The Cold & Dark Process at the Savannah River Site - 9509

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ABSTRACT

The Savannah River Site (SRS) is a 310-square-mile United States Department of Energy nuclear facility located along the Savannah River (SRS) near Aiken, South Carolina. Nuclear weapons material production began in the early 1950s, utilizing five production reactors. In the early 1990s all SRS production reactor operations were terminated.

The first reactor closure end state declaration was recently institutionalized in a CERCLA Early Action Record of Decision. The decision for the final closure of the 318,000 square foot 105-P Reactor was determined to be Insitu decommissioning (ISD).

In order for employees to safely perform D&D work within the P Reactor complex, the facility needed to be placed in a condition known as Cold and Dark.

Cold and Dark ensures a facility is isolated from all external sources of hazardous energy. This includes both identifying potential sources of stored energy as well as isolating electrical and mechanical devices that might pose a hazard to employees. The following paper outlines the process.

INTRODUCTION

The deactivation and decommissioning (D&D) of a facility exposes D&D workers to numerous hazards. One of the more serious hazards is coming into contact to hazardous energy sources (e.g., electrical, pressurized steam). At the Savannah River Site (SRS), a formal process for identifying and eliminating sources of hazardous energy was developed and is called “Cold & Dark”. Several “near miss” events involving cutting of energized conductors during D&D work in buildings, thought to be isolated, identified the need to have a formal process to identify and isolate these potentially hazardous systems. This process was developed using lessons learned from D&D activities at the Rocky Flats Environmental Technology Site (Rocky Flats) in Colorado. The Cold & Dark process defines an isolation boundary (usually a building perimeter) and then systematically identifies all of the penetrations through this boundary. All penetrations that involve hazardous energy sources are then physically air-gapped. The final product is a documented declaration of isolation performed by a team involving operations, engineering, and project management. Once the Cold & Dark declaration is made for a building, work can proceed without the usual controls used in an operational facility (e.g., lockout / tagout, arc flash PPE). It is important to note that the Cold & Dark process does not remove all hazards from a facility. Work planning and controls still need to address hazards that can be present from such things as chemicals, radiological contamination, residual liquids, etc., as well as standard industrial hazards.

BENCHMARKING

The Savannah River Site conducted Benchmarking to compare the Cold and Dark Process at other DOE sites such as Mound and Rocky Flats. The results of the process revealed some similarities and a few differences. The similarities included the following:

- Mound and Rocky Flats were conducting D&D of complete facilities,
- Both sites used a methodical process for isolating utilities and verifying the end state prior to demolition activities
- Both sites required a team based approach, which included hazardous energy sources not just electrical, and both sites required a 100% voltage check.

The differences included the following:

- Both Rocky Flats and Mound processes include demolition interferences. The Savannah River Site covers interferences as part of a separate Engineering Survey
- Both Rocky Flats and Mound processes allow for "levels" of Cold & Dark. Our process is" All or None". Also, Mound and Rocky Flats allow the use of a L/T in lieu of physical air gapping in some circumstances
- And The Rocky Flats process involves an Independent Management Review Board for more complex facilities.

The use of benchmarking played an integral part in the final development of the Cold and Dark Process at the Savannah River Site. Benchmarking in the future will occur to ensure that the SRS is utilizing the lessons learned from other DOE facilities.

WORK DESCRIPTION

The process developed at SRS expanded on a similar process used during the decommissioning of Rocky Flats. It is a robust, thorough, team based process which identifies all sources of hazardous energy and systematically isolates them. The primary steps to declare a facility Cold & Dark are:

1. Define the scope of work and the isolation boundary. This boundary needs to be defined in all three dimensions, usually at the exterior of a facility. This includes all four exterior walls, the slab, and the roof (see Figure 1).

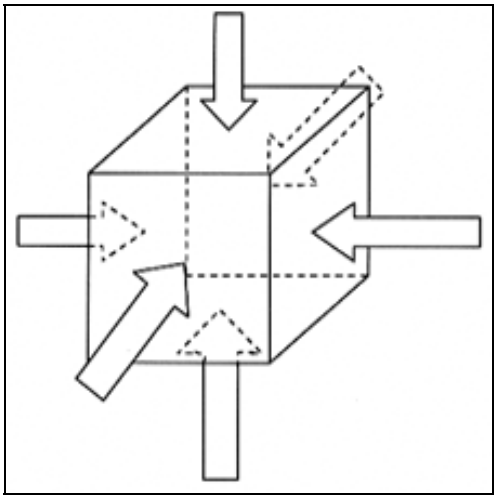

Figure 1. The Cold & Dark Isolation Boundary

2. Assign the team members. The team always includes, as a minimum, an Isolation Engineer, Planner, and Electrical Supervisor. Other subject matter experts (e.g., Fire Protection, Security, and Safety) can be assigned if needed.
3. Initial field walkdown performed by team.
4. Engineer performs document search, additional walk downs, and interviews. All work, at this point, is non-intrusive.
5. Engineer develops an isolation index. This index lists all of the cables, conduits, and pipes that penetrate the isolation boundary. The index includes detailed information on each item that includes a description, the source and the destination. If the engineer is unable to determine all of the needed information, an intrusive walkdown is performed by qualified electrical workers. This includes opening electrical enclosures, verifying absence of voltage, and toning circuits so that all sources and destinations are identified.
6. The index, along with pictures and recommended work instructions, are combined into a single document. This document is then reviewed by a different isolation engineer and then approved by the Engineering Manager. The approved document is provided to Planning.
7. The planner develops a work package that provides instructions for verifying each item on the matrix and physically "air gapping" the cable, conduit, or pipe at both the source and the destination.
8. After the work package is developed and approved, qualified workers cut air gaps in cables, conduits, and pipes.
9. The engineer assures fieldwork has been completed per the isolation index and notifies the project manager for a management team walkdown.
10. A team consisting of the isolation engineer, project manager, and engineering, mechanical, and electrical operations management walk down the facility to ensure all electrical and mechanical feeds have been air gapped and all stored energy hazards have been addressed.
11. A verification of hazardous energy isolation document is approved in the field by the above management and the facility is now considered "cold and dark".

RESULTS

Savannah River Site experienced six electrical events prior to declaring a facility "cold and dark" and has had zero electrical events after "cold and dark" declaration (263 facilities to date).

CONCLUSIONS AND DISCUSSIONS

The formal Cold & Dark process developed at SRS has eliminated D&D worker exposures to hazardous energy sources. Since the implementation of the process, there have been no incidents involving energized conductors or pressurized liquids/gases. During this time, SRS has demolished over 200 facilities. The ability to perform intrusive D&D activities without the normal controls, such as lockouts, results in shorter schedule durations and lower overall costs for a facility D&D.