



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION I**  
2100 RENAISSANCE BOULEVARD, SUITE 100  
KING OF PRUSSIA, PENNSYLVANIA 19406-2713

January 10, 2013

Mr. Michael J. Pacilio, Senior Vice President  
Exelon Generation Company, LLC  
President and Chief Nuclear Officer, Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

**SUBJECT: OYSTER CREEK GENERATING STATION - NRC SPECIAL INSPECTION  
REPORT 05000219/2012009**

Dear Mr. Pacilio:

On November 27, 2012, the U.S. Nuclear Regulatory Commission (NRC) completed a special inspection at your Oyster Creek Generating Station (OCGS). The inspection was conducted to evaluate the emergency preparedness program performance and organizational decision-making associated with Oyster Creek's response to Hurricane Sandy on October 29 and 30, 2012. Although ancillary aspects of the OCGS response to Hurricane Sandy were assessed, the primary focus of the Special Inspection Team (SIT) was to determine if the Alert declaration and notification was timely and accurate. This inspection was conducted to expand on the inspection activities performed by the resident and regional inspectors who provided the real time hurricane response coverage. The NRC's initial evaluation of this event satisfied the criteria in NRC Inspection Manual Chapter (IMC) 0309, "Reactive Inspection Decision Basis for Reactors," for conducting a special inspection. The decision to conduct this special inspection was based on deterministic-only criteria involving emergency preparedness program implementation during an actual event, specifically, initial concerns that OCGS may not have met the planning standards associated with the classification and notification of an event. The SIT Charter (Attachment 2 of the enclosed report) provides the basis and additional details concerning the scope of the inspection. The enclosed inspection report documents the inspection results, which were discussed on November 27, 2012, with Mr. Massaro, Site Vice President, and other members of your staff.

The SIT examined activities conducted under your license as they relate to safety and compliance with Commission rules and regulations and with the conditions of your license. The SIT reviewed selected procedures and records, observed activities, and interviewed personnel. The SIT concluded that OCGS' performance was acceptable and that emergency action level declarations were timely. However, the SIT observed several licensee practices where plant performance could be improved. These areas were related to equipment and organization performance. These observations were determined to be of minor significance and therefore no enforcement action is being taken.

No NRC-identified or self-revealing findings were identified during this inspection. However, a licensee-identified violation which was determined to be of very low safety significance is listed in this report. The NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2 of the Enforcement Policy. If you contest this NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at OCGS.

In accordance with 10 CFR 2.390 of the NRCs "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Gordon K. Hunegs, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Docket No. 50-219  
License No. DPR-16

Enclosure: Inspection Report 05000219/2012009  
w/Attachments:  
Supplemental Information (Attachment 1)  
Special Inspection Team Charter (Attachment 2)  
Detailed Sequence of Events (Attachment 3)

cc w/encl: Distribution via ListServ

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**/RA/**  
 Gordon K. Hunegs, Chief  
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**U. S. NUCLEAR REGULATORY COMMISSION**  
**REGION I**

Docket No.: 50-219

License No.: DPR-16

Report No.: 05000219/2012009

Licensee: Exelon Nuclear

Facility: Oyster Creek Generating Station (OCGS)

Location: Forked River, New Jersey

Dates: November 13, 2012 – November 27, 2012

Team Leader: F. Bower, Senior Resident Inspector, Division of Reactor Projects

Team: S. Barr, Senior Emergency Preparedness Inspector, Division of Reactor Safety  
T. Hedigan, Operations Engineer, Division of Reactor Safety

Approved By: Gordon K. Hunegs, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

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## SUMMARY OF FINDINGS

IR 05000219/2012009; 11/13/2012 – 11/27/2012; Oyster Creek Generating Station (OCGS); Inspection Procedure 93812, Special Inspection.

This report covers a 15-day period of onsite inspection and offsite review from November 13, 2012, through November 27, 2012. A three-person NRC team, comprised of two regional inspectors and one resident inspector, conducted this Special Inspection. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

### **NRC Identified and Self Revealing Findings**

None

### **Other Findings**

A violation of very low safety significance (Green) that was identified by OCGS was reviewed by the inspectors. Corrective actions taken or planned by OCGS have been entered into OCGS's corrective action program. This violation and corrective action tracking number are listed in Section 4OA7 of this report.

## REPORT DETAILS

### 1. Background and Description of Event

In accordance with the Special Inspection Team (SIT) Charter (Attachment 2), the inspection team conducted a detailed review of the emergency preparedness program performance and organizational decision-making associated with Oyster Creek's response to Hurricane Sandy on October 29 and 30, 2012. The SIT gathered information from the control room operators' narrative logs and intake level monitoring logs, interviewed station personnel, and reviewed procedures, emergency response organization records, and various technical documents to develop a detailed timeline of the event (Attachment 3).

On October 29, 2012, Hurricane Sandy, a Category 1 hurricane, was expected to make landfall in the vicinity of the OCGS. OCGS was shutdown on October 22 for a scheduled refueling outage and partially defueled (approximately 10 bundles had been moved to the spent fuel pool) with a time to boil of 28 hours for the core and spent fuel pool. Decay heat removal was via shutdown cooling and spent fuel pool cooling. The reactor vessel head was removed and secondary containment was intact.

At approximately 9:20 a.m. on October 29, 2012, control room operators entered the abnormal operating procedure ABN-32, "Abnormal Intake Level," when intake level downstream of the traveling water screens rose above three feet and the operators began monitoring intake level every four hours. At 1:46 p.m., operators entered ABN-31, "High Winds," due to wind gusts greater than 58 miles per hour.

At 6:47 p.m., due to the combination of the storm surge and the high tidal cycle associated with a full moon, the intake level was measured at 4.65 feet (point 23) and 4.50 feet (point 24) on control room recorder CR-423-11. Control room operators recognized that intake level had reached the Notice of Unusual Event (NOUE) threshold condition of greater than 4.5 feet. At 6:55 p.m., the Operations Shift Manager declared an NOUE HU-4. This declaration was accurate and timely. The state and local notifications were completed within the required timeframe at 7:03 p.m.. However, these notifications were inaccurate because the wind direction provided in the notification was from the wrong level of the site's meteorological tower. This issue is discussed further in report section 4OA7.

At 7:54 p.m., offsite power line R144 tripped and caused a resulting trip of the fuel pool cooling system. Operators entered ABN-16, "Loss of Fuel Pool Cooling." At 8:08 p.m., the modem that was relaying intake level data to the control room recorder (points 23 and 24) failed and rendered the primary means of measuring intake level unavailable. Operators that had been stationed at the intake structure were also relaying intake level readings to the control room from two local pressure indicators (PI-533-1173 and PI-533-1172). At this time, the intake levels were 4.6 psig (5.3 feet) and 4.5 psig (5.1 feet) on pressure indicators 1173 and 1172, respectively. Control room operators had to rely on these secondary indicators to make emergency action level decisions.

Offsite power to OCGS was lost at 8:18 p.m., and operators entered ABN-36, "Loss of Offsite Power." The loss of offsite power caused a trip of the shutdown cooling system. Subsequently, the senior reactor operator (field supervisor) overseeing equipment operators at the intake structure reported to the emergency diesel generators (EDGs)

to facilitate post-start checks of the EDGs that automatically started on the loss of offsite power. The EDGs were automatically aligned to restore power to the emergency busses.

When the field supervisor returned to the intake structure at approximately 8:29 p.m., he reported to the control room that intake level was 4.9 psig (6.0 feet) on both of the local pressure indicators. The Shift Manager reviewed the Alert emergency action level threshold of greater than 6.0 feet intake level and determined that it had not been met, and he requested another intake level reading from the operators at the intake structure.

At 8:32 p.m., the field supervisor reported that he could no longer safely monitor the local pressure indicators (PI-533-1173 and PI-533-1172) to determine intake level due to the rising water level. The inspectors noted that this is consistent with caution statements in ABN-32 because the intake structure deck is at a height of six feet mean sea level and electrically energized motor control centers are mounted on the deck. The field supervisor also reported that intake level was 6.25 feet and rising on a staff gauge located on the intake structure upstream of the traveling screens. The intake staff gauge was an alternate method of monitoring intake level when the primary and secondary level indicators are unavailable.

At 8:44 p.m., the operations Shift Manager declared an Alert (HA-4) in response to the report that intake level was greater than 6.0 feet on the intake staff gauge. State and local notifications for the Alert were completed at 8:51 p.m.. The SIT determined that these notifications were accurate and timely. The shutdown cooling and fuel pool cooling systems were returned to service at 8:50 p.m. and 9:19 p.m., respectively.

At 11:11 p.m., intake level on the staff gauge was 7.0 feet (Note: the staff gauge is not available above 7 feet). At approximately 12:18 a.m. on October 30, 2012, the maximum intake level of 7.4 feet was reached as determined by water level measurements above the base of the service water pumps. Water levels remained below the service water pump motors and well below the design basis flood height of greater than 22 feet that is documented in UFSAR section 2.4.5.4.

On October 30, 2012, intake levels receded below the Alert and NOUE threshold levels at 6:29 a.m. and 5:45 p.m., respectively. OCGS began to restore offsite power on October 30, 2012, and had offsite power fully restored to the plant by 3:46 a.m. on October 31, 2012. At 3:52 a.m. on October 31, 2012, OCGS terminated the Alert.

## 2. Emergency Preparedness Program Performance

### .1 Emergency Action Level (EAL) Declarations

#### a. Inspection Scope

On October 29, the impact of the storm on the OCGS required Exelon to declare two emergency events due to the rising water level at the station intake structure. The two applicable OCGS Emergency Plan emergency action levels (EALs) specified thresholds of intake water level greater than 4.5 feet for the declaration of an NOUE and of intake water level greater than 6.0 feet for the declaration of an Alert. The OCGS Emergency Plan and 10 CFR 50, Appendix E, require that an emergency event be declared within



15 minutes of an EAL threshold being exceeded. Additionally, the licensee must notify applicable offsite response organizations within 15 minutes of the event declaration. The inspectors reviewed Exelon's performance related to the event declarations and the subsequent offsite notifications. Specifically the review was conducted to determine if the declarations and notifications had been made both accurately and timely. This review was accomplished through the review of: the OCGS Emergency Plan; applicable Emergency Plan implementing procedures; control room operating logs; the Shift Emergency Director Checklist; the completed offsite notification forms; and, associated issue reports. The inspectors also interviewed the control room operating crew that was on shift at the time of both event declarations and both notifications.

b. Findings and Observations

No findings were identified. However, Exelon identified that the NOUE offsite notification was inaccurate because the required meteorological information provided in the notification had a wind direction error. This licensee-identified violation of very low safety significance (Green) is further described in Section 4OA7 of this report.

In their attempt to understand the operating crews' actions and to assess the crew performance, the inspectors encountered challenges with control room log keeping clarity. Additionally, the timeliness of control room log corrections made it difficult for the inspectors to determine whether the NOUE and Alert declarations and notifications were completed accurately and timely. Many of the control room log entries were not documented concurrent with activities and decisions made by the control room operating crew. It was necessary for the inspectors to conduct interviews and review unofficial logs and notes, to assess operating crew performance. Nonetheless, the inspectors determined that OCGS operators had made the NOUE declaration in an accurate and timely manner. The Alert declaration and notification were also accurate and timely. The inspectors concluded that OCGS had properly anticipated which EALs would most likely be exceeded during the storm and had, to the extent possible, prepared the offsite notification forms before the storm arrived at the station.

Overall, the emergency preparedness performance was good; however, the inspectors observed some areas where performance could be improved. Specifically, the inspectors noted that determining the Alert EAL threshold for high intake level can be a challenge when the remote intake level recorder in the control room (primary instrument) is not available. This condition occurred on October 29, due to power fluctuations experienced during the hurricane. The challenge arose because, in accordance with the abnormal procedure for rising intake level (ABN-32), the bubblers at the intake structure (local, secondary instruments) are not safe to access at intake levels greater than 6 feet mean sea level (MSL). However, intake level must be measured to determine when water level is greater than 6 feet for the Alert EAL threshold to be met. The inspectors determined that the equipment operator assigned to report bubbler level indication could not access the indications to positively confirm that the water level had exceeded 6 feet.

The inspectors also determined that the control room crew that was receiving the reports from the equipment operator at the intake structure did not have a clear understanding of the intake level required to satisfy the EAL; some operators believed the Alert occurred when the water level reached 6 feet, while others correctly knew that it was when the level was greater than 6 feet.

The inspectors concluded that the above challenges did not prevent the crew from making the Alert declaration in a timely manner. However, if the remote level indications were more accessible, and the control room crew had been briefed on the specific level needed to satisfy the EAL, the emergency preparedness performance would have been improved, easier to verify as appropriate, and better documented.

## .2 Emergency Response Organization (ERO) Activation

### a. Inspection Scope

In accordance with the OCGS Emergency Plan, Exelon was required to augment the on-shift emergency response organization (ERO) and activate emergency response facilities (ERFs) when the Alert declaration was made. The inspectors assessed Exelon's performance, specifically to determine if the Oyster Creek ERO was augmented timely and completely and if the required ERFs were properly activated. The inspectors reviewed ERO checklists, logs applicable to emergency plan implementing procedures; interviewed the OCGS emergency preparedness staff, ERO responders, and the Corporate Emergency Director (CED); and, reviewed various issue reports initiated by OCGS.

### b. Findings and Observations

No findings were identified. The inspectors concluded that Exelon had taken prudent measures to prepare for ERO activation before the storm arrived. The inspectors also concluded that OCGS had complied with all station procedures and regulations in the augmenting of the station ERO and in the activation of the site ERFs; however, the inspectors identified some performance issues.

The offsite Emergency Operations Facility (EOF) was staffed prior to the arrival of the storm, in the morning of October 29. For the on-site ERFs (the Operations Support Center and the Technical Support Center), Exelon verified that the normal work crews and shift personnel contained the adequate ERO members to activate those on-site ERFs without requiring personnel to travel to the site during the storm. The inspectors concluded that once the Alert had been declared, the ERO was adequately augmented and the ERFs were activated in accordance with station procedures. The ERO was maintained and the ERFs were activated until the station terminated from the Alert early in the morning of October 31.

Due to the local loss of electrical power, the EOF was initially ready to be activated with the facility's emergency generator supplying electrical power to the building. Shortly thereafter, that generator began to trip off line, and with no power to the building, the CED did not activate the EOF. The EOF staff diagnosed the generator's tripping as a result of a mechanical fault in the EOF's air conditioner. Once the EOF staff opened the air conditioner's circuit breaker, the generator successfully and consistently supplied power to the building. At that point, the CED activated the EOF and assumed command and control.

The inspectors concluded that the ERO personnel lacked some information regarding EOF equipment and the EOF facility which contributed to delayed EOF activation. The EOF personnel had adequate equipment and resources to help relieve the burden from the control room crew dealing with the emergency event. Exelon initiated an issue

report to review the EOF performance and to determine what improvements in performance could be realized through procedure and training enhancement. The SIT determined that the EOF activation delays associated with the loss of the facility's emergency generator were minor and did not violate NRC emergency preparedness program requirements.

### 3. Organizational Response

#### .1 Hurricane Preparations and Contingency Plans

##### a. Inspection Scope

The inspectors reviewed and assessed OCGS's hurricane preparations that included the implementation of OP-AA-108-11-1001, "Severe Weather and Natural Disaster Guidelines," and OP-OC-108-109-1001, "Severe Weather Preparation." The inspectors also reviewed action items and contingency plans that OCGS created in support of their hurricane preparations. The contingency plans reviewed included "Offsite Power," and "Intake Debris/Grassing Readiness and Contingencies."

##### b. Findings and Observations

No findings were identified.

OCGS created a customized list of action items to ensure that outage related activities and personnel were properly prepared for Hurricane Sandy. The list included approximately eighty items, which included, but were not limited to, confirming the availability of all electrical busses (full defense-in-depth), promulgating a duty roster, and pre-staging a duty team of emergency response personnel.

#### .2 Procedure Adequacy

##### a. Inspection Scope

The inspectors reviewed the following abnormal operating procedures (ABNs) and system operating procedures (SOPs) that were implemented during Hurricane Sandy on October 29 and 30, 2012. The inspectors assessed the operators' procedure use and adherence during and following the storm through a review of plant logs and personnel interviews. The documents reviewed included the following:

- Operator logs;
- ABN-32, "Abnormal Intake Level;"
- ABN-31, "High Winds;"
- ABN-36, "Loss of Offsite Power;"
- SOP-311, "Fuel Pool Cooling System;"
- SOP -324, "Thermal Dilution Pumps;" and
- SOP- 344, "Screen Wash System Evolutions."

The inspectors conducted a review of procedures that OCGS was prepared to use as a contingency, if equipment at the intake structure was lost as a result of high water level during Hurricane Sandy. The review was conducted to assess whether OCGS had

adequate procedures available to effectively mitigate a loss of the service water system and to provide decay heat removal. The following abnormal operating procedures were reviewed:

- ABN-3, "Loss of Shutdown Cooling;"
- ABN-16, "Loss of Fuel Pool Cooling;"
- ABN-18, "Service Water Failure Response;" and
- ABN-19, "RBCCW Failure Response."

b. Findings and Observations

No findings were identified.

Based on a review of abnormal procedures implemented during Hurricane Sandy, interviews of OCGS personnel, and discussion with NRC inspectors that were monitoring operations onsite on October 29, 2012, the inspectors observed that a change to ABN-32 for increasing the intake level that would require securing the service water pumps was not preplanned. The inspectors noted that revision 18 of ABN-32 directed operators to secure all of the service water pumps when the intake level reached seven feet MSL. However, the day shift operating crew identified that the bottom of the service water pump motors was located at approximately 10 feet MSL. Therefore, approximately three feet of available margin existed before the service water pump motors would be impacted. The normal method of decay heat removal from the shutdown cooling and fuel pool cooling systems would therefore remain available. The day shift operating crew discussed revising ABN-32, but did not communicate this contingency plan to the Outage Command Center (OCC) and the procedure change was not pursued further during the day shift.

As intake level rose towards seven feet MSL, the night shift operating crew coordinated with the OCC to have ABN-32 revised to raise the required intake level for securing the service water pumps. Revision 19 to ABN-32 was completed shortly before the intake level reached seven feet MSL. Although intake level rose to approximately 7.4 feet MSL, the intake level did not approach the new higher ABN-32 required limit for securing the service water pumps. OCGS documented this issue in issue report 1438850. The inspectors considered this issue minor because the delay in revising the procedure did not affect the availability, reliability or capability of the shutdown cooling or fuel pool cooling water systems.

.3 Operator Training

a. Inspection Scope

The inspectors interviewed operations personnel regarding the training and procedure reviews/walkthroughs that were performed in accordance with the action item list for hurricane preparations. Through these interviews, the inspectors verified that OCGS conducted just-in-time training for each operating crew by having the crews brief and perform walkthroughs of all system operating and abnormal procedures that were anticipated to be used during the storm.

b. Findings

No findings were identified.

.4 Post- Event Problem Identificationa. Inspection Scope

The inspectors interviewed personnel, reviewed various procedures, logs, critiques and corrective action program documents to assess whether equipment, human performance and programmatic issues related to EAL event declarations, the activation of OCGS's ERO and OCGS's preparedness for the hurricane were appropriately identified and entered into the corrective action program.

b. Findings

No findings were identified.

4OA6 Meetings, Including ExitExit Meeting Summary

On November 27, 2012, the inspection team discussed the inspection results with Mr. M. Massaro, Site Vice President, and members of his staff. The inspection team confirmed that proprietary information reviewed during the inspection period was returned to Exelon.

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by OCGS and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy for being dispositioned as an NCV.

- 10 CFR 50.47(b)(5) requires, in part, that procedures have been established for notification, by the licensee, of state and local response organizations and for notification of emergency personnel by all organizations, and that the content of initial and follow-up messages to response organizations and the public has been established. Exelon procedure EP-MA-114-100, "Mid-Atlantic State/Local Notifications," Step 4.4, provides the directions for completing the State/Local notification form. Step 4.4.7 of EP-MA-114-100 states, in part, that the meteorological tower indicator to use in the case of a no-release condition is the Met Tower 380' indicator. During the events of October 29, 2012, there was no release in progress. Therefore, the OCGS staff should have used the meteorological data from the Met Tower 380' indicator. Contrary to the above, for the state and local notification of the Unusual Event declaration, the OCGS staff used the Met Tower 33' indicator. At the time of the Unusual Event notification, the wind direction that should have been reported from the 380' indicator was 63.7 degrees. The State/Local notification form, however, was completed with the Met Tower 33' wind direction indication, which was 55.7 degrees. The inspectors evaluated the finding using IMC 0609, Appendix B, "Emergency Preparedness Significance Determination Process."

Specifically, Attachment 1, "Failure to Implement (Actual Event) Significance Logic," indicates that any failure by the licensee to properly implement their emergency plan during an actual Unusual Event condition is of very low safety significance (Green). Exelon documented the issue in issue report 1438003 and issue report 1443552.

**SUPPLEMENTAL INFORMATION**

**KEY POINTS OF CONTACT**

**Exelon Personnel**

M. Massaro, Site Vice President  
R. Peak, Plant Manager  
M. Ford, Operations Director  
A. Zuchowski., Shift Manager  
A. Krukowski, Field Supervisor  
M. Baratta, Reactor Operator  
C. Wade, Equipment Operator  
G. Malone, Engineering Director  
J. Dostal, Maintenance Director  
D. DiCello, Work Management Director  
J. Vaccaro, Projects Manager  
J. Barstow, Regulatory Assurance Manager  
D. Chemesky, Chemistry Manager  
T. Farena, RP Manager  
J. Renda, PI Manager  
T. Keenan, Site Security Manager  
J. McDaniel, NOS Manager  
J. Chrisley, Regulatory Assurance  
M. Jesse, Corporate Director Licensing  
J. Armstrong, PB Regulatory Assurance Manager  
N. Dennin, Operations  
D. Moore, Regulatory Assurance  
K. Aleshire, Corporate Director EP  
M. Chanda, EP Manager

**NRC Personnel**

D. Roberts, Director, Division of Reactor Projects  
G. Hunegs, Chief, Reactor Projects Branch 6  
J. Kulp, Senior Resident Inspector, Oyster Creek  
A. Patel, Resident Inspector, Oyster Creek  
P. Kaufman, Senior Reactor Inspector  
J. Schoppy, Senior Reactor Inspector

**State of New Jersey Personnel**

R. Pinney, Supervisor, NJ Department of Environmental Protection

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened, Closed and Discussed

None

## LIST OF DOCUMENTS REVIEWED

### Procedures

ABN-32, Abnormal Intake Level, Revision 18  
ABN-31, High Winds, Revision 18  
ABN-16, Loss of Fuel Pool Cooling, Revision 3  
ABN-18, Service Water Failure Response, Revision 6  
ABN-3, Loss of Shutdown Cooling, Revision 4  
ABN-19, RBCCW Failure Response, Revision 10  
ABN-36, Loss of Offsite Power, Revision 22  
ABN-60, Grid Emergency, Revision 11  
SOP-311, Fuel Pool Cooling System, Revision 107  
SOP-344, Screen Wash System Evolutions, Revision 58  
SOP-311, Fuel Pool Cooling System, Revision 107  
SOP-324, Thermal Dilution Pumps, Revision 87  
OP-AA-108-11-1001, Severe Weather and Natural Disaster Guidelines  
OP-AA-108-114, Post Transient Review, Revision 9  
OP-AA-111-101, Operating Narrative Logs and Records, Revision 7  
OP-AA-101-113-1006, 4.0 Crew Critique Guidelines, Revision 3  
OP-AA-106-101-1001, Event Response Guidelines, Revision 19  
OP-OC-101-111-1001, Strategies for Successful Transient Mitigation, Revision 5  
OP-OC-108-109-1001, Severe Weather Preparation T&RM  
RM-AA-1, Nuclear Policy - Records Management, Revision 0  
EP-AA-1000, Exelon Nuclear Standardized Radiological Emergency Plan, Revision 23  
EP-AA-1010, Radiological Emergency Plan for Oyster Creek Station, Revision 4  
EP-MA-114-100, Mid-Atlantic State/Local Notifications, Revision 18

### Technical Specifications

6.10, Record Retention

### Miscellaneous

EP-MA-114-100-F-03, State/Local Notification Form, NOUE Declaration HU4, Notification time and date: 1903 hours on 10/29/2012  
EP-AA-112-100-F-01, Shift Emergency Director Checklist, Revision 0, for 10/29/2012  
EP-AA-112-F-08, ERO Position Log, Revision C, for various ERO positions on 10/29/2012  
EP-AA-121-F-10, Oyster Creek Equipment Matrix, Revision 0  
Reactor Plant Event Notification Worksheet, EN# 48452, NOUE Declaration HU4, Notification time and date: 1918 hours on 10/29/2012  
Event Notification #48452, Event date: 10/29/2012; Last Update: 10/31/2012  
Oyster Creek Generating Station, OCGS 3-1, Emergency Action Level (EAL) Cold Matrix, dated March 2012  
Oyster Creek Generating Station, OCGS 3-2, EAL Technical Basis, dated March 2012  
Operations Narrative Log for time period from October 28 to October 31, 2012  
Intake Level Monitoring Sheets with data from October 28 to November 1, 2012



Main Control Room Chart Recorder CR-423-11 (Intake Level Data) (Points 23 and 24) between 1600 and 1947 hours on October 29, 2012  
 Main Control Room Chart Recorder CR-423-11 (Channels 21, 22, 23 and 24) printout for the time period from October 28 – November 6, 2012  
 50.59 Screening No. OC-2012-S-00105, Revision 0 for ABN-32 IP 10/29/2012-01, Revision 18, Abnormal Intake Level  
 50.59 Screening No. OC-2012-S-00105, Revision 1 for ABN-32 IP 10/29/2012-01, Revision 18, Abnormal Intake Level  
 Work Order R2184977 (AR A2281406) , Intake Level Instrument Calibration for PI-533-1172 and PI-533-1173  
 Work Order R2165334 (AR A2254314) , Intake Level Instrument Calibration for PI-533-1172 and PI-533-1173  
 Instrument Calibration Sheet for PI-533-1172  
 Document Site Approval Form (AD-AA-101-F-01) for ABN-32, Abnormal Intake Level, Revision 19  
 Exelon Quality Assurance Topical Report (QATR), Chapter 17, Quality Assurance Records, Revision 84  
 Event Summary Report, "Event Summary Report of an Alert Declared at the Exelon Nuclear Oyster Creek Station, from James Bartow (OCGS) to NRC, State and Local emergency management personnel, dated at 10:30 on October 31, 2012

Issue Reports: (\*denotes identified by NRC inspection)

1432426, NOS ID: Hurricane Preparation Deficiencies  
 1432438, ENTERED ABN 32 , UE AND ALERT DUE TO HIGH INTAKE LEVELS  
 1433118, COMBUSTION TURBINE NUMBER ONE FAILED TO START  
 1433143, MULTIPLE TRANSFORMERS EXPLOSIONS DUE TO HURRICANE SANDY  
 1433368, ASSESSMENT OF WATER DAMAGE TO ELECTRICAL EQUIPMENT AT INTAKE  
 1433420, TELEPHONE COMMUNICATIONS TO RDO UNAVAILABLE AFTER HURRICANE  
 1433439, MET TOWER 33' "A" WIND DIRECTION ERRATIC  
 1433442, MET TOWER 150' "A" WIND DIRECTION ERRATIC  
 1433445, MET TOWER 380' "B" WIND DIRECTION ERRATIC  
 1433446, MET TOWER 380' "B" WIND SPEED ERRATIC  
 1433589, LL HURRICANE SANDY EOF GENERATOR REPEAT TRIPS.  
 1433610, ALERT EVENT HA4.4 TERMINATED, REMAINING ACTION TRACKING  
 1433720, POST TRANSIENT WALKDOWN REQUIRED PER CC-AA-5001  
 1434076, NEED REFLECTIVE TAPE STRIPE ON ALL SERVICE WATER & ESW PUMPS  
 1434327, LOW MEGGER READINGS ON FOUR CIRCULATING PUMP MOTORS  
 1434584, HURRICANE SANDY - LOSS OF OFFSITE POWER (ABN-36)  
 1435945, LOSS OF EPZ SIRENS DURING HURRICANE SANDY  
 1436174, WEEKLY SIREN TEST DATA DURING HURRICANE SANDY  
 1436873, ABN-32 NOTE INACCURATE  
 1437137, NOS ID: ERO STAFFING FOR HURRICANE SANDY  
 1437620, PLANT RISK CHANGES DURING HURRICANE SANDY  
 1437773, NOS ID: PROCEDURE ENHANCEMENT FOR OP-AA-108-114  
 1437823, HURRICANE SANDY: TRIP OF B CRD PUMP ON EDG LOADING  
 1437825, HURRICANE SANDY: LOSS OF Z-52 AND Q-121 LINES  
 1437829, HURRICANE SANDY: LOSS OF SEQUENCE OF EVENTS RECORDER  
 1437914, PBX TELEPHONES AT ERF'S FAILED AT TIMES  
 1437925, RING-DOWN PHONE TO SENIOR STATE OFFICIAL FAILED AT EOF  
 1437927, CELL PHONE SERVICE WAS INTERMITTENT DURING AND AFTER STORM  
 1437931, EP TWO-DIGIT PHONE SYSTEM FAILED DURING THE ALERT

1437946, LOSS OF ELECTRICAL POWER TO THE TSC  
1437954, ESTABLISHMENT OF AN ALTERNATE EOF  
1437956, EP EOF GENERATOR VENDOR DID NOT RESPOND TO TELEPHONE CALLS  
1437969, CED RECEIVED 4-5 PHONE CALLS FROM ERO MEMBERS  
1437973, DCC & OPS. COMMUNICATOR DID NOT KNOW WHICH PHONE TO USE.  
1438003, WIND SPEED AND WIND DIRECTION WAS USED FROM WRONG ELEVATION  
1438045, ABN 32 REVISED AND A EXTENDED CONDITION REVIEW IS NEEDED  
1438070, FUKUSHIMA ITEMS USED TO SUPPORT HURRICANE SANDY  
1438131, TRIP OF THE R144 LINE DURING HURRICANE SANDY  
1438143, TRIP OF THE I69360 LINE DURING HURRICANE SANDY  
1438207, DEVELOP PROCEDURES TO USE FLEX FOR DECAY HEAT REMOVAL.  
1438334, HURRICANE SANDY OPERATIONS NIGHT SHIFT 4.0 CRITIQUE  
1438374, LESSONS LEARNED FLEX PUMP OPERATION  
1438409, ADDITIONAL COMMUNICATIONS NEEDED WITH THE ERO  
1438411, DELAY IN ACTIVATION OF THE EOF  
1438415, 50.59 SCREENING ENHANCEMENT REQUIRED  
1438421, DOCUMENTATION OF EOF CRITIQUE  
1438626, DOCUMENTATION OF TSC CRITIQUE  
1438715, GAPS IN LOG-KEEPING AND EVENT DOCUMENTATION DURING HURRICANE  
1438850, HURRICANE SANDY OPERATIONS DAY SHIFT 4.0 CRITIQUE  
1438918, B-MCR HVAC INOPERABLE  
1438959, DEGRADED COMMUNICATION IN MCR DURING HURRICANE SANDY  
1438986, NOS ID: INDIVIDUALS CALLED IN DURING HURRICANE SANDY  
1439036, ERO STAFFING LESSONS LEARNED IDENTIFIED  
1439038, OSC TEAM TRACKING INCONSISTENT  
1439040, ERO LOG KEEPING NEEDS IMPROVEMENT  
1439044, COMMUNICATOR COULD NOT GAIN ACCESS TO THE CONTROL ROOM  
1439089, FRCT #2 FAILURE TO START  
1439339, UNTIMELY ENS NOTIFICATION  
1440806\*, INTAKE LEVEL READINGS AT MCR RECORDER - HURRICANE SANDY  
1440811\*, ABN-36 ENHANCEMENT FOR ACCESSING SECURITY DOORS  
1440882\*, ABN-3 ENHANCEMENT AT REDUCED INVENTORY  
1441135\*, UFSAR AND KNOWLEDGE ENHANCEMENT REQUIRED FOR FLOODING  
1442285\*, DETERMINE SANDY IMPACT ON UFSAR SECTION 2.4  
1443098, HURRICANE LL . LACK OF FUEL FOR VEHICLES & TEMP GENERATORS  
1443552, EVALUATION OF DEP GRADING FOR UNUSUAL EVENT

**LIST OF ACRONYMS**

ADAMS	Agency-wide Documents Access and Management System
CED	Corporate Emergency Director
CFR	Code of Federal Regulations
EAL	Emergency Action Level
EDG	Emergency Diesel Generator
EOF	Emergency Operating Facility
ERF	Emergency Response Facility
ERO	Emergency Response Organization
IMC	Inspection Manual Chapter
MSL	Mean Sea Level
NCV	Non-Cited Violation
NOUE	Notice of Unusual Event
NRC	Nuclear Regulatory Commission
OCC	Outage Control Center
OCGS	Oyster Creek Generating Station
PARS	Publicly Available Records
SIT	Special Inspection Team
UFSAR	Updated Final Safety Analysis Report



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION I**  
2100 RENAISSANCE BOULEVARD, SUITE 100  
KING OF PRUSSIA, PENNSYLVANIA 19406-2713

November 9, 2012

MEMORANDUM TO: Gordon Hunegs, Manager  
Special Inspection Team

Fred L. Bower, Leader  
Special Inspection Team

FROM: Darrell J. Roberts **/RA/**  
Division of Reactor Projects

Christopher G. Miller, Director **/RA by Peter Wilson Acting for/**  
Division of Reactor Safety

SUBJECT: SPECIAL INSPECTION CHARTER TO EVALUATE OYSTER CREEK  
GENERATING STATION'S RESPONSE TO HURRICANE SANDY

In accordance with Inspection Manual chapter (IMC) 0309, "Reactive Inspection Decision Basis for Reactors," a Special Inspection Team (SIT) is being chartered to evaluate the Emergency Preparedness program performance and organizational decision-making associated with Oyster Creek's response to Hurricane Sandy on October 29 and 30, 2012. The SIT will expand on the event follow-up of inspection activities started by the resident and regional inspectors providing hurricane response coverage.

The decision to conduct this special inspection was based on deterministic-only criteria involving emergency preparedness program implementation during an actual event, including the planning standards associated with classification and notification of an event. The SIT will interview personnel and review relevant documentation to determine the timeliness of Oyster Creek's declaration of an Alert due to a high intake level as well as assessing Oyster Creek's preparations for the hurricane. The charter for the SIT is attached.

The inspection will be conducted in accordance with the guidance of NRC Inspection Procedure 93812, "Special Inspection," and the inspection report will be issued within 45 days following the final exit meeting for the inspection.

The special inspection will commence on November 13, 2012. The following personnel have been assigned to this effort:

Senior Sponsor: Darrell Roberts, Director  
Division of Reactor Projects (DRP)  
Region I

Manager: Gordon Hunegs, Chief,  
Reactor Projects Branch 6, Division of Reactor Projects (DRP)  
Region I

Assistant Manager: Jeff Kulp, Chief (Acting),  
Reactor Projects Branch 6, Division of Reactor Projects (DRP)  
Region I

Team Leader: Fred Bower, DRP Senior Resident Inspector  
Division of Reactor Projects (DRP)  
Region I

Full Time Members: Thomas Hedigan, Operations Engineer  
Operations Branch  
Division of Reactor Safety  
Region I

Steve Barr, Senior Emergency Preparedness Inspector  
Plant Support Branch 1  
Division of Reactor Safety  
Region I

Enclosure: Special Inspection Team Charter

Special Inspection Charter to Evaluate Oyster  
Creek Generating Station's  
Response to Hurricane Sandy

A. Background

On October 29, 2012, Hurricane Sandy, a Category 1 hurricane made landfall in the vicinity of the Oyster Creek Nuclear Generating Station (Oyster Creek). Oyster Creek had shut down for a refueling outage on October 24, 2012 and was partially defueled prior to the storm. The shutdown cooling system and the spent fuel pool cooling system were in use for decay heat removal. Refueling maintenance actions were suspended in anticipation of the arrival of the storm. The reactor vessel head and the primary containment head were removed and secondary containment was intact.

Due to the combination of the storm surge and the high tidal cycle associated with a full moon, intake canal water level exceeded the levels for both an unusual event (4.5 Feet Mean Sea Level (MSL) declared at 6:55 PM on October 29, 2012) and an alert (6 Feet MSL declared at 8:44 PM on October 29, 2012) (See EN 48452). Intake level peaked at 7.4 feet at approximately 12:45 AM, Tuesday, October 30, 2012.

Coincident with the rising intake levels, the site experienced a loss of offsite power at 8:18 PM on October 29, 2012. The emergency diesel generators automatically started following the loss of offsite power and restored power to the safety busses. The loss of offsite power event does not appear to have an impact on nuclear safety, as the plant was already in a shutdown condition with both emergency diesel generators available, sufficient water inventory in the spent fuel pool and refueling cavity to facilitate decay heat removal, a decay heat generation rate well within the capabilities of available systems and ample time to implement alternative means of decay heat removal if necessary.

B. Basis for the Formation of the SIT:

The IMC 0309 review concluded that one of the deterministic-only criteria was met due to issues concerning implementation of the emergency preparedness program during an actual event, involving the classification and notification process during the declaration of an alert due to a high level in the intake. Main control room log entries noted that, at 8:18 PM, intake canal level indicated >6.0 feet on the intake canal staff gauge, 4.9 PSIG (corresponding to 6.0 feet) by both the north and south bubblers locally at the intake, and that the remote level indication in the control room was not available due to a loss of offsite power.

10 CFR 50.47 (b)(4) and (5), are risk significant planning standards for maintaining and implementing a standard emergency classification scheme and for notifying state and local emergency response organizations. A failure to timely classify, declare, and notify state and local officials would adversely impact that risk significant planning standard.

The potential delay in making the alert declaration did not have an impact on the licensee's or NRC's emergency response posture. The licensee had already pre-positioned personnel at its emergency response facilities in anticipation of the storm's arrival. In addition, the NRC had already entered monitoring mode with its Headquarters and Regional response centers staffed prior to the storm. State emergency response centers were also activated and in communications with both the licensee and NRC personnel monitoring the storm's impact. Therefore, this inspection is to address issues regarding the licensee's emergency action level classification process.

C. Scope

The team is expected to address the following:

- Develop a complete sequence of events including, but not limited to: operators receipt of important indications, event declarations, and offsite notifications
- Determine the circumstances related to emergency action level event declarations.
- Evaluate the activation of Exelon's emergency response organization.
- Evaluate Exelon's preparedness for the Hurricane related to contingency plans, operator training and adequacy of procedures.

D. Guidance

Inspection Procedure 93812, "Special Inspection," provides additional guidance to be used by the SIT. The inspection should emphasize fact-finding in its review of the circumstances surrounding the event. Safety concerns identified that are not directly related to the event should be reported to the Region I office for appropriate action.

The SIT will report to the site, conduct an entrance meeting, and begin inspection no later than November 13, 2012. While onsite, the Team Leader will provide daily briefings to Region I management, who will coordinate with the Office of Nuclear Reactor Regulation to ensure that all other pertinent parties are kept informed. The Team Manager shall provide a recommendation as to whether the SIT should be upgraded to an Augmented Inspection Team in accordance with IMC 0309. A report documenting the results of the inspection should be issued within 45 days of the completion of the inspection.

This Charter may be modified should the team develop significant new information that warrants review. Should you have any questions concerning this Charter, contact me at (610) 337-5046.

### October 29, 2012, Emergency Declarations during Hurricane Sandy

The team constructed the sequence of events from a review of control room narrative logs, ABN-32 intake level monitoring logs, and plant personnel interviews.

Time	Event
<b>10/28/12</b>	
9:20 am	Abnormal operating procedure (ABN)-32, Abnormal Intake Level, was entered for high intake level.
9:27 am	The intake water levels read on control room recorder CR-423-11 were 3.05 feet on channel 23 and 2.93 feet on channel 24. Intake levels were being recorded every 4 hours.
<b>10/29/12</b>	
11:10 am	Intake level monitoring frequency increased from every 4 hours to every 15 minutes.
1:46 pm	ABN-31, High Winds, was entered due to wind gusts > 58 miles per hour (mph).
6:30 pm	The intake water levels read on CR-423-11 were 4.41 and 4.22 feet on channels 23 and 24, respectively.
6:45 pm	The intake water levels read on CR-423-11 were 4.59 and 4.40 feet on channels 23 and 24, respectively.
6:47 pm	The control room recognizes that conditions were met for declaring a Notification of an Unusual Event (NOUE).
6:49 pm	The intake water levels read on CR-423-11 were 4.65 and 4.50 feet on channels 23 and 24, respectively.
6:55 pm	A NOUE was declared (HU-4) due to intake level greater than 4.5 feet on intake recorder CR-423-11, channels 23 and 24.
7:00 pm	ABN-32 Intake Level Monitoring Sheet documents that intake level on control room recorder CR-423-11 was 4.76 feet on channel 23 and 4.57 feet on channel 24.
7:03 pm	The State and Local Notifications for the NOUE were completed.
7:18 pm	The ENS Notification (EN# 48452) to the NRC Headquarters Operations Officer (HOO) for the NOUE was completed.
7:54 pm	One offsite power line (R144) tripped and resulted in a trip of fuel pool cooling. In response to the loss of fuel pool cooling, operators entered ABN-16, Loss of Fuel Pool Cooling.
8:08 pm	The primary instrumentation for monitoring intake level (CR-423-11, channels 23 and 24) were out-of-service. The intake water levels read on the back-up indicators located at the intake structure was 4.6 psig (5.3 feet) on PI-533-1173 and was 4.5 psig (5.1 feet) on PI-533-1172.
8:18 pm	Operators entered ABN 36, Loss of Offsite Power, in response to a loss of offsite power (LOOP). The LOOP resulted in a trip of shutdown cooling.
~8:18 pm	The Field Supervisor that was overseeing operators at the intake structure was called away from the intake structure to assist another SRO at the EDGs.
~8:29 pm	The Field Supervisor returned to the intake structure and reported to the control room that intake levels were 4.9 psig (6.0 feet) and 4.9 psig (6.0 feet) on PI-533-1173 and PI-533-1172, respectively.
8:32 pm	The Field Supervisor reported that he could no longer safely monitor PI-533-1173 and PI-533-1172 due to the rising storm surge. The Field Supervisor also reported that intake level was at 6.25 feet and rising on the intake staff gauge. (The staff gauge is used as a compensatory measure when the primary and secondary intake level instruments are not available.)



8:44 pm	An Alert (HA-4) was declared due to intake level being greater than 6.0 feet as measured on the intake staff gauge.
8:48 pm	The control room logged that intake level read on the staff gauge was 6.5 feet and rising. All other intake level indication is lost or not available due to safety precautions.
8:49 pm	Motor Control Centers (MCC 1A31 and 1B31) on the intake structure deck were de-energized, in accordance with safety precautions in ABN-32, when intake water level rises to 6.5 feet on the intake staff gauge.
8:50 pm	Shutdown cooling was returned to service.
8:51 pm	The State and Local Notifications for the Alert were completed.
9:19 pm	Fuel pool cooling was restarted.
9:40 pm	The ENS Notification (EN# 48452) to the NRC Headquarters Operations Officer (HOO) for the Alert was completed.
11:11 pm	The intake water level read on the staff gauge was 7.0 feet. (The intake staff gauge is not available with water level above 7 feet.)
11:27 pm	The intake water level was read as 4 inches above the base of the service water pumps. The ABN-32, revision 19 value for tripping the service water (SW) pumps was 6 inches below the pumps' motors (33 inches above the SW pump base).
<b>10/30/12</b>	
12:11 am	Combustion Turbine #2 (station blackout power source) was aligned to B 4160 Bus.
12:18 am	The intake reached its maximum level. (5 inches above the base of the service water pumps, 7.4 feet)
6:29 am	The intake level dropped back below the Alert threshold level. Specifically, the intake levels were 4.9 psig (6.0 feet) and 4.9 psig (6.0 feet) on PI-533-1173 and PI-533-1172, respectively.
9:47 am	Offsite power was restored to the A 4160V Bus.
10:39 am	The #1 EDG was removed from Service.
5:45 pm	The intake level dropped back below the NOUE threshold level. Specifically, the intake levels were 4.12 psig (4.2 feet) and 4.20 psig (4.4 feet) on PI-533-1173 and PI-533-1172, respectively.
<b>10/31/12</b>	
3:17 am	Offsite power was restored to the plant by backfeeding through the main transformers.
3:35 am	Offsite power was restored to B 4160V Bus via the auxiliary transformer.
3:46 am	The #2 EDG was removed from Service.
3:52 am	The Alert was terminated.