

## **Department Of Energy's First Waste Determinations Under Section 3116: How Did the Process Work?**

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### **ABSTRACT**

Congress passed the Ronald W. Reagan National Defense Authorization Act (NDAA) for Fiscal Year 2005 on October 9, 2004, and the President signed it into law on October 28, 2004. Section 3116(a) of the NDAA allows the Department of Energy (DOE) to, in consultation with the Nuclear Regulatory Commission (NRC), determine whether certain radioactive waste resulting from reprocessing of spent nuclear fuel at two DOE sites is not high-level radioactive waste, and dispose of that waste in compliance with the performance objectives set out in subpart C of 10 CFR part 61 for low-level waste. On January 17, 2006, the Department issued its first waste determination under the NDAA for salt waste disposal at the Savannah River Site. On November 19, 2006, the Department issued its second waste determination for closure of tanks at the Idaho Nuclear Technology and Engineering Center Tank Farm Facility. These two determinations and a third draft determination illustrate the range of issues that may be encountered in preparing a waste determination in accordance with NDAA Section 3116. This paper discusses the experiences associated with these first two completed waste determinations and an in-progress third waste determination, and discusses lessons learned from the projects that can be applied to future waste determinations.

### **INTRODUCTION**

The tank waste remediation program is the largest cost element of the Environmental Management (EM) program, accounting for approximately one-third of the total remaining program costs. Managing some tank wastes resulting from reprocessing of spent nuclear fuel as other than high-level waste (HLW) has been a key element of the Department's plans to accelerate environmental cleanup at the four sites where spent nuclear fuel reprocessing occurred; with such strategies decided upon via Records of Decision resulting

from National Environmental Policy Act (NEPA) Environmental Impact Statements (EISs) dating from the early 1980's. In 1999, DOE issued DOE Order 435.1, *Radioactive Waste Management*, and its accompanying Manual and Guides. A provision in the Manual, titled Waste Incidental to Reprocessing formalized long-standing practices the Department had in place for managing some wastes from reprocessing as other than HLW. The provisions include two processes, a citation process primarily for wastes identified in NRC regulatory basis documents as generally not being managed as HLW and an evaluation process under which certain technical requirements must be met for the waste to be managed as non-HLW.

In 2002 external groups sued DOE, believing that DOE "...violated the NWPA [*Nuclear Waste Policy Act*] by promulgating DOE 435.1, which has in it a specific provision that allows DOE to reclassify high-level radioactive waste and call it "incidental waste." [1] In July 2003 the Federal District Court of Idaho agreed with the plaintiff and invalidated the waste incidental to reprocessing provisions of DOE Manual 435.1-1. As a consequence of this action the Department identified a number of key tank waste management activities, at the Office of River Protection (ORP), the Idaho National Laboratory (INL), and the Savannah River Site (SRS) that it would not be able to conduct unless the legal uncertainty posed by the litigation was clarified.

In early fiscal year 2005 the President signed Public Law 108-375, the National Defense Authorization Act (NDAA) for Fiscal Year 2005, which included provisions related to the removal, treatment, and disposal of radioactive waste that DOE planned not to dispose as HLW in a geologic repository.

Section 3116 of the NDAA [2] provides that with respect to material stored at a Department of Energy site at which activities are regulated by a covered State (South Carolina or Idaho) pursuant to approved closure plans or permits issued by the State, the term "high-level radioactive waste" does not include radioactive waste resulting from the reprocessing of spent nuclear fuel that the Secretary of Energy, in consultation with the Nuclear Regulatory Commission, determines -

- (1) does not require permanent isolation in a deep geologic repository for spent fuel or high-level radioactive waste;
- (2) has had highly radioactive radionuclides removed to the maximum extent practical; and
- (3) (A) does not exceed concentration limits for Class C low-level waste as set out in Section 61.55 of title 10, Code of Federal Regulations, and will be disposed of -
  - (i) in compliance with the performance objectives set out in subpart C of part 61 of title 10, Code of Federal Regulations; and
  - (ii) pursuant to a State-approved closure plan or State-issued permit, authority for the approval or issuance of which is conferred on the State outside of this section; or

- (B) exceeds concentration limits for Class C low-level waste as set out in section 61.55 of title 10, Code of Federal Regulations, but will be disposed of -
- (i) In compliance with the performance objectives set out in subpart C of part 61 of title 10, Code of Federal Regulations, and
  - (ii) pursuant to a State-approved closure plan or State-issued permit, authority for the approval or issuance of which is conferred on the State outside of this section; and
  - (iii) pursuant to plans developed by the Secretary in consultation with the Commission.

The first major activity conducted under Section 3116 of the NDAA was putting in place an Interagency Agreement between the NRC and DOE which identified the activities to be performed by the NRC in Fiscal Year 2005 and the terms and conditions for DOE to fund those activities. The Interagency Agreement was put in place in early February 2005. The Interagency Agreement identified four primary activities for NRC to perform: 1) development of internal NRC processes to perform their consultation role; 2) consultation on the Savannah River Site Salt Waste Processing Draft 3116 Waste Determination; 3) consultation on a Savannah River Tank Closure 3116 Determination; and 4) consultation on an Idaho Tank Farm Facility Closure 3116 Determination.

This paper presents a discussion of lessons-learned from completing the waste determination process for two waste determinations and those from a third waste determination that is still under consultation between DOE and NRC under Section 3116 of the NDAA:

- Section 3116 Determination for Salt Waste Disposal at the Savannah River Site (Salt Waste Determination) [3];
- Section 3116 Determination for the Idaho Nuclear Technology Engineering Center Tank Farm Facility (INTEC TFF Waste Determination) [4]; and
- Draft Section 3116 for Closure of Tank 19 and Tank 18 at the Savannah River Site (Tanks 19 & 18 Waste Determination) [5]

## **DISCUSSION**

The first waste determination to be prepared under Section 3116 was for salt waste disposal at the Savannah River Site. Because of critical operational considerations at the Savannah River Site, DOE identified this waste determination as having the highest priority among the three determinations that were identified in the Interagency Agreement with the NRC and developed this determination in advance of the drafts of the other two. Based upon the experience with the Salt Waste Determination, DOE modified the process for preparation of the Idaho Tank Farm Facility (TFF) Waste Determination and the SRS Tank 19 and 18 Waste Determination and consultation with the NRC on these determinations. The discussion below provides information regarding the chronology and general processes for preparation and consultation with the NRC on these three waste determinations.

### **Section 3116 Determination for Salt Waste Disposal at the Savannah River Site**

The federal and contractor staff at SRS began developing the technical, regulatory, and programmatic content that would eventually be required for the Salt Waste Determination as soon as the legislation was passed by Congress. A draft waste determination was prepared and provided for internal review in late December 2004. With no specific guidance on the structure or content of a waste determination, SRS personnel utilized their best efforts to prepare a document that demonstrated compliance with the requirements of Section 3116 for the salt waste stream being considered.

After transmittal to HQ, DOE undertook a comprehensive review of the draft Salt Waste Determination and its supporting documentation. A team of subject matter experts from across the DOE complex spent approximately six weeks reviewing, discussing, commenting on, and revising the draft Salt Waste Determination. Because of the urgency and priority given this waste determination, the document was edited, revised, and reformatted in real time. Language and technical approaches to demonstrate compliance with the Section 3116 requirements were developed and documented during this process. Consultants with prior NRC experience also offered their expert advice on content and approach. DOE's legal staff conducted exhaustive reviews of the document for legal sufficiency and defensibility. The Principle Deputy Assistant Secretary for Environmental Management transmitted a DOE draft determination to the NRC for consultation on February 28, 2005.

Although not required by the NDAA, DOE made the draft waste determination available through a Federal Register Notice for public review and comment. DOE received 32 specific comments on the draft Salt Waste Determination from seven individuals and organizations. DOE prepared a comment response document at the time the Secretary made the Waste Determination to show how DOE had considered and addressed the comments.

To assist the NRC in their review, DOE briefed the NRC on the content and approach taken in the document shortly after it was submitted. On May 25, 2005 the NRC sent DOE a request for additional information (RAI) that included 68 specific technical and programmatic questions. The RAIs ranged from simple clarifications to requests for additional analyses and questions regarding the bases for assumptions used in the analyses. SRS worked with DOE-HQ over the next 30 days to prepare detailed responses that went through similar review and comments cycles as the original draft Salt Waste Determination. By mid-July, all 68 of the RAIs had been responded to and DOE had briefed the NRC on its responses. DOE hosted two public meetings with the NRC in July and August of 2005 to discuss DOE's responses to the RAIs and to further clarify certain technical input. These meetings resulted in two sets of action items for which DOE prepared written responses and submitted to the NRC in September 2006.

The NRC completed their consultation on the Salt Waste Determination and issued their Technical Evaluation Report (TER) on December 28, 2005 [6]. The TER concluded that there was "reasonable assurance that the applicable criteria of the NDAA can be met provided certain assumptions made in DOE's analyses are verified via monitoring".

DOE finalized the Salt Waste Determination in early January, 2006 with updates, corrections and revisions to reflect the contents of the TER and other internally-generated changes to be consistent with the related National Environmental Policy Act (NEPA) documentation, and incorporated the responses to the RAIs and the action items by reference. On January 17, 2006 the Secretary of Energy issued the Department's first Section 3116 Determination, concluding the SRS treated salt waste is not high-level waste and may be disposed of in the Saltstone Disposal Facility at SRS. The NEPA documentation for the salt waste treatment and disposal program was also updated at that same time.

### **Section 3116 Determination for the Idaho Nuclear Technology Engineering Center Tank Farm Facility**

On May 19, 2005, NRC and DOE held a public meeting to discuss the technical aspects of the Idaho draft INTEC TFF Waste Determination. On September 7, 2005, DOE submitted the draft INTEC TFF Waste Determination to the NRC, incorporating observations from the NRC meeting, DOE complex-wide internal meetings as discussed below, and lessons-learned from work on the SRS Salt Waste Determination. Although not required by the NDAA, DOE made the draft waste determination available through a Federal Register Notice for public review and comment. The only comments that DOE received on the draft waste determination were submitted after the end of the public comment period by the State of Idaho and the INL Site Environmental Management Citizens Advisory Board (INL CAB).

On January 10, 2006, NRC issued 17 RAIs in response to the draft INTEC TFF Waste Determination. In general, the NRC RAIs requested information on grout and vault concrete behavior over time, clarification of sampling methodologies, groundwater fate and transport modeling, and an evaluation whether stabilized residual waste concentrations meet Class C levels. DOE responded to those RAIs in three separate submissions in March, April, and May. Additional information was provided to NRC in June and July based on verbal questions asked during a public meeting in June 2006.

On October 20, 2006 the NRC transmitted the results of their consultation process on the waste determination in the form of a TER [7]. The TER stated that there is "*reasonable assurance that the applicable criteria of the NDAA can be met for residual waste associated with the tank farm facilities*" DOE considered the TER, comments received from the State of Idaho and the INL Citizens Advisory Board, and internally-driven factors and modified the draft waste determination. On November 19, 2006 the Secretary issued the Section 3116 Determination "to demonstrate and document that the stabilized residuals in the TFF, and TFF tank system, meet the Section 3116 criteria, and therefore by law, are not HLW." On that day DOE also issued an Amended Record of Decision under NEPA, which identified performance-based closure as discussed in the final Environmental Impact Statement for Idaho High-Level Waste and Facilities Disposition [8] as the methodology by which it would close tanks and related components at the Idaho TFF.

### **Draft Section 3116 for Closure of Tank 19 and Tank 18 at the Savannah River Site**

On July 19, 2005, DOE and NRC held a public meeting to discuss generic technical issues associated with preparing tank closure waste determinations. Subsequently, as DOE was preparing the draft SRS Tanks 19 and 18 Waste Determination, representatives from SRS recognized there would be value in having the radiological performance assessment, or the Performance Objectives Determination Document (PODD), that supports the Tanks 19 & 18 Waste Determination, be independently reviewed to identify any major potential issues. Early in September 2005, a group of DOE and non-SRS affiliated contractors performed this review identifying three key issues and ten secondary issues that were resolved by the time the review results were documented. On September 30, 2005, DOE submitted the draft SRS Tanks 19 & 18 Waste Determination to the NRC. Although not required by the NDAA, DOE made the draft waste determination available through a Federal Register Notice for public review and comment at about the same time. Fewer than 10 public comments were received.

To assist the NRC in their review, DOE briefed the NRC on the content and approach taken in the document in a public meeting on November 30, 2005. NRC informally requested clarification regarding the Multimedia Environmental Pollutant Assessment System modeling used in the Tanks 19 and 18 PODD. DOE formally responded to these clarification questions in a letter dated January 10, 2006 and further discussed these during a conference call between DOE and NRC on January 11, 2006. A public meeting also occurred on January 25, 2006 to discuss several modeling technical topics. DOE provided formal responses on February 28, 2006 to clarifying information requested by NRC during the January 25, 2006 public meeting.

On April 3, 2006, NRC issued RAIs containing 67 detailed questions in response to the September 30, 2006 draft Tanks 19 & 18 Waste Determination. Approximately 45 of the RAIs questioned specific technical analyses in the supporting SRS Tanks 18 & 19 performance assessment. NRC also questioned analyses on long-term grout behavior, tank cleaning technology choices, and requested an evaluation whether stabilized residual waste concentrations meet Class C levels. Three clarifying conference calls to discuss the NRC RAIs occurred in May 2006 between DOE and NRC with SCDHEC and EPA participation and a public meeting occurred on June 8, 2006 to discuss the SRS approach to addressing the NRC RAIs.

Following a tank cleaning technology workshop sponsored by DOE in March 2006, SRS reviewed various options for performing additional tank cleaning of Tanks 19 & 18. In late May 2006 DOE decided to pursue an evaluation of one of the new technologies for potential additional waste removal from Tanks 18/19 prior to closure. The new technology and potential application for removing more waste from Tanks 18 and 19 was discussed by DOE with NRC, SCDHEC and EPA during a meeting on June 29, 2006. This technology evaluation is ongoing but anticipated to be completed early in 2007. Additionally, to address questions raised by NRC and the State of South Carolina Department of Health and Environmental Control, DOE is simultaneously pursuing new

modeling of the environmental impacts associated with closing not only these two tanks but the entire F Tank Farm system through development of a new performance assessment to provide more realistic data versus the bounding analysis previously performed. On July 21, 2006, DOE responded to 16 of the 67 RAI comments.

Responses to the remaining 50 open RAI comments are directly impacted by the two above described activities.

## **EFFECTIVENESS OF PROCESS AND LESSONS LEARNED**

Much of DOE's efforts in tank waste management, leading up to passage of the NDAA, were focused on answering congressional requests or providing information about tank waste issues at its three main spent nuclear fuel reprocessing and tank waste sites. As a consequence of that focus, a lack of knowledge whether a final authorization or appropriation would include any mechanism for making such determinations, and support to the Department of Justice to the Federal Circuit Court in the appeal of the District Court of Idaho's decision, DOE did not have a formal process in place for implementing Section 3116 of the NDAA upon its passage.

Despite this obstacle, DOE was able to prepare the first initial draft of a waste determination under Section 3116 in a period of approximately two months. An important technical component of that first determination, a radiological performance assessment, already existed, which facilitated the process. As noted above, upon passage of the NDAA and before execution of the Interagency Agreement with the NRC, DOE immediately began efforts to prepare the draft Salt Waste Determination. This was followed within several months with initiating the draft INTEC TFF Waste Determination and the draft Tanks 19 & 18 Waste Determination, which allowed identification and implementation of lessons-learned from the Salt Waste Determination.

DOE surveyed federal and contractor staffs who were involved in the preparation of these waste determinations to identify and disseminate lessons-learned. In addition, there were lessons-learned from the two waste determinations that have been completed, as well as the Tank 19 and 18 Waste Determination. Discussed below are some lessons-learned associated with the process of preparing, reviewing and completing waste determinations, and specific lessons-learned associated with work on the three specific waste determinations.

There are a number of different ways to categorize the lessons-learned applicable to the general Section 3116 process; however the following categories will be used for purposes of this paper. These categories and the lessons represent a compilation from DOE Headquarters and the two sites (INL and SRS) for which Section 3116 applies, as well as the Hanford site and the West Valley Demonstration Project.

- **DOE-NRC Interactions and Communications**
  - The consultation process between NRC and DOE at the project level should be more collaborative and real time during preparation of documents. At the

beginning of the Section 3116 consultation process, meetings between the two agencies often focused on articulating agencies' positions rather than focusing on resolving real differences. Lessons learned for meetings that are now being applied include: 1) every meeting needs a clear agenda; 2) meetings should not close without a clear understanding of what decisions were made, what issues are unresolved, what additional information is needed, and what the next steps are; and 3) meeting notes and a summary of actions should be documented.

- DOE and NRC will continue to hold meetings that are open to public in accordance with NRC's Management Directive 3.5; however, there will be some agency-to-agency meetings on management and technical policy topics that warrant such discussions as agreed to by both agencies.
- DOE and NRC should strive to obtain direct input from each other on technical issues prior to submission of draft waste determinations and submission of Requests for Additional Information (RAI) responses. The initial waste determination consultation process resulted in significant DOE rework – remodeling, reanalysis, and recalculation – to address NRC Requests for Information – rather than “front loading” the process to resolve policy approaches and methodologies first, before DOE initiates its analyses.
- As a specific example of this issue, for the Salt Waste Determination DOE prepared responses to NRC RAIs and submitted them to the NRC in final form. In some cases, the NRC deemed a DOE's response to either not fully respond to the original question or to raise further questions that required additional clarification. Detailed discussion of draft RAI responses between the subject matter experts of both agencies would likely result in more complete responses and may have precluded the need for additional follow-up action items. This particular lesson learned has already been implemented and the recently completed Idaho Tank Closure WD did not require an additional round of comments / questions.
- DOE should identify potential technical or regulatory issues to NRC as early as possible in the consultative process. DOE should seek to have preliminary discussions with NRC before NRC forms positions in writing that may reduce some of NRC's flexibility.

Under Path Forward below are some further proposed enhancements to NRC-DOE interactions and consultation that are proposed, specifically for SRS under Section 3116 (and potentially the Hanford Site under any consultation or independent review activities in which the NRC may be engaged).

- **Waste Determination Project Management**

- Interactions between DOE Headquarters and sites implementing Section 3116 has been helpful to maintain coordination and consistency of approaches, resolution of technical issues, and incorporation of lessons learned from previous waste determinations. Although radiological performance assessment techniques and approaches vary across the complex, there is



opportunity to implement them with greater consistency. It is expected that performance assessments prepared for future waste determinations will receive independent technical review through the Department's existing technical resources, including the Low-Level Waste Disposal Facility Federal Review Group, which performs such reviews for disposal facility performance assessments.

- DOE has attempted to manage preparation of waste determinations as a project, applying DOE and EM project management requirements and tools. It conducts weekly waste determination project meetings with the sites to monitor progress on a complex-wide waste determination project schedule, and to exchange information important to maintaining good coordination and consistency in approach. Additionally, DOE has prepared a Program Execution Plan that outlines a standard process for preparing, reviewing, and approving waste determinations under Section 3116 and other regulatory regimes.

- **Waste Determination Preparation and Modification Processes**

- Early, clear definition of key terms, such as “highly radioactive radionuclides” and “removal to the maximum extent practical”, was identified to be key to the success of the effort. Related to this was application of radiological performance measures in 10 CFR 61 that are based on International Council on Radiation Protection (ICRP) 2 [9] principles rather than the current approaches for determining dose based on ICRP 26 [10].
- After submittal of the Draft Salt Waste Determination to the NRC for consultation, DOE representatives identified opportunities for improving the draft waste determination preparation and review process. DOE arranged a workshop at SRS in May 2005 to identify practices or policies that could be improved, as SRS and INL embarked upon preparation of their respective waste determinations. In addition to DOE and contractor representatives from the two sites and Headquarters, representatives from Hanford and WVDP also participated.
- One of the most important technical documents supporting a waste determination is the radiological performance assessment. DOE has implemented a process, whereby it performs an independent, internal review of the performance assessment, to identify any significant issues that should be addressed prior to providing a complete draft waste determination for internal review. This provides reasonable assurance that a higher-quality draft waste determination is the basis for the internal review. This process uses DOE employees and contractors from various sites. These reviews will help DOE identify the parameters to which performance is most sensitive to variations in values, as well as those parameters that have the highest level of uncertainty in their values. Such studies should facilitate reducing the number of NRC RAIs and would facilitate agency-to-agency meetings.

- During the development of the initial draft Salt Waste Determination, ownership of the document resided with the site operating contractor organization. This precluded the ability for DOE to expeditiously make changes to the determination and supporting documentation, e.g., responses to RAIs. As a consequence, DOE decided that the WD would be a DOE document, transferring ownership from the contractor to DOE, and facilitating a less cumbersome modification process.
- **Public Notification, Comment, and Comment Resolution Processes**
  - DOE worked through several iterations regarding a communications plan as it developed the first draft waste determinations and completed the final determination for salt waste disposal. Based on experience with completing the waste determination for salt waste disposal, a generic communications plan was completed that will apply to all Section 3116 determinations.
  - State regulatory agencies in the two covered states under Section 3116, Idaho and South Carolina, are participating in the 3116 process differently. The State of Idaho prepared its own comments on draft waste determinations and provided those to the NRC for consideration of incorporation in the NRC's request for additional information, and forwarded a copy of those comments to DOE. The State of South Carolina provided their comments to DOE through the notice of public availability mechanism. In both cases, DOE developed processes to allow DOE to respond to State issues prior to making the waste determination and provided responses to comments at the end of the process.

### **Conclusions and Path Forward**

DOE, and its associated contractors, has gained much valuable experience in the preparation and review of, and consultation with the NRC on, the two completed waste determinations under Section 3116 of the NDAA, as well as the waste determination that is in progress. DOE has begun to implement the lessons-learned identified above, with an emphasis on implementing those enhancements to the 3116 process that are within DOE's purview. The preparation of a top-level document that identifies a standard process for preparation, review and approval of waste determinations incorporates many of these lessons learned. Future revisions to the document will include a Standard Format and Content Guide that identifies technical expectations for waste determinations under Section 3116 and other regimes.

With regard to the NRC consultation process specified in Section 3116, DOE and NRC are collectively working to develop a new enhanced process for moving forward with Section 3116 waste determinations for closure of tanks at SRS. DOE has proposed a three step process as follows: First, consult with NRC and regulatory agencies of the State of South Carolina and the Environmental Protection Agency prior to performing the new modeling to support development of a the F Tank Farm performance assessment that will meet the expectation of all agencies involved in ultimately agreeing with the closure of these tanks. This strategy proposes use of a core team process previously developed

and implemented by representatives of DOE, State of South Carolina and the Environmental Protection Agency to achieve closure decisions under a Federal Facility Agreement (FFA). The FFA is an agreement between these three agencies for comprehensive remediation of the Savannah River Site to meet requirements of the Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation and Liability Act. Second, DOE proposes to develop a draft waste determination for the entire F Tank Farm for consultation with NRC in parallel with a completed F Tank Farm Performance Assessment. Third, DOE would consult with NRC on Addendums to the F Tank Farm Waste Determinations for making determination decisions about closure of specific tanks, equipment and systems based on actual residual waste volumes and environmental impacts as the tanks are closed over the next two decades.

Although the above described activities and strategy under discussion between DOE and NRC will result in delays in the closure of Tanks 18 and 19, there are a number of substantial and tangible benefits:

- Demonstrating additional waste removal from Tanks 18 and 19 prior to closure will reduce the long term environmental impacts associated with closing the tanks.
- Performing revised modeling will provide additional assurance that closure of all tanks, not just Tanks 18 and 19, will be protective of human health and the environment.
- Providing an enhanced process for efficient consultation between DOE and NRC that will support specific closure decisions over the next two decades and facilitate DOE's ability to meet tank closure milestones under the FFA.

## **REFERENCES**

1. Federal District Court of Idaho Case No. 01-CV-413 Plaintiffs Complaint for Declaratory and Injunctive Relief, February 28, 2002
2. *"Ronald W. Reagan National Defense Authorization Act for FY 2005," Section 3116, 2004.*
3. U.S. Department of Energy, "Section 3116 Determination for Salt Waste Disposal" and "Basis for Section 3116 Determination for Salt Waste Disposal at the Savannah River Site" (DOE-WD-2005-001), January 2006
4. U.S. Department of Energy, "Section 3116 Determination for the Idaho Nuclear Technology Engineering Center Tank Farm Facility" and "Basis for the Idaho Nuclear Technology Engineering Center Tank Farm Facility", November 2006
5. U.S. Department of Energy, "Draft Section 3116 for Closure of Tank 19 and Tank 18 at the Savannah River Site, September 30, 2005
6. Nuclear Regulatory Commission, Technical Evaluation Report for Draft Waste Determination for Salt Waste Disposal, December 2005
7. Nuclear Regulatory Commission, Technical Evaluation Report for Draft Waste Determination for Closure of Idaho Tank Farm Facility, October 2006

8. Final Idaho High-Level Waste and Facilities Disposition Environmental Impact Statement, DOE/EIS-0207, November 2002
9. ICRP. Recommendations of the International Commission on Radiological Protection. ICRP Publication 2, Pergamon Press, Oxford.
10. ICRP. "Recommendations of the International Commission on Radiological Protection." ICRP Publication 26, Annals of the ICRP 1(3), Pergamon Press, Oxford, 1977.