

NRC Decommissioning Lessons Learned

Search Criteria: *Year:* 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-01 *Facility Type:* Reactors, Material Facilities *Stage:* Decommissioning Planning

Benefits: Facilitates Decommissioning Work

Subject: Benefits of early coordination with all regulatory agencies and waste disposal facilities when considering waste disposal options.

Discussion: As part of the planning process, it is important that licensees coordinate early with all regulatory agencies (i.e., federal and state) regarding waste disposal options. If on-site disposal is being considered an option for a project, early consultation and agreement on the approach with all regulatory agencies can help identify concerns and alternatives for waste disposal. For off-site disposal, it is important to coordinate early with the receiving facility and ensure that applicable permits will allow such disposal. If a modification to the permit is needed to allow the disposal, this should be discussed and coordinated early with the receiving facility and regulatory agencies. Licensees should also obtain written certification from the disposal facility being considered in a decommissioning project before submitting a formal request to the NRC for approval of waste disposal under 10 CFR 20.2002. This is very important since the dose assessment that the NRC staff will conduct during the review of a licensee's request is specific to the disposal facility. In addition, this written certification can be useful to licensees in two ways:

- The certification serves as written evidence that the waste disposal facility being considered by the licensee can accept the waste; and
- It avoids the need to reconsider other disposal facilities at a later stage in a decommissioning project, thus reducing the NRC and licensee staff time needed to find an alternate disposal site and reducing delays in decommissioning activities.

These advantages can result in time and money savings for both the NRC and licensee staff.

References: Contact Us About Decommissioning of Nuclear Facilities
<http://www.nrc.gov/about-nrc/regulatory/decommissioning/contactus.html>

Search Criteria: *Year:* 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-02 **Facility Type:** Reactors, Material Facilities **Stage:** Decommissioning Work

Benefits: Facilitates Decommissioning Licensing

Subject: Benefits of using a "split sample" approach during the analysis of radiological samples to support a decision or conclusion during decommissioning activities.

Discussion: Even though it is not required, splitting samples to conduct independent laboratory analyses by the NRC staff and licensees can be beneficial during the early stages of decommissioning activities. One example is the Pathfinder site in South Dakota. The licensee used historical data from the site, which included some sampling data, to conclude that there were no impacts to groundwater from radiological operations at the site. Concurrent with NRC's review of the decommissioning plan (DP) for the site, water samples were taken from some onsite wells and each liquid sample was split between the licensee and the NRC staff. Independent analyses were conducted and the laboratory results were attached to the NRC's inspection report. The results were also referenced in the draft environmental assessment (EA). This approach resulted in several benefits to the licensee and the NRC staff:

- It helped the NRC staff verify the licensee's conclusion (i.e., no groundwater contamination) that was based on historical data for the facility;
- Laboratory results from independent sources provide quality assurance for results that are obtained from only one source; and
- It facilitated the review of the draft EA by the Department of Environmental and Natural Resources in South Dakota. Since results of the split groundwater samples were available prior to the completion of the EA, the groundwater sampling results were incorporated into the draft EA and reviewed by the state.

This approach helped the licensee to streamline the final status survey process by eliminating groundwater from further consideration, thus avoiding unnecessary expenses and staff resources by the licensee.

References: Safety Evaluation Report for License Amendment to Authorize Decommissioning of Xcel Energy's Pathfinder Site in Sioux Falls, South Dakota.

<http://adamswebsearch2.nrc.gov/idmws/ViewDocByAccession.asp?AccessionNumber=ML051430520>

Search Criteria:

Year: 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-03 ***Facility Type:*** Reactors, Material Facilities ***Stage:*** Decommissioning Planning

Benefits: Facilitates Decommissioning Work

Subject: Benefits of conducting a comprehensive characterization of the site before starting decommissioning activities.

Discussion: As discussed in the Regulatory Issue Summary 2002-002, the NRC staff noted in some submittals that characterization surveys for plant structures, systems, and components; surface and subsurface soils; and groundwater were, at times, incomplete. This issue is still occurring in some submittals reviewed by the NRC staff. A comprehensive site characterization is a key step in any decommissioning project. Adequate characterization before commencing decommissioning activities helps licensees identify and quantify the amount and extent of contamination that needs to be remediated. At a minimum, the site characterization must provide sufficient information to allow the NRC to determine the extent and range of expected radioactive contamination at a particular decommissioning site. The purpose of the site characterization is to define relevant features of the soil, water, and buildings in order to assess risk and develop adequate plans to complete decommissioning. By ensuring that enough reliable characterization data is collected during the planning of the project, licensees can obtain several benefits including:

- Early identification of potential issues that could complicate or delay cleanup activities (e.g., unexpected subsurface or groundwater contamination), and take any necessary actions;
- It reduces the likelihood of revising plans and documents already approved by the NRC; and
- Aids in planning and justifying the final status survey.

References: Contact Us About Decommissioning of Nuclear Facilities
<http://www.nrc.gov/about-nrc/regulatory/decommissioning/contactus.html>

Search Criteria:

Year: 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-04 ***Facility Type:*** Reactors, Material Facilities ***Stage:*** Operations

Benefits: Facilitates Decommissioning Licensing

Subject: Licensees should define, describe and document any new processes or modifications to existing processes or facilities in the facilities' files.

Discussion: Whenever licensees want to add or modify facilities or processes at an operating site that involves radioactive material, they should describe these changes, the physical boundaries of the processes or operations, and the potential impacts to human health and safety, or the environment that could result from these changes in detail. Licensees should document and review this information before submitting the license amendment package(s) to the NRC for review and approval. Any pertinent information should be included in the license amendment. For Part 50 licensees, if these changes can be addressed under the 10 CFR 50.59 process and the licensee chooses to use it, the licensee should document such changes in their 10 CFR 50.59 files. Having this information can provide several benefits to licensees, including:

- Ensuring that physical boundaries of the licensed site are clearly defined so that when it is time to decommission, there should not be any question as to what area the licensee is responsible to address. Physical boundaries of operations may impact the scope of the Environmental Assessment that will be performed by NRC as part of the license amendment process. Physical boundaries of operations may also impact issues related to dose compliance for decommissioning, especially if the licensee is considering partial site release or if parts of the site are being cleaned up under other programs such as the U.S. Army Corps of Engineers, Formerly Utilized Sites Remedial Action Program or the West Valley Demonstration Project.
- Assisting the licensee in planning any additional data gathering for baseline purposes or during the scoping phase of decommissioning to describe the radiological status of the site.
- Streamlining the review of the DP or License Termination Plan (LTP).

References: Contact Us About Decommissioning of Nuclear Facilities
<http://www.nrc.gov/about-nrc/regulatory/decommissioning/contactus.html>

Search Criteria: *Year:* 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-05 **Facility Type:** Reactors, Material Facilities **Stage:** Operations

Benefits: Facilitates Decommissioning Licensing

Subject: Licensees should define, describe and update any program plan documents required by their licenses before submitting a DP or LTP for approval. The information should be included in the license amendment request.

Discussion: Information related to a licensee's program that is required by an NRC license, including updates to such programs, should be included in the license amendment request(s), or submitted in parallel as a separate request for a license amendment. Any other additional or supporting information, such as procedures relevant to these program plans, should also be updated in parallel with the license amendment request. This may result in more timely implementation of the changes after the NRC license is amended. Since the approval of the DP or LTP can not be accomplished without NRC review and approval of the program plans required by the license to ensure that they are consistent and appropriate for the proposed decommissioning activities, this approach can help to streamline the review of the DP or LTP.

References: Contact Us About Decommissioning of Nuclear Facilities
<http://www.nrc.gov/about-nrc/regulatory/decommissioning/contactus.html>

Search Criteria: *Year:* 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-06 *Facility Type:* Reactors, Material Facilities *Stage:* Decommissioning Planning

Benefits: Facilitates Decommissioning Licensing

Subject: Benefits of demonstrating the appropriateness of ratios used to calculate Derived Concentration Guideline Levels before the final status survey.

Discussion: If a licensee proposes to use ratios for calculations of Derived Concentration Guideline Levels (DCGLs), the use of data to demonstrate that these ratios are still appropriate at the time of final status survey will be needed. Even when such data is available when the DP is submitted, NRC will ask the licensee to verify that these ratios are still appropriate to support final status survey. If supporting data is not available for this purpose at the time the DP is submitted, the licensee is taking a chance that the DCGLs will not be appropriate and NRC may require verification of such assumptions before it will terminate the license or may even may require, as part of the DP approval, a license condition requiring that the licensee verify these ratios before acceptance of the final status survey reports. Licensees that want to calculate the ratio of radionuclides for derivation of DCGLs based on data obtained before decommissioning activities are completed will be required to verify that these ratios are still applicable at the time of final status survey. If these ratios are not applicable, licensees may be required to conduct additional decommissioning before the final status survey is completed and determine if related documentation must be submitted to the NRC for review and approval. Understanding this approach can avoid the need for additional resources and expenses for both the licensee and the NRC staff during DP review and/or at a later stage in a decommissioning project, thus resulting in savings and avoiding significant delays.

References: Contact Us About Decommissioning of Nuclear Facilities
<http://www.nrc.gov/about-nrc/regulatory/decommissioning/contactus.html>

Search Criteria: *Year:* 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-07 *Facility Type:* Reactors, Material Facilities *Stage:* Decommissioning Planning

Benefits: Facilitates Decommissioning Licensing

Subject: Benefits from understanding the differences between decommissioning in stages and phased decommissioning.

Discussion: A clear understanding of the differences between submitting a DP or LTP in stages and phased decommissioning can help licensees plan and conduct decommissioning activities in a more streamlined manner. Submitting a DP or LTP in stages is administrative in nature and should be coordinated with the NRC staff. Unfortunately the term "phases" has been used interchangeably for the term "stages" and this has led to confusion. Each submission of a portion of a DP or LTP must be approved by NRC and it must be understood that these submissions will not allow the licensee to implement decommissioning in stages because NRC would not incorporate the submissions into the license until all the DP work is completed. Under these circumstances, one environmental review would be conducted after all portions of the DP or LTP are submitted. It is generally not desirable to submit a DP or LTP in stages (i.e., piecemeal approach) for inclusion into the license. Each submission will require a concurrent opportunity for a hearing. In addition, NRC will have to review each submission and then the entire DP or LTP to determine if the plan is fully integrated. Therefore, this practice is discouraged.

On the other hand, "phased decommissioning" means dividing all the decommissioning work into separate phases, such as off-site and on-site remediation activities. In order for phased decommissioning to be approved by NRC, careful consideration of segmentation issues under the National Environmental Policy Act (NEPA) and potential dose modeling issues must be evaluated by NRC early in process. Understanding these differences early in the process can result in many advantages to the licensees, including:

- Ensuring an adequate approach to address NEPA requirements, which is necessary for amending the license to allow decommissioning activities;
- Reducing the likelihood of misinterpretation of phased decommissioning versus submitting a DP in stages; and
- Reducing the likelihood of rejections and resubmittals of licensee's documents to support decommissioning activities.

These advantages can reduce significant delays in the licensing process and can help licensees save time and resources by not having to redo work.

Note: With regard to Environmental Impact Statements (EISs), regulations from the Council of Environmental Quality (40 CFR 1508.25(a)) state that an agency should analyze "connected actions" and "cumulative actions" in one EIS. An agency should also analyze "similar actions" in one EIS when that is the best way to adequately assess the combined impacts of the similar actions or reasonable alternatives. "Connected actions" are those that automatically trigger other actions that may require EISs, cannot proceed unless other actions are taken previously or simultaneously, or are interdependent parts of a larger action and depend on

the larger action for justification. "Cumulative actions" are those that, when viewed with other actions proposed by the agency, have cumulatively significant impacts and, therefore, should be discussed in the same EIS. "Similar actions" are those that, when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental impacts together, such as common timing or geography. NRC has taken the position of analyzing EAs in accordance with this regulation. (See 40 CFR 1508.25(a)).

References: Contact Us About Decommissioning of Nuclear Facilities
<http://www.nrc.gov/about-nrc/regulatory/decommissioning/contactus.html>

Search Criteria: *Year:* 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-08 **Facility Type:** Reactors, Material Facilities **Stage:** Decommissioning Planning

Benefits: Facilitates Decommissioning Licensing

Subject: Licensees should work with NRC staff to complete the checklist in NUREG-1757, Volume 1, Appendix D, and also refer to NUREG-1748 before formally submitting a license amendment request for decommissioning.

Discussion: Licensees and NRC staff should work together to develop information for inclusion in the DP/LTP using the checklist in NUREG-1757, Volume 1, Appendix D, and review the guidance in NUREG-1748 for preparing an Environmental Report during the preparation of a license amendment request for decommissioning activities. Some licensees have not considered the EA process as part of the Appendix D checklist. In addition, it is recommended that licensees take time to review Section XIc., "Effluent Control Program," of the Appendix D checklist carefully for decommissioning activities before submitting its license amendment request for decommissioning. When sites are no longer in production or no longer conducting the same operations as they once did, effluent monitoring may shift from point source monitoring to fugitive emission monitoring. By understanding the guidance in NUREG-1757 and NUREG-1748, licensees should be able to provide NRC with the information required to have a DP/LTP accepted for a detailed technical review. Ultimately, this will help to reduce the review process by the NRC staff, thus resulting in cost savings to the licensee.

References: NUREG-1757: Consolidated Decommissioning Guidance, Volume 1, Revision 1

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1757/v1/>

NUREG-1748: Environmental Review Guidance for Licensing Actions Associated with NMSS Programs

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1748/>

Search Criteria: *Year:* 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-09 **Facility Type:** Reactors, Material Facilities **Stage:** Decommissioning Planning, Decommissioning Work

Benefits: Facilitates Decommissioning Licensing

Subject: Use of NRC's electronic submittal system is voluntary, but it can save time and money to licensees and members of the public.

Discussion: Licensees and members of the public are encouraged to take advantage of the NRC's electronic submittal system, the Electronic Information Exchange (EIE). This feature can help reduce the time and expenses incurred by making hard copies of any document submitted for NRC approval, particularly those that are long. Electronic submittal is also beneficial if a decommissioning document needs to be revised or supplemented with additional information. Licensees, vendors, and members of the public can participate in the EIE. The EIE is designed to ensure that electronic documents can be transmitted via the Internet in a secure and unalterable manner. Submittals such as those that are required to be submitted under oath or affirmation may be safely transmitted using this system. However, applicants, licensees, vendors, etc. must designate individuals who have the responsibility for originating, signing, or sending documents to the NRC in compliance with regulatory requirements. This can only be done through the EIE application process. Some licensees have mistakenly used their internally approved electronic signature systems (i.e., EDMS 2000). Such electronic signature systems are not recognized by NRC. Only individuals on an Authorized Certificate List (ACL) may submit documents electronically to the NRC. Each licensee prepares an ACL of the names and e-mail addresses of individuals allowed to submit documents electronically to the NRC. All documents submitted or transmitted electronically shall be signed using digital signature software. The digital signature provides for the authentication, certification, and security of documents submitted electronically.

References: Electronic Submittals - Electronic Information Exchange
<http://www.nrc.gov/site-help/e-submittals.html>

Search Criteria:

Year: 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-10 ***Facility Type:*** Reactors, Material Facilities ***Stage:*** Operations

Benefits: Facilitates Decommissioning Licensing

Subject: Licensees should revisit their technical basis documents for specific programs used during the operation of their facilities and update them, as appropriate, before submitting license amendment requests for decommissioning activities.

Discussion: Licensees that have their technical basis documents for operational facilities programs, such as environmental monitoring, criticality control, materials control and accounting, etc., need to revisit and update, as appropriate, these documents before planning or conducting any decommissioning activities. Licensees should review their technical basis documents prior to decommissioning to ensure that:

- Programs that were in place during the operation of the facility are still applicable and representative of the activities that will be conducted at the site (i.e., building demolition, soil excavation, etc.);
- Licensees' documents comply with applicable regulations to decommissioning; and
- Routine environmental monitoring programs that were executed during the operation of the facility are reviewed and revised, if necessary, to reflect future decommissioning activities.

These actions may result in a faster DP review and approval, thus saving money for licensees.

References: Contact Us About Decommissioning of Nuclear Facilities
<http://www.nrc.gov/about-nrc/regulatory/decommissioning/contactus.html>

Search Criteria: *Year:* 2006
Stage: All Functional Areas

Facility Type: All Facility Types
Benefit: All Benefits

Lesson ID: 2006-11 *Facility Type:* Material Facilities *Stage:* Decommissioning Planning

Benefits: Facilitates Decommissioning Licensing

Subject: Adequate supporting documentation for decommissioning cost estimates should be submitted to facilitate detailed reviews by NRC staff.

Discussion: Materials facilities have not always submitted adequate information for the NRC staff to conduct a detailed review of the cost estimate for decommissioning activities at these facilities. The acceptable content and format of all required documentation for site-specific decommissioning cost estimates can be found in Appendix A.3 of NUREG-1757, Volume 3. Failure to submit all necessary documentation in an acceptable format to the staff has resulted in additional RAIs and more NRC staff time needed to determine the adequacy of the decommissioning cost estimates, thus resulting in delays, more time being charged to the licensees, and increased costs.

References: NUREG-1757: Consolidated Decommissioning Guidance, Volume 3
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1757/v3/>

Search Criteria:

Year: 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-12 ***Facility Type:*** Reactors, Material Facilities ***Stage:*** Design, Operations

Benefits: Facilitates Decommissioning Work

Subject: The Radioactivity and Effluents Monitoring Program (REMP) may not be sufficient to characterize subsurface contamination at operating sites.

Discussion: The Regulatory Information Summary (RIS) 2002-002 stated that the data derived from REMP tend to be insufficient to allow the NRC staff to fully understand the types and the movement of radioactive material contamination in groundwater at the facility, as well as the extent of this contamination. In addition to REMP, mechanisms to monitor the existence and extent of groundwater contamination at a site are needed. REMP is designed to protect human health at the site boundary, not to define and monitor on-site conditions. Because there is not a characterization and monitoring plan specifically for on-site conditions, the use of REMP for these reasons has resulted in:

- Insufficient subsurface hydro-geologic characterization data;
- Insufficient data on the amount of existing on-site groundwater contamination; and
- Inaccurate estimates of the amount of material that needs to be disposed of in order to address groundwater contamination.

These conditions could result in off-site migration of radionuclides, delays in decommissioning and increased remediation and disposal costs that exceed the decommissioning fund.

References: Contact Us About Decommissioning of Nuclear Facilities
<http://www.nrc.gov/about-nrc/regulatory/decommissioning/contactus.html>

Search Criteria: *Year:* 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-13 **Facility Type:** Reactors, Material Facilities **Stage:** Decommissioning Planning

Benefits: Facilitates Decommissioning Licensing

Subject: Benefits from early coordination and agreement between NRC and licensees on the format and content of any report or plan required to conduct decommissioning.

Discussion: RIS 2002-002 stressed the importance of early coordination and agreement between the NRC staff and licensees on the format and content of any report or plan required to conduct decommissioning. Recent experience has shown that this can result in some advantages to the NRC staff and licensees. This lesson could be of special interest to power reactor licensees that do not need NRC approval before conducting certain decontamination activities. A good example is the Trojan site in Rainier, OR, which was the first reactor licensee to have its license under 10 CFR Part 50 terminated under the License Termination Rule. The licensee discussed and coordinated the content and format of their final status survey reports with the NRC staff prior to their development. The approach resulted in several advantages to the NRC staff and the licensee:

Advantages to the NRC staff:

- Reports were concise, technically accurate, and easy to read.
- Reports were administratively correct, meaning:
 - i. reviews and approvals were complete, signed, and dated;
 - ii. survey equipment records were complete; and
 - iii. training and qualification records were complete.

Advantages to the licensee:

- On the average, NRC staff was able to review supporting documentation for final status surveys in 30 minutes;
- NRC staff reviewed and approved final status survey report in 16 months; and
- Less staff time required by the NRC staff translated into lower costs to the licensee.

References: Contact Us About Decommissioning of Nuclear Facilities
<http://www.nrc.gov/about-nrc/regulatory/decommissioning/contactus.html>

Search Criteria: *Year:* 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-14 **Facility Type:** Reactors, Material Facilities **Stage:** Decommissioning Planning, Decommissioning Work

Benefits: Facilitates Decommissioning Work

Subject: Benefits of implementing a good quality control (QC)/quality assurance (QA) program throughout a decommissioning project.

Discussion: Licensees that implement a good QC/QA program throughout the entire decommissioning of their facilities can obtain several benefits that can truncate the schedule and reduce costs. An effective QC/QA program can help to:

- Self-identify problems or deficiencies during decommissioning and implement corrective actions before routine NRC inspections are conducted;
- Avoid significant delays whenever technical or regulatory issues are identified;
- Ensure that calculations and assumptions are accurate and justifiable;
- Ensure quality submittals, thus reducing requests for additional information (RAIs) and delays; and
- Provide confidence that the final status survey reports are accurate.

These benefits could result in significant savings for licensees. Advantages to the NRC Staff:

- Report reviews are facilitated due to completeness, conciseness, regulatory compliance, technical accuracy and easy-to-read submittals.

Advantages to the licensee:

- Routine QA/QC audits and surveillance can provide independent feedback to senior management on the performance, including safety, work integration, schedule, field performance and documentation, during the deactivation, dismantling, decontamination and final survey phases of the decommissioning project.
- QA/QC audits and surveillance can assist licensees self-identify deficiencies and implement corrective before NRC inspections occur.
- QA/QC audits and surveillance of radiological surveys during decontamination and remediation activities ensure that residual radioactivity levels and compliance with decommissioning plan/license termination plan (DP/LTP) requirements are met.
- QC surveillance that includes independent random sampling and measurements ensure that final status surveys are compliant

with DP/LTP requirements, are well documented, and that confirmatory surveys performed by the NRC will demonstrate regulatory

References: Contact Us About Decommissioning of Nuclear Facilities
<http://www.nrc.gov/about-nrc/regulatory/decommissioning/contactus.html>

Search Criteria: *Year:* 2006
Stage: All Functional Areas

Facility Type: All Facility Types
Benefit: All Benefits

Lesson ID: 2006-15 **Facility Type:** Reactors, Material Facilities **Stage:** Decommissioning Planning

Benefits: Facilitates Decommissioning Work

Subject: Benefits of using realistic scenarios to demonstrate compliance with unrestricted release requirements under the License Termination Rule.

Discussion: Two good examples of the use of realistic scenarios are the Nuclear Fuel Services (NFS) site in Erwin, TN and the FMRI, Inc (Fansteel) site in Muskogee, OK. The staff from the NFS site used a combination of two realistic scenarios to determine radionuclide-specific DCGLs. The licensee demonstrated that the shallow, contaminated groundwater would not be used as a drinking water source in any case. The licensee then demonstrated that the most likely use of the site at license termination was as an industrial site. It also acknowledged that there was considerable suburban development in the area. The licensee performed dose calculations for the facility using an industrial scenario, as well as a suburban resident scenario. The licensee then chose the lower (more conservative) DCGL value of the two scenarios for each specific radionuclide identified on the site. These values are less restrictive than the calculated DCGLs for the default residential farmer scenario.

At the Fansteel site, the licensee proposed an industrial land use scenario for dose estimation purposes. The site is bounded on the north by the Port of Muskogee and industrial operations on the east by the Arkansas River, on the south by US Highway 62, and on the west by the Muskogee Turnpike. In addition, there is a coal-fired power plant across the Arkansas River. The NRC staff confirmed future development plans in the areas surrounding the site, including planned expansion of the Port of Muskogee onto the land currently owned by FMRI, and reviewed the proposed scenario and dose analysis. The NRC staff concluded that the industrial land use scenario was appropriate for dose calculations.

These cases studies are examples of the application of NRC's realistic scenario approach to analyze reasonable foreseeable land uses for the property and still demonstrate compliance with the unrestricted release requirements in 10 CFR Part 20, Subpart E.

References: Contact Us About Decommissioning of Nuclear Facilities
<http://www.nrc.gov/about-nrc/regulatory/decommissioning/contactus.html>

Search Criteria: *Year:* 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-16 **Facility Type:** Reactors, Material Facilities **Stage:** Decommissioning Planning

Benefits: Facilitates Decommissioning Licensing

Subject: Eliminating exposure pathways during the use of realistic scenarios in a dose assessment at a site requires a technically sound justification.

Discussion: Many times, the use of a realistic scenario in a dose calculation involves eliminating one or more exposure pathways to the individual reasonably expected to receive the greatest dose from radiation. As part of this approach, the licensee should provide an acceptable and adequate justification with enough details to allow the NRC staff to conduct an independent review and confirm the validity of the justification. Licensees should meet with NRC staff to discuss the scenario and the justification before development to ensure that it will be acceptable. Failure to provide an adequate justification with strong supporting information can result in a deficient dose assessment, ultimately leading to extensive RAIs, or even rejection of the submittal. This will result in delays in decommissioning activities, more staff time necessary to review the dose assessment, and more time being charged to the licensee.

References: Contact Us About Decommissioning of Nuclear Facilities
<http://www.nrc.gov/about-nrc/regulatory/decommissioning/contactus.html>

Search Criteria: *Year:* 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-17 **Facility Type:** Reactors, Material Facilities **Stage:** Design, Operations

Benefits: Facilitates Decommissioning Work

Subject: Adequate characterization of the subsurface of the site during the design and construction phase of a nuclear facility could be beneficial during the operation and decommissioning of the facility.

Discussion: Adequate characterization of the subsurface (i.e., geology and hydrology) of the area where a nuclear facility will be built can provide several advantages during the operation and decommissioning of the facility. Obtaining enough reliable characterization data of the subsurface before building a facility:

- Will assist in determining how contamination resulting from daily operation of the facility will migrate through the soil and into the groundwater table, and how contamination could be contained.
- Will assist in decommissioning planning, thus reducing the possibility of dealing with unexpected contamination after decommissioning activities have commenced.

In the long run, these actions can reduce the likelihood of significant delays during decommissioning activities, thus saving time and money for licensees.

References: Contact Us About Decommissioning of Nuclear Facilities
<http://www.nrc.gov/about-nrc/regulatory/decommissioning/contactus.html>

Search Criteria: *Year:* 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-18 **Facility Type:** Reactors, Material Facilities **Stage:** Decommissioning Planning

Benefits: Facilitates Decommissioning Work

Subject: Benefits from early coordination with the United States Fish and Wildlife Services (USFWS) and the State Historic Preservation Office (SHPO) during decommissioning planning.

Discussion: Early coordination with USFWS and SHPO during planning of decommissioning activities could be beneficial in the long run. Section 7 of the Endangered Species Act of 1973, and Section 106 of the National Historic Preservation Act of 1966 require federal agencies to coordinate with USFWS and SHPO to determine if there are any endangered species or objects of archaeological value that could be affected by a decommissioning projects. Even though these consultations are not required for licensees, early input and comments from these agencies is strongly recommended. Factoring their comments into the process will help identify endangered species or objects of archaeological value before commencing actual decommissioning work, and planned decommissioning activities accordingly, thus reducing decommissioning challenges at a later stage of the project. This could translate into time and cost savings for licensees in the long run.

References: Contact Us About Decommissioning of Nuclear Facilities
<http://www.nrc.gov/about-nrc/regulatory/decommissioning/contactus.html>

Lesson ID: 2006-19 **Facility Type:** Reactors, Material Facilities **Stage:** Design

Benefits: Facilitates Decommissioning Work, Minimizes Contamination

Subject: Examples of design features that licensees should incorporate to minimize contamination of the environment and to facilitate eventual decommissioning of a facility.

Discussion: Licensees should incorporate design features that ensure that exposures are As Low As Reasonably Achievable during maintenance, component replacement, surveillance, and remote sampling near areas that typically are high-radiation and/or highly contaminated areas. Examples that might apply to the reactor vessel or steam generator area could include: i) install walkways and platforms prior to operations to help reduce the amount of time needed to reach high-radiation and/or highly contaminated areas, and ii) install shield walls. Other design features could include: i) planned removal pathways for tanks and vessels (hatches, removal walls, collapsible systems, etc.), ii) permanent coatings for porous materials isolation of radioactive waste systems, iii) remote sensors for moisture, tank levels, etc., and iv) closed-circuit television.

References: David Matthews Memo re: List of Decommissioning Lessons Learned in Support of the Development of a Standard Review Plan for New Reactor Licensing
<http://adamswebsearch2.nrc.gov/idmws/ViewDocByAccession.asp?AccessionNumber=ML062620355>

Search Criteria: *Year:* 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-20 **Facility Type:** Reactors, Material Facilities **Stage:** Design

Benefits: Facilitates Decommissioning Work, Minimizes Contamination

Subject: The removal of large equipments should be consider when designing enclosures to place them in a nuclear facility.

Discussion: When designing enclosures for large pieces of equipment (e.g., steam generators, large piping, tanks, etc.), the licensee should determine how these pieces will be removed for replacement or permanently removed at the time of decommissioning. Licensees should evaluate: i) size/space clearances, ii) installation of removal roofs/walls, iii) installation of lifting lugs, iv) anchor points for lifts, v) shearable nuts and bolts, vi) quick-disconnect components, etc.

References: David Matthews Memo re: List of Decommissioning Lessons Learned in Support of the Development of a Standard Review Plan for New Reactor Licensing

<http://adamswebsearch2.nrc.gov/idmws/ViewDocByAccession.asp?AccessionNumber=ML062620355>

Lesson ID: 2006-21 **Facility Type:** Reactors, Material Facilities **Stage:** Operations, Decommissioning Planning

Benefits: Facilitates Decommissioning Licensing, Facilitates Decommissioning Work

Subject: Benefits from using adequate onsite measurement capabilities during decommissioning planning.

Discussion: During decommissioning planning, licensees should establish adequate measurement capabilities at the facility (e.g., onsite radiological laboratories, mobile units, etc.). This approach could increase efficiency by ensuring early in the decommissioning process that site characterization measurements to establish radiological conditions in the field or onsite are accurate and reliable.

References: David Matthews Memo re: List of Decommissioning Lessons Learned in Support of the Development of a Standard Review Plan for New Reactor Licensing

<http://adamswebsearch2.nrc.gov/idmws/ViewDocByAccession.asp?AccessionNumber=ML062620355>

Search Criteria:

Year: 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-22 ***Facility Type:*** Reactors, Material Facilities ***Stage:*** Operations, Decommissioning Work

Benefits: Minimizes Contamination, Minimizes Generation of Waste

Subject: Not Applicable

Discussion: Licensees should establish onsite decontamination facilities and/or waste segregation facilities in order to manage large quantities of radioactive material/waste.

References: David Matthews Memo re: List of Decommissioning Lessons Learned in Support of the Development of a Standard Review Plan for New Reactor Licensing

<http://adamswebsearch2.nrc.gov/idmws/ViewDocByAccession.asp?AccessionNumber=ML062620355>

Lesson ID: 2006-23 ***Facility Type:*** Reactors, Material Facilities ***Stage:*** Operations

Benefits: Facilitates Decommissioning Work

Subject: Benefits from establishing a program to ensure adequate and complete documentation of corporate knowledge and operational events.

Discussion: Licensees should establish a program to ensure adequate and complete documentation of corporate knowledge and operational events, beyond those required by NRC in 10 CFR 50.75(g). This program can assist licensees in preparing a good historical assessment of a nuclear facility. An adequate historical assessment can help to save time and effort during decommissioning planning.

References: David Matthews Memo re: List of Decommissioning Lessons Learned in Support of the Development of a Standard Review Plan for New Reactor Licensing

<http://adamswebsearch2.nrc.gov/idmws/ViewDocByAccession.asp?AccessionNumber=ML062620355>

Search Criteria: *Year:* 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-24 **Facility Type:** Reactors, Material Facilities **Stage:** Design

Benefits: Facilitates Decommissioning Work

Subject: Benefits from minimizing the use of embedded piping in nuclear facilities

Discussion: Plant designs should minimize the use of embedded pipes, to the extent practicable, consistent with maintaining radiation doses as low as is reasonably achievable during operations and decommissioning. Embedded pipes, especially those that are small in diameter (less than 6 inches), could complicate decommissioning activities because they can be very difficult to remove or to survey.

References: David Matthews Memo re: List of Decommissioning Lessons Learned in Support of the Development of a Standard Review Plan for New Reactor Licensing

<http://adamswebsearch2.nrc.gov/idmws/ViewDocByAccession.asp?AccessionNumber=ML062620355>

Lesson ID: 2006-25 **Facility Type:** Reactors, Material Facilities **Stage:** Design, Operations, Decommissioning Work

Benefits: Minimizes Contamination, Facilitates Decommissioning Work

Subject: Licensees should make reasonable efforts to prevent, detect, and control minor leaks of radioactive materials over prolonged periods of time.

Discussion: Minor leaks over long periods of time can contribute to significant contamination in soil and groundwater that results in significant costs for remediation. Tanks (e.g., radioactive waste storage tanks, chemical storage tanks, etc.), spent fuel pools, and process/transfer lines should be designed to resist corrosion and minimize leaks. They should be provided with leak detection and monitoring capabilities. For example, the detection system of a spent fuel pool should be capable of detecting minor leaks from the pool. This system should have the ability to be flushed with clean water to remove small quantities of borated water, and dissolve boric acid solids resulting from minor leaks from the spent fuel pool wall and floor welds, bellows to transfer channels, and access gates areas. In addition, an operational program should be implemented throughout the life of the facility to monitor and remediate any leaks.

References: David Matthews Memo re: List of Decommissioning Lessons Learned in Support of the Development of a Standard Review Plan for New Reactor Licensing

<http://adamswebsearch2.nrc.gov/idmws/ViewDocByAccession.asp?AccessionNumber=ML062620355>

Search Criteria:

Year: 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-26 ***Facility Type:*** Reactors, Material Facilities ***Stage:*** Design

Benefits: Minimizes Contamination

Subject: Benefits of having a quality assurance inspection program for grouted areas in a nuclear facility.

Discussion: Licensees should develop a quality assurance inspection program that ensures that grouted areas have no cracks or fissures to allow fluids to bypass the floor drain and move into unmonitored areas beneath the floors and foundations. Concrete grouted connections for floor drains should be constructed such that leaks and spills on the floor will be collected in the floor drains.

References: David Matthews Memo re: List of Decommissioning Lessons Learned in Support of the Development of a Standard Review Plan for New Reactor Licensing

<http://adamswebsearch2.nrc.gov/idmws/ViewDocByAccession.asp?AccessionNumber=ML062620355>

Lesson ID: 2006-27 ***Facility Type:*** Reactors, Material Facilities ***Stage:*** Design, Operations

Benefits: Minimizes Contamination, Minimizes Generation of Waste

Subject: Not Applicable

Discussion: Licensees should develop a floor/wall expansion joint inspection procedure so that floor and wall joints are installed properly to ensure that spills and leaks on the floors do not enter unmonitored areas beneath the floors and foundations.

References: David Matthews Memo re: List of Decommissioning Lessons Learned in Support of the Development of a Standard Review Plan for New Reactor Licensing

<http://adamswebsearch2.nrc.gov/idmws/ViewDocByAccession.asp?AccessionNumber=ML062620355>

Search Criteria:

Year: 2006

Stage: All Functional Areas

Facility Type: All Facility Types

Benefit: All Benefits

Lesson ID: 2006-28 ***Facility Type:*** Reactors, Material Facilities ***Stage:*** Design, Operations

Benefits: Minimizes Contamination

Subject: Licensees should ensure that concrete block walls are completely sealed to prevent the inadvertent intrusion of radioactive material.

Discussion: Licensees should ensure that concrete block walls, constructed to allow removal for future maintenance, or replacement of large components, are completely sealed to prevent intrusion of radioactive materials into the block interiors. Block walls that are not connected to the ceiling are not always sealed on top, allowing contamination to enter the walls. In addition, hollow and solid block walls that are sealed by concrete, paint, or other coatings, have been found with contamination inside the walls. Contamination has been found with walls that are connected to ceilings and free-standing walls that are not physically connected to the ceilings or roofs. On properly sealed walls, the ceilings are sealed or closed so that no contamination can enter.

References: David Matthews Memo re: List of Decommissioning Lessons Learned in Support of the Development of a Standard Review Plan for New Reactor Licensing

<http://adamswebsearch2.nrc.gov/idmws/ViewDocByAccession.asp?AccessionNumber=ML062620355>

Lesson ID: 2006-29 ***Facility Type:*** Reactors, Material Facilities ***Stage:*** Design, Operations

Benefits: Facilitates Decommissioning Work

Subject: Licensees should upgrade areas not designated for radiological activities when such are used for that type of work.

Discussion: Licensees that conduct radiological work in onsite areas not designated for radiological work should upgrade these areas. For example, this applies to the storage of radioactive waste in areas not designated for the storage of radioactive waste. Upgrades could include, for example, increased effluent monitoring for turbine building sumps, and temporary or permanent enclosures of areas. Surveillance programs for these areas should include the monitoring of liquid and airborne effluents. Improvements to control contamination will facilitate decommissioning planning. Licensees should collect radiological information from these areas, which could be used later during decommissioning planning.

References: David Matthews Memo re: List of Decommissioning Lessons Learned in Support of the Development of a Standard Review Plan for New Reactor Licensing

<http://adamswebsearch2.nrc.gov/idmws/ViewDocByAccession.asp?AccessionNumber=ML062620355>