Independent Oversight Review of Site Preparedness for Severe Natural Phenomena Events at the Idaho National Laboratory

July 2012

Office of Safety and Emergency Management Evaluations
Office of Enforcement and Oversight
Office of Health, Safety and Security
U.S. Department of Energy

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Acronyms

AC	Alternating Current
AIP	Agreement in Principle
AMWTP	Advanced Mixed Waste Treatment Project
ATR	Advanced Test Reactor
BDBE	Beyond Design Basis Event
BEA	Battelle Energy Alliance, LLC
BLM	Bureau of Land Management
CFA	Central Facilities Area
CWI	CH2M-WG Idaho, LLC
DOE	U.S. Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
EAL	Emergency Action Level
EAM	Emergency Action Manager
ECC	Emergency Control Center
ECN	Emergency Communications Network
ED	Emergency Director
EHA	Emergency Management Hazards Assessment
EHS	Emergency Management Hazards Survey
EIRMC	Eastern Idaho Regional Medical Center
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EPI	Emergency Plan Implementing Procedure
EPZ	Emergency Planning Zone
ERO	Emergency Response Organization
FAC	Fire Alarm Center
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
FMT	Facility Monitoring Team
FSA	Fuel Storage Area
FY	Fiscal Year
HAZMAT	Hazardous Material
HSS	Office of Health, Safety and Security
HVAC	Heating, Ventilation, and Air Conditioning
IA	Interagency Agreement
IAB	INL Administration Building
IC	Incident Commander
ICP	Idaho Cleanup Project
IDEOP	Idaho Emergency Operations Plan
IEEE	Institute of Electrical and Electronics Engineers
INL	Idaho National Laboratory
INL-VIZ	INL Meteorological Visualization and Atmospheric Modeling System
INTEC	Idaho Nuclear Technology and Engineering Center
kW	Kilowatt
LFM	Lead Federal Manager
MAA	Mutual Aid Agreement
MOU	Memorandum of Understanding
MSA	Mine Safety Appliances
NARAC	National Atmospheric Release Advisory Center
NFPA	National Fire Protection Association
NIMS	National Incident Management System

NNSA	National Nuclear Security Administration
NOAA	National Oceanic and Atmospheric Administration
OFI	Opportunity for Improvement
PPE	Personal Protective Equipment
RADCON	Radiological Control
RAP	Radiological Assistance Program
RCT	Radiological Control Technician
RSAC	Radiological Safety Analysis Computer
RWMC	Radioactive Waste Management Complex
SAR	Safety Analysis Report
SCBA	Self-Contained Breathing Apparatus
SMT	Site Monitoring Team
StateComm	Idaho State Communications Center
TSR	Technical Safety Requirement
UPS	Uninterruptible Power Supply
USAR	Urban Search and Rescue
WCB	Willow Creek Building
WCC	Warning Communications Center

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1.0 PURPOSE

The Office of Enforcement and Oversight (Independent Oversight), within the Office of Health, Safety and Security (HSS), conducted an independent review of the Department of Energy (DOE) Idaho National Laboratory (INL) preparedness for severe natural phenomena events. The HSS Office of Safety and Emergency Management Evaluations performed this review to evaluate the processes for identifying emergency response capabilities and maintaining them in a state of readiness in case of a severe natural phenomena event.

This report discusses the scope, background, results, and conclusions of the review and identifies one finding and several opportunities for improvement (OFIs).

2.0 SCOPE

The scope of this review involves those aspects of the emergency management program that relate to emergency preparedness for a severe natural phenomena event. The primary areas of interest are the identification of needed site response capabilities and their state of readiness. The term "INL site" refers to the efforts or programs of all contractors in Idaho under the oversight of DOE-ID. The INL site facilities of interest consist of the following:

- Emergency Operations Center (EOC)
- Alternate EOC
- Warning Communications Center (WCC)
- Central Facilities Area (CFA) Emergency Control Center (ECC)
- Fuel Storage Area (FSA) at the Idaho Nuclear Technology and Engineering Center (INTEC)
- INTEC ECC
- Advanced Test Reactor (ATR) facility
- ATR ECC.

The INL site emergency response functions of interest include offsite emergency medical, fire response, security response, personnel decontamination, and field monitoring. The scope of this review included portions of the following emergency management program elements:

- Technical planning basis
- Plans and procedures
- Emergency response organization (ERO)
- Emergency facilities and equipment
- Offsite response interfaces.

The DOE Idaho Operations Office (DOE-ID) has oversight and contractual responsibility for the INL, the Idaho Cleanup Project (ICP), and the Advanced Mixed Waste Treatment Project (AMWTP). The INL, ICP, and AMWTP operate at an 888 square mile site, 45 miles west of Idaho Falls, Idaho, and in multiple facilities within the Idaho Falls vicinity. The Office of Nuclear Energy provides funding and programmatic requirements for the work at the INL site, and the Office of Environmental Management provides funding and programmatic requirements for the work at the ICP and AMWTP.

Three primary contactors carry out the work at the INL site:

- Battelle Energy Alliance, LLC (BEA) is the overall INL site contractor. BEA manages and operates the emergency management program for its facilities, as well as some common emergency response functions, such as emergency medical, fire, and security, that support the other two site contractors.
- CH2M-WG Idaho, LLC (CWI) is the ICP contractor. CWI began an independent emergency management program in December 2008, using contracts with BEA to provide a few specific emergency management resources, which include consequence assessment, external liaison, EOC support, and other logistical functions.
- Idaho Treatment Group, LLC, manages the emergency management program for AMWTP. However, since this project is not within the scope of this review, Independent Oversight did not assess its program.

Independent Oversight assessed both the comprehensiveness of the response capabilities identified by the site's analyses and the site's level of preparedness in terms of attaining and maintaining the needed response capabilities. Of particular interest was the site's preparedness for responding to plausible severe natural phenomena events. The scope of the review was consistent with Objectives 1 through 4 of HSS Criteria, Review, and Approach Document 45-51, *Emergency Management Program Inspection Criteria, Approach, and Lines of Inquiry, Targeted Review of Site Preparedness for Severe Natural Phenomena Events*. As stated in the *Plan for the Independent Oversight Review of Site Preparedness for Severe Natural Phenomena Events at the INL*, dated April 2012, the purpose of the review was to determine whether:

1) The site analyzes plausible scenarios representing severe natural phenomena events to determine the capabilities needed for an effective emergency response.
2) The site has a means for determining quickly whether an event results in the loss of a significant quantity of hazardous material (HAZMAT) and is beyond the site's capability to respond.
3) The site's emergency response capabilities are in a state of readiness to perform its required emergency response functions during plausible natural phenomena events.
4) The site's planning is adequate for obtaining and integrating offsite response assets for events beyond the site's response capability.

This assessment was accomplished by reviewing the documentation that establishes and governs the INL emergency management program processes, such as emergency plans, procedures, safety basis documents, checklists, records, memoranda of understanding (MOUs), and mutual aid agreements (MAAs); interviewing key personnel; and performing walkdowns of facilities and equipment.

3.0 BACKGROUND

Numerous examples of severe and catastrophic events, such as earthquakes, tornadoes, floods, wildland fires, and manmade disasters, have emphasized the need to adequately plan and prepare for a large-scale event that could degrade or overwhelm a site's emergency response capability. DOE Order 151.1C, *Comprehensive Emergency Management System*, identifies the functional emergency response requirements for a DOE site, and the emergency management guides associated with DOE Order 151.1C provide guidance for implementing the requirements. Emergency planners at DOE sites determine needed site emergency response capabilities based on site-specific attributes, such as types and forms of HAZMAT, demographics, and geography, using a variety of deterministic analyses. The primary means for determining needed response capabilities are the emergency management hazards assessments

(EHAs), although other site response capability needs are further analyzed in the Fire Department's baseline needs assessments and security vulnerability assessments. The analysis contained in the EHAs should describe a spectrum of events that represent plausible HAZMAT release scenarios, such as operator errors, mechanical failures, fires, and explosions from unintentional or intentional initiators.

Many of these scenarios are also analyzed in the facility-specific safety analysis report (SAR) and used to reduce the risk from a nuclear facility's operations to acceptable levels; these scenarios are known as design basis events. When establishing a facility design, SARs do not analyze events that exceed in severity the parameters defined for the design basis event. Such "beyond design basis events" (BDBEs) include severe natural phenomena events that represent the upper end of the consequence spectrum for which DOE facilities are required to prepare, in accordance with DOE Order 151.1C.

To prepare for a BDBE, emergency response staff must plan a means to provide for immediately protecting personnel, mitigating the consequences of a potential HAZMAT release, and establishing appropriate short-term recovery actions. Preparations include alternate emergency response facilities, redundant and diverse communications systems in case an event renders the primary facilities and equipment unavailable, and other site-specific planning and response capabilities needed for a comprehensive emergency management program.

Some response capabilities that emergency planners may identify as necessary for the most severe and low-probability events would be a financial burden to maintain on site or could be rendered unavailable if such an event occurred. Therefore, emergency planners must predetermine a means to acquire these necessary capabilities from external sources, such as surrounding communities, state authorities, and offsite DOE and national assets. Consequently, preparation for such an event requires the site to establish documented agreements with offsite entities that identify the necessary capabilities, determine mechanisms to bring those capabilities to bear when and where they are needed, and develop procedures to receive and integrate them into the emergency response.

4.0 RESULTS

The following sections discuss the observations made by Independent Oversight during this review, keyed to the objectives in HSS Criteria, Review, and Approach Document 45-51.

4.1 Objective 1: Scenario Analysis

The site analyzes plausible scenarios representing severe natural phenomena events to determine the capabilities needed for an effective emergency response.

4.1.1 Discussion

Independent Oversight reviewed the process guides that BEA and CWI use to develop emergency management hazards surveys (EHSs) and EHAs, as well as the EHSs, EHAs, and SARs for the ATR Complex and INTEC facility. Independent Oversight also reviewed the EHSs and EHAs for the ATR and the INTEC FSA (Building CPP-666) to determine the accuracy and adequacy of analyses conducted for severe natural phenomena events. Additionally, Independent Oversight reviewed the SARs to determine the consistency of the BDBEs identified in both the SARs and the EHAs for each facility. Further, Independent Oversight reviewed the EHAs to determine whether these documents identified the needed emergency response capabilities for severe natural phenomena events, and served as the basis for event classification and pre-planned protective actions.

BEA and CWI developed formal, clearly defined, and well-documented guides for preparing facility EHSs, EHAs, and emergency action levels (EALs) that incorporate the requirements of DOE Order 151.1C and follow the guidance of DOE Guide 151.1-2, *Technical Planning Basis Emergency Management Guide*. The BEA and CWI guides provide detailed instructions on methodology, content, and format to ensure consistency between the EHSs, EHAs, and EALs. For example:

- The BEA and CWI guides GDE-437 and ICP GDE-437, *Developing and Maintaining EHSs*, contain an EHS data sheet template that, when completed, provides photographs and detailed building/operation information for each INL facility. Further, completion of the data sheet template results in appropriate quantitative assessment determinations.
- The BEA and CWI guides GDE-438 and ICP GDE-438, *Developing and Maintaining EHAs*, provide detailed instructions on developing the INL site event-specific EALs and protective actions.
- The EHS and EHA guides identify earthquakes, tornadoes and high winds, lightning and hail, floods, winter storms, and volcanic activity as natural phenomena initiating events.

BEA developed the *EHS for ATR Complex* (EHS-50), and CWI developed the *EHS for INTEC* (EHS-20), per the *Developing and Maintaining EHS* guides. The EHSs provide detailed information for each building within the ATR Complex and the INTEC facility. The EHSs adequately identify threats that could result from natural phenomena events and that could lead to HAZMAT releases at the respective facilities.

BEA developed an EHA for the ATR Complex, *EHA for ATR Complex* (EHA-50), per the GDE-438 guide. Independent Oversight's review of *Appendix D EHA for TRA-670 ATR Building* (EHA-50-D) and the *Upgraded Final SAR for the ATR* (SAR-153) determined that BEA considered comparable natural phenomena events in each document. BEA appropriately identified the loss of coolant water due to a breach of the ATR canal wall from a seismic event as the most severe natural phenomena event for the ATR building and accurately and adequately analyzed seismic events in the ATR EHA, with the analyses going beyond those events analyzed in the SAR. Additionally, BEA appropriately based the ERO capability on the resultant EHA consequence analyses.

CWI developed an EHA for the INTEC facility, *EHA Document for INTEC* (EHA-20), per the ICP GDE-438 guide. Independent Oversight's review of the *Appendix G EHA for INTEC CPP-666, Fluoroinel Dissolution Process and Fuel Storage* (EHA-20-G) and the *SAR for the CPP-666 FSA* (SAR-113) determined that CWI considered comparable natural phenomena events in each document. CWI appropriately identified the FSA pool drain due to a natural phenomena event as the most severe natural phenomena event for the FSA facility and accurately and adequately analyzed the natural phenomena events in the INTEC EHA, with the analyses going beyond the events analyzed in the SAR. Additionally, CWI appropriately based the ERO capability on the resultant EHA consequence analyses.

Overall, BEA and CWI developed EHSs that identify threats resulting from natural phenomena events, as well as EHAs that analyze and document these events. BEA and CWI appropriately analyzed natural phenomena events at the ATR and FSA facilities in their respective EHAs and based the ERO capability on the consequence assessment results contained in the EHAs.

4.1.2 Opportunities for Improvement

No OFIs were identified for this objective.

4.2 Objective 2: HAZMAT Release Determination

The site has a means for determining quickly whether an event results in the loss of a significant quantity of HAZMAT and is beyond the site's capability to respond.

4.2.1 Discussion

Independent Oversight reviewed the EAL statements contained in the respective EHAs for the ATR and FSA facilities to determine whether the EALs are based on the documented consequence analyses. Independent Oversight also reviewed the ATR's Emergency Plan Implementing Procedure (EPI)-15, *ATR Complex Operational Emergency Categorization/Classification and Protective Actions*, and the FSA's EPI-11, *Operational Emergency Categorization/Classification and Protective Actions for INTEC Areas of Responsibility*. Facility emergency action managers (EAMs) use their respective EPIs to make initial protective actions and protective action recommendations. Independent Oversight reviewed these EPIs to ensure that the EALs correlated with the respective EHA EAL statements. Additionally, Independent Oversight reviewed the EALs to determine their usability during plausible severe events (e.g., seismic event destroying multiple facilities on site) that the analysis concludes would overwhelm or incapacitate the site's response capability.

For the events analyzed in the respective EHAs, BEA and CWI developed comprehensive sets of EALs based on building- or activity-specific symptoms and event initiators. BEA and CWI based the EALs for the ATR and FSA facilities on the consequence assessments documented in the respective EHAs. Additionally, EALs are available for natural phenomena events that may impact INL site operations, communications, transportation, and the health and safety of personnel.

EALs for natural phenomena events at the ATR and FSA facilities include weather extremes (i.e., high or low temperatures, high winds, tornadoes, lightning, floods, and snow), earthquakes, and volcanic activity. Natural phenomena event EALs appropriately instruct personnel to follow instructions included in site- or facility-specific procedures and/or as directed by the incident commander (IC) or appropriate responsible personnel. Additionally, natural phenomena event EALs aptly direct the user to refer to the radiological release or non-radiological HAZMAT release EALs already developed from operational analyses conducted in the respective facility EHA for suspected HAZMAT releases. Further, BEA and CWI developed EALs for natural phenomena events that may impact INL site operations, communications, transportation, and/or health and safety of personnel and would overwhelm or incapacitate the site's response capability.

The severe natural phenomena event EAL for the ATR facility (loss of coolant water due to a seismic event) provides adequate protective actions and protective action recommendations and requires BEA emergency management personnel to do the following:

- Evacuate non-essential personnel from each BEA facility, all field workers, and grazing rights personnel (ranchers) within the INL site boundary.
- Recommend that the following non-BEA facilities evacuate:
  - AMWTP
  - Idaho Comprehensive Environmental Response, Compensation, and Liability Act Disposal Facility
  - INTEC
  - Naval Reactors Facility
  - Radioactive Waste Management Complex (RWMC).
- Relocate the ATR ECC to one of the alternate ECC locations (the CFA ECC or the Alternate EOC in Idaho Falls).

- Verify implementation of AOP-0.1, *Operator Evacuation Procedure*, as appropriate.
- Provide protective action recommendations to affected counties to immediately shelter and prepare to evacuate respective offsite populations.

The severe natural phenomena event EAL for the FSA facility (FSA pool drain due to a natural phenomena event) provides adequate protective actions. The event results in a site area emergency that does not require CWI to provide protective action recommendations, but does require CWI emergency management personnel to do the following:

- Evacuate all non-essential personnel from FSA to the appropriate assembly area.
- Shelter all non-essential personnel from other buildings within 800 meters (2,600 feet) of FSA, while securing building windows and doors and turning off ventilation systems, if facility safety allows, until personnel can evacuate to the appropriate assembly area as soon as conditions permit.
- Shelter all other non-essential personnel within the INTEC fence, while securing building windows and doors and turning off ventilation systems, if facility safety allows.

Overall, BEA and CWI developed comprehensive sets of EALs that are appropriately based on consequence assessments documented in the respective EHAs for the ATR and FSA facilities. BEA and CWI analyzed plausible scenarios for severe natural phenomena events and developed EALs for events that would overwhelm or incapacitate the site's response capability.

4.2.2 Opportunities for Improvement

No OFIs were identified for this objective.

4.3 Objective 3: Emergency Equipment and Facilities

The site's emergency response capabilities are in a state of readiness to perform the required emergency response functions during plausible natural phenomena events.

4.3.1 Discussion

Independent Oversight reviewed the systems and equipment associated with the WCC, five emergency response command centers (EOC, Alternate EOC, CFA ECC, ATR ECC, and INTEC ECC), and three key emergency response functions (fire response, personnel decontamination, and field monitoring) that are among the critical functions needed for response to an emergency caused by a severe natural phenomena event. These systems and equipment include:

- Normal and backup power systems
- Communication systems
- Consequence assessment systems
- Habitability equipment
- Personal protective equipment (PPE)
- Radiation survey equipment
- HAZMAT detection equipment
- Decontamination equipment.

In addition, Independent Oversight reviewed response capabilities at the EOC and two INL site nuclear facilities (ATR and FSA), as well as the INL site's ERO and protective force planning for responding to a catastrophic event.

The INL site ERO relies on several emergency response command centers to coordinate and manage the response to an emergency. The affected facility ECC serves as the emergency response command center for emergencies, determines and implements protective actions, performs notifications, authorizes response resources, and determines emergency categorization and classification. Each group of INL site facilities with HAZMAT has an ECC in addition to the CFA ECC, which provides logistical and limited operations support to the other ECCs and implements protective actions for INL employees who are on site but outside of a facility boundary. Each ECC has alternate locations, including a specially-equipped bus, at the INL site and in Idaho Falls at the Alternate EOC.

The EOC, located in the INL Administration Building (IAB) in Idaho Falls, would be unaffected by any postulated HAZMAT release because it is approximately 50 miles from the INL site. The EOC is responsible for providing dose assessment, public information, and other liaison functions. The EOC Emergency Director (ED) can also assume responsibility for protective actions, emergency categorization/classification, and notification functions from the ECC EAM, if requested. If the EOC staff is required to relocate, an Alternate EOC is located in the Willow Creek Building (WCB) in Idaho Falls.

The WCC, located in a Limited Area in the IAB in Idaho Falls, is the emergency notification and activation center for the INL site. BEA staffs the WCC 24 hours a day, 365 days a year and facilitates onsite and offsite notifications as requested by the ECC EAM and/or EOC ED.

Three emergency response functions (fire response, decontamination, and site monitoring) provide critical capabilities needed to respond to a severe natural phenomena event at the INL site. The INL Fire Department consists of three fire stations located at CFA, Materials and Fuels Complex, and Test Area North, with the Fire Alarm Center (FAC) housed on the second floor of the CFA fire station. The department provides fire and emergency medical dispatching, structural fire suppression, HAZMAT mitigation, technical rescue services, emergency medical services (EMS), and wildland fire suppression. Technical rescue services include vehicle and machinery rescue, confined space rescue, structural collapse rescue, and rope rescue.

The decontamination area, located in the CFA Medical Clinic, is designated as the primary point for decontamination of injured employees in case of a large-scale contamination event at the INL site. The Medical Clinic personnel activate and staff the decontamination area as needed during an emergency. In addition, the Fire Department can provide gross decontamination at the event scene.

The Site Monitoring Team (SMT), dispatched from CFA ECC, collects and reports radiological data outside of the facility boundaries, but within the site boundary. The SMT identifies the boundary of the area impacted by a radiological release and provides critical radiological monitoring data for use by decision-makers at the INL EOC.

Normal and Backup Power Systems

Independent Oversight reviewed normal and backup power supplies for the EOC, the Alternate EOC, the CFA ECC, and two nuclear facilities, including their ECCs – the INTEC FSA and the ATR. Independent Oversight analyzed the reliability of power supplies by reviewing inspection, maintenance, and test program procedures against industry and DOE standards for the design, maintenance, and testing of emergency power supply systems. Independent Oversight determined the capability to provide long-term

emergency power through a review of generator refueling plans. Independent Oversight reviewed battery-backed systems to determine their service times and to identify the equipment lost during a long-term loss of alternating current (AC) power. Independent Oversight reviewed design, maintenance, and test documents; interviewed personnel; and performed system walkdowns to make its conclusions.

Independent Oversight referenced DOE-STD-3003-2000, *Backup Power Sources for DOE Facilities*, as the benchmark for determining backup power supply reliability. This DOE standard applies National Fire Protection Association (NFPA)-110, *Standard for Emergency and Standby Power Systems*, NFPA-111, *Standard on Stored Electrical Energy Emergency and Standby Power Systems*, and applicable Institute of Electrical and Electronics Engineers (IEEE) standards to engine generators and uninterruptible power supply (UPS) systems, for equipment that protects the public, site workers, and the environment. The standard establishes general and detailed requirements for reliable backup and emergency power sources for important equipment and identifies nuclear safety systems, radiation monitors and alarms, fire protection systems, security systems, data processing equipment, and emergency lighting as examples of important equipment. However, the standard's requirements apply only if contractual documents, procurements documents, or the authorization basis for a facility invokes the standard, and DOE-ID did not invoke the standard to establish inspection, maintenance, and test programs.

Four feed lines provide commercial power (also referred to as normal or offsite power) to the INL site though the Antelope Substation. Two feed lines then form the 138-kilovolt Scoville Substation Loop, which provides a redundant power source around the INL site. The 138- kilovolt loop feeds substations at the facilities, which reduce power to various AC voltages providing a dual loop power supply. In Idaho Falls, separate substations provide commercial power at the EOC and alternate EOC. Individual facility diesel generators and battery-backed systems provide backup power capability; these systems are detailed in the facility-specific sections below.

Adequate plans exist for the long-term refueling of diesel generators at the INL site and Idaho Falls facilities. Contracted suppliers replenish bulk storage tanks of diesel fuel at the INL site with large tanker trucks, and BEA and CWI each own two refueling trucks with at least a 2000-gallon tank capacity. BEA and CWI contract with local suppliers to resupply the INL site bulk storage tanks and refueling trucks. They can also purchase fuel from any distributer using a "p-card" in case the contracted suppliers do not have diesel fuel available.

INL can provide adequate backup power through mobile generators for buildings with receptacles. BEA owns four mobile generators – one 29-kilowatt (kW), two 50-kW, and one 100-kW – and can rent additional generators in Idaho Falls, if needed. BEA stores the mobile generators outside with their integral fuel tanks filled, allocates the generators based on load priorities, and expects, but does not require, users of mobile generators to return them refueled. BEA starts the mobile generators at least quarterly and checks the fuel levels to ensure timely operability.

BEA establishes minimal inspection, test, and maintenance requirements through technical safety requirements (TSRs), where applicable, and manufacturer recommendations to maintain operability of site emergency and backup power supplies. INL procedure LRD-14403, *Inspection, Testing, and Maintenance of Fire Protection System and Equipment*, establishes periodic inspection, testing, and maintenance requirements for such systems and equipment for operational emergencies. LRD-14403 establishes surveillance requirements based on applicable NFPA standards, although NFPA standards are not always specifically cited in the procedure. LRD-14403 applies to fire alarms, fire suppression systems, fire barriers, emergency lighting, exit signs, and other equipment, but does not currently apply to backup power systems. LRD-14403 appropriately establishes a monthly 30-second functional test and an annual 90-minute functional test for emergency lights and exit signs. Further, LRD-14403 establishes an annual charger test, a 30-minute battery discharge test, and a battery load voltage test for fire alarm

system battery-backed power components. BEA recently drafted a revision to LRD-14403 to add backup power system surveillances and to clarify the application of NFPA-110 and NFPA-111 standards for these systems. The draft revision is ready for the INL review and approval process.

BEA established initial tentative NFPA-110 level designators for the INL fixed generators. These designators – level 1 or 2 – indicate the importance of the loads, such as life safety or important-to-safety loads, on the fixed generator and establish the rigor for system testing. NFPA-110 does not address mobile generators and battery backup power systems, referred to as standby or optional power systems, that are used to power less-important loads and ensure only power continuity and reliability for users. BEA established the tentative level designators after two generators failed to start at INL's Materials and Fuels Complex when BEA secured commercial power during a fire in 2010. Since then, the INL Fire Marshal performed an audit of INL generators using the 2010 version of the NFPA-110 standard as the audit criteria. This effort established tentative generator level designators and identified some generator and fuel testing deficiencies requiring corrective action, as documented in INL assessment report IAS11655, *INL Independent Assessment of Generator Classification and Maintenance (Except for Generators at the Materials and Fuels Complex)*. The INL Fire Marshal considers the generator levels to be tentative because the assessment did not include an engineering evaluation of the system loads. Further, the assessment report cautioned readers not to downgrade any equipment classifications based on the Fire Marshal's review because the audit focused on communication and emergency lighting systems and did not consider all of the equipment discussed in DOE-STD-3003-2000. The INL assessment report also commits to developing a revision of LRD-14403, now overdue, to include the 2010 version of the NFPA-110 standard for backup generators. Independent Oversight noted that BEA tentatively designated some emergency equipment, such as the safety-related seismic category 1 emergency generator for the ATR deep well pump #3, as an optional standby generator (commercial grade), whereas a level 1 designation would be more appropriate per DOE-STD-3003-2000. (See Section 4.3.2, **OFI 3-1**.)

Overall, the INL site provides adequate normal and backup power through multiple commercial power suppliers, a redundant power distribution system, fixed and mobile generators, and generator refueling capabilities. Although BEA initiated the process to establish institutional-level maintenance and test requirements for its backup power systems that incorporate industry standards, completion of this activity is overdue and, in its current form, does not incorporate the applicable DOE standard.

Communication Systems

Independent Oversight reviewed the key communication systems used by the WCC, EOC, Alternate EOC, ECCs, INL Fire Department, and Medical Clinic to communicate with each other; site personnel; the surrounding public; and offsite local, state, and Federal agencies and organizations. The primary and backup systems were examined, along with the processes for maintaining and periodically testing the systems to ensure operability. Independent Oversight also reviewed the availability of alternate means to perform critical tasks when a primary system is out of service due to a severe natural phenomena event.

The INL site radio system provides a mobile communications link with broad coverage of the INL site and surrounding area. Radios are the primary method used for communications in the field, and they are available at all ERO venues. The INL site uses a trunked radio system consisting of two primary transmission sites located on Howe Peak and East Butte and ten additional transmission sites, some located at facility complexes such as the ATR Complex and CFA. Over 2000 radios divided into 30 talkgroups are in operation, consisting of hand-held units, vehicle-mounted units, base stations, and consoles. The radio system provides a large coverage area encompassing 3600 square miles in and around the INL site. In addition, BEA added antennas to improve reception in several locations, such as the ATR Complex and INTEC. The two primary transmitters have backup generators and UPS units to ensure continued operation. The radio system can continue to operate in a limited mode if the system

controller and all but one of the primary transmitters fail. The radio system can also operate in simplex mode (limited to line-of-sight and reduced range) if all of the transmitters fail.

BEA performs appropriate periodic maintenance and testing of the radio system and plans to transition to a new radio system for emergency responders. BEA performs preventive maintenance on the transmitters twice per year; the remaining components of the radio system do not require periodic maintenance. The WCC, INL Fire Department, and Medical Clinic use their hand-held units, base stations, and consoles daily. The Fire Department conducts twice daily tests of the radio system, which include the WCC and Medical Clinic. Additionally, the Fire Department completes a weekly check to confirm the operability of their radios, and the WCC performs a weekly test to confirm the ability to reach the primary mutual aid responders. The EOC, Alternate EOC, and ECCs perform monthly tests of the hand-held units and base stations at their locations. BEA plans to transition to a new radio system, with the site leasing the radio equipment rather than owning it. Improvements in operation expected from the new radio system include:

- Interoperability with mutual aid responders
- Priority communications for emergency responders over other users
- Less delay time when connecting to a transmitter.

BEA plans to transition the INL site emergency responders and protective force to the new radio system by the end of fiscal year (FY) 2012.

The ERO venues are well equipped with communication systems that provide multiple methods for conveying emergency information. All ERO locations are equipped with an adequate number of telephones and facsimile machines, and the WCC and EOC have several telephone lines routed through a telephone switch external to the INL site exchange. The EOC, Alternate EOC, CFA and ATR ECCs, and INL Fire Department have satellite telephones available for use. The INL site also allows the use of cellular telephones at all locations except Limited Areas; most of the ERO members have cellular telephones, and the WCC and the Fire Department command staff have received specific approval to use cellular telephones within Limited Areas during emergencies. The Medical Clinic has an internal intercom system with intercom boxes throughout the building, including the decontamination area. Finally, a video teleconference system can connect the EOC, Alternate EOC, CFA and ATR ECCs, and all three fire stations.

The INL site appropriately tests the communication systems at the ERO venues. The WCC and Medical Clinic use their telephones and facsimile machines daily, and the Medical Clinic tests the intercom system in the decontamination area during quarterly drills. The INL Fire Department documents the results of the daily inventory and weekly operational check of the satellite telephone on FDOP51, *Fire Department Station #1 Daily Apparatus and Equipment Sign-Off*. For the remaining ERO venues, procedures MCP-2396 and ICP MCP-2396, *Functional Checks of Emergency Management Response Equipment*, require monthly operability checks of the communications equipment in the EOC and ECCs, with the results documented on Form 150.25 and ICP Form 150.25, *Functional Operability Check Report*. Notably, some of the users modified the form to include the specific steps taken to ensure operability, such as testing that the satellite telephone can both receive and place a telephone call and confirming that facsimile machines can both receive and transmit a document.

The INL Fire Department successfully operates the emergency reporting telephone system and ensures continuous operability of the system. The INL site uses 777 in place of 911 as the telephone number for reporting emergencies. Cellular telephone users at the site can report emergencies to the FAC using 526-7777 or to the WCC in Idaho Falls using 526-1515. The FAC has three incoming telephone lines for 777 and 526-7777 calls from site personnel; the calls to the 777 number also ring simultaneously at the WCC.

If the FAC has to evacuate, the WCC can answer the 777 telephone calls. The FAC Dispatcher tests both emergency numbers each morning to ensure the telephone system is operable.

A telephone bridge provides for efficient notifications to offsite organizations. Upon receipt of a Form 150.06, *INL Initial Emergency Notification Form*, or Form 150.06A, *INL Follow-Up Emergency Notification Form*, from an ECC or the EOC, the WCC sends the form via facsimile to all appropriate offsite organizations. The WCC then establishes a telephone bridge with the offsite organizations, and the affected facility ECC uses the telephone bridge to conduct a conference call with the offsite organizations to ensure receipt of the notification form and to answer any questions. If the telephone bridge is not available, the affected facility ECC contacts the offsite organizations individually to confirm receipt of the information and answer any questions. If the WCC is unavailable, the EOC and ECCs have procedures in place to send the notification forms directly to the offsite organizations and confirm receipt with a telephone call. The BEA Emergency Management Department staff validates the telephone and facsimile numbers for the offsite organizations quarterly.

The EOC has ready access to an Emergency Communications Network (ECN) node that permits classified videoconferences with DOE Headquarters and other DOE offices. The ECN, located across the hall from the EOC in the IAB, allows DOE-ID to transmit live video, recorded video, and projected images to DOE Headquarters in both unclassified and classified modes. DOE Headquarters conducts a comprehensive weekly test of the ECN with the INL site.

The INL site appropriately uses WebEOC® to share unclassified information about an ongoing emergency with the ERO, although a few ERO locations have not clearly documented the completion of WebEOC operability tests. The ERO uses WebEOC to share emergency-related information via display on video monitors and individual computer monitors. WebEOC is available at the EOC, Alternate EOC, WCC, ECCs, and Medical Clinic. In addition, ERO personnel with a valid user identification and password can log in to WebEOC from any computer with Internet access. The EOC can share information with DOE Headquarters via WebEOC, if necessary. The State of Idaho does not have direct access to WebEOC, but a state representative in the INL EOC can view WebEOC and relay relevant information to the State of Idaho EOC. The WebEOC program is distributed across two computer servers to minimize the risk that a server failure would cause the program to become inoperable. The EOC staff checks the operability of WebEOC weekly after installation of computer patches to ensure that the program is functioning as intended. Personnel at the EOC and ECCs test the operability of WebEOC monthly by logging in to the system and documenting the results on Form 150.25, although the completed forms for the EOC, Alternate EOC, and ATR ECC do not clearly document that WebEOC was operable on all of the computers requiring access at those locations. (See Section 4.3.2, **OFI 3-2**.)

The INL site suitably uses a paging system as the primary means to activate the ERO. The INL EOC and ECCs use a rotating "duty" team concept for the ERO, with each team serving a one-week rotation before the duty shifts to the next team. When an emergency occurs, the WCC notifies the duty teams for the EOC and appropriate ECCs using an automated paging system that transmits a message to the ERO's alphanumeric pagers. The paging system then records whether a positive or negative response was received from each person paged. If the primary paging software system fails, two additional paging software systems are available as a backup. If all of the paging software systems or the WCC are unavailable, the EOC and ECCs can contact their duty teams manually using telephones, cellular telephones, radios, and voice paging systems (at the ATR Complex and INTEC). The ERO paging system does not include the Medical Clinic and INL Fire Department, who use other processes to contact their personnel. The Medical Clinic uses an intercom system to activate the decontamination area personnel, along with telephones, radios, and pagers for personnel not in the building, and tests these communication systems during quarterly drills. The Fire Department recalls additional fire fighters by calling their home and cellular telephones and performs actual recalls five or six times per year.

The ERO responses for the periodic pager tests do not demonstrate that the method is effective in reaching all necessary personnel. The WCC performs an announced weekly test of the ERO paging system and one or two additional unannounced tests during each team's duty week. The tests include all members of the duty team, with all duty teams tested over a four-week cycle. Independent Oversight reviewed the results of a recent unannounced pager test to determine the effectiveness of the pager system in reaching the ERO. The responses from the ERO confirming receipt of a page varied widely among the duty teams and ranged from 33 to 82 percent. In addition, the FY 2010 full participation exercise noted that the paging system did not reach all personnel and delayed some personnel in responding to their duty stations. (See Section 4.3.2, **OFI 3-3**.) The WCC provides copies of the paging system test results to the lead personnel for the duty teams, who follow up with the team members who did not respond to the page. BEA self-identified that it needs a new system because replacement parts do not exist for the current paging system and the frequency used by the paging system will be unavailable after FY 2014. BEA is analyzing alternative systems for notifying ERO members.

The INL site uses a variety of appropriate methods for notifying employees of an emergency and facilitating the safe evacuation of employees. The "IEN/D" radio net talkgroup is the primary method used by the WCC, EOC, and facility ECCs for communicating protective actions and instructions to workers throughout the INL site during an emergency. The WCC also faxes emergency notification forms with protective action instructions to all ECCs at the INL site. The CFA, ATR, and INTEC ECCs can activate sirens at their locations that direct employees to evacuate or shelter. A backup siren system at the CFA, voice paging systems at the ATR Complex and INTEC, and an emergency radio channel and text messaging program at INTEC can also provide instructions to employees in those areas and can be activated (in most cases) from a variety of locations. In the event of an evacuation, the WCC and ECCs can contact the Area Wardens and Area Warden Coordinators via their cellular telephones and radios to relay additional emergency instructions. The FAC and CFA ECC provide emergency instructions to field workers (i.e. workers located in areas outside of established facility complexes) using pagers, cellular telephones, and radios assigned to the field work supervisor for each group of field workers.

The INL site conducts appropriate tests of most notification systems, although BEA does not conduct required tests for contacting field workers. The WCC performs weekly tests of the "IEN/D" radio talkgroup and contacts the ECCs that do not respond to schedule a follow-up test. The INL site tests the sirens and voice paging systems monthly using approved procedures and appropriately documents the test results. In addition, LWP-14101, *Field Work*, requires the CFA ECC to conduct periodic field work communication and response pager tests and provide the results to the field work supervisors and the BEA Emergency Management Department Manager. BEA has not conducted these pager tests for the last several months and has relied on the field work supervisor having an operable cellular telephone or radio. (See Section 4.3.2, **OFI 3-4**.)

Overall, communication systems (i.e., 777 calls, employee notifications, offsite notifications, and ERO communications) are ready to facilitate information flow during severe natural phenomena events. The redundancy in the communication systems for critical emergency response functions increases the likelihood that one or more systems can perform each function in case of any disruptions caused by a severe natural phenomena event. In addition, BEA self-identified issues involving the radio and paging systems and is actively pursuing replacement of both systems. Nonetheless, limitations in the current ERO paging system and documentation of equipment testing somewhat diminish the robustness of the communication systems. More significantly, BEA is not conducting the required periodic field work communication and response tests to ensure that field workers can receive initial notifications of emergencies promptly.

Consequence Assessment Systems

Independent Oversight reviewed the consequence assessment processes and dispersion modeling software programs to determine if the site has established and maintained an adequate consequence assessment system; BEA and CWI have appropriately assigned overall responsibility for initial and ongoing emergency response and provisions for generating timely and useful information for decision-makers for their respective facilities, and ATR and INTEC ECC consequence assessment personnel and EOC assessment specialists understand the consequence assessment processes and dispersion software programs.

The BEA and CWI ECC planning managers and the EOC planning teams perform initial and ongoing consequence assessments for use in validating the adequacy of protective actions. The ECC planning managers conduct initial consequence assessments using information from the facility-specific EALs. The EOC planning team assessment specialists conduct ongoing assessments using source term data from the EHAs and/or actual source term data obtained from the ECC planning manager. BEA and CWI procedures clearly and adequately define the roles and responsibilities for conducting these consequence assessment activities.

EOC assessment specialists conduct plume projection modeling using the Areal Locations of Hazardous Atmospheres (known as ALOHA) or Emergency Prediction Information Code (known as EPICode) dispersion modeling software programs for chemical releases and the Radiological Safety Analysis Computer (RSAC) software program, developed by INL, for radiological releases. The HSS Office of Quality Assurance (HS-33) has not evaluated RSAC for inclusion in the DOE Central Registry software toolbox code; however, the program underwent a rigorous software quality assurance process and meets Nuclear Quality Assurance-1 quality standards. Assessment specialists also conduct ongoing consequence analyses for both chemical and radiological releases using the National Atmospheric Release Advisory Center (NARAC) dispersion modeling software program for all general emergency events. Assessment specialists are currently inputting consequence analysis data for classifiable events identified in the EHAs into NARAC for ease of use and timeliness in obtaining assistance from NARAC during emergency events. Assessment specialists are proficient in the use of the INL Meteorological Visualization and Atmospheric Modeling System (INL-VIZ), a meteorological software program developed by the National Oceanic and Atmospheric Administration (NOAA), to obtain real-time meteorological data during emergency events. Further, NOAA personnel are on the ERO and report to the EOC for emergency events.

EOC assessment specialists can perform consequence assessment activities at the Alternate EOC, if necessary. Assessment specialists also can access the modeling software on their office computers. As an additional backup method, all assessment specialists possess NARAC accounts and can develop projected plume plots by accessing any Internet-enabled computer, if Internet connectivity is available.

Overall, BEA and CWI consequence assessment personnel can provide projections on HAZMAT releases caused by a severe natural phenomena event. The EOC assessment specialists can use various locations (i.e., EOC, Alternate EOC, office computer, and any Internet-enabled computer) to access dispersion modeling software, increasing the probability that consequence assessment activities can continue during severe natural phenomena events.

Habitability Equipment

Independent Oversight reviewed the ECCs at the ATR, CFA, and INTEC areas and the ATR control room to identify any habitability systems and to evaluate system readiness. The EOC and Alternate EOC,

located approximately 50 miles from the INL site in Idaho Falls, do not need a habitability system to protect the EOC cadre from airborne HAZMAT releases originating on the INL site.

The only facility equipped with a habitability system is the ATR ECC. An air filtration system at the ATR ECC extends the time personnel can remain in the ATR ECC in case of an airborne radioactive material release. BEA appropriately certifies the system filters at an approved filter test facility. BEA also performs dioctyl phthalate filter efficiency tests, filter post-installation tests, and system damper alignment functional tests.

Overall, the location of the ECCs reduces the reliance on habitability systems, BEA equips the ATR ECC with the only INL site habitability system to remove airborne radioactive contaminants, and BEA uses appropriate standards to ensure the system's operability.

Personal Protective Equipment

Independent Oversight reviewed the essential PPE used by the INL Fire Department, emergency responders at the ATR Complex, and decontamination personnel, along with the processes for any required maintenance and periodic testing of the equipment.

The INL fire fighters are adequately equipped with PPE that is consistent with the identified hazards at the INL site. Based on the hazards that the fire fighters might encounter, Kappler Level A suits are available for use, along with Mine Safety Appliances (MSA) self-contained breathing apparatus (SCBA) units. Each fire station has a stationary breathing air compressor available to refill the SCBA units; a mobile unit and the special operations truck can perform limited refills at the event scene. The INL Fire Department inventories the Level A suits monthly and visually inspects and pressure tests the suits annually. The Fire Department also conducts periodic inspections of the SCBA units, including daily status checks, monthly equipment inspections, and annual pressure testing. In addition, the Fire Department checks the breathing air compressors monthly and sends breathing air samples to an offsite laboratory for quality checks quarterly. The results of the inventories, inspections, tests, and status checks for the Level A suits, SCBA units, and breathing air compressors are documented as required by procedures HM001, *Kappler Zytron 500 Total Encapsulation Vapor Suit*, and TPR-14604, *Inspecting MSA Firehawk SCBA*, and checklists FDOP51 and *Fire Department Operational Apparatus Check Air Towed Unit – 2010 Mako*.

At the ATR ECC, BEA stores appropriate PPE for emergency response by the reactor operators and radiological control technicians (RCTs) at the ATR Complex. This PPE includes SCBA units, full-face respirators, anti-contamination clothing, and gloves. BEA inventories and inspects the SCBA units at the ATR ECC monthly using approved procedures and documents the results. In addition, an offsite vendor tests the SCBA units annually, and the INL Fire Department refills the SCBA cylinders as needed.

BEA stocks the decontamination area at the Medical Clinic with a sufficient assortment of PPE for responders and personnel undergoing the decontamination process. PPE for the medical staff consists of anti-contamination clothing, gloves, and shoe covers, which are stored in supply areas within the decontamination area. The Medical Clinic also stocks replacement clothing for personnel undergoing decontamination. The medical staff replenishes the PPE and replacement clothing supply in the decontamination area after each use.

Overall, appropriate PPE for response to a severe natural phenomena event is available for the fire fighters, ATR Complex emergency responders, and decontamination personnel.

Radiation Survey Equipment

Independent Oversight reviewed the essential radiation survey equipment used by the facility monitoring teams (FMTs), the SMT, and the INL Fire Department, along with the relevant inventory checklists and processes for any required maintenance and periodic testing of the equipment.

The FMTs and SMT monitor for airborne and surface contamination radiological hazards associated with the most significant scenarios identified in the EHAs (i.e., those that could lead to a site area emergency or general emergency) and appropriately maintain and calibrate the equipment. BEA and CWI task the FMTs with collecting dose readings within the facility boundaries, and BEA tasks the SMT with collecting dose readings outside the facility boundaries, but within the site boundary, during emergency events. The FMT radiation survey equipment resides within the facility-specific ECC buildings, and the SMT equipment resides within the CFA ECC building. This equipment consists of air samplers and both beta-gamma and alpha Geiger counters to detect ionizing radiation. At a minimum, FMTs receive an electronic dosimeter, appropriate PPE, and a deployment bag. The equipment provided to the teams meets the needs identified by the EHAs. BEA and CWI conduct inspections, operational checks, calibration, preventive maintenance, and testing as required by the sitewide *Radiological Control (RADCON) Manual* (LRD-15001), procedures, manufacturer's instructions, and industry standards. Additionally, BEA and CWI emergency management personnel maintain inventory checklists to ensure that emergency equipment and supplies are readily available.

The INL Fire Department equips the HAZMAT response unit and fire engines with an adequate quantity of radiation survey equipment for use during emergency events; however, Independent Oversight identified an issue with the calibration schedule for the radiological survey equipment. The INL Fire Department stores the radiological survey equipment in the fire engines located at each onsite fire station and in the HAZMAT response unit located in the CFA fire station garage. The equipment consists of air samplers and both beta-gamma and alpha Geiger counters to detect ionizing radiation. The INL Fire Department also equips each HAZMAT responder with an electronic dosimeter to monitor possible doses received. Fire Department personnel conduct inspections, operational checks, calibration, preventive maintenance, and testing as required by LRD-15001, procedures, manufacturer's instructions, and industry standards. Fire Department personnel also conduct general calibrations every Monday and conduct daily checks to ensure that the equipment is operable and that calibrations have not expired. However, Fire Department personnel send all of the radiological detection instrumentation for calibration on the same day (it is returned by that evening), leaving the HAZMAT response unit and fire engines with no readily available monitoring equipment. If an emergency occurred on that day, the Fire Department personnel would need to retrieve the equipment from the calibration lab before responding to the emergency. (See Section 4.3.2, **OFI 3-5**.)

Overall, BEA and CWI provide an adequate quantity of operable and calibrated radiation survey equipment to respond to a radiological release caused by a severe natural phenomena event. However, radiological detection instruments stored on the fire engines and the HAZMAT response unit are not readily available on the day they are sent for calibration.

HAZMAT Detection Equipment

Independent Oversight reviewed the HAZMAT detection equipment used by the INL site, along with the processes for calibrating the equipment.

The INL Fire Department appropriately monitors for airborne hazardous chemicals and calibrates the detectors. The Fire Department uses the Industrial Scientific iTX Multi-Gas Monitor to detect carbon monoxide, hydrogen sulfide, combustible gases and vapors, and oxygen-deficient and oxygen-rich

atmospheres and Sensidyne's Deluxe Hazmat III Kit with colorimetric detector tubes to detect the presence of up to 70 organic and inorganic gases. In addition, the Fire Department uses MSA Detector Tubes to check for chemical warfare agents. Each fire engine is equipped with a multi-gas monitor, and the HAZMAT response unit is equipped with a multi-gas monitor, the Sensidyne kit, and the MSA detector tubes. The Fire Department inventories the supply of detector tubes monthly and replaces the expired tubes as needed. A calibration docking station with known calibration gases is used to check the calibration status of the multi-gas monitors daily and to recalibrate the multi-gas monitors monthly.

BEA does not have a documented process for performing field monitoring within the site boundary for the airborne hazardous chemicals associated with the most significant scenarios identified in the EHAs. The Materials and Fuels Complex and INTEC EHAs indicate that these facilities contain the following airborne hazardous chemicals in sufficient quantities to cause a site area emergency: Amercor 1848 (a corrosion inhibitor), nitric acid, mercury vapor, and an amine-based water treatment product. The industrial hygiene staff at these facilities monitor for these chemicals during an emergency, but only within the facility boundary. The INL Emergency Management Department's expectation is that in addition to the INL Fire Department's other emergency response duties, the Fire Department would monitor for these chemicals outside of the facility boundary, but within the site boundary; this expectation is not documented in any plan or procedure. The Fire Department's HAZMAT detection equipment could detect the amine-based water treatment product, but the Fire Department does not stock the supplemental colorimetric detector tubes for the remaining chemicals of concern for use with Sensidyne's Deluxe Hazmat III Kit. Consequently, BEA does not have a plan or the necessary equipment for performing field monitoring for most of the airborne hazardous chemicals of greatest concern and cannot evaluate the occupational or environmental health hazard from a release of these chemicals outside of a facility boundary.

F-1: BEA has not established provisions for assessing the actual onsite consequences of an airborne hazardous chemical release beyond the facility boundary, but within the site boundary, as required by DOE Order 151.1C, *Contractor Requirements Document,* Section 13.

Overall, the INL Fire Department has an adequate quantity of operable and calibrated HAZMAT detection equipment needed to respond to most hazardous chemical releases caused by a severe natural phenomena event. However, BEA has no process for performing field monitoring within the site boundary and cannot verify the impact from a release beyond a facility boundary for most of the airborne hazardous chemicals of greatest concern.

Decontamination Equipment

Independent Oversight reviewed BEA's preparations for a large-scale contamination event, along with the relevant plans, checklists, and equipment.

BEA is adequately equipped to handle multi-person contamination events at the Medical Clinic, which serves as the primary decontamination facility for the site. The clinic is equipped with a decontamination area composed of a separate ambulance bay and facility entry, a shower area, and a treatment room. When activated, medical personnel post the boundary of the decontamination area and permit only authorized staff members to enter the area. The ambulance bay is equipped with garage doors, which are kept closed except during the arrival of contaminated patients. The medical staff triages the contaminated patients in the ambulance bay and removes any remaining contaminated clothing. Seriously injured patients receive immediate medical attention in the treatment room; all other patients proceed to the shower area for further decontamination. The shower area is divided into two sections with two showerheads per section, is screened for privacy, and is large enough to accommodate patients on stretchers and in wheelchairs. An adjacent hallway can be used as an additional staging or treatment area

for less severe injuries. The medical staff inventories the decontamination area equipment monthly and maintains proficiency by participating in at least two drills per year.

The INL Fire Department is appropriately equipped to provide gross decontamination in support of an INL mass-casualty contamination event. The Fire Department can conduct gross decontamination using the nozzles on two fire engines to create an emergency low-pressure deluge, which can remove contamination from clothed workers. The Fire Department estimates that they can decontaminate approximately 25-30 people per hour using this gross decontamination method.

Overall, BEA is ready to respond to a large-scale contamination event that may result from a severe natural phenomena event.

Emergency Operations Center and Warning Communications Center

Independent Oversight reviewed the EOC's documented capability to withstand analyzed severe natural phenomena events and its ability to survive and enable the ERO to remain in a safe environment while performing its emergency response functions. Key systems of interest included normal and backup power supplies.

The IAB, which houses the EOC and the WCC, was adequately constructed using the Uniform Building Code applicable at the time of construction, but would likely not survive a severe natural phenomena event.

Commercial power and backup power systems provide adequate power to the EOC. The backup power system consists of a 125-kW diesel generator, fueled from a 425-gallon tank, and three UPS systems. The generator can carry all emergency loads within the building, which require approximately 50 percent of the generator's output capacity. One UPS system, supporting important equipment in the EOC, and two similar UPS systems, supporting important equipment in the WCC, provide a continuous source of power. BEA sized the UPS systems to sustain their power loads for 85 minutes. The EOC and two WCC UPS systems are currently loaded at approximately 40, 25, and 42 percent of capacity, respectively. Finally, BEA can install a mobile generator, obtained from the INL site or rented locally, using a receptacle at the IAB.

BEA performs adequate testing and maintenance of the IAB diesel generator. The INL Fire Marshal, who is the authority having jurisdiction, established a tentative level 1 designator for the IAB generator due to its emergency lighting load. As a result, BEA performs the following testing and maintenance on the IAB diesel generator:

- BEA uses INL Work Order 168958 01, *Monthly IF-606 IAB Standby Generator Run Test*, to start, load, and run the generator using a test switch, simulating a loss of normal power.
- BEA loads the generator for at least 45 minutes, although the procedure does not specify a minimum test load.
- BEA also exercises the automatic transfer switch during the test start and shutdown of the generator.
- BEA performs quarterly and annual maintenance on the diesel generator and uses a contracted laboratory to analyze the diesel fuel quality annually.

Likewise, BEA performs adequate testing of the UPS systems at the IAB. For example:

- BEA uses Work Order 166249 01, *Monthly IF-606 IAB WCC Backup Power UPS Preventive Maintenance,* and Work Order 160041 01, *Monthly IF-606 IAB EOC Backup Power UPS Preventive Maintenance*, to perform maintenance on the UPS systems.
- BEA's UPS testing process incorporates manufacturer recommendations, inverter voltage checks, battery voltage checks, alarm and inverter log checks, visual equipment inspections, and a review of the environmental conditions at the UPS location.

Overall, BEA equips the IAB with sufficient normal and backup power supplies and adequately tests and maintains backup power supplies for the EOC and WCC. However, the IAB would likely not survive a severe seismic event.

Alternate Emergency Operations Center

Independent Oversight reviewed the Alternate EOC's documented capability to withstand analyzed severe natural phenomena events and its ability to survive and enable the ERO to remain in a safe environment while performing its emergency response functions. Key systems of interest included normal and backup power supplies.

The INL WCB, which houses the Alternate EOC, was adequately constructed using the Uniform Building Code applicable at the time of construction, but would likely not survive a severe natural phenomena event.

Commercial and backup power systems provide adequate power to the Alternate EOC. The backup power system consists of a 60-kW diesel generator, fueled from a 50-gallon day tank and a 250-gallon main fuel tank. The generator provides backup power to the building's emergency egress lighting and exit signs, some security and life safety alarm systems, the freight/passenger elevator, and some workstation receptacles in the Alternate EOC. These loads represent approximately 60 percent of the generator's load capacity. BEA can install a mobile generator using a receptacle at the WCB. The Alternate EOC is not equipped with a UPS system, although UPS units are installed for individual pieces of equipment where the user desires continuous power.

BEA performs adequate testing and maintenance of the WCB diesel generator. The INL Fire Marshal established a tentative level 1 designator for the WCB generator due to its emergency lighting load. As a result, BEA performs the following testing and maintenance on the WCB diesel generator:

- BEA uses INL Work Order 96165 01, *Monthly IF-617 WCB Standby Generator Run Test Preventive Maintenance*, to start, load, and run the generator using a test switch, simulating a loss of normal power.
- BEA loads the generator for at least 45 minutes; although the procedure does not specify a minimum test load, a 30 percent load is typical.
- BEA exercises the automatic transfer switch during the test start and shutdown of the generator.
- BEA performs quarterly and annual maintenance on the diesel generator and uses a contracted laboratory to analyze the diesel fuel quality annually.

Overall, BEA equips the WCB with sufficient normal and backup power supplies and adequately tests and maintains the backup power supply for the Alternate EOC. However, the WCB housing the Alternate EOC would likely not survive a severe seismic event.

CFA Emergency Control Center

Independent Oversight reviewed the CFA ECC's documented capability to withstand analyzed severe natural phenomena events and its ability to survive and enable the ERO to remain in a safe environment while performing its emergency response functions. Key areas of interest included backup power supply systems and capabilities to protect personnel located outside of established facility areas on the INL site.

The CFA-609 building, which houses the CFA ECC, was adequately constructed using the Uniform Building Code applicable at the time of construction, but would likely not survive a severe natural phenomena event. If the CFA ECC is not habitable, the ERO can relocate to a specially equipped bus for use as a mobile ECC, another INL site ECC, or the Alternate EOC in Idaho Falls.

Normal and backup power supplies provide adequate power for the CFA ECC and include:

- A fixed indoor 100-kW, NFPA-110 tentative level 2 generator
- A receptacle for a mobile generator
- A pre-staged mobile generator and installation adapter.

The CFA-609 UPS system does not provide power to the CFA ECC loads, although UPS units are installed for individual pieces of equipment where the user desires continuous power.

BEA performs adequate testing and maintenance of the CFA-609 backup generators, using the following processes:

- Daily shift inspections
- Monthly automatic start tests, 30 minute load tests, and automatic transfer switch tests for the fixed generator using utilities technical procedure LI-273, *CFA-609 Standby Generator GEN-CF609-01*
- Quarterly and annual preventive maintenance on the motor, generator, and starting batteries for the fixed generator using Work Order 32337, *CFA-609 Quarterly Generator Maintenance*, and Work Order 29704, *CFA-609 Annual Generator and ATS Maintenance*
- Monthly start and load tests of the mobile generator during the fixed generator tests.

BEA enables the CFA ECC ERO to perform its emergency response functions of protecting onsite personnel outside of an established facility area and providing logistical support to other facilities through the following mechanisms:

- BEA uses a network of sirens, personnel pagers, radios, and area wardens/area warden coordinators to alert and warn CFA personnel regarding operational emergencies and any required protective actions.
- Area wardens/area warden coordinators perform building sweeps, warn employees, perform and report personnel accountability, and distribute potassium iodide tablets, if needed.
- Area wardens/area warden coordinators carry pagers and/or radios to receive protective action instructions from the CFA EAM.
- BEA uses buildings with appropriately sized rooms to house relocated personnel and serve as shelter during take-cover protective actions.
- BEA maintains two CFA evacuation assembly stations and stages evacuation buses in a CFA parking lot.
- BEA stores fresh potassium iodide tablets in the CFA ECC and on the evacuation buses.
- BEA requires field workers to be reachable by radio or pager in case of an emergency.

- The Bureau of Land Management (BLM), through an agreement with BEA, serves as the responsible party to ensure that special onsite populations, such as ranchers, are reachable in case of an emergency.

BEA evaluated the CFA buildings for their ability to provide shelter during high winds/tornados and airborne releases and to access heating, ventilation, and air conditioning (HVAC) controls for enhancing shelter-in-place protective actions. For safety reasons, an electrician must shut down CFA HVAC systems unless the system is remotely controlled. BEA personnel close doors and windows as part of the shelter-in-place protocols, and BEA plans to limit the time personnel remain in shelters to the minimum needed to perform a safe evacuation.

Overall, BEA sufficiently equips the CFA ECC with normal and backup power supplies and adequately tests and maintains the backup power supplies. Further, BEA maintains the capabilities to protect site workers outside an established facility area and within the CFA area, and the means to provide logistical support to other facilities during operational emergencies. The CFA-609 building would likely not survive a severe event. If the CFA ECC is uninhabitable, BEA can use established alternate facilities to relocate the CFA ECC ERO.

INTEC Fuel Storage Area

Independent Oversight reviewed the FSA's documented capability to withstand analyzed severe natural phenomena events and its ability to receive protective action information, implement planned protective actions, and conduct and report personnel accountability after a facility evacuation. Independent Oversight reviewed design, maintenance, and test documents for key systems; reviewed emergency plans and response procedures; interviewed cognizant personnel; and performed walkdowns of the facility. Key systems of interest included communications, power supplies, and facilities and equipment used to perform protective actions, such as assembly stations, shelters, accountability mechanisms, ventilation system controls, and safe shutdown protocols.

The FSA, operated by CWI, is a hazard category 2 nuclear facility used as interim wet storage for spent reactor fuel, which DOE originally intended to reprocess at INTEC. When DOE decided to end fuel reprocessing in 1992, the mission of the FSA changed to receiving, unloading, loading, and storing spent nuclear fuel. The facility, which began operations in 1984, was built to meet the design codes, standards, regulations, and DOE orders existing at the time the design was initiated. The FSA, designed and constructed with safety significant features to prevent a nuclear criticality, provides adequate shielding to protect personnel from radiation. A seismic evaluation documented in SAR-113 states that the FSA design meets the current design criteria for a performance category 3 facility. The building is constructed to withstand the design basis earthquake and tornado, with reinforced concrete below grade (where the fuel pool area is located) and above grade for radiation shielding. The highest-consequence FSA event is draining of the fuel pool caused by a natural phenomena event. Facility indicators of this event consist of direct observation of the fuel pool level, a radiation area monitor alarm, and continuous air monitor alarms. The primary concerns are direct radiation exposure from the loss of shielding and an inadvertent criticality. The safety analysis does not consider fuel melting without a criticality likely because of the low decay heat rate of the fuel assemblies in the FSA pool. Building egress for life safety is the only required immediate response. Important equipment for this purpose includes emergency lighting, communication systems, radiation and air monitoring/alarm systems, and personnel accountability systems. Event mitigation and recovery actions could require makeup water be added to the fuel pool. Conservative assumptions in the FSA SAR conclude that it would take approximately one day to lower the pool water level to the top of the fuel racks during a worst-case event.

Due to the previously mentioned termination of fuel processing operations, INTEC has a more than adequate backup power capability that can power all INTEC area loads. The INTEC backup power system consists of three 1500-kW diesel generators, tentatively designated as optional standby generators. INTEC does not have master UPS systems, but UPS units for selected equipment provide power continuity to non-essential equipment. More importantly, backup battery power is provided for emergency lighting, the emergency communications system, and the fire alarm panel.

The most significant systems that would not operate during a loss of all AC power are the ventilation systems, radiation area monitors, the continuous air monitors, and the remote control for the fuel pool makeup water system. CWI compensates for these equipment losses by evacuating all personnel from the FSA building upon an extended loss of all AC power and sending appropriately protected radiation control personnel with portable detection equipment into the building to determine radiological conditions and establish appropriate boundaries as described in procedure EAR-130, *Respond to CPP-666 Loss of Electrical Power*. CWI can provide makeup water to the fuel pool through a manual bypass valve or an external source, such as a fire truck, as described in procedure EAR-132, *Respond to Large Basin Water Leak in CPP-666*. CWI also established a load priority list in procedure EDF-5541, *INTEC Standby Power Load Priority List*, to compensate for a partial loss of AC power.

CWI performs adequate testing of the optional standby power system at INTEC, using the following processes:

- Weekly surveillances of the standby generators
- Monthly start tests of the generators using procedure TPR-7233, *Generator Gen-WCS-002, -004, and -006 Operation in Substation 60*
- Annual start tests of the generators, performed by dropping commercial power to INTEC
- Monthly and annual maintenance of the batteries using planned work orders
- Annual inspection and maintenance of the UPS unit by a contracted vendor using ICP standard work order, *Perform Periodic Maintenance on B7-UPS-01*
- Annual tests of the emergency communication system battery and charger, including a 30-minute battery load test, using ICP Work Order 638202, *INTEC Emergency Communication System Annual Preventive Maintenance*.

CWI maintains extensive fresh diesel fuel supplies for the generators, each equipped with a 250-gallon day tank and a 10,000-gallon main fuel tank, as follows:

- CWI refills the main fuel tank when it reaches 7,000 gallons.
- CWI can draw additional diesel fuel from a 300,000-gallon diesel boiler fuel tank, if needed.
- CWI maintains a high turnover rate of less than one year for the diesel fuel, so no fuel testing is necessary.

CWI enables the INTEC ECC ERO to perform its emergency response functions of protecting personnel within the facility boundary through the following mechanisms:

- CWI uses voice announcements over the emergency communications system, personal pagers, radios, and area warden/area warden coordinators to alert and warn INTEC employees of protective actions.
- CWI stages radios in high noise areas.
- Area wardens/area warden coordinators perform building sweeps, direct workers to take protective actions, perform and report personnel accountability, and distribute potassium iodide tablets, if needed.

- Area wardens/area warden coordinators carry pagers and/or radios to receive protective action instructions from the INTEC EAM.
- CWI maintains two evacuation assembly stations – one at each exit from the INTEC area – and parks an evacuation bus at each exit.
- CWI performs positive personnel accountability using badge readers during a full INTEC area evacuation.
- CWI pre-stages fresh potassium iodide tablets in the INTEC ECC and on the evacuation buses.

CWI evaluated the INTEC buildings for their ability to provide shelter during high winds/tornados and airborne releases and to access HVAC controls. For safety reasons, an electrician must shut down the INTEC HVAC systems unless the system is remotely controlled. INTEC personnel close doors and windows as part of the shelter-in-place protocols, and CWI plans to limit the time personnel remain in shelters to the minimum needed to perform a safe evacuation.

The low decay heat rate of fuel assemblies and fail-safe design of equipment enable FSA personnel to evacuate without immediate operator actions to establish a facility safe shutdown. CWI uses adequate response procedures for FSA emergencies, recovery from FSA emergencies, and facility safe shutdown. The procedure set includes:

- *Respond to Fire in CPP-666* (EAR-133)
- *Respond to CPP-666 Loss of Electrical Power* (EAR-130)
- *INTEC Standby Power Load Priority List* (EDF-5541)
- *Respond to Large Basin Water Leak in CPP-666* (EAR-132)
- *Recover from CPP-666 Basin Area Emergencies* (TPR-6953)
- *Startup and Shutdown FAST Utilities* (TPR-6921)
- *Operate FAST HVAC System* (TPR-6979)
- *INTEC Pre-Incident Plan, CPP-666 Fluoroinel Dissolution Process Storage Facility*
- Normal operating procedures to terminate fuel loading, unloading, and transfer activities.

Overall, the FSA is adequately constructed to survive a design basis earthquake and tornado. CWI provides the FSA with a surplus of backup power and a long-term refueling capability. In case of a more severe natural phenomena event, the nature of FSA activities and hazards allows for an immediate facility evacuation and a later safe re-entry to mitigate potential radiation exposure concerns or to provide makeup water to the fuel pool; CWI has adequate procedures to respond to these emergency conditions. CWI also possesses adequate capabilities to alert, warn, and protect employees from hazardous conditions through trained personnel, installed communications equipment, take-cover and evacuation capabilities, and written plans and procedures.

INTEC Emergency Control Center

Independent Oversight reviewed the INTEC ECC's documented capability to withstand analyzed severe natural phenomena events and its ability to survive and enable the ERO to remain in a safe environment while performing its emergency response functions. Key areas of interest included backup power supply systems.

CWI adequately equips the INTEC ECC to allow the ERO to safely perform emergency response functions. The INTEC ECC, located in a dedicated area within the CPP-652 building at INTEC, was adequately built using the Uniform Building Code applicable at the time of construction, but would likely not survive a severe natural phenomena event.

Power for the INTEC ECC comes from the INTEC electrical distribution system previously described. CWI uses one radiation area monitor and one continuous air monitor to detect and alert personnel of airborne radioactive contamination and/or high radiation levels in the INTEC ECC. CWI can use the RWMC ECC as an alternate location if the INTEC ECC becomes uninhabitable. If the INTEC and RWMC ECCs become uninhabitable, CWI can use the Alternate EOC in Idaho Falls through prearrangement with BEA.

Overall, CWI adequately equips the INTEC ECC and monitors for radiation hazards to enable the INTEC ERO to safely perform its emergency response functions, but the ECC would likely not survive a severe event. If the INTEC ECC is uninhabitable, the INTEC ECC ERO will relocate to one of two established alternate facilities.

Advanced Test Reactor

Independent Oversight reviewed the ATR's documented capability to withstand analyzed severe natural phenomena events and its ability to receive protective action information, implement planned protective actions, and conduct and report personnel accountability after a facility evacuation. Independent Oversight reviewed design, maintenance, and test documents for key systems and building emergency plans and response procedures; interviewed cognizant personnel; and performed walkdowns of ATR equipment and areas supporting ATR emergency plans and procedures. Key systems of interest included communications, power supplies, and facilities and equipment used to perform protective actions, such as assembly stations, shelters, accountability mechanisms, ventilation system controls, and safe shutdown protocols.

The ATR, operated by BEA, is a 250-megawatt reactor, hazard category 1 nuclear facility used to perform reactor research. The ATR, built during the 1960s using the Uniform Building Code applicable at the time of construction, has undergone modifications since construction to raise its seismic qualification so the ATR can safely shut down during a calculated 0.24 peak ground acceleration from an earthquake. The principal hazards at ATR consist of the irradiated reactor fuel in the reactor vessel and the spent fuel pool, also known as the fuel canal. A confinement system that contains airborne contaminants from the ATR within the reactor building and the control room area provides an important safety feature. Water in the spent fuel pool supplies an integral part of the containment system boundary.

Backup power supplies provide adequate power for all of the ATR safety systems and include AC generators and battery backed UPS systems. Two collocated generators, 1500 kW and 1200 kW, share a fuel day tank and provide power to a commercial-diesel bus. These generators operate during normal reactor operations and lack a tentative NFPA-110 designator. A third generator, rated at 1500 kW, provides power to an emergency bus, which supplies the AC emergency coolant pump. This generator uses a dedicated fuel day tank and shares the 1500-gallon main fuel tank with the other two ATR generators. BEA designated this generator as an active seismic category 1 safety related component and assigned a tentative NFPA-110 level 2 designator based on dial room communications. Another dedicated generator provides power to a safety related deep well pump. This generator uses a fuel day tank supplied by a 4000-gallon fuel tank. BEA designated this generator as a seismic category 1 safety related component that the ATR TSR requires to be operable whenever irradiated fuel is in the ATR. A test procedure identifies this generator as level 2 generator; a BEA generator classification and maintenance assessment suggests that the generator is an optional standby generator.

Multiple UPS systems provide battery backed power to critical ATR equipment and controls. Appropriately sized UPS systems provide continuous power to critical loads for up to two hours in case the diesel generators fail. Important equipment supported by the UPS systems includes:

- Instrument and control power
- Direct current emergency coolant pump
- Plant protection system
- Reactor vessel vent system
- Fuel canal makeup water control
- Paging system
- Radiation monitors
- Badge readers for personnel accountability.

BEA tests and maintains the ATR backup power systems in accordance with the TSR criteria to demonstrate system operability; however, the ATR TSR often provides criteria that specify less comprehensive and less frequent testing and maintenance than the criteria specified in DOE-STD-3003-2000, which is based on NFPA-110 and NFPA-111 performance criteria. For example, many tests required by the DOE standard on a monthly frequency are required by the ATR TSR on a 100-day frequency. Further, the TSR does not require many of the UPS tests described in the DOE standard. (See Section 4.3.2, **OFI 3-1**.)

BEA enables the ATR ECC ERO to perform its emergency response functions of protecting personnel within the facility boundary through the following mechanisms:

- BEA alerts and warns ATR facility personnel of emergencies and/or protective actions through sirens and alarms, voice paging, radios, and area wardens.
- Area wardens/area warden coordinators perform building sweeps, direct workers to take protective actions, perform and report personnel accountability, and distribute potassium iodide tablets, if needed.
- Area wardens/area warden coordinators carry pagers and/or radios to receive protective action instructions from the ATR EAM.
- BEA maintains two evacuation assembly stations – one at each exit from the ATR area – and parks an evacuation bus near the ATR exits.
- BEA uses staged school buses for evacuating potentially contaminated personnel from ATR or during off normal shift hours when the CFA ECC may not be staffed.
- BEA trains some ATR operators to operate the buses during evacuations.
- BEA performs positive personnel accountability by using badge readers during a full ATR area evacuation.
- BEA pre-stages fresh potassium iodide tablets in the ATR ECC and on the evacuation buses.

BEA evaluated the ATR buildings for their ability to provide shelter during high winds/tornados and airborne releases and to access HVAC controls. For safety reasons, an electrician must shut down the ATR HVAC systems unless the system is remotely controlled. BEA personnel close doors and windows as part of the shelter-in-place protocols, and BEA plans to limit the time personnel remain in shelters to the minimum needed to perform a safe evacuation.

Safe shutdown of the reactor requires inserting safety rods into the reactor core and providing sufficient cooling to remove decay heat from short-lived radioactive fission products. An intact ATR reactor coolant system requires sufficient cooling for at least 30 minutes after a reactor shutdown; sufficient cooling requires one reactor coolant pump for forced flow and an adequate heat sink using appropriately

cooled heat exchangers. Alternative means of establishing flow across the reactor core or providing coolant water to the reactor core are necessary if the reactor coolant system does not remain intact or reactor coolant flow ceases due to the loss of all reactor coolant pumps. For the spent fuel pool, maintaining a proper water level for the fuel pool provides adequate cooling.

BEA's normal, abnormal, and emergency operating procedures have sufficient detail to enable operators to quickly shut down the reactor and provide adequate cooling to irradiated fuel. BEA adequately integrates these procedures with EPIs and provides procedures for a variety of accident scenarios, including loss of coolant flow, loss of coolant, and loss of heat sink scenarios. Cooling water sources include normal de-ionized makeup water, large firewater storage tanks, and the aquifer, using deep well pumps. The procedure set includes:

- AOP-0.1, *Operator Evacuation Procedure*, directs operators to:
  - Evacuate the ATR building and/or control room during a HAZMAT release, flooding, or fire event.
  - Perform safe reactor shutdown.
  - Use expert-based instructions to shut down other systems.
  - Perform area warden duties and direct evacuees to take radios and pertinent logs with them upon evacuation.
  - Sound the emergency evacuation alarm and evacuate personnel to the ATR ECC or other designated place.
- AOP-1.3, *Increased PCS Leakage*, directs operators to perform a reactor scram for an excessive loss of coolant.
- AOP-1.4, *Fission Break*, directs operators to perform a reactor scram and refer to AOP-0.1 for any radiological alarms.
- AOP-2.4, *Primary to Secondary Leak*, directs operators to verify that a reactor scram occurred for a primary to secondary coolant leak.
- AOP-31.2, *Canal Leak*, directs operators to provide automatic or manual makeup water to the canal under various configurations, establish radiological monitoring, initiate an ATR evacuation, and refer to appropriate emergency operating procedures and EPIs.
- Multiple procedures cover the response to a loss of AC power under different conditions – e.g., ECAP-0, *Loss of all Commercial and Diesel Power*, ERP-0.3, *Loss of Commercial Power*, and ERP-0.4, *Loss of Diesel Power*.
- FRP-C.1, *Inadequate Core Cooling*, directs operators to inject coolant via the emergency fire water injection system and vent the reactor vessel to restore core cooling flow.
- FRP-C.2, *Restoration of Primary System Flow*, directs operators to systematically check the support systems for the reactor coolant pump, determine the cause for the loss of flow, and initiate actions to reestablish the flow.
- FRP-C.3, *Degraded Core Cooling*, directs operators to restore the heat sink on the secondary coolant system.
- E-0, *Entry Procedure*, directs operators on steps to take during any reactor scram or during events that occur during an outage.
- E-1, *Loss of Primary Coolant*, directs operators on the response to a large break or loss of coolant accident and includes such actions as using the emergency fire water injection system and deep well pumps and monitoring for habitability concerns in the building.
- E-2, *Loss of Primary Coolant Flow*, directs operators on the response to a complete loss of heat sink that also includes loss of flow and coolant and includes such actions as using available injection water and reactor vessel venting and referring to the EAL if reactor core flow cannot be established within 30 minutes of reactor shutdown.

- The *ATR Pre-Incident Plan, TRA-670 ATR Reactor Building and ATR Complex Facility* provides pertinent information for an effective response by responders external to the facility.

Independent Oversight noted that BEA is pursuing two noteworthy initiatives related to severe events:

- BEA developed a station blackout standard to strengthen the level of preparedness for an extended loss of all AC power at ATR. BEA is currently evaluating mechanisms for implementing the standard.
- BEA is preparing a modification to the spent fuel pool to enable a mobile and external source of water, such as a fire truck, to provide makeup water to the fuel pool. BEA expects to install the modification during the next outage.

Overall, the ATR is adequately constructed to survive all but the most severe events. BEA provides the ATR with adequate backup power and a long-term refueling capability. BEA is pursuing two noteworthy preparations related to severe events: implementation of a new station blackout standard, and a modification to refill the spent fuel pool using a mobile external source. BEA also has adequate capabilities to protect ATR employees during operational emergencies and to safely shut down the reactor. Improvements in the backup power supply inspection, maintenance, and test program could be achieved by applying DOE-STD-3003-2000.

Advanced Test Reactor Emergency Control Center

Independent Oversight reviewed the ATR ECC's documented capability to withstand analyzed severe natural phenomena events and its ability to survive and enable the ERO to remain in a safe environment while performing its emergency response functions. Key areas of interest included normal and backup power supplies.

BEA adequately equips the ATR ECC to allow the ERO to safely perform their emergency response functions. The ATR ECC, located in a dedicated area within building TRA-680 in the ATR Complex, was built using the Uniform Building Code applicable at the time of construction, but would likely not survive a severe natural phenomena event. The ATR ECC can also serve as an alternate location for the ATR reactor control room in case of an evacuation. The ATR ECC enables reactor operators to monitor important reactor core and system conditions, but does not provide any reactor control functions. As previously mentioned, the ATR ECC is equipped with an air filtration habitability system in addition to radiation monitors to detect hazardous radiological conditions. If hazardous conditions exist, personnel can relocate to either the CFA ECC or the Alternate EOC in Idaho Falls.

Normal and backup power sources provide adequate power to the ATR ECC, consisting of a 150-kW fixed generator, tentatively designated as a level 2 generator, and a 12-kW mobile generator. BEA is considering whether to reclassify the fixed generator as an operational standby generator. The fixed generator can power all ATR ECC equipment, and BEA adequately tests the generator quarterly. BEA also performs a start test monthly on the mobile generator. Although TRA-680 does not have a building receptacle for installing the mobile generator, the ATR ECC ERO can use the mobile generator to provide power to selected equipment using extension power cords.

Overall, BEA adequately equips the ATR ECC and enables the ERO to safely perform their emergency response functions and monitor important reactor parameters. A reliable power source provides power to the ATR ECC and BEA performs periodic maintenance and testing. The ATR ECC would likely not survive a severe event. BEA maintains two alternate locations for the ATR ECC in case the ATR ECC becomes uninhabitable.

Emergency Response Organization

Independent Oversight reviewed the ERO capabilities that are essential for response to an emergency caused by a severe natural phenomena event.

The BEA and CWI organizations maintain noteworthy EROs with overall responsibility for initial and ongoing emergency response, consequence analysis, and mitigation for the INL site. BEA and CWI developed EPIs for the ATR, CFA, and INTEC facilities that are consistent with the operational concepts described in their individual emergency plans: *INL Emergency Plan* (PLN-114) and *ICP Emergency Plan* (PLAN-2012). Procedures and checklists provide detailed guidance to personnel at the ECCs (such as emergency coordinators, EAMs, and facility support staff) on formulating protective actions, making required emergency notifications, determining event categorizing and classification, and communicating information. Additionally, procedures clearly define roles and responsibilities, qualification requirements, and response expectations for each of the ERO cadre positions. Detailed, position-specific checklists for the cadre positions provide additional information regarding required actions. BEA also maintains procedures for the activation and operation of the EOC and Joint Information Center.

Overall, EPIs developed by BEA and CWI for their EROs adequately augment their respective emergency plans, provide guidance to ECC personnel, define roles and responsibilities of facility emergency response personnel, and outline processes used to assess event consequences and develop protective actions.

Protective Force

Independent Oversight reviewed the protective force capabilities that are essential for response to an emergency caused by a severe or catastrophic natural phenomena event. Independent Oversight also reviewed the protocols used by offsite law enforcement for INL site events.

Protective force emergency planning adequately addresses nearly all operational emergency events. BEA provides the operational and manpower elements for the protective force in addition to the planning and oversight elements. BEA also organizes the protective force in shifts, with each shift under the supervision of a captain. Each shift contains all of the disciplines necessary for a full security response, including access control personnel and Special Response Team personnel. The protective force works under various agreements with Federal, state, and local law enforcement agencies to ensure effective integration of supplemental personnel, equipment, and capabilities. Currently, BEA relies on established agreements and protocols with the local sheriffs' offices in the five contiguous counties (Bingham, Bonneville, Butte, Clark, and Jefferson) and the City of Idaho Falls Police Department to request and receive law enforcement assistance. Additionally, an MOU between DOE-ID and the State of Idaho Transportation Department provides guidelines for DOE-ID on rerouting or restricting traffic on state highways within the INL site boundaries during an incident that could injure or harm the traveling public. BEA has not established protocols with the Federal Bureau of Investigation (FBI) to define roles, responsibilities, logistical requirements, and procedures for an event at the INL site that requires FBI intervention. The nearest FBI field office is located in Salt Lake City, Utah, approximately 215 miles from Idaho Falls. The *DOE-ID Continuity of Operations Plan* (11.OD.02) establishes some requirements for reconstitution planning after a severe or catastrophic event; nevertheless, BEA has no site/facility-specific catastrophic event response plans or procedures to support security operations after a catastrophic event with severe consequences. (See Section 4.3.2, **OFI 3-6**.)

Overall, the protective force is ready to provide full security services and appropriately integrate county sheriff offices and the City of Idaho Falls Police Department personnel in case of a severe natural

phenomena event or catastrophic event. Nevertheless, BEA does not have site/facility-specific short-term recovery plans and procedures to guide security operations after a severe or catastrophic event.

4.3.2 Opportunities for Improvement

This Independent Oversight review identified the following OFIs. These potential enhancements are not intended to be prescriptive or mandatory. Rather, they are offered to the site to be reviewed and evaluated by the responsible line management organizations and accepted, rejected, or modified as appropriate, in accordance with site-specific program objectives and priorities.

Department of Energy Idaho Operations Office, Battelle Energy Alliance, LLC, and CH2M-WG Idaho, LLC

OFI 3-3: To increase the effectiveness of the pager tests, consider:

- Developing a performance metric that measures ERO availability.
- Establishing a goal for the percentage of the ERO providing affirmative responses during pager tests.
- Periodically briefing senior management on the status of the performance metric.

Battelle Energy Alliance, LLC and CH2M-WG Idaho, LLC

OFI 3-1: To improve the reliability and availability of backup power sources for important equipment, consider:

- Revising LRD-14403 to include backup power sources in the procedure's scope.
- Using the performance criteria contained in the NFPA-110 and NFPA-111 standards as applied to DOE facilities and described in DOE STD-3003-2000.
- Determining the NFPA level classification for backup power systems using an engineering analysis of the loads the systems must carry.
- Evaluating the backup power requirements for the following systems when determining the NFPA level classification:
  - Nuclear safety systems
  - Radiation monitors and alarms
  - Fire protection systems
  - Security systems
  - Data processing equipment
  - Emergency lighting.
- Updating inspection, test, and maintenance program documents to include the NFPA-110 and NFPA -111 performance criteria, as appropriate, for the NFPA level classification established by an engineering analysis.

Battelle Energy Alliance, LLC

OFI 3-2: To strengthen the testing of WebEOC operability, consider specifying the computers that routinely access WebEOC and the steps necessary to confirm operability on the Form 150.25 for the EOC, Alternate EOC, and ATR ECC.

OFI 3-4: To ensure that the CFA ERO can contact field workers during an emergency, consider:

- Specifying the frequency for periodic field work communication and response tests in LWP-14101.
- Expanding the tests to include the field work supervisors' cellular telephones and radios.
- Developing a performance metric that measures the ability to reach all field work supervisors.
- Periodically briefing senior management (DOE-ID and contractors) on the status of the performance metric.

OFI 3-5: To ensure that the INL Fire Department's radiological detection instrumentation is readily available, consider:

- Developing a staggered calibration schedule for the instrumentation stored in the fire engines.
- Procuring duplicate instrumentation for the HAZMAT response unit.

OFI 3-6: To strengthen protective force response and short-term recovery activities for a severe or catastrophic event at the INL site, consider:

- Expanding the definition of a severe event to include catastrophic events caused by natural phenomena, manmade disasters, and terrorism that result in severe consequences.
- Incorporating critical planning objectives for a severe event response to accomplish national response priorities.
- Increasing the depth and scope of severe event planning to provide the operational framework for implementing the security short-term recovery strategies contained within the site emergency plan.
- Including planning provisions to facilitate the integration of state and Federal resources and capabilities in support of a site response to a severe mass casualty/evacuation event.
- Incorporating planning with the FBI to define roles, responsibilities, logistical requirements, and procedures for an event at the INL site that requires FBI intervention.

4.4 Objective 4: Offsite Response Interfaces

The site's planning is adequate for obtaining and integrating offsite response assets for events beyond the site's response capability.

4.4.1 Discussion

Independent Oversight reviewed the site's planning and interactions with offsite response authorities and organizations responsible for protecting the public and augmenting site response resources. This review also looked at the routine dialogue and interfaces with organizations needed to establish and maintain emergency response roles, responsibilities, capabilities, and information needs, consistent with the requirements of the National Incident Management System (NIMS). Independent Oversight also examined written support agreements with offsite response agencies and organizations, evaluated related response plans, and assessed the adequacy of response and short-term recovery procedures after a severe or catastrophic event.

Offsite Interactions

The *INL Emergency Plan/Resource Conservation and Recovery Act Contingency Plan* (PLAN-114) appropriately documents a clear and comprehensive understanding of required offsite relationships and

includes detailed listings of Federal, state, and local response organizations with emergency response or regulatory control responsibilities relevant to the INL site. DOE-ID and BEA hold regular interface meetings with offsite response organizations to exchange information and address any response issues before an emergency occurs. For example:

- DOE-ID and BEA meet regularly with county and regional emergency planning committees to review, analyze, and discuss emergency planning, preparedness, and response issues.
- INL site representatives meet frequently with tribal, state, and local offsite agency and/or jurisdiction representatives to talk about areas of concern and revisions to emergency plans and procedures.
- DOE-ID and BEA meet often with BLM and U.S. Forest Service representatives to review interagency fire response issues and wildland fire preparedness.
- The INL site Emergency Preparedness Coordinating Committee meets bi-weekly to review and discuss emergency management activities between DOE-ID and the INL site contractors, including external interfaces.

Likewise, BEA invites offsite organizations to participate in site-level exercises designed to test offsite interfaces and capabilities and regularly incorporates offsite participation in exercises, such as the following:

- CFA transportation event functional exercise in FY 2009
- Materials Fuel Complex radiological event functional exercise in FY 2010
- ATR Complex reactor loss of cooling accident functional exercise in FY 2011.

Additionally, BEA routinely provides emergency response assistance to the surrounding communities, based on available resources at the time of request. Examples of INL mutual aid support provided during the past two years include:

- 41 EMS responses
- 11 wildland fire responses
- 11 structural or vehicle fire responses
- 3 backup/standby responses.

Offsite authorities are aware that assistance is available from the DOE/National Nuclear Security Administration (NNSA) national assets. The *State of Idaho HAZMAT/Weapons of Mass Destruction Incident Command and Response Support Plan* includes information on the DOE assets available for prompt and effective regional response to radiological incidents. The most visible local asset is the Region 6 Radiological Assistance Program (RAP), which covers five states, including Idaho. Additionally, the *DOE Region 6 RAP Response Plan*, referenced in the *State of Idaho HAZMAT/Weapons of Mass Destruction Incident Command and Response Support Plan Support Plan*, accurately explains:

- Assignment of the primary responsibility for emergency response to an incident involving radioactive material, which usually remains with the party having custody of the material
- Preferred method for requesting DOE RAP's assistance in resolving INL site incidents involving radiological materials
- Radiological monitoring and assessment services available from the Region 6 RAP teams (assembled from 20-24 team members located at the INL site) to the Idaho Department of Environmental Quality.

Region 6 RAP teams have participated in several noteworthy offsite interactions during the last three years, which further familiarized offsite officials with available DOE assistance. These included:

- Radiological response training for Civil Support Teams, who assess suspected weapons of mass destruction attacks
- Participation in DOE exercises involving integration of RAP with state assets
- Radiological and nuclear security support for several significant and high profile events held within Region 6
- Coordination with the State of Idaho on several actual events.

The *Environmental Oversight and Monitoring Agreement (Agreement in Principle (AIP)) between the DOE and the State of Idaho* (DE-EM0000744) and the *MOU by and between DOE-ID and the State of Idaho for Emergency Preparedness* (DE-GM07-06ID11472) and the INL emergency plan discuss the field monitoring resources needed to assist the State of Idaho in identifying the radiological plume, relocation area, and food control boundaries after an INL site radiological emergency. DOE-ID's initial support to the State of Idaho consists of two RCTs and a RADCON supervisor; this team determines whether a detectable release occurred and, if so, verifies the general direction of travel and begins to outline the area of impact. BEA tested this agreement during the 2008 full participation exercise with the State of Idaho and concluded in the after-action report that more INL site RADCON personnel may be required. The State of Idaho supports BEA's conclusion and stated during interviews with Independent Oversight that the state's current offsite monitoring capability is less than what was demonstrated during the 2008 full participation exercise.

Additionally, the *State of Idaho Fixed Nuclear Facility Emergency Plan* provides information on the state's concept of operations for offsite monitoring within the ten-mile plume exposure emergency planning zone (EPZ) and 50-mile ingestion exposure EPZ. The Department of Environmental Quality expects a full Region 6 RAP response to any INL general emergency declaration, in recognition of the limited offsite monitoring capability of the state and the INL site. The plan discusses state field monitoring responsibilities but does not discuss the integration of INL site resources or Region 6 RAP offsite field monitoring resources, which could be deployed elsewhere and unavailable locally. Additionally, this undated plan does not reflect DOE-ID or INL site concurrence on the actions and expectations assigned to DOE.

DOE Order 151.1C states "The contractor at DOE/NNSA Operational Emergency Hazardous Material Program facilities must establish provisions to assess the potential or actual onsite and offsite consequences of an emergency. Consequence assessments must … incorporate monitoring of specific indicators and field measurements; and be coordinated with Federal, State, local, and Tribal organizations." Additionally, DOE-ID has defined in the AIP and MOU with the State of Idaho the requirement for the INL site to provide resources for offsite radiological assessment, monitoring, and decontamination of the general public. Nevertheless, BEA has not changed the INL site's offsite field monitoring resources or fully tested the effectiveness of current capabilities with the State of Idaho; and, offsite monitoring protocols and procedures are not developed. (See Section 4.4.2, **OFI 4-1**.) Further, BEA and CWI do not consider offsite monitoring personnel part of the ERO, do not identify minimum staffing levels and requirements for offsite monitoring, and do not routinely test INL integration with State of Idaho monitoring personnel. (See Section 4.4.2, **OFI 4-2**.)

In response to this issue, the Office of Emergency Management and Policy (NA-41) stated that the interface and responsibilities between the site, RAP, and offsite organizations for offsite monitoring should be clarified in the next revision of DOE Order 151.1C.

Support Agreements

BEA appropriately plans and prepares for the integration of offsite response assets as part of the ERO structure. Numerous existing support agreements identify and integrate offsite resources, in the absence of a statewide intrastate MAA. The INL emergency plan describes and identifies the mechanisms for integrating local agencies and other external organizations into the INL response. These mechanisms include policy letters, agreements, and MOUs between DOE-ID and external agencies. Local agencies entering into agreements with DOE-ID include area hospitals, local fire services, and local law enforcement agencies. An umbrella agreement with the State of Idaho for emergency preparedness includes the following state organizations:

- Idaho Bureau of Homeland Security
- Department of Environmental Quality, INL Oversight Program
- Department of Agriculture
- Idaho State Police
- Department of Health and Welfare, Division of Health
- Idaho Transportation Department.

DOE-ID has also signed agreements with other Federal agencies that are located within or near the INL site EPZ, such as the U.S. Forest Service and BLM.

DOE-ID shares the responsibility with BEA for the initiation, maintenance, renewal, and writing of MOUs, AIPs, and interagency agreements (IAs) directly related to emergency management, emergency response, and law enforcement. The agreements with the State of Idaho include:

- MOU between DOE-ID and the State of Idaho for radiological assistance response for incidents originating outside the INL site or non-DOE incidents in public areas of the INL site
- MOU between DOE-ID and the State of Idaho for emergency preparedness
- AIP between DOE-ID and the State of Idaho for environmental oversight and monitoring
- MOU between DOE-ID and the Idaho Transportation Department that provides for traffic control on public highways within the INL site after an incident that could harm the traveling public.

In addition, DOE-ID signed an AIP with the Shoshone-Bannock Tribes of the Fort Hall Indian Reservation, located in southeastern Idaho, that includes provisions for tribal emergency planning and response with respect to transportation emergencies and funding to train Fort Hall representatives on responding to transportation emergencies.

DOE-ID has also signed suitable MOUs with the three regional hospitals adjacent to the INL site in which the hospitals agree to transport, receive, and medically treat chemically and radiologically contaminated injured INL site personnel. The Eastern Idaho Regional Medical Center (EIRMC), located in Idaho Falls, is the closest major hospital to the INL site and is the primary hospital that would treat injured personnel. The hospital emergency department staff handles arrangements for transferring patients who need treatment beyond what is available locally at this level 2 trauma center. If a mass casualty incident occurs at the INL site, the Idaho State Communications Center (StateComm) coordinates the transfer of patients to area hospitals for subsequent treatment, depending on the type of injury and extent of contamination. The Portneuf Medical Center, located in Pocatello, also agrees to provide mutual assistance and emergency support. Portneuf Medical Center capabilities and protocols are very similar to EIRMC, including a level 2 trauma center designation. Additionally, the Bingham Memorial Hospital, a level 3 trauma center located in Blackfoot, agrees to accept and treat contaminated INL site personnel. DOE-ID does not have an agreement with a level 1 trauma center hospital; the nearest one is the University of

Utah Hospital, located in Salt Lake City, Utah, approximately 215 miles away. All regional hospitals are accessible by ambulance and medical helicopter, although the ground transportation time from the INL site to the closest hospital is approximately 45 minutes. Additionally, several local air ambulance services can provide patient transport, weather permitting.

BEA has performed sufficient planning for a mass casualty incident. The *Emergency Medical Response Plan* (PLN-14503) documents possible transport modes for such an incident. In order of priority, they include:

- Four INL Fire Department ambulances that cover EMS needs within the INL site, plus one additional stand-by ambulance
- Emergency response team vehicles
- Medical vehicle
- Helicopters (Portneuf Life-Flight and EIRMC Air-Idaho)
- Emergency buses.

The Idaho StateComm can provide assistance in deploying additional EMS resources when BEA exhausts its supply of EMS personnel and ambulances. Nonetheless, BEA does not rely on any additional ambulance support within the first hour of a response.

Lastly, numerous support agreements exist with offsite response agencies, but current BEA plans and procedures describe different protocols for requesting offsite assistance for the INL site. (See Section 4.4.2, **OFI 4-3**.) For example:

- The INL emergency plan states that the EOC ED reviews and submits all requests for offsite assistance to the DOE-ID Management Duty Officer for approval.
- The INL emergency plan also permits the EAM to request support from offsite agencies with active MOUs signed by DOE-ID.
- INL Fire Department procedures authorize the Fire Department Battalion Chief to request offsite resources directly from offsite mutual assistance organizations, StateComm, or the Eastern Idaho Interagency Fire Center.
- BEA self-identified that methods used by the protective force and the INL Fire Department to request offsite resources during an exercise varied from the methods practiced on a day-to-day basis.

The INL Fire Department is developing a procedure (SOP 2.4A.4) to define the responsibility and authority for overall Fire Department mutual assistance, but a draft procedure was not yet available for review.

Offsite Response Planning

The INL emergency plan appropriately documents the provisions for interfacing and coordinating with Federal, state, and local agencies responsible for offsite emergency response. Notably:

- An overarching factor in response planning is the location of the INL site, which is in a remote area of the northeastern region of Idaho where the most significant developments are the INL facilities and the associated residential communities and commercial areas.
- Any mutual aid responders from the contiguous counties of Bingham, Bonneville, Butte, Clark, and Jefferson would likely require an hour or more to respond to an onsite event.

- A severe regional event is likely to affect both the site and the surrounding communities, exacerbating the need to use scarce assets in the most prudent manner to accomplish national response priorities.

The State of Idaho Bureau of Homeland Security developed the *Idaho Emergency Operations Plan (IDEOP)*, an all-discipline, all-hazards plan that establishes a single, comprehensive framework for managing domestic incidents and provides the structure and mechanism for coordinating state support to state, local, and tribal incident managers. The IDEOP, aligned with the National Response Framework, provides the following statewide requirements:

- Roles and responsibilities associated with the mitigation, preparedness, response, and recovery efforts for natural disasters, manmade hazards, attacks, and other catastrophic events that affect the State of Idaho
- Methods the state uses to receive and issue notifications, coordinate resources, handle requests for assistance, and provide assistance to political subdivisions
- Incorporation of the NIMS principles.

The *State of Idaho Fixed Nuclear Facility Emergency Plan* includes specific state emergency planning for an INL site event and serves as the primary planning document for offsite response agencies and organizations. This plan describes general concepts that guide the offsite response, such as:

- A radiological material release is the primary concern for offsite emergency planning, so the state uses the worst case radiological release scenarios identified in the INL site hazards assessments to establish the offsite planning basis.
- As an Incident Annex to the IDEOP, the State of Idaho intends to use the *State of Idaho Fixed Nuclear Facility Emergency Plan*, without a state emergency declaration, to support the counties contiguous to the INL site and to coordinate Federal assistance.
- Upon declaration of a disaster emergency by the State of Idaho, the state may implement the Functional Annexes and the Support Annexes of the IDEOP to support the *State of Idaho Fixed Nuclear Facility Emergency Plan*.

Additionally, the *State of Idaho Hazard Mitigation Plan* profiles the three most significant natural hazards (earthquake, wildfire, and flood) that can adversely impact the INL site. The State of Idaho has formed three interagency working groups to coordinate the Federal, state, and local efforts to address these potential hazards:

- The Idaho Seismic Advisory Committee, established in 2007, develops and implements statewide earthquake preparedness and mitigation efforts.
- The Idaho State Fire Plan Working Group, formed in 2002, facilitates implementation of the *Idaho Statewide Implementation Strategy for the National Fire Plan*, which focuses solely on wildland fire hazards.
- The Idaho Silver Jackets Team, formed in 2009, focuses on implementation of the National Flood Risk Management Program and provides expertise to local governments on finding solutions to flood hazards.

Importantly, local emergency operations plans for Bingham, Bonneville, Butte, Clark, and Jefferson counties are consistent in documenting the process for offsite protective action decision-making for an INL site emergency. These local plans establish protocols for all local agencies involved in emergency operations, including:

- Direction and control of local EROs and protective action decision-making before, during, and after an emergency or disaster, which always resides with the elected leadership of the legally recognized jurisdiction impacted by the emergency
- Delineation of the lead agency/IC for a particular emergency and the concept for on-scene incident management
- Details on the interface between the on-scene incident command system, the local EOC, and the State of Idaho EOC.

BEA fittingly plans for wildland fires and has support agreements in place with Federal, state, local, and tribal agencies for wildland fire fighting. BEA expects wildland fires to occur on the INL site and routinely identifies wildland fires in authorization basis documents as an initiating event for a facility fire and/or a potential threat to a facility or its operations. Additionally, wildland fires pose a significant risk at the INL site and all five contiguous counties; therefore, the BLM Interagency Fire Center lightning detection system monitors the entire site and detects the location and number of lightning strikes in real time for wildland fire control. In addition, BEA appropriately plans for wildland fires with Federal, state, and county agencies. For example:

- The *INL Wildland Fire Management Plan* (PLN-14401) provides broad-spectrum guidance for prevention, response, and recovery from wildland fires on the INL site.
- The *INL Wildland Fire Presuppression Plan* (PLN-2114) offers general "size-up" considerations for wildland fires and, importantly, grid-specific suppression plans that include special hazard areas.
- EPI-25, *Response to Wildland Fires*, gives instructions to the ERO when providing support for a wildland fire response on the INL site.
- INL Fire Department procedure SOP-2.5C.8, *BLM Coordination*, provides instructions for the INL Fire Department on requesting assistance from the BLM during a wildland fire.

BEA authorizes the INL Fire Department Battalion Chiefs to request specific offsite resources needed for wildland fire fighting directly from the Eastern Idaho Interagency Fire Center, including strike teams and air attack tankers. Additionally, all requests for wildland fire support identify the specific equipment and personnel needed in accordance with the following agreements:

- *Fire Department Cooperative Fire Protection Agreement between the Department of Agriculture Caribou/Targhee National Forest, Snake River District BLM, and the INL Fire Department*
- *Reciprocal Assistance Agreement between City of Ammon Fire Department, Central Fire District, City of Chubbuck Fire Department, DOE-ID, Rexburg City/Madison County Fire Department, Shelley Fire District, South Custer Rural Fire District, Teton County Fire Protection District* (GM 07-00ID11409 MOD 1)
- *Memorandum of Understanding (MOU) by and between DOE-ID and the City of Idaho Falls Fire Department - Reciprocal Fire Fighting Assistance Agreement* (GM 07-02ID11439 MOD 2).

The Lead Federal Manager (LFM) concept for emergency response, as promulgated in a March 24, 2003, memorandum from the Deputy Secretary of Energy, does not apply, given the current structure of DOE-ID. The LFM memorandum clarified the manager serving as the LFM at each of DOE's multiprogram sites and designated the DOE-ID Manager as the single point of control for an emergency event at or near the Idaho National Engineering and Environmental Laboratory (now called the INL). The designation sought to eliminate any confusion among state and regional officials regarding who represents DOE/NNSA during emergencies. Nevertheless, the LFM designation is no longer necessary based on the current organizational structure of DOE-ID.

Response and Recovery Operations

The INL emergency plan appropriately captures the concept of operations that facility managers/supervisors and other key on-shift personnel immediately transition to an ERO after declaration of an operational emergency. BEA and CWI fittingly use EHSs, EHAs, and other technical basis documents to identify the requisite skills and disciplines needed for mitigation of most emergency events at the INL site. Additionally, full authority and responsibility to implement the emergency plan resides with the facility EAM, operating out of the facility ECC, during the response to an operational emergency. Procedures and checklists require the EAM to either initially perform or to oversee the following minimum functions:

- Detect or assess the emergency event or conditions.
- Initiate response by appropriate emergency resources.
- Implement onsite protective actions.
- Issue offsite protective action recommendations.
- Categorize and classify (as necessary) the emergency event or conditions.
- Perform initial notifications.
- Serve as the emergency coordinator for facilities regulated under the Resource Conservation and Recovery Act.

The senior responding INL Fire Department officer serves as the IC for most events, such as fire, medical response, HAZMAT response, and special rescue operations; the ATR incident response team leader can serve as the IC in some cases. The senior protective force officer serves as the IC during a security event, such as events involving potential weapons fire, security alarm responses, or hostage negotiations. Typically, the senior Fire Department officer and the senior protective force officer form a unified command to manage, control, and coordinate all response activities at the event scene (e.g., fire, rescue, medical, spill containment, and mutual aid) and make on-the-spot decisions.

The division of authority and responsibility varies between the EAM and the EOC ED, based on the magnitude of the event. If conditions force the affected facility ECC ERO to relocate to an alternate ECC, command transfers to the EOC ED during the transition. Once the affected facility ERO reestablishes the ECC, command returns to the EAM. Additionally, some emergencies, such as a catastrophic earthquake, could affect the entire INL site without originating at a specific facility. In such cases, EAMs direct the response within their respective facilities and the EOC ED assumes overall control of response activities. The INL emergency plan authorizes numerous individuals to initiate a request for offsite assistance, including the IC, EAM, or EOC ED.

A baseline needs assessment process, performed in accordance with DOE Order 420.1B, *Facility Safety*, determined the necessary onsite fire and rescue support resources based on the INL EHSs and EHAs. The INL baseline needs assessment concluded that:

- The INL Fire Department can respond to most emergencies at the INL site using only INL assets.
- The minimum INL Fire Department staffing levels provide adequate support for multiple types of events, including a medical response in conjunction with a major event response, as well as contingencies for a second incident response through a callback of Fire Department personnel and reciprocal aid agreements.
- The INL Fire Department requires a minimum staffing level of 23 personnel, which considers incident escalation and an incident injury involving contamination.

- Numerous formal agreements for fire fighting assistance exist with regional fire departments and districts, and other IAs exist with state and Federal entities as identified in the INL emergency plan.

Additionally, BEA appropriately plans for an emergency response at the Research and Education Campus, located in Idaho Falls. Historically, the Idaho Falls Fire Department or Idaho Falls Police Department respond to emergencies at the Research and Education Campus and provide tactical response and mitigation at the incident scene.

The INL Fire Department provides limited technical rescue services involving collapsed structures and maintains a small cache of supplies to support these services. A variety of hazards, including earthquakes, manmade accidents, and terrorist activities, may require an urban search and rescue (USAR) team to locate, extract, and provide initial medical stabilization for victims trapped in confined spaces due to a structural collapse. Important aspects of the INL technical rescue capability include:

- The INL Fire Department requires all members to have technician level qualification for confined space rescue and building collapse.
- A small USAR team (Idaho Task Force 3) in eastern Idaho, composed of members from the Pocatello and Idaho Falls Fire Departments, provides limited capabilities in confined space, trench rescue, and building collapse.
- The closest Federal Emergency Management Agency (FEMA) USAR team (Utah Task Force One) consists of a 70-person team based in Salt Lake City, Utah (215 miles away) and advertises a six-hour dispatch time.
- The Idaho State EOC would coordinate a FEMA USAR request and response to the INL site through FEMA Region 10 (Idaho, Alaska, Washington, and Oregon).
- The INL Fire Department does not maintain a technical rescue capability for trench rescue and relies on INL site personnel to strictly adhere to trenching and excavation protective systems specified by the INL site to prevent trench collapses.
- BEA does not routinely evaluate structural rescue capabilities in site-level drills and exercises.

BEA describes basic emergency event recovery operations in EPI-80, *Recovery*, which includes the recovery plan template used by the recovery organization. Independent Oversight noted some limitations in response and short-term recovery planning for severe and catastrophic events. For example:

- Although the INL site routinely tests recovery planning, most functional exercises only demonstrate fundamental recovery plan preparation.
- The *DOE-ID Continuity of Operations Plan* identifies mission-essential functions, which may be helpful in determining priorities for restoration and mitigation efforts during a severe event scenario; nevertheless, the plan documents only nominal reconstitution planning.
- Potential severe and catastrophic events postulated for the INL site do not have site/facility-specific catastrophic event response plans and procedures that include short-term recovery actions, such as considering infrastructure damage and outages that may impede the normal response of onsite or offsite responders. (See Section 4.4.2, **OFI 4-4**.)
- The INL site conducts some exercises that focus on severe natural phenomena events, but very few exercises postulate severe and catastrophic event consequences that result in significant structural damage or building collapse and generate resource requirements that the INL site cannot meet. (See Section 4.4.2, **OFI 4-5**.)

Overall, the INL site appropriately interacts with offsite response agencies and organizations capable of augmenting site's response resources. DOE-ID and BEA have planned and prepared for the integration of

offsite response assets into the ERO structure, which includes provisions for interfacing and coordinating with Federal, state, and local agencies responsible for offsite emergency response. Importantly, the INL site's remote location means that its emergency response resources constitute the primary response force for any emergency event at the INL site; nearly all offsite mutual aid responders require an hour or more to reach the INL site. BEA uses EHSs, EHAs, and other severe event analyses to establish the offsite response assets that may be needed to respond to severe and catastrophic events and has completed detailed planning for wildland fires with Federal, state, and county agencies. On the other hand, BEA and CWI have performed incomplete planning for response and short-term recovery related to a severe natural phenomena or catastrophic event; do not possess an adequate offsite monitoring capability for radiological releases; and conduct few exercises focused on the response to a catastrophic event affecting multiple HAZMAT operations and support facilities. In addition, BEA has performed minimal planning to address how infrastructure damage and outages might affect the recall of onsite responders and mutual assistance from offsite responders, which may be delayed due to the remote location of the INL site.

4.4.2 Opportunities for Improvement

This Independent Oversight review identified the following OFIs. These potential enhancements are not intended to be prescriptive or mandatory. Rather, they are offered to the site to be reviewed and evaluated by the responsible line management organizations and accepted, rejected, or modified as appropriate, in accordance with site-specific program objectives and priorities.

Department of Energy Idaho Operations Office

OFI 4-1: To improve offsite radiological assessment, monitoring, and decontamination of the general public, in accordance with the State of Idaho AIP and MOU for emergency preparedness, consider:

- Developing protocols for establishing unified command among the organizations capable of providing offsite monitoring (DOE-ID, RAP, Department of Environmental Quality, Idaho National Guard 101st Civil Support Team, and Environmental Protection Agency Region X), depending on each team's capabilities and priorities.
- Coordinating field monitoring methods to ensure data is collected in a uniform manner, consistent with Federal Radiological Monitoring and Assessment Center methods.
- Planning for a significant offsite monitoring effort that includes a phased response by the Federal Radiological Monitoring and Assessment Center that initially provides a Consequence Management Response Team to augment RAP.
- Reconciling the various dispersion models used (NARAC, RSAC, INL-VIZ, and the State of Idaho model) so there is an appropriate transition to the Federal Radiological Monitoring and Assessment Center and the Interagency Modeling and Atmospheric Assessment Center.

Battelle Energy Alliance, LLC

OFI 4-2: To improve the radiological support commitment to the State of Idaho as prescribed in the AIP and the MOU for emergency preparedness, consider:

- Developing a comprehensive understanding of offsite field monitoring that defines an overall monitoring and sampling strategy with the State of Idaho and defines minimum INL site and State of Idaho resources (personnel and equipment), command and control, data acquisition protocols, communications, and safety related guidelines.
- Establishing an INL site offsite field monitoring team as part of the ERO.

- Emphasizing that the prime objective for offsite monitoring is to verify the absence of an airborne plume and identify the boundaries of the area contaminated with a HAZMAT deposition (i.e., bound the plume).
- Ensuring that monitoring capabilities include airborne sampling, direct measurement of the radiation dose rate or contamination levels, and sampling with appropriate radiological analysis of air, water, soil, and vegetation.
- Developing standard operating procedures for offsite monitoring that include staffing and assignment of responsibilities, control of field teams, and specific sampling and monitoring protocols.
- Evaluating field monitoring concepts of operation during INL site exercises with other potential monitoring teams that may include State of Idaho agencies, State of Idaho National Guard 101st Civil Support Team, DOE Region 6 RAP, Environmental Protection Agency Region X, or other Federal agencies.

OFI 4-3: To continue to improve site-specific planning for acquiring offsite assistance for the INL site, consider:

- Developing an EPI for requesting assistance from the numerous offsite organizations with written assistance agreements and from other likely response organizations without written assistance agreements.
- Integrating predetermined authorizations for time-urgent assistance requests (e.g., air and ground fire fighting support, EMS, and local law enforcement access control) into the offsite assistance procedure.
- Defining key protocols in the offsite assistance procedure, such as notifications, minimum information required by the response organizations, communications with the INL site ERO, and safety and security considerations for offsite responders.

OFI 4-4: To continue to improve site-specific planning for severe and catastrophic events at the INL site, consider:

- Developing, as an appendix to the site emergency plan, a catastrophic event plan for natural phenomena, manmade disasters, and terrorism events that result in severe consequences.
- Integrating the site catastrophic event plan with applicable state and Federal catastrophic event plans.
- Referencing other appropriate site-specific emergency planning documents as annexes to the emergency plan (e.g., the heightened security conditions response plan and continuity-of-operations plan).
- Including the planning assumptions that severe and catastrophic events overwhelm site and local response capabilities, adversely impact site safeguards and security measures, cause a long-term outage of critical site infrastructure and systems (e.g., power, water, and communications), and cause secondary events such as fires or landslides.
- Developing facility- or organization-specific emergency response procedures, matrices, or checklists needed to implement the catastrophic event plan. Key site organizations and functions to consider include protective force operations, power and utilities, fire protection, telecommunications, shift operations, and critical facilities/operations.
- Developing an incident action plan template for a multi-agency response at the INL site that includes a statement of objectives, NIMS/Incident Command System organization, tactics and assignments, and supporting materials (e.g., maps, communications plan, medical plan, traffic plan, and special precautions).

- Predetermining the types of additional resources needed by the site, the availability of those resources, and logistical requirements once the resources arrive at the site.
- Triggering self-help response, which includes the identification of roles and responsibilities, life-saving skills among workers, and locations of medical and life-sustaining supplies currently on site.

OFI 4-5: To continue reinforcing the INL ERO and offsite responder skills and capabilities related to severe and catastrophic events, consider:

- Continuing to include catastrophic event scenarios in the INL drill and exercise program.
- Conducting tabletop exercises with appropriate Federal, state, and local response agencies and organizations that would respond to a catastrophic event caused by natural phenomena, manmade disaster, or terrorism.
- Updating response plans and procedures to reflect information extrapolated from catastrophic planning workshops, drills, exercises, and lessons learned from past disasters.

5.0 CONCLUSIONS

This review focused on selected emergency management programmatic elements, with an emphasis on INL's preparedness for severe natural phenomena events. Independent Oversight noted numerous positive program attributes demonstrating that DOE-ID and the INL site continue to improve the emergency management program, enabling site responders to respond to a wide range of potential initiating events. Although the necessary emergency management framework is firmly established, Independent Oversight identified one finding indicating that some specific requirements are not being met, and offered several OFIs suggesting approaches to further strengthen the emergency management program.

In accordance with the review objectives outlined in the *Plan for the Independent Oversight Review of Site Preparedness for Severe Natural Phenomena Events at the INL*, dated April 2012, Independent Oversight determined that:

- The site adequately analyzes plausible scenarios representing severe natural phenomena events to determine the capabilities needed for an effective emergency response.
- The site has a means for determining quickly whether an event results in the loss of a significant quantity of HAZMAT and is beyond the site's capability to respond.
- The site's emergency response capabilities are in a state of readiness to perform its required emergency response functions during plausible natural phenomena events.
- The site's planning is adequate for obtaining and integrating offsite response assets for events beyond the site's response capability.

BEA and CWI developed EHSs, EHAs, and EPIs that are well documented and thorough, and have appropriately analyzed natural phenomena events at the ATR and FSA facilities in their respective EHAs. Employee, ERO, and offsite notification systems are capable of performing as intended during emergencies, and critical response communication systems are sufficiently redundant to minimize disruption during most severe natural phenomena events. The ATR has multiple and diverse means to cool the spent fuel pool and ensure water flow through the ATR under various emergency conditions. BEA and CWI maintain an adequate quantity of operable and calibrated radiation survey equipment to respond to a radiological release caused by a severe natural phenomena event. The INL site has adequate

normal and backup power that includes multiple commercial power supplies, redundant power distribution, fixed and mobile generators, and procedures for obtaining and distributing diesel fuel.

The INL site's remote location necessitates that its emergency response resources constitute the primary response force for an emergency event. DOE-ID and BEA have appropriately planned and prepared for the integration of offsite response assets into the ERO structure, which includes provisions for interfacing and coordinating with Federal, state, and local agencies responsible for offsite emergency response. Also, the Emergency Preparedness Coordinating Committee, composed of key representatives from across the site, plays a key role in the emergency management program and provides a forum for discussing program issues. Several new initiatives are underway based on lessons learned from the Fukushima Daiichi nuclear power plant accident, which include:

- Development of a station blackout standard for ATR
- Planned installation of equipment to allow the external addition of water to the ATR spent fuel canal
- Identification of methods to add external water to the FSA fuel pool at INTEC.

Independent Oversight identified one finding – BEA has no process for performing field monitoring within the site boundary for most identified airborne hazardous chemical releases, and therefore cannot verify the impact from a release beyond a facility boundary. Also, BEA may not be able to promptly and effectively obtain the necessary field measurements to assess offsite consequences as defined in the AIP and MOU with the State of Idaho. These limits on consequence assessment capabilities negatively impact the site's ability to assess the potential or actual onsite and offsite consequences of an emergency in a timely and integrated manner. Also, BEA and CWI have not adopted as a requirement DOE-STD-3003-2000 that establishes both general and detailed requirements for reliable backup and emergency power sources for systems such as nuclear safety systems, radiation monitors and alarms, fire protection systems, security systems, data processing equipment, and emergency lighting. This standard generally requires more robust testing than is currently being performed on some of these systems.

6.0 FINDINGS AND FOLLOW-UP

Findings indicate significant deficiencies or safety issues that warrant a high level of attention on the part of management. If left uncorrected, such findings could adversely affect the DOE mission, the environment, the safety or health of workers, the public, or national security. Findings may identify aspects of a program that do not meet the intent of DOE policy.

F-1: BEA has not established provisions for assessing the actual onsite consequences of an airborne hazardous chemical release beyond the facility boundary, but within the site boundary, as required by DOE Order 151.1C, *Contractor Requirements Document,* Section 13.

DOE Order 227.1, *Independent Oversight Program*, states that timely and appropriate action to address the findings and other deficiencies identified in HSS Independent Oversight appraisal reports must be taken and corrective action plans must be developed and implemented for Independent Oversight appraisal findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 226.1B, *Implementation of DOE Oversight Policy*, to manage and track these corrective action plans to completion.

DOE Order 227.1 further states that the Office of Enforcement and Oversight must establish and implement a tailored approach for following up on findings based on significance and complexity. The

approach must include selected appraisals to review the timeliness and adequacy of corrective actions, verify and validate the effectiveness of the corrective actions, and confirm closure of findings.

Therefore, as part of its oversight activities, Independent Oversight will follow the closure of the finding identified in this section and monitor the disposition of the OFIs, particularly the OFI related to offsite radiological field monitoring. Because this review encompasses only selected emergency management elements identified in DOE Order 151.1C, future assessments should consider focusing, in part, on other elements of the emergency management program, including readiness assurance, exercises, and termination and recovery.

Appendix A
Supplemental Information

Dates of Review

Scoping Visit:	April 17-19, 2012
Onsite Data Collection:	April 30 – May 9, 2012
Validation:	May 10, 2012
Closeout (teleconference):	June 14, 2012

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Randy Griffin – Lead
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Tom Rogers

Appendix B
Documents Reviewed and Interviews

Documents Reviewed

- 08-FI-1104-1564-028, Fire Department Cooperative Fire Protection Agreement between Caribou/Targhee National Forests and Idaho Falls District BLM and INL Fire Department, 5/28/08
- 11.OD.02, DOE-ID Continuity of Operations Plan, Rev. 2, 1/10/11
- AIP between the Shoshone-Bannock Tribes and DOE, 9/22/00
- AOP-0.1, Operator Evacuation Procedure, Rev. 6, 3/23/05
- AOP-1.3, Increased PCS Leakage, Rev. 4, 5/2/06
- AOP-1.4, Fission Break, Rev. 4, 5/2/06
- AOP-2.2, Fire in the ATR Cooling Tower, Rev. 2, 2/9/06
- AOP-2.4, Primary to Secondary Leak, Rev. 5, 9/14/10
- AOP-31.2, Canal Leak, Rev. 8, 2/15/11
- ATR-11, Facility Monitoring Team Coordinator, Rev. 0, 2/23/12
- ATR-16, Area Warden Coordinator, Rev. 0, 1/25/12
- ATR-17, Area Warden, Rev. 0, 1/25/12
- ATR Pre-Incident Plan, TRA-670 ATR Reactor Building and ATR Complex Facility, 9/18/11
- BEA Emergency Management Organization Chart, undated
- Bingham County Emergency Operations Plan, 6/11
- Bonneville County Emergency Operations Plan, Rev. 2, 8/23/10
- Butte County Emergency Operations Plan, Rev. 2, 9/11
- CFA-15, Area Warden, Rev. 0, 4/03/09
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Interviews

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- BEA ATR Area Warden Coordinator
- BEA ATR ECC Emergency Planner
- BEA ATR ECC Facility Manager
- BEA ATR ECC Habitability System and Electrical Distribution System Engineer
- BEA ATR Electrical Distribution Engineer
- BEA CFA Area Warden Coordinator
- BEA CFA ECC Emergency Planner
- BEA CFA Lead Electrical/Maintenance Planner

- BEA Chemical Services Supervisor
- BEA Classified Cybersecurity Manager
- BEA Continuity of Operations Coordination and Implementation
- BEA Cybersecurity Alternate Communications Security
- BEA Deputy Fire Chief
- BEA Emergency Management Manager
- BEA Emergency Management Public Liaison
- BEA EOC Planner
- BEA EOC Technical Specialist
- BEA EOC/WCC Engineer
- BEA EOC/WCC System Administrator
- BEA Fire Chief
- BEA Fire Department Special Operations Officer
- BEA Fire Marshal
- BEA Hazard Assessor
- BEA Hazard Assessor Technical Lead
- BEA Information System Security Officer
- BEA Information Systems Security Site Manager
- BEA Infrastructure Manager
- BEA Lead Electrical Maintenance Planner
- BEA Nursing Services Manager
- BEA RADCON Supervisor
- BEA Safeguards and Security Director
- BEA Service Fleet Supervisor
- BEA Spectrum Management
- BEA Technical Lead for Drills, Exercises, and Training
- BEA WCC Manager
- BEA WCB Complex Engineer
- BEA WCB Facility Specialist
- BEA Wireless Technical Lead
- CWI EAM
- CWI Emergency Management Department Manager
- CWI Emergency Management Drill and Exercise Coordinator/Planning Manager
- CWI FMT Coordinator
- CWI INTEC Area Warden Coordinator
- CWI INTEC Chief Engineer
- CWI INTEC Distributed Control System Engineer
- CWI INTEC Electrical Engineer
- CWI INTEC Life Safety Engineer
- CWI INTEC Power Distribution Department Manager
- CWI INTEC Power System Engineer
- CWI INTEC Technical Support Director
- CWI Life Safety Systems Manager
- CWI Program Specialist
- CWI RADCON Team Supervisor
- CWI Technical Support Director
- DOE-ID Alternate Communications Security
- DOE-ID Emergency Management Offsite Coordinator

- DOE-ID Emergency Management Program Manager
- DOE-ID Infrastructure Planning and Security Manager
- DOE-ID Local Law Enforcement Agency Liaison
- DOE-ID Protective Force Program Manager
- NA-42 Region 6 RAP Regional Response Coordinator
- State of Idaho Bureau of Homeland Security Northeast Area Field Officer
- State of Idaho INL Oversight Program Regional Manager
- State of Idaho INL Oversight Program Senior Health Physicist.