

## RESULTS OF EVALUATIONS FOR THE RESTRICTED RELEASE AND INSTITUTIONAL CONTROL ISSUE

### 1. BACKGROUND

The staff provided background and an initial analysis of the restricted release issue in SECY-02-0177. The issue was defined and planned evaluations were identified. This attachment provides the results of the staff's evaluations.

### 2. ISSUE DESCRIPTIONS AND DESIRED OUTCOMES

2.1 Issue: U. S. Nuclear Regulatory Commission (NRC) licensees have difficulties arranging the institutional controls required by the restricted release and alternate criteria provisions of the License Termination Rule (LTR) that ensure long-term effectiveness. Subissues include:

- 1) Government and Tribes are unwilling to accept transfer of ownership of private sites, because of long-term liability and funding concerns (e.g., potential future additional cleanup, potential failure of engineered barriers, and the ability to obtain funds given to the U. S. Treasury for future custodial activities).
- 2) Lack of identifying independent third parties to ensure long-term effectiveness of institutional controls and, if needed, to provide control and maintenance if the current owner/licensee abandons the site, goes bankrupt, or if a subsequent owner does not provide control and maintenance. Also, there is a concern over long-term continuity of an independent third party.
- 3) Difficulties establishing legally enforceable institutional controls involving various types of "deed restrictions" that ensure effectiveness over long periods of time and if property ownership changes.
- 4) Unclear and perceived limited flexibility of the existing LTR risk-informed, graded approach to institutional control requirements for providing degrees of effectiveness based on dose levels and radionuclide half-life. This includes the meaning of "enforceable" and the threshold for needing "durable" controls, as well as use of engineered barriers, role of independent third party, and degree of public involvement.
- 5) Selecting realistic exposure scenarios that appropriately consider institutional control effectiveness and radiological hazard. Note that this issue is addressed under the realistic exposure scenario issue in Attachment 6.

The above issues pertain to both the restricted release provisions in 10 CFR 20.1403 and the alternate criteria in 10 CFR 20.1404. One of the required conditions under 10 CFR 20.1404, is that a licensee "Has employed to the extent practical restrictions on site use according to the provisions of 10 CFR 20.1403 in minimizing exposures at the site."

2.2 Desired outcome: Make the restricted release and alternate criteria provisions of the LTR more available for NRC licensee use by identifying institutional control options and removing existing regulatory impediments (such as the issues identified above) currently associated with the institutional control requirements of both the restricted release and alternate criteria provisions of the LTR. Graded institutional control options should be based on radiological risk and time-frame that the institutional control must remain effective.

### 3. EVALUATIONS OF RELEVANT INFORMATION AND EXPERIENCE

This section summarizes the results of the staff's evaluations and provides insights that will be useful in evaluating the options in section 4 to resolve the issue.

#### 3.1 U.S. Environmental Protection Agency

The staff reviewed key U. S. Environmental Protection Agency (EPA) guidance and met with EPA to discuss institutional control experience under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and The Resource Conservation and Recovery Act (RCRA). Based on this information, insights relevant to the LTR restricted release issues are summarized below.

Both short-term and long-term effectiveness of institutional controls have become a high priority in Superfund and RCRA programs. Because of the importance of institutional controls in selecting the overall remedy for a site, EPA has many roles. First, EPA develops guidance. Guidance has already been developed and is available for identifying, evaluating, and selecting institutional controls. This guidance describes types of institutional controls, examples, and limitations. In addition, criteria for evaluating controls are given. Some highlights from this guidance provide insights for the LTR analysis.

- 1) EPA allows use of proprietary or governmental institutional controls, but recognizes the weaknesses of these types of institutional controls, and that failure is possible. Therefore, EPA encourages layering of institutional controls (e.g., multiple types) to make them more effective over the necessary time period.
- 2) EPA considers EPA orders or permits as one type of institutional control that can be used, but these would have to be reissued when ownership changes. EPA orders or permits can be considered similar to an NRC license.
- 3) EPA considers that institutional controls should supplement engineering controls, and generally should not be used as the sole remedy.
- 4) Flexibility is needed for selecting appropriate institutional controls tailored for specific site needs, legal jurisdictions, and time periods.

In addition to the existing guidance, EPA released for public comment on February 19, 2003, draft guidance on monitoring and enforcing institutional controls. The staff's initial review noted that this guidance addresses ways to deal with issues that crosscut EPA's multiple programs. Extensive information is provided for issues associated with planning, implementing, monitoring, and enforcing institutional controls. Although much of this guidance provides specific

approaches or procedures applicable to EPA's multiple programs, some of the principles also are relevant to NRC's restricted release provision. Examples include: early and full life-cycle planning and cost estimating; early involvement by State and local governments and communities; rigorous periodic monitoring (e.g., Five-Year Review under CERCLA and community reviews) to ensure long-term effectiveness of institutional controls; and variability of enforcement tools, depending on the type of institutional control and jurisdiction. The staff will continue its review of this guidance to identify insights that could enhance the implementation of the LTR's restricted release provision.

EPA involvement with institutional controls extends beyond developing and issuing guidance. EPA also has an approval role for CERCLA and RCRA decision documents involving reliance on institutional controls. Regarding implementation, however, EPA turns over responsibility for institutional control effectiveness to the States after 10 years. Therefore, States have a statutory role for maintaining effective institutional controls. Similarly, EPA guidance on use of institutional controls when Federal agencies, other than EPA, transfer property to non-Federal users states that even if implementation of institutional controls is diligent, the ultimate responsibility for monitoring, maintaining, and enforcing institutional controls remains with the lead Federal agency.

Finally, EPA has an independent oversight, evaluation, and enforcement role. EPA conducts Five-Year Reviews under CERCLA as an independent evaluation to assure long-term effectiveness of a site's remedy, including institutional controls. If needed, appropriate actions can be taken. The Five-Year Review also applies to certain Federal facilities, where the Federal agency conducts the review and EPA approves the review. Under RCRA, EPA is just beginning to consider what it will do with the Thirty-Year Review and beyond.

In summary, it appears to the NRC staff, that EPA's overall approach to short- and long-term effectiveness of institutional controls involves the following principal elements:

- 1) EPA provides policy and guidance for evaluating, selecting, monitoring, and enforcing institutional controls;
- 2) Institutional controls supplement engineering controls;
- 3) Institutional controls are tailored to specific-site needs, using layering of multiple controls or using them in series to achieve the desired level and duration of effectiveness;
- 4) EPA approves decision documents that involve institutional controls;
- 5) Federal (for Federal facilities) or State governments have responsibility for effective implementation; and
- 6) EPA maintains independent oversight, including periodic comprehensive reevaluations to ensure effective implementation for the time period needed (e.g., Five-Year Reviews under CERCLA).

Overall, because of its approach, EPA relies on institutional control effectiveness and, therefore, does not require an assessment of potential safety consequences or use of dose “caps”, assuming failure of institutional controls, as NRC requires in 10 CFR20.1403(e). Although different, these two approaches have the same goal of achieving protection. However, NRC’s approach seeks finality, while EPA’s approach does not, because of its continued oversight through the Five-Year Review process.

### 3.2 U.S. Department of Energy

#### 3.2.1 Insights from Key DOE Long-Term Stewardship Documents Relevant to the Restricted Release Issue

The staff reviewed selected key U. S. Department of Energy (DOE) documents describing DOE’s long-term stewardship program, including the January 2001 “Report to Congress on Long-Term Stewardship” (DOE/EM-0563), the October 2001 “Long-Term Stewardship Study” (DOE/EM-0604); a draft of DOE’s Long-Term Stewardship Strategic Plan; and the August 2002 draft of “Long-Term Stewardship Science and Technology Roadmap.” Furthermore, the staff has been monitoring DOE’s program through contacts with DOE staff and attendance at various meetings. Based on this information, key insights relevant to the LTR restricted release issues are summarized below.

1) DOE documents describe many challenging long-term stewardship issues and DOE’s approaches to address them for its sites. DOE considers that many of these challenges are also relevant to other governmental and private entities engaged in cleanup and long-term stewardship.

2) The following issues identified by DOE are also important to implementing restricted release under the LTR.

- a) Ensuring continued effectiveness for long periods of time and if property ownership changes;
- b) Developing a process for meaningful stakeholder/public involvement;
- c) Ensuring long-term public access to information and outreach efforts; and
- d) Providing reliable and sufficient funding.

3) DOE documents describe the scope of DOE’s extensive and diverse long-term stewardship responsibilities and supporting technical capabilities. These documents demonstrate DOE’s existing and future capability to provide stewardship for as many as 200 sites contaminated with radioactivity. In addition to DOE mission related sites, DOE already takes stewardship responsibility for sites from other agencies such as uranium mill tailings sites from NRC licensees under Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA); Formerly Utilized Sites Remedial Action Program sites from the U.S. Army Corps of Engineers; and one NWPA 151(c) site from an NRC licensee. Currently, DOE conducts long-term stewardship activities at 34 sites.

4) DOE's long-term stewardship activities are impacted by multiple and sometimes overlapping regulatory authorities, including: CERCLA; RCRA; UMTRCA; and State environmental laws and regulations.

5) In addition to DOE's existing extensive programmatic and technical capabilities, DOE also is conducting studies to significantly enhance its future capabilities. The draft Long-Term Stewardship Science and Technology Roadmap is an ongoing effort being developed to aid DOE in identifying and implementing knowledge and tools that will enhance the performance and reduce the costs at DOE's long-term stewardship sites. The draft Roadmap was compiled by Idaho National Engineering and Environmental Laboratory using an interdisciplinary team from industry, academia, Federal and State regulators, stakeholder groups, DOE national laboratories, DOE site contractors, and other Federal agencies.

The draft Roadmap effort systematically identifies gaps in existing long-term stewardship capabilities and recommends research and development that can address these gaps. Long-term stewardship is described as a system with many interrelated and interacting components. Four functions are identified for the long-term stewardship system (contain, monitor, communicate, and manage) and capabilities are identified to fulfill each function. For each capability, enhancements and research are recommended to address deficiencies or make improvements in existing long-term stewardship capabilities. Examples of recommended areas of research include: site modeling tools; engineered systems for contaminant containment; sensor and sensor systems for site monitoring; preservation and communication of site information; site-community relations; and effective and survivable land use controls.

Of particular interest to the LTR restricted release issue are the following two recommendations made to DOE for enhancing effective and survivable land use controls. The first recommendation consists of identifying potential legal strategies; assessing established agreements, and developing draft alternative legal instruments. The second recommendation is to provide archive options for maintaining land use control information for future generations.

### 3.2.2 Status of Potential DOE Changes to Long-Term Stewardship Policy and Management

The staff summarized DOE's consideration of potential changes to its Long-Term Stewardship Program in both SECY-02-0008 and SECY-02-0177, including the transfer of its stewardship responsibilities to the U. S. Department of the Interior (DOI) or another Federal land management agency. However, subsequent to status reports, DOE recently proposed a separate new DOE office (not under the Office of Environmental Management) that would include long-term stewardship rather than continuing to seek a transfer of its stewardship responsibilities to another Federal agency. This new Office of Legacy Management was announced and included in the President's fiscal year 2004 budget submitted to Congress in February 2003.

Under this proposal, DOE would maintain its current long-term stewardship responsibilities within this new office and give it greater visibility and responsibility. If approved by Congress, DOE's unique Federal long-term stewardship and technical capability for sites with radioactive

waste, noted above in section 3.2.1, will likely increase in the future as the DOE sites are remediated and transferred into long-term stewardship.

### 3.3 ECOS Long-Term Stewardship Interagency Cooperative Efforts

In 2001 the Environmental Council of States (ECOS) established a Long-Term Stewardship Subcommittee, which is a cooperative effort to share information among Federal, State, and Tribal organizations with a responsibility or interest in long-term stewardship.

NRC was invited to become involved with the subcommittee and attended the August 2002 workshop. During this meeting, status reports were presented by Federal agencies (DOE, EPA, U. S. Department of Defense (DOD), DOI, U. S. Department of Agriculture, General Services Administration, and NRC) regarding their institutional control programs and issues. Workshop attendees also reviewed a draft Long-Term Stewardship Agreement on shared principles that will be eventually signed by EPA, DOE, DOI, DOD, and ECOS.

Insights relevant to the restricted release issue include the following.

- 1) A continued NRC monitoring and involvement, as appropriate, with the ECOS Long-Term Stewardship Subcommittee provides an efficient mechanism to maintain awareness and exchange current information about issues and evolving solutions among other Federal agencies and States.
- 2) A draft Agreement gives useful guidance on long-term stewardship principles such as sustainability of institutional controls, roles, funding, and stakeholder involvement.
- 3) The Guardian Trust Pilot, sponsored by EPA, DOD, and the Commonwealth of Pennsylvania, was briefed to ECOS Subcommittee as an example of potential solutions to common long-term stewardship issues. The Pilot could offer a range of long-term stewardship services such as site surveillance, maintenance, groundwater monitoring, fund management, information management, and public outreach. This pilot project appears to be the best example of a private form of an “independent third party” option. However, the pilot is far from being available for use and may not have funding to complete. Thus, completion for use in Pennsylvania is doubtful and wider application to other States or agencies is even more uncertain, at this time.

### 3.4 Agreement States

#### 3.4.1 Agreement State Implementation of the LTR

Information about the implementation of the LTR by Agreement States has been obtained through the following three efforts. First, the Office of State and Tribal Programs requested information from Agreement States in December 2001 about the status of implementing the LTR. The status has been periodically updated. As of December 5, 2002, responses from Agreement States indicated that most Agreement States have adopted a compatible rule. Of the 32 Agreement State Programs, 25 have adopted an equivalent LTR; 3 have adopted a more restrictive LTR; and 4 have not adopted the LTR. One State (Ohio) uses a decommissioning possession-only license in lieu of the institutional control requirement in the LTR (see section

3.4.2). A second State (Wisconsin), which is in the process of becoming an Agreement State, has adopted the Ohio model for a possession-only license in its application to become an Agreement State.

Second, the staff obtained the results of an informal Internet inquiry of Agreement States conducted by the State of California in June 2002. California used RADRAP, the electronic bulletin board for Agreement States, to ask the Agreement States if a restricted release site has been approved and, if so, what restrictions were imposed and if deed restrictions were used. Only five states responded to California's request and none of the five States has approved a restricted release. One of these States also commented that once a license is terminated, there is no way of enforcing any restrictions.

Third, during the December 2002 monthly call with the Organization of Agreement States (OAS), the staff provided an overview of the LTR Analysis, including reference to the background on the issues in SECY-02-0177 and the staff's plans to provide a Commission paper in April 2003. The staff also asked if any Agreement States had experience with the restricted release provisions of the LTR or if any Agreement States were considering the possession-only license, like Ohio.

The initial responses in the monthly call did not identify any other Agreement States that were considering restricted release. In addition, the OAS summarized the LTR Analysis discussion in the formal notes of the monthly call, which were provided to all Agreement States. Agreement States with any restricted release or possession only license experience were asked to contact the NRC staff. To date, no Agreement States have contacted the staff.

#### 3.4.2 State of Ohio

The staff reviewed the State of Ohio's decommissioning regulation, a Commission paper that evaluated Ohio's regulation and possession-only license, and the Commission's Staff Requirements Memorandum approving the staff's recommendations. The staff also discussed implementation of the decommissioning possession-only license regulation with the Chief of the Bureau of Radiation Protection of the Ohio Department of Health.

Insights relevant to the LTR restricted release issues are as follows.

- 1) Based on the staff's evaluation and recommendation in SECY-98-209, the Commission found Ohio's possession-only license approach compatible with the LTR. Ohio became an Agreement State in 1999.
- 2) Although Ohio implemented the possession-only license in its decommissioning regulations to be consistent with State law, Ohio also believes a license is more protective than deed restrictions, especially for sites with long-lived radionuclides.
- 3) Ohio also considers a license to be more efficient, because it knows how to use a license and is unfamiliar with establishing and enforcing institutional controls.
- 4) Ohio plans on implementing the possession-only license by first issuing a decommissioning possession-only license when it approves a licensee's decommissioning plan. When decommissioning activities are completed, these

conditions are removed from the license, leaving only the conditions for the possession only part of the license, such as specific restrictions on site access and use.

5) Ohio currently plans on using the license for only the Shieldalloy Metallurgical Corporation (SMC) site in Cambridge, Ohio. SMC also has an NRC license for a decommissioning site in Newfield, New Jersey.

Based on the above efforts, the staff concludes that Ohio is the only Agreement State with a possession-only license provision at this time, and no other Agreement States have used restricted release. Finally, the staff understands that Wisconsin has included the possession-only license in its application to become an Agreement State.

### 3.5 NRC Decommissioning Program Sites Considering Restricted Release

The staff reviewed and updated the status of complex decommissioning sites currently considering restricted release and summarized the current status below. This information is significant to the LTR Analysis of the restricted release issue because it provides the current context of sites that might be affected by the staff's recommended options.

On October 1, 2002, the staff identified in SECY-02-0177, four licensed decommissioning sites considering restricted release: 1) SCA Services Inc. (SCA), Michigan; 2) SMC, New Jersey; 3) Jefferson Proving Ground (JPG), Indiana; and 4) Sequoyah Fuels, Oklahoma. In addition, the staff projected the potential for five future licensed sites that are currently operating that could consider restricted release, because of the high volume of long-lived radionuclides each possess.

Changes have occurred subsequent to SECY-02-0177. At this time, two licensed decommissioning sites, SCA and SMC, are continuing to evaluate the restricted release option. A third site, the formerly licensed AAR site in Michigan, is a new site that is considering restricted release. A fourth site, JPG is considering continuing its agreement with other Federal agencies for institutional controls as part of its plans for site security and radiological surveys, but may use an NRC possession-only license until technology is available to characterize the unexploded ordnance on the site. Sequoyah Fuels is no longer seeking restricted release under the LTR because it is now decommissioning under Part 40 Appendix A.

Other decommissioning sites that might consider restricted release in the future are West Valley in New York and Safety Light in Pennsylvania. Another potential future need for institutional controls could include monitoring and maintenance of concrete structures, should the power reactor entombment option be developed.

Residual contamination at the decommissioning sites considering restricted release, at this time, all contain long-lived radionuclides (uranium or thorium). Therefore, for these sites, permanent (1000 year) institutional controls are necessary. This is similar to what is required under UMTRCA for permanent DOE long-term stewardship for uranium mill tailings sites .

The following sections summarize the current status of institutional controls at the four sites currently considering institutional controls for restricting future site use.



### 3.5.1 AAR, Michigan

The Commission directed the staff, in SRM-SECY-01-0194, to consider creative options that would make restricted release more available to a site, using AAR, a formerly licensed site, as a pilot for consideration of alternative approaches. The staff met with AAR representatives in an October 29, 2002 public meeting to discuss decommissioning options for the site, including the possibility of a restricted release. During the meeting, AAR presented the results of its recent dose analyses, completed to support its proposal for unrestricted release of the eastern portion of the site and a restricted release of the western portion of the site. The staff gave an overview of restricted release LTR requirements and options. AAR discussed its current thinking to enter into a settlement agreement with the NRC on the restrictions and controls needed for 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 restrictive covenant legally would allow NRC or local and State governments to monitor and enforce the restrictions. The staff is currently working with AAR to resolve issues with the dose analyses. After resolution of those issues, the staff will continue to discuss with AAR the possibility of establishing a settlement agreement (including restrictive covenant) between AAR and NRC. Once AAR submits its plans, the staff would complete its review and inform the Commission of its results and any policy issues that result from AAR's proposal.

The approach being considered is significant to the LTR analysis because it tests one of the staff's options evaluated in section 4.2.1.2 for NRC to monitor and enforce after license termination using a legal agreement for sites with a low-dose hazard (i.e., less than 100 mrem/yr dose assuming failure of institutional controls) but long-duration hazard from thorium contamination. Interacting with AAR and evaluating potential approaches has been a useful pilot as the Commission directed in SRM-SECY-01-0194.

### 3.5.2 SCA Services, Michigan

The decommissioning plan for the SCA site is currently scheduled for submittal in September 2003. The staff has previously met with SCA to discuss preparation of the decommissioning plan and use of institutional controls appropriate for the thorium contamination in an existing capped land fill on the site. Most recently, SCA participated by teleconference in the October 2002 AAR public meeting, where NRC staff discussed the LTR restricted release requirements and options. Subsequently, the staff discussed with SCA the current status for selecting institutional controls. These interactions are part of the staff's current approach for pre-decommissioning plan consultations and the phased review for institutional controls.

SCA is currently evaluating both the unrestricted and restricted release options, based on dose assessment results and supporting data. Its evaluations of restricted release have included discussions with the State of Michigan regarding a State role in institutional controls because of the adjoining decommissioning site owned by the State (Michigan Department of Natural Resources) and the State Game Area and Federal Wildlife Refuge surrounding much of the SCA site. No commitment has been obtained from the State at this time. SCA will also need institutional controls for the hazardous chemicals also in the capped landfill on the site. Short term controls are being considered under the State's RCRA program.

This site is important to the LTR analysis because it is an example of seeking some form of a State role for long-term institutional controls to restrict future site use for long-lived radionuclide contamination (thorium) within an existing capped landfill that also contains hazardous chemicals under the State's RCRA program.

### 3.5.3 SMC, New Jersey

The decommissioning plan for the SMC site was submitted in August 2002. Shieldalloy representatives attended the October 2002 AAR meeting where NRC staff discussed the LTR restricted release requirements and options. The staff has completed an acceptance review of the decommissioning plan and has rejected the plan because of deficiencies with the proposed institutional controls, independent third party, financial assurance amount for control and maintenance of the engineered cell cap, and early documentation of advice received from affected parties.

One aspect of SMC's proposal was to transfer the site in the future, after operations had ended to a local or State government, for use as a park. However, the decommissioning plan did not provide any documentation that the government entities identified were considering or had committed to the transfer of the property or had indicated their willingness and capability to monitor and enforce the long-term control and conduct the necessary maintenance.

SMC also submitted a November 15, 2002, letter to NRC requesting deferral of NRC action on the decommissioning plan pending the staff's April 2003 Commission paper with the results of the LTR Analysis, so that SMC could consider the other options for restricting use that might be recommended by the staff to the Commission. SMC has informally expressed its interest in the option for a possession only license similar to its other site in Cambridge, Ohio.

The staff has rejected SMC's deferral request and plans on meeting with SMC to discuss the decommissioning plan deficiencies, and revising the decommissioning plan, using the staff's phased approach. For this site, the phased approach would consist of meetings to discuss and seek agreement on the licensee's approach to institutional controls and financial assurance before the licensee conducts the work needed to address the deficiencies identified by the staff and resubmit a revised decommissioning plan. During these meetings the staff plans on describing options for restricted release that the staff has recommended to the Commission, with the understanding that the Commission has not yet approved them. This approach allows SMC work to continue and not be delayed by the Commission's decision in response to the staff's April 2003 LTR Analysis Commission paper.

### 3.5.4 JPG, Indiana

The revised decommissioning plan for JPG was submitted in June 2002. The Department of the Army, which owns the site, proposed restricting site use with an Agreement with the U.S. Air Force and the U.S. Fish and Wildlife Service. The JPG approach to institutional controls appears acceptable. However, in a February 4, 2003, letter to NRC, the Department of the Army stated that the unexploded ordnance on-site that is co-mingled with the licensed material (depleted uranium) would prevent the collection of site-specific data that may be required by NRC to validate the off-site transport models. As a result, the Department of the Army requested an alternative schedule for submittal of a decommissioning plan and proposed that a

license amendment be negotiated with NRC that would create a 5-year renewable possession-only license for an indefinite time period. Under this proposal the institutional controls would be part of the site security and radiation control programs until the license is eventually terminated. The staff prepared a Commission paper (SECY-03-0031) that describes the licensee's proposal and the staff's agreement with the approach.

The JPG experience is useful to the LTR Analysis because it illustrates an acceptable way to establish institutional controls on Federally owned sites using documented agreements among Federal agencies. This successful example has limited value to NRC because there are no other Federally owned NRC licensed sites. It does, however, illustrate the potential use of a possession-only license for a complex decommissioning site, although the primary reason is to maintain land use controls until technology becomes available in the future to address the unexploded ordnance.

### 3.6 Other NRC Programs

#### 3.6.1 Part 40, Appendix A, "Criteria Relating to the Operations of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for their Source Material Content"

Part 40, Appendix A, provides a regulatory framework for a robust and reliable long-term care system consisting of the following elements:

- 1) Federal government (DOE) ownership, monitoring, and maintenance, in perpetuity. (Note that under UMTRCA, the State where the site is located has the right of first refusal to become the long-term custodian, and DOE, or another agency designated by the President, must assume that role if the State defers);
- 2) DOE provides long-term custodial care under an NRC general license, with no license termination;
- 3) NRC oversight of the long-term custodian;
- 4) DOE's long-term custodial care supplements engineered barriers which are designed with the objective of lasting for up to 1000 years to the extent reasonably achievable, and in any case for at least 200 years without reliance on active maintenance. UMTRCA and Appendix A make clear that the reclamation design should be such that ongoing maintenance will not be required; and
- 5) Most sites are in isolated locations.

Other general insights from implementing the general license program for long-term care under Part 40, Appendix A, that are important to the LTR Analysis include:

- 1) UMTRCA required NRC to license the long-term custodial care of uranium mill tailings sites;

2) NRC implemented this statutory requirement by selecting a general license approach, which was implemented by a rulemaking. The Regulatory Analysis for this rulemaking concluded that either a general license applicable for all sites or a separate specific licenses for each site would have the same end result, but that the general license would be most efficient for this case because of the expectation that there would be one licensee (DOE) eventually, for all UMTRCA Title I and Title II sites;

3) DOE is required to prepare a long-term surveillance plan and submit it to NRC for approval, before license termination of the specific license. This plan provides the specific conditions that DOE would use to implement its long-term custodial duties at the site under the general license. Additional guidance for the LTR could be developed based on the NRC and DOE guidance and experience using these plans.

4) DOE is required to submit an annual report to NRC, that describes the status of each site under a general license. The annual report is the instrument NRC uses to efficiently monitor DOE activities and site conditions.

5) DOE and NRC have over 10 years of experience implementing the general license program, including developing and reviewing: cost estimates of long-term care; engineered controls; and site-specific long-term surveillance plans. NRC also conducts inspections or observes DOE inspections of the sites.

Recently, the staff made recommendations (SECY-02-0183) that the Commission approved (SRM-SECY-02-0183) with respect to using institutional controls on private property adjacent to the Western Nuclear Inc. site in Wyoming. The following insights from these decisions are important to the LTR restricted release issue.

1) Institutional controls can be used for off-site private properties as an alternative to DOE ownership required by Part 40, Appendix A, but only if properties cannot be purchased;

2) Institutional controls consisted of an easement that would be written to give DOE access to monitor and a restrictive covenant that would be written to give DOE authority to enforce restrictions;

3) These institutional controls are acceptable because the Federal government--DOE-- has agreed to monitor, enforce, and provide the "durability", because of DOE's presence and statutory long-term care role at the adjacent site.

4) This approach for the Western Nuclear Inc. site, approved by the Commission, is somewhat similar to the staff's recommended option in section 4.2.1 for NRC monitoring and enforcement after license termination using a legal agreement. Under this LTR-recommended option, the institutional controls, such as a restrictive covenant, would be written to include NRC monitoring and enforcement, as could be done with DOE for the Western Nuclear Inc. site.

### 3.6.2 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste"

Part 61 includes provisions that address institutional controls for low-level waste disposal sites. Major concepts of Part 61 that are important to the LTR Analysis are given below.

1) The inadvertent intruder in the future is protected from waste by institutional controls for up to 100 years for Classes A and B wastes that will decay in 100 years to acceptable hazard levels. The waste concentration provides protection after that time. For Class C waste, protection is provided by both institutional controls for up to 100 years and engineering measures, either by greater depth of disposal or engineered intruder barriers designed to remain effective for 500 years. Beyond 500 years, protection is provided by the waste concentration.

2) Part 61 requires that disposal only be on land owned by the Federal or State government. A licensee would operate the facility and eventually transfer the license after site closure, stabilization, and post-closure observation to the Government owner, who would then be responsible for institutional controls. Thus, the license continues through the institutional control phase for the Federal or State government owners and would be terminated at the end of the phase. There could be earlier license termination if a transfer were to DOE, because NRC lacks regulatory authority over DOE for this specific activity. Note that DOE is not obligated to take a Part 61 site from a State.

3) Part 61 describes institutional control activities as including: 1) environmental monitoring; 2) periodic surveillance; 3) minor custodial care; and 4) administration of funds.

4) The period of institutional controls is determined by the Commission, but institutional controls cannot be relied upon for more than 100 years after transfer of control to the Government owner.

5) The Commission would approve the funding arrangement between the licensee and Government owner. Sufficient funds will be available to cover the costs of monitoring and any required maintenance during the institutional control period.

6) Active maintenance is acceptable for only the 100-year institutional control period. Thus, engineered intruder barriers would need to be designed to last 500 years without active maintenance.

### 3.6.3 10 CFR Part 63, "Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada"

Part 63 includes provisions that address institutional controls and assessment of future human intrusion for a geologic repository at Yucca Mountain.

A major concept regarding institutional controls for a geologic repository is in the following statements from 10 CFR 63.102(k):

Active and passive institutional controls will be maintained over the Yucca Mountain site, and are expected to reduce significantly, but not eliminate, the potential for human activity that could inadvertently cause or accelerate the release of radioactive material.

However, because it is not possible to make scientifically sound forecasts of the long-term reliability of institutional controls, it is not appropriate to include consideration of human intrusion into a fully risk-based performance assessment for purposes of evaluating the ability of the geologic repository to achieve the performance objective at 63.113(b). Hence, human intrusion is addressed in a stylized manner....

Another important concept of geologic repository institutional controls is that the Energy Policy Act gave DOE responsibility for long-term control of the Yucca Mountain site after termination of the NRC license, without a continuing NRC role. Accordingly, Part 63 provides a provision for license termination after permanent closure of the geologic repository, during which time DOE would be responsible for institutional controls. Another provision requires DOE to submit, for NRC approval, a plan for control of all its future activities, after license termination, that could impact safety and performance of the repository. Although, eventual license termination for a geologic repository is anticipated by the regulations, it should be clearly understood that this approach resulted from a statutory mandate and relies on permanent Federal control by DOE and prior approval of DOE's plans for active and passive controls by NRC before license termination.

#### 3.6.4 West Valley Policy Statement

In February 2002 the Commission issued the final policy statement for decommissioning criteria for the West Valley Demonstration Project. This policy statement approved the LTR as the decommissioning criteria for West Valley. Some concepts in the policy statement and NRC's response to comments that are summarized below are related to the LTR Analysis of the restricted release issue.

- 1) The policy statement recognizes that a flexible approach to decommissioning is needed for West Valley. For example, the Commission would consider an exemption allowing higher limits for doses on a failure of institutional controls if it can be rigorously demonstrated that the protection for future generations can be reasonably assured through more robust engineered barriers and/or increased long-term monitoring and maintenance.
- 2) If the NRC license cannot be terminated in a manner that provides reasonable assurance of adequate protection, then the appropriate action may be to require a long-term or even a perpetual license for a portion of the site until, if, and when possible, an acceptable alternative is developed to permit license termination. If a long-term or perpetual license is necessary, the Commission's intent is for that portion of the site to be decontaminated in the interim to the extent technically and/or economically feasible.

Some of the NRC responses to comments on the LTR guidance as it relates to West Valley are important to be aware of for the LTR Analysis and are summarized below.

- 1) The LTR and guidance are not prescriptive as to the criteria for acceptability of site-specific institutional controls or engineered barriers because of the wide range of residual radioactive contamination encountered at decommissioning sites licensed by NRC.

2) The Commission views engineered barriers referred to in the Statement of Considerations of the LTR as distinct and separate from institutional controls. The response clarifies NRC's view on the terms institutional controls, engineered barriers, and physical controls.

### 3.7 National Research Council Report on "Long-Term Institutional Management of U.S. Department of Energy Legacy Waste Sites"

In 2000, the National Research Council's Board on Radioactive Waste Management published a report entitled "Long-Term Institutional Management of U.S. Department of Energy Legacy Waste Sites."

The report describes a conceptual approach and specific measures and factors as they apply to the management of DOE waste sites and the challenges DOE faces in post-remediation site management.

In the staff's view, many of the issues discussed in this report are shared by other remediation programs that implement restrictions on future land use, including NRC's LTR analysis of the restricted release issue.

Therefore, the staff has summarized the following key points, from this extensive report, that might provide insights to help understand and resolve NRC's restricted release issues.

- 1) The Board's report concludes that there is no convincing evidence that institutional controls and other stewardship measures are reliable--the likelihood of their failure is relatively high. The report also refers to its earlier report, in 1995, entitled "Technical Bases for Yucca Mountain Standards," by noting one of the conclusions, namely that although institutional controls cannot be relied on to protect a repository against intrusion, they should be used as an added measure of protection.
- 2) To address the challenge of fallibility, the Board's report provides a broad range of advice. The report first establishes a general conceptual approach, to planning and decision-making, that would address the potential for failure and uncertainty. This approach is a framework to be applied on a site-specific level.
- 3) More specific advice is also provided by identifying criteria for designing an institutional management system including, for example: 1) layering of institutional controls to provide defense in depth; 2) redundancy that provides more than one organization to be responsible for controls; 3) stability through time; 4) periodic reevaluation of effectiveness; and 5) flexibility to tailor controls to site needs and correct and redirect.
- 4) Key activities of a comprehensive long-term stewardship program are also discussed: a) legal and physical restrictions on use; b) oversight and enforcement; c) information management; d) dissemination of information over time; e) periodic comprehensive reevaluations (e.g., EPA's Five-Year Reviews under CERCLA); and f) monitoring new emerging technologies to identify opportunities for more effective remediation.

- 5) The report also notes that the extensiveness and intensity of controls, monitoring, and enforcement should directly correlate with the severity of the risk to potential users of the site.
- 6) The important role of stakeholders is also addressed, including the view that external groups and interested citizens should retain the right of oversight and influence over organizations responsible for the site.
- 7) Primary weaknesses of institutional controls are discussed that help identify the nature of the problem and suggest solutions. Many weaknesses of institutional controls concern the fallibility of memory and susceptibility of present-day intentions to future political and economic pressures. Furthermore, the Board's report indicates that the viability over time of restrictions is likely to be especially questionable in cases where contamination levels are not high enough to prohibit all public access but not low enough to permit unrestricted use.
- 8) Measures to overcome deficiencies are noted in the report, such as: a) periodic evaluations can reduce or even eliminate some of the negative impacts of technical and institutional limitations; b) stable funding for monitoring and maintenance; c) oversight by the public (e.g., including public use of the site, such as a park).
- 9) Finally, one of the Board's conclusions of particular interest to the LTR Analysis is that oversight and enforcement if carried out with continuous vigilance, should help compensate for deficiencies in institutional controls.

### 3.8 ASTM Standard Guide for Use of Activity and Use Limitations

In July 2000, the American Society for Testing Materials (ASTM) published "Standard Guide for Use of Activity and Use Limitations, Including Institutional and Engineering Controls." Guidance is provided for selecting and implementing activity and use limitations (i.e., physical controls and institutional controls) for Federal, State, Tribal, and local remediation programs using a risk-based approach. The risk-based approach means using results of site-specific risk assessments. The general view is given that the greater the risk of exposure over a long period of time, the greater the need to use institutional controls that will be effective over the time period needed.

A selection process and criteria are described to evaluate appropriate types of institutional controls, which are similar to those in EPA guidance. Types of institutional controls and related advantages and disadvantages are described.

Some key insights important to NRC's restricted release issues are given below.

- 1) Activity and use limitations should be considered early and as an integral part of remedial action selection.
- 2) The potential for institutional control failure is recognized and, therefore, use of multiple institutional controls (i.e., layering) is encouraged to increase effectiveness.



3) Differences in State real estate laws result in differing degrees of effectiveness and long-term reliability of institutional controls. Certain legal doctrines may limit long-term enforceability. Therefore, there is a need for flexibility in tailoring institutional controls to the site and jurisdictional characteristics.

4) Institutional controls often supplement engineering controls, but engineering controls need monitoring and enforcement, through institutional controls, to remain effective.

5) The issue of enforceability is discussed, including the wide range of enforceability associated with the different types of institutional controls. The importance of considering both specific State property law and limitations on long-term enforceability is discussed. The need for an enforcer to monitor compliance and take legal action if necessary is discussed. This is critical because legal instruments do not enforce themselves. Thus, identifying a willing and able entity to monitor and enforce is critical to long-term reliability of institutional controls.

### 3.9 ISCORS Statement of Policy on Use of Institutional Controls

The ISCORS subcommittee on risk harmonization recently agreed to develop a set of institutional control principles. The draft is being prepared and will be eventually adopted by ISCORS.

## 4. EVALUATION OF OPTIONS

The staff identified and evaluated the following options to resolve the institutional control issues necessary for the viability of the restricted release and alternate criteria provisions of the LTR. These options are applicable to both existing and future licensees. However, the need for using the restricted release and alternate criteria provisions could be reduced for future licensees if the recommendations are implemented for other LTR issues for measures to prevent future legacy sites and more realistic exposure scenarios.

### 4.1 LTR Clarification Options

#### 4.1.1 Clarify the LTR Risk-Informed, Graded Approach for Restricting Use.

The existing restricted release requirements of the LTR in 10 CFR 20.1403, discussions in the LTR "Statement of Considerations", and the decommissioning guidance (NUREG-1757, September 2002) provide a basis for a risk-informed graded approach for using institutional controls to restrict site use. However, this approach can be clarified and more completely explained in revised guidance to improve both understanding and use by licensees and the staff. This clarification applies to the restrictions that would be used for license termination with restricted release under 10 CFR 20.1403 or for license termination with the alternate criteria in 10 CFR 20.1404.

The clarification would address the following two parts of the risk-informed graded approach: 1) general risk framework and grades of institutional controls; and 2) specific grades of institutional controls determined by site-specific factors that could affect overall risk to public health and

safety. Each of these two parts of the graded approach is summarized below, and revised guidance could provide further details and examples.

1) General risk framework and grades of institutional controls.

The general risk framework can be defined by the hazard level and likelihood of hazard occurrence. This framework is summarized in Table 1 and discussed below.

The hazard level is established in the LTR (10 CFR 20.1403 (e)(ii)) as the dose level of 100 mrem/yr., calculated without institutional controls restricting site use. This dose level is the public dose limit. The LTR also defines the general grades of controls: sites below the 100 mrem/yr dose level require legally enforceable institutional controls and sites above the 100 mrem/yr dose level require both legally enforceable and durable institutional controls. Thus, the LTR requires that institutional controls provide more reliable or sustainable protection over the time period needed (i.e., durable) for sites that could exceed the public dose limit, assuming no restrictions. As noted below the “Statement of Considerations” also provides for durable controls for long-lived radionuclides regardless of the dose limit.

The likelihood of hazard occurrence can be simply defined by the hazard duration based on the half-life of the radionuclide contamination. Longer durations associated with longer half-lives, increase the likelihood of institutional control failure and hazard occurrence. The 100- year time period can be used as a simple way to define the likelihood of hazard occurrence. This approach is derived from discussions in section B.3.3 of the LTR “Statement of Considerations” about the durability of institutional controls and the 100-year time period. This section notes that short-lived nuclides, such as Cobalt-60 or Cesium-137 (half-lives 5.3 and 30 years respectively), would decay to unrestricted use levels in about 10 to 60 years, and, therefore, fall below the 100-year period. Discussions in section B.3.3 also note that “In a limited number of cases, in particular those involving large quantities of uranium and thorium contamination, the presence of long-lived nuclides at decommissioning sites will continue the potential for radiation exposure beyond the 100-year period. More stringent institutional controls will be required in these situations....” Thus, in the staff’s view, the longer the duration of the hazard, the greater the likelihood of institutional controls failing and, therefore, the need for using controls that are more reliable and sustainable for the duration of the hazard (i.e. durable). The 100-year time limit is reinforced by the low-level waste disposal regulations, in 10 CFR 61.7, that require institutional controls for up to 100 years, which is described as a time period that would allow Class A and Class B low-level waste to decay to a level that will present an acceptable hazard to an intruder. For the above reasons, the staff could consider using 100 years to generally separate lower likelihood from higher likelihood of hazard occurrence.

Grades of institutional controls are not discussed in the LTR and the LTR does not define the term “durable” institutional controls as used in 10 CFR 20.1403 (e)(ii). However, section 3.3 of the LTR “Statement of Considerations” gives some insight by discussing the durability of institutional controls and noting that more stringent controls will be required for exposures beyond the 100-year period, “such as legally enforceable deed restrictions and/or control backed up by State or local government control or ownership,

engineered barriers, and Federal ownership, as appropriate.” Consistent with the LTR and “Statement of Considerations”, NUREG-1757 indicates that institutional controls should be durable for sites exceeding the 100 mrem per year calculated dose, but less than the 500 mrem per year dose and for sites with long-lived radionuclides. The controls should be expected to last as long as they are needed. Thus, the staff believes that durable institutional controls would be needed for sites with a hazard level above the 100 mrem/yr value, or sites with a higher likelihood of hazard occurrence (i.e., hazard duration of greater than 100 years).

Based on these discussions, the staff could define two general grades of institutional controls: a) legally enforceable and b) durable and legally enforceable. The first grade of legally enforceable could use conventional institutional controls that are enforceable, such as a restrictive covenant. Examples of durable and legally enforceable institutional controls might include: a) layering of legally enforceable institutional controls that includes a government control (e.g., deed restrictions giving authority to Federal or State governments for monitoring and corrective action); b) State or Federal ownership and control; c) legally enforceable institutional controls monitored and enforced by NRC (new recommended option); and d) NRC possession-only specific license (new recommended option). Table 1 summarizes the grades and gives examples. It should be noted that for long-lived isotopes with doses closer to 25 mrem/yr, special consideration may be warranted, such as relying only on deed restrictions backed up by zoning, based on the language of the “Statement of Considerations.”

## 2) Specific grades of institutional controls.

Specific grading of controls can be selected within the two general grades defined above. This approach recognizes that the site-specific factors affecting risk are highly variable from site to site. As a result specific grading recognizes the need for flexibility to tailor institutional controls to achieve the desired effectiveness. Specific grading involves evaluating and balancing numerous site-specific factors such as: a) physical characteristics of the site that limit future land use; b) land uses that could be adverse and therefore should be prohibited; c) land uses that are acceptable and could result in productive reuse of the site; d) dose assessment results (including low probability, alternate land use scenarios); e) engineered barriers and related maintenance; f) cost of monitoring controls and maintenance used as the basis for financial assurance; g) jurisdictional limitations on enforceability and long-term effectiveness of institutional controls; and h) advice from affected parties, such as local governments and the public. Particular attention might be needed to evaluate and tailor the durable institutional controls for specific sites that are well below the 100 mrem/yr value (lower hazard) but have long-lived radionuclides.

It is important to note that the few decommissioning sites considering restricted release at this time have either uranium or thorium contamination or both, and thus, may need some form of durable institutional controls, based on the duration of hazard.

Finally, the risk-informed graded approach can be implemented by the staff in its existing phased review of restricted release decommissioning plans and interactions with licensees. The phased review focuses on resolving institutional control and financial

assurance approaches first, so that the restricted release option is feasible before extensive staff effort is expended on detailed technical reviews of the decommissioning plan or development of an environmental impact statement.

Pros:

Provides clearer guidance to licensees and staff regarding the options and flexibility available under the existing risk-informed graded approach of the LTR.

Resolves the perception that Federal ownership is the only acceptable option to the staff.

Flexibility and tailoring institutional controls for site-specific factors is consistent with EPA guidance that defines criteria to use in evaluating and selecting appropriate institutional controls. It is also consistent with recommendations in the ASTM Standard and the National Research Council report on long-term institutional management, both summarized in sections 3.7 and 3.8.

Cons:

Additional, unbudgeted resources are needed to revise guidance.

4.1.2 Emphasize the Availability of the Option for Restricting Use after License Termination with Layered and Redundant Institutional Controls Together with an Independent Third Party that is also Responsible for One of the Institutional Controls.

Use layered (i.e., multiple) institutional controls to provide redundancy or backup if one of the controls fails (e.g., a restrictive covenant backed by local government land use zoning).

In addition to the institutional controls, implement the LTR requirement for an independent third party by clarifying that an independent third party needs to be independent from the owner, but may be an entity responsible for the institutional control. This option clarifies that a local or State government responsible for a zoning control could also agree to be responsible for monitoring the controls and assuming control of the site and maintenance in the event the owner cannot. In agreeing to the third party role, governments would need to agree that the financial assurance provided for future maintenance and repair of the site and engineered controls are sufficient. This agreement on sufficiency of funding is important to resolve concerns regarding future financial liability. This option, while efficient, could be viewed as less effective than an independent third party that is fully independent from parties responsible for the institutional controls because a government entity would be monitoring itself.

This option is a variation on option 2(a) in Attachment 1 of SECY-02-0177, where the staff planned on evaluating redundant institutional controls without the independent third-party oversight. The staff's evaluation resulted in concluding that some type of third-party oversight of institutional controls is necessary to have assurance of continued effectiveness. This is needed even in the short-term because of the likelihood of ownership changes over the next few decades. Option 2(a) would require a rule change, which the staff does not consider warranted.

This option could be used for lower hazard level (less than 100 mrem/yr cap) or shorter-duration sites.

Pros:

Redundancy of controls accounts for potential failure and compensates for a less than fully independent third party. The remaining uncertainty may be acceptable for low-hazard and short-duration sites.

Simplest and most efficient to use and could be easier to identify an independent third party who already has a responsibility for an institutional control.

Could be enforced by courts and local government

Could be a viable way to address the independent third party for some cases and resolve the issue of institutional controls remaining effective over time and as ownership changes.

Cons:

Reduced independence of the third party could result in a conflict of interest when the third party is both responsible for the institutional control and the oversight of the institutional control. For example, if a local government with zoning responsibility over a site were pressured politically or by business interests to change zoning, there would not be another party independent from the local government to question the change and raise safety concerns.

Could reduce public confidence by giving the appearance of being less protective and not maintaining safety.

## 4.2 New Options to Restrict Site Use

### 4.2.1 Add a New Option for Restricting Use by NRC Monitoring and Enforcing Institutional Controls after License Termination.

NRC could monitor and enforce institutional controls after license termination by using either authority under 10 CFR 20.1401(c) or legal agreement. These two approaches are described below. Under this option NRC would make the institutional control “durable” by providing Federal Government independent oversight, including five-year rechecks, if needed. This is one of the new options that the Commission directed the staff to consider in SRM-SECY-01-0194. NRC oversight could be “graded” and could vary from simple review of owner certification letters to periodic site inspections of land use and institutional controls.

Institutional controls implemented by the licensee would need to specifically authorize NRC access to the site to periodically inspect and conduct five-year rechecks, if needed. A standby trust could be established before license termination for the purpose of providing maintenance through a trustee if the owner cannot and because NRC, as a regulator, cannot conduct maintenance activities. Such a standby trust would be similar to what has been done for some

uranium mill tailings sites under 10 CFR Part 40, Appendix A, to use if the licensee goes bankrupt. If this occurs, NRC would activate the standby trust and select a trustee to continue the site monitoring and maintenance that had been done by the owner/licensee using funds from the financial assurance instrument, which would be separate from the standby trust.

The financial assurance required by 10 CFR 20.1403 would need to be established and the owner (previous licensee) and its successor owners through a deed restriction, would need to agree to pay NRC annually for the activities NRC conducts. Another alternative would be to provide a single payment at the time of license termination, like UMTRCA sites, which NRC would need to recover through its appropriation request.

#### 4.2.1.1 NRC Monitoring and Enforcement Under the Regulations (10 CFR 20.1401(c)) if there is a Significant Threat

Licensees would select and implement enforceable institutional controls consistent with existing NRC guidance, but NRC would act as the independent third party to monitor and enforce the controls under existing LTR provision 10 CFR 20.1401(c).

The LTR general provision under 10 CFR 20.1401(c) provides for the following potential future NRC action after license termination: "... the Commission will require additional cleanup only if based on new information, it determines that the criteria of this subpart were not met and residual activity remaining at the site could result in significant threat to public health and safety." This provision could include NRC monitoring to identify new information such as failure of institutional controls or adverse changes in land use. Monitoring could include the owner agreeing, as a condition to license termination and included in a deed restriction, to provide in response to an NRC request, a letter certifying effectiveness of controls as a simple way to notify NRC and local governments. By including the obligation to respond to NRC periodic requests in the deed restriction, future owners would be required to provide NRC information about the site. In addition, NRC could seek to have the local government agree to provide an annual letter reporting on effectiveness of controls.

Such new information could then be evaluated to determine if the changes could result in the LTR criteria no longer being met and, if not met, could result in a significant threat to public health and safety. The term "significant threat" is not defined in the LTR. In fact, the Commission in the "Statement of Considerations" for the LTR specifically declined to define the term. One could argue that a "significant threat" might be as high as 500 mrem/yr since the LTR allows restrictions to fail at that level under 10 CFR 20.1403(e)(2). The staff could use a dose estimate above the public dose limit of 100 mrem/year as a "trigger" level to further evaluate the specific circumstances to determine if there is a significant threat and what corrective actions might be needed.

NRC could enforce the continued effectiveness of the restrictions by taking the following approach. If NRC were to determine that the new information could result in a significant safety threat, NRC could require additional cleanup, as stated in 10 CFR 20.1401(c), if the adverse land use were not changed and if effective institutional controls were not reimplemented.

The licensee would need to establish sufficient financial assurance that includes the long-term cost of NRC (acting as an independent third party ) monitoring and other actions, as required

under the LTR [10 CFR 20.1403(c)]. The licensee, as part of license termination, and its successors through a deed restriction, would need to agree to pay NRC annually for the activities NRC conducted, or provide a single payment at the time of license termination, like UMTRCA sites, which NRC would need to recover through its appropriation request.

This option would be considered one type of a durable institutional control.

Pros:

Allows license termination and finality as envisioned under the LTR, but NRC remains involved to some degree.

Removes the NRC license “stigma” from the site, which could be important for future property value and sale. However, the restrictions and NRC monitoring may discourage future purchasers.

Some licensees may prefer license termination.

Allows NRC monitoring to identify new information, but only enforce if there is a significant safety threat.

Resolves the independent third party issue.

Resolves the institutional control long-term reliability issues by NRC monitoring and taking action to reimplement institutional controls if necessary, over time.

More consistent with EPA’s approach for five-year reviews, including evaluating the effectiveness of institutional controls.

Cons:

The “Statement of Considerations” did not envision a periodic monitoring role for the NRC after license termination. However, there is nothing in the LTR that precludes it, provided that licensable material remains at the site.

Annual reporting and fees may be difficult to secure from future owners.

If a system is needed to monitor terminated sites because of the potential impact on public health and safety, one could argue that the site is not appropriate for license termination. Rather, a possession-only license may be more appropriate.

The option has not been implemented before by NRC or legally tested.

The deed restriction is dependent on the law of the site’s jurisdiction and may not be viable in all states.

Could not be used for the lower hazard (e.g., less than 100 mrem/yr dose cap sites) because they would not present a significant safety threat under 10 CFR 20.1401(c).

No definition of significant threat to safety; guidance may need to be developed

Although NRC costs could be minimal for monitoring simple sites with institutional controls; increased costs could be needed if NRC had to take some action or if the owner reporting fails.

If the owner and future owners do not provide information to the NRC, NRC may need to enforce the restrictions and may need to conduct periodic inspections instead.

Funds received annually from the owner for NRC activities or a single payment would go to the U.S. Treasury, and NRC would need to recover these funds through the appropriation process (similar to what DOE currently does for UMTRCA sites making a payment to the U.S. Treasury).

#### 4.2.1.2. NRC monitoring and enforcement under a legal agreement

NRC would monitor and enforce under legal agreements or authority written into institutional controls, similar to the approach under consideration for use with AAR, summarized in section 3.5.1. This option is essentially the same as the option under 4.2.1.1, but based on a legal agreement and deed restriction rather than the regulation (10 CFR 20. 1401(c)).

Monitoring could include the owner agreeing, as a condition to license termination and included in a deed restriction, to provide a response annually or at other frequency to an NRC request for certifying effectiveness of controls as a simple way to notify NRC and local governments. By including this obligation in the deed restriction, future owners would be required to also provide a response.

The licensee would need to establish sufficient financial assurance for the long-term cost of NRC (acting as an independent third party ) monitoring and other actions, as required under the LTR (10 CFR 20.1403(c)). The licensee, as part of license termination, would need to agree to pay NRC annually for the activities NRC conducted, or provide a single payment at the time of license termination, like UMTRCA sites, which NRC would need to recover through its appropriation request.

This option could be used for any site.

##### Pros:

Allows license termination and finality as envisioned under the LTR, but NRC remains to a limited degree.

Some licensees may prefer license termination.

Removes the NRC license “stigma” from the site, which could be important for future property value and sale. However, the restrictions and NRC monitoring may discourage future purchasers.

Resolves the independent third party issue by NRC becoming the third party.



Resolves the institutional control long-term reliability issues by NRC monitoring and taking action to reimplement institutional controls if necessary over time.

A somewhat similar approach was approved by the Commission for the Western Nuclear Inc. site, where authority could be written into institutional controls for DOE to monitor and enforce controls on the private property adjacent to the site.

Cons:

The "Statement of Considerations" did not envision a periodic monitoring role for the NRC after license termination. However, there is nothing in the LTR that precludes it, provided that licenseable material remains at the site.

This has never been implemented by NRC or legally tested.

Annual reporting and fees may be difficult to secure from future owners.

If a system is needed to monitor terminated sites because of the potential impact on public health and safety, one could argue that the site is not appropriate for license termination. Rather, a possession-only license may be more appropriate.

The deed restriction is dependent on the law of the site's jurisdiction and may not be viable in all states.

Although NRC costs could be minimal for monitoring simple sites with institutional controls, increased costs could be needed if NRC must take some corrective action.

Funds received annually from the owner for NRC activities, or received as a single payment, would go to the U.S. Treasury, and NRC would need to recover these funds through the appropriation process (similar to UMTRCA sites making a payment to the U.S. Treasury)

4.2.2 Add a new option for restricting use by an NRC possession-only specific license after completion of remediation.

This option would involve amending the existing specific license for decommissioning to a possession-only specific license, after completing remediation and after LTR dose criteria are met. For such sites, the possession-only license acts as an institutional control to maintain the restrictions necessary to meet the LTR criteria.

For this option, all the requirements of 10 CFR 20.1403, other than institutional controls, would be required, including the public participation provisions and financial assurance. Financial assurance would, for this case, be based on a cost estimate for NRC monitoring and inspection fees, and any maintenance costs.

New license conditions for land use restrictions, monitoring, maintenance, reporting, and financial assurance would be specified in the possession-only license. A Long-Term Care Plan implemented under the possession-only license could provide the detailed plans for restrictions,

monitoring, reporting, and maintenance similar to the Long-Term Surveillance Plans under 10 CFR Part 40, Appendix A. The possession-only license is the type of institutional control, similar to EPA's orders or permits, that provide the necessary restrictions on access or future land use. NRC would monitor, inspect, and enforce under the license authority.

If site ownership changes in the future, the possession-only license would need to be transferred before ownership passes. Therefore, an independent third party is not needed. However, a standby trust would need to be established, similar to what has been done for some uranium mill tailings sites under Part 40, Appendix A, because of the potential for the licensee to go bankrupt or out of business. If this occurs, NRC would activate the standby trust and select a trustee to continue the site monitoring and maintenance that had been done by the owner/licensee, using funds from the financial assurance instrument.

At the end of the period of restricted site use, the possession-only license could be terminated; however, for long-lived radionuclides, the license would likely be permanent, but periodically renewable (e.g., every five years). The Timeliness Rule has been met with completion of remediation and compliance with the LTR dose criteria.

This option could be used for any restricted release site that is unable to establish acceptable institutional controls using other available options.

No rulemaking is needed to implement this option; it can be implemented with revisions to existing guidance for decommissioning and use of possession-only license. Environmental reviews, which may include an environmental impact statement, would need to be done for the license amendment establishing the possession-only license. An opportunity for a hearing would be provided as part of the amendment process.

Pros:

This option addresses the concern of some that the Federal government, which allowed a site to be contaminated through its license authorization and termination actions, should not leave long-term protection up to other parties.

Provides viable and immediately available option that could be selected by licensees currently preparing their decommissioning plans and thereby avoid potential delays.

Provides licensees with the ultimate solution to the LTR requirement for legally enforceable institutional controls or durable institutional controls if no other acceptable options are available. This option would resolve all restricted release issues.

This is the most effective monitoring and enforcement tool available to NRC for short- or long- term use that NRC knows how to use. Avoids the legal complexity and uncertainty of establishing enforceable institutional controls that will be effective over long-time periods.

Gives flexibility for other solutions for restricted use to evolve and possibly become available in the future, such as DOE ownership under NWPA 151(b) or the Guardian Trust Pilot for an independent third party.

No rulemaking needed to implement; can implement with revisions to existing guidance for decommissioning and use of possession-only license.

NRC's licensing oversight of the few complex decommissioning sites could be combined with the existing NRC oversight of over 20 uranium recovery sites required by UMTRCA. Thus, there is an existing statutory NRC mission and well-established program to provide regulatory oversight in perpetuity for as many as 40 sites that are very similar to the complex decommissioning sites and would require about the same type of monitoring.

Similar to EPA, State of Ohio, and NRC, under UMTRCA/Part 40 Appendix approaches, for a government entity to remain in an oversight role to ensure long-term effectiveness of institutional controls.

This approach should increase public confidence because this option would be more protective of future generations because of continuous Federal government involvement. This approach is also consistent with EPA's approach to continued oversight.

Staff and Commission reviewed and found the Ohio possession-only license approach more stringent than the LTR, but because this approach did not create a significant regulatory conflict, it was determined to be compatible with NRC's program.

Most cost effective option for a few sites.

Low-cost NRC monitoring that could use an annual letter of certification or registration.

NRC resources would be fee recoverable from the licensee.

Cons:

Concerns could be raised about lack of finality and departure from the LTR goal of license termination and no further NRC role. However, this approach may be only needed for rare cases to resolve existing decommissioning sites. Furthermore, it should not be a precedent for future sites because many of the staff's other recommendations in this paper will minimize future legacy sites that might need restricted release.

NRC licensing oversight for some sites could be permanent because the current sites considering restricted release are sites with uranium and thorium contamination. Although this NRC role was not envisioned under the LTR, it is similar to the existing statutory role under UMTRCA for permanent NRC oversight of DOE's long-term stewardship of Title I and II uranium recovery sites. Therefore, such a permanent oversight role for long-term stewardship is not a new role for NRC, as an agency.

A licensee could object to concept and fees over the long-term, including the license "stigma". On the other hand, this option would only be used if the licensee selected it because it was unable to arrange other institutional controls or third party oversight under the LTR.

#### 4.2.3 Add a new option for restricting use by an NRC general license after completion of remediation.

This option would involve terminating the existing specific license after completing remediation and after LTR dose criteria are met and issuing a new general license for long-term care. The Commission directed the staff to evaluate a general license option. The general license would be a type of institutional control, similar to EPA's orders or permits, that provides the necessary restrictions on future use. Required environmental reviews, advice from affected parties, and financial assurance would continue.

This option could be used for sites with a higher hazard (above 100 mrem/yr dose cap), longer duration (e.g., long-lived radionuclides such as uranium or thorium sites), or if a site cannot establish other types of acceptable institutional controls.

A Long-Term Care Plan implemented under the general license could provide the site-specific conditions for restrictions, monitoring, and maintenance similar to the Long-Term Surveillance Plans under 10 CFR Part 40, Appendix A. Reporting requirements could also be included in the general license, such as a periodic registration process; an annual report similar to the current approach used under 10 CFR Part 40, Appendix A, for uranium recovery sites; or an annual letter certifying effectiveness of restrictions and results of monitoring and maintenance. However, unlike the 10 CFR Part 40, Appendix A approach, where the general licensee will only be the Federal government, the general licensee for this option will be private entities who might change over time and may not understand that they are a licensee.

A rulemaking would be needed to establish a new general license program and fee category.

##### Pros:

Except for the cost of rulemaking and the associated time to complete the rule, this option has the same pros as the possession-only specific license.

Cost of NRC monitoring would be fee-recoverable from the licensee thru a new fee category.

##### Cons:

No advantage over the possession-only license option.

Requires new rulemaking to establish the general license program and fee category.

The time need to complete a new rulemaking (2-3 years) would further delay the decommissioning schedules for some licensees that are currently preparing their decommissioning plans and seeking viable options for institutional controls.

Rulemaking would not be cost-effective for a few sites.

It is not clear that NRC could require prior approvals of a change in ownership under the general license.

#### 4.2.4 Continue to monitor the DOE long-term stewardship program changes and reevaluate the potential for restricting use through future site transfers to DOE under NWPA 151(b).

Revised DOE policy and program changes have been recently settled by including the new Office of Legacy Management in the President's budget for Congressional approval. Therefore, continued NRC monitoring both at the staff and senior management level may be useful to determine if and when NRC might again discuss potential transfer of a few sites to DOE under NWPA Section 151(b). NRC could also be supportive of DOE's new office in communications with Congress.

##### Pros:

DOE has unique and extensive stewardship capability for as many as 200 future sites, that will require a mission and supporting infrastructure to last in perpetuity. Thus, DOE ownership continues to be a highly effective Federal solution that would resolve the institutional control and third party issues.

Transfer of privately owned sites to DOE is already authorized under NWPA Section 151(b) and could provide another viable option for durable institutional controls, if DOE agrees.

Under the expanded and enhanced long-term commitment to long-term stewardship by DOE's new Office of Legacy Management, there might be an opportunity to reconsider, at an appropriate time, transfer of NRC licensed sites to DOE.

##### Cons:

There is uncertainty in Congressional approval of DOE's new office.

There is continued uncertainty about DOE's willingness to accept NRC licensed sites.

#### 4.2.3 Remove dose cap requirements for sites with Federal ownership or control.

For sites that could be Federally owned or under Federal control, including NRC licensing, do not assume failure of the Federal government, and therefore, the dose cap requirements of the LTR assuming failure of institutional controls would not apply.

##### Pros:

Could make restricted release more available for a site that could not meet the 500 mrem/yr dose cap.

Could result in less cleanup and lower cost to licensee.

Similar to EPA's approach, which does not assume failure of institutional controls, because of its overall approach to effectiveness, including EPA's ongoing role to conduct Five-Year Reviews (see section 3.1).

Cons:

Would require rulemaking to change, or an exemption.

Likely would reduce public confidence because of removing an existing LTR dose requirement and the appearance of becoming less protective of future generations.

Removes the dose cap, which is the tool currently used to implement the risk-informed and graded approach to institutional controls.

Reduces long-term protection of future generations by removing the dose caps , which limits the dose consequences should the Federal government controls fail.

## 5. RECOMMENDATIONS

The recommended options and recommended implementation actions to resolve this issue are provided below.

1.1 Clarify the existing risk-informed, graded approach for restricting use. Implement with revised guidance and a RIS.

1.2 Emphasize the availability of the option of restricting use with layered and redundant institutional controls together with an independent third party that is also responsible for one of the institutional controls. Implement with revised guidance and a RIS.

1.3 Add a new option for restricting use by NRC monitoring and enforcement of institutional controls after license termination using either the regulation or legal agreement. Implement with revised guidance (that includes a model restrictive covenant) and a RIS.

1.4 Add a new option for restricting use by an NRC possession-only specific license. Implement with revised guidance and a RIS.

Note that the staff plans on continuing to monitor DOE's Long Term Stewardship Program changes and reevaluate the potential for restricting use through future site transfers to DOE under NWPA 151(b).

Note that the staff plans on continuing to monitor and participate, where beneficial to the staff, with cooperative, interagency activities to share information and develop solution to long-term stewardship/institutional controls issues (e.g., ECOS Long-Term Stewardship Subcommittee, DOE Long-Term Stewardship Roadmap development).

Note that the staff will continue to explore with licensees the use of the recommended approaches for restricted release, pending the Commission's deliberations. The staff will inform the Commission if a licensee is willing to adopt any of these approaches. In addition, if the Commission approves one or more of the options, the staff will seek to implement the option(s) in advance of the RIS and guidance if it will further the decommissioning process.

TABLE 1. NRC’S RISK-INFORMED GRADED APPROACH FOR INSTITUTIONAL CONTROLS TO RESTRICT SITE USE

<p><b>Lower Risk</b></p> <p><b>Lower Hazard Level (25-100 mrem/year)</b></p> <p><b>Shorter Hazard Duration– Lower Likelihood</b>  <b>Shorter Half-Life (less than 100 years)</b></p>	<p><b>Higher Risk</b></p> <p><b>Higher Hazard Level (100-500 mrem/year)</b></p> <p><b>Longer Hazard Duration– Higher Likelihood</b>  <b>Longer Half-Life (greater than 100 years)<sup>1</sup></b></p>
<p><u>General Grade</u></p> <p>Legally enforceable institutional controls</p> <p><u>Specific Grade</u></p> <p>Tailor specific type of institutional controls and land use restrictions to site-specific circumstances</p> <p><u>Examples</u></p> <p>Single conventional “deed restriction” such as a restrictive covenant (less control)</p> <p>Layered/redundant controls such as restrictive covenant, deed notice, and State registry (more control)</p>	<p><u>General Grade</u></p> <p>Durable and legally enforceable institutional controls</p> <p><u>Specific Grade</u></p> <p>Tailor specific type of institutional controls and land use restrictions to site-specific circumstances</p> <p><u>Examples</u></p> <p>Layered/redundant controls that includes a State government control (less durable)</p> <p>Conventional institutional control with NRC monitoring and enforcement after license termination using legal agreement (less durable)</p> <p>Conventional institutional control with NRC monitoring and enforcement after license termination using regulatory authority under 10 CFR 20. 1401(c) (more durable)</p> <p>State or Federal government ownership and control (NWPA 151(b)) (most durable)</p>

<sup>1</sup> It may be appropriate to treat sites with longer half-live contamination but doses close to 25 mrem/yr as “Lower Risk” sites.