EFFECTIVE IMPLEMENTATION OF DOE RESTART ORDERS AND STANDARDS FOR DEACTIVATION FACILITIES

W. C. Tindal, D. L. Daniels
BWXT Y-12, L.L.C.
Y-12 National Security Complex
P.O. Box 2009, Oak Ridge, TN 37831-8123

ABSTRACT

Building 9206 at the Y-12 National Security Complex has recently completed an Operational Readiness Review (ORR). The scope of the review covered the transition from a post operation surveillance and maintenance (S&M) mode to a deactivation mode. This process has generated several lessons learned that may be valuable to other Department of Energy (DOE) nuclear facilities.

INTRODUCTION

When one thinks of a deactivation project involving a nuclear facility, certain common threads always seem to surface. Building 9206, at the Y-12 National Security Complex (NSC), is no exception. The facility was operated during the cold war supporting nuclear weapon production. Its mission involved fissile and other radioactive materials. With the end of the cold war, production requirements reduced. Increased regulations and scrutiny accompanied the transition. The result is a facility whose capacity is in excess of mission requirements, or an "excess facility."

As with a number of facilities in the nuclear weapons complex, what became the final shut down did not begin that way. What was to be a short stand down of operations to address safety concerns at the site became a permanent shut down for Building 9206. The decision for permanent shut down was based on limited funds for restart of the site coupled with the fact that the building provided unneeded excess capacity. The compound result is an excess facility that contains a substantial quantity of fissile materials. In fact, some process systems remain loaded with virtually the same materials that were being processed at the time of the stand down.

As an excess nuclear facility, the next step in the life cycle is Deactivation. The top priority of deactivation is the removal of hazardous materials from process systems. It is there that the interface between operating nuclear facility requirements and facility disposition requirements begin to blur. And it is this contradiction and lessons learned related to the efficient navigation of restart issues that is worthy of investigation.

This paper presents lessons learned from the recent completion of an ORR at Building 9206. The scope of the review included the stabilization of a highly reactive compound and the transition from post operations S&M to deactivation. The format for the paper includes a general question with the corresponding lesson learned by the project. This is followed by a discussion of the lesson including examples.

IS AN ORR REQUIRED FOR TRANSITION TO DEACTIVATION?

Our lesson at Y-12 is that for a complex Deactivation project, an Operational Readiness Review is appropriate to assess readiness for transition from post operations S&M to deactivation.

In order to discuss the issues, let us first review the readiness review requirements for nuclear facility restart. These requirements are defined in Attachment A of Reference 1. Simply, there are four options with respect to the order. There can be an ORR, Readiness Assessment (RA), an exemption from the order, or a justification that the order does not apply. These questions are vital to understanding the support requirements needed during the review and the resulting cost to the project. It is inescapable that with increased level of review, expectations for documentation increase. This results in significant increased cost.

Right off, one could argue that the order does not apply. The stated scope is for the restart of nuclear facilities. While a nuclear facility, in this case the facility is being deactivated rather than being restarted. In addition, the applicability of the order is directly tied to the concept of "program work". Program work is defined in Reference 2 as:

> Work in a reactor or non-reactor nuclear facility that is accomplished to further the goals of the facility mission and/or the program for which the facility is operated. Program work is not accomplished when a facility is shutdown. Program work does not include work that would be required to maintain the facility in a safe shutdown condition, minimize radioactive material storage, or accomplish modifications and correct deficiencies required before program work can recommence.

Once a facility has completed it's operational life and is ready to transition to deactivation, it has ceased program work. Even though nuclear activities may be conducted in support of deactivation, in most all cases they are required to "maintain safe shutdown" or other facility support activities.

The path to considering an exemption follows a similar logic. Reference 2 describes one of the situations where they would be appropriate as, "one-time unique operations to clean out systems or components incident to deactivation and decommissioning." This seems to be a tailor made fit to deactivation. However seeking an exemption is often perceived as avoiding a requirement. Our experience in pursuing this course of action for Building 9206 was not positive. The additional requirements for justification were so extensive that completion of the ORR was a more efficient resolution.

With respect to an ORR, the order contains six cases where an ORR is required but three specifically relevant to cases involving deactivation. A category 2 facility must conduct an ORR for a "Restart after an extended shutdown" of 12 months or more, "after

substantial process, system, or facility modifications," or "when deemed appropriate by DOE management." These requirements do not clarify the applicability to deactivation projects.

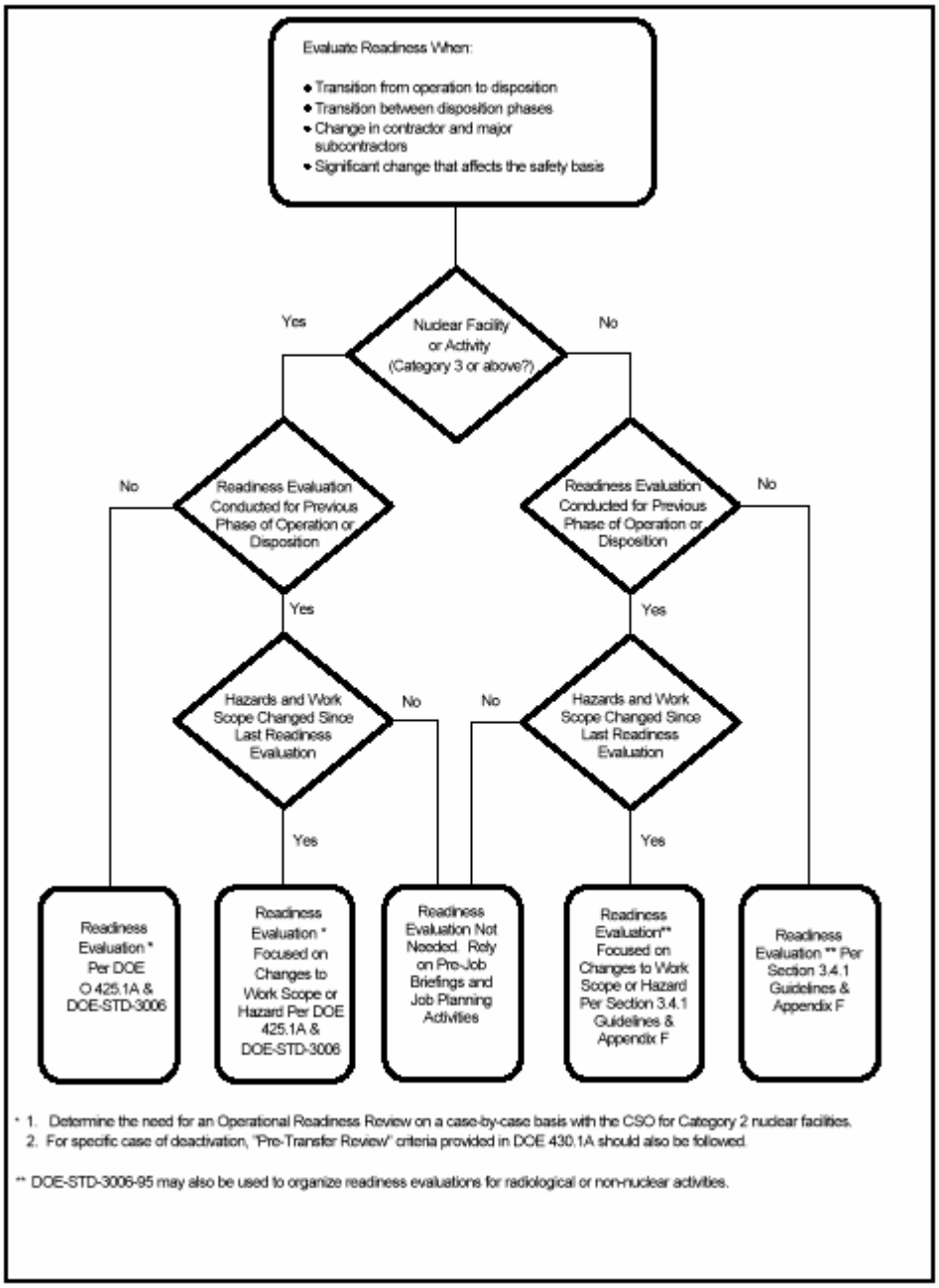

Figure 1: Readiness Evaluation Determination

DOE has recognized that there are interpretations necessary between DOE orders and requirements followed for deactivation. In order to clarify these differences, a DOE Standard was issued. This standard, DOE-STD-1120-98 (Reference 3), presents a

flowchart for use in determining what type of review is appropriate for this type of facility life cycle transition (Figure 1).

Evaluating the flow chart with Building 9206 in mind, the first question is what is being evaluated. In this case it is the transition to deactivation. The stand down duration was longer than 12 months and there is no record of a recent readiness evaluation. By following the flow chart, the application of DOE O 425.1A (or the current order 425.1B) is clearly specified.

In addition Volume II, Appendix B contains examples of how to apply the concepts contained in the standard. Example # 21 discusses a hazard category 2 nuclear facility similar to Building 9206. This example suggested strongly that an ORR was the appropriate readiness review mechanism. In fact, this example was the main deciding factors in the determination that the transition of Building 9206 from post operations S&M to deactivation would require an ORR.

HOW CAN YOU POSSIBLY COVER THE WHOLE SCOPE OF DEACTIVATION IN ONE REVIEW?

The scope of a Deactivation ORR is best focused on the first major stabilization or clean out activity. Use the preparations for that first activity to "prove in" the safety programs that will be utilized for future deactivation work.

Deactivation activities are almost always performed in order to reduce hazards. In fact following LCAM guides and implementing an end-points process ensures this. The most logical way to execute a deactivation project is to reduce or eliminate the largest hazards first. Reducing the largest hazards first is driven by the desire to eliminate the risk to workers, the public, and the environment. This also results in earlier reduction in S&M cost.

It is extremely difficult to imagine evaluating readiness for an entire deactivation project. With duration typically covering several years, the project will utilize multiple procedures and safety approvals. The scope would be so large that it would likely be impossible to ensure that the paperwork generated at the start of the project would be suitable for use when it comes time to execute that phase of the project. The answer is that in reality you cannot perform a readiness evaluation that covers all deactivation execution activities.

While it may seem strange, the best situation is one where this first deactivation is significantly complex and involves the majority, if not all site safety programs. At building 9206, this involved stabilization of an enriched uranium compound that is pyrophoric in air. Since the potential hazards include nuclear criticality, fire, explosion, exposure to radioactive and toxic material, high temperatures, and exposure to an asphyxiant, it constituted the most complex deactivation task anticipated. Preparation involved nuclear criticality safety approvals, modification to safety documentation, and approval from fire protection engineers, industrial safety, industrial hygiene, and

radiological control, to name a few. In addition this was not a compound commonly handled by operations personnel so the involvement of technology development engineers was important to ensure that the stabilization process would work.

The activity required virtually the highest level of training and procedures. It involved very detailed control of equipment configuration and status. Extensive safety analysis was required, especially to understand the extent of the fire and explosion hazard. This analysis included computer modeling of dynamic upset conditions such as loss of inert gas containment and resulting detonation.

The key point is that by proving that the project team is able to implement these programs properly and correctly for this high hazard evolution, they are equally qualified to implement these programs for future deactivation work. While this does not absolve the team from future readiness reviews (some type of review will always be warranted), it does limit the scope to ensuring that the appropriate programs have been implemented for that process.

HOW DO YOU ASSESS READINESS FOR THE FUTURE WORK?

A graded readiness assessment program is key to the ability to address uncertain future scope.

From the highly complex stabilization operation described above, to housekeeping and utility reconfiguration, deactivation of a nuclear facility requires a wide variety of discrete activities. A significant number of these activities would be considered nuclear activities based on the potential for nuclear criticality. Nuclear activities fall within the scope of DOE O 425.1B, and prior to the start of work, a formal process is required to assess readiness.

Assuming a Deactivation ORR was performed, as described above, future work involving nuclear activities would require a graded RA. The requirements for when to perform a RA are much simpler. The advantage of performing a RA is that the level of documentation required is significantly less. The level of documentation is driven by the level of hazards and is typically specified in site management procedures. For Building 9206 this approach was a good fit with the project execution approach that grouped work into approximately 50 discrete subprojects.

At Y-12, the graded RA process is documented in a site manual on readiness. Used for both nuclear and non-nuclear readiness, the manual is an extremely valuable tool. The manual provides a formal grading process for a RA based on screening criteria. These criteria include impact on safety basis, use of safety class equipment, extensive facility modifications, significant changes to nuclear criticality safety documentation, training, or unique hazards. If met, a numerical score is given for each of the above criteria. These scores are added together to determine an overall grading score. The total score determines if a Level I, II, or III RA will be required.

These screening criteria rely on the facility having a previous ORR and provide an excellent implementation of the guidance contained in Reference 3. The results of the screening provide one of three levels of Readiness Assessment. These levels provide grading with respect to the depth and breadth of the review.

A Level III RA corresponds to the highest level of rigor and formality. Similar in substance to an ORR, this level of RA is required for cases where significant hazards exist, where controls for the hazards are complex, or where there are significant changes to safety basis documents. Similar to an ORR, a Level III RA requires an approved Plan of Action and an Implementation Plan.

A Level II RA is not significantly different from a Level III RA. However, a Level II RA does allow for a more targeted scope of the review. This scope is documented in the Plan of Action.

A Level I RA corresponds to the least complex evolutions. The intent is that this level of review would be appropriate for evolutions where little change is needed in safety documentation, training or hazard controls. Examples would include performing a clean out activity in a hood where a similar activity has already been performed. This level of review does not require the same level of documentation as the higher two levels. While still independent, the requirements for details in the Plan of Action are significantly reduced. In addition this level does not require a separate implementation plan.

The manual also includes a readiness evaluation called Standard Operation checklist. As with any grading process using a numerical scoring method, a question will arise when a zero score is assigned. The standard operation is used for new activities that score zero points. Operations management, to ensure that all appropriate documentation is prepared prior to starting an activity, uses a simple checklist.

WHAT IS THE BEST PREPARATION METHOD FOR A DEACTIVATION RELATED READINESS REVIEW?

A strict focus on safe operation (regardless of the review) is key to successful completion of the review.

The best advice we were ever given related to readiness review preparation was to ignore the fact that there would be a review. At a site where the review process has resulted in a high level of scrutiny, it can be understood why a significant amount of attention has been directed toward the review process. However, this focus can ultimately be counterproductive. Focus on the review can result in a lopsided focus on paperwork rather than on performance.

The trap of preparing for the review rather than operations is quite logical. No one with any competitive spirit likes findings. When a review results in findings, a significant quantity of work is needed to address the finding, identify the root cause, create a corrective action plan, and document closure of the corrective actions. Good well

meaning personnel who have dealt with readiness review findings in the past tend to prepare for reviews by utilizing the lessons learned from previous reviews. While this is important it can result in a punch list of items to be addressed. The danger is that this can lead to a thought process where one thinks, "If I address the list of previous failures, I will be successful in the future."

Focus on the review can have several damaging results. While addressing lessons learned is an important healthy activity, a backward looking attitude misses a key area for readiness, preparation for processing. Previous lessons should be used as a final check after all preparation activities have been completed.

Recent experience at Building 9206 was very positive in this area. Preparation included extensive practice in the field. Procedures were exercised prior to operation using a surrogate material. While the material properties were not identical to the material being processed, all operating procedures could be practiced prior to initial operation. In addition, technical information was presented as a means to ensure safe operation rather than an end to themselves.

CONCLUSION

For a typical deactivation project involving a nuclear facility, significant effort can be expended early in the deactivation process addressing readiness review requirements. Lessons learned from Building 9206 at the Y-12 NSC have shown that an ORR is the appropriate readiness review process for nuclear facility transition from post operation S&M to deactivation. The best scope for this review is one that includes the highest hazard activity, coupled with a commitment for graded readiness assessments for future activities. Finally, preparation focused on operation can avoid the backward looking trap that results in preparing for the review rather than operation.

REFERENCES

1. DOE O 425.1B, Startup and Restart of Nuclear Facilities
2. DOE-STD-3006-2000, Planning and Conduct of Operational Readiness Reviews
3. DOE-STD-1120-98, Integration of Environment, Safety, and Health into Facility Disposition Activities, Volume 1 of 2.
4. DOE-STD-1120-98, Integration of Environment, Safety, and Health into Facility Disposition Activities, Volume 2 of 2.

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