

All-Hazards Survey

- **Scope:** An All-Hazards Survey must be performed by DOE/NNSA sites/facilities/activities.
- **Purpose:** Its purpose is to identify all-hazards that are applicable to the operation of that entity and establishes the planning basis for the emergency management program.

Each All-Hazards Survey:

- 1) must describe the applicable potential health, safety, or environmental impacts;
- 2) must identify the need for development of further planning and preparedness beyond the Emergency Management Core Program requirements that will apply to each type of hazard
- 3) must be submitted for approval to the Cognizant Field Element Manager or appropriate Federal Manager
- 4) must be reviewed for significant changes every 3 years and updated as needed
- 5) May include multiple facilities or include only one site/facility

All Hazards Survey & HazMat Screening



Performing an All-Hazards Survey

- Purpose: The All-Hazards Survey is conducted to determine applicable hazards and threats that are plausible for each site.
- Scope: The survey must address the following:
 - Natural Hazards
 - Technological Hazards
 - Human-made Hazards
- a) The All-Hazards Survey includes conducting a Threat and Hazard Identification and Risk Assessment (THIRA) in accordance with the Department of Homeland Security, Comprehensive Preparedness Guide (CPG) 201, "Threat and Hazard Identification and Risk Assessment Guide"
- b) Uses and incorporates analyses and assessment information required in other applicable DOE orders directives
- c) For severe incidents, considers its reliance on local/regional offsite responders and how the site/facility/activity will handle severe incidents if these response resources are not available.

Why THIRA?

- Based on PPD-8 National Preparedness
- Geared toward communities, but useable for DOE Lab/campus-type settings
- Used by other federal agencies, required for use by all 56 State Administrative Agencies, and all 31 UASIs for Homeland Security Grants
- Relatively simple
- Standardized template can assist Department in getting clear enterprise risk profile

Performing THIRA



Figure 1: The THIRA Process

Appendix A: THIRA Template

The following table illustrates one possibility for how communities may organize the information in their THIRAs.

Threat/Hazard			
Context Description			
Core Capability			
Capability Target			
Resource Requirement			
Resources		Number Required	

- Incorporate other work already done (e.g., NPH, BNA, safety basis documents, etc.)
- Consider beyond design basis/severe incidents (e.g., OE-1)
- Incorporate summary in Emergency Readiness Assurance Plan (ERAP) → DOE Enterprise Threat & Hazard Risk Profile

Example: Identification of Threats & Hazards

Table 2: Example Threats and Hazards

Natural	Technological	Human-caused
<ul style="list-style-type: none"> ▪ Avalanche ▪ Animal disease outbreak ▪ Drought ▪ Earthquake <ul style="list-style-type: none"> • M7+ • <M7 ▪ Epidemic ▪ Flood ▪ Hurricane ▪ Landslide ▪ Pandemic ▪ Tornado ▪ Tsunami ▪ Volcanic eruption ▪ Wildfire ▪ Winter storm 	<ul style="list-style-type: none"> ▪ Airplane crash ▪ Dam failure ▪ Levee failure ▪ Mine accident ▪ Hazardous materials release ▪ Power failure ▪ Radiological release ▪ Train derailment ▪ Urban conflagration • Loss of water/sewage • Loss of natural gas • Structural fire • Internal (building) flooding 	<ul style="list-style-type: none"> ▪ Biological attack ▪ Chemical attack ▪ Cyber incident ▪ Explosives attack ▪ Radiological attack ▪ Sabotage ▪ School and workplace violence • Active shooter/threat



Sample THIRA



Threat and Hazard Identification and Risk Assessment

Threat/Hazard Group	Natural	Threat/Hazard Type	Major Earthquake (M7+)
Context Description	The SF Bay Area has 8 active seismic faults (e.g., San Andreas, Hayward, etc.) capable of producing M7+ earthquakes. The USGS estimates better than a 67% probability of a significant earthquake prior to 2030. Damage resulting from such a quake will include structural and non-structural damage to facilities, interruption of transportation corridors, hazardous materials releases, utility (water, electricity, natural gas, sanitary sewage, storm drainage), and impact on emergency medical and response services. Impact on the SLAC National Accelerator Facility could include: traumatic injuries due to building/equipment; interruption of mission through damage to equipment, loss of utilities, inability to staff operations; transportation corridor failures will likely strand personnel at the laboratory.		
Core Capability			
Capability Target	<p>During the first 24 hours:</p> <ul style="list-style-type: none"> Perform initial triage of medical injuries, treat & transport injured, coordinate any rescues as needed Perform initial building damage assessment Feed & house up to 500 personnel Coordinate with Stanford University and other local DOE Labs (LBNL, LLNL, Sandia Livermore) <p>During hours 24-48:</p> <ul style="list-style-type: none"> Initiate recovery operations Feed & house up to 200 personnel Coordinate with Stanford University and other local DOE Labs (LBNL, LLNL, Sandia Livermore) <p>During hours 48-72:</p> <ul style="list-style-type: none"> Continue recovery operations; develop long-term recovery plan Feed & house up to 50 personnel Coordinate with Stanford University and other local DOE Labs (LBNL, LLNL, Sandia Livermore) 		
Resource Requirement			
Resources		Numbers	
Site Security Staff (including EMTs)		10 day shift, 4-5 during other shifts	
Emergency Response Team		30 day shift, call back after-hours	
ESH Staff		Up to 50 day shift, call back after-hours	
Facilities & Operations Staff		Up to 100 day shift, call back after-hours	
Menlo Park Fire Department / Woodside Fire Department		Based upon type of response, auto-aid, and mutual aid	



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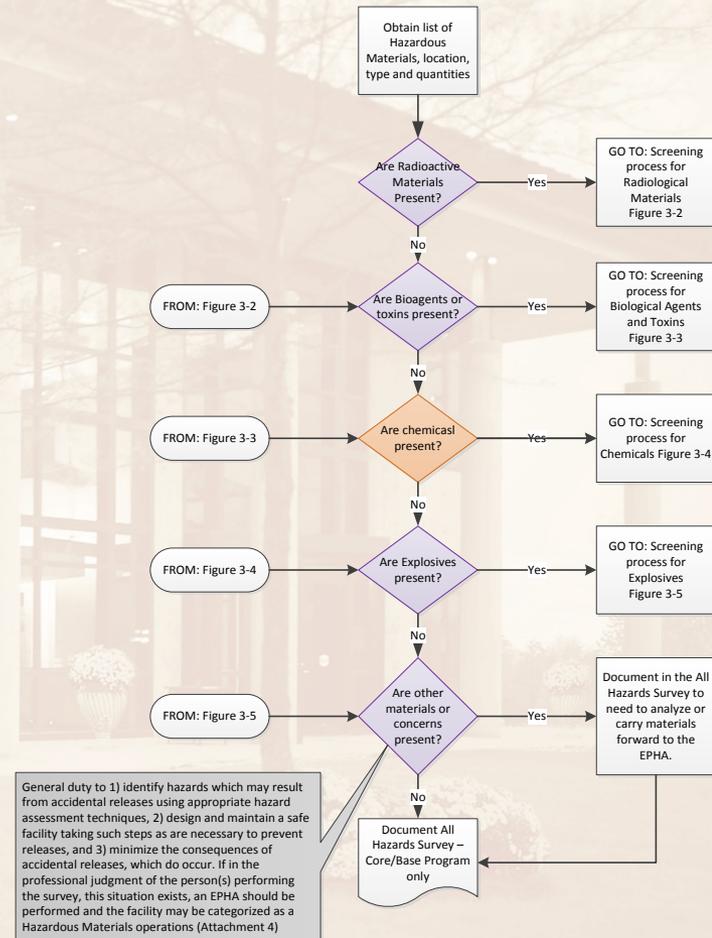


Brief Summary of Changes to Screening

- Radiological and Biological screening did not really change
- Chemical Screening Changed Quite a Bit
 - More chemical material/quantity combinations will screen out
 - Tried to make some of the criteria less “gray” or subjective
- Emphasized the General Duty Clause more (although it was always there)

Hazardous Materials Screening Process

- If THIRA includes hazardous materials as a threat/hazard, then screen materials
- If not excluded or screens out, then conduct EPHA and move to Attachment 4, HazMat Program
- Exclusions
- Materials
 - Radiological materials
 - Hazardous Biological Agents and Toxins
 - Chemicals
 - Explosives



General Duty Clause

- Notwithstanding whether a hazardous material screens out based upon the thresholds and exclusions, there is a general duty for DOE/NNSA sites/facilities/activities to:
 - identify by using appropriate hazard information, assessment techniques and tools and the consequences that may result from accidental releases of hazardous materials,
 - design, maintain, and operate a safe facility taking such steps as are necessary to prevent releases, and
 - minimize through appropriate emergency planning the consequences of accidental releases, which might occur.
 - Considering the possibility that excluded materials could initiate, through fires or explosions, the release of collocated or hazardous materials in adjacent facilities

General Duty Clause (cont.)

If, based on the assessment process and the professional judgment of the person(s) performing and approving the survey, that additional analysis and planning is warranted in order to minimize, through appropriate emergency planning, the consequences of accidental releases, which might occur, an EPHA is to be performed and the facility required to comply with the Emergency Management Hazardous Materials Program.

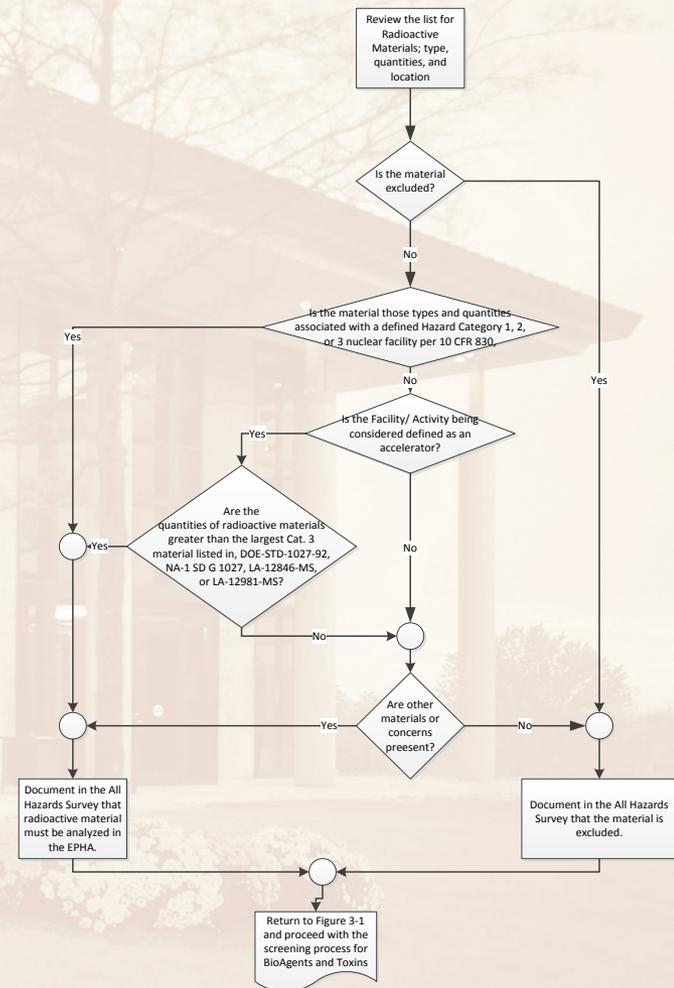


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Radiological Materials

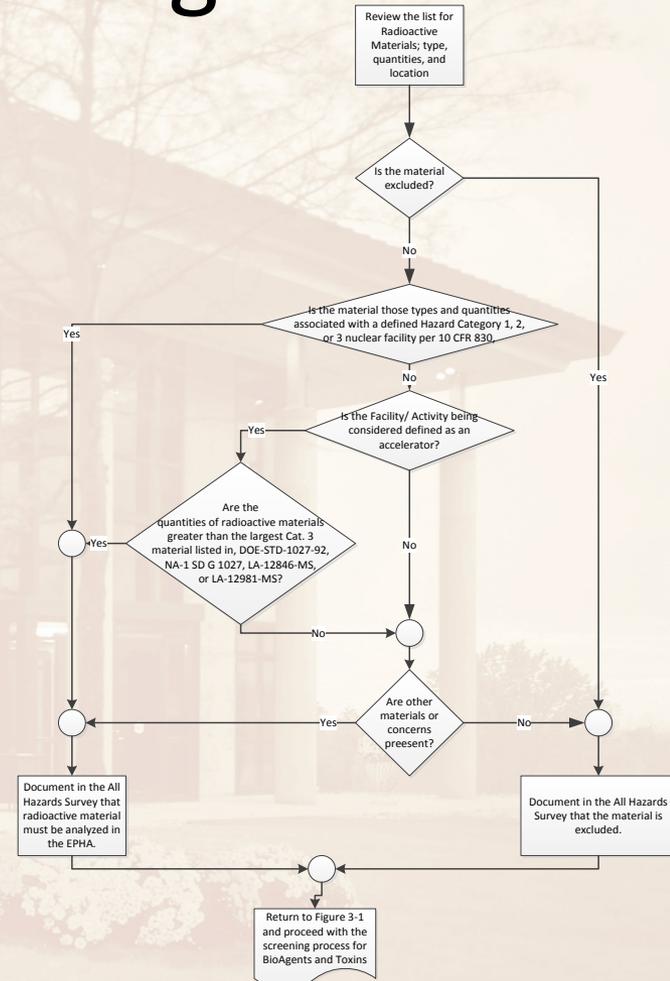
- Excluded materials include:
 - Sealed rad sources engineered to pass the special form testing specified by the DOT or ANSI;
 - Materials in DOT Type B shipping containers with overpack, if the Certificates of Compliance are current and the materials stored are authorized by the Certificate; and, materials used in exempt, commercially available products
 - Materials, that because their physical form, or other factors (e.g., plausible dispersal mechanisms), do not present an airborne exposure hazard.
 - solid materials in a form with particle size > 10 microns and no plausible release scenario to reduce the material to particles < 10 microns



Radiological Screening

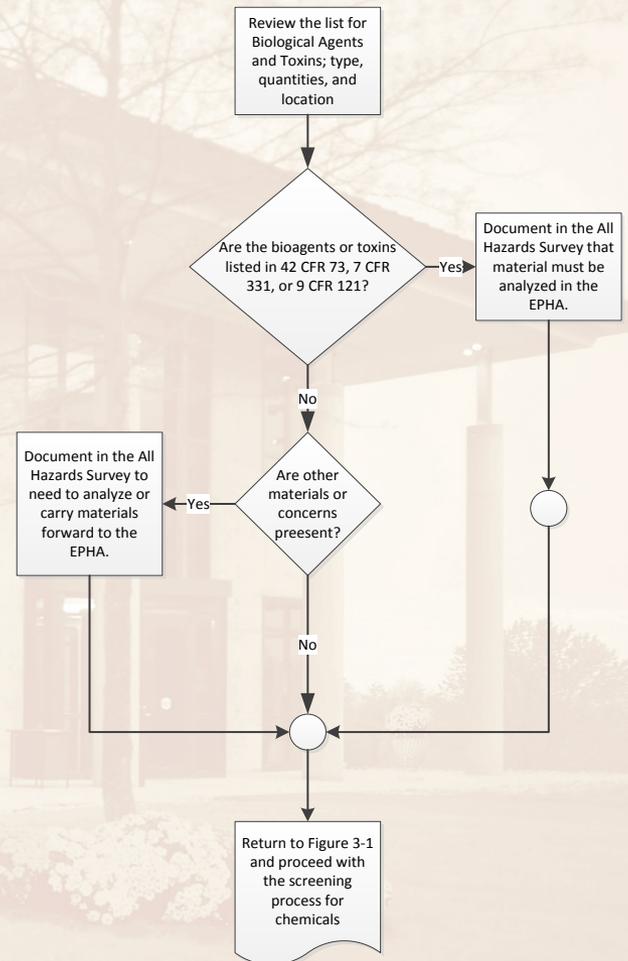
- Hazard Category 1, 2, or 3 nuclear facility per 10 CFR 830
- Accelerators (DOE O 420.2C), when in quantities greater than the largest Category 3 value (or if the sum of the ratios exceeds 1)

Note: Current 151.1-C: Radioactive materials listed in DOE-STD-1027-92 in quantities greater than the Category 3 values given in Attachment 1, Table A.1 of that Standard.



Biological Agents and Toxins

- At a minimum, specific hazardous biological agents and toxins must include Federally regulated agents and toxins identified in lists published in:
 - Department of Health and Human Services (HHS) regulations [42 CFR 73] and
 - Department of Agriculture (USDA) regulations [7 CFR 331 and 9 CFR 121], and
 - require an EPHA and a Hazardous Material Program.
- Toxins listed in 42 CFR 73 and 9 CFR 121 must exceed the minimum quantities specified to be Federally regulated.

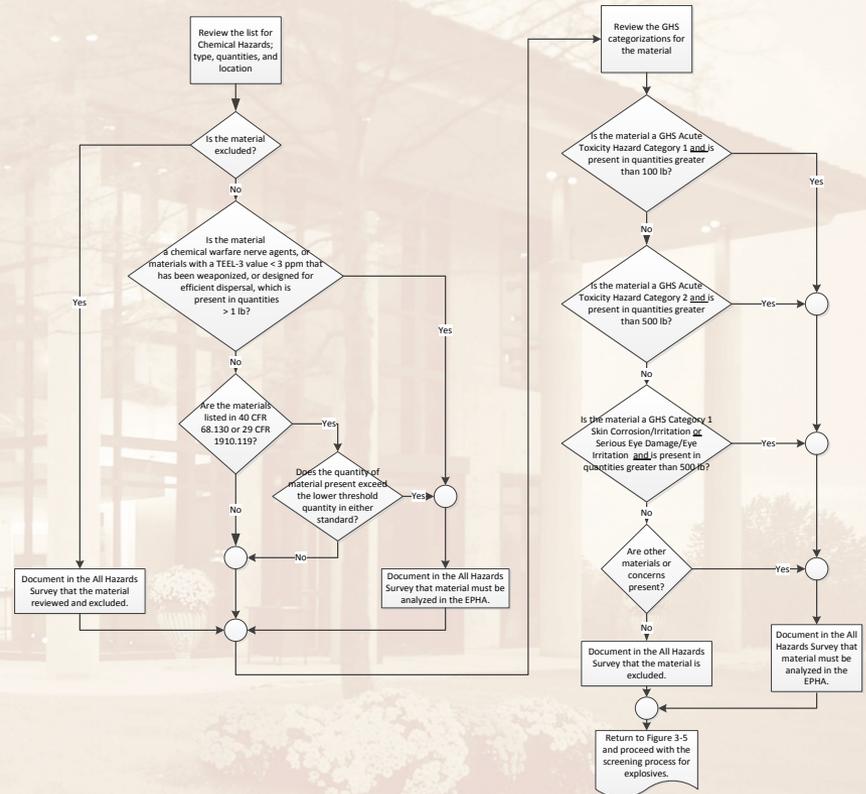


Chemical Exclusions

- Materials used in the same form, quantity, and concentration as a product packaged for distribution and use by the general public (for example, if it is used in consumer products for household use or small businesses through ordinary communities);
- Materials, that because their physical form, or other factors (e.g., plausible dispersal mechanisms), do not present an airborne exposure hazard.
 - Solid materials in a form with particle size > 10 microns and solid materials with no plausible release scenario to reduce the material to particles < 10 microns, and
 - liquids with a vapor pressure, at standard temperature under conditions of storage, of < 10 mm Hg.
- Simple asphyxiants and cryogenic materials may be excluded but will be analyzed in the THIRA.
- Hydrocarbon fuel and petroleum products
 - "Consistent with Federal law, fuel oil and gases (e.g., petroleum, propane, etc.) are excluded in the definition of hazardous materials used in this Order,
 - However large scale storage inventories must be analyzed in the THIRA and addressed in emergency management planning using appropriate guidance (e.g., NFPA, DOT/ERG, etc.) and
 - The site's Baseline Needs Assessment (BNA).
 - This analysis and planning should include consequences with respect to overpressure (e.g., 1 psi) or radiant heat dose (e.g., second-degree burn) exposures from explosions or fires involving these inventories.
 - Additionally, when "oil" is a part of a process containing or collocated with another hazardous material, it must be considered in the EPHA as a possible initiator or contributor for the release of that hazardous material.

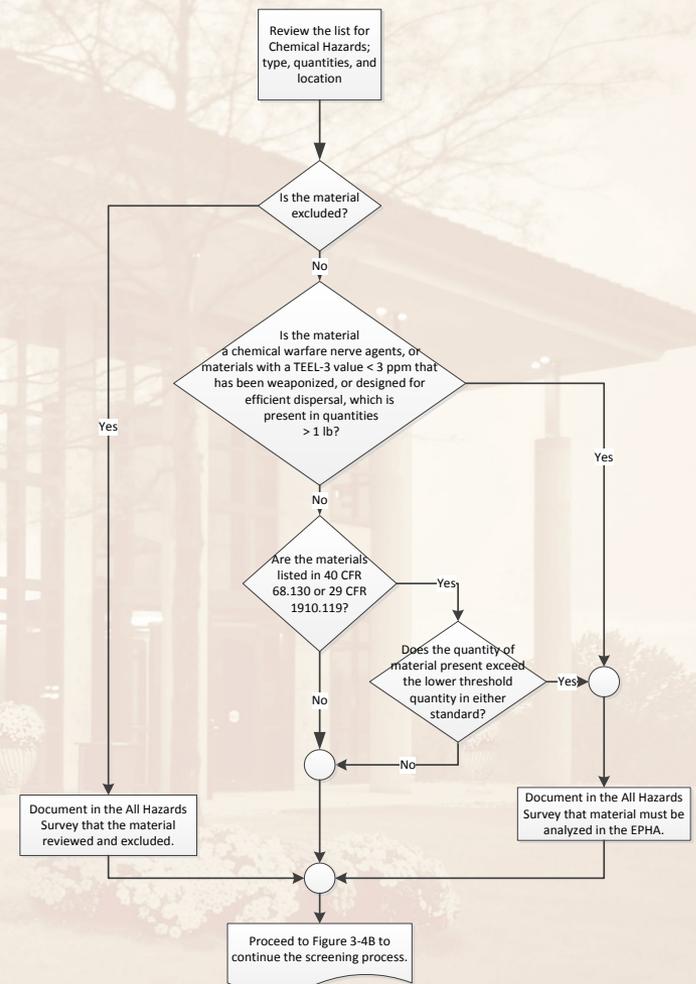
Chemical Screening

- Extraordinary toxic hazards.
- Chemicals exceeding a published threshold quantity
- Global Harmonized System (GHS)
 - Acute Toxic Hazard Category 1
 - Acute Toxic Hazard Category 2
 - Category 1 Skin Corrosion/Irritation or Serious Eye Damage/Eye Irritation
- Chemical wastes



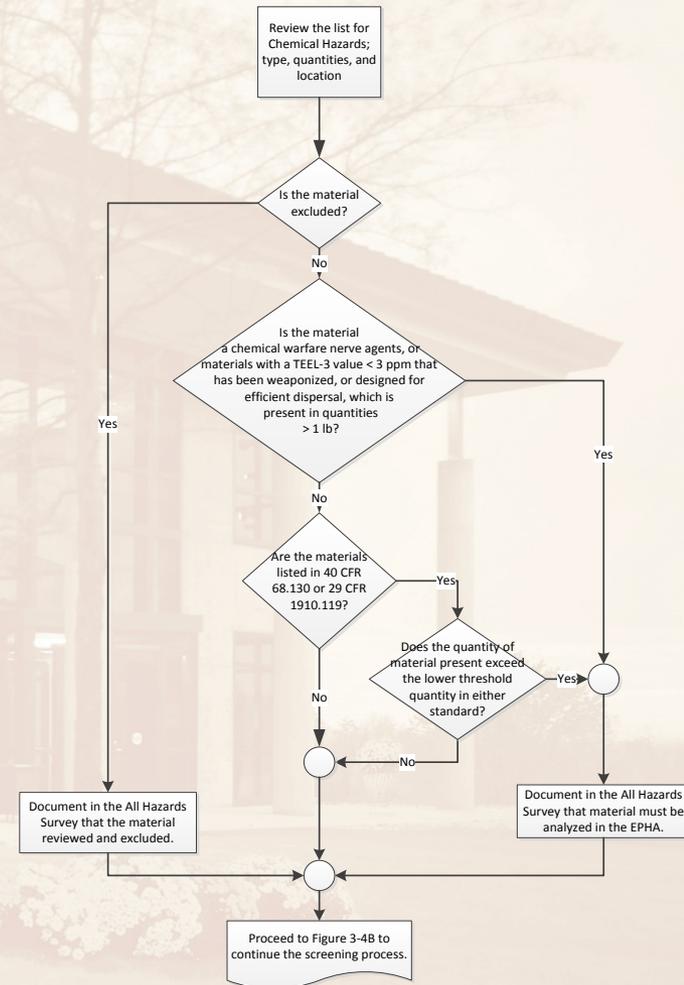
Extraordinary toxic hazards

- Materials with high acute toxicity and very dispersible, may represent an extraordinary toxic hazard beyond the local incident scene, in quantities greater than one (1) pound (0.45 kg).
- These substances include, but may not be limited to:
 - chemical warfare nerve agents;
 - any substance of similar toxicity [e.g., 60-minute 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.



Exceeds TQ

- Chemicals in quantities that exceed the lower threshold quantity (TQ) listed in either 40 CFR 68.130 (EPA Risk Management Program) or 29 CFR 1910.119(a).(1) (OSHA Process Safety Management Program).
 - Chemical material, location, and quantity combinations that screen in for toxic hazard screen in for inclusion in an EPHA.
 - Chemical material, location and quantity combinations that screen in for flammability concerns without also screening in for toxic hazard under the 40 CFR 68.130 or 29 CFR 1910.119.a.1 specifications must be annotated in the Hazards Survey but do not require an additional EPHA.

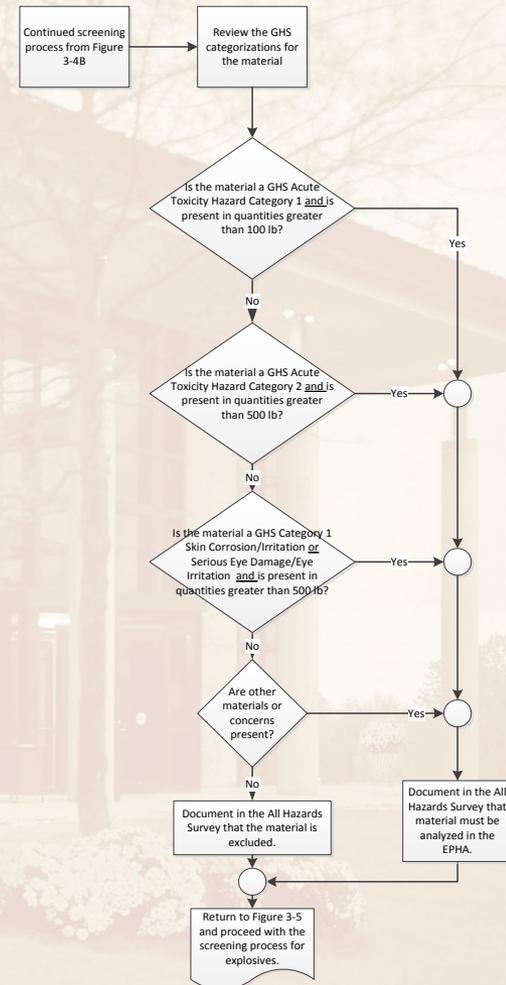


GHS Hazard Categorization

- The GHS provides a basis for harmonization of rules and regulations on chemicals at national, regional and worldwide level, an important factor also for trade facilitation
- The new system, which was called "Globally Harmonized System of Classification and Labelling of Chemicals (GHS)", addresses classification of chemicals by types of hazard and proposes harmonized hazard communication elements, including labels and safety data sheets.
- It aims at ensuring that information on physical hazards and toxicity from chemicals be available in order to enhance the protection of human health and the environment during the handling, transport and use of these chemicals.
- Adopted by the UN in 2003. Mandatory use in the U.S. June 2015.

GHS Hazard Categorization

- For chemicals not specifically listed previously, the TQ is based upon the Global Harmonized System (GHS) hazard categorizations. These categorizations can be taken from the manufacturer's Safety Data Sheet, or can be determined from other credible toxicology data sources and compared against the GHS category definitions
 - GHS Acute Toxicity Hazard Category 1, greater than **100 pounds** (45.4 Kg)
 - GHS Acute Toxicity Hazard of Category 2 greater than **500 pounds** (227 Kg)
 - GHS Category 1 Skin Corrosion/Irritation or Serious Eye Damage/Eye Irritation, greater than **500 pounds** (227 Kg)



GHS Pictograms

Acute Toxicity
Category 1 and 2

Cat 1: oral 5 mg/Kg dermal
50 mg/Kg gas 100
ppm 4h vapor 0.5
mg/L dust/mist
0.05mg/L
Cat 2: oral 50 mg/Kg
dermal 200 mg/Kg
gas 500 ppm 4h
vapor 2 mg/L
dust/mist 0.5mg/L



DANGER

Fatal if inhaled

Corrosive



DANGER

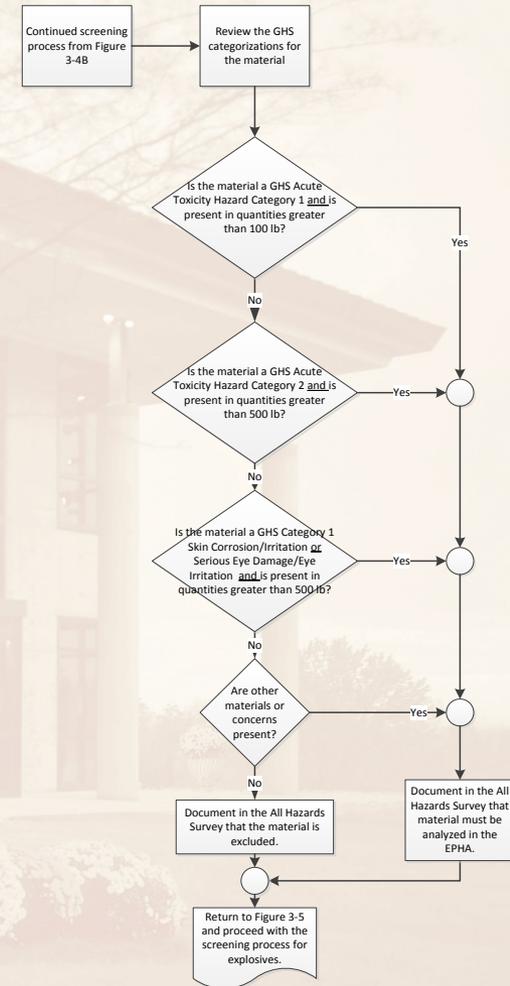
Causes severe skin burns and
eye damage

GHS Screening Basis

Examples	GHS Category	Extraordinary toxin (lb)	RMP/PSM (lbs)	GHS TQ (lbs)
Sarin		1	0 / 100	
Diborane	AT-1		2,500 / 100	
Ozone	AT-1		-- / 100	
Nitrogen dioxide	AT-1		250 / --	
Chlorine	AT-2		2,500 / 1,500	
Nitric Acid (>80%)	Skin/Cor-1		15,000 / 500	
Ammonia, anhydrous	Skin/Cor-1		10,000 / 10,000	
Potassium cyanide	AT-2		-- / --	500
Aniline	AT-2		-- / --	500
Sulfuric acid	Skin/Cor-1	VP < 0.3 mmHg (EXCLUDE)		
Carbon Monoxide	AT-3	No TQ (EXCLUDE)		

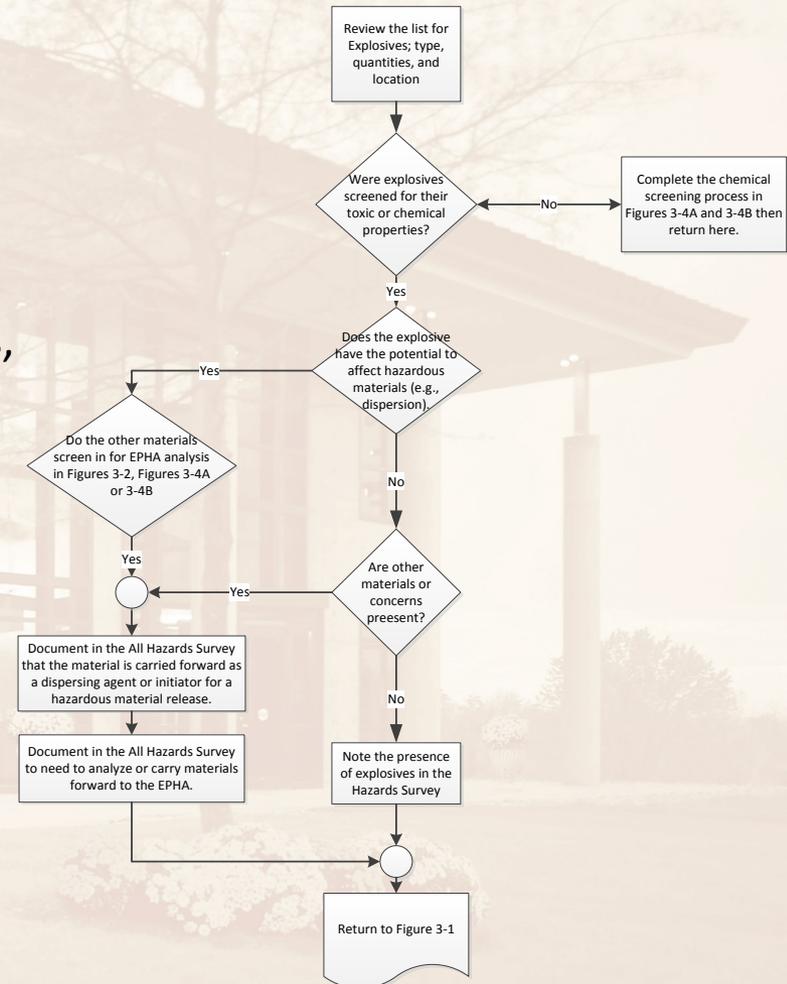
Chemical Wastes

- Chemical wastes only require further analysis if the storage quantities exceed those above and the concentration is comparable to that which would require such a similar classification (i.e., very dilute and chemically neutralized chemical waste does not require a further analysis).



Explosives

- All explosives in a facility/activity must be subjected to a hazardous material screening process to determine if there is a hazardous materials impact (e.g. toxicity, dispersion of other hazardous materials)
- Facility/activity emergency planning, preparedness, and response must take into account the hazards associated with explosives and be consistent with DOE-STD-1212, Explosives Safety.
- A graded approach must be applied based on the explosive's Hazard/Division class.
- Explosives are excluded from further analysis in an EPHA, regardless of the facility designation (e.g., nuclear facility), provided the explosives are also screened through the Chemical screening criteria.



Radiological Materials	Types and quantities associated with a defined Hazard Category 1, 2, or 3 nuclear facility (10 CFR 830); Materials associated with a facility/activity being defined as an accelerator per DOE O 420.2C in quantities greater than the largest Category 3 value ^{1 2}	
Hazardous Biological Agents & Toxins	Federally regulated agents/toxins listed in 42 CFR 73, 7 CFR 331, and 9 CFR 121	
Chemicals	Chemicals in quantities that exceed the lower threshold quantity (TQ) listed in either 40 CFR 68.130 (EPA Risk Management Program) or 29 CFR 1910.119(a)(1) (OSHA Process Safety Management Program). If a chemical is not listed, then the following screening quantities apply:	
	Public use or non-dispersible materials are excluded from further screening.	
	Categories of chemicals not addressed above:	
	Extraordinary toxic hazards ³	1 pound (0.45 kg)
	GHS Acute Toxicity Hazard Category 1	100 pounds (45.4 kg)
	GHS Acute Toxicity Hazard of Category 2	500 pounds (227 kg)
GHS Category 1 Skin Corrosion/Irritation or Serious Eye Damage/Eye Irritation	500 pounds (227 kg)	
Other	General duty to 1) identify hazards which may result from accidental releases using appropriate hazard assessment techniques, 2) design and maintain a safe facility taking such steps as are necessary to prevent releases, and 3) minimize the consequences of accidental releases, which do occur. If in the professional judgment of the person(s) performing the survey, this situation exists, an EPHA should be performed and the facility may be categorized as a Hazardous Materials operations (Attachment 4)	

Co-located Materials

- If the screening is being performed for individual facilities, and the containers are not connected and are not physically in one location, then each container and its associated process should be evaluated separately.
- If separated containers are connected by process piping, if a credible common event (e.g., fire, loss of containment, cascading effects, etc.) in one facility could cause the material to be released from more than one container, then the total quantity of that hazardous material should be used to determine if it exceeds the applicable screening threshold.

Some Screening Examples Compared 1

Material	Quantity	151.1 C (OLD)	151.1D (NEW)	NOTES
Anhydrous Ammonia	Three 150 lb Cylinders	Screened in because HHR>2 and gas over 10lb per container.	Screens out It's on the RMP List but at less than RMP Quantity	Changed. Screening Quantity Increased. This threshold increased quite a bit.
Uranium 235 Stored as solid metal parts	1.95E+06 Ci	Screened in because it exceeded CAT 3 quantity for DOE STD 1027-92 . (Screened out for sites that follow NA-1 SD G 1027)	Screened in because it exceeded CAT 3 quantity for DOE STD 1027-92 . (Screened out for sites that follow NA-1 SD G 1027)	Same. No change. 151.1D screening criteria really didn't affect radiological screening.
Crimean-Congo haemorrhagic fever virus	3 grams	Screened In HHS and USDA Select Agents and Toxins 7CFR Part 331, 9 CFR Part 121, and 42 CFR Part 73	Screened In HHS and USDA Select Agents and Toxins 7CFR Part 331, 9 CFR Part 121, and 42 CFR Part 73	Same. No change. 151.1D screening criteria really didn't affect biological screening.

Some Screening Examples Compared 2

Material	Quantity	151.1 C (OLD)	151.1D (NEW)	NOTES
Chemical ABC Low-volatility liquid	1000 lb	Screened in liquid with VP>1.0 NFPA HHR>2	Screens out VP<10.0 GHS=X	Changed. Screening vapor pressure for determining whether a material is dispersible increased. This threshold relaxed.
Chemical XYZ solid in fine powder	66 lb	Screened in. Analyst couldn't identify whether the material was smaller than 10 microns or not, HHR>2, and >40lb LSQ.	Screens out. Although it's GHS 1, it's less than 100lb.	

Some Screening Examples Compared 3

Material	Quantity	151.1 C (OLD)	151.1D (NEW)	NOTES
VX Gas Samples in small vials used for research	0.1lb	Screened out. Although it's extremely toxic and a chemical warfare agent, this is less than one pound.	Screened out. Same reasons. No change.	151.1D treats the extremely hazardous or weaponized materials the same as 151.1C did.
Acetonitrile	55-gallons (360 lb)	Screened out (at most sites) due to HHR<3 although it has been screened in at some locations due to products of combustion	Screened out Acute Tox. 3 (Dermal) H311	<ol style="list-style-type: none"> 1) 151.1D's toxicity and quantity thresholds both increased. 2) 151.1D pulled the products-of- combustion screening info from the guide to the order and made it more explicit.

Screening Recap

- Radiological and Biological screening did not really change
- Chemical Screening Changed Quite a Bit
 - More chemical material/quantity combinations will screen out
 - Tried to make some of the criteria less “gray” or subjective
- Emphasized the General Duty Clause more (although it was always there)