



U.S. DEPARTMENT OF  
**ENERGY**

OFFICE OF  
**ENVIRONMENTAL  
MANAGEMENT**

# Nuclear Safety – How we ensure safety

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# Purpose

- Give briefing on process used to comply with Federal Law which requires we ensure Safe Operation of Nuclear Facilities
- To fulfill a request made by the Nuclear Materials Committee



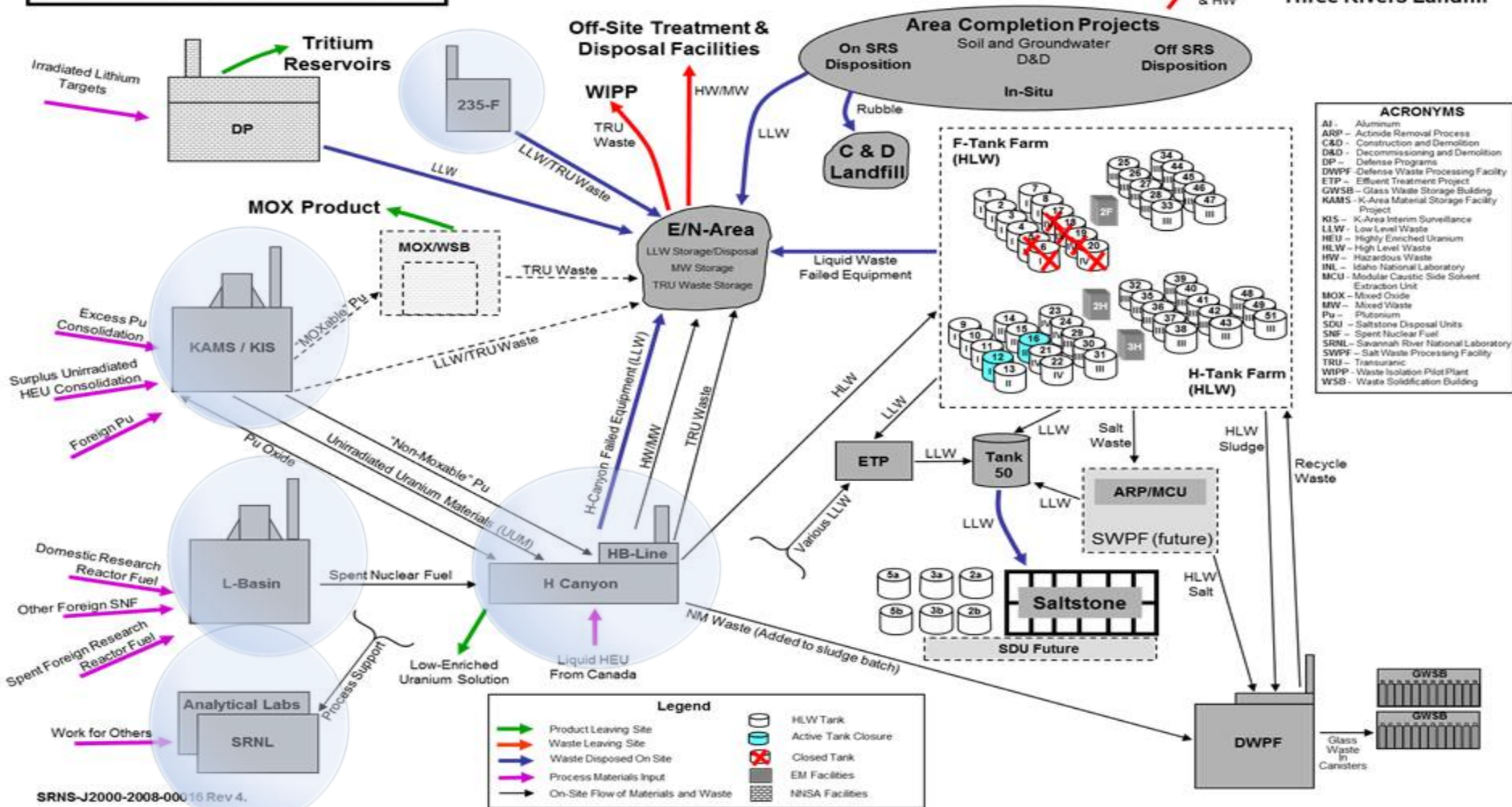
# Savannah River Site Waste and Material Flow Path



EM NM Facilities

This depiction of SRS activities shows only the general scope of the major facilities and missions. It does not represent all processes or all materials flow.

Off-Site Disposal  
e.g., Clive, Utah,  
Three Rivers Landfill



**ACRONYMS**

- Al - Aluminum
- ARP - Actinide Removal Process
- C&D - Construction and Demolition
- D&D - Decommissioning and Demolition
- DP - Defense Programs
- DWPF - Defense Waste Processing Facility
- ETP - Effluent Treatment Plant
- GWSB - Glass Waste Storage Building
- KAMS - K-Area Material Storage Facility Project
- KIS - K-Area Interim Surveillance
- LLW - Low Level Waste
- HEU - Highly Enriched Uranium
- HLW - High Level Waste
- HW - Hazardous Waste
- INL - Idaho National Laboratory
- MCU - Modular Caustic Side Solvent Extraction Unit
- MOX - Mixed Oxide
- MW - Mixed Waste
- Pu - Plutonium
- SDU - Saltstone Disposal Units
- SNF - Spent Nuclear Fuel
- SRNL - Savannah River National Laboratory
- SWPF - Salt Waste Processing Facility
- TRU - Transuranic
- WIPP - Waste Isolation Pilot Plant
- WSB - Waste Solidification Building

**Legend**

- Green arrow: Product Leaving Site
- Red arrow: Waste Leaving Site
- Blue arrow: Waste Disposed On Site
- Purple arrow: Process Materials Input
- Black arrow: On-Site Flow of Materials and Waste
- White cylinder: HLW Tank
- Blue cylinder: Active Tank Closure
- Red X: Closed Tank
- Grey box: EM Facilities
- White box: NSNA Facilities

# Acronyms

- AA- Authorization Agreement
- AEF – Active Engineered Feature
- CAM – Continuous Air Monitor
- CFR- Code of Federal Regulations
- DSA – Documented Safety Analysis
- EGs - Evaluation Guidelines
- HA – Hazards Analysis
- HEPA – High Efficiency Particulate Air
- NIM – Nuclear Incident Monitor
- NPH – Natural Phenomena Hazards
- PEF – Passive Engineered Feature
- SAC – Specific Administrative Control
- SC – Safety Class
- SMP – Safety Management Program
- SS – Safety Significant
- TSR – Technical Safety Requirement

- 10CFR830 (The Law)

- Title 10 – Energy
- Part 830 – Nuclear Safety Management
- Subpart B – Safety Basis Requirements



“The safety basis requirements of Part 830 require the contractor responsible for a DOE nuclear facility to analyze the facility, the work to be performed, and the associated hazards and to identify the conditions, safe boundaries, and hazard controls necessary to protect workers, the public and the environment from adverse consequences. ...Performing work consistent with the safety basis provides reasonable assurance of adequate protection of workers, the public, and the environment”

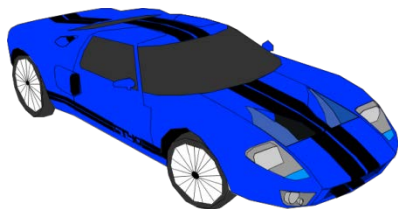
- Conclusion – we at SRS comply with the law



# Guidance (How it's done)

10CFR830 Appendix A, Table 2 'Safe Harbor' (how you can do it)

SRS facilities are Section 2, Nonreactor Facilities; so method used is DOE-STD-3009 *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*



# Guidance (How it's done)

What constitutes the facility Safety Basis? Many items, but most important are:

- Documented Safety Analysis (DSA) – **what could go wrong** (postulated accidents) and **what do we need to keep us safe** (controls/mitigation strategies)
- Technical Surveillance Requirements (TSR) – **the rules** for the stuff that we decided we need to keep safe (**operating requirements**)
- Authorization Agreement (AA) – the activities specifically authorized by DOE (**License**)

# DSA (How it's done)

DOE-STD-3009 process is as follows:

- Describe facility and process
- Perform Hazards Analysis (HA) on proposed activities (**what could go wrong**)
- Capture credible potential accidents, assign bounding (**conservative**) consequences and compare to Evaluation Guidelines (EGs)
- Accidents that 'challenge' EGs require more detailed analysis and are likely candidates for designated Safety components and/or Administrative Controls
- Confirm analysis results, functionally classify Safety equipment (SS or SC depending on whom they protect: SS onsite; SC offsite) and fully describe Administrative Programs/Controls (**who specifically do they protect**)
- Gather the elements from above process and write the TSRs in a way that clearly describes what is protected and how (**The instruction manual for the operators**)





# Example (what does this look like in the real world?)

Hypothetical 'facility' that has fissile material storage and processing:

- Hazards of concern (typical, not intended as an all inclusive list)
  - Criticality
  - Airborne respirable contamination
  - Direct exposure (shine)
  - Impact (drop, vehicle, missile)
  - Fire
  - Natural Phenomenal Hazard (NPH) (tornado, earthquake)



## Example (Continued)

- Equipment prevention/mitigation (design features; active engineered feature: Safety significant = workers; Safety Class = public)
  - Criticality – safe shape (design feature); criticality blocks (design feature); NIMs (active feature); all features SS
  - Airborne material control – HEPA filtered ventilation (active feature) SC; CAMs (active feature) SS
  - Direct exposure – walls (design feature) SS
  - Impact – robust storage container (design feature) SS; specially designed shipping package (design feature) SS
  - Fire – detection and suppression system (active feature) SC
  - NPH – building design and construction to withstand earthquakes (design feature) SC



## Example (Continued)

- Admin programs/controls (Safety Management Programs = SMP; Specific Admin Controls = SAC)
  - Criticality – material limits (SAC)
  - Airborne material control – Radiological Control coverage to detect (SMP)
  - Direct Exposure – Radiological Control coverage to detect (SMP)
  - Impact – control vehicle operations (**speed and location**) and gas bottle locations (SACs); material handling strategies (**don't lift big stuff over nuclear material**) (SMP)
  - Fire –fire prevention (SMP); combustible load limits (SAC)
  - NPH – Emergency Response (SMP)



# Summary

- Safety is the number one priority at SRS
- Safety of DOE facilities is a rigorous and robust process with checks and balances
- Personnel responsible for facility safety are well trained and qualified