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STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

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Mr. Richard T. French
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Dear Messrs. Klein and French:

This letter has been prepared to express the concern of the Washington State Department of Ecology (Ecology) regarding the future planning, integration, and funding of the geophysical logging program at the Hanford Site, currently conducted under the auspices of the United States Department of Energy, Grand Junction Office (USDOE-GJO). Ecology understands that discussion is underway regarding the current workscope under the USDOE-GJO direction. Our concern with the geophysical logging program at Hanford relates specifically to: 1) the current lack of funding to continue the program during Fiscal Year (FY) 2000 and beyond, 2) the elimination of a tool necessary for valid and accurate characterization and monitoring of the vadose zone, and 3) the potential expenditure of funds to replace a peer reviewed and technically accepted logging program with one of unknown quality.

Ecology believes that eliminating or reducing geophysical logging will jeopardize essential characterization work and prevent the Groundwater Vadose Zone Integration Project from achieving its goal of understanding the cumulative impact to the Columbia River from all of the contamination sources at the Site. Geophysical logging is integral to vadose zone monitoring/characterization. It is a requirement of the corrective action program at the single-shell tank farms, and it will be used during the characterization of past practice liquid disposal facilities in the 200 Areas. The quality of the logging effort will be a determining factor in the validity and accuracy of the characterization activities. Hanford scientists and an independent expert panel have validated the existing program. The program is acceptable to Ecology, and as important, it is already in place and ensures that limited cleanup dollars will not be spent to reproduce it.

Changing groundwater conditions that reduce the effectiveness of groundwater monitoring systems, increasing groundwater contamination from leaking tank wastes, and the decision to ship off-site low level waste (LLW) and mixed low-level waste (MLLW) to Hanford for disposal will require an increased, not decreased, level of vadose zone characterization and monitoring. Geophysical logging is presently the most effective technique for monitoring the vadose zone for the movement of moisture and gamma emitting contaminants. It is also the only technique that provides data on the subsurface distribution of gamma emitting radionuclides. Used during characterization, this technique will provide valuable data for use in risk analyses, estimating the nature and extent of contamination, developing remediation strategies, determining the cost of remedial options, and making informed single-shell tank (SST) retrieval and closure decisions.

The United States Department of Energy-Richland Office (USDOE-RL) has been criticized for its management of geophysical logging at the Hanford site. These criticisms have included the following:

1. The General Accounting Office (GAO), in its 1989 review of USDOE-RL management of SSTs, concluded that the geophysical logging program was inadequate due to outdated equipment used by both Westinghouse Hanford Company (WHC) and Pacific Northwest National Laboratory (PNNL).

2. In a 1990 USDOE Tiger Team Assessment of the Hanford site, the team concluded that "*the current system for vadose zone surveillance around the SSTs consists of outdated drywell logging techniques that are limited in their effectiveness.*"

3. In 1992 another GAO report stated, "*It is important to monitor and characterize the extent of contamination in the vadose zone and determine whether it is migrating toward the groundwater. However, existing vadose zone programs receive limited funding, operate with out-of-date and uncalibrated equipment, and are not comprehensive enough to assess the migration of contaminants from tanks or in the ground.*"

In 1994, the USDOE-RL requested the USDOE-GJO to conduct a baseline characterization of gamma emitting contamination in the vadose zone at SSTs by conducting spectral gamma-ray logging of boreholes that surround the tanks. To date, few, if any, technical problems have been identified with the baseline logging program. Regulators and public interest groups have been satisfied with the overall management of the program, its ability to meet deadlines, and the technical quality of the work. In 1998, in an Integration Project Expert Panel (IPEP) closeout report, IPEP provided the following comments:

1. *"The baseline SCLS logging, including shape factor analysis, is the one area where a serious, steady, ongoing effort is being directed towards borehole investigations in the vadose zone at Hanford."*

2. *"The baseline logging plan should be extended to other logging methods and a periodic relogging program is needed for monitoring."*

3. *"Periodic logging of drywells with the spectral gamma ray (not gross gamma) logging equipment should be instituted. This will become especially important as retrieval begins and baselines should be established now."*

4. *"Vadose zone field studies should be designed for continuity. Field studies of this nature require a great deal of time, and should be done by an organization that can guarantee continuity in terms of personnel, data management, and data analysis."*

The baseline logging program has essentially been completed. However, a clear need for continued monitoring of the tank farms and associated past-practice liquid waste disposal facilities (cribs, ponds and ditches) is evident. The associated past-practice sites are listed in Attachment 1 of the Hanford Federal Facility Agreement and Consent Order, Change Request, M-45-98-03. This change request contains milestones requiring the submittal of Resource Conservation & Recovery Act of 1976 Facility Investigation/Corrective Measures Studies (RFI/CMS) documentation for Ecology review and approval.

The RFI/CMS work plans must include the use of geophysical logging techniques as a prerequisite for Ecology approval. In addition, the Environmental Restoration (ER) Program's efforts to characterize past practice liquid waste disposal facilities at other locations of the Site will require the use of geophysical logging to both understand the distribution of gamma emitting radionuclides, and to prevent worker exposure during field activities. To keep the scheduled characterization activities on track, Ecology urges USDOE to continue geophysical logging at Hanford by keeping the existing program intact. Ecology's reasons for requiring geophysical logging and for supporting the current geophysical borehole logging program at Hanford are summarized below.

- **Corrective Action Program.** The corrective action program currently being implemented under proposed changes to the Tri-Party Agreement (TPA) at the single-shell tank farms and associated past practice sites requires that USDOE conduct accurate and defensible geophysical logging activities as part of an overall characterization effort. The geophysical logging procedures must be detailed in the RFIs. Ecology's approval of these workplans will be predicated on the validity and technical defensibility of the calibration, data collection, data management, QA/QC procedures, and data analysis procedures described in the work plans. Shape factor analysis will also be a requirement of the RFI/CMS documents. The continued delay in funding the geophysical logging program will likely push back the implementation of the corrective action activities described in the proposed TPA Change Request, M-45-98-03 and result in the resubmission of the change request for additional 45-day public comment period.

- **Acceptability.** The Vadose Zone Baseline Characterization Project is supported by nationally recognized experts in the development and implementation of spectral gamma logging methods.Project personnel are familiar with Hanford geology and waste disposal practices, and with conducting field operations in the Hanford environment. The logging program has been subjected to a detailed and critical review by Hanford scientists.

In addition, the USDOE-RL convened an independent expert panel (The SX Expert Panel) to specifically review issues raised by the project results/conclusions related to potential groundwater contamination associated with single-shell tank farms. The overall project management and its conclusions were found to be valid and defensible by the experts. These findings were substantiated later by other Hanford contractors using independent data.

- **Consistency.** Detailed procedures developed for instrument calibration, data collection, data analysis, processing, and reporting have been reviewed and accepted by Hanford scientists, regulators, and the SX expert panel (now the Integration Project Expert Panel). These procedures ensure that data from successive logging runs are comparable, repeatable, and allow subtle changes in subsurface data to be recognized. These same procedures would provide the basis for the implementation of an acceptable monitoring program to support waste retrieval and closure activities.

The combination of serious environmental issues and limited funding at Hanford require that USDOE-RL use the most effective and efficient technologies and organizations available. The amount and distribution of contamination in the vadose zone are unknown and hence the risk to human health and the environment that this contamination poses is also unknown. For the USDOE to meet its regulatory commitments at the tank farms, at past practice disposal facilities, and at LLW and MLLW sites, it is imperative that the most effective techniques for characterizing and monitoring the vadose zone be used. The existing geophysical logging program should be continued.

If you have any questions regarding this letter, please contact Dr. Dib Goswami, senior Nuclear Waste Program hydrogeologist at (509) 736-3015, or Stan Leja, Ecology Vadose Zone Lead, at (509) 736-3046.

Sincerely,

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JH:SL:lkd

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Admin Record: SST TSD S-2-4 Vadose Zone Characterization