

**PURPOSE**

On May 11, 2011, the U.S. Nuclear Regulatory Commission (NRC) issued Bulletin (BL) 2011-01, "Mitigating Strategies" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML111250360). The stated purpose of BL 2011-01 was to achieve the following objectives:

1. *To require that addressees provide a comprehensive verification of their compliance with the regulatory requirements of Title 10 of the Code of Federal Regulations (10 CFR) Section 50.54(hh)(2),*
2. *To notify addressees about the NRC staff's need for information associated with licensee mitigating strategies under 10 CFR 50.54(hh)(2) in light of the recent events at Japan's Fukushima Daiichi facility in order to determine if 1) additional assessment of program implementation is needed, 2) the current inspection program should be enhanced, or 3) further regulatory action is warranted, and*
3. *To require that addressees provide a written response to the NRC in accordance with 10 CFR 50.54(f).*

BL 2011-01 requested that licensees provide the following information within 60 days of the date of the BL.

1. *Describe in detail the maintenance of equipment procured to support the strategies and guidance required by 10 CFR 50.54(hh)(2) in order to ensure that it is functional when needed.*

*Examples of the types of information to include when providing your response to Question (1) are:*

- a. *Measures implemented to maintain the equipment, including periodicity.*
- b. *Basis for establishing each maintenance item (e.g., manufacturer's recommendation, code or standard applicable to the craft). This should include consideration of storage environment impact on the maintenance necessary.*

*These examples are not meant to limit your response if you use other methods to address the issues described above.*

2. *Describe in detail the testing of equipment procured to support the strategies and guidance required by 10 CFR 50.54(hh)(2) in order to ensure that it will function when needed.*

*Examples of the types of information to include when providing your response to Question (2) are:*

- a. *A description of any testing accomplished to ensure the strategies were initially feasible.*
- b. *A description of any periodic testing instituted for the equipment, along with the basis for establishing that test requirement.*

- c. A description of the corrective action process used when the equipment fails to adequately perform its test.*

*These examples are not meant to limit your response if you use other methods to address the issues described above.*

- 3. Describe in detail the controls for assuring that the equipment is available when needed.*

*Examples of the types of information to include when providing your response to Question (3) are:*

- a. A description of any inventory requirements established for the equipment.*
- b. A listing of deficiencies noted in inventories for the equipment and corrective actions taken to prevent loss.*

*These examples are not meant to limit your response if you use other methods to address the issues described above.*

- 4. Describe in detail how configuration and guidance management is assured so that strategies remain feasible.*

*Examples of the types of information to include when providing your response to Question (4) are:*

- a. Measures taken to evaluate any plant configuration changes for their effect on feasibility of the mitigating strategies.*
- b. Measures taken to validate that the procedures or guidelines developed to support the strategies can be executed. These measures could include drills, exercises, or walk through of the procedures by personnel that would be expected to accomplish the strategies.*
- c. Measures taken to ensure procedures remain up-to-date and consistent with the current configuration of the plant.*
- d. A description of the training program implemented in support of the mitigating strategies and the manner in which you evaluate its effectiveness.*

*These examples are not meant to limit your response if you use other methods to address the issues described above.*

- 5. Describe in detail how you assure availability of off-site support.*

*Examples of the types of information to include when providing your response to Question (5) are:*

- a. A listing of off-site organizations you rely on for emergency response.*

- b. Measures taken to ensure the continuity of memoranda of agreement or understanding or other applicable contractual arrangements. This should include a listing of periods of lapsed contractual arrangements.*
- c. A listing of any training or site familiarization provided to off-site responders. This should include any measures taken to ensure continued familiarity of personnel of the off-site responders in light of turnover and the passage of time.*

*These examples are not meant to limit your response if you use other methods to address the issues described above.*

Mega-Tech Services, LLC was contracted by the NRC, under purchase order number NRC-HQ-12-P-03-0040, to provide technical assistance to NRC staff regarding the analysis of responses to NRC Bulletin 2011-01. Mega-Tech Services, LLC analyzed the 60-day responses received from licensees pertaining to questions 1 through 5 of BL 2011-01, to determine; standard industry practices for maintenance, testing and inventory controls, assess industry practice for configuration controls, guidance management and training to ensure the continuing feasibility of the mitigating strategies, and to evaluate licensee management of off-site support. Mega-Tech Services, LLC provided three summary reports; one for evaluation of question 1, 2, and 3 (Task 2), one for question 4 (Task 5), and one for question 5 (Task 6).

This report summarizes the results of previous evaluations under tasks 2, 5, and 6 of the subject purchase order required by task 7. In addition, the report includes a summary of deficiencies identified in the individual responses. The Task 7 report includes the following:

- Conclusion regarding standard industry practices for maintenance, testing and inventory controls,
- Standard practice for configuration controls, guidance management and training,
- An evaluation of site management of off-site resources, and
- A summary of corrective action program (CAP) issues reported by sites, resulting from reviews required by the Bulletin.

## **BACKGROUND**

Following the terrorist events of September 11, 2001, the readiness of NRC-regulated facilities to manage challenges to core cooling, containment and spent fuel pool (SFP) cooling following large explosions or fires was enhanced through a series of orders and imposition of license conditions. The NRC-endorsed Nuclear Energy Institute (NEI) Document 06-12, "B.5.b Phase 2 & 3 Submittal Guideline," Revision 2, was adopted by all licensees to meet the regulatory requirements for mitigating strategies. These requirements were formalized in the rulemaking of March 27, 2009, resulting in 10 CFR 50.54(hh)(2). The following, from NEI-06-12, Revision 2, provide examples of guidance regarding questions 1 through 5 of BL 2011-01:

- *Equipment associated with the external strategy is not to be treated as safety-related equipment. As such, it is not subject to any new special treatment requirements under 10 CFR (e.g., [Quality Assurance] QA, seismic, [Environmental Qualification] EQ, etc.).*

- *Equipment associated with the external strategy will meet standard industry practices for procuring and maintaining commercial equipment.*
- *There is no need to consider the potential for equipment to be out of service for routine maintenance activities. This also means that there is no need to provide redundancy in the means of makeup.*
- *Equipment associated with these strategies will meet standard industry practices for procuring and maintaining, commercial equipment.*
- *Level of training on implementing procedures/guidance is expected to be consistent with [Severe Accident Management Guidelines] SAMG-type actions and consistent with utility commitments made under B.5.b Phase 1.*
- *... The lifting capability (e.g., crane or fire truck with extension ladder) may be located off-site as long as the site has confidence (e.g., through [a memorandum of understanding] MOU) that it will be available for use on-site within the required timeframe (i.e., 2 hours or 5 hours)....*
- *... it may be necessary to rely on a spray capability provided from offsite, it must be controlled under an MOU and can be implemented onsite within the time constraints for this strategy,...*

The NRC conducted a comprehensive inspection of the implementation of the mitigating strategies developed by licensees in 2008. Subsequently, the NRC incorporated this inspectable area into the baseline reactor oversight process on a sample basis as part of the triennial fire protection inspection.

The events in Japan highlight the importance and potential versatility of B.5.b mitigating strategies. Therefore, the NRC sought comprehensive confirmation that licensees are maintaining equipment and strategies needed to satisfy 10 CFR 50.54(hh)(2).

## METHODOLOGY

Mega-Tech Services, LLC examined all of the 60-day responses for BL 2011-01 from licensees (total number of responses was 104 licensed reactors at 65 sites) and responses to the completeness Requests for Additional Information (RAIs).

In performing the analysis, the responses to the bulletin questions were categorized on a site basis versus number of units or plants. This approach was taken because, support for the B.5.b mitigating strategies was determined on a site basis.

Mega-Tech Services, LLC analyzed the industry commitments made by each site in response to the questions of BL 2011-01. Standard industry practices were identified based on a consensus between at least two-thirds of the sites for a given practice or activity (e.g., maintenance, testing, inventory, or training). Sites that did not address the activity or where the activity was not applicable were not included in the consensus calculation.

This approach for defining a standard industry practice is based on the approval process used by the American National Standards Institute (ANSI), American Society of Mechanical

Engineers (ASME) and National Fire Protection Association (NFPA) to approve industrial codes and standards. For those three organizations, a vote of at least two-thirds of attending members is required to form a consensus.

### **Conclusions for Task 2 (Bulletin Questions 1, 2, and 3)**

Mega-Tech Services, LLC analyzed the licensee responses including applicable RAIs regarding questions 1, 2 and 3 of BL 2011-01. The analysis included the identification of standard industry practices, where applicable, for maintenance, testing and control of equipment needed to implement the mitigating strategies. The results of the analysis identified standard industry practices and standard industry bases for these practices as follows:

#### **Standard Industry Practices:**

##### Maintenance and Testing Frequency

Monthly frequency:

- Checking fluid/oil levels etc. for the Fire Truck when applicable

Quarterly frequency:

- Checking fluid/oil levels etc. for the B.5.b Portable Pump and Engine
- B.5.b Portable Pump and Engine Trailer Maintenance Checks
- Battery Checks for the B.5.b Portable Pump and Engine
- Testing of radios
- Testing of satellite phones

Semiannual frequency:

- Fuel tank level checks and/or fuel sampling for the B.5.b Portable Pump and Engine

Annual frequency:

- Replacement of the fluids, filters, etc. for the fire pump
- Testing of the fire truck pump performance
- Replacement of the fluids, filters, etc. for the B.5.b Portable Pump, Engine and Trailer Maintenance
- B.5.b Portable Pump and Engine Testing (full-flow test)
- Checking fire hoses
- Checking portable power supplies
- Testing portable power supplies
- Maintenance and testing of monitor nozzles
- Testing of Air/Nitrogen Bottles

Three or Four Year frequency:

- Battery replacement for the B.5.b Portable Pump and Engine (4 year)
- Fire hose hydrostatic test or replacement (3 year)

Initial Testing To Ensure Mitigating Strategy Feasibility

- The standard industry practice for the initial testing to determine feasibility of the SFP External Makeup strategy using a portable pump was through a timed dry run exercise.
- The standard industry practice for the initial testing to determine feasibility of the SFP External Spray strategy using a portable pump was through a mockup exercise with the portable pump.
- The standard industry practice for the initial testing to determine feasibility of the use of DC power to manually depressurize a boiling water reactor (BWR) reactor pressure vessel (RPV) using temporary portable power was through power source testing.

Corrective Action Program Description

- The standard industry practice is to use the site CAP to document failures, establish priorities for corrective actions and perform trending.

Inventory Control Frequency

## Quarterly frequency

- B.5.b Portable Pump, Engine and Trailer
- Fire Pumper Truck
- Procedures
- Radios
- Satellite phones
- Firefighting turnout gear including self contained breathing apparatus (SCBA)

## Semi Annual frequency

- Fire Hose and fittings
- Air/nitrogen bottles
- Gauges and test instruments

## Annual frequency

- B.5.b Portable Pump Tow Vehicle
- B.5.b Portable Pump Fuel or Fire Truck Fuel
- Monitor Nozzles
- Flange adapter storage boxes
- Portable AC/DC power supplies
- Tools

**Standard Industry Bases:**

Sites generally used a combination of vendor manual recommendations and NFPA industry standards. Many sites noted that engineering judgment was used to modify or enhance these standards.

## Vendor and/or NFPA:

- Replacement of the fluids, filters, etc. for the Fire Truck
- Testing of the fire truck pump performance
- Checking Fire hoses
- Fire hose hydrostatic testing

## Vendor/Site Judgment:

- Checking fluid/oil levels etc. for the B.5.b Portable Pump and Engine
- Replacement of the fluids, filters, etc. for the B.5.b Portable Pump and Engine
- B.5.b Portable Pump and Engine Testing
- B.5.b Portable Pump and Engine Trailer Maintenance Checks
- Battery replacement for the B.5.b Portable Pump and Engine
- Fuel Sampling, Checks, etc. for the B.5.b Portable Pump and Engine
- Battery Checks for the B.5.b Portable Pump and Engine
- Checking portable power supplies
- Testing portable power supplies

## Site Judgment:

- Testing monitor nozzles
- Testing radios
- Testing satellite phones
- Testing air/nitrogen bottles

**Conclusions for Task 5 (Bulletin Question 4)**

Mega-Tech Services, LLC analyzed the licensee 60-day responses including applicable RAI regarding question 4 of BL 2011-01. The analysis identified standard industry practices for configuration management, procedure controls, initial validation, and design controls to ensure that the mitigating strategies associated with 10 CFR 50.54(hh)(2) remain feasible. The analysis also identified standard industry practices for training various site organizations on 10 CFR 50.54(hh)(2) requirements.

During the review of all 65 site responses, there were no potential non-compliances noted regarding Question 4 of BL 2011-01.

The results of the analysis identified standard industry practices and they are as follows:

## Standard Industry Practices:

- a. Plant configuration changes are procedurally evaluated against the licensing basis, including the license conditions and their associated safety evaluation.
- b. Initially, mitigating strategies were validated by walkdowns, engineering evaluations and/or tabletop reviews. Subsequent procedure changes are validated to ensure that the guideline remains viable. In 2011, B.5.b mitigating strategies were revalidated by similar techniques. The training discussed below also validates that the associated mitigating strategies can be deployed.

- c. The design change process requires a review of affected procedures and any necessary changes to be made. The mitigating strategy guidelines are controlled consistent with procedural controls under established administrative processes.
- d. Initial B.5.b training was provided to Operations, ERO personnel and/or Key Decision Makers, Fire Brigade Members and Security.
- e. Recurring training is provided for all Operations, ERO and Fire Brigade personnel. Training is provided for Security, Maintenance, and General Employees on an as-needed basis.
- f. The standard industry practice for the training program periodicity and evaluation process for the various organizations needed in support of the mitigating strategies is as follows:

Station Personnel	Training	Periodicity	Evaluation
Operations (licensed operators)	Recurring training	At least Biennially	Examinations and In-plant drills/exercises
ERO	Recurring training	At least Biennially	Examinations and/or In-plant drills/exercises
Fire Brigade	Large accelerant fed fires - Phase 1	At least Biennially	In-plant drills/exercises
Security *	Recurring training	Annually	In-plant drills/exercises
Maintenance **	Recurring training	At least Triennially	In-plant drills/exercises
General Employees***	Recurring training	Annually	Examinations

\* - For Security, 18 sites did not address recurring training.

\*\* - For Maintenance, 43 sites did not address training.

\*\*\* General Employees, 47 sites did not address initial training, 48 sites did not address recurring training and 53 sites did not address the evaluation for recurring training.

From the above information, Mega-Tech Services, LLC concluded that B.5.b training is provided to operations, Fire Brigade and ERO personnel while training is not generally provided to security, maintenance personnel (only 33% of sites provided training to Maintenance) or general employees. The conclusion is that Operations (licensed operators), ERO, and Fire Brigade personnel most likely carry out the mitigating strategy's actions with the assistance of security, maintenance personnel or general employees. The latter would act under the direction of Operations (licensed operators) and/or ERO personnel, hence training may not be required for security, maintenance or general employees.

### Conclusions for Task 6 (Bulletin Question 5)

Mega-Tech Services, LLC analyzed the licensee 60-day responses including applicable RAI responses regarding question 5 of BL 2011-01. The analysis provided conclusions regarding standard industry practices for negotiating and managing agreements with off-site agencies.

In reviewing the site responses the following were noted:

- There was a wide variation in the number of off-site organizations that each site listed in their responses.



Note: One site maintained only one agreement and noted that all agreements were specified in the site emergency plan, but no specific agencies were noted.

- All sites except one had agreements with one or more local fire departments.
- A majority of the sites noted agreements with Local Law Enforcement Agencies (LLEAs). Several of the initial 60-day responses did not note agreements with LLEAs but submitted additional information in response to RAI's confirming agreements with LLEAs. It should be noted that the identification and support of LLEAs is addressed in the site's Physical Security Plan as required by 10 CFR 73.55(k)(8)(iii), (9) and Appendix C to 10 CFR 73, "Nuclear Power Plant Safeguards Contingency Plans," Section (II)(B)(3)(d).

10 CFR 73.55(k)(8)(iii) states: *"Notify law enforcement agencies (local, State, and Federal law enforcement agencies (LLEA)), in accordance with site procedures."*

10 CFR 73.55(k)(9) states: *"Law enforcement liaison. To the extent practicable, licensees shall document and maintain current agreements with applicable law enforcement agencies to include estimated response times and capabilities."*

Appendix C to 10 CFR 73, Section (II)(B)(3)(d) states: *"Law Enforcement Assistance. Provide a listing of available law enforcement agencies and a general description of their response capabilities and their criteria for response and a discussion of working agreements or arrangements for communicating with these agencies."*

- All except two of the sites noted agreements with various hospitals, EMT services or individual doctors (MDs).
- Only 38 of the 65 sites noted agreements with various combinations of local, state or federal emergency management agencies (EMAs). It should be noted that Appendix E to 10 CFR 50, "Emergency Planning and Preparedness for Production and Utilization Facilities" Section (IV)(D)(1) provides requirements for licensee agreements with various local, state or federal EMAs.

Appendix E to 10 CFR 50, Section (IV)(D)(1) states: *"Administrative and physical means for notifying local, State, and Federal officials and agencies and agreements reached with these officials and agencies for the prompt notification of the public and for public evacuation or other protective measures, should they become necessary, shall be described. This description shall include identification of the appropriate officials, by title and agency, of the State and local government agencies within the EPZs."*

Although it is not verifiable, it appears that some licensees did not note these agreements in their individual responses to the Bulletin, most likely due to the fact that agreements with state, local and federal EMAs, are required by their respective emergency plans.

- No site reported any existing lapsed agreements, although during the process of their reviews, nine sites reported that some agreements were discovered lapsed or were not documented. They have been subsequently renewed and/or documented.

The results of the analysis identified standard industry practices and they are as follows:

- a. Off-site support is provided by local fire departments, local police departments, state agencies, federal agencies, other sites in the utility ownership framework, miscellaneous hospital and medical facilities, and suppliers of various products such as fuel.
- b. Off-site support is generally provided through MOUs, Letters of Agreement (LOAs), Purchase Orders (POs), and Contracts with various outside organizations and were reviewed annually.
- c. Sites typically provided training for some off-site agencies but not all the ones where agreements existed. Generally fire departments, local law enforcement agencies, and various state agencies were provided on-site training annually, typically during annual site emergency exercises. Other agencies or organizations that would not normally be expected to respond to the site were not trained (e.g., hospitals and doctors) or businesses that only provided material support via purchase orders or contracts.
- d. Sites maintained adequate oversight of renewal of various MOU's or LOA's. A few agreements, 9 of 810, had expired but were generally identified by licensee review or corrective action processes and these lapsed agreements were renewed as required.

### **Summary of Corrective Actions**

Mega-Tech Services, LLC conducted a review of the 60-day responses and responses to RAIs, to determine if sites generated any CAP issues in the course of their reviews of practices for the mitigating strategies.

The following results were obtained:

- 65 sites responded;
- 35 sites did not report any CAP issues;
- 30 sites reported CAP issues; and
- 23 sites reported CAP issues that were generated as a result of their actions in response to the bulletin.

CAP issues at the 23 sites were identified in the following areas:

- Maintenance and Testing - 9
- Inventory Control - 9
- Off-site agreements - 9
- Training - 4
- Procedures - 2

The total number of CAP issues (33) is greater than 23 because some sites reported more than one CAP issue. All CAP issues were entered into the site's CAP. Some responses noted that the CAP issues were corrected while some other responses noted that further review and/or analysis was needed to resolve the issue.