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WP 12-11

Revision 4

Development and Maintenance of an Emergency Planning Hazards Survey

Cognizant Department: Emergency Management

Approved by: Robert Paslay

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CHANGE HISTORY SUMMARY

Revision Number	Issue Date	Description of Changes
4	1/14/11	Editorial revision to update organizational information.

1.0 INTRODUCTION

This document establishes site requirements and standard methods for developing and maintaining an Emergency Planning (EP) Hazards Survey. Results of EP Hazards Surveys determine the need for a quantitative Emergency Planning Hazards Assessment (EPHA).

Provisions of this procedure apply to Washington TRU Solutions LLC (WTS) as the management and operations contractor at the Waste Isolation Pilot Plant (WIPP) and to subcontractors performing work for WTS when required by subcontract or applicable law.

According to DOE G 151.1-2, *Technical Planning Basis Emergency Management Guide*, the EP Hazards Survey is required to combine as many facilities as possible that are subject to the same hazard, to the extent that a single EP Hazards Survey for a site would meet the requirement. With this guidance in mind, the scope of an EP Hazards Survey should, at a minimum, combine all facilities in a given site area. All site facilities should be included in an EP Hazards Survey (regardless of the need for an EPHA).

If it is determined that the WIPP facilities contain hazardous materials in quantities that exceed thresholds specified in this procedure (and the applicable EP Hazards Survey) then an EPHA must be prepared in accordance with WP 12-12, Development and Maintenance of an Emergency Management Hazards Assessment.

The EP Hazards Survey generated as a result of implementing this procedure is to be maintained and processed as a quality record in accordance with the Emergency Management Records and Inventory Disposition Schedule.

2.0 RESPONSIBILITIES

2.1 Emergency Management Manager

- Ensure consistency in EP Hazards Survey development and implementation.
- Approve deviations from this procedure and ensure deviations are documented within the applicable EP Hazards Survey.
- Ensure that EP Hazards Survey is updated prior to significant changes to a facility or its hazardous material inventories (but no less frequently than every three years) as required by DOE Order 151.1C, *Comprehensive Emergency Management System*.
- Provide signature approval of the EP Hazards Survey.

2.2 Operations Manager

- Provide resources (e.g., funding, Subject Matter Experts [SMEs]) to support EP Hazards Survey development.

- Notify the Emergency Management Manager prior to significant changes to a facility or its hazardous material inventory.
- During the review cycle, distribute to applicable facility SMEs for review.
- Provide signature approval of the EP Hazards Survey.

2.3 Subject Matter Experts

SMEs are considered "experts" in a specific area based on their knowledge (e.g., Hazardous Materials Area Representative, System Engineers). The EP Hazards Survey Coordinator uses SMEs to gather requisite information, including from the hazards database and facility walk-downs, needed for development of the EP Hazards Survey.

2.4 EP Hazards Survey Coordinator

- Develop EP Hazards Surveys.
- Resolve review comments generated by facility personnel, Emergency Management, and the DOE.

3.0 PROCESS

3.1 EP Hazards Survey

The EP Hazards Survey identifies materials hazardous enough and in sufficient quantity to warrant consideration in the site's operational emergency management program. The process results in the identification of hazardous materials that require quantitative assessment in an EPHA.

3.1.1 Area Definition

A. The area to be included in the EP Hazards Survey is the WIPP Site Protected Area. A principal consideration is structural and geographical boundaries used in the site chemical inventory database. An area includes all structures associated with the area. Examine these boundaries with objectives of the EP Hazards Survey in mind – identification of hazardous material from the hazards database and walkdowns for inclusion in an EPHA. Though WIPP activities are conducted in other areas, such as the Skeen-Whitlock Building, characterization activities at some generator sites, and the laboratory work at the Carlsbad Environmental Monitoring & Research Center, those areas will not be included in the WIPP EP Hazards Survey.

B. Identify buildings within the defined area. Building and hazard details developed to support the WIPP Documented Safety Analyses should be used. Provide sufficient detail to support identification of hazardous material. Areas to be addressed include:

- General characterization of facility and operation (e.g., office building, laboratory, warehouse)
- Estimate of normal occupancy, including the number of people on aboveground floors
- Whether classified material is normally stored in the facility
- Special designations (e.g., nuclear facility, radiological facility)
- Whether hazardous materials (other than standard office products) are stored in the facility

C. Identify independent segments [optional]. Segments are independent if failures in one do not affect another. Segmentation may be used during hazards identification to compare to screening thresholds (e.g., to determine whether a chemical in a given location exceeds laboratory-scale quantity). For purposes of the EP Hazards Survey, chemicals stored in different rooms would typically be considered in independent segments. Chemicals stored in a common room should be segmented only if it could be shown that a common mode failure (other than catastrophic failure such as fire or earthquake) is not postulated.

3.1.2 Identification and Screening of Hazards

The following list contains the key documents that process changes in operations, processes, or accident analysis that involve hazardous materials.

- Waste Isolation Pilot Plant Documented Safety Analysis
- Fire Hazards Analysis
- Chemical/Radiological Inventory List
- WP 12-IH.02-4, Hazard Communication Program

A. Chemicals (material for which chemical toxicity, rather than radiotoxicity is the primary hazard)

The first step in the chemical screening process is identification of chemicals present at a facility. This is done by a review of site chemical and waste inventory databases and existing industrial and nuclear safety documentation, and includes a facility walkdown verifying database

accuracy. The WIPP Documented Safety Analyses identify hazards in accordance with DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis*. Other databases to be considered include pollution prevention and pollution prevention web sites for surplus chemical storage; the latest inspections for Hazardous Waste Storage Areas, Satellite Accumulation Areas per WP 02-RC3109, Satellite Accumulation Area, Hazardous Waste Storage Area, and Universal Waste Storage Area Inspections; and the chemical inventory data maintained in the IH database per WP 12-IH.02-4, Hazard Communication Program, as well as the basic transuranic waste information from the waste acceptance criteria and inventory per the WIPP Waste Information System database. If there is a concern regarding the current status or accuracy a qualitative assessment may be performed to determine the hazardous chemical inventory of concern. Identify maximum inventories of chemicals (i.e., nonradioactive hazardous materials and mixed waste). Expected or historical quantities may be used if physical or administrative limits do not exist. Hazardous Materials Area Representatives and Industrial Hygiene may be consulted for questions regarding chemical inventory.

Retain for analysis in the EPHA, chemicals that exist in substantial quantity and meet specific hazard criteria. Chemicals must be quantitatively analyzed in the EPHA unless they may be excluded by any of four criteria:

- Common Public Use Exclusion
- Laboratory-Scale Exclusion
- Low Dispersibility Exclusion
- Low Toxicity Exclusion

(1) Common Public Use Exclusion

Eliminate from further consideration materials commonly available to the public (i.e., if the formulation and concentration is the same as products that are distributed without significant restrictions to the public). Examples of products that may be excluded are: cleaning products, bleach, motor oil, gasoline, paint, and pesticides not designated *restricted use* by the U.S. Environmental Protection Agency (EPA).

(2) Laboratory-Scale Exclusion

Eliminate from further consideration materials that are handled, stored, and used in amounts that do not exceed

laboratory-scale quantities. *Laboratory-scale* is defined in Title 29 *Code of Federal Regulations* (CFR) §1910.1450 as that for which *containers used for reactions, transfer, and other handling of substances are designed to be easily and safely manipulated by one person*. For EP Hazards Survey screening purposes, quantities may be considered *laboratory-scale* if they do not exceed:

- Forty pounds (18 kilograms [kg]) for solids,
- Five gallons (19 L) for liquids, or
- Ten pounds (4.5 kg) for bottled gases (i.e., compressed gases, cylinders with a full gross weight of 40 pounds [18 kg] will typically contain 10 pounds [4.5 kg] or less of most common toxic gases).

A one-pound (0.45 kg) threshold value applies for substances that, because of high acute toxicity and dispersibility, may represent an *extraordinary toxic hazard* beyond the local event scene. Those substances should include, but may not be limited to chemical warfare nerve agents; any substance of similar toxicity (e.g., Acute Exposure Guideline Level [AEGL]-3, Emergency Response Planning Guideline [ERPG]-3, or Temporary Emergency Exposure Limit [TEEL]-3 values less than 3 ppm) that has been *weaponized* or designed for efficient dispersal as a gas, vapor, or aerosol; and, compressed gases with acute toxicity in the same range.

Chemicals in laboratory-scale containers are not aggregated for screening purposes. From DOE Guide 151.1-2: Quantitative analyses of concurrent releases of small quantities (all below the *laboratory-scale* threshold) are typically not warranted because the cost and effort involved in accurately modeling accident phenomenology on a small scale and the limited geographic area that could be affected do not add value to the planning and response process.

(3) Low Dispersibility Exclusion

Eliminate from further consideration chemicals that do not present an airborne exposure hazard due to their physical form or other factors. Gases may not be excluded. Materials may be excluded if they meet one of the following tests:

- The substance is solid at ambient temperatures and does not include a significant fraction of respirable particles.
- The substance is a liquid that exhibits a vapor pressure (or partial pressure when in solution) of less than 1 mm Hg at 20ºC. Note that in aqueous solutions, the hazardous material of concern may have a negligible partial pressure and the reported vapor pressure is really only the partial pressure of the water (e.g., sodium hydroxide solution).

Specific dispersibility criteria are therefore:

- Gases – All are considered readily dispersible.
- Liquids – Only those with a vapor pressure > 1 mm Hg are considered readily dispersible.
- Solids – Only fine powders (diameter $\leq$ 10 microns) are considered readily dispersible. (See Attachment 4 for a discussion of particles sizes.)

(4) Low Toxicity Exclusion

Eliminate from further consideration chemicals with an National Fire Protection Association (NFPA) 704 Health Hazard rating (or equivalent WIPP Health Hazard rating) of 2 or lower. Such materials do not need to be considered in an EPHA. Chapter 5 (*Health Hazards*) of NFPA 704 is included in Appendix A. In addition, if a chemical has a Health Hazard rating of 3 or 4 *solely* due to cryogenic properties (i.e., is a frostbite hazard), it also may be excluded.

B. Radionuclides

Identify maximum inventories of radioactive materials. Consider physical limits and administrative limits (e.g., WIPP Waste Acceptance Criteria

limits). Expected or historical quantities may be used where physical limits are unknown or administrative limits do not exist.

Radioactive materials that require further analysis in an EPHA include materials listed in DOE-STD-1027-92 in quantities greater than Category 3 values given in Attachment 1, Table A.1.

Radioactive materials that may be excluded from the inventory include:

- Sealed radioactive sources engineered to pass special form testing specified by the U.S. Department of Transportation (DOT) in 49 CFR §173.469 or testing specified by the American National Standards Institute (ANSI) standard, ANSI N43.6, *Sealed Radioactive Sources – Classification*.

- Materials in solid form for which there is no plausible dispersal mechanism.

- Materials stored in DOT Type B shipping containers (with overpack) if the Certificates of Compliance are current and the materials stored are authorized by the certificate.

- Materials used in exempt, commercially available products as described in 10 CFR §§30.11-30.19 (e.g., timepieces, illumination devices, thermostats, etc.).

C. Hazardous biological agents and toxins identified in DOE O 151.1C require an EPHA and Hazardous Material Program. Specific hazardous biological agents and toxins must include Federally regulated agents and toxins identified in lists published in Department of Health and Human Services regulations (42 CFR Part 73) and Department of Agriculture regulations (7 CFR Part 331 and 9 CFR Part 121), and require an EPHA and a hazardous material program. Toxins listed in 42 CFR Part 73 and 9 CFR Part 121 must exceed the minimum quantities specified to be federally regulated. Though there are not currently any biological agents or toxins at WIPP, due to the scientific experimental area of the underground and the variety of experiments that may exist at any one time, a specific review of the experiments should be conducted with the hazards survey.

D. The number of materials requiring hazards assessment may be reduced by inventory segmentation (i.e., portions of the inventory may separated by distance or physical barriers). For radiological materials, segmentation should normally be to the building level. For chemicals, segmentation may be to room level. Increased segmentation of chemical inventories is primarily due to them being excluded from fire scenarios and other catastrophic events (e.g., earthquake).

E. Upon completion of the screening, some facilities may have no identified hazardous materials requiring further analysis. In this case, document

the results of the EP Hazards Survey and the conclusion that no further analysis is needed. Route the EP Hazards Survey for approval.

3.1.3 Identify Generic Emergency Conditions

Identify and document emergency conditions that may occur at each facility for which some level of planning and preparedness may be required. Hazardous materials below screening thresholds, or not specifically addressed as part of the EPHA are considered when identifying generic emergency conditions. At a minimum, the following generic emergency conditions are considered (as applicable):

- Structural fires
- Natural phenomena impact (e.g., wind, flood, earthquake, wildfire)
- Environmental releases (e.g., oil or other pollutants)
- Hazardous material releases (biological, chemical, or radiological)
- Malevolent acts (e.g., armed assault, sabotage)
- Facility damage with possible compromise of classified material
- Workplace accident or mass casualty event (e.g., explosion, release of toxic fumes)
- Hazard external to the site (e.g., hazardous material in nearby facilities, transportation accidents)
- Nuclear criticality accident

Some emergency conditions apply to every facility (e.g., fires), while others apply only to facilities that exceed a threshold inventory (e.g., release of oil). Site-specific potential hazards (e.g., flooding from a nearby dam failure) are included in the list of potential emergencies to identify the facilities that are potentially threatened.

If any buildings have classified repositories, they must be identified and information provided accordingly.

3.1.4 Qualitatively Describe Potential Impacts

Qualitatively describe potential health, safety, environmental, or national security impacts of the emergency conditions identified in the previous step. These descriptions relate the potential impacts to the different types of operational emergencies. For example, potential impacts of a structure fire in an office building could be workers

injured by smoke inhalation or burned, or compromise of classified material. Additional examples are provided in the DOE G 151.1-1.

3.1.5 Identify Applicable Planning and Preparedness Requirements

Various federal, state, and local regulations include requirements that pertain to planning and preparedness for emergencies. The DOE recognizes these requirements and directs that they be incorporated into site emergency management programs.

> *The Hazards Survey process will involve the review of facility programs already in place to meet Federal, State, and local requirements related to worker health and safety, environmental protection, and hazardous materials reporting. It is not suggested that emergency management departments assume increased responsibility and authority for ensuring compliance with the Resource Conservation and Recovery Act (RCRA), CERCLA [Comprehensive Environmental Response, Compensation, & Liability Act] , NPDES [National Pollutant Discharge Elimination System], and OSHA [Occupational Safety & Health Administration] requirements. However, the Hazards Survey and its periodic updates, as a minimum, should serve as an internal quality assurance check on compliance with those regulations. Facility/site management may find it useful to incorporate the Hazards Survey process into its program of internal oversight and compliance monitoring for hazardous materials, environmental protection, and worker safety regulations [DOE G 151.1-2].*

Correlate EP Hazards Survey results with relevant planning requirements from other federal, state, or local requirements that apply, providing a summary of the required scope of emergency planning at the site. The summary should address each base program requirement listed in the Order and identify how they are met. Base program requirements identified in DOE O 151.1C are:

- OSHA requirements for employee evacuation plans (29 CFR §1910.38) and notification systems (29 CFR §1910.165).
- Federal property management regulations for occupant emergency programs (41 CFR §§102-74.235 to 102-74.260) and accident and fire prevention (41 CFR §102-74-360).
- The Federal Emergency Management Agency requirements for emergency operations plans for state and local governments (44 CFR Part 302) that address similar hazards.
- Federal Energy Regulatory Commission requirements for emergency plans (18 CFR §12.20) to protect the health and safety of members of the public upstream and downstream of water projects (dams).

- EPA requirements, implementing the Clean Water Act through NPDES (40 CFR Part 10-129). Of particular note are requirements for contingency planning for oil spills through 40 CFR Part 112, which mandates preparation of Spill Prevention Control & Countermeasure Plans.

- EPA requirements implementing provisions of the Safe Drinking Water Act (40 CFR Parts 141-142).

- EPA requirements implementing CERCLA, embodied in the 40 CFR Part 300 series, including Title III, Emergency Planning & Community Right-to-Know Act, embodied at 40 CFR Part 355.

- DOT requirements for emergency response information (49 CFR §172.600 Series) and hazardous materials training (49 CFR §172.700 series).

- DOE O 420.1B, *Facility Safety*, which addresses requirements for fire protection programs. Some requirements must be incorporated into the facility emergency plan, including response by DOE/NNSA or local community fire departments.

- DOE O 470.1, *Safeguards & Security Program*, which addresses requirements for appropriate protection levels for DOE interests and documentation in facility-specific Site Safeguards & Security Plans.

- DOE N 473.9, *Security Conditions*, which ensures that the Department uniformly meets protection requirements specified in Presidential Decision Directive 39, *U.S. Policy on Counterterrorism*.

- The *Health Insurance Portability and Accountability Act of 1996*, which restricts access to individual medical information.

When completed, the EP Hazards Survey should document and serve as a guide to assessing site compliance with the above requirements.

3.1.6 EP Hazards Survey Summary Table

Prepare a summary of the results for inclusion in the EP Hazards Survey (e.g., Table 1). This summary will be the source for information to be provided in the following sections. If a single summary table is cumbersome, include as an Appendix or break the information down into several tables. If numeric codes are used, include description tables that define numeric codes used in the Summary Table (e.g., Tables 2a, 2b, and 2c).

Table 1 - EP Hazards Survey Summary Table

Building ID	**Type/Use**	**Occupancy** (ground floor/ other)	**Classified Material**	**Special Conditions**	**Hazardous Material**	**Emergency Conditions**	**Potential Impacts**	**Applicable Requirements**
##	Chemical processes, Offices, Maintenance	Occupancy during dayshift includes ~## employees Occupancy during off-shift includes ~y employees, as needed	Yes	Fixed contamination areas Material Access Areas High contamination areas RCRA-regulated hazardous waste area, fissile control area, radiation area Toxic Substance Control Act-regulated materials storage area PCBs	**Radiological materials exceeding screening values**: (DOE-STD-1027-92 Hazard Category 2 TQs) Enriched and depleted uranium Uranyl nitrate Plutonium **Chemicals exceeding screening values**: Hydrogen fluoride Nitric acid 50% **Other materials considered for analysis**: Aluminum nitrate Aluminum nitrate nonahydrate	1 2 4 6 7 8	1, 5, 6, 7 8 1, 3, 4 5, 6, 7, 8 4, 5, 6, 7 1, 7, 8 7, 8, 9	1,4 4 3,5 7 1 3

Table 2a - EP Hazards Survey Summary Table Code 1

Possible Emergency Condition
1. Structural fire
2. Natural Phenomena (earthquake/tornado)
3. Flood
4. Structural collapse
5. Industrial/process accident
6. Hazardous material release
7. Environmental release
8. Damage impacting classified material
9. Criticality mishap
10. Hazard external to facility
11. Transportation accident external to site
12. Malevolent act (terrorism/sabotage)
13. Other

Table 2b - EP Hazards Survey Summary Table Code 2

Potential Impacts
1. Worker death or injury
2. Public death or injury
3. Fire
4. Facility destroyed
5. Equipment damaged
6. Hazardous materials release
7. Waterways polluted
8. Environmental damages
9. Wildlife killed or injured
10. Site mission degraded
11. Adverse regulatory impact
12. Loss/compromise of classified material
13. Adverse effect/compromise of response capability
14. Costs increased
15. Not applicable (N/A)

Table 2c - EP Hazards Survey Summary Table Code 3

Applicable Regulations
1. DOE Order 151.1C (Base Program)
2. OSHA, 29 CFR §1910.38; 29 CFR §1910.165
3. Federal Property Management, 41 CFR §101-20.103-4 and 41 CFR §101-20.105
4. Federal Emergency Management Agency, 44 CFR Part 302
5. EPA, Clean Water Act, 40 CFR Parts 100-129
6. EPA, Safe Drinking Water regulations, 40 CFR Parts 141-142
7. EPA, CERCLA, 40 CFR Part 302
8. EPA, Emergency Planning & Community Right-to-Know Act, 40 CFR Part 355
9. EPA, Resource Conservation & Recovery Act, 40 CFR Part 260
10. Department of Transportation, 49 CFR Part 172, Subpart H
11. Other

3.2 EP Hazards Survey Format

The EP Hazards Survey contains the following:

- Title Page
- Approval Sheet
- Table of Contents
- List of Tables
- List of Acronyms and Abbreviations

1.0 INTRODUCTION (including a chronological revision history)
2.0 SUMMARY
3.0 FACILITY DESCRIPTION
4.0 IDENTIFICATION AND SCREENING OF HAZARDS
5.0 REFERENCES
APPENDICES (as applicable)

3.3 EP Hazards Survey Review, Approval, and Revision

3.3.1 Review and Approval of the EP Hazards Survey

A. The EP Hazards Survey undergoes an internal review by the EP Hazards Survey team and selected SMEs within the facility prior to being routed for formal review and comment.

B. EP Hazards Survey are reviewed and approved by:

- Operations manager – it is the responsibility of the Operations manager to delegate reviews to Facility Operations and Engineering, etc., as deemed necessary.
- Hazardous Materials Management Program Administrator
- Emergency Management manager
- Quality Assurance
- Carlsbad Field Office

C. The EP Hazards Survey Coordinator obtains the dispositions, USQ Screening, RCRA screening, and comments as appropriate.

3.3.2 Revision Control

A. Hazards surveys must be updated prior to significant changes to the included facilities or their hazardous material inventories. Significant changes, for example, are those that would result in an unreviewed safety question for nuclear facilities, as defined in 10 CFR Part 830. It is important to note that a negative unreviewed safety question determination may still result in increased hazardous material inventories due to the bounding nature of DSA analyses. Changes that result in a reduction of hazards with no adverse effect on safety or emergency preparedness or response may be included in the next scheduled review and update.

The EP Hazards Survey is also reviewed and revised as necessary every three years.

B. Triennial reviews shall be conducted by the emergency management organization and consider at a minimum the following:

- Has a new hazardous material (Health Hazard rating of 3 or 4) been brought into the facility since the last EP Hazards Survey review?
- Has there been a significant change in the inventory of an existing hazardous material (Health Hazard rating of 3 or 4) in the facility since the last EP Hazards Survey review by review of the hazards database and vacility walkdowns?
- Is there any new information (NI) that may impact the EP Hazards Survey?

Results of the review shall be compared to the EP Hazards Survey to determine impacts. If the review identifies changes in the facility that may impact the technical validity of the EP Hazards Survey, an evaluation shall be performed to determine if a revision to the EP Hazards Survey is required.

If the EP Hazards Survey does not need revision, document the review. The EP Hazards Survey shall be entered into the electronic document management system for review and approval by the following:

- Impacted facility/project manager(s)
- Emergency Management manager

The review letter should be sent to document control and include the following distribution:

- Facility/project manager(s)
- Emergency Management manager
- Carlsbad Field Office

C. An immediate change may be made to an existing EP Hazards Survey if approved by the Emergency Management manager. In addition, the Emergency Management manager may approve a review limited to the change only.

4.0 REFERENCES

DOE Order 151.1C, Comprehensive Emergency Management System

DOE-G-151.1-2, Technical *Planning Basis Emergency Management Guide*, U.S. DOE, July 11, 2007

DOE-STD-1027-92 CN1, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, CN-1, September 1997

DOE-STD-3009-94, Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis

ANSI N43.6, Sealed Radioactive Sources – Classification

LA-10294-MS, A Guide to Radiological Accident Considerations for Siting and Design of DOE Nonreactor Nuclear Facilities, J. C. Elder, et al., dated January 1986

NFPA 704, Standard System for the Identification of the Hazards of Materials for Emergency Response, 2001 Edition

NFPA HAZ-91, Fire Protection Guide to Hazardous Materials, Tenth Edition, 1991

WP 02-RC3109, Satellite Accumulation Area, Hazardous Waste Storage Area, and Universal Waste Storage Area Inspections

WP 12-12, Development and Maintenance of an Emergency Preparedness Hazards Assessment

WP 12-IH.02-4, Hazard Communication Program

Attachment 1 – Terms and Definitions

Area – site geographical marker used to identify buildings and other structures.

Base program – program defined within DOE O 151.1C that implements requirements of applicable federal, state, and local regulations for fundamental worker safety programs (e.g., fire, safety, and security). These requirements are not unique to DOE operations. Each DOE site must have an Operational Emergency Base Program that provides the framework for response to serious events involving health and safety, the environment, and safeguards and security.

Hazardous material – any solid, liquid, or gaseous material that is toxic, flammable, radioactive, corrosive, chemically reactive, or unstable upon prolonged storage, in quantities that could pose a threat to life, property, or the environment.

Lethal concentration, 50% (LC_{50}) – an LC_{50} value is the concentration of a material in air that will kill 50% of the test subjects (animals, typically mice or rats) when administered as a single exposure (typically 1 or 4 hours). Also called the median lethal concentration and lethal concentration 50, this value provides an idea of the relative acute toxicity of an inhalable material.

Lethal dose, 50% (LD_{50}) – an LD_{50} value is the amount of a solid or liquid material that it takes to kill 50 percent of test animals (for example, mice or rats) in one dose. The dose may be administered orally (by mouth), injection, or dermally (application to the skin).

New information (NI) – information originating internal or external to WTS which might jeopardize the adequacy of Safety Analysis that supports the Safety Basis for a Nuclear Facility. Such information is reviewed to determine if a Potential Inadequacy in Safety Analysis should be declared. NI may come from several sources including: (1) vendor notification, (2) discovery of a discrepant "as found" state, (3) errors of inaccuracy or omission in the current safety analysis, (4) occurrence of an event, and (5) technological advances (NI developed as a part of upgrading analysis is excluded).

Safety basis – documented safety analysis and hazard controls that provide reasonable assurance that a DOE nuclear facility can be operated safely in a manner that adequately protects workers, the public, and the environment. The Safety Basis is described in documents such as the facility Documented Safety Analysis and Auditable Safety Analysis. Safety Basis documents are approved by the DOE. When possible, an EP Hazards Survey should draw from Safety Basis documentation.

Sealed radioactive source – radioactive source manufactured, obtained, or retained for the purpose of using the emitted radiation. A sealed radioactive source consists of a known or estimated quantity of radioactive material contained within a sealed capsule, sealed between layers of nonradioactive material, or firmly fixed to a nonradioactive surface by electroplating or other means intended to prevent leakage or escape of the radioactive material. Sealed radioactive sources do not include reactor fuel elements,

Attachment 1 – Terms and Definitions

nuclear explosive devices, or radioisotope thermoelectric generators.
(10 CFR Part 835)

Segment – demarcation used in hazards assessments where a system, section, building, etc., is unaffected by failure of other systems, sections, buildings, etc.

Site – area over which the DOE has access control authority.

special nuclear material [Atomic Energy Act of 1954] – (1) plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the U.S. Nuclear Regulatory Commission determines to be special nuclear material, but excludes source material; or (2) any material artificially enriched by any of the foregoing, but excludes source material.

Type B packaging – packaging designed to retain integrity of containment and shielding required by 49 CFR when subjected to normal conditions of transport and hypothetical accident test conditions set forth in 10 CFR Part 71.

Attachment 2 – Abbreviations and Acronyms

ANSI	American National Standards Institute
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DSA	Documented Safety Analysis
DWPF	Defense Waste Process Facility
EPA	U.S. Environmental Protection Agency
EPHA	Emergency Planning Hazards Assessment
FMTS	Field Material Tracking System
LC50	Lethal Concentration, 50%
LD50	Lethal Dose, 50%
NFPA	National Fire Protection Association
NI	New Information
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety & Health Administration
PISA	Potential Inadequacy in Safety Analysis
RCRA	Resource Conservation & Recovery Act
SME	Subject Matter Expert
SNM	Special Nuclear Material
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant

Attachment 3 – NFPA 704 Health Hazard Criteria

5.1 General

5.1.1* This chapter shall address the capability of a material to cause personal injury due to contact with or entry into the body via inhalation, ingestion, skin contact, or eye contact.

5.1.2 Injury resulting from the heat of a fire or from the force of an explosion shall not be considered.

5.1.3* Health hazards that can result from chronic or repeated long-term exposure to low concentrations of a hazardous material shall not be considered.

5.1.4* If the oral toxicity values indicate a significantly different health hazard rating than from other more likely routes of exposure, or where the oral toxicity values would tend to either exaggerate or minimize the hazards likely to be encountered, then professional judgment shall be exercised in assigning the health hazard rating.

5.1.5* For purposes of assigning the health hazard rating, only the inherent physical and toxic properties of the material shall be considered. However, if the combustion or decomposition products are known, generated in significant quantities, and present a significantly greater degree of risk, they shall be rated accordingly.

5.1.6 The degree of hazard shall indicate to fire-fighting and emergency response personnel one of the following:

(1) They can work safely only with specialized protective equipment.
(2) They can work safely with suitable respiratory protective equipment.
(3) They can work safely in the area with ordinary clothing.

5.2* Degrees of Hazard

The degrees of health hazard shall be ranked according to the probable severity of the effects of exposure to emergency response personnel detailed in Table 5.2.

Table 5.2 - Degrees of Health Hazards

Degree of Hazard*	Criteria
4 — Materials that, under emergency conditions, can be lethal.	Gases whose LC_{50} for acute inhalation toxicity is less than or equal to 1,000 parts per million (ppm).
	Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than ten times its LC_{50} for acute inhalation toxicity, if its LC_{50} is less than or equal to 1,000 ppm.
	Dusts and mists whose LC_{50} for acute inhalation toxicity is less than or equal to 0.5 milligrams per liter (mg/L).

Attachment 3 – NFPA 704 Health Hazard Criteria

Table 5.2 - Degrees of Health Hazards	
Degree of Hazard*	**Criteria**
	Materials whose LD_{50} for acute dermal toxicity is less than or equal to 40 milligrams per kilogram (mg/kg).
	Materials whose LD_{50} for acute oral toxicity is less than or equal to 5 mg/kg.
3 — Materials that, under emergency conditions, can cause serious or permanent injury.	Gases whose LC_{50} for acute inhalation toxicity is greater than 1000 ppm but less than or equal to 3,000 ppm.
	Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than its LC_{50} for acute inhalation toxicity, if its LC_{50} is less than or equal to 3,000 ppm and that does not meet the criteria for degree of hazard 4.
	Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 0.5 mg/L but less than or equal to 2 mg/L.
	Materials whose LD_{50} for acute dermal toxicity is greater than 40 mg/kg but less than or equal to 200 mg/kg.
	Materials that are corrosive to the respiratory tract.
	Materials that are corrosive to the eye or cause irreversible corneal opacity.
	Materials that are corrosive to skin.
	Cryogenic gases that cause frostbite and irreversible tissue damage.
	Compressed liquefied gases with boiling points at or below -55°C (-66.5°F) that cause frostbite and irreversible tissue damage.
	Materials whose LD_{50} for acute oral toxicity is greater than 5 mg/kg but less than or equal to 50 mg/kg.
2 — Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.	Gases whose LC_{50} for acute inhalation toxicity is greater than 3,000 ppm but less than or equal to 5,000 ppm
	Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC_{50} for acute inhalation toxicity, if its LC_{50} is less than or equal to 5,000 ppm and that does not meet the criteria for either degree of hazard 3 or degree of hazard 4.
	Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 2 mg/L but less than or equal to 10 mg/L.
	Materials whose LD_{50} for acute dermal toxicity is greater than 200 mg/kg but less than or equal to 1,000 mg/kg.

Attachment 3 – NFPA 704 Health Hazard Criteria

Table 5.2 - Degrees of Health Hazards	
Degree of Hazard*	**Criteria**
	Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that can cause severe tissue damage, depending on duration of exposure.
	Materials that are respiratory irritants.
	Materials that cause severe but reversible irritation to the eyes or lacrimators.
	Materials that are primary skin irritants or sensitizers.
	Materials whose LD_{50} for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg.
1 — Materials that, under emergency conditions, can cause significant irritation.	Gases and vapors whose LC_{50} for acute inhalation toxicity is greater than 5,000 ppm but less than or equal to 10,000 ppm.
	Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 10 mg/L but less than or equal to 200 mg/L.
	Materials whose LD_{50} for acute dermal toxicity is greater than 1,000 mg/kg but less than or equal to 2,000 mg/kg.
	Materials that cause slight to moderate irritation to the respiratory tract, eyes, and skin.
	Materials whose LD_{50} for acute oral toxicity is greater than 500 mg/kg but less than or equal to 2,000 mg/kg.
0 — Materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials.	Gases and vapors whose LC_{50} for acute inhalation toxicity is greater than 10,000 ppm.
	Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 200 mg/L.
	Materials whose LD_{50} for acute dermal toxicity is greater than 2,000 mg/kg.
	Materials whose LD_{50} for acute oral toxicity is greater than 2,000 mg/kg.
	Materials that are essentially nonirritating to the respiratory tract, eyes, and skin.

* For each degree of hazard, criteria are listed in a priority order based upon likelihood of exposure.

5.2.1 Data from all routes of exposure shall be considered when applying professional judgment to assign a health hazard rating.

Attachment 4 – Discussion of Particle Size

This attachment will assist the analyst in estimation of particle size for performance of an EP Hazards Survey. Estimation of particle size provided at this level is gross and is not intended to take the place of formal analysis where warranted. The purpose to assis in the elimination of materials that obviously exceed the 10-micron threshold. Micron (short for micrometer) is 1 millionth of a meter (1 thousandth of a millimeter). One micron equals 0.00004 (forty-millionths) of an inch. The human eye can resolve particles down to about 40 microns.

Ordinary granulated, all-purpose white table sugar is processed into granules 450-600 microns in diameter. Confectioners' sugar (10-X) (i.e., powdered sugar) is pulverized until 97 percent can pass through a 74-micron sieve.

The following table may assist in estimation of particle size.

Particle	Particle Size (microns)
One inch	25,400
Eye of a needle	1,230
Beach sand	100 – 10,000
Fertilizer	10 – 1,000
Pollen	10 – 1,000
Cayenne pepper	15 – 1,000
Grain dust	5 – 1,000
Human hair	40 – 300
Dust mites	100 – 300
Sawdust	30 – 600
Cement dust	3 – 100
Ginger	25 – 40
Mold spores	10 – 30
Starches	3 – 100
Red blood cells	5 – 10
Mold	3 – 12
Textile dust	6 – 20
Gelatin	5 – 90
Spider web	2 – 3
Spores	3 – 40
Coal dust	1 – 100
Smoke from synthetics	1 – 50
Smoke from natural material	0.01 - 0.1
Oil smoke	0.03 – 1
Burning wood	0.2 – 3
Tobacco smoke	0.01 – 4
Auto emission	1 – 150
Talcum dust	0.5 – 50
Copier toner	0.5 – 15
Corn starch	0.1 - 0.8