

How Difficult is it to Obtain Restricted Release Authorization

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ABSTRACT

Setting and implementing clean up standards for nuclear facilities pose some of the most significant policy and technical challenges facing the nuclear industry and regulators today. There continue to be challenges associated with the legal infrastructure and regulations for radioactive waste management, disposal, clearance and site release. Although progress on low-level waste (LLW) disposal sites has been achieved in some areas, we are still searching for safe, reliable and cost effective disposal solutions. In particular some facilities may not be able to decommission to levels that permit unrestricted use after decommissioning, in part because of the lack of cost effective disposal alternatives. The authors have worked on a number of approaches to addressing restricted release requirements for contaminated sites, and offer some perspective on this very difficult waste management issue.

INTRODUCTION

Setting and implementing clean up standards for nuclear facilities pose some of the most significant policy and technical challenges facing the nuclear industry and regulators today. There continue to be challenges associated with the legal infrastructure and regulations for radioactive waste management, disposal, clearance and site release. Although progress on low-level waste (LLW) disposal sites has been achieved in some areas, we are still searching for safe, reliable and cost effective disposal solutions. In particular high-volume low-activity disposal sites similar to the Morvilliers site in France [1] are not available in this country. Some commercial licensed facilities may not be able to decommission to levels that permit unrestricted use after decommissioning in part because of the lack of cost effective disposal alternatives. The authors have worked on a number of approaches to addressing restricted release requirements for contaminated sites and offer some perspective on this very difficult waste management issue.

Restricted release has been a difficult concept to implement for a number of reasons. Early lessons have shown that institutional controls can and do fail. Love Canal and other experience [2] have shaped the thinking on the use of institutional control by a number of regulators. The Department of Energy (DOE) has over a hundred sites that will come under institutional control as part of the legacy management program.

There are a large number of commercial nuclear sites that are regulated by the United States Nuclear Regulatory Commission (NRC) or authorized agreement states. Some of these sites

have soil and/or groundwater contamination that contains long lived radionuclides such as technetium, uranium and thorium. NRC regulations address institutional control in three areas. LLW disposal sites are covered by 10 CFR Part 61 and require institutional control by either the State or Federal Government for up to 100 years. Uranium mill tailings sites are also required to have institutional control under 10 CFR Part 40. Institutional control is provided by either the state or Federal Government. For other licensees, the NRC promulgated its License Termination Rule (LTR) (10 CFR 20.1401-20.1406) in 1997, 62 FR 39088 (July 21, 1997), and it included provisions that allowed restrictive release under certain conditions.

There are many challenges facing the licensee seeking a restrictive release including the potential for lengthy litigation, objections from the impacted State, complex exposure scenarios and dose modeling requirements, adequacy of the restrictions, and the need for effective public involvement.

The authors have worked on a number of sites that involved questions of restricted release. This paper provides some insight regarding application of restricted release concepts at various sites such as: Sequoyah Fuels in Oklahoma, Shieldalloy in New Jersey, Shieldalloy in Ohio, AAR in Michigan, and Molycorp in Pennsylvania.

BACKGROUND

All of the early LLW disposal sites were operated under the control of NRC agreement states and continue to be managed by those states. The closed sites (Beattie NV, Sheffield IL, West Valley NY and Maxey Flats KY) are managed by the State under institutional control. The Barnwell and Hanford LLW sites continue to operate under the control of the sited states. The regulations provide a means for requiring institutional control by government.

There are over 50 mill tailings sites that are either remediated and under DOE institutional control or in the process of being turned over to DOE for long term institutional control. The Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) sets up a process where sites that were used to process and dispose of mill tailings would be remediated and transferred to the Federal Government for long term institutional control. The NRC promulgated rules under 10 CFR Part 40 to implement the requirements of the UMTRCA. There has and continues to be a fairly orderly process for turning over these sites to the Federal Government following completion of site remediation and license termination. DOE's legacy management program will ultimately be responsible for these sites under a NRC general license.

Prior to the promulgation of the LTR, NRC regulations did not contain a provision for releasing sites for other than unrestricted use. Experience with decommissioning facilities has indicated that for certain sites, achieving the unrestricted use criterion might not be appropriate because: (1) there may be net public or environmental harm in achieving unrestricted use; (2) expected future use of the site would likely preclude unrestricted use; or (3) the cost of cleanup and waste disposal to achieve the unrestricted use criterion is excessive compared with achieving the same dose criterion by restricting the use of the site and eliminating exposure pathways.

As a result of difficulty in addressing sites with contaminated soil and groundwater, NRC put in place a series of regulations to address the clean up and termination of commercial sites starting

in 1988 and culminating in 1997. The series of regulations addressed the definition of unrestricted site termination, financial assurance provisions, record keeping, timely decommissioning and ultimately the termination of the license under unrestricted or restricted release conditions. As noted above, the NRC included in its 1997 LTR provisions that allowed restrictive release under certain conditions.

Summary of restricted release requirements under the LTR

As described in the NRC guidance "Consolidated Decommissioning Guidance," NUREG 1757 (September 2006), the LTR established a system of controls to sustain protection at restricted use or alternate criteria sites. The system includes the following elements: (1) legally enforceable institutional controls; (2) engineered barriers to the extent necessary; (3) monitoring and maintenance; (4) independent third party oversight; (5) sufficient funding; and (6) maximum limits on dose (i.e., "dose caps") if institutional controls fail. While elements 1, 3, 4, 5, and 6 are required by the LTR, element 2 (engineered barriers) is not required but could be used to mitigate adverse processes (e.g., infiltration or erosion) so that the dose criteria of the LTR can be met.

Specifically under the LTR, license termination under restricted conditions will be permitted if all the following requirements are met:

1. The licensee can demonstrate that further reductions in residual radioactivity necessary to release the site for unrestricted use: (1) would result in net public or environmental harm; or, (2) were not being made because the residual levels are as low as is reasonably achievable (ALARA).
2. The licensee has made provisions for legally enforceable institutional controls that would limit dose to the average member of the critical group to 0.25 mSv/y.
3. The licensee has provided sufficient financial assurance to enable an independent third party to assume and carry out any necessary control and maintenance of the site.
4. The licensee has submitted a decommissioning plan that indicates the licensee's intent to release the site under restricted conditions and describes how advice from individuals and institutions in the community who may be affected by the decommissioning has been sought and incorporated, as appropriate.
5. The residual radioactivity levels have been reduced so that, if the institutional controls were no longer in effect, the annual dose to the average member of the critical group would not exceed 1.0 mSv/y or, under certain conditions, would not exceed 5.0 mSv/y. If the 5.0 mSv/y value is used, the licensee must: (1) demonstrate that achieving 1.0 mSv/y is prohibitively expensive, not technically achievable, or would result in net public or environmental harm, (2) make provisions for durable institutional controls, and (3) provide sufficient financial assurance to allow an independent third party to carry out rechecks of the controls and maintenance at least every 5 years and carry out any necessary controls and maintenance.

If the licensee is requesting license termination under the restricted use provisions of 10 CFR 20.1403, there must be a demonstration that the licensee qualifies for license termination under 10 CFR 20.1403(a). In addition, a description of the institutional controls the licensee has instituted or plans to institute at the site and a description of the activities undertaken by the licensee to obtain advice from the public on the proposed institutional controls are required. The licensee must also demonstrate that the potential doses from residual radioactive material at the site will not exceed the limits in 10 CFR 20.1403 and are ALARA. There is also a requirement for a description of the amount and mechanism for financial assurance required under 10 CFR 20.1403(c).

As noted below, licensees have faced challenges in implementing the restrictive release provisions of the LTR. Obtaining an independent third party to serve as the institutional controls has been problematic for each licensee considering restricted release. States have not been agreeable to becoming the independent third party. NRC has also been unsuccessful in its efforts to make arrangements for DOE to take ownership of commercial sites after decommissioning to provide institutional controls under section 151(b) of the Nuclear Waste Policy Act of 1982. As a result, the NRC staff considered approaches to have enforceable institutional controls that could be implemented consistent with the NRC regulations. (See, Results of the License Termination Rule Analysis, SECY -03-0069 (May 2, 2003)).

Originally, NRC was of the view that following license termination under the LTR, NRC had no further role leaving it up to the institutional controls to maintain any needed restrictions. NRC has rethought its role with institutional controls and now is of the view that its involvement in institutional controls would facilitate establishing enforceable controls. It is now NRC's position that if a licensee cannot establish acceptable institutional controls or independent third party arrangements, NRC will accept institutional controls wherein NRC is involved. NRC has issued guidance that provides two options involving NRC: an NRC long-term control (LTC) license or an NRC legal agreement and restrictive covenant (LA/RC). This guidance is found in Chapter 17 and Appendix M of Volume 1 of NUREG 1757.

The LTC license option is a possession-only license that would be used to satisfy the LTR requirement for legally enforceable and durable (if needed) institutional controls. The conditions of the LTC license would require the licensee to maintain restrictions on site use and any necessary monitoring, maintenance, and reporting. NRC would use inspections and enforcement, if needed, to assure that the licensee's controls and other activities are effective.

The LA/RC option is a combination of a legal agreement and restrictive covenant that provides a legally enforceable institutional control, with the NRC having an oversight role. It expands the traditional restrictive covenant approach by providing an enforcement role for the NRC through the court system. Under the LA/RC option, the current licensee or site owner and NRC enter into a legal agreement on the restrictions and controls needed for license termination under restricted conditions. The legal agreement includes using a restrictive covenant, which outlines the restrictions on site use and any necessary maintenance, monitoring, or reporting. In accordance with the legal agreement, the licensee or site owner is required to record the restrictive covenant with the appropriate recordation body in the jurisdiction where the site is located, before the site is released under restricted conditions.

It is noted that the LA/RC option has not been implemented by the NRC or legally tested. In addition, NRC's ability to enforce the LA/RC depends on the laws of the jurisdiction where the site is located. As a result, a licensee interested in utilizing the LA/RC approach needs to demonstrate that the LA/RC is a legally enforceable institutional control in the jurisdiction where the site is located.

It should be noted that just recently the State of New Jersey has taken issue [3] with the above guidance. On December 21, 2006, New Jersey brought suit against the NRC in the United States Court of Appeals for the Third Circuit arguing, among other things, that the guidance in NUREGF 1757 conflicts with statutory and regulatory requirements, is arbitrary and capricious, and lacks a reasonable basis. As of the submittal of this paper, NRC has not responded to the suit.

Examples of sites seeking Restricted Release Conditions

As can be seen from the cases discussed below, there are high hurdles for a licensee seeking restrictive release. NRC recent NUREG 1757 guidance [4] that discusses institutional controls and other issues such as, financial assurance, and cell designs should facilitate restrictive releases. However, the experience to date for sites that do not have a rule or legislation based solution has been frustrating for licensees and other stakeholders.

Two LLW sites have been closed under federal legislation. Maxey Flats Kentucky and Beatty Nevada sites are currently under institutional control provided by the sited state. Maxey Flats is a CERCLA site that is owned by the Commonwealth of Kentucky. The remedial action at Maxey Flats is on-going pursuant to a Consent Decree signed by the Commonwealth of Kentucky, and the U.S Environmental Protection Agency (EPA). At the Beatty site, the licensee, US Ecology, has completed the state-approved closure plan to stabilize the site. The plan was to ensure that the LLW disposed during the operational phase of the facility continued to remain in a suitable, stable, and safe condition after site closure. The Nevada State Health officials continue to monitor for radioactivity in groundwater, air, soil, and vegetation.

The Molycorp Inc. considered a restrictive release approach for its Washington, Pennsylvania, site that produced an alloy from ore that contained natural thorium. The process produced thorium bearing slag that was used as fill over portions of the site. Molycorp's original decommissioning plan under the LTR was to build an on site disposal cell with institutional controls under the restrictive release provisions of 10 CFR 20.1403. Molycorp planned to set up a corporation to serve as an independent third party for institutional controls. The staff had significant questions on the durability of a private party to last for the 1000 year time period provided in the LTR. There was also significant public opposition to leaving a disposal cell on site. In 2001, Molycorp withdrew its request for restrictive release and is now pursuing an unrestricted release.

AAR Manufacturing, Inc. is considering a restrictive release for its site in Livonia, Michigan, that contains thorium slag. AAR purchased this site from a company that formerly conducted licensed activities on the site and whose license was terminated by the Atomic Energy

Commission in 1971. In the mid 1990's, NRC concluded that in light of the residual radioactivity at the site remediation would be required. NRC has allowed AAR to maintain possession of its property without requiring it to become a license on the basis that it was cooperating in the decommissioning process. For purposes of institutional controls, AAR plans to enter into a settlement agreement with NRC on the restrictions and controls needed for a restricted release. The agreement would include using a deed restriction that would outline the restrictions on the site, such as prohibiting farming and developing residential properties on the site; the deed restriction would transfer to each subsequent owner of the property through the deed. The agreement and deed restriction would allow NRC or local and State governments to monitor and enforce the restrictions. This is similar to the LA/RC option in NUREG 1757. Once the technical issues at the site are resolved, it is expected that NRC will provide its views on the institutional controls proposed by AAR.

Another example of the difficulties associated with restricted release is indicated by the experience at the Sequoia Fuels site in Oklahoma. This site converted yellow cake (U₃O₈) to Uranium hexafluoride (UF₆) for use in the enrichment process. It was licensed under 10 CFR Part 40. Originally SFC was required to decommission the site under the LTR. However, it ran into difficulties in obtaining a governmental entity to serve as an independent third party for institutional control for the contamination that would be left on site. After much discussion and time, the Commission granted SFC's request for the license to decommission its facility under 10 CFR Part 40, rather than the LTR, on the basis that the residual radioactivity SFC possessed was considered to be mill tailings. This is a unique case, as the first stage of the conversion process of the SFC's facility was viewed by the NRC as a continuation of the milling process that was started at a uranium mill. As a result of this conclusion by the NRC, the licensee possessed mill tailings which are considered to be 11(e)(2) byproduct material. Under UMTRCA, DOE is required to assume responsibility under an NRC general license for 11(e)(2) byproduct material remaining at a site after license termination. With DOE available to be used for institutional controls, progress on the remediation of this difficult site was facilitated.

Shieldalloy Metallurgical Corporation (SMC) is responsible for two sites, one in New Jersey and one in Ohio. Ohio an NRC agreement state has determined that the SMC site in Cambridge, Ohio can be remediated under a long term possession only license similar to the LTC proposed by NRC under the above sited policy. However the State of New Jersey takes a different position regarding the SMC site in Newfield NJ. This site contains uranium and thorium contaminated waste similar to the Cambridge site.

The Newfield site applied for a restricted release amendment first in August, 2002, which was subsequently denied (February, 2003) by the staff during the acceptance review. A subsequent decommissioning plan (October, 2005) was also denied in January 2006. The reasons cited for the denial included deficiencies in the document for: dose modeling, surface water hydrology and erosion protection for its on site disposal cell, institutional controls, and financial assurance. SMC proposed using the NRC LTC license approach because it could not arrange for durable institutional controls. A third revised decommissioning plan was submitted in June 2006 and was subsequently accepted (October, 2006) by the staff for review. However, the State of New Jersey on December 22, 2006, petitioned [3] for a hearing, a petition for rulemaking and a Stay of any action on the decommissioning plan. This was in addition to the court filing described

above. The focus of the state in this case has been on institutional control issues, dose modeling, and financial assurance issues.

CONCLUSION

Setting and implementing clean up standards for nuclear facilities pose some of the most significant policy and technical challenges facing the nuclear industry and regulators today. There continue to be challenges associated with the legal infrastructure and regulations for radioactive waste management, disposal, clearance and site release.

There are a large number of commercial nuclear sites that are regulated by the NRC or authorized agreement states. Some of these sites have soil and/or groundwater contamination that contains long lived radionuclides such as technetium, uranium and thorium. For such licensees, the NRC promulgated its LTR in 1997 and it included provisions that allowed restrictive release under certain conditions. In particular some facilities may not be able to decommission to levels that permit unrestricted use after decommissioning, in part, because of the lack of cost-effective disposal alternatives.

There are many challenges facing the licensees seeking a restrictive release including the potential for lengthy litigation, objections from the public and impacted State, complex exposure scenarios and dose modeling requirements, and adequacy of the restrictions. The need for effective public involvement cannot be over emphasized as licensees seeking to leave disposal cells on site will likely face public opposition especially for sites near populated areas. In that regard, licensees considering restrictive releases should be familiar with an NRC report issued in 2002 entitled, "Best Practices for Effective Public Involvement in Restrictive-Use Decommissioning of NRC-Licensed facilities." It is available at the NRC ADAMS site at ML031130508.

There have been a number of significant challenges to the use of the restricted release concept as shown above. No licensee has yet to achieve authorization under the LTR for a restrictive release. Experience has shown that it is important for licensees to be prepared to address this difficult concept and its implementation. It is important to research the associated legislation, regulations and guidance that address the utilization of institutional control concepts. Review of relevant experience at other sites is necessary to prepare for the submittal of an adequate decommissioning plan. NRC guidance in NUREG 1757 needs to be carefully considered. Licensees who choose to depart from this guidance risk having their plans deemed unacceptable and face additional delays in explaining the bases for their approaches. Licenses should also follow the progress of the various legal challenges to the use of institutional controls, as it may affect their future plans for decommissioning.

In our view, restrictive releases should be the last resort. However, the cost of disposal is one of the key drivers that has created the need for some licensees to consider the restrictive release approach. Thus, it is important to address the need for cost-effective high-volume low-activity disposal capacity. Low activity, disposal sites similar to the French concept at Morvilliers would help avoid proliferation of sites that face bankruptcy, or are forced to use long term institutional controls when other reasonable options are not available.

From our perspective, there is a gap in the United States for a very low level waste (VLLW) licensing approach for high-volume low-activity waste disposal that would be protective of public health and safety. We would expect that given the hazards with such VLLW material, sites could be licensed with fewer restrictions than in the current 10 CFR Part 61. France, Spain and Japan have already addressed this issue. This would reduce the costs associated with disposing of such material and in some cases the need for the LTR restrictive release approach.

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