

**This document was prepared in conjunction with work accomplished under Contract No. DE-AC09-96SR18500 with the U.S. Department of Energy.**

**This work was prepared under an agreement with and funded by the U.S. Government. Neither the U. S. Government or its employees, nor any of its contractors, subcontractors or their employees, makes any express or implied: 1. warranty or assumes any legal liability for the accuracy, completeness, or for the use or results of such use of any information, product, or process disclosed; or 2. representation that such use or results of such use would not infringe privately owned rights; or 3. endorsement or recommendation of any specifically identified commercial product, process, or service. Any views and opinions of authors expressed in this work do not necessarily state or reflect those of the United States Government, or its contractors, or subcontractors.**

## **The Cold & Dark Process at the Savannah River Site**

John C. Gilmour  
CH2SRC  
And  
Michael L. Willis  
WSRC

### **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.

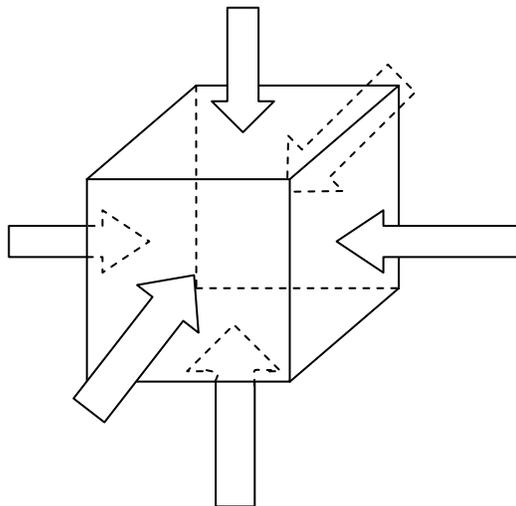
Once the Cold & Dark declaration is made for a building work can proceed without the usual controls used in an operational facility (e.g. lockout/tagout, arc flash PPE). It is important to note that the Cold & Dark process does not remove all hazards from a facility. Work planning and controls still need to address hazards that can be present from such things as chemicals, radiological contamination, residual liquids, etc., as well as standard industrial hazards.

### **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 3 dimensions, usually at the exterior of a facility. This includes all four exterior walls, the slab, and the roof.

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 walk down 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 walk down 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 field work 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 above management and the facility is now considered “cold and dark”.

## **Results**

Savannah River Site experienced 6 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 lock outs results in shorter schedule durations and lower overall costs for a facility D&D.