UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

OFFICE OF THE
GENERAL COUNSEL

March 18, 2002

Michael C. Farrar, Chairman
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dr. Peter S. Lam
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dr. Jerry Kline
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, DC 20555

In the Matter of
Private Fuel Storage L.L.C.
(Independent Spent Fuel Storage Installation)
Docket No. 72-22-ISFSI

Dear Administrative Judges:

In accordance with the filing requirements discussed during the prehearing conference of January 17, 2002, enclosed please find the following documents:

1. "NRC Staff's Outline of Proposed Key Determinations For Contention Utah O (Hydrology)";

2. "Preface to NRC Staff's Testimony of Richard H. Ketelle Concerning Contention Utah O (Hydrology)";

3. "NRC Staff Testimony of Richard H. Ketelle Concerning Contention Utah O (Hydrology)," with his attached statement of professional qualifications;

4. NRC Staff's Proposed Exhibit F, entitled "Utah Water Atlas for Potential Evapotranspiration."

The Staff has previously served upon the Licensing Board and parties a copy of NUREG-1714, "Final Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians and

the Related Transportation Facility in Tooele County, Utah," dated December 2001. This document will be offered into evidence as Staff Exhibit E (two volumes).

Sincerely,

Catherine L. Marco

Catherine L. Marco
Sherwin E. Turk
Counsel for NRC Staff

Enclosures: As stated
cc w/Encls.: Service List

March 18, 2002

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
PRIVATE FUEL STORAGE, L.L.C.	)	Docket No. 72-22-ISFSI
	)	
(Independent Spent Fuel Storage Installation)	)	

NRC STAFF'S OUTLINE OF PROPOSED KEY DETERMINATIONS FOR CONTENTION UTAH O (HYDROLOGY)

A. The Staff's determination of the potential impact of the Applicant's facility on water quality is set forth in the Staff's "Final Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah," NUREG-1714 (December 2001).

B. The Staff has evaluated the impacts on groundwater and surface water resources that may result from the Applicant's facility for contaminants from the Applicant's facility and has determined that any impacts will be small.

C. The Staff's FEIS addresses potential impacts to groundwater from the Applicant's wastewater (septic) systems.

1. The leach fields are likely to be able to accept the anticipated water volumes.

2. Facility design elements will be used to prevent spills of oil, antifreeze or other chemicals from entering the waste water system.

3. PFS has committed to develop and implement procedures to ensure the proper handling of hazardous materials, including the implementation of a Best Management Practices ("BMP") Plan.

D. The Staff's FEIS addresses potential impacts to surface water and groundwater from the Applicant's construction and operation activities. The Staff has determined that any impacts will be small.

E. The Staff's FEIS addresses potential impacts to surface water through run-off from the detention basin. Potential impacts to surface water quality are expected to be small.

1. The detention pond is designed as a seepage basin capable of containing all site runoff from a storm up to a 100-year precipitation event.

2. Facility design and operating procedures will reduce introduction of contaminants into the detention basin.

3. PFS has committed to sample and, if necessary, remove water from the detention pond after significant storms.

F. The potential impact to downgradient water sources is small.

1. There are not likely to be any significant water quality impacts on other well users or the aquifer.

2. The time for any contaminant in the groundwater to seep to the closest spring would be decades.

3. The existence of an approximate 20-foot layer of fine-grained soils within the top 25-30 feet of soils below surface provides protection against groundwater contamination.

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PREFACE TO NRC STAFF'S TESTIMONY
OF RICHARD H. KETELLE CONCERNING
CONTENTION UTAH O (HYDROLOGY)

The NRC Staff (Staff) is filing the testimony of Richard H. Ketelle, concerning Contention Utah O. Mr. Ketelle is a subsurface contamination specialist with the Bechtel Jacobs Company, LLC in Oak Ridge, Tennessee. Mr. Ketelle has had wide-ranging experience in site assessment and groundwater contamination investigations.

Mr. Ketelle assisted in the Staff's environmental review of the Private Fuel Storage (PFS) Facility (PFSF) with respect to potential impacts to hydrologic resources from the construction and operation of the PFSF, as set forth in the "Final Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah," NUREG-1714, issued in December 2001 (FEIS).

The Staff's testimony discusses the potential impacts to hydrologic resources from the Applicant's construction and operation activities, specific issues related to the Applicant's proposed septic systems and retention pond, and water quality issues related to downgradient users. The Staff has evaluated these potential impacts on hydrologic resources and, as set forth in the Staff's testimony and the FEIS, concludes that the potential impacts are small.

March 18, 2002

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NRC STAFF TESTIMONY OF RICHARD H. KETELLE
CONCERNING CONTENTION UTAH O (HYDROLOGY)

Q1. Please state your name, occupation, and by whom you are employed.

A1. My name is Richard H. Ketelle. I am employed as a subsurface contamination specialist, with the Bechtel Jacobs Company, LLC in Oak Ridge, Tennessee. I am providing this testimony under a technical assistance contract between the staff of the Nuclear Regulatory Commission ("NRC Staff" or "Staff") and Oak Ridge National Laboratory ("ORNL"). A statement of my professional qualifications is attached hereto.

Q2. Please summarize your education and experience related to subsurface hydrology.

A2. I hold Bachelor of Science and Master of Science degrees in Geology from the University of Tennessee in Knoxville. I have worked in the field of subsurface hydrology since 1979 and have wide-ranging experience in site assessment and groundwater contamination investigations. In 1993 and 1994, I served as the Technical Lead for groundwater activities for ORNL's Environmental Restoration Program. I performed hydrogeologic analyses for several remedial action projects at ORNL, which culminated in construction of groundwater collection and treatment facilities. I worked with advanced groundwater models for use in risk assessment analyses for site remediation at ORNL. In 1995 and 1996, I served as the Groundwater Coordinator for the ORNL site. From 1996 to 2000, I provided oversight of groundwater monitoring

activities for ORNL. I also served as the technical lead for the Remedial Investigation Report preparation for the Melton Valley Watershed in Tennessee and assisted in the preparation of the Melton Valley Proposed Plan and Record of Decision.

Q3. Please describe your current responsibilities.

A3. I am currently responsible for the Water Quality Program at the ORNL site, including planning and overseeing surface water and groundwater monitoring for the Environmental Monitoring Program at ORNL. I provide technical support to remediation projects and procurement teams for the ORNL site. In addition, I provide technical assistance to ORNL's Research Reactors Division on the release of tritium, cobalt, and europium-contaminated process wastewater to groundwater at ORNL's High Flux Isotope Reactor site.

Q4. Please explain what your duties have been in connection with the NRC Staff's review of the application filed by Private Fuel Storage, L.L.C. ("PFS" or "Applicant") for a license to construct and operate an Independent Spent Fuel Storage Installation ("ISFSI") on the Reservation of the Skull Valley Band of Goshute Indians, geographically located within Skull Valley, Utah (the "proposed PFS Facility").

A4. As part of my official responsibilities, I assisted the NRC Staff in its evaluation of the potential environmental impacts related to the Applicant's construction and operation of the proposed PFS Facility. My specific role was to conduct an evaluation of potential impacts to water resources due to construction and operation of that facility. Further, I assisted in preparation of the Staff's "Draft Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Facility on the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah," NUREG-1714, issued in June 2000 ("DEIS"). I also assisted in preparation of the Staff's "Final Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation

on the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah," NUREG-1714, issued in December 2001 ("FEIS"). In addition, I assisted the NRC Staff in preparing the "NRC Staff's Response to Applicant's Motion for Summary Disposition of Utah Contention O -- Hydrology," dated July 19, 2001.

Q5. What is the purpose of this testimony?

A5. The purpose of this testimony is to provide the NRC Staff's views concerning Contention Utah O, specifically regarding: (1) non-radiological contaminant pathways from the Applicant's sewer/wastewater system, routine facility operations, and construction activities; (2) non-radiological contaminant pathways from the Applicant's retention pond; (3) the potential for non-radiological groundwater and surface water contamination; and (4) the potential for groundwater contamination to impact downgradient water users.

Q6. Are you familiar with Contention Utah O?

A6. Yes. I understand that Contention Utah O, as admitted by the Licensing Board in LBP-98-7 and modified in LBP-99-6 and LBP-99-39, states as follows:

> The Applicant has failed to adequately assess the health, safety, and environmental effects from the construction, operation and decommissioning of the ISFSI as required by 10 C.F.R. §§ 72.24(d), 72.100(b), and 72.108, with respect to the following contaminant sources, pathways, and impacts:
>
> 1. Contaminant pathways from the Applicant's sewer/ wastewater system; routine facility operations; and construction activities.
>
> 2. Contaminant pathways from the Applicant's retention pond in that:
>
> a. The ER fails to discuss potential for overflow and therefore fails to comply with 10 C.F.R. Part 51.
>
> b. ER is deficient because it contains no information concerning effluent characteristics and environmental impacts associated with seepage from the pond in

violation of 10 C.F.R. § 51.45(b) and § 72.126(c) & (d).

3. Potential for groundwater and surface water contamination.

4. The effects of Applicant's water usage on other well users and on the aquifer.

5. Impact of potential groundwater contamination on downgradient hydrological resources.

In addition, I understand that certain portions of these issues (*i.e.,* water usage impacts and radiological contamination) have been resolved by the Licensing Board's decision in LBP-01-40.

Q7. Has the Staff conducted an evaluation of the potential impacts to hydrologic resources (*i.e.*, groundwater and surface water) resulting from the construction and operation of the proposed PFS Facility?

A7. Yes. The Staff's evaluation of these matters is set forth in various sections of the FEIS issued in December 2001. In particular, the impacts of the proposed PFS Facility on hydrological resources in and around the proposed Skull Valley site are discussed in FEIS §§ 3.2.2, 4.2.1, 4.2.2, 6.1.2, and 9.4.2.

Q8. Has the Staff reached a conclusion as to the potential impacts that may result from construction and operation of the PFS Facility on hydrologic resources?

A8. Yes. As set forth in sections 3.2, 4.2, 6.1.2, and 9.4.2 of the FEIS, the Staff has evaluated the potential impacts due to construction, operation and decommissioning of the PFSF on hydrological resources in Skull Valley, and has determined that any such impacts will be small.

Q9. What information did the Staff consider in conducting this evaluation?

A9. The Staff considered the information contained in the Applicant's Environmental Report ("ER"), which addressed the environmental impacts of the proposed PFS Facility, as well as the Applicant's responses to Staff requests for additional information, and the Applicant's Safety Analysis Report ("SAR").

I. Basis 1: Contaminant Pathways: Sewer/Wastewater System, Operations, and Construction Activities.

Q10. Do you agree with the State of Utah's assertion in Basis 1 of Contention Utah O, that inadequate consideration has been given to the health, safety, and environmental effects with respect to contaminant pathways from the Applicant's sewer/wastewater system, routine facility operations, and construction activities?

A10. No.

Q11. Please explain the basis for your conclusion in this regard.

A11. This conclusion is supported by the following considerations, with respect to the Applicant's septic systems, operations, and construction activities.

Septic Systems.

With respect to the Applicant's septic systems, section 4.2.2.4 (at page 4-12 to 4-13) of the FEIS addresses the potential impacts to groundwater resources from the Applicant's two proposed septic systems. One of the proposed septic systems would serve the Administration and Operation and Maintenance Buildings and the other would serve the Canister Transfer Building and Health Physics Building. Both systems are designed to use 130m^2 leach fields.

The FEIS includes an assessment of the ability of the site soils to accept the septic system effluent volume. Based on soil characteristics information available in the Applicant's site characterization data, the near-surface soils will prevent rapid percolation of effluent to the groundwater. The fine-grained soils are expected to allow slow seepage of effluent during which many of the constituents will adhere to soil particles because of chemical interactions between the effluent and soil. Annual rainfall at the site is less than 12 inches and annual potential evapotranspiration in the Skull Valley area is 27 – 30 inches (Utah Water Atlas) (http://www.engineering.usu.edu/uwrl/atlas/ch3/index.html). *See* Utah Water Atlas for potential evapotranspiration in Skull Valley (Staff Exhibit F). Because evapotranspiration exceeds site

rainfall, it is likely that much of the water in the effluent will be transpired to the atmosphere by plant growth. Therefore, on an annual average basis the amount of water from the leach fields that will reach the groundwater table is small.

The estimated rate of application of water to the leach fields would be much lower than the estimated soil percolation rate. Therefore, as stated in FEIS Section 4.2.2.4, the leach fields are likely to be able to accept the anticipated water volumes while preventing direct discharge into the groundwater. The FEIS recognizes (Section 4.2.2.4) that improper functioning of a septic system could occur if natural or man-made preferential seepage pathways exist within the seepage field area. In such a case, there could be rapid percolation of incompletely treated septic water downward toward to the groundwater table. However, no such pathways have been identified to date. Further, PFS has committed to register the septic fields with the Environmental Protection Agency, as stated in § 4.2.2.4 of the FEIS. Thus, seepage of incompletely treated septic water into the groundwater does not appear to warrant concern.

Operations.

With respect to the facility's routine operations, which include operation of the septic systems, the only liquid effluents that would be generated at the facility are stormwater runoff that would be directed to the detention basin and the natural drainage system, and domestic wastes that would be fed into the facility's septic system.

PFS has provided certain design features that serve to reduce the potential for contamination of surface and ground water by hazardous materials. For example, sections 2.1.3 (page 2-28) and 4.2.2.4 (pages 4-13 to 4-14) of the FEIS describe the drain sumps proposed for use in the Canister Transfer Building. As stated therein, the drain sumps would not be connected with the on-site septic systems, thus eliminating these areas as potential sources of contamination. Similarly, hazardous materials will be stored in a manner that reduces the potential for

contamination. Further, PFS has committed to prepare and implement a Best Management Practices ("BMP") Plan as described in FEIS Section 9.4.2 ("Mitigation Measures"). The BMP Plan would address spills or accidental releases during facility construction and operation.

PFS has indicated that the only identified hazardous materials that will be used or stored on site during facility operation are lubricating oils and diesel fuel. Diesel fuel will be stored in aboveground tanks and enclosed in secondary tanks to limit the potential for leakage. PFS has committed to placing absorbent materials under nozzles during refueling to minimize accidental spilling of diesel fuel and to ensure rapid and effective remediation of the affected environment in the event of a diesel fuel spill. Lubricating oils will be stored in sealed metal drums in designated operating and maintenance buildings. There will only be limited quantities of cleaning solvents, painting products, pesticides and herbicides on site during facility operation.

A contaminant released into the shallow soils must pass through approximately 20 feet of fine-grained soil near the surface, and then percolate through approximately 100 feet of fine sand to reach the groundwater. Stormwater runoff from the facility may infiltrate in shallow soils or flow into the detention basin. In the event that runoff from cask storage pads and onsite transportation areas or vehicle parking areas carries small amounts of oil or grease, such constituents are expected to adhere to soil particles and biodegrade. In the event soluble metals are present, it is expected that chemical adsorption to the soil particle surfaces will significantly retard their movement in the soil. It is very likely that water in the shallow soils, including that which infiltrates in drainage courses, will be returned to the atmosphere through evapotranspiration before reaching the groundwater table.

On the basis that (a) the soils appear to have the capability of receiving the effluent volume, (b) the soils are of a texture that will attenuate many dissolved constituents, and (c) the depth to

groundwater is more than 100 feet, the Staff concludes that the potential for adverse groundwater impacts is small.

With respect to potential contamination of the sanitary waste system, facility design elements and procedures will be used to prevent spills of oil, antifreeze, or other chemicals from entering the sanitary waste leach field system. While it is possible for small quantities of non-hazardous chemicals to be introduced into the wastewater treatment, as discussed in FEIS section 4.2.2.4, the Applicant has not identified any unique substances of a hazardous or regulated nature that would be introduced into the septic system that would not be expected in a sanitary wastewater stream. In addition, certain of the chemicals that might be introduced into the septic system would be subject to biological decomposition, which would minimize the potential for adverse impacts to groundwater via the wastewater treatment systems. Further, as described above, PFS will implement a BMP plan which will provide further assurance that hazardous material is not introduced in the septic system.

The Applicant has identified the hazardous and non-hazardous chemicals and materials that would be located onsite during facility operations. During facility operations, PFS has committed to place hazardous materials in sealed and properly labeled containers stored in designated areas, thereby limiting the potential introduction of such materials into the sanitary waste system. PFS has further committed to develop and implement procedures to ensure that personnel comply with and properly implement all applicable rules and regulations governing the use, storage and handling of hazardous materials. Further, during facility operation, PFS has committed to policies and procedures ensuring that all rules and regulations governing the use and storage of hazardous substances are properly implemented.

In sum, the potential for non-radiological contamination is very low due to (a) the lack of significant sources of contamination on site, (b) the Applicant's commitment to implement and

follow procedures to prevent or minimize contamination and ensure compliance with applicable rules and regulations, and (c) the presence of design features that will help control and minimize any potential contamination. The combination of facility design considerations and the implementation of procedures limiting the potential for introduction of hazardous materials into the sewer/wastewater system or the contamination of surface and ground water makes the likelihood of contamination very low.

Construction Activities

With respect to the Applicant's construction activities, the FEIS discusses the potential impacts of construction activities on surface water quality and groundwater quality. Section 4.2.1.1 of the FEIS addresses the specific impacts to surface water quality from spills of such chemicals as petroleum hydrocarbon fuels. Section 4.2.1.3 of the FEIS presents a similar discussion on the potential for spills to impact groundwater quality. As stated in the FEIS, the Staff has concluded that impacts to either the surface water flow system or to the groundwater quality in Skull Valley would be small as a result of construction of the facility.

As discussed above and in FEIS Section 9.4.2 ("Mitigation Measures"), PFS has committed to prepare and implement a Best Management Practices ("BMP") Plan during construction and operation of the facility. The BMP Plan would address spills or accidental releases during facility construction and operation and to maintain unobstructed flow through culverts to minimize upstream ponding where PFS access corridors cross ephemeral drainage channels. These measures are designed to prevent unacceptable environmental consequences during facility construction. Given the low annual precipitation at the site (estimated to be less than 12 inches per year), the absence of nearby downgradient surface water bodies, the weak connection between the land surface and the local groundwater system because of the low permeability of the site soils,

and the high evapotranspiration at the site, the Staff has concluded there is a very low likelihood that PFS site construction activities will lead to contamination of surface or groundwater.

Q12. The State asserts that an analysis must be conducted to determine whether a connection exists between the surface and an underlying aquifer. Do you believe this presents a valid concern?

A12. No. The Applicant characterized the material properties of the soil profile and determined the hydraulic conductivity of the aquifer (saturated zone) beneath the site through performance of a pump test, as discussed in section 3.2.2 (page 3-13) of the FEIS. This provides an acceptable basis for determining the potential for any contamination from the facility to affect the aquifer.

The Applicant performed soil tests of a geotechnical nature, which confirmed the presence of an approximately 20-foot layer of fine-grained soils (silty clays and clayey silts) located within the top 25-30 feet below surface, overlying fine sand that contains the ground water table, which is located at a depth of approximately 125 feet beneath the site. The natural moisture content of soils in this layer of fine-grained soils was low relative to saturated moisture contents. As stated in section 4.5.6 of the Applicant's ER and in section 3.2.2. of the FEIS, the result of the pump test indicated the aquifer beneath the site has a hydraulic conductivity of approximately 5×10^{-5} cm/sec.

The presence of fine-grained soils in this approximately 20-foot layer protects the underlying groundwater from rapid infiltration of water or other spills at the land surface. The presence of these fine-grained soils, combined with low annual rainfall (less than 12 inches) and an excess of potential evapotranspiration (27-30 inches), creates a setting in which movement of moisture from the surface soils to the groundwater, shown to lie 125 feet below ground surface, is slow.

Q13. Does the Applicant's analysis provide an adequate basis to determine the potential for the aquifer to be contaminated by construction and operation of the proposed PFS Facility?

A13. Yes. The site soil and groundwater characteristics data provided by the Applicant show that there is a substantial buffer between the facilities that would be constructed and operated at the land surface and the groundwater beneath the site. The Applicant's analysis of the site confirmed that groundwater beneath the proposed site has a low vulnerability for being contaminated. Factors that minimize the potential for contamination of the groundwater include the types of soils that exist within about 25-30 feet of the surface, the depth to groundwater beneath the site, low annual rainfall, and the high potential evapotranspiration of the area. Further, the Applicant tested the aquifer permeability at the site, which was found to be moderately low, meaning that groundwater seepage velocities beneath the site are low.

II. Basis 2: Contaminant Pathways - Retention Pond

Q14. Do you agree with the State of Utah's assertion in Basis 2(a) of the contention, that the Applicant's ER or the Staff's FEIS fail to adequately consider the health, safety, and environmental effects of the proposed PFS Facility, with respect to contaminant pathways from the Applicant's retention pond, in that the ER or FEIS fails to discuss potential overflow?

A14. No.

Q15. Please explain the basis for your conclusion in this regard.

A15. The potential for contamination from the retention pond (also referred toby PFS as the "detention pond") has been considered in both the ER and the FEIS. As stated in section 4.2.4 of the Applicant's ER, in the unlikely event that overflow of the retention pond is imminent, temporary pumps would be used to drain the basin. Such action would prevent erosion of the embankments to prevent uncontrolled release. The Staff has concluded that the potential for contamination from retention pond effluent is low. The detention pond is designed as a seepage basin capable of containing all site runoff from a storm up to a 100-year precipitation event. Theoretically, overflow could occur as a result of a storm greater than the 100-year event or if

multiple, less severe storms occur in rapid succession. However, as described above, facility design and operating procedures will make release of contamination into the detention pond unlikely. Further, PFS has committed to sample the water in the detention pond after significant storm events and prior to release of water from the detention pond. If contamination is detected, the pond water will be removed for offsite treatment and/or disposal, thus limiting the possibility of release of contaminated water via surface flow. Therefore, runoff from the retention pond is very unlikely to result in contamination of surface or groundwater.

Q16. Do you agree with the State of Utah's assertion in Basis 2(b) of the contention, that the Applicant's ER or the Staff's FEIS failed to adequately assess the health, safety, and environmental effects of the proposed PFS Facility, with respect to contaminant pathways from the Applicant's retention pond, in that the ER or FEIS contains no information concerning effluent characteristics and environmental impacts associated with seepage from the pond?

A16. No.

Q17. Please explain the basis for your conclusion in this regard.

A17. Although the Applicant did not provide a wastewater profile for the pad area or other paved surface runoff, it is assumed that this water would be similar to parking lot runoff from an concrete parking lot that receives light traffic. During the storage pad loading phase approximately 150 (100 - 200) fuel storage casks per year will be moved from the Cask Loading Facility to positions on the storage pads (FEIS page 2-19) . This rate of pad loading indicates less than one trip per day for pad loading. Ancillary operational activities on the site, such as storage area inspections and site maintenance, would also contribute to the presence of people and vehicles. Based on the expected low use levels there would be little if any dissolved material of concern. In addition, contaminant attenuation processes in the near-surface soils, such as adsorption of dissolved metals and retention of petroleum hydrocarbons accompanied by degradation by soil

microbes, are expected to prevent impacts to groundwater from small amounts of oil, grease, or dissolved metals, should they be present.

III. Basis 3: Potential for Groundwater and Surface Water Contamination.

Q18. Do you agree with the State of Utah's assertion in Basis 3 of this contention, that the FEIS failed to adequately assess the health, safety, and environmental effects with respect to the potential for groundwater and surface water contamination?

A18. No.

Q19. Please explain the basis for your conclusion in this regard.

A19. The potential for contamination of surface water or groundwater is discussed in the FEIS, in sections 3.2, 4.2, 6.1.2, and 9.4.2. As set forth therein, the Staff has concluded that the potential for groundwater and surface water contamination from the proposed PFS Facility is very low. This conclusion is based upon the following considerations. First, there are no perennial surface water sources within five miles downgradient of the PFSF site. The proposed PFS site is not in close proximity to any other channel, in that the nearest intermittent stream is located approximately 1,500 feet northeast of the site. Second, the wastewater treatment system and the detention pond are the two site components with any significant potential to release contaminants into the surface water or groundwater at the site of the proposed PFS Facility. Facility design features and operating procedures limit the potential release of contaminants into the wastewater treatment system or the detention pond, thus significantly reducing the potential for those areas to contaminate the groundwater or surface water. Third, the low annual precipitation and weak hydrologic link between land surface and water table, limit the ability of the wastewater treatment system and/or retention pond to contaminate the groundwater or surface water. Thus, the lack of significant contaminant sources, coupled with the absence of nearby surface water features, low

annual precipitation, and the weak hydrologic linkage between the land surface and the groundwater table, makes the likelihood of surface water or groundwater contamination very low.

IV. Basis 5: Impact of Potential Groundwater Contamination on Downgradient Hydrological Resources.

Q20. Do you agree with the State of Utah's assertion in Basis 5 of this contention that the Applicant's ER or the Staff's FEIS failed to adequately assess the health, safety, and environmental effects of the proposed PFS Facility with respect to the impact of potential groundwater contamination on downgradient hydrological resources?

A20. No.

Q21. Please explain the basis for your conclusion in this regard.

A21. As stated in the discussion above and in sections 3.2, 4.2, 6.1.2, and 9.4.2 of the FEIS, no significant contamination of groundwater or surface water resources as a result of the construction and operation of the proposed PFS Facility. Further, as discussed above and in section 4.2 of the FEIS, contaminants are unlikely to travel through the soil column from the land surface to the groundwater zone. In this regard, section 3.2.2 of the FEIS (page 3-13) includes an estimate of groundwater seepage velocity of approximately 3 feet per day based on available data. The nearest downgradient springs shown on the map are approximately 11 miles north of the proposed site. In the unlikely event that contamination from the proposed PFS Facility were to reach the groundwater table, the travel time for seepage to the closest spring would be decades for any contaminant that is not subject to attenuation in the soil. Further, other factors, such as the contaminant attenuation process in soil, mineral materials in the groundwater zone, dilution, and dispersion processes in the groundwater flow system, would reduce concentrations along the flow path by orders of magnitude. As a result of these considerations, any potential groundwater contamination resulting from the construction and operation of the proposed PFS Facility is unlikely to have impact on downgradient hydrological resources.

Similarly, the closest downgradient, off-reservation well to the PFSF site is estimated to be approximately 9,500 feet away. Construction and operation of the PFSF is unlikely to have a significant adverse impact on water quality in offsite wells because groundwater beneath or near the facility is not expected to be significantly impacted.

CONCLUSION

Q22. What is your overall conclusion with respect to the health, safety and environmental effects regarding the contaminant sources, pathways and impacts described in Contention Utah O?

A22. For the reasons discussed above and in the FEIS, there is a very low likelihood that activities associated with construction and operation of the proposed PFS Facility (including operation of the facility sewer/wastewater system) will result in any significant contamination or groundwater or surface water, or will have any significant hydrologic impact. As stated in sections 4.2 and 6.1.2 of the FEIS, the impacts of the facility on surface water quality and groundwater quality are expected to be small. Accordingly, it is my conclusion that the concerns raised in Contention Utah O have been addressed satisfactorily.

Q23. Does this conclude your testimony?

A23. Yes.

Richard H. Ketelle

EDUCATION

M.S. in Geology, University of Tennessee, Knoxville, 1977. Thesis Title: Characterization of the Mineral and Metal Content of Suspended Sediment, New River Basin, Tennessee.

B.S. in Geology, University of Tennessee, Knoxville, 1973.

EXPERIENCE

Engineering Specialist — March 2000 to Present
Bechtel-Jacobs Corporation
Oak Ridge, Tennessee

Responsible for Water Quality Program at the Oak Ridge National Laboratory ("ORNL") site including planning and overseeing surface water and groundwater monitoring for the Environmental Monitoring ("EM") Program at ORNL. Provides technical support to remediation projects and procurement teams for the ORNL site. Provides technical assistance to ORNL Research Reactors Division on release of tritium contaminated process wastewater to groundwater at the High Flux Isotope Reactor site.

Research Staff — 1979-March 2000
Oak Ridge National Laboratory
Oak Ridge, Tennessee

Groundwater Manager
Oak Ridge National Laboratory (1996-2000)

Provided oversight of groundwater monitoring activities for ORNL. Assigned as technical lead for the Remedial Investigation Report preparation for the Melton Valley Watershed and participated in preparation of the MeltonValley Proposed Plan and Record of Decision. Also participated in public interactions of the End Use Working Group and the Stewardship Working Group sponsored by the Oak Ridge Reservation Site Specific Advisory Board.

Group Leader, Applied Geology Group
Oak Ridge National Laboratory (1995-1996)

Led technical activities in groundwater investigations for the ORNL Environmental Restoration Program. Groundwater Coordinator for ORNL site.

Research Staff Member
Oak Ridge National Laboratory (1993 - 1994)

Technical Lead for groundwater activities for ORNL Environmental Restoration. Lead hydrogeologic analyses for several remedial action projects at ORNL which culminated in construction of groundwater collection and treatment facilities. Contributed to use of advanced groundwater models in risk assessment analyses for site remediation at ORNL.

Research Associate, Applied Physical Sciences Group
Oak Ridge National Laboratory (1990-1992)

Directed activities of Applied Physical Sciences Group geologists in preparing report sections for the Gaseous Diffusion Plant Safety Analysis Report Upgrade Program. Participated in groundwater modeling task supporting the Performance Assessment for operating low-level waste disposal facilities in Solid Waste Storage Area 6 at ORNL. Directed site monitoring activities for the proposed future low-level waste sites at Oak Ridge. Advised ORNL Environmental Restoration staff on geologic and hydrogeologic considerations in risk assessment of ORNL facilities.

Research Associate
Oak Ridge National Laboratory (1979-1989)

1985-1989: Responsible for geologic and hydrogeologic site characterization studies in DOE's Low-Level Waste Disposal Development and Demonstration Program and the ORNL Remedial Action Program Remedial Action Feasibility Study. Activities included characterization program task planning and performance using both subcontract personnel and ORNL staff. Planned and supervised construction of piezometers and water quality monitoring wells at the ORNL facilities for the purpose of basic site characterization, sampling of selected wells in a contaminant scoping survey, and performance of hydraulic testing in core holes to develop a large-scale understanding of the groundwater flow system at ORNL. Responsible for the performance of the first regional inventory of karst subsidence in East Tennessee.

1982-1985: Performed site characterization of two proposed low-level radioactive waste disposal sites and participated in pathways analyses for both sites. Work at the West Chestnut Ridge Site at Oak Ridge included characterization of thick residual soils, bedrock, and groundwater flow in the karst aquifer. Work at the Ohio site involved characterization of soil and bedrock conditions as well as performance of aquifer tests and participation in the site pathways analysis. Pathways analyses for both of these sites included groundwater contaminant transport analyses and estimation of potential radiological dose to. Participated in preparation of documents pertaining to appropriate techniques for shallow land burial of low level radioactive waste and remedial measures to stabilize shallow land burial facilities. Applied electromagnetic survey techniques to groundwater studies at several sites.

1979-1982: Performed analyses of potential impacts of large-scale synthetic fuel plant construction and operation and participated in preparation of NEPA documents for other DOE sponsored projects.

Hensley-Schmidt Consultants, Inc. 1977-1979
Chattanooga, Tennessee

As a geologic consultant, performed coal exploration and reserve estimation on properties in Alabama, Kentucky, Tennessee, and West Virginia. Performed foundation and settlement investigations at several large construction sites.

Field Assistant 1977
U.S. Geological Survey
Reston, Virginia

Participated in field geologic mapping and sampling for mineral resource assessment at areas proposed for designation as National Wilderness Areas in East Tennessee. Gained experience in geologic mapping in the metamorphic rock setting of the Blue Ridge Province of East Tennessee.

REGISTRATION

Registered Professional Geologist in the State of Tennessee No. 555

OTHER TRAINING

2000	Multi-Agency Radiation Survey and Site Investigation Manual training, Washington, D.C.
1993	Dynamic Graphics, Earthvision training course.
1990	Applied Groundwater Modeling, International Groundwater Modeling Center, Butler University, Indianapolis, Indiana.
1984	Geotechnical Applications of Borehole Geophysics, by Jeffrey Daniels.
1984	Project Management, Oak Ridge National Laboratory.
1983	Geotechnical Engineering for Waste Disposal Projects, University of Texas Short Course.
1981	Introductory Soil Mechanics, The University of Tennessee, One Quarter.
1978	Fundamentals of Grouting, University of Missouri Short Course.

PUBLICATIONS

R.H. Ketelle and G.J. Davies, Hydrogeochemical Responses of Knox Group Springs to Precipitation at Oak Ridge Tennessee. GSA Abstracts with Programs Vo. 31 No. 7 p. 331 October 1999.

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R. R. Lee, R. H. Ketelle, J. M. Bownds, T. A. Rizk, Modeling Groundwater Flow and Contaminant Transport at Oak ridge National Laboratory, in proceeding of the Ninth Oak Ridge National Laboratory Life Sciences Symposium: The Scientific Challenges of NEPA, Knoxville, Tn.. October 24-27, 1989.

E. C. Drumm, W. F. Kane, R. H. Ketelle, J. Ben-Hassine, J. A. Scarborough, Subsidence of Residual Soils in a Karst Terrain, ORNL.TM-11525, June 1990.

D. W. Lee, J. S. Baldwin, D. C. Kocher, J. M. Bownds, R. H. Ketelle, R. J. Luxmoore, J. M. Begovich, H. W. Godbee, J. L. Kasten, C. W. Nestor, Review Draft of Performance Assessment for SWSA 6, June 1990.

R. H. Ketelle, R. R. Lee, M. W. Yambert, H. K. Hardee, Supplemental Hydrologic Data Collected at Central Waste Management Division Sites; 9/1/89 - 3/31/90. K/WM-3, June 1990.

R. H. Ketelle, J. G. Newton, and J. M. Tanner, Karst Subsidence in East Tennessee. In Proceedings of the Second Conference on Environmental Problems in Karst Terranes and their Solutions. Sponsored by NWWA, Nashville, Tennessee, November 17-18, 1988.

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R. R. Lee and R. H. Ketelle, Stratabound Pathways of Preferred Groundwater Flow: an Example from the Copper Ridge Dolomite in East Tennessee. In Proceedings: "Focus: Conference on Eastern Regional Groundwater Issues." Sponsored by National Water Well Association (NWWA), Burlington, Vermont, July 14-16, 1987.

E. C. Drumm, R. H. Ketelle, W. E. Manrod, and J. Ben-Hassine, Analysis of Plastic Soil in Contact with Cavitose Bedrock. Published in "Proceedings of ASCE Specialty Conference on Geotechnical Practice for Waste Disposal, 1987." Geotechnical Specialty Publication No. 13. June 15-17, 1987, Ann Arbor, Michigan.

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R. Blumberg, J. B. Cannon, G. S. Hill, R. H. Ketelle, D. W. Lee, and F. G. Pin, ""GCEP Waste Pathways Analysis Study," K/D-5375, Jannuary 1983.

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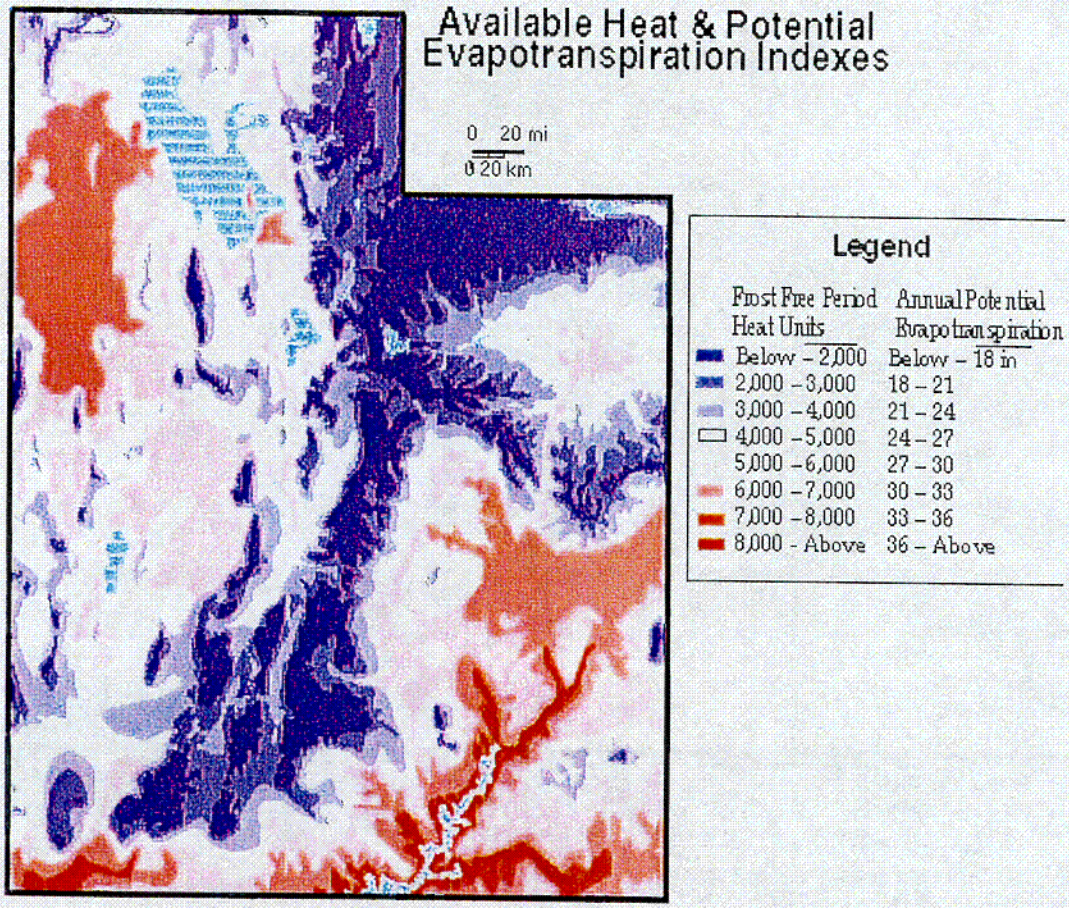
STAFF EXHIBIT F



Utah Water Atlas for
Potential Evapotranspiration

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