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NUCLEAR REGULATORY COMMISSION
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MEMORANDUM TO: Robert C. Pierson, Chief
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THRU: Michael Tokar, Section Chief
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FROM: Rex Wescott
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SUBJECT: TRIP REPORT OF NRC/CNWRA TEAM VISIT TO HANFORD SITE ON JANUARY 13-15, 1997

A team of 6 NRC staff (including the onsite representative) and 5 CNWRA staff visited the Hanford Site for a site tour and technical presentations and discussions. In addition to the meetings with DOE contractors and Regulatory Unit (RU) Staff, the NRC and CNWRA staff members also held meetings to discuss comments on CNWRA contract deliverables and the progress of the contract.

The first meeting between NRC staff and DOE took place on Monday afternoon, January 13, at the DOE RU offices. Mike Talbot and Tom Sheridan of DOE RU were in attendance as well as Robert Pierson and other NRC staff (listed in Appendix A, copy attached). At this meeting some basic guidelines regarding the handling of proprietary data were discussed. In addition, R. Pierson mentioned that one of our more important data needs was to have sufficient information on the solidification processes to be able to make overview presentations to management and the Commission.

Tuesday, January 14, started with a meeting of NRC staff (as listed above), CNWRA staff (as listed in Appendix A), and DOE staff and contractors at the Richland Operations Office. Tom Sheridan gave some brief welcoming remarks and R. Pierson followed this with remarks about what NRC perceives as important regulatory issues with emphasis on: (1) 10 CFR Part 70 rulemaking, (2) Integrated Safety Assessment, and (3) the Standard Review Plan.

The bus tour around the Hanford Facility was conducted primarily by Don Woodrich (DOE) and consisted of visits to the 200 West Area, 200 East Area, HLW canister storage building construction site, AP tank farm, Evaporator, TWRS privatization construction site, and the old reactors and 100 areas. Some specific information provided during the tour consisted of:

1. The 101 SY tank is a double-shell tank (DST) with the mixer pump installed. This pump is a 150 hp pump with a 1 MGD capacity. The pump runs for a short period (approximately 25 minutes), about 3 times a week. There are two other DSTs in the SY area. All DST tanks have a 7/8" inner liner and a 3/8" outer liner of high carbon steel. All three DSTs are actively ventilated to the atmosphere through filters.

2. The Analytical Laboratory (222-S) was described by Lenny Perkins (Rust Federal Services). The lab was described as employing 380 people and was capable of performing approximately 300 separate analytical measurements. The laboratory has lead caves and hot cell labs where samples are handled by manipulators. The lab produces approximately 153 gallons of waste per week which is stored in the DSTs.

3. The HLW canister storage building (under construction) is designed to contain three vaults of waste or spent fuel canisters. One vault will contain spent fuel presently stored in the K-basins. The other two will contain glass logs from the vitrification effort. The canisters will be cooled by natural air convection. The design life of the building will be 75 years.

4. The 242-A evaporator was described by Jim Gerry (Rust Federal Services). The evaporator was built in 1977 and evaporated approximately 100 million gallons between 1977 and 1989. The evaporator was upgraded between 1989 and 1994 as part of the liquid effluent retention system. From 1994 to present, 8 million gallons of effluent has been evaporated. The boil-off rate of the evaporator is 50 gallons per minute. The evaporator is being used to raise the specific gravity of effluent in the single-shell tanks from 1.25 to 1.41. For future runs of the evaporator, starting material specific gravity will be 1.3.

5. The effluent "crib" area was described by Don Woodrich. At this area, effluent from the tanks was infiltrated into the ground through perforated pipe or "cribs" of gravel held by railroad ties. Remediation of the crib sites is presently being accomplished by a 15 foot layer of large cobblestones which serves as a capillary barrier, topped by 3 feet of soil.

6. The AP tank farm was described by Tim Bohan (Lockheed Martin). These tanks are the most recently constructed (1980's), have the most homogeneous waste, and are the lead tanks for privatization. The tank farm consists of 8 DSTs with a capacity of 1 million gallons each.

7. The grout facility was responsible for solidifying approximately 1 million gallons of low activity waste. Each gallon of liquid waste plus cement and fly ash produced 1.4 gallons of grout. The grout was disposed of in a 125' by 50' by 25' vault. Original plans called for 250 vaults.

During lunch time, an excellent overview presentation of the Hanford Site was provided by Don Woodrich. This presentation included visual representations of the waste volume onsite and descriptions of the single-shell and double-shell tanks, including color pictures of the sludge inside the tanks. The present radioactive inventories of the tank waste were shown as being almost entirely ^{137}Cs and ^{90}Sr. The presentation also briefly provided a look at some waste disposal activities such as mixing, sluicing, solid waste retrieval, and an overview of the envisioned remediation system.

After returning to Richland, the NRC and CNWRA staffs met without DOE present and discussed how to improve the quality of Chapter 2, part of Deliverable 3.1.1, Hanford Tank Waste Familiarization Report. The overall consensus was that the chapter required more information with better organization. For guidelines on the level of detail and the types of figures, NRC staff suggested maps and figures from DOE presentations, and the Safety Analysis Report for WNP-2 (or other similar facilities). Because of the amount of work involved, it appeared that the CNWRA may not be able to meet the OPS plan schedule and the NRC staff agreed to postpone the due date for this deliverable. In a later discussion between CNWRA and NRC staff, Pat Mackin of CNWRA opened a discussion to resolve issues related to preparing a report to analyze DOE's technical basis for classifying a fraction of the tank waste as incidental. Issues discussed included report format, and possible problems from the lack of available information on the technical and economic assessment.

Wednesday, January 15, was devoted to presentations by DOE on subjects requested by NRC or considered important by DOE to gain an understanding of the TWRS regulatory activities.

Highlights from the presentations are as follows:

1. Site hydrology and contaminant transport - Comprehensive overview presented by K. Michael Thompson (DOE), including maps of contaminant movement, geologic cross-sections and detailed stratigraphy. It appears that tank leaks have reached the aquifers. In comparison to the amount of material "cribbed," the amount reaching the aquifer is small. The following were mentioned as major threats to aquifers: carbon tetrachloride, hexavalent chromium, tritium, and nitrates. A major issue, at present, is obtaining consensus on a site-wide groundwater model.

2. Tank-related fire safety issues were presented by Bob Cash, Duke Engineering Services. The flammable gas problem was discussed and it was stated that concentrations of hydrogen approximately at the lower flammability limit were recovered from core samples in some of the tanks. The organics project and the safe storage of complexants, heating in tank C-106, the deterioration of ferrocyanide, and the potential for an organic pool fire in tank C-103 were also discussed. The status of issues was intended for the tanks at present, once

transfers/storage/and pretreatment is started, the same issues may need to be revisited.

3. The cross site transfer pipeline was presented by Greg Parsons (Numatec Hanford Corporation) (NHC). It was described as using about 6 miles of 3" pipe from the SY tank farm to lift Station 244A. Two pipeline are being constructed, one for liquid effluents and one for slurries. The pipelines are presently 52 percent complete and are expected to be ready to operate by February 1998. The pipeline for effluents is designed to handle 140 gpm of liquids at a specific gravity of 1.25, 20 percent solids, and a viscosity of 10 centipoise. Another factor influencing the design was to keep the temperature drop of the fluid low. The design life is 40 years.

4 Waste characterization and feed envelopes were presented by Karyn Weimers. There is a large uncertainty in characterization data because most sources were empirical, based on process records and feed data. A problem with direct tank samples (besides waste heterogeneity) is that waste is subsequently transferred to and from tanks changing composition. However, the envelopes are thought to provide sufficient basis for Phase I, Part A, contract awards and deliverables. Planned envelope development stages were described.

5. The staging of feed for the Phase I pilot project was presented by Paul Certa (NHC). The waste compatibility evaluation will include criticality, flammable gas concentration, energetics, corrosion, and ability to pump. Waste is expected to be fed at the rate of two metric tons of sodium per day.

6. Waste classification and its relationship to the remediation program was discussed by Don Woodrich. Incidental waste as defined by agreement was discussed.

7. The procurement schedule was described by Bill Taylor (DOE). The major point of interest was that LMAES can negotiate the per unit cost of low activity waste as late as January 2003, because of the unique nature of their solidification process.

8. The waste disposal privatization operations and interface were described by Rob Gilbert (DOE). The operations were described conceptually showing feed envelopes, waste treatment, and immobilized products. The interface was described in terms of what would be supplied to the contractors and what waste forms and waste products (conceptually) would have to be returned to DOE or disposed of by the contractors. The LMAES molten metal technology, Q-CEP, was described as being able to reduce a low activity waste feed of 29,000 cubic meters of tank waste to 2,300 cubic meters of immobilized low level waste using the Q-CEP process. This process was described as using propane as a carbon source and recycling NaOH, metal, and synthetic gas. One of the problems is

finding potential customers for recycled products. There is a smaller version of the Q-CEP process being used at Oak Ridge. Both the molten metal and glass technologies expect to extract cesium, strontium, and technetium from the low level waste stream.

9. Quality Assurance considerations were presented by Charlie Bell, Los Alamos, in terms of the regulatory documents required for Phase I of the privatization program, the contract stipulations, and the contract regulatory mandates. The two privatization contractors have submitted preliminary QA plans, addressing only controls applicable during Part A (includes some conceptual design) of Phase 1. NRC reviewed and commented on these plans. The QA program for the contractors is mandated by 10 CFR 830.120. At the present time, the DOE regulating unit is using Los Alamos Jeff Martin for QA activities.

The NRC and CNWRA staffs considered the technical presentations and accompanying discussions to be very informative. In addition, the presentations and the trip afforded the NRC/CNWRA team an opportunity to meet their DOE technical counterparts for some subject areas.

This trip report was prepared with input from Amy Bryce, Joan Higdon, and the CNWRA staff.

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Attachment: Appendix A-Trip Participants

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APPENDIX A - TRIP PARTICIPANTS

NRC PARTICIPANTS

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ATTACHMENT