Idaho Cleanup Project

Lessons Learned from Close Interaction between Nuclear Safety and Fire Protection within the Idaho Cleanup Project

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Agenda

1. Compare and contrast FHAs and DSAs
2. Discussion: misconceptions, frequently asked questions, real-life FHA/DSA inconsistencies

Purpose

Documented Safety Analysis (DSA)

1. The DSA and hazard controls provide reasonable assurance that a DOE nuclear facility can be operated in a manner that adequately protects the public and workers.
2. Identifies controls to minimize risk of radiological exposure to public and workers

Fire Hazards Analysis (FHA)

1. The FHA identifies the potential for fire loss (life, mission, monetary) and justifies the appropriate fire protection programs and systems to meet DOE fire protection goals
2. Identifies controls to minimize government's cost of restoring to pre-fire condition

Driver

Documented Safety Analysis (DSA)

- Federal Law –

  10 CFR 830 Subpart B invokes DOE standards that prescribe methodologies and approaches

Fire Hazards Analysis (FHA)

- ICP Contract –

  List B includes both DOE O 420.1B and DOE O 440.1A which invoke codes and consensus standards:

  – OSHA
  – NFPA
  – IBC

Required for

Documented Safety Analysis (DSA)

1. Hazard category 1, 2, and 3 nuclear facilities

Fire Hazards Analysis (FHA)

1. Hazard category 1, 2 and 3 nuclear facilities,
2. Significant new facilities, and
3. Facilities that represent unique fire safety risks

Contractor has latitude in how nuclear facilities are delineated

Typically, a *Building FHA* covers one building and its auxiliary systems

Area FHAs may be used for groups of buildings or areas with common missions/operations… or common elements: fire water supply, alarm systems, emergency planning, etc.

ICP Nuclear Facilities

Hazard Category 2

INTEC 1st Calcined Solids Storage Facilities
INTEC 2nd, 3rd, 4th, and 5th Calcined Solids Storage Facilities
INTEC 6th Calcined Solids Storage Facilities
INTEC FAST Fuel Storage Area (FSA)
INTEC Unirradiated Fuel Storage Facility
Radioactive Waste Management Complex (RWMC)
INTEC Underground Fuel Storage Facility
INTEC Process Equipment Waste (PEW) System
INTEC New Waste Calcining Facility
[INTEC Waste Management Facility (IWMF) – appendage to the NWCF]
*Integrated Waste Treatment Unit (IWTU)***

INTEC Tank Farm
INTEC Irradiated Fuel Storage Facility
INTEC Laboratory Facilities
INTEC Fuel Processing Facility
▪ INL On-Site Transportation Activities
▪ INTEC Cask Transfers
▪ *Generic D&D Activities***

Hazard Category 3

INTEC FAST Fluorinel Dissolution Process Area
INTEC CPP-603 Basin Facility

INTEC Remote Analytical Lab
▪ Calcine Sample Storage Cask Ops*

* scheduled for cancellation ** *future nuclear facility* ▪ *activity or operation, not a physical facility*

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When reviewed and revised

Documented Safety Analysis (DSA)

- Annually submit to DOE either the updated DSA for approval or a letter stating that there have been no changes in the DSA since the prior submission

Fire Hazards Analysis (FHA)

- Review every 3 years
- Revise when
  - Changes to the annual DSA updates impact the contents in the FHA,
  - A modification to the facility or an associated facility poses a significant new fire safety risk, or
  - The 3 year review identifies the need for changes

Hazards and accident analysis

Documented Safety Analysis (DSA)

- All hazards are identified and grouped
- Events/accidents are postulated and binned according to probability and consequences
- Bounding and some representative accidents are analyzed, assuming no mitigation
- For ICP nuclear facilities, fire accidents comprise most of the significant accidents that can lead to radiological exposures to workers and the public

Fire Hazards Analysis (FHA)

- Fire initiators and flammable/ combustible materials are identified by fire area
- Analyses focus on individual fire areas
- Evaluates the consequences of a single, worst-case automatic fire protection system malfunction
- Assumes the fire will occur (Probability of 1)

Controls selection

Documented Safety Analysis (DSA)

1. Controls are selected to reduce the risk (probability and/or consequences) of accidental radiological dose to workers and the public

Fire Hazards Analysis (FHA)

1. Controls are selected to reduce risks … and the government's dollar loss of restoring to pre-fire conditions

Preferences in selecting controls

1) Controls that *prevent* over controls that *mitigate* consequences
2) Passive engineered over active engineered controls
3) Engineered controls over administrative controls
4) Personnel Protective Equipment (PPE) is last choice

Other considerations in selecting controls

- Reliability, availability, maintainability
- Effects on facility workers
- Optimization and integration
- Cost/benefit
- Human factor impacts
- Impacts on ICP or facility-specific mission

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DSA vs. FHA

Documented Safety Analysis (DSA)

1. Evaluates all events, fires among most significant
2. Consequence is radiological dose to public & workers
3. Considers probability (expected, anticipated through beyond extremely unlikely)
4. Thresholds are multi-stepped levels for *consequence* and *probability* for 3 different receptors (public, co-located worker, facility worker)
5. Controls selected to ↓ radiological dose

Fire Hazards Analysis (FHA)

1. Evaluates fire events
2. Consequence is $$ loss (cost to restore to pre-fire condition)
3. Probability of 1
4. Thresholds are MPFL of $1M and $50M
5. Controls selected to ↓ $$ loss