



Emergency Management Issues Special Interest Group Annual Meeting

Hazardous Material Inventory Reduction at Nuclear and High Hazard Facilities

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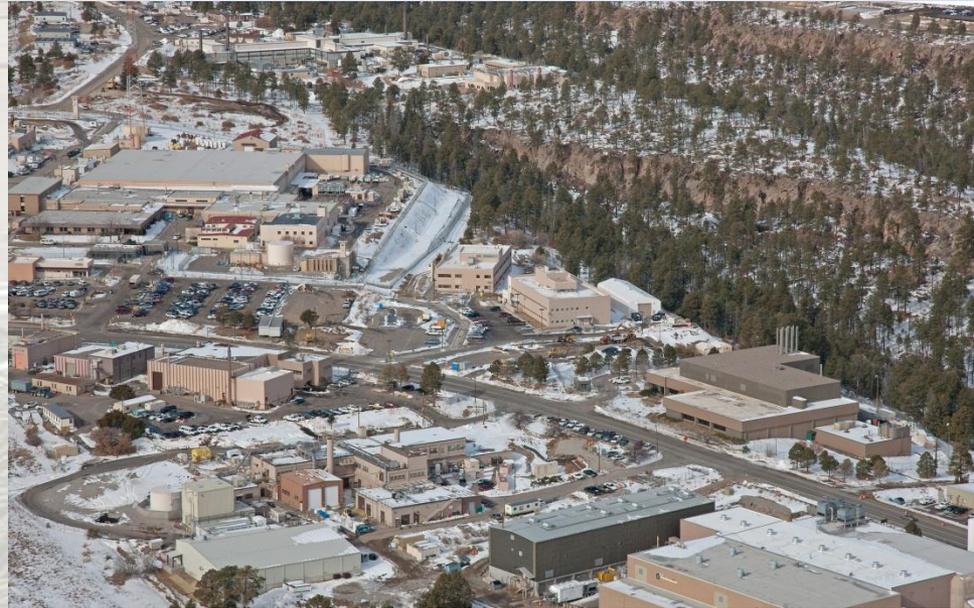
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Introduction: ADPSM Facilities

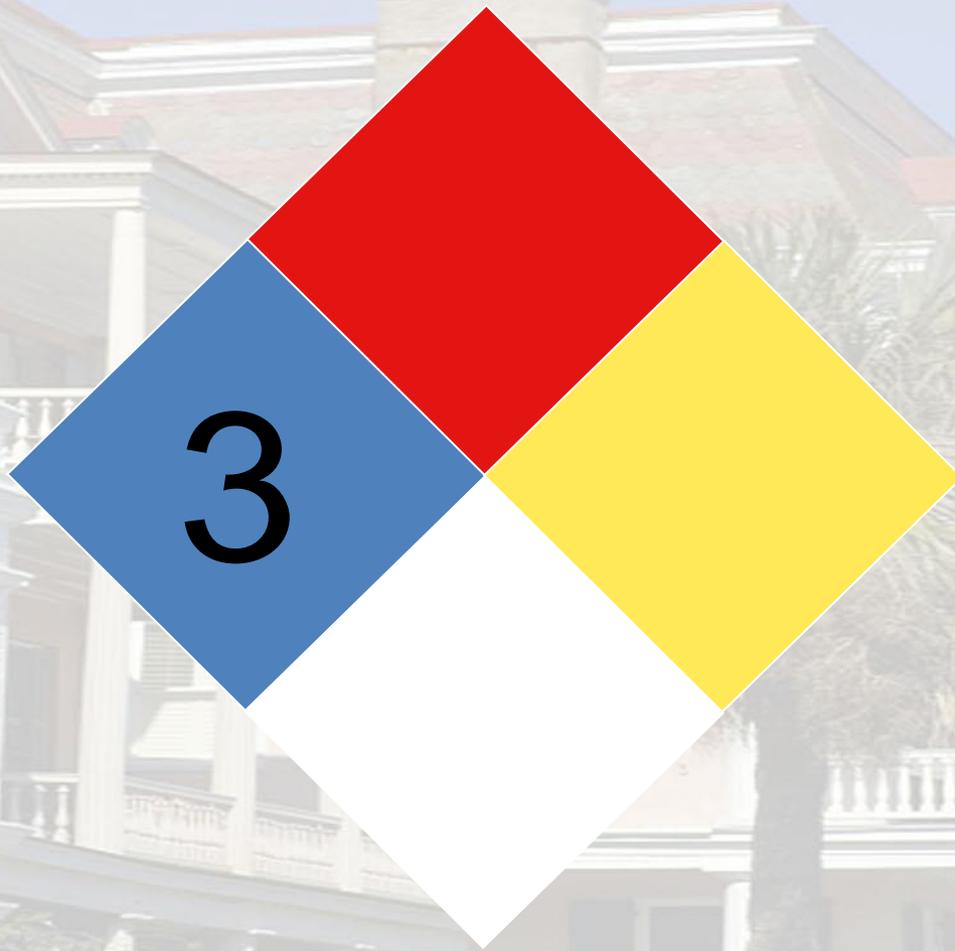
- Trap Door Site (TA-22)
- Radioactive Liquid Waste Treatment Facility (TA-50)
- LANL Plutonium Facility (TA-55)



Introduction: EPHA Screening Thresholds

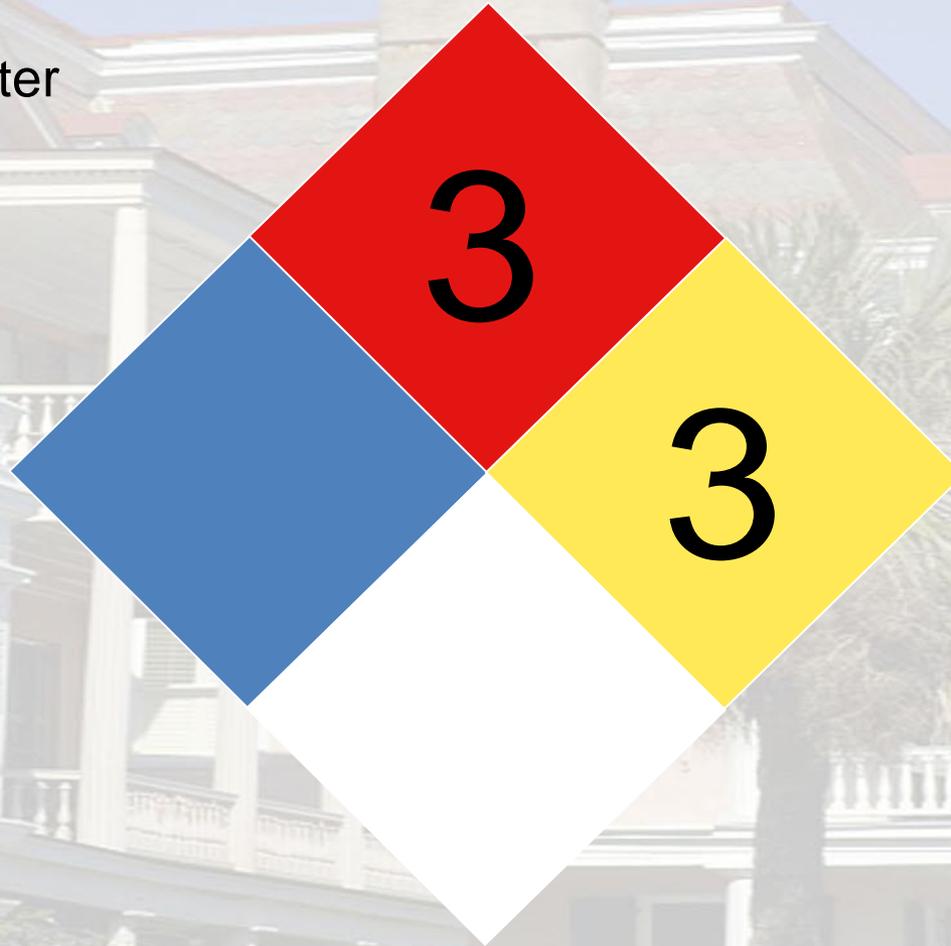
Physical State	Screening Thresholds	Unit of Measure
Gas	10	Pounds
Liquid	5	Gallons
Powders	40	Pounds

Introduction: NFPA Health Ratings



Introduction: NFPA Flammable and Instability Ratings

• Initiator or Promoter



• Incompatibility

Introduction: Classification Criteria

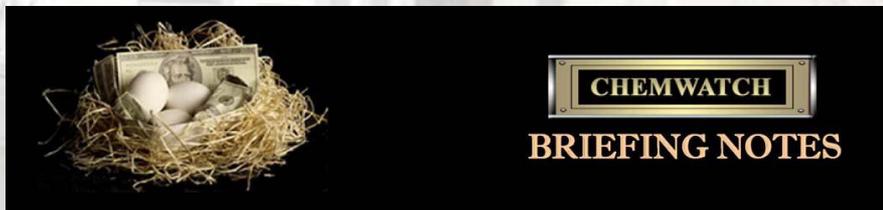
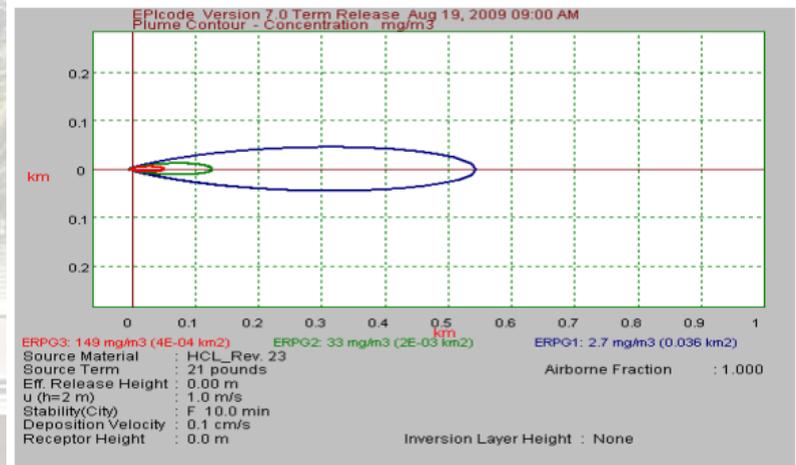
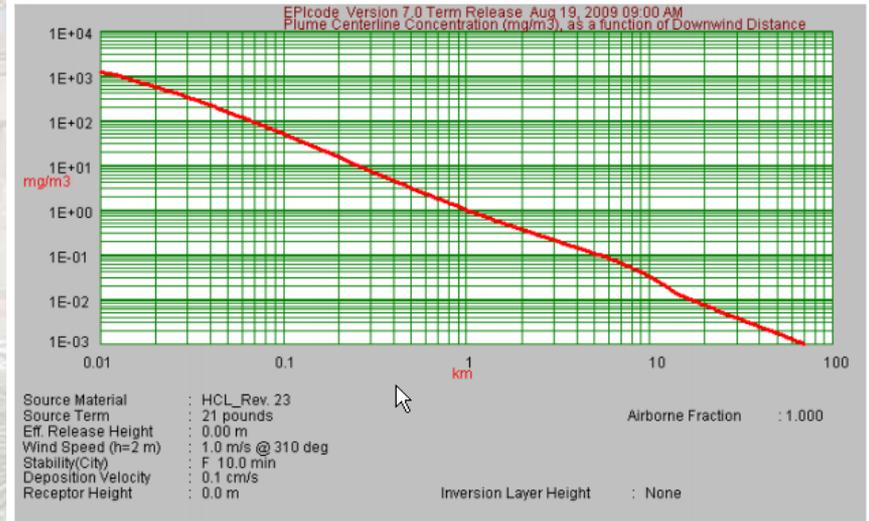
Emergency Planning Zone	Classification	
Alert	> ERPG-2 at 30 m	≥ 1 or 5 rem at 30 meters
Site Area Emergency	> ERPG-2 at 100 m	≥ 1 or 5 rem at 100 meters
General Emergency	> ERPG-2 at Site Boundary	≥ 1 or 5 rem at the site boundary

Hazardous Material Reduction Plan

1. Obtain a listing of chemical containers at TA-55, TA-50, and TA-22.
2. Identify hazardous materials in amounts that exceed specified screening thresholds at ADPSM facilities.
3. Compare the hazardous materials that meet both criteria against the list provided by EO Division.
4. Generate a list for worse case scenarios for hazardous materials within ADPSM facilities that meet or exceed chemical threshold quantities.

LANL Institutional Resources

- ChemLog
- Chemwatch
- EPIcode
- Pollution Prevention



Results: Chemical Inventory

Facility	Buildings	Chemical Containers
TA-55	20	3953
TA-22	9	1187
RLWT	5	936
Total	34	6076

Results: Threshold Quantities

TA	Bldg.	Chemical Name	Inventory (lb)	NFPA Health
50	248	Hydrochloric Acid	141	3
50	1	Sodium Hydroxide (25%)	14260	3
55	3	Chlorine	40	4
55	3	Chlorine	40	4
55	127	Nitric Acid, 69%-71%	6000	3
55	192	Potassium Hydroxide	110	3
55	192	Potassium Hydroxide	110	3
55	192	Potassium Hydroxide	110	3
55	5	Sodium Hydroxide	110	3

Results: Chemicals That Exceed Threshold Quantities

Chemical Compound	CAS Number	State	Solution Conc. (w/o)	TEEL-2 (mg/m3)	Threshold Quantity (lbs) at a distance (meters) of:					
					30	100	200	500	750	1000
Chlorine	7782-50-5	Gas		6	0.15	1	3	10	19	29
Hydrochloric Acid	7647-01-0	Liquid	37%	32	2.18	13	38	151	277	427
Hydrogen Chloride	7647-01-0	Gas		33	0.83	5	14	57	105	162
Nitric Acid	7697-37-2	Liquid	70%	62	268	1640	4650	18500	34000	52500
Potassium Hydroxide	1310-58-3	Solid		2	50.5	309	878	3490	6420	9900
Sodium Hydroxide	1310-73-2	Solid		5	126	773	2200	8720	16100	24700

Results: “As-Is” Material at Risk (MAR) within TA-55 and TA-50

CHEMICAL HAZARDS							
Location	Description	Hazard	MAR (lbs)	No. of Containers	Alert (lbs)	SAE (lbs)	GE (lbs)
TA-55-0192	Explosion: Full facility	Potassium Hydroxide	700	1	0.51	1	
TA-55-0192	Explosion: Full facility	Sodium Hydroxide	700	1	1.10		
TA-55-0127	Explosion: Full facility	Nitric Acid, 69%-71%	6000	1	268.00	6000	
TA-55-0005	Explosion: Full facility	Sodium Hydroxide	882	1	1.26		
TA-55-0003	Explosion: Full facility	Chlorine Gas	87	1	0.15	87	
TA-55-0003	LOC: Full facility	Chlorine Gas	87	1	0.15	87	
TA-55-0003	LOC: Localized	Chlorine Gas	44	1	0.15	44	
TA-50-114	Chemical reaction due to breach	Chlorine Gas	18	1	0.15	18	
TA-50-114	Chemical reaction due to breach	HCl Gas	18	1	0.83	18	
TA-50-114	Loss of Containment	Hydrochloric Acid	1489	1	4.41	4	1489
TA-50-0001	Breach of one drum	Hydrochloric Acid	365	1	4.41	365	
TA-50-0001	Breach of four drums	Hydrochloric Acid	365	4	4.41	4	1460
TA-50-0001	Breach of one drum	Sodium Silicate	543	1	37.90	1195	
TA-50-0001	Breach of two drums	Sodium Silicate	543	2	37.90	2391	

Results: Source Term Quantities within TA-55 and TA-50

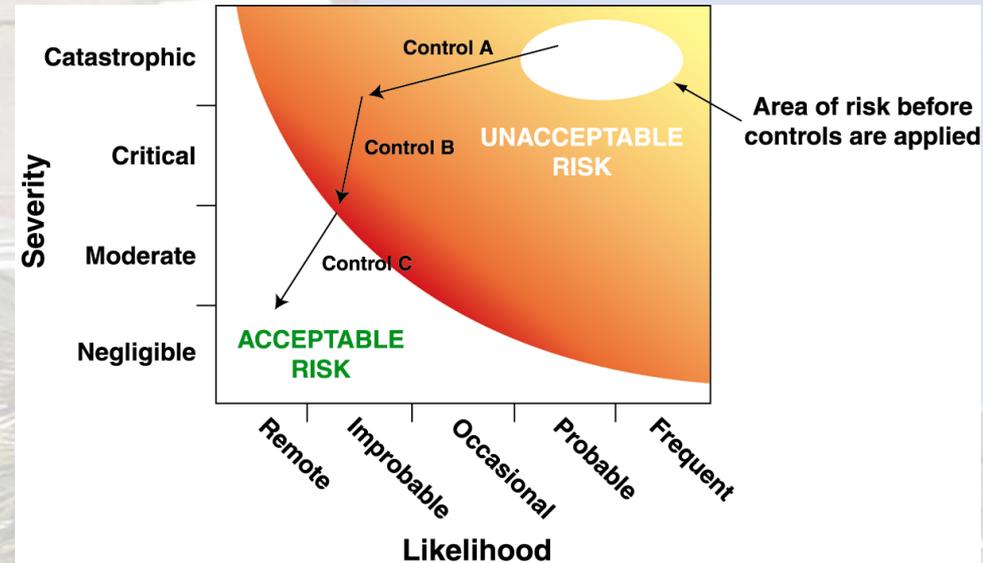
RADIOLOGICALS		MAR	Source Term at a Given Class		
Location	Description		Alert	SAEs	GEs
TA-55-0004	Fire, first floor, 2 GBs, ventilation inoperable	1.54 E + 04 Ci			9.2 E - 01 Ci
TA-55-0004	Fire, first floor, Single container, ventilation inoperable	6.12 E + 02 Ci		3.7 E - 02 Ci	
TA-55-0004	Fire, basement: TRU waste drum, RoboCal, Packing & unpacking rm; ventilation inoperable	8.84 E + 04 Ci			5.3 E + 00 Ci
TA-55-0004	Fire, Basement: TRU Waste drums; ventilation inoperable	1.43 E + 03 Ci		8.6 E - 02 Ci	
TA-55-0004	Fire, Basement: RoboCal; ventilation inoperable	7.14 E + 04 Ci			4.3 E + 00 Ci
TA-55-0004	Fire, Basement: Packing & unpacking rm; Ventilation inoperable	1.55 E + 04 Ci			9.3 E - 01 Ci

Discussion: Long-Term Reduction in Hazardous Materials

TA	Chemical Name	Opportunities
50	Hydrochloric Acid	Purchase in containers of 5 gallons or less
55	Chlorine	Investigate the feasibility of a chlorine generator
55	Potassium Hydroxide	Purchase in containers of 40 pounds or less
55	Sodium Hydroxide	Purchase in containers of 40 pounds or less

Discussion: Mission Essential Needs

- The sodium hydroxide inventory at TA-50, nitric acid inventory at TA-55, and Source Term quantities at both TA-50 and TA-55 cannot be reduced based on mission-essential needs.
- When measures are proposed to improve the hazard control system of an operation, all risk factors must be assessed.



Discussion: TA-55 and TA-50 Facility EPHA Revision Plan

TA-55 & TA-50 Facility EPHA Revision Plan	Duration	Start	End	Depart
Download ChemLog chemical container inventories.	1 day	04/25/11	04/25/11	TA55-OPS
Arrange for EO-EPP to verify material in question.	1 day	04/26/11	04/26/11	TA55-OPS
Verify materials in question.	1 day	04/27/11	04/27/11	EO-EPP
Remove chemicals from TA-55 & TA-50 Facility EPHA.	180 days	04/28/11	01/04/12	EO-EPP
Revise TA-55 & TA-50 Safety Basis documents.	20 days	04/28/11	05/25/11	SB-PF

Discussion: TA-55 and TA-50 Facility Disposal Plan

TA-55 & TA-50 Facility Disposal Plan	Duration	Start	End	Depart
Perform Hazard Assessment on reducing volumes of HCl, NaOH, and KOH.	20 days	04/25/11	05/20/11	SB-PF
Decide on smaller containers.	1 day	05/23/11	05/23/11	TA-55-RLW
Submit GSAF proposal on Cl ₂ generator	1 day	06/09/11	06/09/11	SB-PF
Place Cl ₂ generator in PF-4	360 days	06/10/11	10/25/12	TA55-OPS
Use up remaining volumes of HCl, NaOH, and KOH.	180 days	05/23/11	01/27/12	SB-PF
Use up remaining volumes of Cl ₂	180 days	10/26/12	07/04/13	TA55-OPS
Arrange for EO-EPP to verify material in question.	1 day	07/05/13	07/05/13	TA55-OPS
Verify materials in question.	1 day	07/08/13	07/08/13	TA55-OPS
Remove chemicals from TA-55 & TA-50 Facility EPHA.	180 days	07/09/13	03/17/14	TA-55-RLW
Revise TA-55 & TA-50 Safety Basis documents.	20 days	07/09/13	08/05/13	SB-PF

Summary

- An inventory assessment of hazardous material facilities have been completed.
- Pursuing opportunities discussed in this presentation will result in significant reduction of hazardous material containers; from nine containers to two.
- The other containers and Source Term quantities cannot be reduced based on mission-essential needs.
- Initiatives of this type contribute to ADPSM's scientific and technological excellence by increasing operational safety.

Acknowledgements

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