

Transitioning From Operations to Decommissioning - 16049

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ABSTRACT

With the recent unplanned shutdown of a number of U.S. Nuclear Power Plants, a benchmarking effort was conducted in late 2104 to capture the lessons learned from these recently shutdown sites. The specific plants benchmarked for this effort included San Onofre Nuclear Generating Station (SONGS), Kewaunee, Zion, and Crystal River Nuclear Power Stations.

The benchmark results found for the most part, site personnel had little or no decommissioning experience and in fact, were not aware of the challenges facing a plant in transitioning from operations to decommissioning. This lack of experience and knowledge resulted in a steep learning curve, a loss of productivity, and significant challenges by plant personnel prepared the site for decommissioning.

The results of the benchmark identified a number of areas and challenges facing an operating plant during this period. All sites visited identified four key areas where significant cost savings and planning effectiveness could have been realized if they had been better prepared. The areas included transition planning, staffing, stakeholder involvement, and cost estimating. It was recognized if these areas are aggressively managed early in the process, it will have a significant positive impact on the effectiveness and cost of decommissioning and can better set the stage for a successful project.

INTRODUCTION

A benchmarking effort was conducted in late 2104 to capture the lessons learned from U.S. utility sites that recently shut down and ceased operations. The specific plants benchmarked included San Onofre Nuclear Generating Station (SONGS), Kewaunee, Zion, and Crystal River Nuclear Power Stations. Two of the sites, Kewaunee and Crystal River made the decision to place their facilities in a SAFSTOR condition. SONGS has elected to enter prompt DECON and will be contracting out much of the decommissioning effort scheduled to begin in 2015. Zion elected to a unique approach and is being decommissioned by a private company, ZionSolutions, which assumed the NRC license and decommissioning fund.

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In most instances, once a power plant permanently ceases operations, the site will no longer collect funds from ratepayers to support decommissioning. The site will then prepare or have a contractor prepare a final detailed decommissioning cost study and that will determine the funds available for decommissioning. Therefore, the challenge for the licensee is to safely decommission the facility and terminate the license using these approved funds. It has been recognized that effective management of the transition phase from Operations to Decommissioning can not only result in significant cost savings, but can set the stage for the overall decommissioning project.

To capture lessons learned for plants undergoing the transition, the benchmarking effort included interviews, questionnaires, document reviews, and site visits for all sites except SONGS. The objective of this benchmarking was twofold:

- Identify any lessons learned or significant cost savings which could be realized by capturing the experience and lessons learned from nuclear power plants presently undergoing the decommissioning transition process.
- Use the results of this effort to support the development of guidance for the planned or unplanned permanent shutdown a nuclear power plant; specifically focusing on savings and efficiency during the transition phase.

RESULTS:

The results of the benchmark identified a number of areas that if adequately addressed, can result in significant savings during the transition from operations to decommissioning. Four areas for improvement were common across the sites;

- Transitioning and planning from operations to decommissioning
- Staffing and Personnel issues
- Stakeholder involvement
- Cost estimating

TRANSITION FROM OPERATIONS TO DECOMMISSIONING

The focus and the mindset required for decommissioning a facility is significantly different from that of operations. Operating plants are focused on operational excellence, protecting the reactor, and producing power safely while meeting stringent technical specifications and regulatory regulations. On the other hand, the goal of decommissioning is to safely terminate the site license to a predefined end point criteria and complete the work for the amount of money within the Decommissioning Trust Fund (DTF).

Site personnel recognized they had little or no experience or knowledge of the requirements for decommissioning. With limited information or past experience, the sites relied on Electric Power Research Institute (EPRI) Decommissioning Pre-Planning Manual (#1003025 issued November 2001) as a key planning document.

Once the decision is made to permanently cease operations, the operations and support personnel have to balance stringent operational requirements while focusing on shutting down the site and transitioning to a decommissioning status; system deactivation and safely removing fuel from the reactor into the spent fuel pool and/or dry cask storage. Until all spent fuel is placed into dry cask storage or removed from the site, regulatory requirements associated with plant operations, nuclear safety, quality assurance, and security remain the focus of day-to-day plant activities.

It was also recognized to effectively transition from operations to decommissioning requires involvement by all organizations. A concerted team effort is needed and should include personnel from operations, licensing, engineering, safety, radiological controls and project management. Some sites established a decommissioning team early on in the process to address licensing issues, system deactivation, technical specification and procedure changes as well as planning and scheduling. This team focused and assisted the site in changing the mindset from operations to decommissioning. It was also recognized using personnel with decommissioning experience added significant value to the overall effort and is highly recommended and encouraged. Even having one personnel with decommissioning experience adds value to the project.

STAFFING

A major cost factor in any decommissioning is the project staff; both overhead and direct labor. Labor, management and support staff can be as high as 40% to 60% of the overall decommissioning costs. Therefore, any actions taken to reduce unnecessary personnel and/or project duration will result in significant cost savings. The transition period is an ideal period to leverage this and the actions taken by management early in this process will significantly affect the effectiveness and can reduce the cost of the overall transition. Sites should develop an organizational plan, routinely communicate with all employees, and manage the changes by developing and implementing change management plan immediately or even before shutting down.

Once personnel believe the plant is at risk of closing or the announcement to cease operations is made, it is an emotional period for all site personnel. This emotional period will continue and could even get worse during the actual

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transition if actions are not taken to address employees concerns. Management's challenge is to keep site personnel focused on safe operations and work practices while performing day-to-day activities, knowing they may not be employed in the future.

A transition and decommissioning organization should be developed and should be tied to key milestones. This will ensure the project maintains institutional knowledge, identifies key personnel needed during various phases, and establishes a structured reduction in force. Both Kewaunee and Crystal River successfully addressed this concern and reduced staff by taking a number of key actions:

- They put employees first and focused on open and frequent communications with all site personnel
- Management worked closely with the staff to offset some of the uncertainty associated with the plant shutdown. This included giving priority to the affected personnel for opportunities at others company sites, generous severance packages, as well as job retraining and placement support.

A key factor to the success of this effort was management's candid approach and being upfront and honest with each person, including keeping them abreast of the short and long-term plans for each individual. The management focused on communication and demonstrated sincerity, which minimized gossip and negative feelings. Human Resources (HR) personnel were heavily involved and every effort was made to minimize the impact of job losses. When possible, personnel were provided opportunities to work at other company sites. In some instances, additional HR staff were temporarily assigned to assist the site in addressing these issues.

STAKEHOLDER INVOLVEMENT

When an operating plant shuts down permanently, whether planned or unplanned, the local community is affected in a number of ways. There is a loss or significant reduction in tax revenue as well as a loss of jobs at the power plant. The loss of employment at the sties has a cascading affect and will adversely impact real estate values and local businesses such as restaurants, hotels, and other service providers. This socio-economic impact will require immediate attention and should be addressed early and if possible, even before the plant shuts down. If mutual agreement on issues regarding socio-economic impact are not adequately addressed, it will adversely affect decommissioning costs as well as good will with the community. It should be noted that in most instances, the local authorities and communities will be involved in some aspects of the decommissioning project. They can impact such items as end point criteria, location of ISFSI, as well as other

decommissioning decisions. Therefore, it is imperative the stakeholders not be ignored and included in the planning and implementation process. This requires up front planning, communication, and coordination with the local, state and federal organizations.

Stakeholder outreach efforts and community relations are necessary to ensure all stakeholders concerns are addressed and as necessary factored into the decommissioning planning and project. The involvement of Stakeholders should be early in the process, even before the plant is shut down.

Stakeholder involvement includes the local community, local, state, and Federal regulators as well as "anti-nuclear" organizations and interveners. In most instances the site will need to establish a community relations and outreach effort to include local community and affected parties.

ACCURATE COST ESTIMATE (COST STUDY)

Cost estimates are routinely prepared throughout the life of the plant to determine how much money must be set aside to complete decommissioning at the end of its operating license. In most cases, early estimates prepared years ahead of decommissioning are considered budgetary estimates. A detailed site specific cost study is normally prepared when the plant decides to permanently cease operation enter the decommissioning stage, typically within two years. This detailed site specific estimate will define the funds the project will have to decommissioning the facility and terminate the NRC license.

To ensure an accurate and site specific estimate, it is recommended key site personnel be involved in developing and/or reviewing the cost estimate to ensure it addresses site specific issues as well as any regulatory or other changes since the last estimate. As a minimum, personnel involved should have experience in operations, radiological controls, finance, project controls, licensing, engineering and if possible, decommissioning or outage experience.

It should be noted the NRC docket the cost estimate but doesn't approve it. However, a quality cost estimate must be prepared with sufficient supporting information since it is used to collect decommissioning funds from the ratepayers. It is not uncommon for elements or activities within a cost estimate to be challenged by interveners or others. Therefore the decommissioning cost study must be accurate and contain sufficient supporting detail such that it can withstand outside audits and assessments.

RECOMMENDATIONS:

Transition phase:

- Pre-Plan early for decommissioning – Develop guidance while still operating

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- Establish an organizational plan to identify transition group
- Establish a Change Management Plan that can be implemented should the plant shut down prematurely
- Leverage personnel with decommissioning experience
- Benchmark recently shut down power plants or recently completed decommissioning
- Consider Training personnel for upcoming decommissioning projects such as:
 - Argonne National Laboratories (ANL) Facility Decommissioning
 - Oak Ridge Associated Universities (ORAU)
 - RESRAD – Residual Radioactivity – ANL
 - Project Management and Cost Estimating Classes
- Developed a “realistic” organization tied to key milestones to ensure institutional knowledge is not lost and key personnel do not leave.
- Benchmark other sites undergoing decommissioning
- Consider using the Electric Power Research Institute (EPRI) Decommissioning Pre-Planning Manual (#1003025 issued November 2001) as a key planning document.

Staffing:

- Put Employees first, especially during this transition period
 - Openly communicated and addressed uncertainty – Honest and upfront
 - Gave priority to impacted personnel
 - Overly communicated – Meetings/one-on-One/Emails
 - Involve Human Resource personnel as necessary
- Provide fair severance packages and Job Retraining Support
- Each operating site or utility should have a “decommissioning expert” on staff for the following reasons:
 - Keeps abreast of decommissioning issues
 - Understands challenges/issues facing ongoing D&D projects
 - Gate keeper for all decommissioning issues

Stakeholders:

- Identify and Understand Stakeholders and their concerns – even before decision to shutdown
- In most instances the site will need to establish a community relations and outreach effort to include local community and affected parties.

Cost Estimate:

- Key site personnel should be involved in developing/reviewing the detailed cost estimate during planning and preparation
- Ensure estimate is site specific and factors in recent challenges and Lessons Learned, addresses any regulatory or other changes since the last estimate

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- Involve various organizations to challenge and reviewing the estimate including corporate, finance, operations, radiological controls, project controls, licensing, engineering and decommissioning or outage experience
- Collect & organize applicable documents while still operating
- Establish a process by which changes in site configuration, procedures or processes impact decommissioning cost so the information can be captured for future decommissioning cost updates

REFERENCES

[1] CRP-REF-F-14-MB01 Tennessee Valley Benchmark Report: Recent Nuclear Power Plant Decommissioning Experience, September 15 - October 30, 2014 – Joseph Carignan and Predrag (Mick) Mastilovic

NOTES:

When an NRC license reactor permanently ceases operations, they have three options or strategies for dispositioning the facility: DECON, SAFSTOR, or ENTOMB.

- DECON, often referred to as immediate dismantling, is conducted soon after the nuclear facility closes. All equipment, structures, and portions of the facility containing radioactive contaminants are removed or decontaminated to a level that permits release of the property and termination of the NRC license.
- SAFSTOR, often considered "deferred dismantling," is where the nuclear facility is maintained and monitored for a period of time and maintained in a safe condition until it is decommissioned and NRC license terminated.
- ENTOMB is where the radioactive contaminants are permanently encased on site and is maintained and monitored until the radioactivity decays to a level permitting restricted release of the property. To date, no NRC-licensed reactor have opted for this approach.

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