

# The Steps Necessary for Successful D&D

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# Outline

- Purpose
- Definitions
- Drivers for fire protection features
- Systems typically proposed to be taken out-of-service while awaiting D&D
- Drivers for the deactivation of the fire protection systems



# Outline

## (cont'd)

- Deactivation of fire suppression in large facilities
- Facilities awaiting D&E
- Considerations during decommissioning
- Conclusions



# Purpose

- Provide an overview, from a fire protection perspective of the steps necessary to prepare a facility for Deactivation and Decommissioning (D&D)
- Fire protection for nuclear facilities is a critical safety system and must be adequately addressed when preparing a facility for D&D





# Definitions

## Authority Having Jurisdiction (AHJ):

- *The organization, office, or individual responsible for approving equipment, an installation, or a procedure.*

## Combustibles:

- *Materials, solid or liquid that support combustion and that contribute to the fire protection needs of a facility*



# Definitions (cont'd)

## Deactivation:

- *The process of placing a building, portion of a building, structure, system, or component in a safe and stable condition to minimize the long-term cost of a surveillance and maintenance program in a manner that is protective of workers, the public, and the environment.*



# Definitions (cont'd)

## Decommissioning:

- *For those buildings, portions of buildings, structures, systems or components in which deactivation occurs, all activities that occur after the deactivation. It includes surveillance, maintenance, decontamination and/or dismantlement for the purpose of retiring the building from service with adequate regard for the health and safety of workers and the public and protection of the environment.*



# Definitions (cont'd)

## Fire Hazards Analysis (FHA):

- *A report that comprehensively assesses the risk from fire within individual fire areas in relation to the existing or proposed fire protection features so as to ascertain whether the objectives of the AHJ are met. The report is generally performed by or under the direction of a qualified fire protection engineer*



# Definitions (cont'd)

## Fire Protection System:

- *Any fire alarm device or system, or fire extinguishing device or system, or combination thereof, designed and installed for detecting, controlling, or extinguishing a fire or otherwise alerting occupants, the fire department, or both that a fire has occurred*



# Definitions (cont'd)

## Life Safety System:

- *Any device or system designed and installed for assisting or protecting building occupants in timely evacuation of a facility. Egress lighting and exit signs are examples of Life Safety Systems.*



# Drivers for Fire Protection Features

- Governed by
  - Fire Risks to the public
  - Fire Risks to the workers
  - Fire Risks to the Fire Fighters
  - Potential release of hazardous and/or radiological materials to the environment
  - FHA credited features
  - Authorization Basis credited features
- Property protection and program continuity are not normally factors to consider for D&D
  - Insurance carrier(s) may have input/criteria



# Need for Fire Protection Features (cont'd)

- Fire hazards may change over time
  - Fire protection features must be adequate to quickly deal with these changes
  - The Fire Hazards Analysis (FHA) and other similar documents (AB's, FSAR's, PRA;s, etc.) must be current, revised and approved accordingly
  - Fire safety features that were previously required by the Authority Having Jurisdiction may be deactivated when technically justified by the FHA and then approved by the AHJ and the appropriate AB document



# Systems That Typically Are Proposed to Be Deactivated While Awaiting Decommissioning Include the Following:

- Automatic sprinklers
- Gaseous fire protection systems
- Fire extinguishers
- Hose reel stations
- Manual fire pull stations
- Filter plenum fire protection systems
- Emergency lighting
- Exit lighting
- Smoke/Heat detection



**In Many Cases, the Driver for the Deactivation of the Fire Protection Systems Are the Costs Associated With the Maintenance of Systems/Services That Include:**

- Heat
- Power
- Inspection, Testing and Maintenance (ITM)
- Maintenance of the lighting circuits
- Exhaust ventilation
- Security
- Occupant safety



**Necessary and sufficient measures are required to be in place and maintained for the facility to be in a safe shutdown mode whereby the systems will not be necessary**



- Define and Remove Combustibles
- Minimize Ignition Sources
- Remove Oil(s) in Machinery and Equipment
- Removal of Nuclear Material
- Documentation via an approved FHA



# Removal of Combustibles

- Remove **ALL** combustible material, both fixed and transient
- If there are exceptions they need to be analyzed
  - Computer based fire modeling
- Examples of exceptions
  - Fiberglass reinforced plastic HVAC
  - Wood paneling



# Removal of Nuclear Material

- Generally all nuclear material must be removed prior to the deactivation of the fire protection systems
- Hold-up material can be a difficult issue
  - Contained within ductwork, machinery, gloveboxes
  - Measurement not precise
  - Can be very difficult to remove
  - Need to consider impacts of lofting



# Nuclear Safety Perspective

- A fire protection system is only required if the dose calculations indicate that an unmitigated fire (one that only relies on passive controls) does not exceed the allowable dose to the public or co-located worker.
- When the dose calculations indicate that a fire protection system is warranted, then credit is given for the particular fire protection system.



# Deactivation of Fire Suppression Systems in Large Facilities

- Must reflect the possibility that emergency response forces may not be able to safely enter the facility to conduct manual fire suppression
- A “stand-off and protect” tactical approach which will involve an exterior attack and protection of exposures must have approval of the AHJ (“surround and drown”)



# Example of Stand-Off and Protect



# Deactivation of Fire Suppression Systems in Large Facilities (cont'd)

- If approved, additional emphasis must be placed on maintaining communication and cooperation between facility personnel and emergency response groups
- Updating fire pre-plans
  - Document the changes of occupancy
  - Document the changes in fire protection system status



# Deactivation of Fire Suppression Systems in Large Facilities (cont'd)

- Consideration should be given to the possibility of restoring the fire protection system when the facility is ready for D&D
- In the case of automatic sprinklers, this could be difficult due to corrosion over time
- The Navy has experience with similar systems on moth balled vessels



# Facilities Awaiting D&D

- Retained fire protection systems may not be required to comply with all design and installation standards with the approval of the AHJ
- It may only be important for the system to function “adequately” during a fire in it’s current design mode.
- Certain systems could be manual



# Facilities Awaiting D&D (cont'd)

- However, retained fire protection features must be inspected, tested and maintained in a necessary and sufficient to assure that the features will function adequately (as credited) during postulated fire(s)
- Additionally, these types of facilities must be routinely inspected and reviewed by representatives of the local fire authority and fire protection engineers to ensure conditions are consistent with all approved documents (FHA, AB, Pre-fire plan, etc.)



# Considerations During Decommissioning

- Prior to actual D&D, procedures must be implemented to control hazardous operations such as
  - Cutting and welding
  - Combustible controls, in-place and transient
  - Smoking (generally not a problem)
- Prior to D&D, the following should be addressed
  - Life safety features of the facility
  - Notification of Fire Department
  - Temporary heat-producing devices



# Considerations During Decommissioning (cont'd)

- All retained interior fire protection systems should be maintained and verified operational while interior D&D activities are taking place
- Interior fire protection systems previously removed from service during deactivation should be evaluated for reactivation during interior D&D activities
- The need for these systems will require detailed analysis utilizing tools such as computer fire models, PRA's, etc.



# Considerations During Decommissioning (cont'd)

- All FHA/Authorization Basis fire protection features that are credited must be maintained and verified operational
- Periodic tours by the emergency forces must be made to familiarize them with the current conditions
- Drills and exercises must be conducted that reflect the current configuration of the facility



# Conclusions

- Fire Protection Features can be properly deactivated
- Fire Protection Features are important during actual decommissioning
- FHAs are an important element in the justification of the deactivation of fire protection features
- Ultimately, the public, worker and the environment must be adequately protected during all phases of D&D

