicals makers to aluminum- electrolytic-capacitor makers is experiencing trouble overall," said Chikai Tanaka, an analyst at Nomura Holdings Inc. "The capacitors are used in most electronics other than cell phones, so I expect some impact on industries including television and computers."

Nippon Chemi-Con Corp. (6997) has tumbled 33 percent in Tokyo since the close of trade before the quake hit through today, while the Kyoto-based Nichicon Corp. (6996) slid 2.4 percent from the March 10 close.

Tomiyama Pure Chemical, which says on its website to be "Japan's only manufacturer for the specialized electrolytes" used in making the capacitors said a plant in Saitama prefecture, further south, lacked capacity to make up for the shortfall in production. A spokesman at Nippon Chemi-Con's corporate planning department, who declined to give his name, said Tomiyama Pure Chemical's market share is high and if the supply disruption continues, it will hurt the industry.

"We still have some stock, so there is no impact on the company at the moment," said Fumio Yamashita, a spokesman for Nichicon. "But looking forward, we are considering different options including finding a substitute for the chemical."

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To contact the editor responsible for this story: Nick Gentle at ngentle2@bloomberg.net.

Anti-nuclear Activists Attack Waste Shipments (SarONCA)

By Cathy Dobson

The Sarina (Ontario) Observer, March 25, 2011

A shipment of 16 radioactive steam generators will be the first of many if allowed to travel the Great Lakes and cross the ocean to a Swedish recycling plant, two American anti-nuclear activists said in Sarnia Thursday.

"This is just the first batch," predicted Kevin Kamps, a radioactive waste specialist with a lobby group dedicated to ending nuclear energy and weapons development.

There are 32 steam generators in temporary storage at Bruce Power on Lake Huron and more at the Pickering nuclear station, according to Kamps.

He was in Sarnia for a meeting with Mayor Mike Bradley who has been a vocal opponent of the shipment.

Approval was granted Feb. 4 by the Canadian Nuclear Safety Commission (CNSC) but Kamps and his colleague, Michael Keegan of the Coalition for Nuclear Free Great Lakes, hope to convince US authorities to kill the plan.

"This is a first step and sets a precedent by which many more shipments of radioactive materials will begin," Keegan said.

"They are establishing a precedent for commerce in poison on the Great Lakes, which I find unacceptable."

Bruce Power CEO Duncan Hawthorne said there is no risk to the public in transporting nuclear waste on the lakes.

The CNSC approved the shipment based on scientific analysis that showed the amount of radioactivity would not contaminate the water if there was an accident, Hawthorne said.

He said that each 100-tonne generator will carry four grams of radioactive waste. That compares to the amount that would be found in a heart pacemaker, he said.

"If all 16 generators sink and every piece of radioactive material gets in the water right outside a water intake pipe, there would be no impact on people's drinking water," Hawthorne said. "Even though it would be highly unlikely and grossly improbable, the regulator has proven that."

But Keegan and Kamps said there has been no Environmental Assessment on the proposed shipment.

"What Duncan Hawthorne says is not proven," said Keegan.

"I challenge what he says," Kamps said. "There are water soluble poisons that are very toxic in very small amounts."

Hawthorne told The Observer that sending the used generators to Sweden for recycling is the right thing to do.

"Burying it is not the most environmentally friendly," he said.

Hawthorne added that he finds it odd Sarnians are so concerned about the steam generator shipment.

"When I look at Sarnia, I see all the oil and gas installations there and I find it somewhat strange to focus on a nuclear plant with an excellent safety record, and have less concern about what's going into the Great Lakes every day with the processes around you."

Concern will only grow as long as the nuclear industry exists because there is no safe way to deal with its waste, Kamps said.

"The bottom line is we need to stop making it."

Keegan said he has some hope that a request for a judicial review of the commission's decision will be successful and the shipments can be stopped.

The Sierra Club of Canada and the Canadian Environmental Law Association have asked the Federal Court of Canada to review the reasons why the country's nuclear watchdog granted export and transfer licenses to Bruce Power.

There's also a chance the US Department of Transportation Pipeline and Hazardous Materials Safety Administration will oppose the shipment.

"It's been a very rubber-stamp kind of process in the past with them but we're hoping public pressure will change that this time," Keegan said.

Seven senators have agreed to "turn up the heat" in Washington," Kamps said. "We want a thorough analysis of the danger this poses to our waterways."

Nuclear Waste Watchdog: It's Time To Speak Up (PORTHUR)

By Amy Biolchini

Port Huron (MI) Times Herald, March 23, 2011

With the possibility of a shipment of 16 radioactive steam generators passing through the St. Clair River, nuclear waste watchdog Kevin Kamps urged the public Wednesday night to make their voices heard.

A radioactive waste specialist and representative of national organization Beyond Nuclear, Kamps spoke to a crowd of 30 people at a Blue Water Sierra Club meeting at the Municipal Office Center in Port Huron.

Extensively referencing the current meltdown at Japan's Fukushima Daiichi nuclear plant, Kamps explained the dangers of radioactive waste.

Though some might joke about the lack of tsunamis and earthquakes in Southeast Michigan, Kamps said any loss of power to a nuclear facility is a major risk. Local factors include ice storms, tornadoes and squirrels, Kamps said, citing historical examples.

The proximity of many nuclear facilities and waste dumps to the Great Lakes is troubling, Kamps said, because of the potential for drinking water contamination and damage to aquatic environments.

"Lake sediments have never been analyzed for radioactivity," Kamps said.

A proposed Deep Geologic Repository at Kincardine, Ontario, on the Lake Huron shoreline, just 50 miles away from Michigan, could store radioactive waste for all 20 of Ontario's nuclear facilities, Kamps said.

Kamps also spoke on the dangers of installing two new nuclear power plants, including a proposed Fermi 3 in Monroe. The Plan suggested for Fermi 3 is the same system in place at Fukushima Daiichi and has been criticized for its weak design and containment breaches, Kamps said.

Kamps also made his case against transporting radioactive waste across the Great Lakes.

The Canadian Nuclear Safety Commission approved Bruce Power's proposal Feb. 4 to ship 16 radioactive steam generators from Owen Sound, Ontario, through the Great Lakes and the St. Lawrence Seaway to Sweden for recycling.

Kamps said Bruce Power has no plan to remove the generators should the ship sink at any point during its journey. The possibility that one of the 16 generators could leak underwater, should it sink, is highly likely, Kamps said.

The proposal faces its final approval by the US Department of Transportation's Pipeline and Hazardous Materials Safety Administration before the radioactive waste can enter US territorial waters. Kamps advised the public to contact PHMSA Administrator Cynthia Quartermann, as well as Michigan Sens. Carl Levin and Debbie Stabenow, to voice their opinions on the proposal.

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Ontario Indians Protest Plans To Ship Radioactive Waste Over Great Lakes (MIMESS)

By Kyle Daly

Michigan Messenger, March 25, 2011

The Union of Ontario Indians will battle a plan to ship 1,600 tons of radioactive waste from the Bruce nuclear power complex to Sweden via the Great Lakes and St. Lawrence Seaway, the group announced this week.

UOI, a political advocacy organization that represents 39 First Nation communities in Ontario, said that the Canadian Nuclear Safety Commission and Bruce Power Corporation failed to properly consult with First Nation communities before approving the plan to ship 16 contaminated steam generators from the Bruce Power complex in Kincardine.

"[M]ost of the Chiefs and Councils who are signatories to treaties all along the Great Lakes were never consulted," Southwest Regional Anishinabek Nation Chief Chris Plain said in a statement. "The duty to consult and accommodate must be done with the rights holders and we were never consulted."

"We will do everything in our power to prevent the Ontario and Federal governments and the nuclear power industry from using our precious waterways as a garbage disposal route," Anishinabek Nation Grand Council Chief Patrick Madahbee said. "It is contrary to Supreme Court decisions, our aboriginal and treaty rights, the United Nations Declaration on the Rights of Indigenous Peoples, and the laws of Nature."

Mayors from more than 70 communities along the Great Lakes and St. Lawrence Seaway have warned that the proposed shipment has not received adequate environmental review and threatens the water supply for millions of people.

The ongoing nuclear disaster in Japan shows that accidents can result in radioactive contamination of water supplies. This week officials in Tokyo warned residents not to let infants drink the tap water because it contains elevated levels of radioactive iodine.

US Dept. of Transportation approval is required for the Bruce shipment to pass through US waters.

North Korea Suggests Libya Should Have Kept Nuclear Program (NYT)

By Mark McDonald

New York Times, March 25, 2011

SEOUL, South Korea — A North Korean statement that Libya's dismantling of its nuclear weapons program had made it vulnerable to military intervention by the West is being seen by analysts as an ominous reinforcement of the North's refusal to end its own nuclear program.

North Korea's official news agency carried comments this week from a Foreign Ministry official criticizing the air assault on Libyan government forces and suggesting that Libya had been duped in 2003 when it abandoned its nuclear program in exchange for promises of aid and improved relations with the West.

Calling the West's bargain with Libya "an invasion tactic to disarm the country," the official said it amounted to a bait and switch approach. "The Libyan crisis is teaching the international community a grave lesson," the official was quoted as saying Tuesday, proclaiming that North Korea's "songun" ideology of a powerful military was "proper in a thousand ways" and the only guarantor of peace on the Korean Peninsula.

As they have watched the attacks in Libya this week, senior North Korean leaders "must feel alarmed, but also deeply satisfied with themselves," said Rüdiger Frank, an adjunct professor at Korea University and the University of North Korean Studies, writing on the Web site 38 North. North Korea is believed to have 8 to 12 nuclear weapons and last year disclosed a new uranium-enrichment plant.

Mr. Frank said that the Libyan situation was "at least the third instance in two decades that would seem to offer proof that they did something right while others failed and ultimately paid the price." He said North Korea would probably see object lessons in the Soviet Union's decision to end the arms race and to "abandon the political option to use their weapons of mass destruction," and in Iraq's agreement to accept United Nations nuclear inspectors and monitors. And now, Libya.

"To put it bluntly," Mr. Frank said, "in the eyes of the North Korean leadership all three countries took the economic bait, foolishly disarmed themselves, and once they were defenseless, were mercilessly punished by the West."

"It requires little imaginative power to see what conclusions will be drawn in Pyongyang," he said, adding that anyone in the senior leadership who favored denuclearization "will now be silent."

The United States said there was no link between Libya's abandonment of efforts to develop nuclear arms and other weapons and the current military campaign by Western nations.

"Where they're at today has absolutely no connection with them renouncing their nuclear program or nuclear weapons," said Mark Toner, a State Department spokesman.

The comments by the anonymous North Korean official appeared to dim the chances for a renewal of the so-called six-party talks on the dismantling of North Korea's atomic program. The talks ended in 2009 when North Korea withdrew, angry over international sanctions that followed a long-range missile test. The two Koreas, the United States, China, Russia and Japan are the participants in the six-party process, which began in 2003. China, North Korea's only major ally, has served as the host country.

UN Says 6 Million NKoreans Need Food Aid (AP)

By Matthew Pennington, Associated Press

Associated Press, March 25, 2011

WASHINGTON — The United Nations reported Thursday that more than 6 million North Koreans, about a quarter of the communist state's population — are in urgent need of international food aid.

The findings, the result of a needs assessment conducted in February and March, will add to pressure for the United States to resume food aid to North Korea suspended in 2009 after its monitors were expelled. But doing so could be seen as aiding a government that has since advanced its nuclear weapons programs and is accused of twice attacking US ally South Korea.

In its report, the result of an assessment conducted in February and March, the U.N. said that North Korea has suffered a series of shocks including summer floods and then a harsh winter, "leaving the country highly vulnerable to a food crisis."

It said the worst affected include children, women and the elderly, and recommended providing 430,000 metric tons (475,000 tons) of food aid.

North Korea's public distribution system will run out of food at the beginning of the "lean season" that runs between May and July, between spring and fall harvests. This would "substantially increase the risk of malnutrition and other diseases," the report said.

An outbreak of the livestock disease foot and mouth detected in December also posed a "serious threat to food security," it said.

Three U.N. agencies — the World Food Program, the Food and Agriculture Organization, and UNICEF — conducted the assessment at North Korea's request. They visited 40 counties in nine of the country's 11 provinces.

Five nongovernment US aid agencies that visited the North last month reported severe food shortages and alarming malnutrition among children.

The U.N. said the current nutrition situation appears to be "relatively stable" but is liable to deteriorate in the "lean season."

"Children who are now mild to moderately malnourished can rapidly become severely malnourished and decrease their chance of survival or full development," the report said.

The United States said Thursday it is still considering whether to resume food aid to the North, which has had chronic problems in feeding its people since its assistance from the former Soviet Union ended. The country suffered famine in the mid-1990s in which at least hundreds of thousands are believed to have died.

State Department spokesman Mark Toner said the criteria for deciding whether to give such aid are "apolitical."

Senate Foreign Relations Committee Chairman John Kerry said Thursday the results of the U.N. assessment were "dire" and called for resumption of aid if it could be properly monitored.

"It is tempting to withhold food assistance until North Korea abandons its pursuit of nuclear weapons or adopts economic reforms. But the North demonstrated during the famine in the mid-to-late 1990s, in which an estimated 5-10 percent of ordinary North Koreans died, that it is willing to allow its people to suffer enormously," the Massachusetts Democrat said in a statement.

International donors will be concerned that any food aid not be redirected from civilians to North Korea's powerful military. They will also seek to act in concert with South Korea if assistance is restarted.

Tensions remain high on the Korean peninsula after two deadly, unprovoked military attacks on US ally South Korea in the past year.

The North also recently revealed it had developed a new means of generating fissile material that might be used for a nuclear bomb. Talks on it disarming its nuclear programs have stalled for nearly two years.

From: LIA08 Hoc
Sent: Thursday, April 28, 2011 6:58 AM
To: Shaffer, Mark R
Subject: RE: USNRC Earthquake-Tsunami Update 042711 1200 EDT

Categories: FOIA Forwarded

The connection is that some of the Japan points of contact with our Japan Site Team will not be available during this time.

Liaison Team Coordinator
US Nuclear Regulatory Commission
email: lia08.hoc@nrc.gov
Desk Ph: 301-816-5185

From: Shaffer, Mark R [mailto:ShafferMr@state.gov]
Sent: Thursday, April 28, 2011 6:48 AM
To: LIA08 Hoc
Cc: Schwartzman, Jennifer
Subject: RE: USNRC Earthquake-Tsunami Update 042711 1200 EDT

So does that mean that all responders and recovery efforts at Fukushima just stops during this time, or just robots can work or what? I don't get the connection with Fukushima.

This email is UNCLASSIFIED.

From: LIA08 Hoc [mailto:LIA08.Hoc@nrc.gov]
Sent: Thursday, April 28, 2011 12:24 PM
To: Shaffer, Mark R
Cc: Schwartzman, Jennifer
Subject: RE: USNRC Earthquake-Tsunami Update 042711 1200 EDT

National holiday

Liaison Team Coordinator
US Nuclear Regulatory Commission
email: lia08.hoc@nrc.gov
Desk Ph: 301-816-5185

From: Shaffer, Mark R [mailto:ShafferMr@state.gov]
Sent: Thursday, April 28, 2011 5:51 AM
To: LIA08 Hoc; LIA03 Hoc
Cc: Schwartzman, Jennifer
Subject: RE: USNRC Earthquake-Tsunami Update 042711 1200 EDT

?? What does "National Stand-Down" mean??

Japan has scheduled a national stand-down on Friday April 29th, and Tuesday through Thursday, May 3rd, 4th, and 5th 2011 inclusive

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From: LIA08 Hoc [mailto:LIA08.Hoc@nrc.gov]
Sent: Wednesday, April 27, 2011 5:50 PM
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The next NRC Update will be distributed at 1200 EDT on Thursday, April 28, 2011

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Beth Reed
Liaison Team Coordinator
US Nuclear Regulatory Commission
email: lia08.hoc@nrc.gov
Desk Ph: 301-816-5185

From: RMTPACTSU_ELNRC <RMTPACTSU_ELNRC@ofda.gov>
Sent: Monday, March 28, 2011 5:46 PM
To: LIA02 Hoc; LIA04 Hoc; LIA03 Hoc; Collins, Elmo
Cc: ET07 Hoc
Subject: FYI: NRC Traveler Elmo Collins

Subject: NRC Traveler Elmo Collins

Dear NRC Colleague – Please be advised that Mr. Collins is now good to go. He's been issued his TA, travel ticket and hotel instruction. The DART confirmed that his hotel reservation has been made. This complete the travel process for his outbound travel.

Please let us know if you have any questions.

Surin McKenna
Admin Coordinator
Pacific Tsunami and Japan Earthquake Response Management Team
USAID/DCHA/OFDA
Rmtpactsu_ac@ofda.gov
202-712-0031

From: LIA07 Hoc
Sent: Monday, March 28, 2011 3:56 AM
To: OST04 Hoc
Subject: FW: 0430 EDT (March 28, 2011) USNRC Earthquake/Tsunami Status Update
Attachments: USNRC Earthquake-Tsunami Update.032811.0430EDT.pdf

From: LIA07 Hoc
Sent: Monday, March 28, 2011 3:52 AM
Subject: 0430 EDT (March 28, 2011) USNRC Earthquake/Tsunami Status Update

Attached, please find a 0430 EDT (March 28, 2011) status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami.

Please note that this information is "Official Use Only" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Caroline

Caroline Nguyen
Office of Nuclear Reactor Regulation
US Nuclear Regulatory Commission
LIA07.HOC@nrc.gov (Operations Center)
Caroline.Nguyen@nrc.gov

From: LIA08 Hoc
Sent: Monday, March 28, 2011 3:39 PM
To: Droggitis, Spiros
Cc: Weber, Michael; LIA06 Hoc; Harrington, Holly; Sheron, Brian; Case, Michael; Zimmerman, Roy; McDermott, Brian
Subject: RE: RESPONSE - Daily Plant Status Report - 3/28/2011

Hi Spiros,

Let's go with this:

Recirculation pumps, located in the drywell, may have failed seals. Seal failure creates a pathway for radioactive reactor coolant system water to travel from the reactor to the primary containment structure.

Thanks,

Rani

From: Droggitis, Spiros
Sent: Monday, March 28, 2011 2:09 PM
To: LIA08 Hoc
Subject: RE: RESPONSE - Daily Plant Status Report - 3/28/2011

Jeff: If Mike et. al. think this answers the mail, we can send it. Just confirm that these answers are ok and we can handle the rest. Thanks for your help, Spiros

From: LIA08 Hoc
Sent: Monday, March 28, 2011 2:06 PM
To: Droggitis, Spiros
Subject: FW: RESPONSE - Daily Plant Status Report - 3/28/2011

Hi Spiros....per the info from below regarding Congressman Markeys questions, do you need any more info, or can you send this to the congressmans staff? Thanks...Mike Weber wants to make sure we have closed this loop. Jeff Temple

From: Weber, Michael
Sent: Monday, March 28, 2011 1:54 PM
To: Sheron, Brian
Cc: RST01 Hoc; LIA06 Hoc; LIA08 Hoc; Blount, Tom; ET07 Hoc; ET05 Hoc; OST02 HOC; FOIA Response.hoc Resource
Subject: RESPONSE - Daily Plant Status Report - 3/28/2011

Did OCA respond to this question from Congressman Markey's staff?

From: Sheron, Brian
Sent: Monday, March 28, 2011 7:53 AM
To: RST01 Hoc; HOO Hoc; Weber, Michael
Subject: RE: Daily Plant Status Report - 3/28/2011

See Spiros' question and my proposed response. Any problems? Let me know if OK to forward to him. Thanks.

Several ramifications.

- 1.) Recirc pumps are inside the drywell. Hence, if they are leaking, water is going into the drywell, and there is a possibility that the drywells may already be flooded. If the drywells are flooded up above the vessel lower head, that will provide cooling to the lower head. There is speculation that cores have melted in units 1 through 3, and may have partially relocated to the vessel lower head. Thus, a flooded drywell will help to retain the molten cores in-vessel and prevent a vessel melt-though.
- 2.) The leaking recirc pumps also provide a path for core material to exit the vessel into the drywell and wetwell. NRC status reports state that there may be damage to the containments in units 2 & 3. If so, then fission products would have a path from the core to the environment. Water in the basements of units 2 & 3 was found to be highly radioactive and analysis indicated core material present.

From: Droggitis, Spiros
Sent: Monday, March 28, 2011 7:32 AM
To: Sheron, Brian
Cc: Riley (OCA), Timothy; Shane, Raeann
Subject: FW: Daily Plant Status Report - 3/28/2011

Brian: In sending these plant status reports to the Hill staffers, Michal Freedoff from Congressman Markey's office asked what does it mean that the "recirculation pump seals have likely failed" in Units 1, 2 & 3 under the core cooling section. Is that a question that you can answer generically as to its significance or do we need to pose that to the Ops Center team? Appreciate your help, Spiros

From: Droggitis, Spiros
Sent: Monday, March 28, 2011 5:14 AM
To: Droggitis, Spiros
Cc: Schmidt, Rebecca; Powell, Amy; Shane, Raeann; Riley (OCA), Timothy; Dacus, Eugene; Decker, David; Weil, Jenny
Subject: Daily Plant Status Report - 3/28/2011

From: LIA05 Hoc
Sent: Monday, March 28, 2011 4:10 PM
To: Feighert, Dan
Subject: RE: Crisis Management Team

Mr. Feighert,

Thanks.

Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187

*****FOR OFFICIAL USE ONLY*****

~~DO NOT RELEASE OUTSIDE OF THE FEDERAL FAMILY~~

From: Feighert, Dan [mailto:dan.feighert@dhs.gov]
Sent: Monday, March 28, 2011 4:08 PM
To: LIA05 Hoc; Dan Feighert; Andrew Seward; Harry Sherwood; John Simpson; Lisa Hamilton; Michelle Ralston; Rebecca Fontenot; Steve Horwitz; Tim Greten; Vanessa E. Quinn
Subject: RE: Crisis Management Team

I have heard of nothing. I will forward to Al Coons in case he has some info.

From: prvs=0610c37e9=LIA05.Hoc@nrc.gov [mailto:prvs=0610c37e9=LIA05.Hoc@nrc.gov] **On Behalf Of** LIA05 Hoc
Sent: Monday, March 28, 2011 2:00 PM
To: Dan Feighert; Andrew Seward; Harry Sherwood; John Simpson; Lisa Hamilton; Michelle Ralston; Rebecca Fontenot; Steve Horwitz; Tim Greten; Vanessa E. Quinn
Subject: Crisis Management Team
Importance: High

Request from the NRC Liaison Team,

Any news or information regarding a DHS or DOE Crisis Management Team being deployed? Please advise.

Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187

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LL77/117

From: LIA05 Hoc
Sent: Monday, March 28, 2011 4:10 PM
To: LIA06 Hoc; LIA08 Hoc
Subject: FW: Crisis Management Team

FYI,

Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187

*****FOR OFFICIAL USE ONLY*****

~~DO NOT RELEASE OUTSIDE OF THE FEDERAL FAMILY~~

From: Greten, Timothy [mailto:Timothy.Greten@dhs.gov]
Sent: Monday, March 28, 2011 4:08 PM
To: LIA05 Hoc; Dan Feighert; Andrew Seward; Harry Sherwood; John Simpson; Lisa Hamilton; Michelle Ralston; Rebecca Fontenot; Steve Horwitz; Tim Greten; Vanessa E. Quinn
Subject: RE: Crisis Management Team

Ken-

Last we heard that was still up in the air (i.e. who would head it, what mission would be, etc etc).

From: prvs=0610c37e9=LIA05.Hoc@nrc.gov [mailto:prvs=0610c37e9=LIA05.Hoc@nrc.gov] **On Behalf Of** LIA05 Hoc
Sent: Monday, March 28, 2011 4:00 PM
To: Dan Feighert; Andrew Seward; Harry Sherwood; John Simpson; Lisa Hamilton; Michelle Ralston; Rebecca Fontenot; Steve Horwitz; Tim Greten; Vanessa E. Quinn
Subject: Crisis Management Team
Importance: High

Request from the NRC Liaison Team,

Any news or information regarding a DHS or DOE Crisis Management Team being deployed? Please advise.

Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187

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From: LIA08 Hoc
Sent: Thursday, April 28, 2011 5:57 PM
To: Hoc, PMT12
Subject: RE: Bullet train

Categories: FOIA Forwarded

Thanks Jessie.

Two pieces of critical information before we move forward, though: (1) How did we find out about the need for this "tasking" (i.e., from who); and (2) Who is the audience for the reply?

Thanks! ☺

Liaison Team Coordinator
US Nuclear Regulatory Commission
email: lia08.hoc@nrc.gov
Desk Ph: 301-816-5185

From: Hoc, PMT12
Sent: Thursday, April 28, 2011 5:54 PM
To: LIA08 Hoc
Subject: Bullet train

Mike,

Here is my text for the Bullet Train issue so far. I will explain the last paragraph to you in a minute. Please remember this is rough! I will write the tracker now and send that to you as well.

-Jessie

Bullet train service between Tokyo and Sendai resumes within the next week. There is also a highway route from Tokyo to Sendai that runs essentially parallel to the bullet train. Both routes contain segments that are within the 50 mile (80 km) zone but outside 18.6 mi (30 km) zone. DOE has been performing radiation readings of the highway route and will be providing the data to the NRC Japan Protective Measures Team (PMT). This travel route is a major thoroughfare between these cities, without which travel between Tokyo and Sendai can take over 10 hours to travel between these two destinations.

AMS monitoring results in areas beyond 25 miles from the Fukushima Daiichi reactors show areas where dose rates are many times higher than historical background. However, DOE reports that the measured external dose rates in these areas are not high enough to warrant evacuation or relocation of the population.

Between the 80 km (50 mi) recommended evacuation zone established for American citizens in Japan and the 30 km (18.6 mi) Japanese zone, and based on DOE areal monitoring, the portion of travel route within these evacuation zones received at most only between 0.03 mR/hr and 0.25 mR/hr at the last reading (04-27-2011). It is the recommendation that American citizens that choose to use these forms of transportation do not stop in the evacuation zones and travel directly through the area to minimize the exposure. By minimizing the time spent

- in these zones, and exposure to radiation is minimal and well below US EPA limits and is not a major health concern. American citizens should also heed Japanese warnings in the area.

From: LIA05 Hoc
Sent: Monday, March 28, 2011 6:53 PM
To: Dan Feighert; Andrew Seward; Harry Sherwood; John Simpson; Lisa Hamilton; Michelle Ralston; Rebecca Fontenot; Steve Horwitz; Tim Greten; Vanessa E. Quinn
Subject: FW: 1800 EDT (March 28, 2011) USNRC Earthquake/Tsunami Status Update
Attachments: USNRC Earthquake-Tsunami Update.032811.1800EDT.pdf

Please find the attached NRC Status Update for 1800 today.

Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187

*******FOR OFFICIAL USE ONLY*******
DO NOT RELEASE OUTSIDE OF THE FEDERAL FAMILY

From: LIA01 Hoc
Sent: Monday, March 28, 2011 6:52 PM
To: LIA05 Hoc
Subject: FW: 1800 EDT (March 28, 2011) USNRC Earthquake/Tsunami Status Update

From: LIA07 Hoc
Sent: Monday, March 28, 2011 6:39 PM
Subject: 1800 EDT (March 28, 2011) USNRC Earthquake/Tsunami Status Update

Attached, please find a 1800 EDT, March 28, 2011 status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami.

Please note that this information is "Official Use Only" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Sara

Sara K. Mroz
Communications and Outreach
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
Sara.Mroz@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

LLLL/120

From: LIA08 Hoc
Sent: Monday, March 28, 2011 2:31 PM
To: Droggitis, Spiros
Cc: Weber, Michael; LIA06 Hoc; Harrington, Holly
Subject: RE: RESPONSE - Daily Plant Status Report - 3/28/2011

Spiros. Talked to Pat Hyland in the RST and Mike Weber, the ET Director. Please do not use Brian Sherons answer to the Congressman...too much technical information based on the question asked. The answer is:

Recirculation pumps, located in the drywell, may have failed seals. Seal failure creates a pathway for radioactive reactor coolant system water to travel from the reactor to the primary containment structure. (Holly.....any thoughts on how to simplify the answer to Congressman Markeys question from reading our status summaries....."what does it mean that the recirculation pump seals have likely failed..."). Spiros...let us play with this one sentence answer and get back to you this afternoon.

Jeff Temple

From: Droggitis, Spiros
Sent: Monday, March 28, 2011 2:09 PM
To: LIA08 Hoc
Subject: RE: RESPONSE - Daily Plant Status Report - 3/28/2011

Jeff: If Mike et. al. think this answers the mail, we can send it. Just confirm that these answers are ok and we can handle the rest. Thanks for your help, Spiros

From: LIA08 Hoc
Sent: Monday, March 28, 2011 2:06 PM
To: Droggitis, Spiros
Subject: FW: RESPONSE - Daily Plant Status Report - 3/28/2011

Hi Spiros....per the info from below regarding Congressman Markeys questions, do you need any more info, or can you send this to the congressmans staff? Thanks...Mike Weber wants to make sure we have closed this loop. Jeff Temple

From: Weber, Michael
Sent: Monday, March 28, 2011 1:54 PM
To: Sheron, Brian
Cc: RST01 Hoc; LIA06 Hoc; LIA08 Hoc; Blount, Tom; ET07 Hoc; ET05 Hoc; OST02 HOC; FOIA Response.hoc Resource
Subject: RESPONSE - Daily Plant Status Report - 3/28/2011

Did OCA respond to this question from Congressman Markey's staff?

From: Sheron, Brian
Sent: Monday, March 28, 2011 7:53 AM
To: RST01 Hoc; HOO Hoc; Weber, Michael
Subject: RE: Daily Plant Status Report - 3/28/2011

See Spiros' question and my proposed response. Any problems? Let me know if OK to forward to him. Thanks.

Several ramifications.

- 1.) Recirc pumps are inside the drywell. Hence, if they are leaking, water is going into the drywell, and there is a possibility that the drywells may already be flooded. If the drywells are flooded up above the vessel lower head, that will provide cooling to the lower head. There is speculation that cores have melted in units 1 through 3, and may have partially relocated to the vessel lower head. Thus, a flooded drywell will help to retain the molten cores in-vessel and prevent a vessel melt-though.
- 2.) The leaking recirc pumps also provide a path for core material to exit the vessel into the drywell and wetwell. NRC status reports state that there may be damage to the containments in units 2 & 3. If so, then fission products would have a path from the core to the environment. Water in the basements of units 2 & 3 was found to be highly radioactive and analysis indicated core material present.

From: Droggitis, Spiros
Sent: Monday, March 28, 2011 7:32 AM
To: Sheron, Brian
Cc: Riley (OCA), Timothy; Shane, Raeann
Subject: FW: Daily Plant Status Report - 3/28/2011

Brian: In sending these plant status reports to the Hill staffers, Michal Freedoff from Congressman Markey's office asked what does it mean that the "recirculation pump seals have likely failed" in Units 1, 2 & 3 under the core cooling section. Is that a question that you can answer generically as to its significance or do we need to pose that to the Ops Center team? Appreciate your help, Spiros

From: Droggitis, Spiros
Sent: Monday, March 28, 2011 5:14 AM
To: Droggitis, Spiros
Cc: Schmidt, Rebecca; Powell, Amy; Shane, Raeann; Riley (OCA), Timothy; Dacus, Eugene; Decker, David; Weil, Jenny
Subject: Daily Plant Status Report - 3/28/2011

From: LIA08 Hoc
Sent: Thursday, April 28, 2011 3:40 PM
To: Droggitis, Spiros
Subject: RE: Daily Plant Status Report - 4/27/2011

Categories: FOIA Forwarded

Thanks Spiros. As soon as you hear from Marty about the process to follow, please let me know. Jeff

Liaison Team Coordinator
US Nuclear Regulatory Commission
email: lia08.hoc@nrc.gov
Desk Ph: 301-816-5185

From: Droggitis, Spiros
Sent: Thursday, April 28, 2011 3:25 PM
To: LIA08 Hoc
Subject: FW: Daily Plant Status Report - 4/27/2011

Jeff; Example of plant status report to Hill, but try to have them marked "OUO". Thanks, Spiros

From: Droggitis, Spiros
Sent: Wednesday, April 27, 2011 1:20 PM
To: Droggitis, Spiros
Cc: Schmidt, Rebecca; Powell, Amy; Shane, Raeann; Decker, David; Dacus, Eugene; Riley (OCA), Timothy; Combs, Thomas
Subject: Daily Plant Status Report - 4/27/2011

*****NOTE: THE ATTACHED IS FOR OFFICIAL USE ONLY*****

The next NRC Update will be distributed at 1200 EDT on Thursday 28, 2011

*****NOTE: THE ATTACHED IS FOR OFFICIAL USE ONLY*****

Also want to remind you of a Commission meeting tomorrow on "Briefing on the Status of NRC Response to Events in Japan and Briefing on Station Blackout" at 9:30 am. The meeting will be webcast. Details follow:

Purpose

[Webcast]

Commission Meeting - Briefing on Status of NRC Response to Events in Japan and Briefing on Station Blackout.

Meeting Date(s) & Time(s)

04/28/11
09:30AM

Meeting Location

NRC One White Flint North

444/122

11555 Rockville Pike
Room: Commissioners' Conference Room
Rockville MD

Schaperow, Jason

From: Schaperow, Jason
Sent: Tuesday, March 29, 2011 2:23 PM
To: Tinkler, Charles
Subject: Qs and As

Hi Charlie,

When you get a chance, could you email me a copy of the Qs and As that you developed for Mike Weber?
(They might come in handy for me to have.)

Thanks,
Jason

LLLL/123

Schaperow, Jason

From: Schaperow, Jason
Sent: Tuesday, March 29, 2011 1:28 PM
To: Chang, Richard
Subject: FW: Question from House staffers

From: Schaperow, Jason
Sent: Friday, March 25, 2011 3:03 PM
To: Sheron, Brian
Cc: Gibson, Kathy
Subject: Question from House staffers

Hi Brian,

Regarding a question that the House staffers (Jeff Baran, Allison Cassidy) asked us today at 2:00...

I found on the NRC external web site the report they asked about. The report is NUREG/CR-6920, "Risk-Informed Assessment of Degraded Containment Vessels." The project manager was Herman Graves (RES/DE) and the Sandia analysts were Spencer, Petti, and Kunsman. Jose Pires (RES/DE) may have been involved in this work as well. The following is a link to the document:
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6920/>

Would you like me to ask Herman or Jose to come see you about this?

Thanks,
Jason

LLL 4/124

Schaperow, Jason

From: Schaperow, Jason
Sent: Tuesday, March 29, 2011 3:32 PM
To: 'Gauntt, Randall O'
Cc: Tinkler, Charles
Subject: RE: Please review attached slides. Thanks.

Importance: High

Thanks for looking it over today.

Also, could you answer the following 2 questions, where there are blanks in the slides:
What are the title and date of the report that the P6 SFP source term was taken from?
Which Peach Bottom unmitigated LTSBO case was used for the reactor source term?

Thanks again,
Jason

From: Gauntt, Randall O [<mailto:rogaunt@sandia.gov>]
Sent: Tuesday, March 29, 2011 3:19 PM
To: Schaperow, Jason
Subject: RE: Please review attached slides. Thanks.

Jason,
This seems accurate to me. We now know that there was in fact more fuel in Unit 4, and probably all the pools than were indicated in the Origen runs that GE gave us.
Randy

From: Schaperow, Jason [<mailto:Jason.Schaperow@nrc.gov>]
Sent: Tuesday, March 29, 2011 11:20 AM
To: Gauntt, Randall O
Subject: FW: Please review attached slides. Thanks.
Importance: High

If you could handle the request below today, it would be much appreciated. The reason for the hurry is twofold:

- The longer it takes, the more we will forget what we did on 3/18/11.
- There is an open meeting of the NRC's Commission (i.e., Chairman Jaczko and the 4 other Commissioners) on 4/14/11 on the Fukushima accident, and one of the topics is likely to be source term and dose estimation.

From: Schaperow, Jason
Sent: Tuesday, March 29, 2011 11:31 AM
To: Gauntt, Randall O
Cc: Tinkler, Charles
Subject: Please review attached slides. Thanks.
Importance: High

Hi Randy,

Charlie stated that we need to have some slides documenting the source terms we gave to the Ops Center on the evening of March 18. To fulfill this need, I developed some slides, which are attached. Please review the attached slides for accuracy.

Also, there are 2 places in the slides that I need your help to fill in information. Specifically, what are the title and date of the report that the P6 SFP source term was taken from? Also, which Peach Bottom unmitigated LTSBO case was used for the reactor source term?

Thanks,
Jason

Schaperow, Jason

From: Schaperow, Jason
Sent: Tuesday, March 29, 2011 4:05 PM
To: Schaperow, Jason
Subject: FW: Reminder: FW: WAIVER OF WORK SCHEDULE AND PAY CAP RULES FOR WORK IN RESPONSE TO THE EVENTS IN JAPAN

From: Greenwood, Carol
Sent: Monday, March 28, 2011 1:54 PM
To: Schaperow, Jason
Subject: RE: Reminder: FW: WAIVER OF WORK SCHEDULE AND PAY CAP RULES FOR WORK IN RESPONSE TO THE EVENTS IN JAPAN

Yes, Thank you!

Carol

From: Schaperow, Jason
Sent: Monday, March 28, 2011 1:53 PM
To: Greenwood, Carol
Cc: Santiago, Patricia
Subject: RE: Reminder: FW: WAIVER OF WORK SCHEDULE AND PAY CAP RULES FOR WORK IN RESPONSE TO THE EVENTS IN JAPAN

Hi Carol,

I got a call from the Ops Center yesterday morning at 0600 for support. So, I worked from 0600 to 0800 yesterday. I used the link below to add this to your timesheet. Did I do it correctly?

Thanks,
Jason

From: Greenwood, Carol
Sent: Friday, March 18, 2011 10:31 AM
To: Armstrong, Kenneth; Bajorek, Stephen; Boyd, Christopher; Elkins, Scott; Hoxie, Chris; Lee, Richard; Rubin, Stuart; Santiago, Patricia; Sherbini, Sami; Tinkler, Charles; Voglewede, John; Zigh, Ghani; Tomon, John
Subject: FW: Reminder: FW: WAIVER OF WORK SCHEDULE AND PAY CAP RULES FOR WORK IN RESPONSE TO THE EVENTS IN JAPAN

Please update the Excel spreadsheet [by clicking here](#) with names and dates of any staff that have or will be performing emergency-related premium work in response to the events in Japan. This applies to the IRC, OIP, OPA or wherever they are doing emergency work.

Please confirm to me when your branch is updated.

The spreadsheet is at g:\DSA\Directors Office\JapanResponseWork.xlsx if the above link doesn't work.

Regards

Carol Greenwood

Lead Administrative Assistant

LLLL/126

RES/DSA
U.S. Nuclear Regulatory Commission
Phone: 301-251-3319



From: Gibson, Kathy
Sent: Friday, March 18, 2011 8:07 AM
To: Greenwood, Carol
Subject: Fw: Reminder: FW: WAIVER OF WORK SCHEDULE AND PAY CAP RULES FOR WORK IN RESPONSE TO THE EVENTS IN JAPAN

Would you check with the BCs and compile this list for Andrea for DsA? Thx

From: Valentin, Andrea
To: Gibson, Kathy; Scott, Michael; Coyne, Kevin
Sent: Fri Mar 18 08:00:34 2011
Subject: Reminder: FW: WAIVER OF WORK SCHEDULE AND PAY CAP RULES FOR WORK IN RESPONSE TO THE EVENTS IN JAPAN

This is a reminder to provide me with a list of names of staff that are performing emergency-related premium work (and the dates that the people worked) in response to the events in Japan. This applies to the IRC, OIP, OPA or wherever they are doing emergency work.

Thanks,
Andrea

From: Khan, Charline
Sent: Thursday, March 17, 2011 7:29 AM
To: RidsAcraAcnw_MailCTR Resource; RidsAslbpmManagement Resource; RidsOgcMailCenter Resource; RidsOcaaMailCenter Resource; RidsOcfMailCenter Resource; RidsOigMailCenter Resource; RidsOipMailCenter Resource; RidsOcaMailCenter Resource; RidsOpaMail Resource; RidsSecyMailCenter Resource; RidsSecyCorrespondenceMCTR Resource; RidsEdoMailCenter Resource; RidsAdmMailCenter Resource; RidsCsoMailCenter Resource; RidsOeMailCenter Resource; RidsFsmeOd Resource; RidsOiMailCenter Resource; RidsOIS Resource; RidsHrMailCenter Resource; RidsNroOd Resource; RidsNroMailCenter Resource; RidsNmssOd Resource; RidsNrrOd Resource; RidsNrrMailCenter Resource; RidsResOd Resource; RidsResPmdaMail Resource; RidsSbcrMailCenter Resource; RidsNsirOd Resource; RidsNsirMailCenter Resource; RidsRgn1MailCenter Resource; RidsRgn2MailCenter Resource; RidsRgn3MailCenter Resource; RidsRgn4MailCenter Resource
Cc: Davidson, Lawrence; Buchholz, Jeri; Johns, Nancy
Subject: WAIVER OF WORK SCHEDULE AND PAY CAP RULES FOR WORK IN RESPONSE TO THE EVENTS IN JAPAN

MEMORANDUM TO: Those on the Attached List

FROM: Miriam L. Cohen, Director/RA by J. Buchholz for/
Office of Human Resources

DATED: March 16, 2011

**SUBJECT: WAIVER OF WORK SCHEDULE AND PAY CAP RULES FOR WORK IN RESPONSE TO THE
EVENTS IN JAPAN**

ADAMS Accession No. ML11075A003 refers

NOTE: Electronic distribution only

Charline Khan

Administrative Assistant (Rotation)

U.S. NUCLEAR REGULATORY COMMISSION

Office of Human Resources

P:301-492-2318

Charline.Khan@nrc.gov

Wagner, Katie

From: Wagner, Katie
Sent: Tuesday, March 29, 2011 4:17 PM
To: Bush-Goddard, Stephanie
Cc: Lee, Richard
Subject: Sharepoint

Stephanie,

Are these items "pending" or "completed"?

25	3/17/2011	Edward Lazo	Edward.LAZO@oecd.org	Stephanie Bush-Goddard x7528	HEB	Request for information on whether the [US] government has made recommendations with regard to [US] citizens in Japan, with regard to food or goods coming from Japan, with regard to [US] citizens going to Japan. Also requesting information regarding [other] [US] published governmental positions.	Information regarding published U.S. governmental positions.	Pending
46	3/24/2011	John Holdren	John P. Holdren@ostp.eop.gov	Stephanie Bush-Goddard x7528	HEB	Review information on OSTP analysis and layperson's summary of standards applicable to I-131 in drinking water.	Review information on OSTP analysis and layperson's summary of standards applicable to I-131 in drinking water.	Pending

Thanks,

Katie Wagner
General Engineer
U.S. Nuclear Regulatory Commission
(301) 251.7917
Katie.Wagner@nrc.gov

4444/127

Schaperow, Jason

From: Schaperow, Jason
Sent: Tuesday, March 29, 2011 4:31 PM
To: 'kcw@dycoda.com'
Subject: FW: Bunn article

From: Schaperow, Jason
Sent: Tuesday, March 29, 2011 2:59 PM
To: Tinkler, Charles
Subject: FW: Bunn article

Please note that the correction/retraction is at the top of the page (at the link below).

From: Schaperow, Jason
Sent: Tuesday, March 29, 2011 2:58 PM
To: Tinkler, Charles
Subject: Bunn article

http://www.washingtonpost.com/opinions/how-we-can-reduce-the-risk-of-another-fukushima/2011/03/23/ABpyl3KB_story.html

LLLL/128

From: OST01 HOC
Sent: Thursday, April 28, 2011 12:27 AM
To: Tracy, Glenn; Hoc, PMT12; LIA08 Hoc; RST01 Hoc; RST02 Hoc
Cc: OST01 HOC
Subject: draft Japan One Pager 0700 EDT 4-28-11.docx
Attachments: draft Japan One Pager 0700 EDT 4-28-11.docx

All,

Please update one pager due by 0530 to me. Please make sure all items on one pager are up-to-date and accurate since we have the Commission meeting later this morning.

Kind Regards,
EST

Schaperow, Jason

From: Schaperow, Jason
Sent: Tuesday, March 29, 2011 3:07 PM
To: Chang, Richard
Subject: FW: new and improved Q&A's
Attachments: Q&A SBO.doc

From: Tinkler, Charles
Sent: Tuesday, March 29, 2011 2:50 PM
To: Gibson, Kathy; Armstrong, Kenneth
Cc: Schaperow, Jason
Subject: new and improved Q&A's

New version (also included reference to Op-Ed)

Charles Tinkler
Charles.Tinkler@nrc.gov

LLLL/130

SOARCA Insights

- Probabilistic risk assessments and severe accident research and studies over the last 20 yrs have evaluated US plant response to an event generally similar to the event which occurred at Fukushima (not including similar Tsunami)
- In many respects the Japanese event resembles a severe accident scenario which is known as a long term station blackout, an event in which offsite AC power and emergency onsite AC power is lost. The plant is able to respond safely through the use of turbine driven equipment controlled by emergency DC power (station batteries)
- Recent severe accident studies (SOARCA) for a long term station blackout (seismically initiated) at a US BWR Mark I plant indicate that US plants can safely shutdown during such an event through the use of new, additional equipment, put in place (and inspected) following the terrorist attack of 9/11
 - Comprehensive security assessments focused on implementing plant changes to enhance plants ability to respond to accidents
- The new, additional equipment (B.5.b) includes both portable generators (with inverters) and an independent portable diesel driven pump. Additionally procedures have been developed for manual start of turbine driven pump (RCIC).
- These measures combined with existing infrastructure and coordination within the nuclear industry indicate that US plants have capability to successfully respond to a station blackout.
- Also, as a result of our post 9/11 security assessment additional equipment has been added to improve spent fuel pool cooling.
 - Measures have been added to provide water spray capability to the spent fuel pools by a diesel driven pump.
 - Further, another enhancement has been made to spent fuel pools to enhance coolability of the fuel by distributing fuel within the pool (by locating higher decay power assemblies amongst lower decay power assemblies).
 - These items were also identified by the National Academy of Sciences. [Note an Op-Ed was written which erroneously stated that these measures were not implemented – a retraction was printed in the Washington Post]

From: RST01B Hoc
Sent: Tuesday, March 29, 2011 4:47 PM
To: rob.versluis@nuclear.energy.gov
Subject: FW: 1800 EDT (March 28, 2011) USNRC Earthquake/Tsunami Status Update
Attachments: USNRC Earthquake-Tsunami Update.032811.1800EDT.pdf

From: RST01 Hoc
Sent: Tuesday, March 29, 2011 4:35 PM
To: RST01B Hoc
Subject: FW: 1800 EDT (March 28, 2011) USNRC Earthquake/Tsunami Status Update

FYI for 3/28

From: LIA07 Hoc
Sent: Monday, March 28, 2011 6:39 PM
Subject: 1800 EDT (March 28, 2011) USNRC Earthquake/Tsunami Status Update

Attached, please find a 1800 EDT, March 28, 2011 status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami.

Please note that this information is "~~Official Use Only~~" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Sara

Sara K. Mroz
Communications and Outreach
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
Sara.Mroz@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

LLLL/131

From: LIA05 Hoc
Sent: Tuesday, March 29, 2011 4:41 PM
To: Dan Feighert; Andrew Seward; Harry Sherwood; John Simpson; Lisa Hamilton; Michelle Ralston; Rebecca Fontenot; Steve Horwitz; Tim Greten; Vanessa E. Quinn
Subject: Japan Press Releases for Today
Attachments: Japan Press Releases 41.pdf

Please find the attached.

Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187

LLLL/132

March 29, 2011

Nuclear and Industrial Safety Agency

Seismic Damage Information (the 60th Release)

(As of 08:00 March 29th, 2011)

Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa NPS, Tohoku Electric Power Co. Inc.; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co. Inc. (TEPCO); Tokai Dai-ni NPS, Japan Atomic Power Co. Inc. as follows:

Major updates are as follows.

1. Nuclear Power Stations (NPSs)

● Fukushima Dai-ichi NPS

- The water was confirmed to be collected in the vertical parts of the trenches (an underground structure for laying pipes, shaped like a tunnel) outside of the turbine building of Units 1 to 3. The dose rates on the water surface were 0.4 mSv/h of the Unit 1's trench and 1,000 mSv/h of the Unit 2's trench. The rate of the Unit 3's trench could not measure because of the rubble. (Around 15:30 March 27th)
- The pump for the fresh water injection to RPV of Unit 3 was switched from the Fire Pump Truck to the temporary motor-driven pump. (20:30 March 28th)
- In the samples of soil collected on 21 and 22 March 2011 on the site (at 5 points) of Fukushima Dai-ichi NPS, plutonium 238, 239 and 240 were detected (23:45 March 28th announced by TEPCO). The concentration of the detected plutonium was at the equivalent level of the fallout (radioactive fallout) that was observed in Japan concerning the past atmospheric nuclear testing, i.e. at the equivalent level of the normal condition of environment, and was not at the level of having harmful influence on human body.

2. Action taken by NISA

(March 28th)

Regarding the delay in the reporting of the water confirmed outside of the turbine buildings, NISA directed TEPCO to accomplish the

communication in the company on significant information in a timely manner and to inform it in a timely and appropriate manner.

(Attached sheet)

1. The state of operation at NPS (Number of automatic shutdown units: 10)

● Fukushima Dai-ichi NPS, TEPCO

(Okuma Town and Futaba Town, Futaba County, Fukushima Prefecture)

(1) The state of operation

Unit 1 (460MWe): automatic shutdown
 Unit 2 (784MWe): automatic shutdown
 Unit 3 (784MWe): automatic shutdown
 Unit 4 (784MWe): in periodic inspection outage
 Unit 5 (784MWe): in periodic inspection outage, cold shutdown
 at 14:30 March 20th
 Unit 6 (1,100MWe): in periodic inspection outage, cold shutdown
 at 19:27 March 20th

(2) Major Plant Parameters (As of 06:00 March 29th)

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Reactor Pressure*1 [MPa]	0.493(A) 0.603(B)	0.074(A) 0.072(B)	0.135(A) 0.011(C)	—	0.111	0.106
CV Pressure (D/W) [kPa]	285	100	108.5	—	—	—
Reactor Water Level*2 [mm]	-1,600(A) -1,600(B)	-1,500(A) Not available(B)	-1,900(A) -2,300(B)	—	2,363	1,965
Suppression Pool Water Temperature (S/C) [°C]	—	—	—	—	—	—
Suppression Pool Pressure (S/C) [kPa]	285	down scale (under survey)	179.2	—	—	—
Spent Fuel Pool Water Temperature [°C]	Indicator Failure	45.0	Indicator Failure	Indicator Failure	37.1	22.0
Time of Measurement	04:00 March 29th	04:00 March 29th	04:45 March 29th	March 29th	06:00 March 29th	06:00 March 29th

*1: Converted from reading value to absolute pressure

*2: Distance from the top of fuel

(3) Situation of Each Unit

<Unit 1>

- TEPCO reported to NISA the event (Inability of water injection of the Emergency Core Cooling System) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness. (16:36 March 11th)
- Operation of Vent (10:17 March 12th)
- Seawater injection to the Reactor Pressure Vessel (RPV) via the Fire Extinguish Line started. (20:20 March 12th)
→Temporary interruption of the injection (01:10 March 14th)
- The sound of explosion in Unit 1 occurred. (15:36 March 12th)
- The amount of injected water to the Reactor Core was increased by utilizing the Feedwater Line in addition to the Fire Extinguish Line. (2m³/h→18m³/h).(02:33 March 23rd) Later, it was switched to the Feedwater Line only (around 11m³/h). (09:00 March 23rd)
- Lighting in the Central Operation Room was recovered. (11:30 March 24th)
- As the result of concentration measurement in the stagnant water on the basement floor of the turbine building, $2.1 \times 10^5 \text{Bq/cm}^3$ of ¹³¹I (Iodine) and $1.8 \times 10^6 \text{Bq/cm}^3$ of ¹³⁷Cs (Caesium) were detected as major radioactive nuclides.
- White smoke was confirmed to generate continuously. (As of 06:30 March 29th)
- Fresh water injection to RPV is being carried out. (As of 08:00 March 29th)

<Unit 2>

- TEPCO reported to NISA the event (Inability of water injection of the Emergency Core Cooling System) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness. (16:36 March 11th)
- Operation of Vent (11:00 March 13th)
- The Blow-out Panel of reactor building was opened due to the explosion in the reactor building of Unit 3. (After 11:00 March 14th)

- Reactor water level tended to decrease. (13:18 March 14th) TEPCO reported to NISA the event (Loss of reactor cooling functions) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness. (13:49 March 14th)
- Seawater injection to RPV via the Fire Extinguish line was ready. (19:20 March 14th)
- Water level in RPV tended to decrease. (22:50 March 14th)
- Operation of Vent (0:02 March 15th)
- A sound of explosion was made in Unit 2. As the pressure in Suppression Pool (Suppression Chamber) decreased (06:10 March 15th), there was a possibility that an incident occurred in the Chamber. (About 06:20 March 15th)
- Electric power receiving at the emergency power source transformer from the external transmission line was completed. The work for laying the electric cable from the facility to the load side was carried out. (As of 13:30 March 19th)
- Injection of 40t of Seawater to the Spent Fuel Pool was started.(from 15:05 till 17:20 March 20th)
- Power Center of Unit 2 received electricity (15:46 March 20th)
- White smoke generated. (18:22 March 21st)
- White smoke was died down and almost invisible. (As of 07:11 March 22nd)
- Injection of 18t of Seawater to the Spent Fuel Pool was carried out. (From 16:07 till 17:01 March 22nd)
- White smoke was confirmed to generate continuously. (Around 06:20 March 25th)
- Injection of seawater to the Spent Fuel Pool via the Fuel Pool Cooling Line was carried out. (From 10:30 till 12:19 March 25th)
- White smoke was confirmed to generate continuously (As of 08:00 March 26th)
- Lighting of Central Operation Room was recovered (16:46 March 26th)
- The pump for the fresh water injection to RPV of Unit 2 was switched from the Fire Pump Truck to the temporary motor-driven pump.(18:31 March 27th)
- Regarding the result of the concentration measurement in the stagnant water on the basement floor of the turbine building of Unit 2 of

Fukushima Dai-ichi NPS announced by TEPCO on 27 March, TEPCO reported to NISA that as the result of analysis and evaluation through re-sampling, judging the measured value of Iodine-134 was wrong, the concentrations of gamma nuclides including Iodine-134 were less than the detection limit.(00:07 March 28)

- White smoke was confirmed to generate continuously. (As of 06:30 March 29th)
- Fresh water injection to RPV is being carried out. (As of 08:00 March 29th)

<Unit 3>

- TEPCO reported to NISA the event (Inability of water injection of the Emergency Core Cooling System) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness. (05:10 March 13th)
- Operation of Vent (20:41 March 12th)
- Operation of Vent (08:41 March 13th)
- Fresh water started to be injected to RPV via the Fire Extinguish Line. (11:55 March 13th)
- Seawater started to be injected to RPV via the Fire Extinguish Line. (13:12 March 13th)
- Seawater injection for Units 1 and 3 was interrupted due to the lack of seawater in pit. (01:10 March 14th)
- Seawater injection to RPV for Unit 3 was restarted. (03:20 March 14th)
- Operation of Vent (05:20 March 14th)
- The pressure in Primary Containment Vessel (PCV) of Unit 3 rose unusually. (07:44 March 14th) TEPCO reported to NISA on the event falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness. (7:52 March 14th)
- In Unit 3, the explosion like Unit 1 occurred around the reactor building (11:01 March 14th)
- The white smoke like steam generated from Unit 3. (08:30 March 16th)
- Because of the possibility that PCV of Unit 3 was damaged, the workers evacuated from the main control room of Units 3 and 4 (common control room). (10:45 March 16th) Thereafter the operators returned to the room and restarted the operation of water injection. (11:30 March 16th)

- Seawater was discharged 4 times to Unit 3 by the helicopters of the Self-Defence Force. (9:48, 9:52, 9:58 and 10:01 March 17th)
- The riot police arrived at the site for the water spray from the ground. (16:10 March 17th)
- The Self-Defence Force started the water spray using a fire engine. (19:35 March 17th)
- The water spray from the ground was carried out by the riot police. (From 19:05 till 19:13 March 17th)
- The water spray from the ground was carried out by the Self-Defense Force using 5 fire engines. (19:35, 19:45, 19:53, 20:00 and 20:07 March 17th)
- The water spray from the ground using 6 fire engines (6 tons of water spray per engine) was carried out by the Self-Defence Force. (From before 14:00 till 14:38 March 18th)
- The water spray from the ground using a fire engine provided by the US Military was carried out. (Finished at 14:45 March 18th)
- Hyper Rescue Unit of Tokyo Fire Department carried out the water spray. (Finished at 03:40 March 20th)
- The pressure in PCV of Unit 3 rose (320 kPa as of 11:00 March 20th). Preparation to lower the pressure was carried. Judging from the situation, immediate pressure relief was not required. Monitoring the pressure continues (120 kPa at 12:15 March 21st).
- On-site survey for leading electric cable (From 11:00 till 16:00 March 20th)
- Water spray over the Spent Fuel Pool of Unit 3 by Hyper Rescue Unit of Tokyo Fire Department was carried out (From 21:30 March 20th till 03:58 March 21st).
- Works for the recovery of external power supply is being carried out.
- Grayish smoke generated from Unit 3. (At around 15:55 March 21st)
- The smoke was confirmed to be died down. (17:55 March 21st)
- Grayish smoke changed to be whitish and seems to be ceasing. (As of 07:11 March 22nd)
- Water spray (Around 180t) by Hyper Rescue Unit of Tokyo Fire Department was carried out. (from 15:10 till 15:59 March 22nd)
- Lighting was recovered in the Central Operation Room. (22:43 March 22nd)

- Injection of 35t of seawater to the Spent Fuel Pool via the Fuel Pool Cooling Line was carried out. (From 11:03 till 13:20 March 23rd)
- Slightly blackish smoke generated from the reactor building. (Around 16:20 March 23rd) At around 23:30 March 23rd and around 4:50 March 24th, it was reported that the smoke seemed to cease.
- Around 120t of seawater was injected to the Spent Fuel Pool via the Fuel Pool Cooling Line. (From around 5:35 till around 16:05 March 24th)
- As the results of the survey of the stagnant water, into which workers who were laying electric cable on the ground floor and the basement floor of the turbine building of the Unit 3 walked, the dose rate on the water surface was around 400mSv/h, and as the result of gamma-ray analysis of the sampling water, the totaled concentration of each nuclide of the sampling water was around 3.9×10^6 Bq/cm³.
- Water spray by Kawasaki City Fire Bureau supported by Tokyo Fire Department was carried out. (From 13:28 till 16:00 March 25th)
- Water spray of approximately 100t using Concrete Pump Truck (50t/h) was carried out. (From 12:34 till 14:36 March 27th)
- The pump for the fresh water injection to RPV was switched from the Fire Pump Truck to the temporary motor-driven pump.(20:30 March 28th)
- White smoke was confirmed to generate continuously (As of 06:30 March 29th)
- Injection of fresh water to RPV is being carried out. (As of 08:00 March 29th)

<Unit 4>

- Because of the replacement work of the Shroud of RPV, no fuel was inside the RPV.
- The temperature of water in the Spent Fuel Pool had increased. (84 °C at 04:08 March 14th)
- It was confirmed that a part of wall in the operation area of Unit 4 was damaged. (06:14 March 15th)
- The fire at Unit 4 occurred. (09:38 March 15th) TEPCO reported that the fire was extinguished spontaneously. (11:00 March 15th)
- The fire occurred at Unit 4. (5:45 March 16th) TEPCO reported that no

- fire could be confirmed on the ground. (At around 06:15 March 16th)
- The Self-Defence Force started water spray over the Spent Fuel Pool of Unit 4 (09:43 March 20th).
 - On-site survey for leading electric cable (From 11:00 till 16:00 March 20th)
 - Water spray over the Spent Fuel Pool of Unit 4 by Self-Defence Force was started. (From around 18:30 till 19:46 March 20th).
 - Water spray over the Spent Fuel Pool by Self-Defence Force using 13 fire engines was started (From 06:37 till 08:41 March 21st).
 - Works for laying electricity cable to the Power Center was completed. (At around 15:00 March 21st)
 - Power Center received electricity. (10:35 March 22nd)
 - Spray of around 150t of water using Concrete Pump Truck (50t/h) was carried out. (from 17:17 till 20:32 March 22nd)
 - Spray of around 130t of water using Concrete Pump Truck (50t/h) was carried out. (From 10:00 till 13:02 March 23rd)
 - Spray of around 150t of water using Concrete Pump Truck (50t/h) was carried out. (From 14:36 till 17:30 March 24th)
 - Spray of around 150t of water using Concrete Pump Truck (50t/h) was carried out. (From 19:05 till 22:07 March 25th)
 - Injection of seawater to the Spent Fuel Pool via the Fuel Pool Cooling Line was carried out. (From 06:05 till 10:20 March 25th)
 - Water spray of approximately 125t using Concrete Pump Truck (50t/h) was carried out. (From 16:55 till 19:25 March 28th)
 - White smoke was confirmed to generate continuously. (As of 06:30 March 29th)

<Units 5 and 6>

- The first unit of Emergency Diesel Generator (B) for Unit 6 is operating and supplying electricity. Water injection to RPV and the Spent Fuel Pool through the system of Make up Water Condensate (MUWC) is being carried out.
- The second unit of Emergency Diesel Generator (A) for Unit 6 started up. (04:22 March 19th)
- The pumps for Residual Heat Removal (RHR) (C) for Unit 5 (05:00 March 19th) and RHR (B) for Unit 6 (22:14 March 19th) started up and

recovered heat removal function. It cools Spent Fuel Pool with priority.
(Power supply : Emergency Diesel Generator for Unit 6) (05:00 March 19th)

- Unit 5 under cold shut down (14:30 March 20th)
- Unit 6 under cold shut down (19:27 March 20th)
- Receiving electricity reached to the transformer of starter. (19:52 March 20th)
- Power supply to Unit 5 was switched from the Emergency Diesel Generator to external power supply. (11:36 March 21st)
- Power supply to Unit 6 was switched from the Emergency Diesel Generator to external power supply. (19:17 March 22nd)
- The temporary pump for RHR Seawater System (RHRS) of Unit 5 was automatically stopped when the power supply was switched from the temporary to the permanent. (17:24 March 23rd)
- Repair of the temporary pump for RHRS of Unit 5 was completed (16:14 March 24th) and cooling was started again. (16:35 March 24th)
- Power supply for the temporary pump for RHRS of Unit 6 was switched from the temporary to the permanent. (15:38 and 15:42 March 25th)

<Common Spent Fuel Pool>

- It was confirmed that the water level of Spent Fuel Pool was maintained full at after 06:00 March 18th.
- Water spray over the Common Spent Fuel Pool was started (From 10:37 till 15:30 March 21st)
- The power was started to be supplied (15:37 March 24th) and cooling was also started.(18:05 March 24th)
- As of 08:00 March 28th, water temperature of the pool was around 34°C.
-

<Other>

- As the result of nuclide analysis at around the southern Water Discharge Canal, $7.4 \times 10^1 \text{Bq/cm}^3$ of ^{131}I (Iodine) (1,850.5 times higher than the concentration limit in water outside the Environmental Monitoring Area) was detected. (14:30 March 26th)
(As the result of measurement on 27 March, it was detected as 250

times higher than the limit in water. On the other hand, as the result of the analysis at the north side of the Water Discharge Canal of the NPS, $4.6 \times 10^1 \text{Bq/cm}^3$ of ^{131}I (Iodine) (1,150 times higher than the limit) was detected. (14:05 March 27th)

- The water was confirmed to be collected in the vertical parts of the trenches (an underground structure for laying pipes, shaped like a tunnel) outside of the turbine building of Units 1 to 3. The dose rates on the water surface were 0.4 mSv/h of the Unit 1's trench and 1,000 mSv/h of the Unit 2's trench. The rate of the Unit 3's trench could not measure because of the rubble. (Around 15:30 March 27th)
- In the samples of soil collected on 21 and 22 March 2011 on the site (at 5 points) of Fukushima Dai-ichi NPS, plutonium 238, 239 and 240 were detected (23:45 March 28th announced by TEPCO). The concentration of the detected plutonium was at the equivalent level of the fallout (radioactive fallout) that was observed in Japan concerning the past atmospheric nuclear testing, i.e. at the equivalent level of the normal condition of environment, and was not at the level of having harmful influence on human body.

● Fukushima Dai-ni NPS (TEPCO)

(Naraha Town / Tomioka Town, Futaba County, Fukushima Prefecture.)

(1) The state of operation

- | | |
|-------------------|--|
| Unit1 (1,100MWe): | automatic shutdown, cold shut down at 17:00,
March 14th |
| Unit2 (1,100MWe): | automatic shutdown, cold shut down at 18:00,
March 14th |
| Unit3 (1,100MWe): | automatic shutdown, cold shut down at 12:15,
March 12th |
| Unit4 (1,100MWe): | automatic shutdown, cold shut down at 07:15,
March 15th |

(2) Major plant parameters (As of 06:00 March 29th)

	Unit	Unit 1	Unit 2	Unit 3	Unit 4
Reactor Pressure*1	MPa	0.15	0.13	0.10	0.13
Reactor water temperature	℃	27.4	27.8	39.6	27.7
Reactor water level*2	mm	9,296	10,296	7,826	8,785
Suppression pool water temperature	℃	25	25	26	26
Suppression pool pressure	kPa (abs)	107	105	103	103
Remarks		cold shutdown	cold shutdown	cold shutdown	cold shutdown

*1: Converted from reading value to absolute pressure

*2: Distance from the top of fuel

(3) Report concerning other incidents

- TEPCO reported to NISA the event in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Unit 1. (18:08 March 11th)
- TEPCO reported to NISA the events in accordance with the Article 10 regarding Units 1, 2 and 4. (18:33 March 11th)
- TEPCO reported to NISA the event (Loss of pressure suppression function) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Unit 1. (5:22 March 12th)
- TEPCO reported to NISA the event (Loss of pressure suppression function) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Unit 2. (5:32 March 12th)
- TEPCO reported to NISA the event (Loss of pressure suppression function) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Unit 4 of Fukushima Dai-ni NPS. (6:07 March 12th)

- Onagawa NPS (Tohoku Electric Power Co. Inc.)

(Onagawa Town, Oga County and Ishinomaki City, Miyagi Prefecture)

(1) The state of operation

Unit 1 (524MWe): automatic shutdown, cold shut down at 0:58, March 12th

Unit 2 (825MWe): automatic shutdown, cold shut down at earthquake

Unit 3 (825MWe): automatic shutdown, cold shut down at 1:17, March 12th

(2) Readings of monitoring post, etc.

MP2 (Monitoring at the North End of Site Boundary)

approx. 0.77μ SV/h (16:00 March 27th) → approx. 0.68μ SV/h (16:00 March 28th)

(3) Report concerning other incidents

- Fire Smoke on the first basement of the Turbine Building was confirmed to be extinguished. (22:55 on March 11th)
- Tohoku Electric Power Co. reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness. (13:09 March 13th)

2. Action taken by NISA

(March 11th)

14:46 Set up of the NISA Emergency Preparedness Headquarters (Tokyo) immediately after the earthquake

15:42 TEPCO reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

16:36 TEPCO recognized the event (Inability of water injection of the Emergency Core Cooling System) in accordance with the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Units 1 and 2 of Fukushima Dai-ichi NPS. (Reported to NISA at 16:45)

18:08 Regarding Unit 1 of Fukushima Dai-ichi NPS, TEPCO reported to NISA in accordance with the Article 10 of the Act on Special

Measures Concerning Nuclear Emergency Preparedness.

- 18:33 Regarding Units 1, 2 and 4 of Fukushima Dai-ni NPS, TEPCO reported to NISA in accordance with the Article 10 of Act on Special Measures Concerning Nuclear Emergency Preparedness.
- 19:03 The Government declared the state of nuclear emergency. (Establishment of Government Nuclear Emergency Response Headquarters and Local Emergency Response Headquarters)
- 20:50 Fukushima Prefecture's Emergency Response Headquarters issued a direction for the residents within 2 km radius from Unit 1 of Fukushima Dai-ichi NPS to evacuate. (The population of this area is 1,864.)
- 21:23 Directives from Prime Minister to the Governor of Fukushima Prefecture, the Mayor of Okuma Town and the Mayor of Futaba Town were issued regarding the event occurred at Fukushima Dai-ichi NPS, TEPCO, in accordance with the Paragraph 3, the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness as follows:
- Direction for the residents within 3km radius from Unit 1 of Fukushima Dai-ichi NPS to evacuate
 - Direction for the residents within 10km radius from Unit 1 of Fukushima Dai-ichi NPS to stay in-house
- 24:00 Vice Minister of Economy, Trade and Industry, Ikeda arrived at the Local Emergency Response Headquarters

(March 12th)

- 05:22 Regarding Unit 1 of Fukushima Dai-ni NPS, TEPCO recognized the event (Loss of pressure suppression function) to fall under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness. (Reported to NISA at 06:27)
- 05:32 Regarding Unit 2 of Fukushima Dai-ni NPS, TEPCO recognized the event (Loss of pressure suppression function) to fall under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.
- 05:44 Residents within 10km radius from Unit 1 of Fukushima Dai-ichi NPS shall evacuate by the Prime Minister Directive.
- 06:07 Regarding of Unit 4 of Fukushima Dai-ni NPS, TEPCO recognized the

event (Loss of pressure suppression function) to fall under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

06:50 In accordance with the Paragraph 3, the Article 64 of the Nuclear Regulation Act, the order was issued to control the internal pressure of PCV of Units 1 and 2 of Fukushima Dai-ichi NPS.

07:45 Directives from Prime Minister to the Governor of Fukushima Prefecture, the Mayors of Hirono Town, Naraha Town , Tomioka Town and Okuma Town were issued regarding the event occurred at Fukushima Dai-ni NPS, TEPCO, pursuant to the Paragraph 3, the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness as follows:

- Direction for the residents within 3km radius from Fukushima Dai-ni NPS to evacuate
- Direction for the residents within 10km radius from Fukushima Dai-ni NPS to stay in-house

17:00 TEPCO reported to NISA the event (Unusual increase of radiation dose at the site boundary) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

17:39 Prime Minister directed evacuation of the residents within the 10 km radius from Fukushima Dai-ni NPS.

18:25 Prime Minister directed evacuation of the residents within the 20km radius from Fukushima Dai-ichi NPS.

19:55 Directives from Prime Minister was issued regarding seawater injection to Unit 1 of Fukushima Dai-ichi NPS.

20:05 Considering the Directives from Prime Minister and pursuant to the Paragraph 3, the Article 64 of the Nuclear Regulation Act, the order was issued to inject seawater to Unit 1 of Fukushima Dai-ichi NPS and so on.

20:20 At Unit 1 of Fukushima Dai-ichi NPS, seawater injection started.

(March 13th)

05:38 TEPCO reported to NISA the event (Total loss of coolant injection function) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Unit 3 of

Fukushima Dai-ichi NPS. Recovering efforts by TEPCO of the power source and coolant injection function and the work on venting were under way.

09:01 TEPCO reported to NISA the event (Unusual increase of radiation dose at the site boundary) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

09:08 Pressure suppression and fresh water injection started for Unit 3 of Fukushima Dai-ichi NPS.

09:20 The Pressure Vent Valve of Unit 3 of Fukushima Dai-ichi NPS was opened.

09:30 Directive was issued for the Governor of Fukushima Prefecture, the Mayors of Okuma Town, Futaba Town, Tomioka Town and Namie Town in accordance with the Act on Special Measures Concerning Nuclear Emergency Preparedness on the contents of radioactivity decontamination screening.

13:09 Tohoku Electric Power Co. reported to NISA that Onagawa NPS reached a situation specified in the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

13:12 Fresh water injection was switched to seawater injection for Unit 3 of Fukushima Dai-ichi NPS.

14:36 TEPCO reported to NISA the event (Unusual increase of radiation dose at the site boundary) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

(March 14th)

01:10 Seawater injection for Units 1 and 3 of Fukushima Dai-ichi NPS were temporarily interrupted due to the lack of seawater in pit.

03:20 Seawater injection for Unit 3 of Fukushima Dai-ichi NPS was restarted.

04:40 TEPCO reported to NISA the event (Unusual increase of radiation dose at the site boundary) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

05:38 TEPCO reported to NISA the event (Unusual increase of radiation

dose at the site boundary) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

07:52 TEPCO reported to NISA the event (Unusual rise of the pressure in PCV) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Unit 3 of Fukushima Dai-ichi NPS.

13:25 Regarding Unit 2 of Fukushima Dai-ichi NPS, TEPCO recognised the event (Loss of reactor cooling function) to fall under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

22:13 TEPCO reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

22:35 TEPCO reported to NISA the event (Unusual increase of radiation dose at the site boundary) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

(March 15th)

00:00: The acceptance of experts from IAEA was decided. NISA agreed to accept the offer of dispatching of the expert on NPS damage from IAEA considering the intention by Mr. Amano, Director General of IAEA. Therefore, the schedule of expert acceptance will be planned from now on according to the situation.

00:00: NISA also decided the acceptance of experts dispatched from NRC.

07:21 TEPCO reported to NISA the event (Unusual increase of radiation dose at the site boundary) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

07:24 Incorporated Administration Agency, Japan Atomic Energy Agency (JAEA) reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Nuclear Fuel Cycle Engineering Laboratories, Tokai Research and Development Centre.

07:44 JAEA reported to NISA in accordance with the Article 10 of the Act on

Special Measures Concerning Nuclear Emergency Preparedness regarding Nuclear Science Research Institute.

08:54 TEPCO reported to NISA the event (Unusual increase of radiation dose at the site boundary) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

10:30 According to the Nuclear Regulation Act, Minister of Economy, Trade and Industry issued the directions as follows.

For Unit 4: To extinguish fire and to prevent the occurrence of re-criticality

For Unit 2: To inject water to reactor vessel promptly and to vent Drywell.

10:59 Considering the possibility of lingering situation, it was decided that the function of the Local Emergency Response Headquarters was moved to the Fukushima Prefectural Office.

11:00 Prime Minister directed the in-house stay area.

In-house stay was additionally directed to the residents in the area from 20 km to 30 km radius from Fukushima Dai-ichi NPS considering in-reactor situation.

16:30 TEPCO reported to NISA the event (Unusual increase of radiation dose at the site boundary) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

22:00 According to the Nuclear Regulation Act, Minister of Economy, Trade and Industry issued the following direction.

For Unit 4: To implement the injection of water to the Spent Fuel Pool.

23:46 TEPCO reported to NISA the event (Unusual increase of radiation dose at the site boundary) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

(March 18th)

13:00 Ministry of Education, Culture, Sports, Science and Technology decided to reinforce the nation-wide monitoring survey in the emergency of Fukushima Dai-ichi and Dai-ni NPS.

15:55 TEPCO reported to NISA on the accidents and failure at Units 1, 2, 3 and 4 of Fukushima Dai-ichi NPS (Leakage of the radioactive materials inside of the reactor buildings to non-controlled area of radiation) pursuant to the Article 62-3 of the Nuclear Regulation Act.

16:48 Japan Atomic Power Co. reported to NISA accidents and failures in Tokai NPS (Failure of the seawater pump motor of the emergency diesel generator 2C) pursuant to the Article 62-3 of the Nuclear Regulation Act.

(March 19th)

07:44 The second unit of Emergency Diesel Generator (A) for Unit 6 started up.

TEPCO reported to NISA that the pump for RHR (C) for Unit 5 started up and started to cooling Spent Fuel Storage Pool. (Power supply: Emergency Diesel Generator for Unit 6)

08:58 TEPCO reported to NISA the event (Unusual increase of radiation dose at the site boundary) falling under the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

(March 20th)

23:30 Directive from Local Emergency Response Headquarters to the Prefectural Governor and the heads of cities, towns and villages (Tomioka Town, Hutaba Town, Okuma Town, Namie Town, Kawauchi Village, Naraha Town, Minamisouma City, Tamura City, Kazurao Village, Hirono Town, Iwaki City and Iidate Village) was issued regarding the change of the reference value for the screening level for decontamination of radioactivity.

(March 21st)

07:45 Directive titled as “Administration of the stable Iodine” was issued from Local Emergency Response Headquarters to the Prefectural Governor and the heads of cities, towns and villages (Tomioka Town, Hutaba Town, Okuma Town, Namie Town, Kawauchi Village, Naraha Town, Minamisouma City, Tamura City, Kazurao Village, Hirono Town, Iwaki City and Iidate Village), which directs the above-mentioned

governor and the heads to administer stable Iodine under the direction of the headquarters and in the presence of medical experts, and not to administer it on personal judgements.

16:45 Directive titled as “Ventilation for using heating equipments within the in-house evacuation zone” was issued from the Head of Local Emergency Response Headquarters to the Prefectural Governor and the heads of cities, towns and villages (Tomioka Town, Hutaba Town, Okuma Town, Namie Town, Kawauchi Village, Naraha Town, Minamisouma City, Tamura City, Kazurao Village, Hirono Town, Iwaki City and Iidate Village), which directs the above-mentioned governor and heads to publicly announce the guidance to the residents within the in-house evacuation zone, concerning the indoor use of heating equipments that require ventilation, in order to avoid poisoning from carbon monoxide and to reduce exposure.

17:50 Directive from the Head of Government Nuclear Emergency Response Headquarters to the Prefectural Governors of Fukushima, Ibaraki, Tochigi and Gunma was issued, which direct the above-mentioned governors to issue a request to relevant businesses and people to suspend shipment of spinach, *Kakina* (a green vegetable) and raw milk for the time being.

(March 22nd)

16:00 NISA received the response (Advice) from Nuclear Safety Commission Emergency Technical Advisory Body to the request for advice made by NISA, regarding the report from TEPCO titled as “The Results of Analysis of Seawater” dated March 22nd.

(March 25th)

NISA directed orally to the TEPCO regarding the exposure of workers at the turbine building of Unit 3 of Fukushima Dai-ichi Nuclear Power Station occurred on March 24th, to review immediately and to improve its radiation control measures from the viewpoint of preventing a recurrence.

(March 28th)

Regarding the mistake in the evaluation of the concentration

measurement in the stagnant water on the basement floor of the turbine building of Unit 2 of Fukushima Dai-ichi NPS announced by TEPCO on 27 March, NISA directed TEPCO orally to prevent the recurrence of such a mistake.

13:50 Receiving the suggestion by the special meeting of Nuclear Safety Commission (Stagnant water on the underground floor of the turbine building at Fukushima Dai-ichi Plant Unit 2), NISA directed TEPCO orally to add the sea water monitoring points and carry out the groundwater monitoring.

Regarding the delay in the reporting of the water confirmed outside of the turbine buildings, NISA directed TEPCO to accomplish the communication in the company on significant information in a timely manner and to inform it in a timely and appropriate manner.

< Possibility on radiation exposure (As of 08:00 March 29th) >

1. Exposure of residents

- (1) Including the about 60 evacuees from Futaba Public Welfare Hospital to Nihonmatsu City Fukushima Gender Equality Centre, as the result of measurement of 133 persons at the Centre, 23 persons counted more than 13,000 cpm were decontaminated.
- (2) The 35 residents transferred from Futaba Public Welfare Hospital to Kawamata Town Saiseikai Kawamata Hospital by private bus arranged by Fukushima Prefecture were judged to be not contaminated by the Prefectural Response Centre.
- (3) As for the about 100 residents in Futaba Town evacuated by bus, the results of measurement for 9 of the 100 residents were as follows. The evacuees, moving outside the Prefecture (Miyagi Prefecture), were divided into two groups, which joined later to Nihonmatsu City Fukushima Gender Equality Centre.

No. of Counts	No. of Persons
18,000cpm	1
30,000-36,000cpm	1
40,000cpm	1
little less than 40,000cpm*	1
very small counts	5

*(These results were measured without shoes, though the first measurement exceeded 100,000cpm)

- (4) The screening was started at the Off site Centre in Okuma Town from March 12th to 15th. 162 people received examination until now. At the beginning, the reference value was set at 6,000cpm. 110 people were at the level below 6,000 cpm and 41 people were at the level of 6,000 cpm or more. When the reference value was increased to 13,000 cpm afterward, 8 people were at the level below 13,000 cpm and 3 people are at the level of 13,000 cpm or more.

The 5 out of 162 people examined were transported to hospital after being decontaminated.

- (5) The Fukushima Prefecture carried out the evacuation of patients and personnel of the hospitals located within 10km area. The screening of all the members showed that 3 persons have the high counting rate. These members were transported to the secondary medical institute of exposure. As a result of the screening on 60 fire fighting personnel involved in the transportation activities, the radioactivity higher than twice of the back ground was detected on 3 members. Therefore, all the 60 members were decontaminated.
- (6) Fukushima Prefecture has started the screening from 13 March. It is carried out by rotating the evacuation sites and at the 13 places (set up permanently) such as health offices. Up until March 26th, the screening was done to 95,373 people. Among them, 98 people were above the 100,000cpm, but when measured these people again without clothes, etc., the counts decreased to 100,000cpm and below, and there was no case which affects health.

2. Exposure of workers

As for the workers conducting operations in Fukushima Dai-ichi NPS, the total number of people who were at the level of exposure more than 100mSv becomes 19, as the three workers (All the people were the subcontractor's employees.) who were laying cables in the turbine building of Unit 3 of the NPS were confirmed to be at the level of exposure more than 170mSv on March 24.

For two out of the three workers, the attachment of radioactive material on the skin of both legs was confirmed. As the two workers were judged to have a possibility of beta ray burn, they were transferred to the Fukushima Medical University Hospital, and after that, on March 25th, all of the three workers arrived at the National Institute of Radiological Sciences in the Chiba Prefecture. As the result of examination, the level of exposure of their legs was estimated to be from 2 to 3 Sv. The level of exposure of both legs and internal did not require medical treatment, but they decided to monitor the progress of all three workers in the hospital. All the three workers have been discharged from the hospital around the noon on 28 March.

3. Others

- (1) 4 members of Self-Defence Force who worked in Fukushima Dai-ichi NPS were injured by explosion. One member was transferred to National Institute of Radiological Sciences. After the examination, judged that there were wounds but no risk for health from the exposure, the one was released from the hospital on March 17th. No other exposure of the Self-Defence Force member was confirmed at the Ministry of Defence.
- (2) As for policeman, the decontaminations of two policemen were confirmed by the National Police Agency. Nothing unusual was reported.
- (3) On March 24th, examinations of thyroid gland for 66 children aged from 1 to 15 years old were carried out at the Kawamata Town public health Center. The result was not at the level of having harmful influence.
- (4) From March 26th to 27th, examinations of thyroid gland for 137 children aged from 1 to 15 years old were carried out at the Iwaki City Public Health Center. The result was not at the level of exposure of no problem.

<Directive of screening levels for decontamination of radioactivity>

- (1) On March 20th, the Local Emergency Response Headquarters issued the directive to change the reference value for the screening level for decontamination of radioactivity as the following to the Prefectural Governor and the heads of cities, towns and villages (Tomioka Town, Hutaba Town, Okuma Town, Namie Town, Kawauchi Village, Naraha Town, Minamisouma City, Tamura City, Kazurao Village, Hirono Town, Iwaki City and Iidate Village).

Old : 40 Bq/cm² measured by a gamma-ray survey meter or 6,000 cpm

New : 1 μ Sv/hour (dose rate at 10cm distance) or 100,000cpm equivalent

<Directives of administrating stable Iodine during evacuation>

- (1) On March 16th, the Local Emergency Response Headquarters issued “Directive to administer the stable Iodine during evacuation from the evacuation area (20 km radius)” to the Prefectural Governor and the heads of cities, towns and villages (Tomioka Town, Hutaba Town, Okuma Town, Namie Town, Kawauchi Village, Naraha Town, Minamisouma City, Tamura City, Kazurao Village, Hirono Town, Iwaki City and Iidate Village).
- (2) On March 21st, the Local Emergency Response Headquarters issued Directive titled as “Administration of the stable Iodine” to the Prefectural Governor and the heads of cities, towns and villages (Tomioka Town, Hutaba Town, Okuma Town, Namie Town, Kawauchi Village, Naraha Town, Minamisouma City, Tamura City, Kazurao Village, Hirono Town, Iwaki City and Iidate Village), which directs the above-mentioned governor and heads to administer stable Iodine under the direction of the headquarters and in the presence of medical experts, and not to administer it on personal judgements.

<Situation of the injured (As of 08:00 March 29th)>

1. Injury due to earthquake on 11 March

- Two employees (slightly, have already gone back working)
- Two subcontract employees (one fracture in both legs, be in hospital)
- Two missing (TEPCO's employee, missing in the turbine building of Unit 4)

2. Injury due to the explosion of Unit 1 of Fukushima Dai-ichi NPS on 12 March
 - Four employees (two TEPCO's employees and two subcontractor's employees) were injured at the explosion and smoke of Unit 1 around turbine building (non-controlled area of radiation) and were examined by Kawauchi Clinic. Two TEPCO's employees return to work again and two subcontractors' employees are under home treatment.
3. Injury due to the explosion of Unit 3 of Fukushima Dai-ichi NPS on 14 March.
 - Four TEPCO's employees (They have already returned to work.)
 - Three subcontractor employees (They have already returned to work.)
 - Four members of Self-Defence Force (one of them was transported to National Institute of Radiological Sciences considering internal possible exposure. The examination resulted in no internal exposure. The member was discharged from the institute on March 17th.)
4. Other injuries
 - Two subcontractor's employees were injured during working at temporary control panel of power source in the Common Spent Fuel Pool, transported to where were industrial medical doctors the Fukushima Dai-ichi NPS on 22 and 23 March. (One employee has already returned to work and the other is under home treatment.)
 - One emergency patient on 12 March. (cerebral infarction, transported by the ambulance, be in hospital)
 - Ambulance was requested for one employee complaining the pain at left chest outside of control area on March 12. (conscious, under home treatment)
 - Two employees complaining discomfort wearing full-face mask in the main control room were transported to Fukushima Dai-ichi NPS for a consultation with an industrial doctor on 13 March. (One employee has already returned to work and the other is under home treatment.)

<Situation of resident evacuation (As of 08:00 March 29th)>

At 11:00 March 15th, Prime Minister directed in-house stay to the residents in the area from 20 km to 30 km radius from Fukushima Dai-ichi NPS. The directive was conveyed to Fukushima Prefecture and related municipalities.

Regarding the evacuation as far as 20-km from Fukushima Dai-ichi NPS and 10-km from Fukushima Dai-ni NPS, necessary measures have already been taken.

- The in-house stay in the area from 20 km to 30 km from Fukushima Dai-ichi NPS is made fully known to the residents concerned.
- Cooperating with Fukushima Prefecture, livelihood support to the residents in the in-house stay area are implemented.

<Directives regarding foods and drinks>

Directive from the Head of Government Nuclear Emergency Response Headquarters to the Prefectural Governors of Fukushima, Ibaraki, Tochigi and Gunma was issued, which directed above-mentioned governors to suspend shipment and so on of the following products for the time being.

(1) Items under the suspension of shipment and restriction of intake (As of March 28th)

Prefectures	Suspension of shipment	Restriction of intake
Fukushima Prefecture	Non-head type leafy vegetables, head type leafy vegetables, flowerhead brassicas (Spinach, Cabbage, Broccoli, Cauliflower, <i>Komatsuna</i> *, <i>Kukitachina</i> *, <i>Shinobufuyuna</i> *, Rape, <i>Chijirena</i> , <i>Santouna</i> *, <i>Kousaitai</i> *, <i>Kakina</i> *, etc.), Turnip, Raw milk	Non-head type leafy vegetables, head type leafy vegetables, flowerhead brassicas (Spinach, Cabbage, Broccoli, Cauliflower, <i>Komatsuna</i> *, <i>Kukitachina</i> *, <i>Shinobufuyuna</i> , Rape, <i>Chijirena</i> , <i>Santouna</i> *, <i>Kousaitai</i> *, <i>Kakina</i> *, etc.)
Ibaraki Pref.	Spinach, <i>Kakina</i> *, Parsley, Raw milk	
Tochigi	Spinach, <i>Kakina</i> *	

Pref.		
Gunma Pref.	Spinach, <i>Kakina</i> *	

*a green vegetable

(2) Request for restriction of drinking for tap-water (As of 15:00 March 28th)

Scope under restriction	Water service (Local governments requested for restriction)
All residents	Iitate small water service (Iitate Village, Fukushima Prefecture)
Babies ・ Water services that continue to respond to the directive ・ Tap-water supply service that continues to respond to the directive	<Fukushima Prefecture> Minami-soma City water service (Minami-soma City) Iwaki City water supply service (Iwaki City) Tamura City water supply service (Tamura City) Date City Tuskidate small water supply service (Date City) Non

<Directive regarding the ventilation when using heating equipments in the area of indoor evacuation >

On March 21st, Directive titled as “Ventilation for using heating equipments within the in-house evacuation zone” from the Head of Local Emergency Response Headquarters to the Prefectural Governor and the heads of cities, towns and villages (Tomioka Town, Hutaba Town, Okuma Town, Namie Town, Kawauchi Village, Naraha Town, Minamisouma City, Tamura City, Kazurao Village, Hirono Town, Iwaki City and Iitate Village) was issued, which directs those governor and heads to publicly announce the guidance to the residents within the in-house evacuation zone, concerning the indoor use of heating equipments that require ventilation, in order to

avoid poisoning from carbon monoxide and to reduce exposure.

< Fire Bureaus' Activities >

- From 11:00 till around 14:00 on March 22nd, Niigata City Fire Bureau and Hamamatsu City Fire Bureau gave guidance to TEPCO as to the set up of large decontamination system.
- From 8:30 till 9:30, from 13:30 till 14:30 on March 23rd, Niigata City Fire Bureau and Hamamatsu City Fire Bureau gave guidance to TEPCO as to the operation of large decontamination system.

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