Practical Solutions To Difficult Decommissioning Issues – Lessons Learned

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Abstract - *Over the past several years the Nuclear Regulatory Commission (NRC) has evaluated its decommissioning regulations and processes, and as a result, has implemented a number of changes to its decommissioning program and its approach to reviewing regulatory decommissioning issues. This paper discusses seven of the innovative approaches used by both licensees and the NRC staff to resolve difficult decommissioning issues, such that they may be used by other licensees and staff in the future. Based on these and other experiences, the NRC has identified a number of generic lessons learned from the NRC perspective, four of which will be discussed in the paper. To document these lessons learned, we are establishing a revised web page for decommissioning. The revised web page will include information on the comprehensive decommissioning program and have a special section for lessons learned. The lessons learned page will include information that will benefit the NRC staff, current decommissioning licensees, future decommissioning licensees, and future reactors. The paper will also discuss what can be done in the design and planning phase of future facilities that will make eventual decommissioning more efficient and effective. In summary, the industry and staff have implemented innovative approaches to decommissioning and have learned a number of lessons from the sites that are currently in decommissioning. The staff will document these innovative approaches and lessons learned in our guidance and look at activities and designs such that the decommissioning sites of tomorrow can take advantage of issues that were resolved by the decommissioning sites of today.*

I. INTRODUCTION

Over the past several years the United States Nuclear Regulatory Commission (NRC) has evaluated its decommissioning regulations and processes, and as a result, implemented a number of changes to its decommissioning program and its approach to reviewing regulatory decommissioning issues. Those efforts have resulted in more complete applications submitted for approval based on realistic assumptions, shorter NRC review times, and shared knowledge of decommissioning activities among the sites. Within the last year a number of sites have progressed in their decommissioning projects by proposing innovative approaches to decommissioning issues. The NRC has evaluated the technical and policy implications of these approaches and has approved several of them. This paper discusses some of the innovative approaches used by both licensees and the NRC staff to resolve difficult decommissioning issues. These approaches can be used by other licensees and staff in the future. Based on these experiences, the NRC has identified a number of generic lessons learned from the NRC perspective which will also be discussed. These include not only activities that can be performed while in decommissioning, but also certain activities that operating sites can implement today to improve decommissioning in the future. The paper will also look beyond the current reactor and material sites, and begin a dialogue with the industry about what can be done in the design and planning phase of future facilities that will make eventual decommissioning more efficient and effective.

II. DISCUSSION

In 2002, the Commission directed the staff to analyze the License Termination Rule (LTR)[1] with particular emphasis on making the LTR provisions for restricted release and alternate criteria more available for licensee use. Based on that analysis, contained in SECY-03-0069[2] and SECY-04-0035,[3] the staff identified a number of actions that could be implemented to make restricted release more available for licensee use. The staff found that if implemented, the actions would provide licensees flexibility and solutions to decommissioning issues that had not been considered previously. The staff documented the results of the LTR analysis in Regulatory Issue Summary 2004-08[4] and began to implement, on a case by case basis, the lessons learned from the LTR analysis with existing

decommissioning projects. A summary of some of those cases is outlined below.

For the Shieldalloy Metallurgical Corporation (Shieldalloy) and Jefferson Proving Ground (JPG) sites, the staff held meetings with the licensees to discuss implementing long term control (LTC) licenses. In the LTR analysis, the staff realized that there may be very specific cases where the institutional control (IC) for a restricted release could take the form of a LTC license. As part of the Shieldalloy work, the staff developed draft guidance on the types of issues that need to be addressed in an application for a LTC license. The guidance is contained in a letter to Shieldalloy dated May 15, 2004,[5] and will be included in the revision to the NRC's consolidated guidance document, NUREG-1757.[6] The issues identified in the guidance document that need to be addressed as part of a LTC license include: 1) eligibility to implement an LTC license, 2) current ownership of the site and future ownership, 3) a risk-informed, graded approach to the IC, 4) demonstration of sufficient financial assurance, and 5) long term record retention. The LTC license is a valuable tool in very specific cases to implement a risk-informed approach to an institutional control.

The IC was also an issue for the AAR site in Michigan. In this case, the site is considering releasing a portion of the site for unrestricted use while the remaining portion would be released for restricted use. At this site, the IC may consist of a deed restriction with the NRC as an enforcing party. If at any time in the future the land is sold, the restrictions will continue on to the new land holder. While the proposal still needs to be finalized and considerations continue, this risk-informed approach to the IC is based on the fact that this a site where plant operations continue, the radioactive source is thorium slag and, therefore, a deed restriction for the restricted use portion of the site is an appropriate level of IC.

At the Trojan site in Oregon, the staff addressed a much different issue. During the review of the implementation of the License Termination Plan (LTP), the staff raised questions regarding the apparent difference in the clearance release criteria and the LTR unrestricted release criteria. In this case, Trojan's LTP was approved allowing certain equipment to remain in the buildings at license termination. By leaving equipment in the buildings, even though it met the LTR release criteria, it raised the concern that the material may be released after license termination and thus, the staff was being inconsistent with what is being proposed for the release of solid materials (clearance) criteria and guidance. After review of the history of both release criteria, it was determined that the purpose and use of the different release criteria were appropriate. The LTR release criteria recognizes the finality of the LTR while the clearance release criteria recognizes the operating status of the sites.

The staff dealt with difficult legal issues associated with the Fansteel site in Oklahoma. This company was in bankruptcy and had limited funding to remediate the site. The staff took this into consideration and developed a unique approach for the review of the decommissioning plan (DP) at the beginning of the decommissioning process. The decommissioning would be conducted in phases, with the most significant contamination being removed in the first phase. The staff imposed a number of license conditions on the licensee[7] in lieu of reviewing all phases of the decommissioning plan. This allowed the staff to focus its and the licensee's resources on the cleanup of the most risk significant contamination and, because the licensee was in bankruptcy and funding was questionable, this was in the public's best interest.

At the Kiski Valley Water Pollution Control Authority (Kiski) site, as part of the review process, the NRC conducted dose assessments for a range of realistic potential scenarios. The Kiski site was a waste water treatment plant which treated sewage sludge by incineration. The cause of the contamination in the sludge and ash was believed to have resulted from the laundry drains from which permissible levels were discharged. The staff performed the independent dose assessment to address questions raised by the state regulatory agency. The staff concluded that regardless of whether the ash was left in place or excavated pursuant to Pennsylvania State law, the site was acceptable for unrestricted use. The staff also determined that the scenarios analyzed in the DP were consistent and bounded by the NRC staff's analyses.[8] The staff found that by performing its own analyses the site met the unrestricted release criteria and ensured public health and safety. The site was released in early 2005 with no further NRC required remediation.

The staff continued to implement the Commission's direction to use realistic dose modeling scenarios at a number of sites including the Michigan Department of Natural Resources (MDNR), SCA Holdings, Cabot Reading, and Fansteel sites. The staff considers reasonably foreseeable land use scenarios as those scenarios that are likely within the foreseeable future (up to 100 years) considering advice from land use planners and stakeholders. The staff also considers the physical characteristics of the land to determine whether the resident farmer or a less bounding scenario is justified. When adequately justified, the use of realistic scenarios result in licensees developing realistic dose assessments which results in releasing the land with an appropriate level of control and remediation.

Also as part of the LTR analysis, the staff evaluated the potential use of soil mixing as a decommissioning option in certain cases. The Commission granted approval to allow soil mixing in limited circumstances, on a case by case basis, in addition to continuing the use of intentional mixing to meet waste acceptance criteria and for other limited waste disposal situations (10 CFR 20.2002 disposals). This option may be useful for licensees where it can be demonstrated that removal of soil would not be reasonably achievable, where the resultant footprint of the area containing the contaminated soil following license termination would be equal to or smaller than the original footprint, and where clean soil would not be mixed with contaminated soil to lower concentrations. As with LTC licenses, the use of soil mixing may be an appropriate solution to solve unique and difficult decommissioning issues.

To implement the LTR analyses recommendations and the decommissioning program improvements, the staff has developed and Integrated Decommissioning Improvement Program (IDIP). The IDIP is an integrated internal plan that identifies all tasks, assignments, and schedules for the recommendations. It includes the staff's actions and schedules for new and revised guidance development, rulemaking, and other internal process changes that will result in improvements in the implementation of the overall decommissioning program for staff and for licensees.

One of the actions identified in the IDIP is to improve openness with all our stakeholders, and to document these decommissioning lessons learned. To do this, the NRC is establishing a revised web page for decommissioning. The revised web page will include information on the comprehensive decommissioning program and have a special section for lessons learned. The lessons learned page will include information that will benefit the NRC staff, current decommissioning licensees, future decommissioning licensees, and future reactors. It will include a feature that will allow licensees as well as staff to share lessons learned. The revised webpage is scheduled to be available in mid 2005.

Based on the case-specific lessons learned, some of which were discussed in this paper, the staff also has developed a number of generic lessons learned that apply to most decommissioning cases. First and foremost is communication and sharing of information between the NRC and licensee, and within licensee peer groups. The NRC encourages pre-application meetings for the licensee to provide an overview of the decommissioning approach, for the NRC to provide an overview of our review process, and for discussion of site specific issues prior to submittal of the LTP or DP. Not enough can be said about sharing information throughout the industry. Licensees should talk to each other about how certain situations were handled, and learn from those who have completed the activities. Second, an accurate, extensive site characterization is extremely important in developing the decommissioning approach and avoids surprises while in decommissioning. This characterization would include a detailed historic site assessment, including documenting activities while operating so that all the details of the operating events are captured. Interviews with employees as they leave employment are also extremely helpful. Documenting the corporate knowledge can save time and resources in the decommissioning process. Third, groundwater characterization is crucial to a successful decommissioning. Groundwater monitoring beyond the normal radioactive effluent monitoring program is needed for decommissioning. This may be more easily accomplished while operating and may reduce delays in decommissioning waiting for groundwater data. Fourth, current operational events such as spills could impact decommissioning complexity. Documenting these events and cleaning them up thoroughly saves time and effort in decommissioning. And lastly, licensees need to take advantage of the flexibility in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM),[9] the LTR, and NRC guidance. In 2003, the NRC published its consolidated guidance which identified in one place the guidance for licensees to use in decommissioning and identified the NRC review criteria to be used. The guidance is scheduled to be updated every 3 years.

Much of the staff's work focuses on sites that have decommissioning activities already underway. However, there are actions that can be taken at the design and construction phase to incorporate some of the lessons learned from decommissioning activities today. Examples include: 1) not burying or embedding radioactive pipes so that they will not have to be dug up or the wall demolished to decommission, 2) establishing a comprehensive groundwater monitoring program during the operations phase, 3) and locating certain buildings on the site such that should a spill occur it could be naturally contained. A well designed plant may reduce decommissioning costs and effort in the future.

III. CONCLUSIONS

The NRC staff has taken and is continuing to take actions to make the Decommissioning Program more efficient, open, and flexible, while ensuring public health and safety protection of the environment. In addition, the industry and staff have learned a number of lessons from the sites that are currently in decommissioning. The challenge to the industry as a whole will be to

document these lessons learned and look at future activities and designs, so that the decommissioning sites of tomorrow can take advantage of issues that were resolved by the decommissioning sites of today.

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