

Site: Sandia National
Laboratories/New
Mexico**Subject:** Office of Enforcement and Oversight's Office of Safety and Emergency
Management Evaluations Activity Report for the Sandia National
Laboratories Emergency Action Levels and Associated Consequence
Analyses**Dates of Activity** 08/22/2011 - 08/25/2011**Report Preparer** Deborah Johnson**Activity Description/Purpose:**

Personnel from the U.S. Department of Energy (DOE) Office of Health, Safety and Security (HSS), Office of Safety and Emergency Management Evaluations, met with Sandia Site Office and Sandia National Laboratories/New Mexico (SNL/NM) emergency management personnel to review the actions taken to resolve 2009 Independent Oversight findings pertaining to the emergency action levels (EALs) and the associated emergency planning hazards assessment (EPHA) consequence analyses. This review was to validate that SNL has made appropriate revisions to their EALs and that the incident commanders (ICs) can categorize and classify an emergency event in a timely manner using the EALs.

Result:

SNL has put forth considerable effort to develop effective EALs that the ICs can use to categorize and classify emergency events in a timely manner. Technical planning basis personnel and the ICs worked together to develop new, user friendly EALs. The improvements and changes identified and incorporated in the EALs are as follows:

- The source term column has been eliminated because this information is not needed by the ICs.
- The order of certain columns was changed to present the information in order of importance.
- Inclusion of EALs for typical meteorological (Stability Class D at 10 miles-per-hour) conditions.
- Elimination of General EALs. The General EALs were confusing to the ICs because they listed a series of thresholds that had to be interpreted, for example:
 - How much material-at-risk (MAR) is required to exceed the protective action criterion (PAC) at 330 feet; 980 feet; 2,950 feet; and 6,560 feet (the Protective Action Plan binning distances)?
 - How much MAR is required to reach an Alert (exceed the PAC at 100 feet), Site Area Emergency (exceed the PAC at 330 feet), and General Emergency (exceed the PAC at the nearest site boundary)?
- Inclusion of external explosion scenarios.

In addition, SNL revised emergency plan implementing procedure (EPIP)-300, *Declaration of Operational Emergencies and Protective Actions*, to include criteria for the ICs to make initial immediate protective actions (PAs) to ensure the health and safety of site personnel and the public. EPIP-300 directs the IC to:

- Determine if initial immediate PAs or protective action recommendations (PARs) should be issued based on the initial information received about the incident.
- Initiate the immediate onsite PAs and, if necessary, offsite PARs by utilizing the current Emergency Response Guide (ERG).
- Confirm that the initial incident information was correct when they arrive at the incident scene.
- Determine if revisions of onsite PAs and offsite PARs are needed utilizing the current ERG for non-EPHA facilities and EALs for EPHA facilities if initial incident information is correct.

Drills and exercises conducted after the EALs and EPIP-300 were revised and identified that the ICs have achieved a 100-percent performance rating in accurately categorizing and classifying events in a timely manner. Further, Sandia Site Office personnel have maintained oversight of the ICs competency to ensure the implemented changes have been effective.

In addition to the above-mentioned revisions, SNL implemented corrective actions for the majority of the opportunities for improvements (OFIs) identified in the 2009 Independent Oversight inspection report pertaining to the EPHA consequence analyses associated with the EALs. For the OFIs of concern that SNL did not implement corrective actions, adequate justification for not implementing corrective actions was given to the HSS reviewer during the visit. The OFIs and corrective actions or justifications are discussed below.

OFI: To enhance the quality and completeness of EPHAs by adding additional details and ensuring that accurate and conservative mechanisms are used during the EPHA development process. Specific actions to consider include:

- Incorporate facility operations in the development and selection of the range of accident scenarios, and establish appropriate source terms utilizing release fractions (i.e., damage ratios, airborne release fractions, respirable fractions, and leak path factors) that take into account facility barriers and instrumentation to attain realistic consequence analyses.

SNL's EPHA methodology uses a standard spectrum of scenarios that establish a consistent framework for the analyses in the EPHAs, and facility operations are incorporated into this framework. Each EPHA lists the scenarios that are analyzed and provides the basis for excluding scenarios. Source terms are established per the EPHA methodology, which utilizes the release fractions obtained from the DOE Source Term Handbook (DOE-HDBK-3010-94). The damage ratio is always set to one. Leak path factors are facility and location specific and are dependent on the scenario (i.e., barriers are assumed to remain intact for some scenarios [such as a simple chemical spill] but not for others [such as an explosion]).

HSS concurs with SNL's justification.

- Incorporate accident analyses conducted in documented safety analysis (DSA) and facility safety analysis (FSA) documents into the consequence assessments to ensure consistency between the emergency technical planning basis and the facility authorization basis, including use of terminology in place at the facilities.

SNL has developed a DSA to EPHA scenario mapping table using the terminology from the DSAs/FSAs (where applicable) to the corresponding EAL(s). The mapping table is included with the EALs for the relevant facilities. In this way, should an incident be described using terminology from the DSA/FSA, responders can identify the EAL to be used.

HSS concurs with SNL's actions.

- Establish worst-case container quantities with radiological material facility managers and perform consequence assessment analyses for these quantities rather than the upper limit of DOE-STD-1027-92 Hazard Category 3 quantities.

Consequence analyses of the worst-case container have been incorporated into the affected EPHAs (i.e., Manzano Nuclear Facilities and Transportation of Hazard Category 3 Radioactive Material). However, SNL will also continue to perform consequence assessment analyses based on percentages of DOE-STD-1027-92 Hazard Category 3 quantities because the facilities track their radioactive material inventories using those limits. Additionally, ICs are given the radiological inventories for each Manzano bunker and the Auxiliary Hot Cell in percentages, and EALs have been developed for 1, 10, 25, 50, 75, and 100-percent of the Category 3 upper limits. This system provides a rapid means of adjusting protective actions in the early stages of an incident.

HSS concurs with SNL's actions.

OFI: To improve the timeliness and accuracy of event categorization and classification and formulation of corrective actions, consider revising the EAL set to make them more user friendly. Specific actions to consider include:

- Expand the spectrum of initiating events included in the EPHAs to address specific facility operations and system and equipment configurations.

The technical planning basis personnel and ICs met to address this OFI. The ICs were asked if providing more detailed descriptions of incident initiators (for example, all the initiators that could lead to a release, all the initiators that could lead to a small fire) was needed. The ICs saw no benefit in providing more details in the EALs. HSS concurs with this decision. The ICs have proven that they can make timely and accurate categorization and classification with the revised EALs, and the EPHAs and EALs contain a standard spectrum of scenarios. Therefore, no further actions are needed.

HSS concurs with SNL's actions.

- Include critical receptors of interest that correlate with the protective-action zone and isolation zone distances obtained from the EPHA consequence analyses.

Critical receptors were not discussed in the Independent Oversight inspection report other than in this OFI. The critical receptors of interest that correlate with the protective-action zone and isolation zone distances are considered in the PA Plans created as part of the EPHAs. HSS reviewed the Independent Oversight inspection report and determined that this OFI was inadvertently included in the report. Therefore, no further action is needed.

HSS concurs with SNL's actions.

- Include accident event terminology consistent with that used by the facilities (e.g., fuel cladding failure, loss of coolant accident, dropped/ruptured cylinder).

As discussed previously, a detailed mapping table was developed for the scenarios in the DSAs to the EALs in the EPHAs. This mapping table is included with the EALs for the relevant facilities. Additionally, the mapping table development process is included in the EPHA methodology procedure (NM-CAT-SOP-1601).

HSS concurs with SNL's actions.

- Provide facility-specific emergency recognition indicators for EALs, including facility monitoring instruments and alarms that would be utilized in the detection and recognition of a hazardous material release.

Although some SNL facilities have monitoring instruments and alarm systems, these systems have not been tied into the Phoenix system (site overall alarm system). For example, a high-level toxic gas alarm from the 858 facilities comes in as a fire alarm to the Phoenix system. There are currently no facility instruments or alarms that could be used to provide facility-specific emergency recognition indicators for the EALs.

HSS concurs with SNL's actions.

OFI: To improve event classification and protective action decision making, consider the following:

- Provide EALs for EPHA facility explosions that occur outside the facility.

The SNL EPHAs and EALs included a small explosion where the explosive device is placed adjacent to the hazardous material. However, in response to the 2009 Independent Oversight inspection report, SNL developed a large explosion scenario where the explosive device is placed adjacent to an exterior wall of the building. The EPHAs contain the consequence analysis, and the corresponding EAL has been developed for the large explosion scenario.

HSS concurs with SNL's actions.

- For malevolent acts involving potential vehicle bombs or explosive devices that do not involve the potential for a hazardous material release, use the evacuation distances developed by the Department of the Treasury and the Bureau of Alcohol, Tobacco, and Firearms (ATF).

SNL developed a workaid from the Department of Homeland Security (DHS) data (the DHS data replaced the ATF data) for use by the emergency responders. The work aid allows the ICs to input an estimated or actual quantity of TNT to obtain a more accurate protective action distance, rather than using the range of distances provided on the DHS card. The DHS card did not include safe distances for liquefied propane gas (LPG), so SNL kept the ATF safe distances for LPG, but also developed a workaid that allows the ICs to input an estimated or actual quantity of LPG to obtain more accurate safe distances.

HSS concurs with SNL's actions.

HSS Participants	References
1. Deborah Johnson	1. EPHA for the Manzano Nuclear Facilities, Volume 3: EALs, Rev. 5, March 2011.
2.	2. EPHA for Building 858 EF: MicroFab Facility, Volume 3: EALs, Rev. 3, July 2010.
3.	3. EPHA for Building 958/959: HWMF, Volume 3: EALs, Rev. 14, February 2011.
4.	4. EPHA for Building 6588: Annular Core Research Reactor Facility, Volume 3: EALs, Rev. 9, April 2011
5.	5. NM/TTR-EM-EPIP-300, <i>Declaration of Operational Emergencies and Protective Actions</i> , Rev. 7, 3/1/2011.
6.	6. NM-CAT-SOP-1601, <i>Methodology for Preparing Emergency Planning Hazards Assessments (EPHAs)</i> , Rev. 2, 7/28/2011.

Were there any items for HSS follow up? ☐Yes ☒No

HSS Follow Up Items

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