September 24, 2008

R. Mark Shaw
Project Manager, Tank Farm Closure Project
U.S. Department of Energy, Idaho Operations Office
MS 1222
1955 Freemont Avenue
Idaho Falls, ID 83415

SUBJECT: NUCLEAR REGULATORY COMMISSION ONSITE OBSERVATION REPORT FOR THE IDAHO NATIONAL LABORATORY IDAHO NUCLEAR TECHNOLOGY AND ENGINEERING CENTER TANK FARM FACILITY

Dear Mr. Shaw:

The enclosed document describes the U.S. Nuclear Regulatory Commission's (NRC's) onsite observation activities on August 12-13, 2008, at the Idaho National Laboratory (INL), Idaho Nuclear Technology and Engineering Center Tank Farm Facility (INTEC TFF). This onsite observation was conducted in accordance with the Ronald Reagan National Defense Authorization Act for Fiscal Year 2005 (NDAA), which requires NRC to monitor disposal actions taken by the Department of Energy (DOE) for the purpose of assessing compliance with the performance objectives set out in 10 CFR Part 61, Subpart C. The activities conducted during the site visit were consistent with those described in the NRC's monitoring plan, dated April 13, 2007, for INTEC TFF.

NRC's onsite observation at INL was focused on two performance objectives, 10 CFR 61.41, *protection of the general population from releases of radioactivity*, and 10 CFR 61.43, *protection of individuals during operations*; by observing DOE's ancillary components and equipment grouting operations, including the grouting of transfer lines, cooling coils and tank risers; by observing DOE's groundwater sampling program; and verifying DOE's radiation protection measures in its INTEC TFF grouting operations. Since the grouting operations will impact the long-term stability of the tank farm facility after its closure, this observation also partially assessed the performance objective in 10 CFR 61.44, *stability of the disposal site after closure*.

Based on our observations, NRC continues to conclude that there is reasonable assurance that the applicable criteria of the NDAA can be met if key assumptions made in DOE's waste determination analyses prove to be correct. In accordance with the requirements of the NDAA and consistent with NRC's monitoring plan for the INTEC TFF, NRC will continue to monitor DOE's disposal actions at INL. The monitoring activities are expected to be an iterative process and several onsite observation visits, and technical reviews of various reports, studies, etc., may be necessary in order to obtain the information needed to fully assess compliance with all of the performance objectives set out in 10 CFR Part 61, Subpart C.

On August 13, 2008, at the conclusion of the onsite observation activities, members of my staff discussed the topics addressed in this report with you and other DOE INL staff members. If you have any questions or need additional information regarding this report, please contact Michael Fuller, Project Manager, at 301-415-7640

Sincerely,

/RA by Abradford/

Patrice M. Bubar, Deputy Director
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Enclosure: NRC Observation Report

cc w encl: B. LaRue
Environmental Scientist/Impact Assessment
ID DEQ INL Oversight Program
900 North Skyline Drive, Suite C
Idaho Falls, ID 83402

On August 13, 2008, at the conclusion of the onsite observation activities, members of my staff discussed the topics addressed in this report with you and other DOE INL staff members. If you have any questions or need additional information regarding this report, please contact Michael Fuller, Project Manager, at 301-415-7640

Sincerely,

/RA by ABradford/
Patrice M. Bubar, Deputy Director
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Enclosure: NRC Observation Report

cc w encl: B. LaRue
Environmental Scientist/Impact Assessment
ID DEQ INL Oversight Program
900 North Skyline Drive, Suite C
Idaho Falls, ID 83402

DISTRIBUTION:
RidsOpaMail RidsOgcMailCenter RidsOcaMailCenter

ML082550157

OFC	FSME/DWMEP	FSME/DWMEP	FSME/DWMEP	FSME/DWMEP	FSME/DWMEP
NAME	M.Fuller	P.Swain	A.Kock	A.Bradford	AHB1 for P..Bubar
DATE	09 / 11 /08	09 / 18 /08	09 / 19 /08	09 / 24 /08	09 / 24 /08

OFFICIAL RECORD COPY

IDAHO NATIONAL LABORATORY IDAHO NUCLEAR TECHNOLOGY AND ENGINEERING CENTER TANK FARM FACILITY

NRC ONSITE OBSERVATION REPORT

EXECUTIVE SUMMARY

NRC staff conducted its third onsite observation visit of the Idaho Nuclear Technology and Engineering Center Tank Farm Facility (INTEC TFF) on August 12 to 13, 2008. This visit was intended to focus on two of the four performance objectives — 10 CFR 61.41, *protection of the general population from releases of radioactivity*, and 10 CFR 61.43, *protection of individuals during operations* — by observing DOE's ancillary components and equipment grouting operations, including the grouting of transfer lines, cooling coils and tank risers; by observing DOE's groundwater sampling program; and verifying DOE's radiation protection measures in its INTEC TFF grouting operations. Because the grouting operations will impact the long-term stability of the tank farm facility after its closure, this observation also partially assessed the performance objective in 10 CFR 61.44, *stability of the disposal site after closure*. This report provides a description of NRC onsite observation activities from the visit.

Grouting Operations

NRC staff monitored ongoing grouting operations of the tank and ancillary equipment at the INTEC TFF by interviewing site personnel, observing grouting operations, and reviewing videos of grouting operations.

$ The observation determined that the grouting of ancillary components and equipment is being conducted in a manner that ensures the grout specifications meet those that were assumed in DOE's final waste determination, issued in November 2006.

Groundwater Sampling

NRC staff interviewed DOE and its contractors involved in groundwater monitoring and observed staff performing compliance sampling at a groundwater monitoring well.

$ The observation determined that the sampling of groundwater was performed in accordance with the established procedures.

Radiation Protection Program

NRC staff interviewed DOE and its contractor's radiation protection personnel, reviewed the radiological control documents associated with TFF grouting operations, and reviewed the associated worker dose records.

$ The observation determined that DOE has an adequate program for protecting its personnel from radiation exposures during INTEC TFF grouting operations.

1.0 BACKGROUND

The National Defense Authorization Act for Fiscal Year 2005 (NDAA) authorizes the DOE, in consultation with the NRC, to determine that certain radioactive waste related to the reprocessing of spent nuclear fuel is not high-level waste, provided certain criteria are met. The NDAA also requires NRC to monitor DOE disposal actions to assess compliance with the performance objectives in 10 CFR Part 61, Subpart C.

On September 7, 2005, DOE submitted a draft waste determination for residual waste stored in the INTEC TFF to demonstrate compliance with the NDAA criteria including a demonstration of compliance with the performance objectives in 10 CFR Part 61, Subpart C (DOE, 2005). In its consultation role, the NRC staff reviewed the draft waste determination and concluded that the NDAA criteria could be met for residual waste stored in the INTEC TFF, assuming that certain key assumptions were shown to be correct. NRC documented the results of its review in a technical evaluation report (TER) issued in October 2006 (NRC, 2006). DOE issued a final waste determination in November 2006 taking into consideration the findings documented in NRC's TER (DOE, 2006).

To carry out its monitoring responsibility under the NDAA, NRC plans to perform three types of activities focusing on key monitoring areas identified in its monitoring plan for the INTEC TFF (NRC, 2007): (i) technical reviews, (ii) onsite observations, and (iii) data reviews. Technical reviews generally will focus on obtaining additional model support for assumptions DOE made in its performance assessment that are considered important to DOE's compliance demonstration. Onsite observations generally will be performed to (i) observe and review data collected to assess consistency with assumptions made in the waste determination (e.g., observation of waste sampling used to generate data on residual waste inventories) or (ii) observe key disposal (or closure) activities related to technical review areas (e.g., slag and other material storage, grout formulation and preparation, and grout placements). Data reviews will supplement technical reviews focusing on real-time monitoring data that may also indicate future system performance or review of records or reports that can be used to directly assess compliance with performance objectives.

NRC's August 2008 onsite observation at INL was the third such visit to INL. Additional visits will be conducted in the future to continue to assess the performance objectives in 10 CFR Part 61, Subpart C.

2.0 NRC ONSITE OBSERVATION ACTIVITIES

2.1 Grouting Operations

2.1.1. Observation Scope

During this onsite observation visit, NRC staff observed ongoing grouting operations at the INTEC TFF. NRC staff interviewed site personnel to gather information on: (i) the grouting operations that have taken place since the August 2007 onsite observation visit, (ii) the status of ongoing grouting operations, (iii) the procedures used to place grout into the various types of ancillary equipment, (iv) the grout mix used for grouting the ancillary equipment, and (v) quality assurance procedures. In addition, NRC staff observed grouting operations and watched videos of various grouting operations.

2.1.2 Observation Results

In the time since the August 2007 NRC onsite observation visit to INL, site personnel completed the grouting of Tanks 180, 181, 182, 183, 184, 185, and 186, including the domes of the tanks as well as the upper portion of the tank vaults. In addition, ancillary equipment, such as the cooling coils in the tanks, transfer lines, and tank risers, were also grouted. At the time of this onsite observation visit, the remaining ancillary equipment, that had not yet been grouted, included approximately 300 ft (91 m) of transfer line, the risers for Tanks 182, 183, 184, 185, and some valve boxes and relief pits. On the day of the NRC onsite observation visit, relief valve pit RVP-5, which is affiliated with Tank 180, was being grouted. NRC staff observed the transfer of the grout to the pipe grout mixer and pump. NRC staff also reviewed videos showing the grouting of cooling coils, and vessel-off-gas (VOG) lines, as well as video showing the inside of the tank domes and the vaults at different stages in the grouting process. By watching these videos, NRC staff observed the processes used to grout the tank domes, vaults, and ancillary equipment and piping, including the changes made to the riser and piping configurations to provide access for grout. NRC staff observed that the grout flowed easily and appeared to fill the void spaces well.

NRC staff and site personnel discussed the procedures used to ensure that the ancillary equipment was fully grouted and that grout was not being placed into areas that were not intended to be grouted, such as, certain transfer lines still in use or potentially needed in the future. In those cases where it was possible to grout all the way through a piece of ancillary equipment (e.g. a pipe that had access on both ends) the grout was pumped until it came out on the other side. In addition, site personnel calculated the amount of grout needed to grout the equipment based on engineering drawings before grouting began. Grouting operations were stopped when the ancillary equipment was filled with a grout volume that was equal to 10% more than the volume calculated based on the engineered drawings. Site personnel stated that a few pours were stopped because this limit was reached. In these cases, it was determined that there was an error in the calculation rather than a problem with the grouting. An additional safety requirement for grouting operations involved the setting of a maximum pressure for the grout being pumped into the ancillary equipment, and grouting operations were stopped if this pressure was reached.

NRC staff and site personnel also discussed the processes used to access and grout the various ancillary equipment and piping, including the tank domes, the transfer lines, and the cooling coils. The domes for Tanks 180, 181, 182, 183, 184, 185, and 186 have been grouted. The grouting of these tank domes was done by emplacing grout through

the outside risers until the grout level reached the height of these risers. The remaining portion of the tank dome was then grouted through the center riser, which is located at the highest point in the dome.

Grouting operations have also been completed for much of the ancillary equipment and piping on site. All but approximately 300 ft (91 m) of the more than 7 mi (11 km) of transfer lines has been grouted. The transfer lines also had secondary containment, which has also been grouted. Because the transfer lines had contained contaminated material, any liquid that came out of the lines during grouting was managed as waste. The cooling coils were grouted from April 28 to May 13, 2008 using a total of 9 yd^3 (7 m^3) of grout. Three of the 300,000 gallon (1,000 m^3) tanks and all four of the 30,000 gallon (100 m^3) tanks have cooling coils with a 1.5 inch (3.8 cm) diameter. These lines never contained waste and were not internally contaminated. To ensure complete grouting of the entire cooling coil, the ends of the cooling coils were cut off and grout was pumped into one end of the coil until grout came out of the other end. Residual water pushed out of the coils by the grout was monitored for radioactivity and determined to be non-contaminated. Grouting operations were ceased on two of the cooling coils prior to grout coming out of the coil because the high pressure limit was reached. Both of these coils had longer lengths, so more pressure was required to push the grout all the way through these coils. Grouting of the remainder of these two coils was completed by emplacing grout into the other end of the coils. NRC staff found that the procedures used to grout the ancillary equipment are adequate and appropriate for ensuring that the ancillary equipment is properly grouted.

The grout mix used for grouting the ancillary equipment had a high water content comparable to that used for the upper portion of the tank to ensure that the grout was able to flow easily into all areas of the ancillary components. The design specifications for this mixture are described in Appendix C of DOE's final waste determination (DOE, 2006). NRC staff observed the grout consistency in the videos of grouting operations and confirmed that it was easily able to flow into piping. The grout components were typically measured out by the batch plant and mixed in a cement truck, but because of smaller volumes needed for some of the ancillary equipment, some of the grout mixing was done directly in the Pipe Grout Mixer. The consistency of the grout was verified using both the puddle test and compressive strength tests. NRC staff found that these procedures are appropriate for ensuring the consistency of the grout.

2.1.3 Conclusions and Follow-up Actions

NRC staff did not observe any problems with the grouting of the ancillary equipment at the INTEC TFF and the staff determined that this program is being conducted in a manner that ensures the grout specifications meet those that were assumed in DOE's final waste determination, issued in November 2006.

NRC staff plans to review the outcome of the grouting operations for the remaining ancillary equipment. In addition, on future site visits NRC staff plans to observe the grouting of the remaining four large tanks once the waste has been removed and they have been cleaned.

2.2 Groundwater Monitoring

2.2.1 Observation Scope

During this onsite observation visit, NRC staff observed routine groundwater monitoring activities, reviewed pertinent procedures, and interviewed site personnel to gather information about the ongoing groundwater monitoring program at the INTEC TFF.

2.2.2 Observation Results

Monitoring of underlying aquifers can be used to help in assessing whether the performance objective in 10 CFR 61.41, related to protection of the general public from releases of radioactivity, is being met and also to provide information to update modeling efforts to evaluate future performance. NRC staff observed DOE contractor site personnel conduct groundwater sampling at a groundwater monitoring well. No sampling was being performed in the INTEC TFF during the onsite observation visit; however, sampling was being performed at Test Area North (TAN). The sampling procedure is the same for the two areas. At TAN, the monitoring observed is part of the remediation efforts for a plume that resulted from a previous injection well. The plume contains trichloroethylene, perchloroethylene, and various radionuclides. The well that was sampled was TAN-1614. The INL staff sampled the well per the procedure, TPR-165, Revision 11, "Low-Flow Groundwater Sampling Procedure," (CWI, 2007). Analysis of the samples is done in house for TAN, while at INTEC TFF the samples are analyzed at offsite laboratories that comply with DOE protocols for quality assurance. NRC staff plans to review groundwater sample data during a future onsite observation visit.

2.2.3 Conclusions and Follow-up Actions

The NRC staff determined that the sampling of groundwater was performed in accordance with the established procedures. NRC will continue monitoring activities related to groundwater monitoring during future onsite observation visits to INL.

2.3 Radiation Protection Program

2.3.1 Observation Scope

During this onsite observation visit, NRC staff interviewed DOE, and contractor radiation protection personnel, reviewed radiological control documents associated with INTEC TFF grouting operations, and reviewed associated worker dose records.

2.3.2 Observation Results

DOE has contracted with CH2M-HILL and Washington Group, Idaho (CWI) to provide radiological protection for site personnel during INTEC TFF closure operations. Through interviews with key personnel and a review of pertinent records, NRC staff determined that radiation levels at the INTEC TFF are typically low during grouting operations. Furthermore, as low as is reasonably achievable (ALARA) reviews are required for all grouting activities. Because all INTEC TFF tank closure operations are project oriented,

a special personal electronic dosimeter (ED) monitoring device is required for each person conducting a specific project. While a thermoluminescence dosimeter (TLD) that is exchanged every quarter provides an individual's total external radiation dose received over that period, an ED can provide a specific dose associated with a specific activity, e.g., transfer line grouting. Through interviews with radiation protection personnel and observing the radiation protection computerized system operation, it was determined that the use of EDs can provide accurate information on worker dose associated with INTEC TFF grouting operations.

Through a review of INTEC TFF operation personnel dose records for 2008 (through August 1, 2008), including TLD and ED records, it was determined that there were no overexposure or overdose incidents involving INTEC TFF grouting operations. The maximum dose received by a worker during this period was 9 millirem (mrem). The maximum dose allowed to a worker under DOE regulations is 5,000 mrem per year (equivalent to 10 CFR Part 20 dose limits). CWI maintains an administrative limit of 700 mrem per year.

2.3.3 Conclusions and Follow-up Actions

Through a review of the radiation protection program implemented by DOE and CWI at the INTEC TFF, interviews with radiation protection personnel, and a tour of the facility, NRC staff determined that DOE took adequate steps to maintain radiation doses ALARA during INTEC TFF grouting operations. No specific items were identified for follow-up. NRC will continue monitoring activities related to radiation protection during future onsite observation visits to INL.

3.0 PARTICIPANTS

NRC Observation Team

M. Fuller
C. McKenney
K. Pinkston
P. Swain
B. Traynham

Idaho Department of Environmental Quality

M. Dietrich
B. LaRue

Partial List of DOE Representatives

P. Breidenbach
S. Butterworth
R. Carroll
M. Letourneau
B. Maxfield
R. McCollum
E. Myler
J. Long
M. Shaw
J. Valentine

4.0 REFERENCES

DOE. DOE/NE–ID–11226, “Draft Section 3116 Determination Idaho Nuclear Technology and Engineering Center Tank Farm Facility–Draft.” Rev. 0. Idaho Falls, Idaho: DOE. 2005.

DOE. DOE/ID–11226, “Basis for Section 3116 Determination for the Idaho Nuclear Technology and Engineering Center Tank Farm Facility.” Rev. 0. Idaho Falls, Idaho. DOE. 2006.

NRC. “U.S. Nuclear Regulatory Commission Technical Evaluation Report for the U.S. Department of Energy Idaho National Laboratory Site Draft Section 3116 Waste Determination for Idaho Nuclear Technology and Engineering Center Tank Farm Facility.” Washington, DC: NRC. 2006.

NRC. “U.S. Nuclear Regulatory Commission Plan for Monitoring Disposal Actions Taken by the U.S. Department of Energy at the Idaho National Laboratory Idaho Nuclear Technology and Engineering Center Tank Farm Facility in Accordance with the National Defense Authorization Act for Fiscal Year 2005.” Washington, D.C.: NRC. 2007.

CH2M-HILL and Washington Group, Idaho (CWI), 2007. TPR-165, "Low-Flow Groundwater Sampling Procedure," Revision 11. October 29, 2007.