PNNL-13228

Evaluation of Elevated Tritium Levels in Groundwater Downgradient from the 618-11 Burial Ground

Phase I Investigation

P. E. Dresel R. M. Smith
B. A. Williams C. J. Thompson
J. C. Evans
Pacific Northwest National Laboratory

L. C. Hulstrom
CH2M Hill Hanford, Inc.

May 2000

Prepared for
the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830

Pacific Northwest National Laboratory
Richland, Washington 99352

Summary

This report describes the results of the preliminary investigation of elevated tritium in groundwater discovered near the 618-11 burial ground, located in the eastern part of the Hanford Site. Tritium in one well downgradient of the burial ground was detected at levels up to 8,140,000 pCi/L.

The 618-11 burial ground received a variety of radioactive waste from the 300 Area between 1962 and 1967. The burial ground covers 3.5 hectare (8.6 acre) and contains trenches, large diameter caissons, and vertical pipe storage units. The burial ground was stabilized with a native sediment covering. The Energy Northwest reactor complex was constructed immediately east of the burial ground.

The Phase I investigation consisted of sampling existing monitoring wells in the vicinity of the 618-11 burial ground. The sampling included wells upgradient of the burial ground, downgradient wells, Energy Northwest water supply wells, and Energy Northwest monitoring wells. The samples were analyzed for a variety of radionuclides and chemicals including water quality parameters and potential contaminants. Sampling was conducted in February 2000.

The Phase I investigation confirmed the elevated tritium levels in a single well downgradient of the burial ground. Other wells contained tritium at lower levels similar to levels in the plume emanating from the 200 East Area. The well with the elevated tritium contained no other contaminants at levels that could be clearly tied to a source in the burial ground. Constituents detected at elevated levels in the sampling area include nitrate, uranium, technetium-99, and carbon tetrachloride. Levels of technetium-99 and carbon tetrachloride were below the drinking water standards. The nitrate and uranium does not appear to be related to the 618-11 burial ground, based on the distributions and chemical correlations. Insufficient information is available to define the source of technetium-99, but it is a known contaminant within the plume from the 200 East Area.

The distribution of tritium points strongly to a probable source within the 618-11 burial ground. Other sources considered include the tritium plume from the 200 East Area and Energy Northwest operations. However, the tritium levels are too high to be explained by either of these sources. The distribution is inconsistent with the 200 East Area plume. Similarly, the high tritium is located upgradient of the Energy Northwest WNP-2 reactor, so known discharges from Energy Northwest are unlikely to be the source.

Potential tritium source materials and source locations within the 618-11 burial ground have not been identified. Possible source materials include fission products and activation products from nuclear operations. In particular, there is a possibility that the tritium is related to tritium production research carried out at the Hanford Site in the 1960s. Although that link has not been established, the hypothesis is consistent with what is known about the research and about burial ground operations.

The investigation did not define the extent of the elevated tritium levels in groundwater. The available data suggest the plume is narrow. Data on vertical extent of the contamination are sparse. No tritium was detected in the confined aquifer samples.

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1.0 Introduction

The 618-11 burial ground is located in the eastern part of the U.S. Department of Energy (DOE) Hanford Site (Figure 1.1). Groundwater monitoring well 699-13-3A was installed immediately downgradient of the 618-11 burial ground to determine if the burial ground had affected groundwater quality. A groundwater sample collected from this well in January 1999 contained 1,860,000 pCi/L of tritium.[1] A sample collected in January 2000 contained 8,140,000 pCi/L of tritium. After the January 2000 sampling, an investigation of the extent of tritium in this vicinity was initiated.

This report summarizes the results of Phase I of this investigation. Phase I consisted of sampling available wells in the vicinity of the burial ground for an extended group of constituents, interpretation of the sampling results, and an initial assessment of geologic, hydrologic, and historical data.

1.1 Site Description

The 618-11 burial ground received waste between March 1962 and December 1967 (Demiter and Greenhalgh 1997). The site consists of three trenches, two to five large-diameter caissons, and fifty vertical pipe storage units. The site covers an area of 3.5 hectare (8.6 acre) and is located approximately 300 m (1,000 ft) west of Energy Northwest Plant 2 (WNP-2). The trenches are 274.3 m (900 ft) long by 15.2 m (50 ft) wide. The vertical pipe units are five 208-L (55-gal) drums welded together end-to-end and are approximately 4.6 m (15 ft) long by 55.9 cm (22 in.) in diameter. The caissons are 2.4-m- (8-ft) diameter metal pipe, 3 m (10 ft) long, buried vertically 4.6 m (15 ft) below grade, connected to the surface by offset 91.4-cm- (36-in.) diameter pipe with a dome-type cap. All vertical pipe units and caissons were capped with concrete and covered with native sediment as they were filled.

Waste was sent to the 618-11 burial ground from the 324, 325 and 327 Building hot cells and the Plutonium Recycle Test Reactor in the 300 Area. Inventories of the waste do not specifically mention that tritium was disposed to the burial ground, though hydrogen gas (a possible misnomer) was identified.

Shortly after the site was closed, it was covered with 1.2 m (4 ft) of soil. In 1983, the surface of the site was stabilized with an additional 0.6 m (2 ft) of clean material and planted with wheatgrass. The bottoms of the trenches and caissons are estimated to be approximately 9.1 m (30 ft) below grade, while the bottoms of the vertical pipe units are estimated to be 6.4 m (21 ft) below grade. The site perimeter is fenced and marked with concrete markers. Plants in the area show no obvious signs of vegetative stress that would indicate radiological or chemical constituent uptake from either the waste site or the unplanned releases that have occurred at the site.

Groundwater contamination from the 200 East Area extends through the location of the 618-11 burial ground. Contamination from the 200 East Area consists predominantly of tritium with associated nitrate and iodine-129. However, near the burial ground the iodine-129 is generally below detection limits. An

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[1] In this report analytical results will be rounded to 3 significant digits.

area of anomalously low tritium has been noted east of the burial ground when compared to the surrounding plume from the 200 East Area (Figure 1.2).

The Energy Northwest reactor complex was constructed east of the 618-11 burial ground. The WNP-2 reactor initially went critical in January 1984 (Washington Public Power Supply System 1985). Construction was not completed on two other power plants, WNP-1 and WNP-4. Some tritium is produced during reactor operations by ternary fission. Several instances of release of tritium and other radionuclides to the environment have been documented (Washington State Department of Health 1999). Release locations include the WNP-2 Sanitary Waste Treatment Facility and the storm drain outfall.

The relationship of the tritium in groundwater to these three potential sources, the 618-11 burial ground, the 200 East Area, and WNP-2, is discussed in Section 4 of this report.

1.2 History of Site Investigations

In 1978, Pacific Northwest Laboratory conducted both geophysical surveys and core drilling and sampling near the 618-11 burial ground (Phillips et al. 1980). According to Phillips et al. wells "were located to enable drilling beneath the structure where radiocontaminated leachate, if present, would be intercepted, rather than drilling into the structure." Two soil samples were collected from depths of 8.8 and 9.4 m (29 and 31 ft). Gross alpha, gross beta, and other natural occurring radionuclides were reported to be within background range. A small concentration of cesium-137 (0.16 pCi/g) was found at a depth of 8.8 m (29 ft) but was not judged to be a concern.

An Environmental Impact Statement (EIS) was issued in 1987. The EIS analyzed the impact of strategies for the final disposal of high-level, transuranic, and tank waste generated during national defense activities and stored at the Hanford Site (DOE 1987). The EIS also evaluated waste that was disposed at the Hanford Site prior to 1970, before the transuranic category was established, that would otherwise be considered as transuranic if generated today. Because the 618-11 burial ground was used between 1962 and 1967 for disposal of laboratory waste (including remote-handled hot cell waste) from 300 Area operations, it was specifically included in the scope of the EIS under the classification of "pre-1970 Buried Suspect Transuranic-Contaminated Solid Wastes."

Several disposal alternatives were studied in the EIS (DOE 1987). Based on the conclusions of that study, a preferred alternative for deferral of disposal decisions pending additional development and evaluation was selected for the single-shell tanks, transuranic-contaminated soil sites, and the pre-1970 buried suspect transuranic-contaminated solid waste sites. Prior to decisions on final disposition of these wastes, alternatives would be analyzed in subsequent environmental documentation, including a supplement to the EIS. These decisions were documented in a corresponding Record of Decision (ROD) (53 FR 12449) and implementation plan (DOE-RL 1988). The EIS and associated ROD included one exception to the preferred alternative, the 618-11 burial ground. A decision was made to proceed with removal and processing of waste from the 618-11 burial ground based on

- its location outside of the 200 Area plateau
- concerns over a potential for flooding
- a DOE desire to consolidate the pre-1970 buried transuranic-contaminated waste to the 200 Area plateau at a reasonable cost.

In 1992, the U.S Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology) directed that an engineering evaluation/cost analysis be performed to consider Expedited Response Action (ERA) alternatives for the 618-11 burial ground. The evaluation analyzed options that included no action, increased monitoring, removal and monitored storage, and a demonstration/feasibility study. The proximity of buried waste to the water table in the area and the potential for migration of contaminants were of concern based on the limited information known about waste inventory.

Increased monitoring was the selected option as documented in the ERA proposal (DOE-RL 1993). A removal action was eliminated as an immediate need based on the absence of data to identify a threat to human health and the environment and the lack of operating facilities to receive, process, and/or dispose of excavated high-activity transuranic material. To support the ERA recommendation, a new well (699-13-3A) was installed in 1995 to monitor groundwater adjacent to the burial ground. Groundwater samples from this well were analyzed for radioactive and hazardous chemical constituents of concern on an annual basis.

Tritium was not identified as a constituent of concern for the burial ground, so it was not included in the analyte list until January 1999. No follow-on action was taken regarding the 1,860,000 pCi/L result from the January sampling (reported in May 1999) until January of 2000. The high tritium value from the January 1999 and January 2000 samples triggered an off normal event report, RL-PNNL-PNNLBOPER-2000-0003, submitted on February 3, 2000.

1.3 Hydrogeologic Setting

The 618-11 burial ground and the Energy Northwest nuclear power plant complex are constructed on suprabasalt sediments of Miocene to Pleistocene age (Figure 1.3). The stratigraphic column includes in ascending order from oldest to most recent, the Columbia River Basalt Group, Ringold Formation, and Hanford formation and Pre-Missoula gravel. In addition, a thin, regionally discontinuous veneer of Holocene alluvium and eolian sediment overlies the principal geologic units.

The information currently available to describe the hydrogeology of the area is regional in nature and does not provide the details necessary to delineate and accurately predict groundwater flow conditions near the WNP-2 plant and 618-11 burial ground. Lindsey (1995) describes the regional geology of the Hanford Site. The hydrogeologic description of the Hanford Site is provided in Hartman (2000).

The suprabasalt sediments are the hydrogeologically most significant units in terms of contaminant transport beneath the area because these units form the uppermost aquifer system. This aquifer system is the primary groundwater contaminant pathway to the Columbia River. The upper aquifer system consists of an upper unconfined aquifer and deeper confining to semi-confining aquifer conditions. The Elephant Mountain Member basalt forms the bottom of this uppermost aquifer system and is located at a depth greater than 150 m (500 ft) beneath the surface. Confined aquifer conditions exist beneath the Elephant Mountain Member basalt. The confined aquifer system is used for water supply at WNP-1 (two wells) and for emergency supply at WNP-2 (one well). Information obtained from well drilling records, and in recent water-level measurements, confirm that the basalt-confined aquifers have a higher water level (potentiometric surface) than the uppermost unconfined aquifer, resulting in upward flow if any leakage occurs between the two aquifers. This condition significantly reduces the possibility of a downward movement of tritium into the lower, deeper confined aquifer.

The Pliocene-age Ringold Formation, which overlays the Elephant Mountain Member basalt, is composed of a mix of variably cemented and consolidated gravel, sand, silt and clay. Overlying the Ringold Formation is the Hanford formation and pre-Missoula Gravel.

The Hanford formation units consist of mostly unconsolidated gravel, sand, and silt. Fluvial pre-Missoula (flood) gravel underlies the Hanford formation in some areas of the Hanford Site. The pre-Missoula gravel is difficult to distinguish from Hanford gravel and is commonly grouped together.

Hydraulic data have not been evaluated for this report. However, comparisons of aquifer testing data and well completion pumping results from similar lithologies west of the burial ground indicate that the Hanford formation is significantly higher in permeability (possibly by several orders of magnitude) than the underlying Ringold Formation sediment.

An accurate structure map of the Ringold Formation is key to understanding groundwater and tritium flow paths to the river because of the differences in permeability between the Ringold Formation and the Hanford formation sediment. The geologic unit at the water table varies from Hanford/pre-Missoula to Ringold Formation in the vicinity of the 618-11 burial ground because of structural features created on the top of the Ringold Formation by cataclysmic flooding, fluvial reworking, and erosion by the Columbia River. Areas where saturated Hanford formation sediments are thin or absent are expected to provide barriers to flow or to significantly decrease groundwater velocity.

In most of the area west and north of the 618-11 burial ground, the Ringold Formation sediments lie saturated beneath the present day water table. Most of the tritium (and associated contaminants) from the 200 East Area is presumed to be moving within the Hanford/Pre-Missoula sediments (Figure 1.4). Ringold Formation sediments are interpreted to be above the water table in the area east of the 618-11 burial ground. Limited data suggest that these Ringold Formation sediments may be exposed above the water table east of the burial ground to the river. The areal extent of this Ringold exposure is not accurately known but has been confirmed by outcrop evaluation along the river and in examination of excavations and drill cuttings during WNP-2 plant construction.

The water table surrounding the 618-11 burial ground has been elevated over 4.6 m (15 ft) due to years of large volume artificial recharge to the aquifer in the 200 Areas located west of the site. Early water-level measurements are available from wells drilled in the 1950s. It is presumed that these old water-level measurements reflect a more regionally stable and natural condition that stabilized near the top of the Ringold Formation contact with the overlying Hanford/Pre-Missoula gravel and sand sequences. It is assumed this condition existed because the water table could not be sustained above this contact unless there was a significant flux in recharge, such as that which resulted from Hanford Site operations.

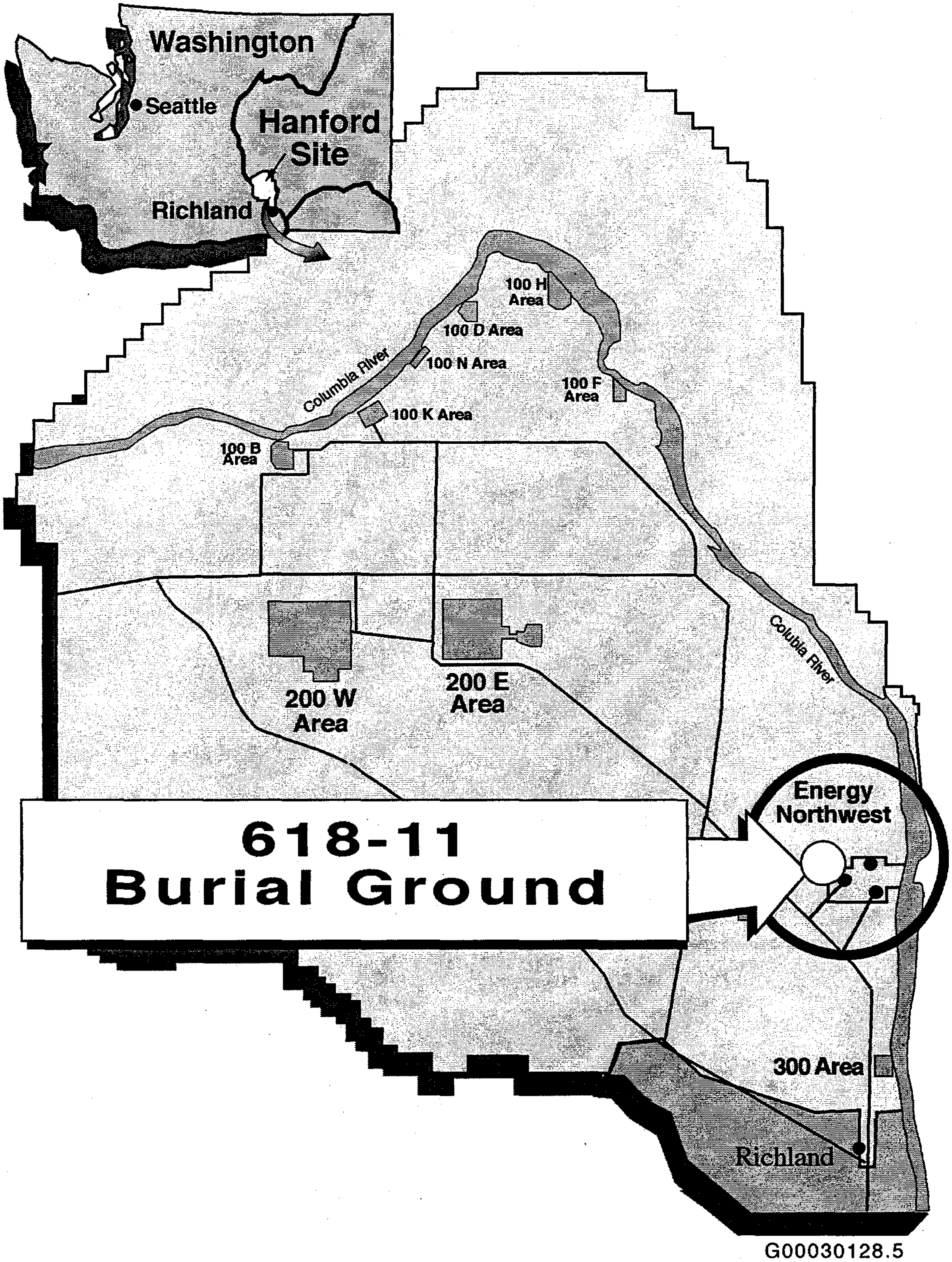

Figure 1.1. Location of the 618-11 Burial Ground, Hanford Site, Washington

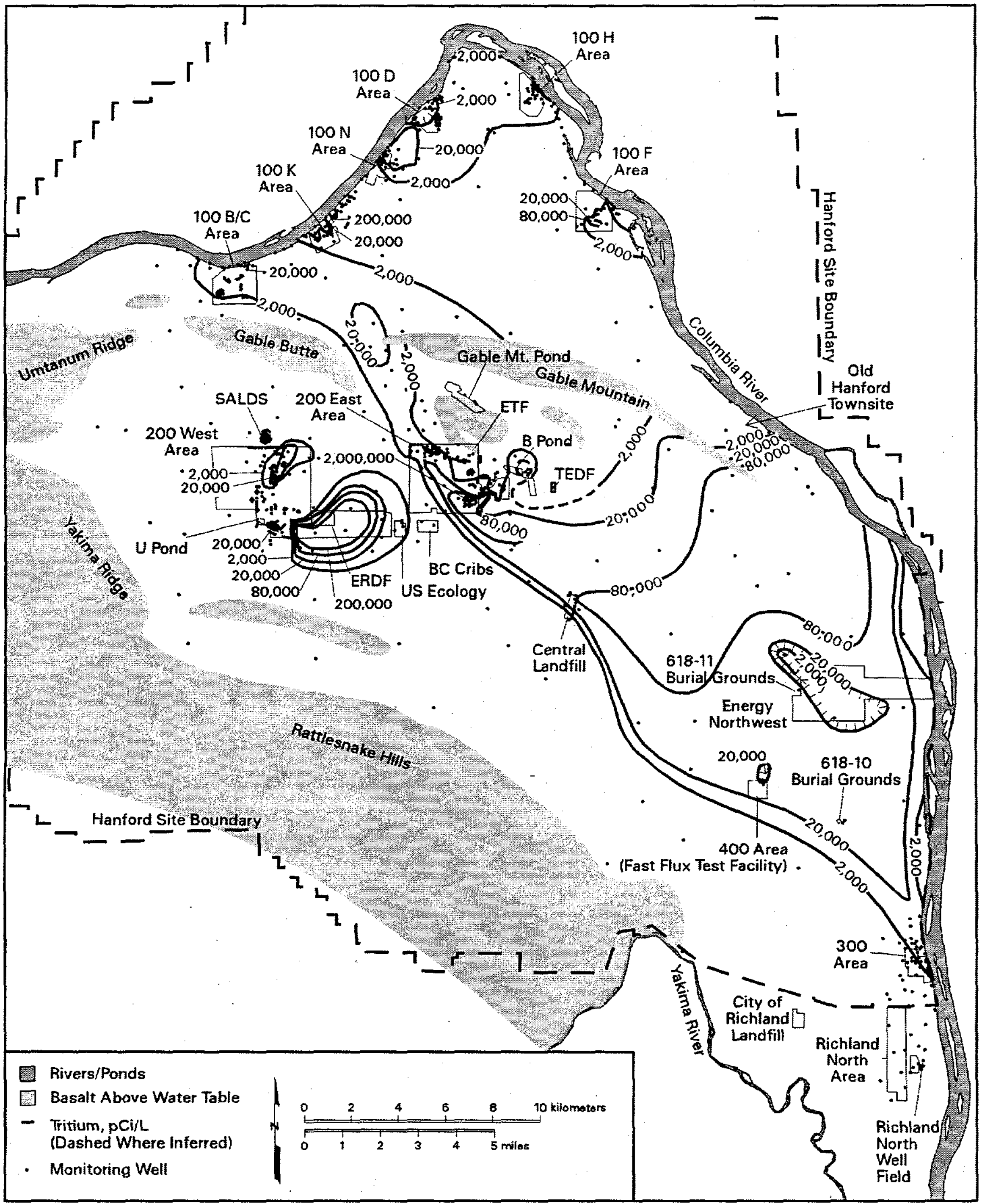

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Figure 1.2. Tritium Concentrations at the Top of the Unconfined Aquifer, Hanford Site, Fiscal Year 1999

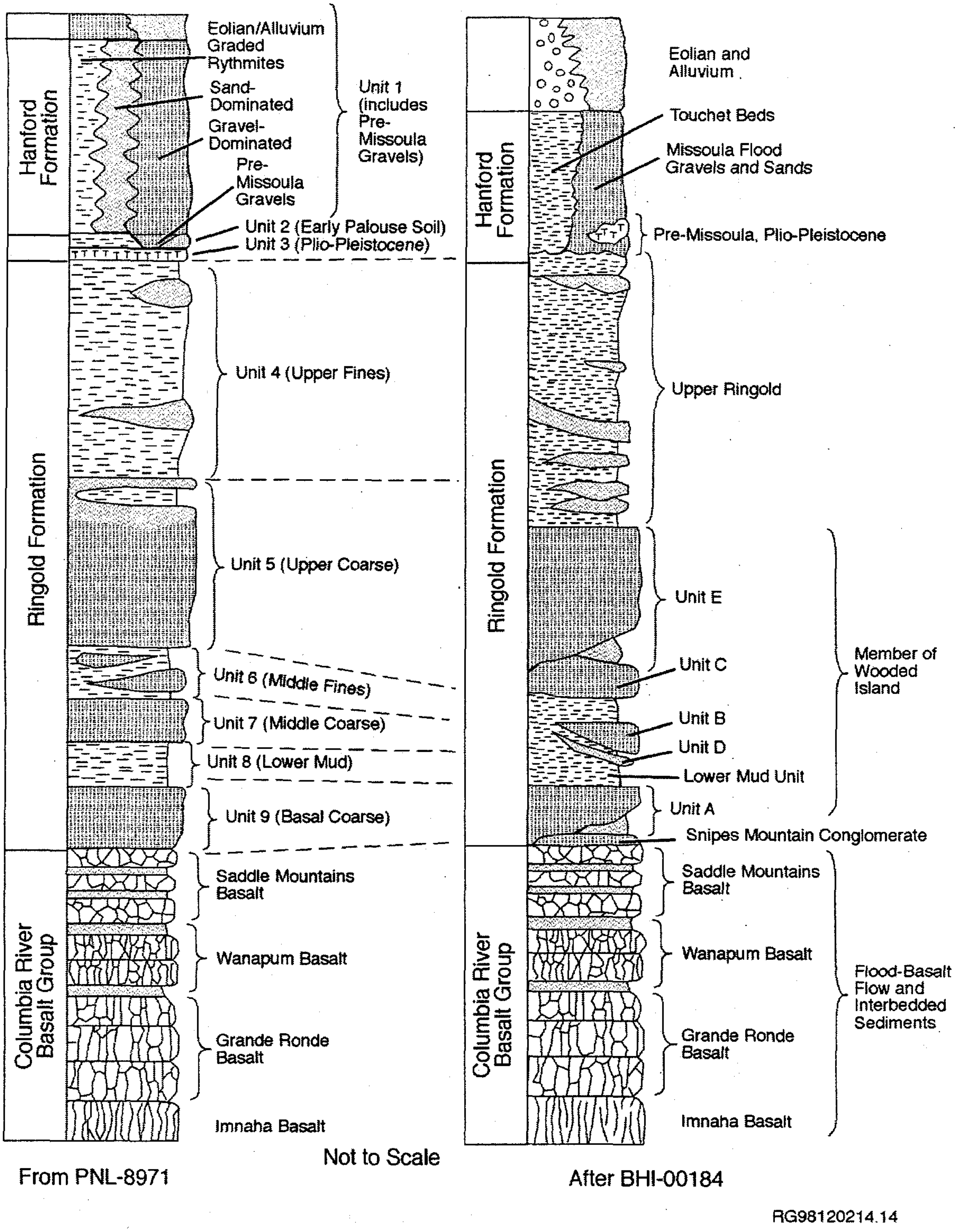

Figure 1.3. Generalized Hydrogeologic and Geologic Stratigraphy

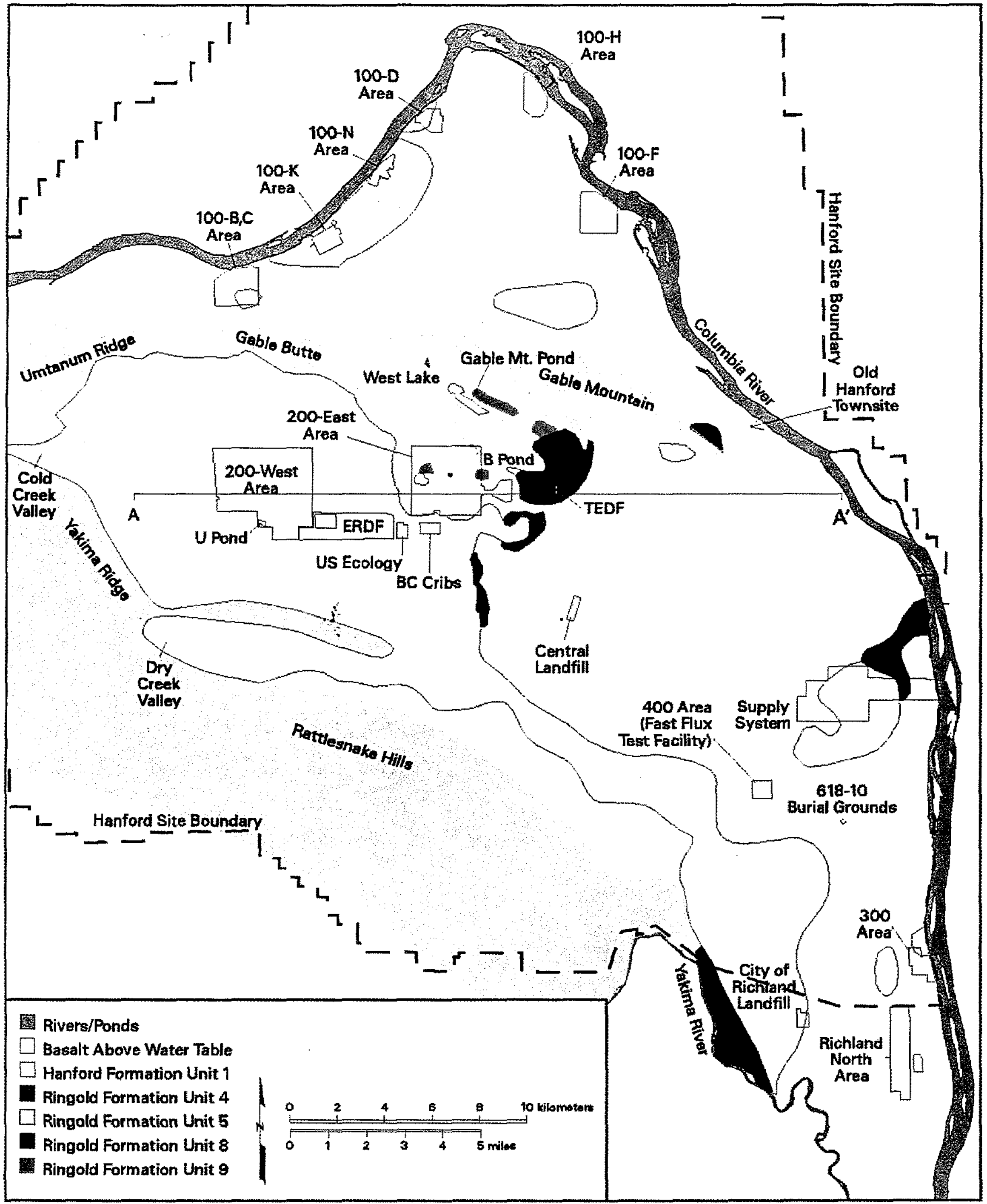

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Figure 1.4. Hydrologic Units Present at the Water Table, 1998

2.0 Phase I Sampling and Analysis

The *Sample and Analysis Instructions for Special Sampling of High Concentration Tritium and Surrounding Wells Near the 618-11 Burial Ground, Revision 1*, outlined the plan for this Phase I investigation (Appendix A). These instructions were based on a statement of data quality objectives that are included in the instructions.

The problem statement for the Data Quality Objectives is:

> "In January 1999 a tritium level of 1,860,000 pCi/L was detected in well 699-13-3A, located near the 618-11 burial ground, just west of the Energy Northwest complex. This value was confirmed by reanalysis. A sample from January 2000 contained approximately 8,000,000 pCi/L of tritium. These levels are of concern because they are far above levels reported in the large tritium plume that extends from the 200 East Area through the area of the Energy Northwest complex.
>
> The immediate task is to determine the extent of the anomalously high tritium concentrations and to provide data to distinguish the source."

2.1 Sampling Design

The Phase I investigation was designed to provide pertinent information as rapidly as was practicable. The investigation was restricted to sampling existing groundwater monitoring wells in the vicinity of the burial ground. Wells that needed significant remediation prior to sampling were excluded from the sampling. Phase I was restricted to a single round of sampling. The sampling concentrated on wells completed at the top of the unconfined aquifer, but some additional wells, including some confined aquifer wells, were included. Wells chosen for sampling are listed in Appendix A. Several of the wells could not be sampled as discussed in Section 2.2. The wells actually sampled are listed in Table 2.1 and are shown on Figure 2.1. The wells sampled include monitoring and water supply wells owned by Energy Northwest. These wells have not yet been assigned Hanford well names (i.e., "699" numbers), but unique well ID numbers have been assigned, corresponding to the Hanford well inventory. In this report, the well ID numbers and names used by Energy Northwest will be used to describe the wells. For example, Energy Northwest monitoring well MW-9 is associated with well ID C3079.

Radioactive analytes of interest include

- tritium
- strontium-90
- technetium-99
- iodine-129
- plutonium isotopes

- gamma scan (reported radionuclides include beryllium-7, potassium-40, cobalt-60, ruthenium-106, antimony-125, cesium-134, cesium-137, europium-152, europium-154, and europium-155)
- gross alpha
- gross beta
- uranium (total and isotopic)
- plutonium isotopes (plutonium-238, plutonium-239/240).

Total activity screens were measured on a sample from well 699-13-3A where previous data indicated that the activity was near or above the Department of Transportation Shipping Limits for radionuclides and, thus, required special shipping papers. Total activity screens were also collected on wells where insufficient data were available to determine if the samples would need to be shipped as radioactive.

Chemical analytes of interest include

- alkalinity
- anions (including bromide, chloride, nitrate, and sulfate)
- filtered metals (including major cations such as calcium, magnesium, potassium, sodium, contaminants of interest such as chromium and other metals)
- semivolatile organic compounds (including tributyl phosphate and other compounds).
- volatile organic compounds (including carbon tetrachloride, trichloroethene, and other compounds).

Field parameters pH, specific conductance, temperature, and turbidity were measured in all wells at the time of sampling.

The analytes for each well in the Phase I sampling are listed in the Sampling and Analysis Instructions (see Appendix A). The analyte list depended on the proximity to the burial ground, the monitored interval, and historical information from the wells. Only wells in the immediate vicinity of the 618-11 burial ground were sampled for volatile and semivolatile organic compounds. Plutonium isotopes, strontium-90, and total uranium were analyzed only in selected wells. Confined aquifer wells were sampled only for tritium.

Analysis of radiological constituents was performed by Quanterra Analytical Services, Richland Washington. A split sample from well 699-13-3A was sent to Thermo NUtech Laboratories, Richmond California, for tritium analysis. Chemical analyses were performed by Quanterra Analytical Services, St. Louis, Missouri. All analyses for well 699-13-3A were requested on a priority 7-day turn around time. Tritium analyses from other wells were requested on a 7-day turn around time and remaining analyses on a 14-day turn around time. In actuality, these turn around times were not met for all analyses as discussed in the following sections. Total activity screens were measured at the Waste Sampling and Characterization Facility laboratory on the Hanford Site and were reported in less than 24 hours.

Additional radiological analyses were performed by Pacific Northwest National Laboratory. Screening sampling of strontium-90 and technetium-99 was performed using extraction with Empore® disks followed by gas proportional counting. In addition, technetium-99 was measured using inductively coupled plasma/mass spectrometry (ICP/MS) because of disagreement between the different technetium-99 measurements and the gross beta measurements.

Several other groups collected split samples for independent analysis. These included Energy Northwest (tritium only), Washington State Department of Health, and Washington State Department of Ecology.

2.2 Sampling Activities

The sampling and analysis instructions were issued on Friday, February 4, 2000. Sampling began on Monday, February 7, 2000. The Phase I sampling was completed on February 15, 2000. Field records for the sampling were completed on Groundwater Sampling Report forms, which are included as Appendix B of this report.

The original sampling instructions listed 27 wells to be sampled, of which 22 wells actually were sampled. It was discovered that well 699-12-2A no longer exists. Well 699-14-E6T could not be sampled because of an obstruction. Wells 699-2-E14 and 699-15-E13 are confined aquifer wells that would require modification to collect representative samples. Therefore, they were removed from the Phase I sampling. Well 699-20-E12 was not sampled for several reasons. The annulus of the well was considered difficult or impossible to sample because of the presence of several piezometers. The uppermost piezometer had been removed, and, therefore, could not be sampled. The well was listed as requiring containment of purgewater, but the access road was not suitable for a purgewater truck. For these reasons, well 699-20-E12 was deleted from the Phase I sampling.

The results of the total activity screens for the sampling are listed in Appendix C. The only samples that required shipping as radioactive material (greater than 2.0 nCi/g or 2,000,000 pCi/L) were the samples from well 699-13-3A. The total activity screens also provide a useful comparison to laboratory results discussed in Section 3.

It is likely that decontamination water was left in the 90 m (300 ft) pump tubing attached to the portable pump during sampling of Energy Northwest well MW-7 (C3077). The specific conductance measured was low compared to that expected for groundwater samples. This well is located downgradient from a storm-water discharge that could have some impact on the specific conductance, but it is not felt that this would explain the unusual chemistry. For this reason, all data from sampling well MW-7 are considered suspect. Energy Northwest well MW-9 (C3079) is located upgradient of the storm-water discharge and closer to the 618-11 burial ground, so the data from MW-7 are not critical to the Phase I analysis.

Table 2.1. Wells Sampled During the Phase I Sampling Event

Well	Location	Pump Type	Casing/ Screen Diameter (in.)	Open Interval Top (ft BGS)	Open Interval Bottom (ft BGS)	Hydrogeologic Interval	Comments
699-10-E12	Near River	Electric Submersible	8	60	75.9	Top unconfined	Perforated casing
699-12-4D	At burial ground (upgradient)	Electric Submersible	8	65	145	Top unconfined	Perforated casing
699-13-1A	Former WNP-2 Supply Well	Portable Grundfos	8	79	199.5	Unconfined	Multiple screens
699-13-1B	Former WNP-2 Supply Well	Portable Grundfos	8	83	229.5	Unconfined	Multiple screens
699-13-1C	WNP-2 Backup Supply Well	Turbine	6	506	695	Confined	3 Screens set in open hole
699-13-3A	At burial ground (downgradient)	Portable Grundfos	4	55.94	76.28	Top unconfined	
699-15-15B	Upgradient	Electric Submersible	6	141	154.7	Top unconfined	
699-17-5	Upgradient	Electric Submersible	8	45	62.5	Top unconfined	Perforated casing
699-21-6	Upgradient	Electric Submersible	6	43	66	Top unconfined	Screen inside perforated casing
699-8-17	Upgradient	Electric Submersible	8	109	139.3	Top unconfined	Screen inside perforated casing
699-9-E2	Energy Northwest	Electric Submersible	8	15	60	Top unconfined	Perforated casing
ENW-31	WNP-1 Supply Well	Turbine	12	247	341.5	Confined	Multiple screens
ENW-32	WNP-2 Supply Well	Turbine	12	244.25	366	Confined	Multiple screens
ENW-MW1	Energy Northwest	Portable Grundfos	2	57.05	67.05	Top unconfined	
ENW-MW2	Energy Northwest	Portable Grundfos	2	55.00	65.00	Top unconfined	
ENW-MW3	Energy Northwest	Portable Grundfos	2	49.05	59.05	Top unconfined	
ENW-MW4	Energy Northwest	Portable Grundfos	2	63.50	73.50	Top unconfined	
ENW-MW5	Energy Northwest	Portable Grundfos	2	60.02	75.02	Top unconfined	
ENW-MW6	Energy Northwest	Portable Grundfos	2	36.37	46.37	Top unconfined	
ENW-MW7	Energy Northwest	Portable Grundfos	2	17.66	27.66	Top unconfined	
ENW-MW8	Energy Northwest	Portable Grundfos	2	25.17	35.17	Top unconfined	
ENW-MW9	Energy Northwest	Portable Grundfos	2	26.85	36.85	Top unconfined	

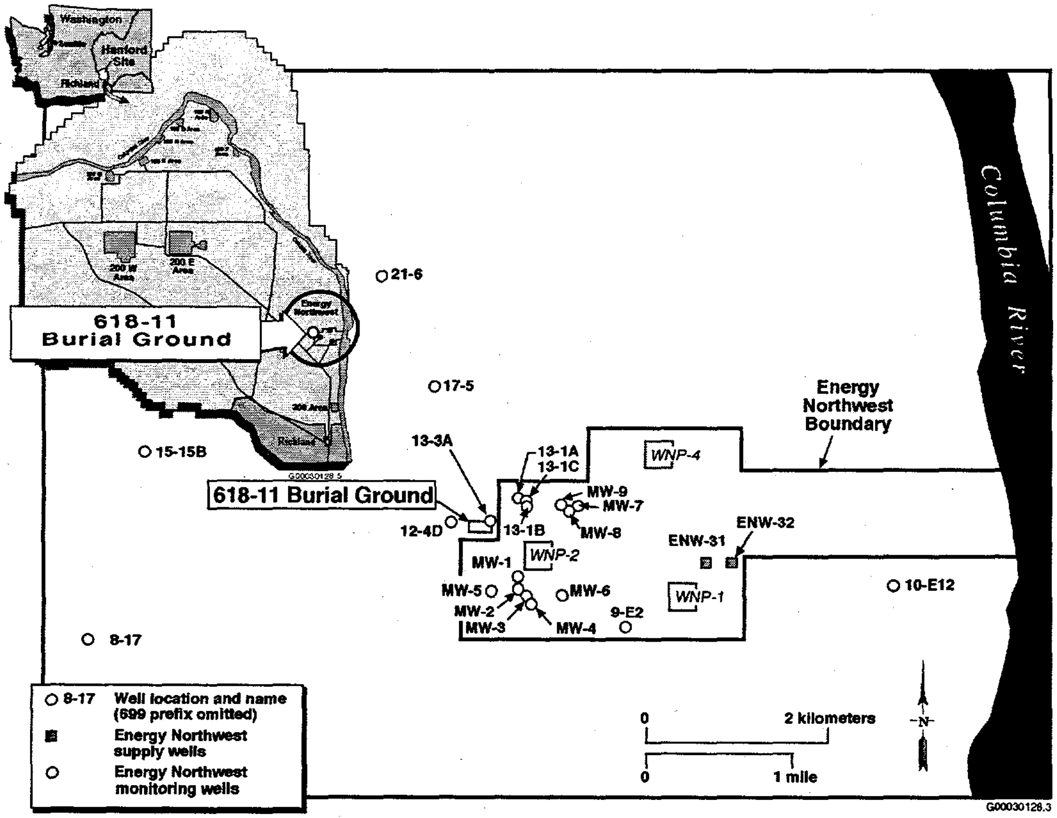

Figure 2.1. Groundwater Well Locations in the Vicinity of the 618-11 Burial Ground

3.0 Results of Phase I Sampling

Analytical results for the Phase I sampling are tabulated in Appendix C. These results must be considered preliminary because not all formal data packages were received from the laboratory at the time this report was prepared. Well 699-13-3A continued to have elevated tritium compared to the surrounding 600 Area at 7,229,700 pCi/L (a replicate analysis indicated 6,894,100 pCi/L of tritium). Tritium levels in other wells are all less than 60,000 pCi/L. This means that well 699-13-3A remains the primary focus of the investigation. The results of radionuclide sampling will be summarized first. Then the results of the chemical constituent sampling will be described. Only the primary result will be discussed where replicate analyses are available unless there is a significant difference between replicates.

3.1 Radionuclide Results

3.1.1 Tritium

Tritium results are shown in Figure 3.1. As stated above, well 699-13-3A was the only well with extremely high tritium results (7,230,000 pCi/L). The maximum concentration detected in the other wells in this sampling event was 54,400 pCi/L in well 699-8-17, which is located upgradient of the 618-11 burial ground.

Well 699-12-4D, located immediately upgradient of the burial ground, contained only 1,850 pCi/L of tritium. Well 699-12-4D is an older well, with perforated casing, that extends 28 m (92 ft) below the water table. Thus, the sample may be subject to some dilution by mixing in the borehole.

Other wells that are located upgradient or cross-gradient from the 618-11 burial ground include wells 699-8-17, 699-15-15B, 699-17-5, and 699-21-6. These wells are not believed to be effected by any potential release from the burial ground because of their location. Therefore, they provide information on the regional tritium plume. Tritium concentrations in these wells ranged from non-detect up to 54,400 pCi/L. Although these data bound the regional plume concentrations, the rather large variation complicates detailed interpretation.

The nearest wells downgradient of well 699-13-3A are wells 699-13-1A, 699-13-1B, and 699-13-1C. Well 699-13-1A contained the highest tritium levels of the group, 23,300 pCi/L, while tritium was barely detected in well 699-13-1B at 300 pCi/L. Tritium was not detected in well 699-13-3C, which is completed in the uppermost basalt-confined aquifer. These wells were drilled as water supply wells and do not represent conditions at the top of the aquifer. Wells 699-13-1A and 699-13-1B have multiple open intervals, none across the water table. These wells were sampled with a portable pump. The pump was set in the middle of the uppermost screen. The great difference in tritium concentrations between wells 699-13-1A and 699-13-1B suggests that the samples came predominantly from different intervals.

Tritium concentrations in monitoring wells located near WNP-2 ranged up to 14,100 pCi/L. These monitoring wells are roughly downgradient from the 618-11 burial ground.

Wells currently designated ENW-31 (C3080) and ENW-32 (C3081) are water supply wells for WNP-1 that are completed in the uppermost basalt confined aquifer. Tritium was not detected in these wells.

Well 699-10-E12 is located approximately downgradient of the 618-11 burial ground and roughly 1.5 km (0.9 mi) from the Columbia River. It contained 23,200 pCi/L of tritium, within the range of values for upgradient wells.

3.1.2 Uranium and Gross Alpha

The only radionuclides other than tritium detected in well 699-13-3A were uranium, technetium-99, gross alpha, and gross beta (see Appendix C). The gross alpha measurements agree with the uranium isotopic measurements with the possible exception of Energy Northwest well MW-1 (C3071) where the total uranium concentration was over 5 pCi/L greater than the gross alpha concentration (Table 3.1). Thus, the uranium is the only significant alpha emitter in the groundwater. The uranium isotopic data can be compared to the total uranium measurements by converting the individual isotope activity-concentration to mass concentration using the specific activity of the isotopes. The sum of the isotopic mass is in agreement with the measured uranium concentrations where both analyses were performed.

The calculated uranium concentrations are shown in Figure 3.2. Uranium concentrations were greater than the proposed maximum contaminant level of 20 μg/L in monitoring wells Energy Northwest wells MW-2 (C3072), MW-3 (C3073), and MW-9 (C3079). The uranium concentration in well 699-13-3A was measured at 10.3 μg/L and calculated from the individual isotopes to be 10.7 μg/L. This value is somewhat higher than the immediately upgradient well 699-12-4D, where the calculated concentration is 5.7 μg/L but well within the range of data from surrounding wells. The uranium concentration in well 699-13-3A is comparable to previous results (Figure 3.3). The gross alpha measurements are also similar to previous results (Figure 3.4).

The cause of elevated uranium in groundwater in the study area is unclear. The concentrations are spatially variable and do not form distinct plumes. There is no obvious relationship to the 618-11 burial ground or any other potential source.

The uranium concentrations in these samples are generally too low to develop an isotopic signature from the activity ratios. This is particularly true of the uranium-235, which was below the detection limit for several samples. It is possible to measure more precise isotopic ratios using other techniques.

3.1.3 Gross Beta, Technetium-99, and Strontium-90

Strontium-89 and strontium-90 were not detected in the total-beta radiostrontium analyses from any of the samples. Technetium-99 is a low energy beta emitter, so it is undercounted in the gross beta measurements. The energy of the technetium-99 beta is only 0.294 MeV compared to 0.546 MeV for strontium-90 and 2.281 MeV for yttrium-90, a short lived daughter of strontium-90. At the Hanford Site, a rule of thumb is that a gross beta measurement will be approximately one-third of the technetium-99 concentration where technetium-99 is the major beta-emitter present.

Technetium-99 results reported by the primary analytical laboratory for well 699-13-3A are considered suspect because they do not agree with the gross beta measurements and the results do not agree with technetium-99 measurements reported using different methods by Pacific Northwest National Laboratory. The primary analytical laboratory reported 18,600 pCi/L of technetium-99 with a duplicate value of 13,600 pCi/L, compared to the gross beta measurement of 15 pCi/L with a duplicate value of 20.8 pCi/L. The technetium-99 concentration of 54.5 pCi/L (by the Empore disk measurement at Pacific Northwest National Laboratory) is in agreement with the gross beta measurement. Additional technetium-99 measurements were made at Pacific Northwest National Laboratory using inductively-coupled plasma/mass spectrometry because of the discrepancies between other analyses. The inductively-coupled plasma/mass spectrometry results were 0.004 µg/L with a duplicate of 0.005 µg/L that correspond to 68 pCi/L and 85 pCi/L respectively. These results confirm the Empore disk measurements but are less precise because the results were near the detection limits (approximately 0.001 µg/L). The inductively-coupled plasma/mass spectrometry analysis was performed on filtered samples rather than the standard unfiltered samples because there was insufficient unfiltered samples remaining for analysis. The primary analytical laboratory results are being investigated, and it appears that the tritium may have interfered with the measurement. The conclusion is that there are no major beta-emitting radionuclides that were not included in the analyte list.

Gross beta results from the February 2000 sampling of well 699-13-3A were considerably lower than results from the preceding sampling. Concentrations of gross beta had risen in this well, reaching 36.6 pCi/L in January 2000. However, the February result was 15.0 pCi/L with a duplicate sample reported as 20.8 pCi/L (Figure 3.5). The reason for this decline is unclear, as is the reason for the previously increasing trend. It is possible that the pump was placed at a different depth in the February sample and resulted in changes in concentration. However, the drop in gross beta is proportionally greater than the drop in tritium concentration. Tritium is not detected in the gross beta measurement because the gross beta sample is first evaporated onto a planchet.

3.1.4 Other Radionuclides

No radionuclides were detected in the gamma-scan from any of the wells. Gamma-emitting radionuclides reported as non-detect include beryllium-7, potassium-40, cobalt-60, ruthenium-106, antimony-125, cesium-134, cesium-137, europium-152, europium-154, and europium-155. Other radionuclides would be reported if detected.

Iodine-129 was not detected in any of the samples. Even the wells upgradient of the 618-11 burial ground are outside the area of the detectable iodine-129 plume from 200 East Area so this is not unexpected.

Plutonium isotopes were not detected in any of the samples.

3.2 Chemical Results

Anion, filtered metal, and alkalinity measurements were made at all wells sampled in February 2000. Volatile organic compounds and semivolatile organic compounds were measured in wells 699-12-4D, 699-13-1A, 699-13-3A, and 699-10-E12. The charge balance calculated from the anion, major cations, and alkalinity was within 6% with the exception of Energy Northwest well MW-7 (C3077), which had a charge balance of -13.55%. As discussed in Section 2.2, the data from this well are suspect due to incomplete purging of decontamination rinse from the pump tubing.

3.2.1 Nitrate

The nitrate distribution in the vicinity of the 618-11 burial ground is shown in Figure 3.6. The highest nitrate concentration detected was 32.5 mg/L (as N) in Energy Northwest monitoring well MW-9 (C3079). The drinking water standard maximum contaminant level for nitrate is 10 mg/L as N. The nitrate concentration in well 699-13-3A was also over twice the maximum contaminant level at 22.8 mg/L as N. Well 699-17-5, located north of the burial ground also contained nitrate at levels above the maximum contaminant level (16.4 mg/L as N). Thus the nitrate contamination is relatively widespread and does not correspond to the tritium contamination. Monitoring well 699-12-4D, located west (upgradient) of the 618-11 burial ground contained 6.3 mg/L (as N) nitrate, a much lower concentration than well 699-13-3A.

3.2.2 Other Anions

Traces of nitrite were detected in wells 699-17-5 (0.097 mg/L as N) and 699-21-6 (0.044 mg/L as N). The presence of nitrite indicates slightly reducing conditions in these wells. The nitrite is less than the maximum contaminant level of 1 mg/L and appears unrelated to the high tritium concentration in well 699-13-3A. Nitrite was not detected in the other wells sampled.

Sulfate was detected at 259 mg/L in Energy Northwest monitoring well MW-9 (C3079), a level slightly above the 250 mg/L secondary maximum contaminant level. Sulfate varied greatly throughout the study area, ranging from 2 mg/L in uppermost basalt-confined aquifer well 699-13-1C, to the 259 mg/L in Energy Northwest well MW-9 (C3079).

3.2.3 Cations

No metals were detected at levels above primary maximum contaminant levels. All metal analyses were performed on samples filtered through 0.45 µm filters in the field. Aluminum was detected at an extremely high level of 1,060 µg/L in well 699-13-1A. It is not plausible that aluminum at this level is present in solution at the sample pH of 8.06, so this result is considered suspect. This aluminum level is greater than the secondary maximum contaminant level.

Iron was detected in well 699-21-6 at 378 µg/L, above the secondary maximum contaminant level of 300 µg/L. Manganese in well 699-21-6 was also slightly above the 50 µg/L secondary maximum contaminant level at 50.1 µg/L. The only other well with concentrations of manganese above the secondary maximum contaminant level was well 699-13-1B with 94.2 µg/L. The manganese concentration in well

699-13-1A was slightly below the secondary maximum contaminant level at 49.2 μg/L. The presence of iron and manganese may be related to slightly reducing conditions because the solubility is greater under reducing conditions.

3.2.4 Major Ion Water Types

The relationships between the major ions in groundwater are commonly used to distinguish waters of distinct geochemical types and to infer the history and evolution of groundwater chemistry. The Piper diagram is one method used to graph the relationships between cations and anions in groundwater (Piper 1944). The Piper diagram illustrates the relative proportion of cations and of anions (in milliequivalents per liter).

A Piper diagram for the samples analyzed in the Phase I investigation is shown in Figure 3.7. On this figure the black circles are samples from the top of the unconfined aquifer, except for well 699-13-3A, which is shown in red for emphasis. The samples from deeper in the unconfined aquifer (former water supply wells 699-13-1A and 699-13-1B) are shown in blue, and samples from the confined aquifer (former water supply well 699-13-1C and Energy Northwest water supply wells at WNP-1, ENW-31 (C3080) and ENW-32 (C3081) are shown in green.

The diagram shows a distinct difference among the three intervals, particularly with regard to the cations. The samples from the top of the unconfined aquifer are dominated by calcium with approximately equal proportions of sodium and magnesium. The confined aquifer samples are dominated by sodium with lesser amounts of calcium and magnesium. The samples from deeper in the unconfined aquifer are intermediate in composition between the top of the unconfined and the confined aquifer.

Nearly all the samples contain bicarbonate as the major anion (nitrate is not considered in the Piper diagram presented in Figure 3.7). Carbonate is insignificant at the pH of the samples. The confined aquifer, deeper unconfined aquifer, and some samples from the top of the unconfined aquifer contain over 80 % bicarbonate. The samples from the top of the unconfined aquifer show considerable variation in the proportion of sulfate and bicarbonate present with only minor variation in the chloride. If nitrate is included in the Piper diagram by combining it with chloride, then the samples from the top of the unconfined aquifer scatter more with respect to anions (Figure 3.8). Well 699-13-3A has an elevated proportion of chloride plus nitrate relative to most samples.

Multivariate plots (also called spider diagrams or radar diagrams) provide an alternate way to compare groundwater chemistry between wells. An advantage of spider diagrams is that they can include as many individual ions as required. They can be plotted in absolute concentrations or as percents of the total. A disadvantage is that they can become quite complicated if many wells are included.

The spider diagram shown in Figure 3.9 illustrates several distinct ratios of anions in unconfined aquifer wells near the 618-11 burial ground. Wells 699-12-4D and Energy Northwest well MW-1 (C3071) are typical of most wells in the area, with high bicarbonate and low sulfate, nitrate, and chloride. Energy Northwest well MW-2 (C3072) is unique because it has somewhat elevated chloride. Energy Northwest well MW-9 (C3079) contains a distinctly high proportion of sulfate and nitrate, unlike any other wells sampled. The high sulfate raises questions regarding the relationship between elevated nitrate concentrations seen in well 699-13-3A and Energy Northwest well MW-9 (C3079). The ratio of the anions in well 699-13-3A is nearly identical to the ratio in well 699-17-7, located to the north suggesting a similar origin unrelated to the 618-11 burial ground.

3.2.5 Organic Constituents

Organic constituents were measured in selected wells during the Phase I sampling and analysis. The samples measured for Appendix IX list volatile and semivolatile organic constituents are well 699-12-4D, located immediately upgradient of the burial ground, well 699-13-3A, immediately downgradient of the burial ground, well 699-13-1A, a former water supply well, and well 699-10-E12, located several kilometers downgradient of the burial ground (see Figure 2.1).

Methylene chloride was detected in both samples from well 699-13-3A at a concentration of 3 to 3.4 µg/L. However, contamination was detected also in the laboratory blanks associated with these samples. A trace of methylene chloride, 0.68 µg/L, was detected also in the sample from well 699-13-1A. The maximum contaminant level for methylene chloride (dichloromethane) is 5 µg/L. Methylene chloride was detected in several field transfer and equipment blanks. Laboratory contamination is suspected because methylene chloride is a common laboratory contaminant.

Traces of carbon tetrachloride, 0.24 µg/L, were detected in the duplicate samples from well 699-13-3A. Trichloroethene was detected in one of the two duplicates at a level of 0.32 µg/L. Trichloroethene was also detected at a level of 0.21 µg/L in an equipment blank associated with this well.

Chlorobenzene was detected at 0.41 µg/L in well 699-12-4D. This value is near the method detection limit. The MCL for chlorobenzene is 100 µg/L.

The only semivolatile constituent identified in the samples was a detection of an estimated 1.4 µg/L of bis(2-ethylhexyl) phthalate in one of the duplicates from well 699-13-3A. The compound bis(2-ethylhexyl) phthalate is considered to be a common laboratory contaminant.

3.3 Quality Control

Quality control data for the 618-11 burial ground investigation includes the results from field blanks, field duplicates, split samples, and several types of laboratory-generated quality control samples. These latter samples include method blanks, laboratory control standards, matrix duplicates, matrix spikes, and matrix spike duplicates. Definitions of the different types of quality control samples are provided in Appendix D. This discussion focuses mainly on the field quality control results; however, a brief summary of the laboratory quality control data is provided near the end of this section.

Table 3.2 lists the number and types of field quality control samples that were collected for the Phase I investigation. Three types of field blanks were included to check for contamination resulting from field activities and/or bottle preparation. Two field duplicates were collected to provide a measure of the overall sampling and analysis precision. A split sample was also collected for additional confirmation of previous elevated tritium results from well 699-13-3A.

A total of 208 results were generated from the field blanks. Forty-nine results were above the detection limits, and 32 results were greater than the quality control limit for field blanks (generally 2 times the method detection limit for chemistry methods and 2 times the total propagated uncertainty for radiochemistry methods). Except for one potassium-40 result (133 pCi/L; 2 times the minimum detectable activity), no radionuclides were detected in any field blanks. The constituents with out-of-limit results were bromodichloromethane, calcium, chloride, chloroform, iron, sodium, and zinc. Most of the out-of-limit results were 10 to 20 times lower than the lowest concentrations measured in groundwater samples from the Phase I investigation. However, iron and zinc were detected in field blanks at levels similar to those in groundwater samples. Iron was found in 4 field blanks at concentrations ranging from 55.3 μg/L to 371 μg/L. Zinc was detected in 6 field blanks; the results ranged from 6.7 μg/L to 26.1 μg/L. Levels of iron and zinc up to 89.8 μg/L were also detected in laboratory method blanks. Bromodichloromethane and chloroform were measured in both equipment and full trip blanks at levels up to 23 μg/L, but neither compound was detected in groundwater samples. Based on previous groundwater-monitoring-project data, the source of these trihalomethanes is suspected to be the reagent water used to prepare the field blanks. Overall, the field blank results suggest that sample contamination was not significant for the Phase I investigation.

Field duplicate results are evaluated using the relative percent difference statistic, which is calculated for each pair of matching results. In general, field duplicates with at least one result greater than 5 times the method detection limit or minimum detectable activity must have a relative percent difference less than 20% to be considered acceptable. The two field duplicate samples for the Phase I investigation were analyzed for alkalinity, anions, metals, and several radionuclides to produce a total of 71 result pairs. Ninety-four percent of the field duplicate results were within quality control limits; thus, sampling and analysis precision was excellent overall. Four pairs of results had quantifiable results that exceeded the quality control limits. Iron had results of 71.7 μg/L and 262 μg/L for samples from Energy Northwest well MW-9 (C3079) ; the relative percent difference was 114%. Two of the zinc results (33 μg/L and 21.7 μg/L) from well 699-13-3A had a relative percent difference of 41%. Both of these metals were detected in field and method blanks; thus, the poor precision may have resulted from sample contamination. The relative percent difference for gross beta and technetium-99 in samples from 699-13-3A was 32% (15.0 pCi/L and 20.8 pCi/L) and 31% (13,600 pCi/L and 18,600 pCi/L), respectively. The reason for the variability in these results is unknown, but it should be noted that the technetium-99 results appear to be unreasonably high based on the relatively low gross-beta concentrations. The technetium-99 matrix spike result for the 699-13-3A sample was also very high (211% recovery); thus, a matrix interference may have biased the results.

The split sample results for tritium in well 699-13-3A were 7,230,000 pCi/L and 7,410,000 pCi/L, indicating agreement between laboratories. These values, along with the field duplicate result of 6,890,000 pCi/L, confirm the elevated result of 8,140,000 pCi/L measured at this well in January 2000.

Most of the laboratory quality control results were within acceptance limits, indicating the analyses were generally in control, and the results are reliable. The following observations summarize the laboratory quality control results:

- Four constituents exceeded the quality control limits for method blanks: aluminum, chloride, iron, and zinc. Two method blanks had aluminum results (63 µg/L and 89 µg/L) that were greater than the levels measured in most of the groundwater samples taken during the Phase I investigation. As noted previously, iron and zinc were also detected at levels comparable to groundwater-sample concentrations.

- All laboratory-control-sample results were within acceptance limits.

- Four matrix duplicates with quantifiable results had a relative percent difference greater than 20%. Three of the out-of-limit result pairs were for uranium-234. The largest relative percent difference for uranium-234 was 24.3%; thus, the data was not significantly compromised. Gross alpha in laboratory duplicates from Energy Northwest well MW-8 (C3078) had results of 6.3 and 22 pCi/L. The reason for the poor precision in these samples is unknown.

- Most matrix spike results were within acceptance limits; thus, sample-matrix effects did not appear to have a significant impact on data quality. Six matrix spike recoveries were high; the results were for chloride, fluoride, nitrite, technetium-99, and uranium. However, only the chloride and technetium-99 recoveries were significantly out-of-limit (i.e., >140%). Both results were associated with samples from well 699-13-3A. The chloride recovery was 204%, and the technetium-99 recovery was 211%. In both cases, the associated sample results may be biased high.

Table 3.1. Comparison of Uranium Isotopic Concentrations to Gross Alpha and Total Uranium Concentrations

Well	Sample Number	U-234 (pCi/L)	U-235 (pCi/L)	U-238 (pCi/L)	Total Uranium (pCi/L)	Gross Alpha (pCi/L)	Calculated Total Uranium (μg/L)	Measured Total Uranium (μg/L)
699-10-E12	B0XK02	2.37	*0.09*	1.43	3.90	3.71	4.30	5.15
699-12-4D	B0XJW0	1.80	*0.02*	1.91	3.74	3.44	5.70	5.87
699-13-1A	B0XJW9	2.77	*-0.01*	1.29	4.05	4.16	3.83	
699-13-3A	BOXJT8	4.35	0.29	3.55	8.18	6.06	10.70	10.32
699-15-15B	B0XK20	3.39	*0.12*	2.28	5.79	4.22	6.84	
699-17-5	B0XK15	1.36	*0.11*	0.99	2.46	2.48	2.98	
699-21-6	B0XK23	1.56	*-0.01*	0.96	2.51	2.08	2.85	
699-8-17	B0XK12	1.53	*0.04*	1.32	2.89	3.83	3.95	
699-9-E2	B0XJY4	1.28	*0.07*	1.13	2.48	1.98	3.40	
C3071/ENW-MW1	B0XKC1	5.93	*0.34*	5.09	11.36	5.23	15.31	
C3072/ENW-MW2	B0XKC2	12.20	0.58	10.90	23.68	22.10	32.71	
C3073/ENW-MW3	B0XKC3	7.67	0.79	7.96	16.42	18.40	24.06	
C3074/ENW-MW4	B0XKC4	2.01	*0.19*	2.57	4.77	6.50	7.74	
C3075/ENW-MW5	B0XKC5	1.45	*0.02*	0.93	2.39	3.51	2.77	
C3076/ENW-MW6	B0XKC6	4.14	0.22	4.36	8.72	7.66	13.08	
C3078/ENW-MW8	B0XKC8	3.00	*0.18*	2.96	6.14	6.32	8.89	
C3079/ENW-MW9	B0XKC9	12.60	0.52	12.30	25.42	22.10	36.85	
C3079/ENW-MW9	B0XKD0	13.70	0.42	11.40	25.52	22.80	34.13	
C3080/ENW-31	B0XKD1	1.05	*0.18*	*0.25*	1.48	1.19	0.82	
C3081/ENW-32	B0XKD2	1.12	*0.03*	0.59	1.74	1.19	1.78	
Italicized values are less than the minimum detectable activity								

Table 3.2. Field Quality Control Samples

Sample Type	Number of Samples	Associated Wells	Comments
Equipment Blanks	4	699-13-3A(a), 699-13-1B, ENW-MW5	Sampled with portable Grundfos pump
Full Trip Blanks	2	699-13-3A, 699-21-6	
Field Transfer Blanks	3	699-13-3A, 699-13-1A, ENW-MW6	Volatile organic analysis only
Field Duplicates	2	699-13-3A, ENW-MW9	
Split Samples	1	699-13-3A	Tritium analysis only
(a) Two equipment blanks were collected at 699-13-3A; the first was collected before the well was sampled, and the second was collected after the well was sampled.			

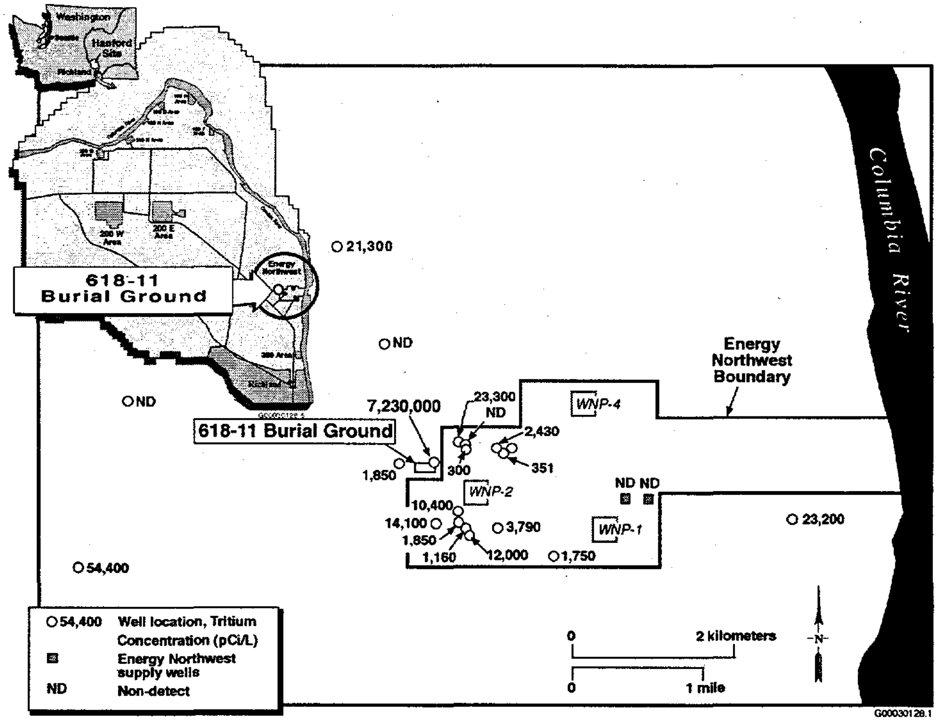

Figure 3.1. Tritium Concentrations for February 2000 Sampling Near the 618-11 Burial Ground

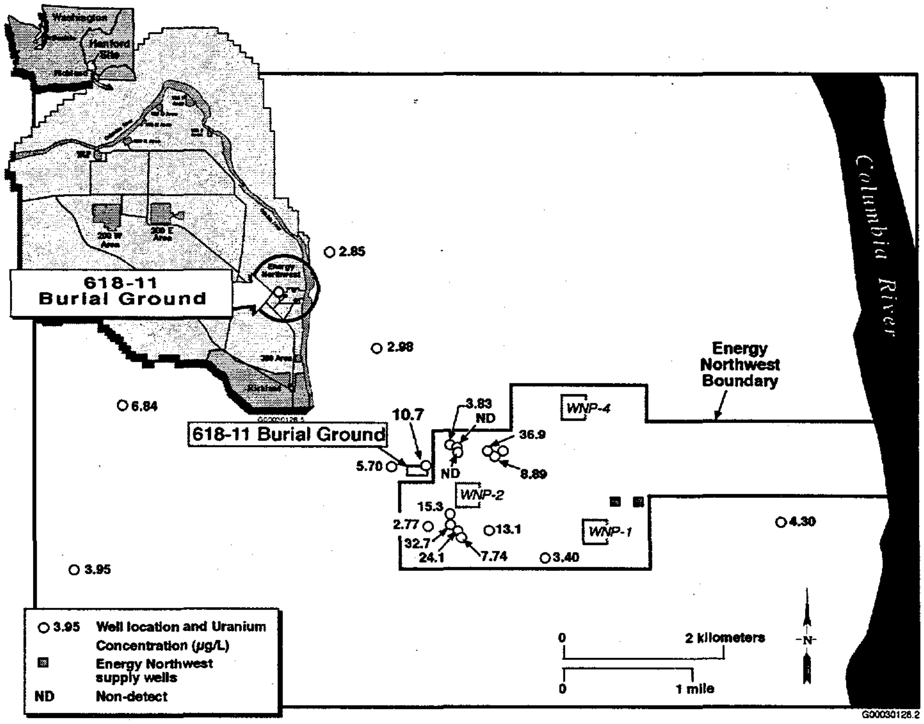

Figure 3.2. Calculated Uranium Concentrations for February 2000 Sampling Near the 618-11 Burial Ground

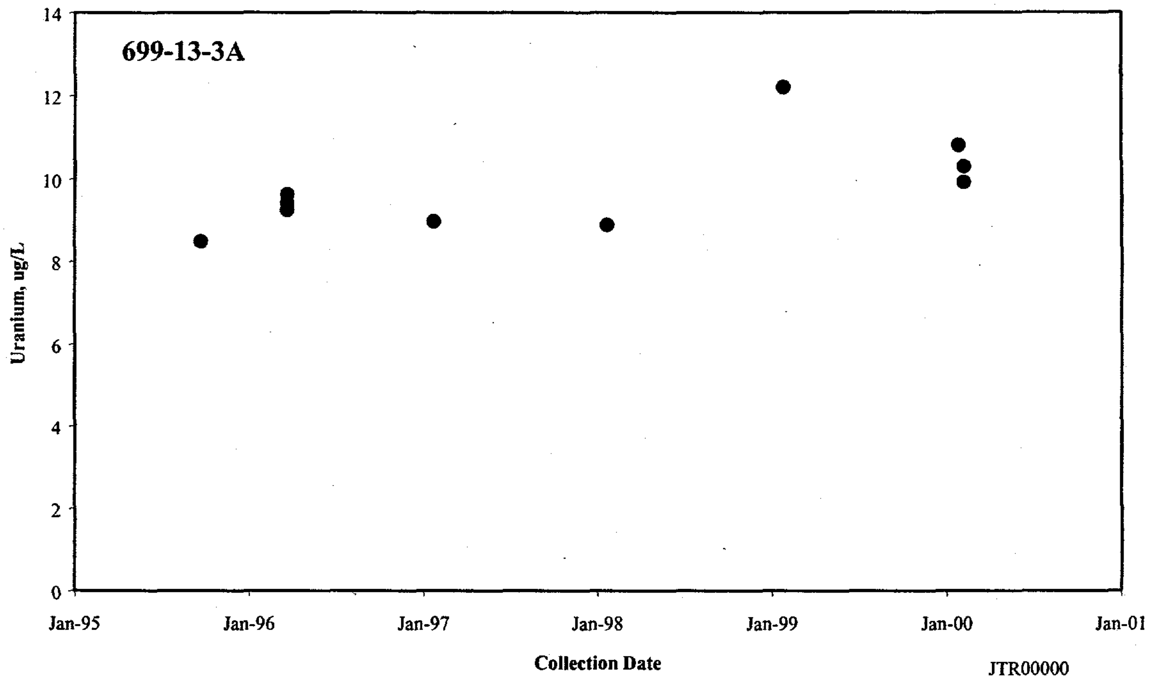

Figure 3.3. Uranium Concentration Trend in Well 699-13-3A

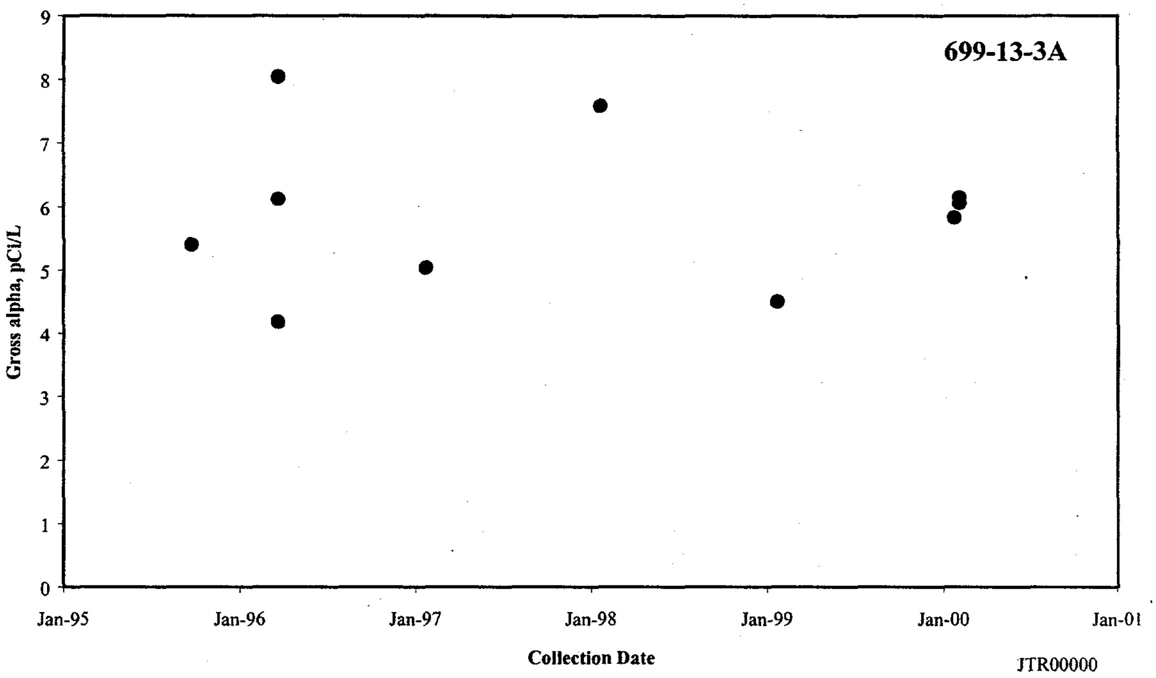

Figure 3.4. Gross Alpha Concentration Trend in Well 699-13-3A

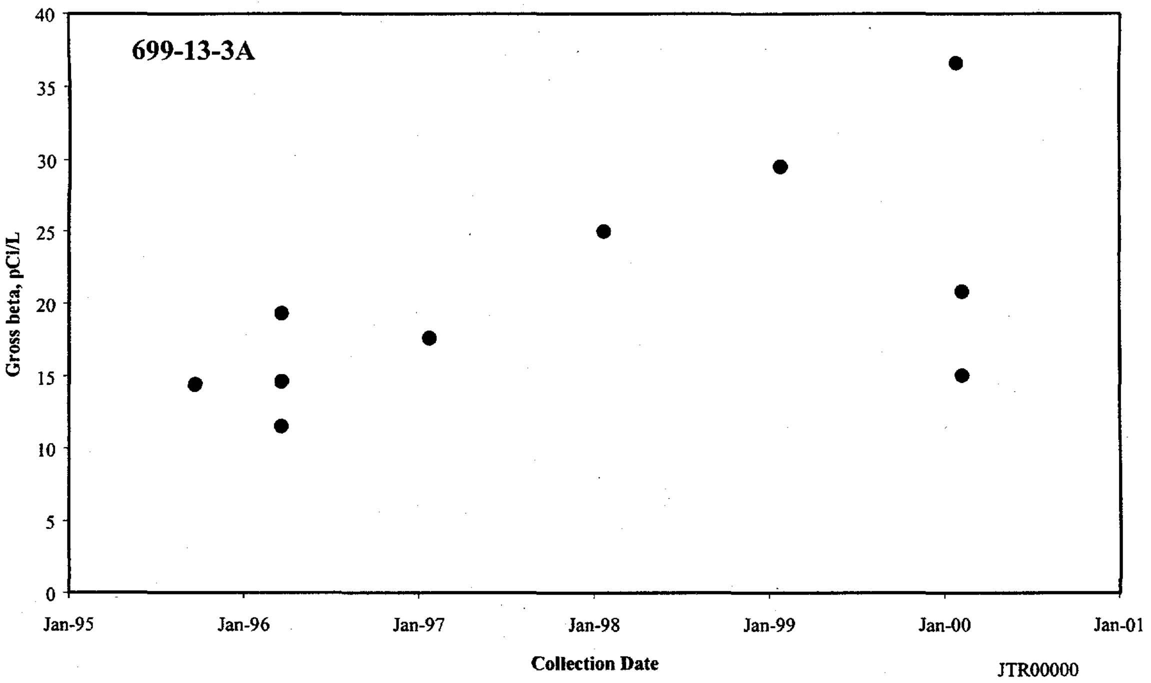

Figure 3.5. Gross Beta Concentration Trend in Well 699-13-3A

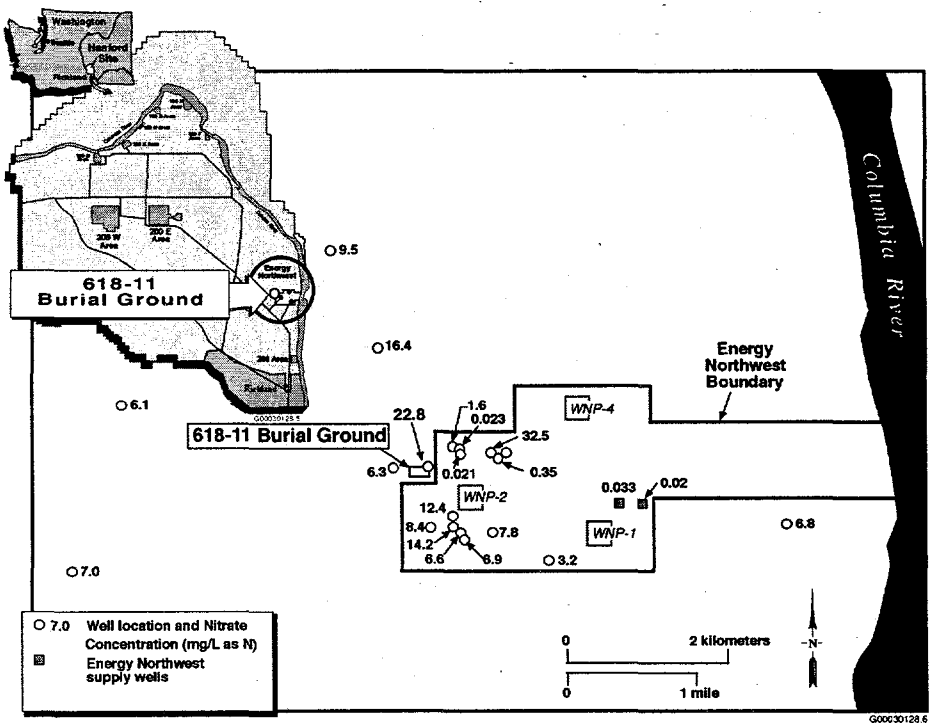

Figure 3.6. Nitrate Concentrations Expressed in mg/L as N for February 2000 Sampling Near the 618-11 Burial Ground

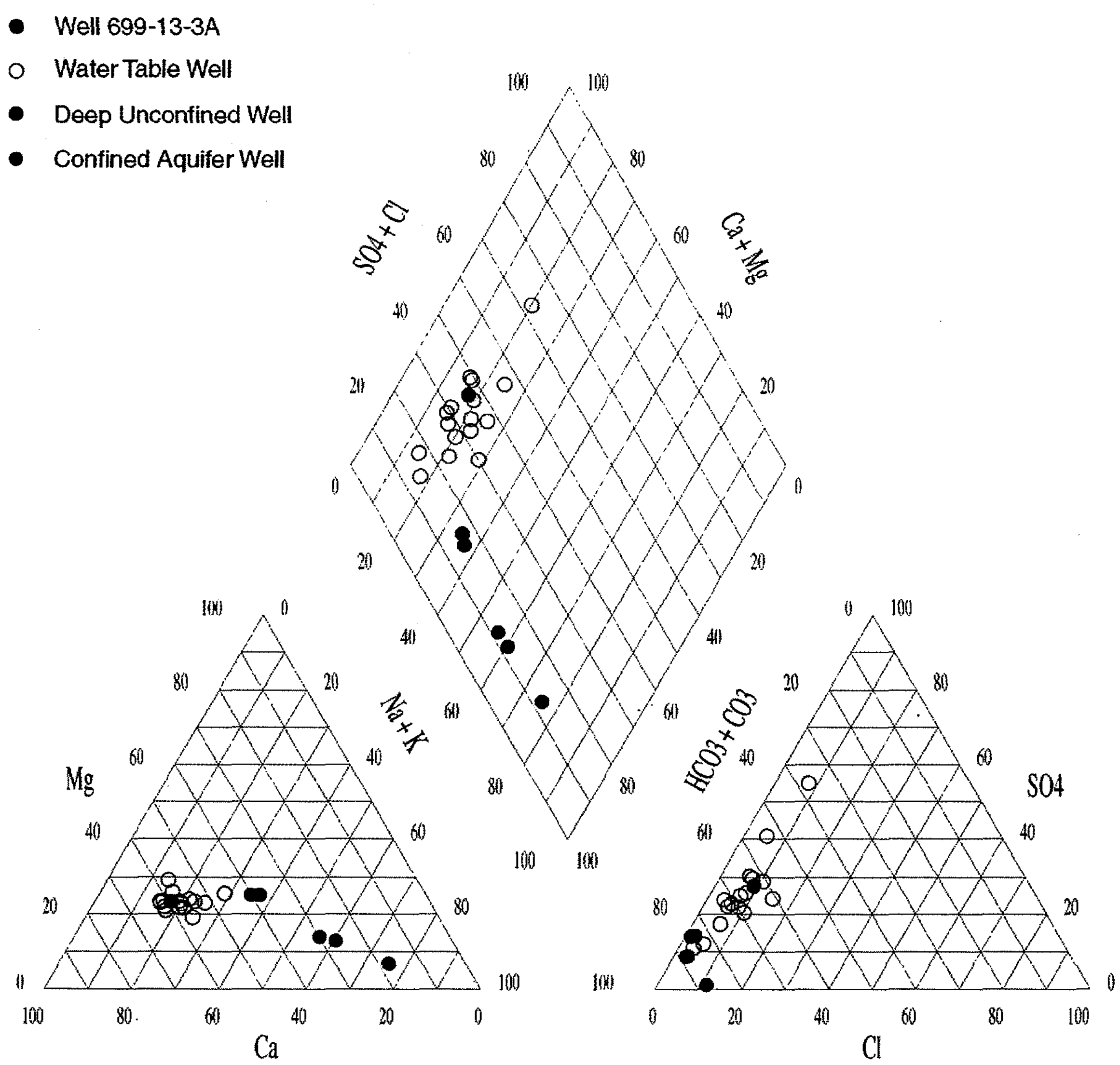

Figure 3.7. Piper Diagram for Major Ions in the Phase I Samples

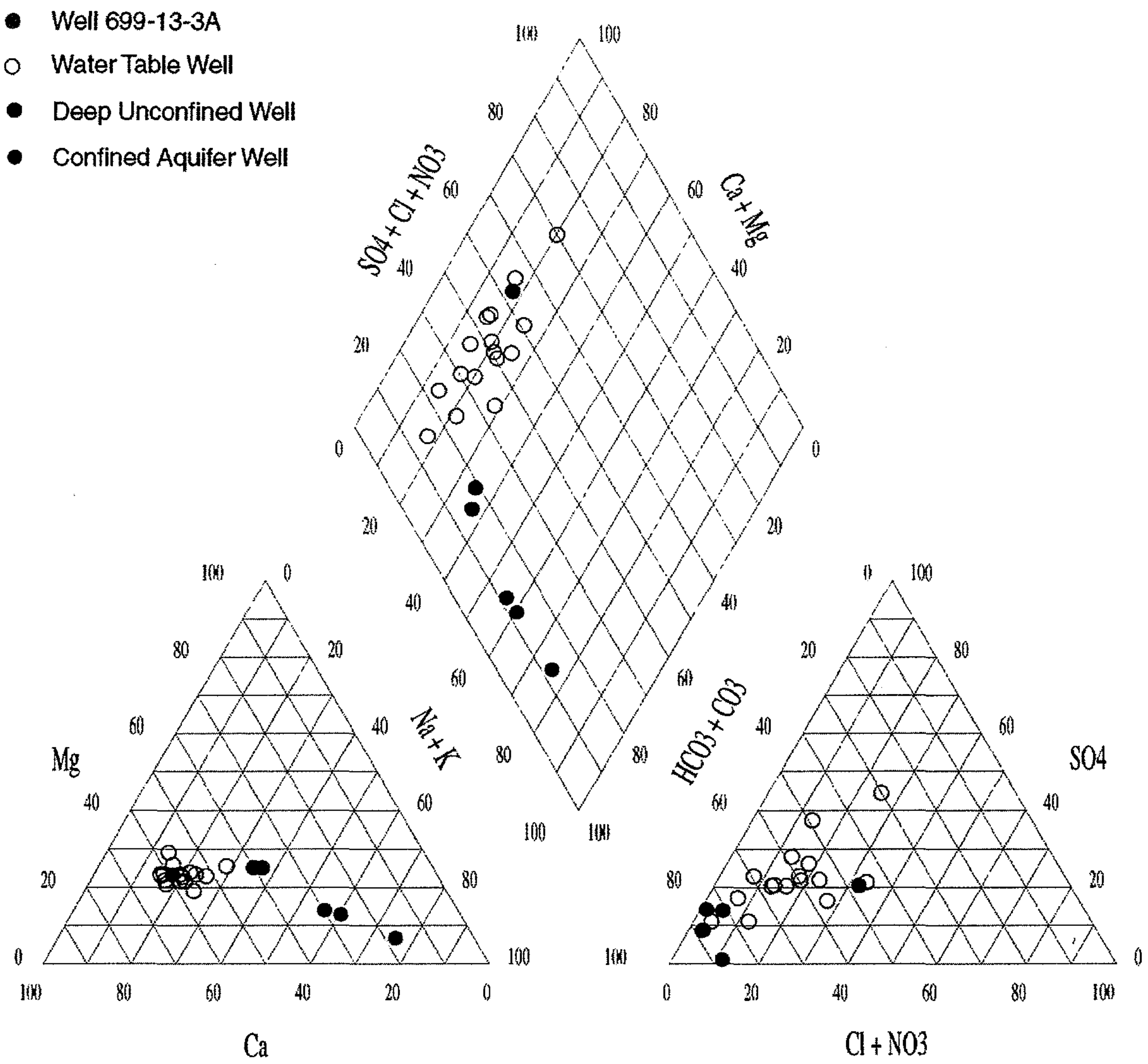

Figure 3.8. Piper Diagram for Major Ions in the Phase I Samples Including Nitrate with the Chloride Component

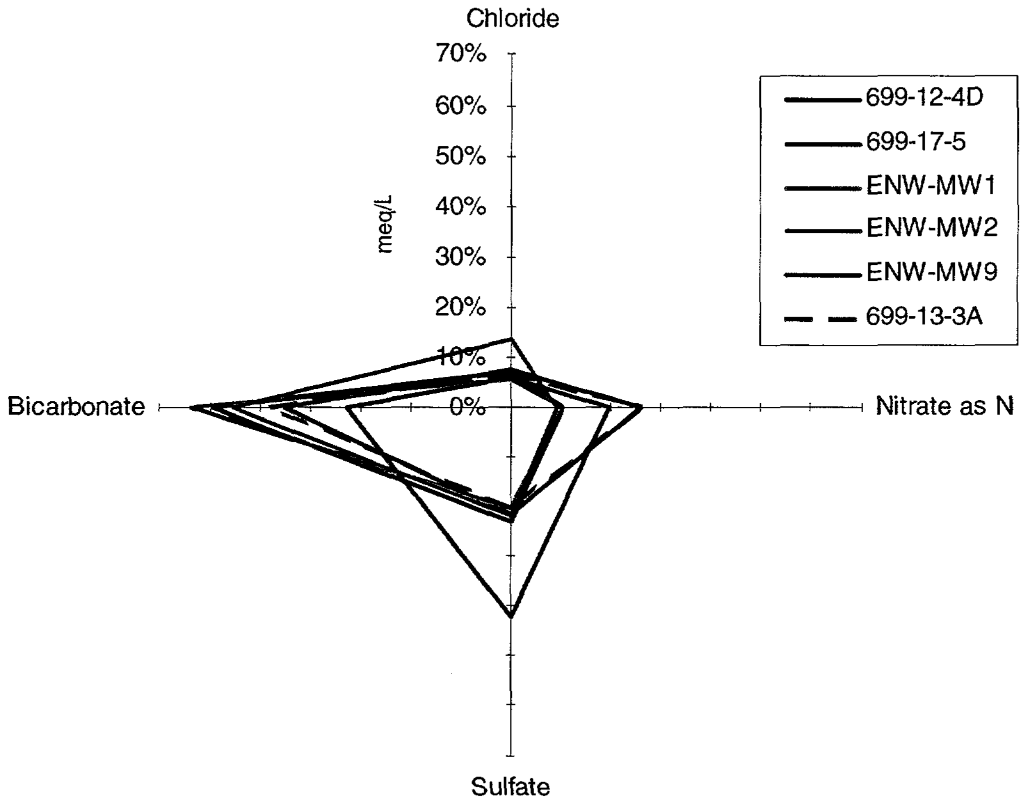

Figure 3.9. Relationship Between the Percentage of Anion Milliequivalents in Selected Wells Near the 618-11 Burial Ground

4.0 Discussion

The most important result of the Phase I sampling is that the extremely elevated tritium levels remain restricted to only well 699-13-3A, immediately downgradient of the 618-11 burial ground. Well 699-12-4D, upgradient of the burial ground, contained 1,850 pCi/L of tritium. Any explanation of the tritium contamination must consider the much lower levels in surrounding wells. The explanation must also consider the lack of co-contaminants with the possible exception of nitrate and minor levels of technetium-99.

In the following sections the results will be discussed with respect to possible sources in the 200 East Area, Energy Northwest operations, and the 618-11 burial ground. A detailed discussion of the historical tritium concentrations in the plume emanating from the 200 East Area and in the vicinity of the 618-11 burial ground is included in order to evaluate the possibility of a source from the 200 East Area.

4.1 Relationship to the 200 East Area Tritium Plume

4.1.1 Historical Plume Conditions

The tritium plume from the 200 East Area has been mapped since the 1960s. Historical maps show the plume expanded into the vicinity of the 618-11 burial ground in approximately 1979. However, this interpretation is heavily influenced by data from wells 699-13-1A and 699-13-1B that were drilled in 1973. Thus, concentrations in this area were not established earlier and no clear breakthrough curve was recorded. A reinterpretation of the historical data highlights some problems and unknowns regarding the details of the plume migration into this area.

Samples collected from wells 699-13-1A and 699-13-1B have historically contained elevated levels of tritium (Figure 4.1). In the first year it was sampled, 1973, tritium concentrations in well 699-13-1A averaged 121,000 pCi/L and rose to a maximum of 390,000 pCi/L in 1974. In 1975 and 1976, tritium concentrations dropped to a low of 8,800 pCi/L, after which they began to rise in the last half of 1976 to another high of 200,000 pCi/L in 1977. Beginning in 1978, tritium concentrations fluctuated, ranging from 12,000 to 1,100,000 pCi/L in 1978 alone. These fluctuations occurred from 1978 through 1980 reaching a maximum value of 1,400,000 pCi/L. The well was not sampled after June 1981 until February 2000. Tritium concentrations in well 699-13-1B are similar to those in well 699-13-1A, but the rise in tritium concentrations in 1974 and 1975 is absent in well 699-13-1B, and peak tritium concentrations in well 699-13-1B are only half the levels in well 699-13-1A.

Before the source of historical tritium in wells 699-13-1A and 699-13-1B is discussed, well construction and history need to be considered. The wells were drilled in 1973, approximately 112 m (370 ft) apart and approximately 425 m (1,400 ft) from the 618-11 burial ground. Both wells were constructed to supply water for construction of facilities for Energy Northwest (formerly know as Washington Public Power Supply System). The wells are 20 cm (8 in.) in diameter, 72 and 75 m (235 and 245 ft) deep, respectively, with multiple screened sections and extending approximately 55 m (180 ft) below the water table. Well construction drawings of the wells are presented in Figure 4.2. Well 699-13-1A was constructed with three screen sections, the upper section 5 m (15 ft) long and the lower two each 3 m (10 ft) long. The top of the upper screen section was located approximately 6 m (20 ft) below the water table at the time it was drilled. Well 699-13-1B has four screen sections with the upper section 6 m (20 ft) long and lower three each 3 m (10 ft) long. The top of the upper screen was located approximately 8 m (25 ft) below the water table.

Details of the historical use of wells 699-13-1A and 699-13-1B for water supply are unknown. The location of the pump in the wells during their use and sampling, the volumes of water and rate at which it was withdrawn, and the continuity of withdrawals is also unknown. In addition, the effects of the pumping on the direction and velocity of groundwater flow in the area are unknown. It is likely that the wells were used on a demand basis that resulted in a variable pumping schedule. A fluctuating withdrawal schedule could be responsible for the fluctuating tritium concentrations in the two wells. If tritium concentrations are generally higher in the upper portion of the groundwater system and the pumps were set in the middle or lower screen sections, as might be expected for a water supply well, high tritium concentrations could have been drawn into the well from the upper part of the aquifer when the well was pumped at a high rate. As the pumping rate dropped, more of the water could have been produced from the lower screened sections where the pump was located and where tritium concentrations were low. This would explain the tritium levels that were high during the active reactor construction period and that dropped to low levels at the end of construction when withdrawals would likely have been reduced.

Reactor WPN-2 began operation in January 1984. It is probable that a major Columbia River water supply was developed in the early 1980s to support the need for WNP-2 reactor cooling water, eliminating the need for these two water supply wells. This may be the reason they were not sampled after mid-1981. Currently WNP-2 uses the Columbia River for its water supply. Whatever the source of tritium, historical tritium fluctuations in wells 699-13-1A and 699-13-1B could be explained by the variable pumping history of the two wells.

The tritium plume that extends southeast from 200 East Area has its source in early separations operations in 200 East Area. Historical interpretations of the growing Hanford sitewide tritium plume show a slow migration of the tritium plume to the east and southeast until approximately 1972 (Kipp 1973). Figure 4.3 shows the plume in 1972 consisting of a northern and a southern lobe with the highest concentrations in the northern lobe.

The slow eastern and southern migration of the southern lobe was believed to have continued until 1973 when the plume apparently reached well 699-13-1A, as shown in Figure 4.4 (Kipp 1975). It is unknown if tritium was present in this area prior to 1973 because well 699-13-1A was not drilled until 1973. Between 1973 and 1978, the depiction of the extent and distribution of the tritium plume changed little on this southern boundary. In reality, tritium levels were peaking at 390,000 pCi/L in well 699-13-1A, but the annual average values were less than the 300 pCi/mL (300,000 pCi/L) contour level. As a result, the plume maps do not indicate this rise until 1979 (Figure 4.5), at which time the average reached 905,000 pCi/L (Eddy and Wilbur 1980). The 1978 plume map should have indicated that well 699-13-1A was greater than 300,000 pCi/L because the reported mean was 301,000 pCi/L. This value would have been much higher (460,000 pCi/L) had a reported value of 1,100,000 pCi/L been included.

The high data point resides in the HEIS database and in project records, but was not included in the evaluation. Regardless, the 1979 interpretation extended the 300,000 pCi/L tritium contour beyond well 699-13-1A.

Interpretations of tritium plume distributions differed between 1979 and 1980 in a very important and fundamental way. However, they were based on a common assumption. The common assumption was that there was a continuum of contamination between the well 699-20-20 area and the vicinity of the 618-11 burial ground. Because there are no data in the intervening area, this assumption cannot be verified. The major difference is the flow path that connected the two areas. Because the investigators connect these two areas of high tritium concentration, it is reasonable to conclude that the authors had no indication that another source of tritium existed near wells 699-13-1A and 699-13-1B. The 1979 plume was based on the notion that contamination in the vicinity of well 699-13-1A migrated into the area through the southern lobe of the plume, south of well 699-15-15B and north of well 699-8-17. There are no intermediate control points along this narrow flow path to support this interpretation. The 1980 data were interpreted in Eddy and Wilbur (1981) to indicate that contamination was reaching the area through a narrow flow path from the northwest, east of well 699-15-15B and west of well 699-17-5, both of which had lower tritium concentrations (Figure 4.6). As in the 1979 interpretation, there are no intermediate wells along this flow path to support the interpretation.

The problem with the depiction of the 1980 plume is that three critical data points were incorrectly accounted for in the interpretation. Data for wells 699-20-20 (583 pCi/ml) and 699-15-26 (250 pCi/ml) were incorrectly included in regions of lower concentration and the mean tritium concentration for well 699-13-1A was determined to be 297 pCi/ml (297,000 pCi/L), slightly below the 300 pCi/ml contour. If these data are factored into the plume depictions, a significantly different plume geometry results (Figure 4.7). If this flow path is correct, wells upgradient of the 618-11 burial ground area should have contained tritium concentrations at least as high or higher than 1,100,000 pCi/L. One well (699-26-15A) in this flow path and upgradient contained tritium as high as 1,600,000 pCi/L in 1970 and remained above 1,000,000 pCi/L until 1979. This indicates that a source of tritium existed at levels sufficient to explain high levels that appeared later in wells 699-13-1A and 699-13-1B.

4.1.2 Geologic Constraints on the Tritium Plume Migration

Geologic and well completion data must be used to help judge the merits of either interpretation. In 1979, data from wells 699-15-15B and 699-17-5 may have been used to infer an apparent barrier to southern migration of the plume. This interpretation is supported by the geology at these locations. Both wells are screened across the water table but the water table is near the Hanford formation/Ringold Formation contact. The wells recover slowly after removing water, indicating that the hydraulic conductivity is low, consistent with the Ringold Formation characteristics. The 1979 interpretation is consistent with an assumption that the low hydraulic conductivity region is continuous between wells 699-15-15B and 699-17-5, forming a hydrologic barrier to groundwater flow and contaminant migration. The 1980 interpretation may have assumed that the low conductivity regions are isolated to the vicinity of the wells and a higher conductivity zone exists between the two wells. The Ringold Formation has a shallow dip from east to west through the area and it outcrops along the eastern bank of the Columbia River east of the area. Recent interpretations as presented in Hartman (1999) show the Ringold

Formation at the water table in an area east of the Energy Northwest reactors (see Figure 1.4). However, because the saturated part of the Hanford formation is thin and the dip of the contact is shallow, the zone of lower transmissivity may extend for a considerable distance to the west. As contaminants moved southeast out of the 200 East Area, via a flow path through highly transmissive sediments, they reached this lower transmissive Ringold sediment contact, which in effect diverted most of the flow, splitting it into two separate flow paths.

The Ringold Formation is not encountered at the water table in shallow wells located north of the Energy Northwest complex, apparently due to erosion associated with either catastrophic flooding and/or the ancestral Columbia River. The ancestral Columbia River migrated across this area, in a southeast to southerly direction and may have resulted in eroding or reworking the older Ringold Formation gravel, which is now replaced and filled in with younger, more transmissive Hanford formation deposits. Some of these erosional events are illustrated as the topographic features that can be seen on the ground surface across the area (Figure 4.8). The top of the Ringold Formation was probably eroded to a lower elevation north of wells 699-15-15B and 699-178-5 by these erosional forces. Erosional features typical of braided stream environments are most likely the structural pattern developed on the Ringold surface. At present no detailed evaluation has been completed to determine the nature and extent of the erosionally controlled flow paths. For example, if the river eroded into the Ringold sediment between well 699-15-15B and 699-17-5, a transmissive zone may exist, allowing the tritium plume to continue migrating toward the 618-11 burial ground. This scenario, however, is speculative.

The conceptual models are based on the information that well 699-17-5 is in an area of low transmissivity and, therefore, not a dynamic portion of the groundwater flow system. This explains why historical tritium concentrations in the well have been low. A major anomaly is that the well has consistently contained elevated levels of nitrate. The sitewide tritium and nitrate plumes had a common source and emanated from 200 East Area together with little chance that they would be separated by natural reactions in the groundwater system. Because tritium concentrations have been low in the well, the nitrate must be from a different source that contained no tritium. At the current time, there are no explanations for this observation.

4.1.3 Current Plume Conditions

The highest tritium concentrations detected in wells upgradient of the 618-11 burial ground were 1,600,000 pCi/L in 1969 in well 699-26-15A and 1,100,000 pCi/L in 1974 in well 699-27-8 (Figure 4.9). These levels are clearly lower than the recent values of 7,230,000 to 8,140,000 pCi/L in well 699-13-3A. The discrepancy in concentration is even greater when you consider that approximately 2 ½ half-lives of decay have occurred in the intervening years.

The current distribution of tritium shown in the Phase I results (see Figure 3.1) is also inconsistent with a source from the 200 East Area. A plume from the 200 East Area would be expected to result in similar concentrations throughout the study area. However, the presence of considerably lower concentrations in wells other than well 699-13-3A indicates a local source.

Further support for a local source for the tritium contamination comes from the relationship of tritium to co-contaminants. Iodine-129 was not detected in the samples from well 699-13-3A. Although the detectable iodine-129 plume does not extend as far as the tritium plume, the iodine-129 is consistently detected within the area of the plume from 200 East Area when tritium concentrations are high (Figure 4.10). In contrast, the iodine-129 for the Phase I sampling of well 699-13-3A was extremely low compared to the 200 East Area plume. For the purpose of the figure the non-detect iodine-129 value for well 699-13-3A was graphed at the minimum detectable activity value of 0.2 pCi/L.

Nitrate in well 699-13-3A is also considerably lower than would be expected for at source from the 200 East Area (Figure 4.11). Although nitrate is higher in well 699-13-3A than in surrounding monitoring wells (see Figure 3.6), the nitrate levels do not approach the levels found in the highest tritium concentration samples from the 200 East Area. Thus, it is difficult to explain the chemistry by invoking a 200 East Area source.

4.1.4 Summary

The current high levels of tritium in well 699-13-3A are not consistent with the levels seen in surrounding wells and thus suggest a local source for the contamination. The tritium contamination level is higher than currently seen anywhere else in the plume from the 200 East Area. It is conceivable that elevated tritium levels seen in water supply wells in the late 1970s are related to the 200 East Area tritium plume. However, the presence of low permeability sediments in the vicinity may inhibit transport of contamination from the 200 East Area. Further investigation of the geology would be needed to determine if erosional features provide a lower permeability pathway to the vicinity of the 618-11 burial ground.

4.2 Relationship to Tritium Discharges from WNP-2

Energy Northwest operations use large volumes of water, some of which is disposed to the environment. Operation of WNP-2 uses primary and secondary cooling water loops. The primary loop is contained within the facility and the water has become highly radioactive. Because this loop contains valves and other structures that may leak, the atmosphere of the reactor containment building can become radioactive. The building contains an exhaust system that prevents the release of such contaminants. The secondary loop consists of 25 million liters (6.5 million gallons) of cooling water that is cycled at 2.3 million liters (600,000 gallons) per minute. The secondary cooling water passes through the cooling towers where approximately 49,000 liters (13,000 gallons) per minute is lost to the atmosphere as evaporate. Cooling tower blowdown is removed from the secondary system, at a rate of 5,700 liters (1,500 gallons) per minute and represents discharge water that is released directly to the Columbia River. The rest of the secondary cooling water is recovered and recycled. Secondary coolant makeup water represents the bulk of the intake water and is about 57,000 liters (15,000 gallons) per minute.

Five types of water samples are collected as part of Energy Northwest's environmental monitoring program. The types of water samples collected include

- intake water from the Columbia River
- wastewater from the sanitary waste treatment facility (SWTF)
- storm drain outfall (released to a ditch and pond)
- discharge water that is released back into the Columbia River
- groundwater (three wells sampled).

The intake water represents "background" tritium concentrations for water used by Energy Northwest. The other four water types represent conditions of liquid streams affected by Energy Northwest operations as they are released back to the environment.

4.2.1 Intake Water

Tritium concentrations in intake water reflect levels present in precipitation and tritium that has entered the Columbia River from groundwater sources through the Hanford Reach of the river. Tritium is naturally formed in the upper atmosphere where highly energetic cosmic rays collide with nitrogen, resulting in the formation of tritium. The tritium atom is incorporated into a water molecule where it then falls to earth in precipitation. Davis and DeWiest (1966) reported that prior to major atmospheric testing of nuclear weapons beginning in 1952, tritium concentrations in rainfall were as high as 30 pCi/L. Groundwater entering the Columbia River, just downstream of the Hanford Townsite, resulted in maximum tritium concentrations of 4,100 pCi/L in the river at 1998 in near shore locations with an average transect level of 730 pCi/L (Dirkes et al. 1999). Tritium concentrations at the 300 Area dropped to an average of 42 pCi/L. Energy Northwest intake water averaged 120 pCi/L in 1998 (McDonald et al. 1999). Therefore, the Energy Northwest intake water has a low tritium concentration.

4.2.2 Wastewater from the Sanitary Waste Treatment Facility

This waste stream consists of sanitary wastewater from WNP-2 operations and from Fast Flux Test Facility sanitary wastewater. The average tritium concentration in this waste stream in 1998 was 3,723 pCi/L with a maximum sample concentration of 20,000 pCi/L (McDonald et al. 1999). In the previous 14 years of operation, this stream averaged 497 pCi/L with a maximum value of 6,700 pCi/L. This increase is due to the addition in 1998 of sanitary wastewater from the Fast Flux Test Facility that contained an average tritium concentration of 8,008 pCi/L to the stream. Fast Flux Test Facility process water is pumped from one primary groundwater well and two backup wells if the primary well cannot be used. This water supply contains tritium at the levels found in the wastewater. This level rose to 20,000 pCi/L when the backup wells were used when the primary well was taken offline for pump maintenance.

4.2.3 Storm Drain Outfall

The 1998 average tritium concentration in the storm drain outfall was 325 pCi/L with a high of 3,700 pCi/L (McDonald et al. 1999). In the previous 14 years, the average tritium concentration for this waste stream was 5,704 pCi/L with a high of 270,000 pCi/L. The high levels were measured in 1992 when it was found that moisture in building exhaust ventilation condensed on surrounding buildings where it then entered the storm drains. This problem was corrected and levels dropped to current levels in the first half of 1993 (Washington Public Power Supply System 1996).

4.2.4 Discharge Water

Discharge water refers to all water discharged directly into the Columbia River; it is sampled before it is discharged to the river. This stream consists mainly of cooling tower blowdown. The 1998 average tritium concentration in the discharge water was 803 pCi/L with a high of 1,600 pCi/L (McDonald et al. 1999). In the previous 14 years, the average tritium concentration was 1,907 pCi/L with a high of 12,000 pCi/L. This discharge is permitted with a National Pollutant Discharge Elimination System (NPDES) permit. The permit level has not been exceeded.

4.2.5 Groundwater

Energy Northwest samples three groundwater supply wells for their environmental surveillance program, well 699-13-1C, northeast of WNP-2, and wells designated ENW-31 (C3080) and ENW-32 (C3081) on the northeast side of WNP-1. These wells are all completed in the confined aquifer. Historically, the tritium concentrations in these wells have been near or below the detection limit of the analytical method. Reported tritium concentrations have ranged from less than detection to 324 pCi/L (McDonald et al. 1999). These numbers agree with values from the Phase I sampling where tritium was not detected at any of these locations.

From 1996 through 1998, Washington State Department of Health sampled five Energy Northwest monitoring wells for tritium. They also sampled the water supply wells discussed above. The Washington State Department of Health data for tritium are in general agreement with the Phase I sampling results reported here. The maximum concentration detected in the Washington State Department of Health data was 18,600 pCi/L in Energy Northwest monitoring well MW-5 (C3075).

4.2.6 Summary

In summary, Energy Northwest environmental monitoring data indicate that liquid waste streams generated by Energy Northwest operations, and DOE in the case of the 400 Area sanitary wastewater, contained average tritium concentrations at less than 6,000 pCi/L and a maximum of 270,000 pCi/L. This information is corroborated by data from the Washington State Department of Health (1999). The highest tritium concentrations were related to a condition that was corrected shortly after it was detected. The result was that tritium concentrations dropped to previous low levels. These data indicate that Energy Northwest operations are not responsible for the high tritium concentrations in well 699-13-3A.

4.3 Relationship to the 618-11 Burial Ground

The 200 East Area and Energy Northwest power plant are unlikely sources of the tritium at levels seen in well 699-13-3A. The 618-11 burial ground source is, however, consistent with the spatial distribution of tritium shown in Figure 3.1. Tritium levels in well 699-12-4D, located immediately upgradient from the burial ground, are considerably lower. The markedly lower tritium levels in other downgradient wells is consistent with a narrow plume that could be expected from a near-by source. A burial ground source would not be expected to be associated with large volumes of water, which is also consistent with a localized plume.

The presence of tritium bearing waste disposed to the 618-11 burial ground has not been established. A possible source is tritium present as a product of nuclear fission. Tritium is produced in nuclear reactors through several processes. Some tritium is produced through neutron capture on deuterium in the cooling water, but this is not expected to have a significant effect on other waste streams. In ternary fission, a fissionable atomic nucleus, such as uranium-235, is split into three nuclei. Ternary fission occurs much less frequently than binary fission. Tritium from reactor operations may also be produced through irradiation of trace impurities in the fuel, cladding materials or other reactor materials. Thus, some tritium can be expected to be present in materials that have been cycled through a nuclear reactor. Irradiated fuel and other radioactive materials were studied in the 300 Area and waste disposed to the 618-11 burial ground. The tritium content of the waste is generally not documented, and little is known about the potential tritium release to the environment from these waste forms. However, significant tritium contamination has not been identified with other radioactive solid-waste burial grounds. A possible exception is the 118-F-1 burial ground where tritium concentrations up to 180,000 pCi/L have been detected in a downgradient well.

A potentially larger source of tritium is from tritium production carried out at the Hanford Site. Although most of the U.S. government tritium production occurred at the Savannah River Site, significant tritium production and production research occurred at the Hanford Site during two time periods. The first time period was approximately 1949 to 1952 when tritium was produced by irradiation of lithium containing targets and processed in the 100 B Area. This campaign was called the P-10 project.

The second time period for recorded tritium production at the Hanford Site was a mid-1960s project know as the Hanford Coproduct Program. Information associated with that work was declassified in the early 1970s. In its early stages, which began in 1963, the project was intended to provide comprehensive engineering data on the optimal characteristics of lithium based irradiation targets to be used for tritium production in parallel with plutonium and electrical energy production at the Hanford N Reactor. This work is documented in numerous unclassified reports. A good summary of the activities performed can be found in Johnson et al. 1976.

Initial irradiation for the Hanford Coproduct Program was performed in one of the K Reactors using aluminum-lithium rods similar to those used in the P-10 Project. All subsequent irradiation was performed at N Reactor during 1965 to 1967, culminating with a full-scale test involving more than 1,500 lithium aluminate target columns containing on the order of 17 tons of lithium aluminate. Tritium production associated with that test was calculated to be on the order of 70 million curies of tritium per year. Following irradiation, the entire target load was shipped to Savannah River for extraction, so it is unlikely that the production run itself was responsible for significant tritium releases at the Hanford Site. However, research activities involving smaller but still significant quantities of tritium production are almost certain to have generated some major waste products. All research activities, including tritium extraction performed in support of the Coproduct Program, were performed in the Hanford 300 Area through 1967.

The fate of any waste generated by the Coproduct Program research activities, including the extracted tritium itself, remains unknown. However, because the work was performed during the time period for which the 618-11 burial ground was used as the primary site for disposal of waste from 300 Area operations, it is quite possible that some, if not all, of the Coproduct Program research waste was routed to that location. The limited records associated with the 618-11 burial ground do, in fact, list aluminum-lithium as having possibly been disposed to the burial ground. While lithium aluminate and other related materials are not specifically enumerated separately, it is unlikely that the minor difference in terminology is significant. For lack of additional details, it would be prudent to assume that the term is used as a generic reference to tritium production target materials. It is, however, unclear whether the aluminum-lithium material, if present, was actually irradiated and what amount of tritium could have remained in the material after study. Hydrogen gas is also included on the same list. Because it seems unlikely that actual high pressure cylinders of hydrogen would be placed in a burial ground intended for low-level radioactive waste, it is possible that this is an oblique reference to gaseous tritium waste associated with the target extractions. Tritium is a very labile material with the ability to eventually diffuse through most materials and reactively exchange with normal hydrogen in water and some organics. Unless specifically packaged for long-term storage, it is quite likely that tritium containing materials disposed to a landfill would pose an eventual potential for groundwater contamination.

The potential rate of release of tritium from the waste and the travel time through the vadose zone have not been established. There is no record of disposal of liquids to the 618-11 burial ground. Thus, tritium transport would probably have occurred under natural recharge conditions or with recharge enhanced by some anthropogenic process. Water was applied over the burial ground when the wheatgrass cover was established in 1983 (Demiter and Greenhalgh 1997). This could have enhanced recharge and contaminant transport in the vadose zone. However, enhanced recharge in 1983 would not explain the elevated tritium levels seen in the late 1970s in well 699-13-1A.

It is fairly well established that the downward migration of the leading edge of the tritium bomb-pulse through the vadose zone is faster than the bulk water velocity. This is attributed to exchange between the aqueous and vapor phases in the soil and vapor phase transport (Phillips et al. 1988). The implications of the vapor transport effect on travel time to the water table for tritium at the 618-11 burial ground has not been quantified.

The relatively shallow depth to groundwater and the lack of deep rooted vegetation, such as sagebrush, on the burial ground suggest that there has most likely been sufficient time for tritium transport to the water table. The exact timing of any transport and the mass flux cannot be ascertained with any certainty at this point. It is unclear, for instance, if vadose transport would have been sufficiently rapid to allow the high levels of tritium to arrive in well 699-13-1A in the 1970s.

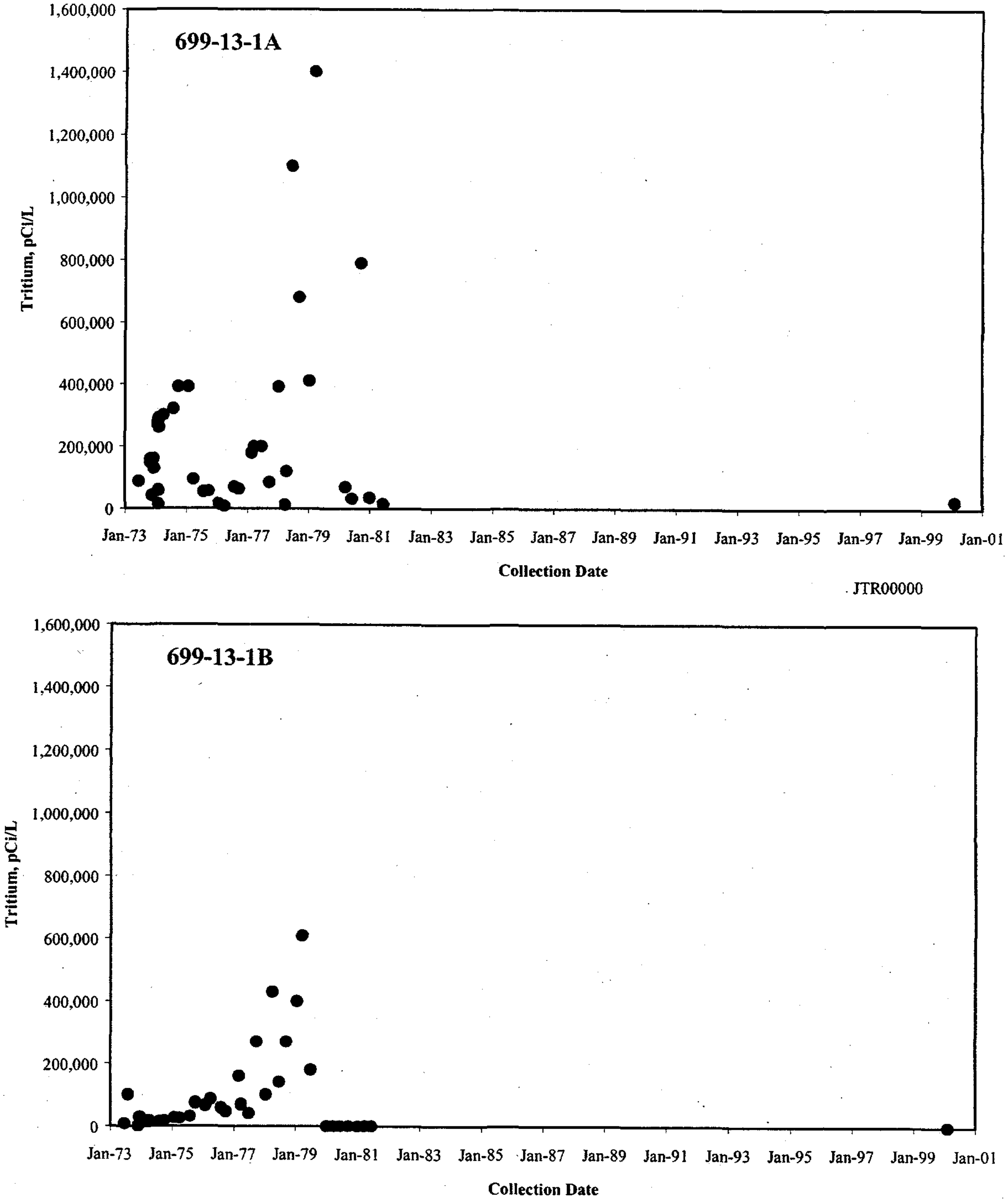

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Figure 4.1. Tritium Concentration Trends in Wells 699-13-1A and 699-13-1B

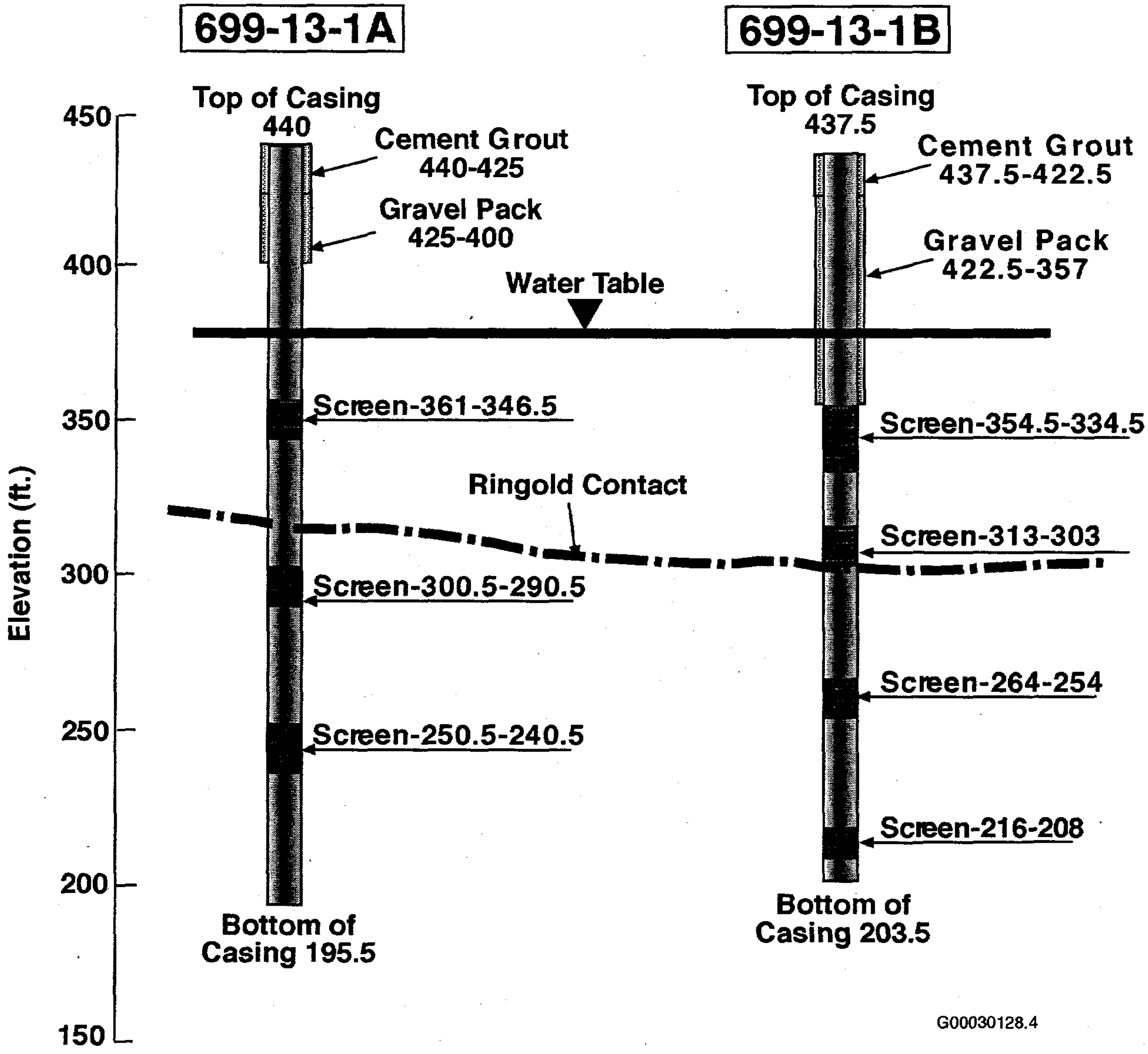

Figure 4.2. Well Construction and Lithology for Wells 699-13-1A and 699-13-1B

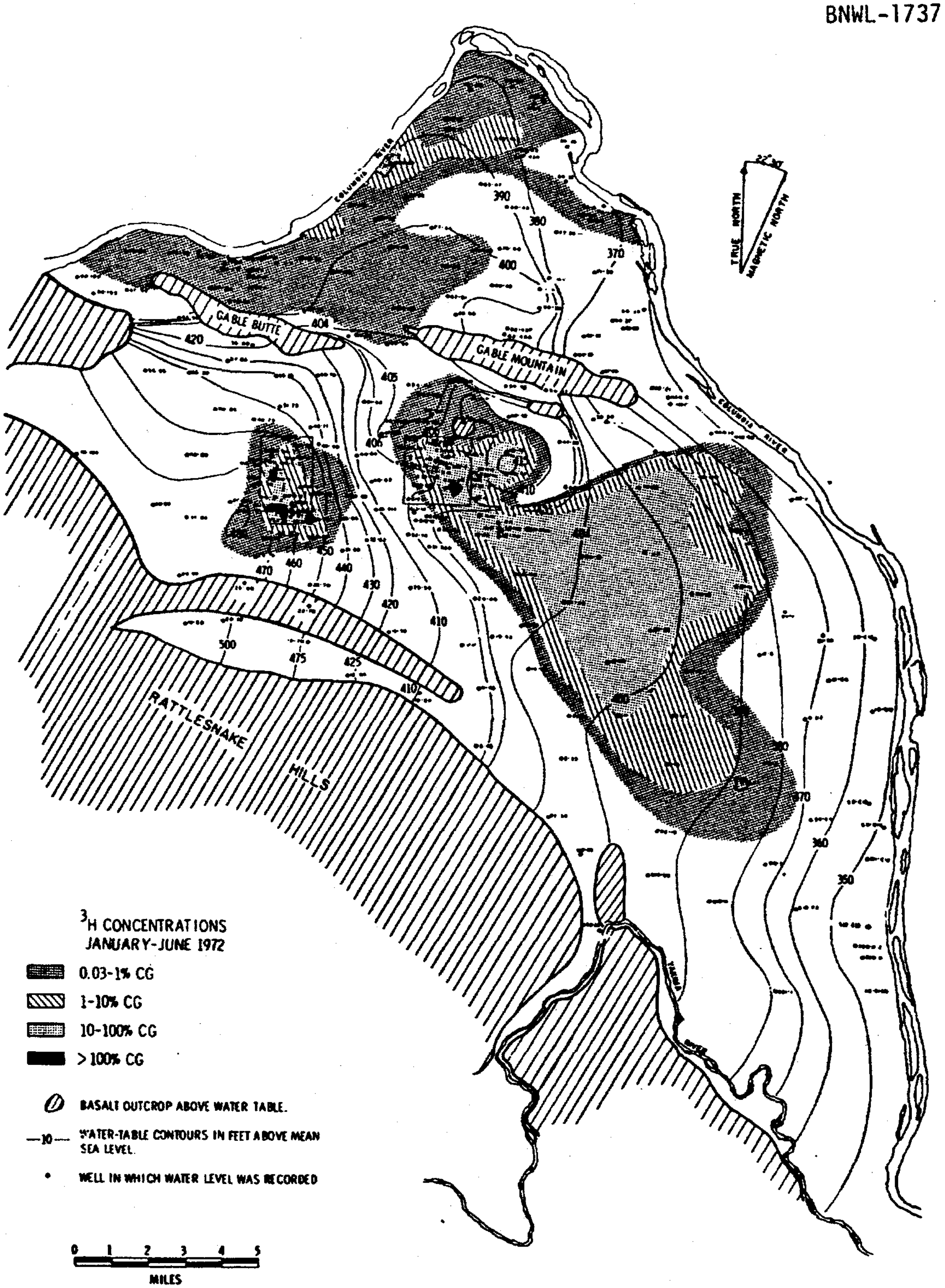

Figure 4.3. Tritium Plume as Reported in 1972 (Kipp 1973). CG for tritium equals 3,000,000 pCi/L.

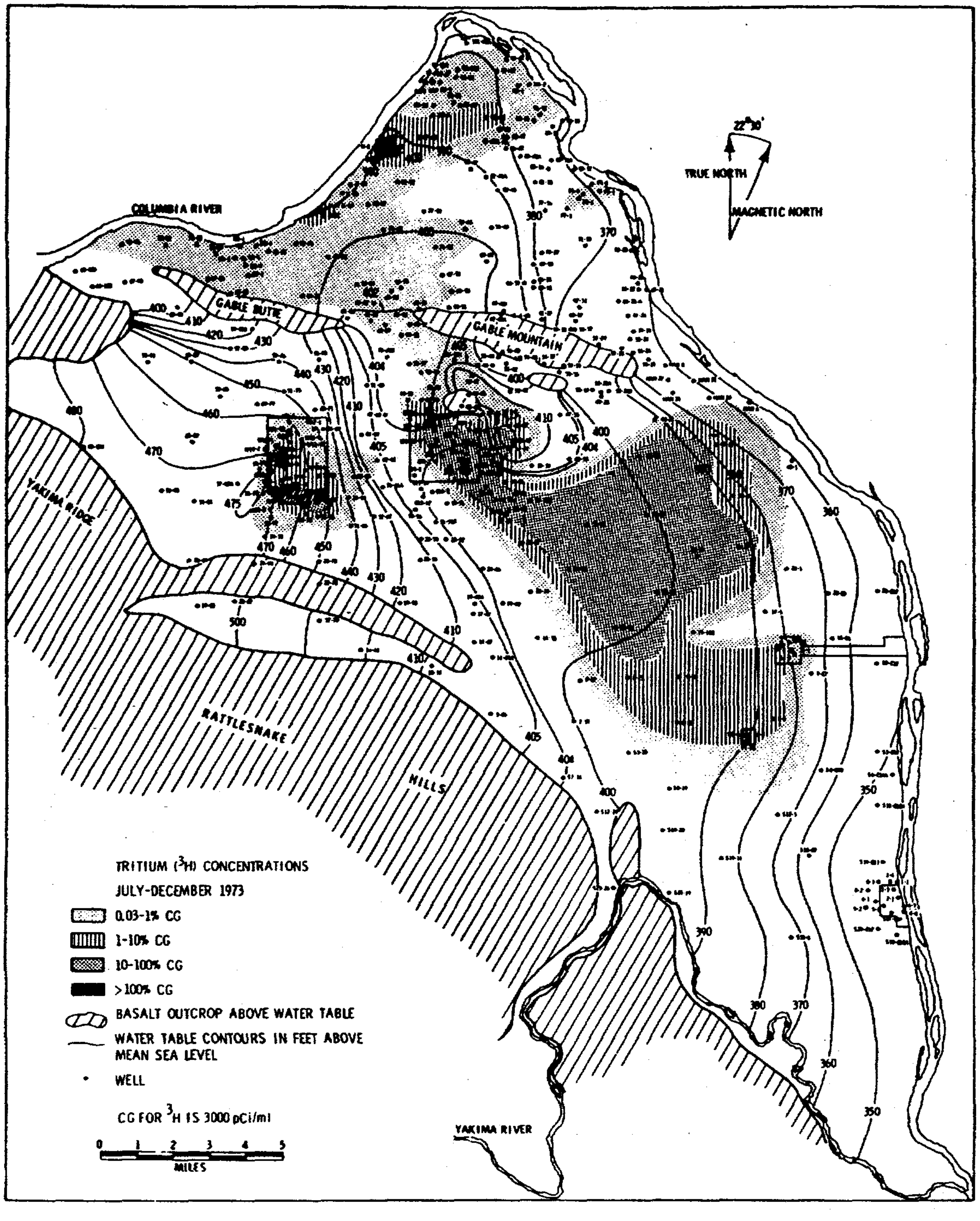

Figure 4.4. Tritium Plume as Reported in 1973 (Kipp 1975). CG for tritium equals 3,000,000 pCi/L.

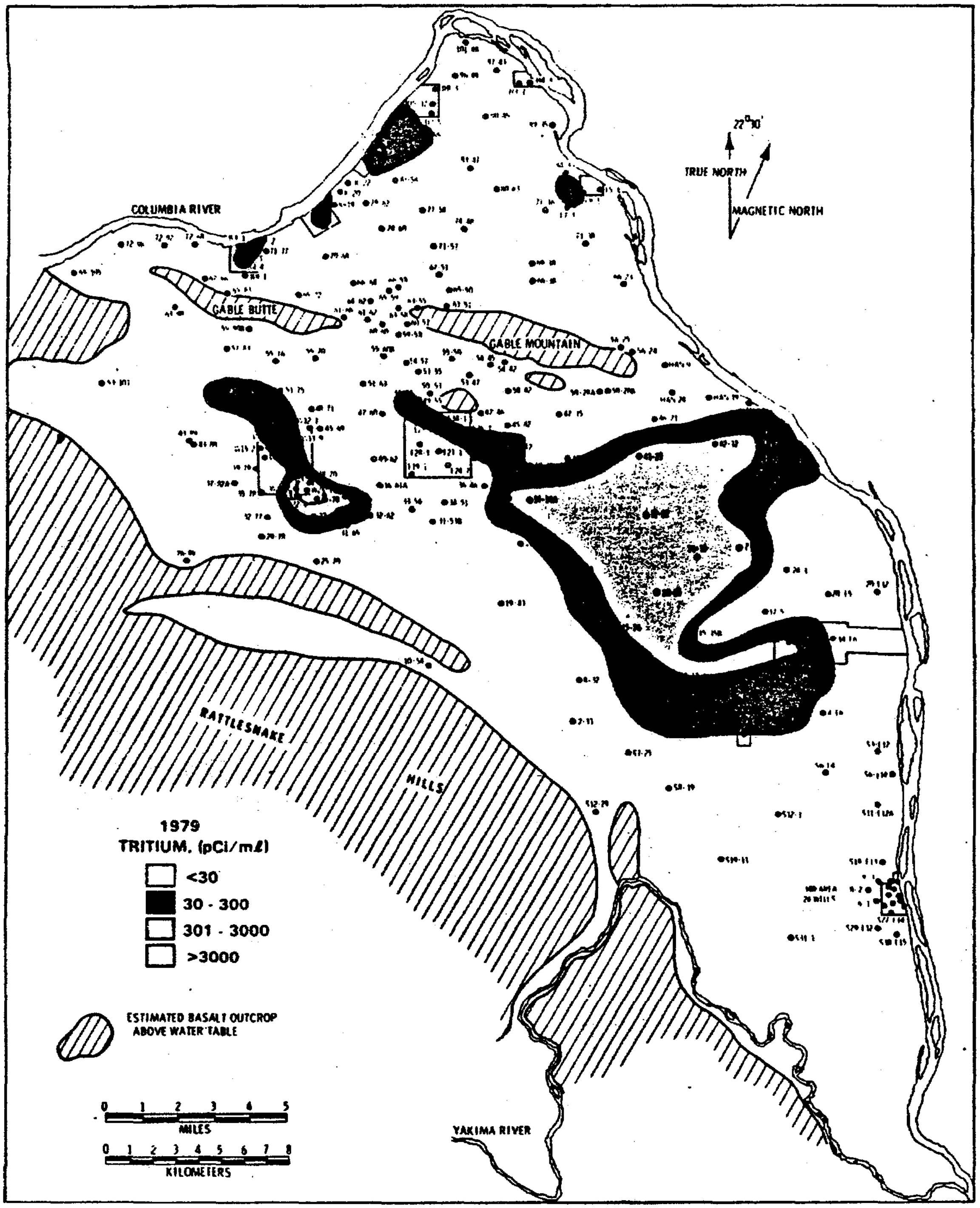

Figure 4.5. Tritium Plume as Reported in 1979 (Eddy and Wilbur 1980)

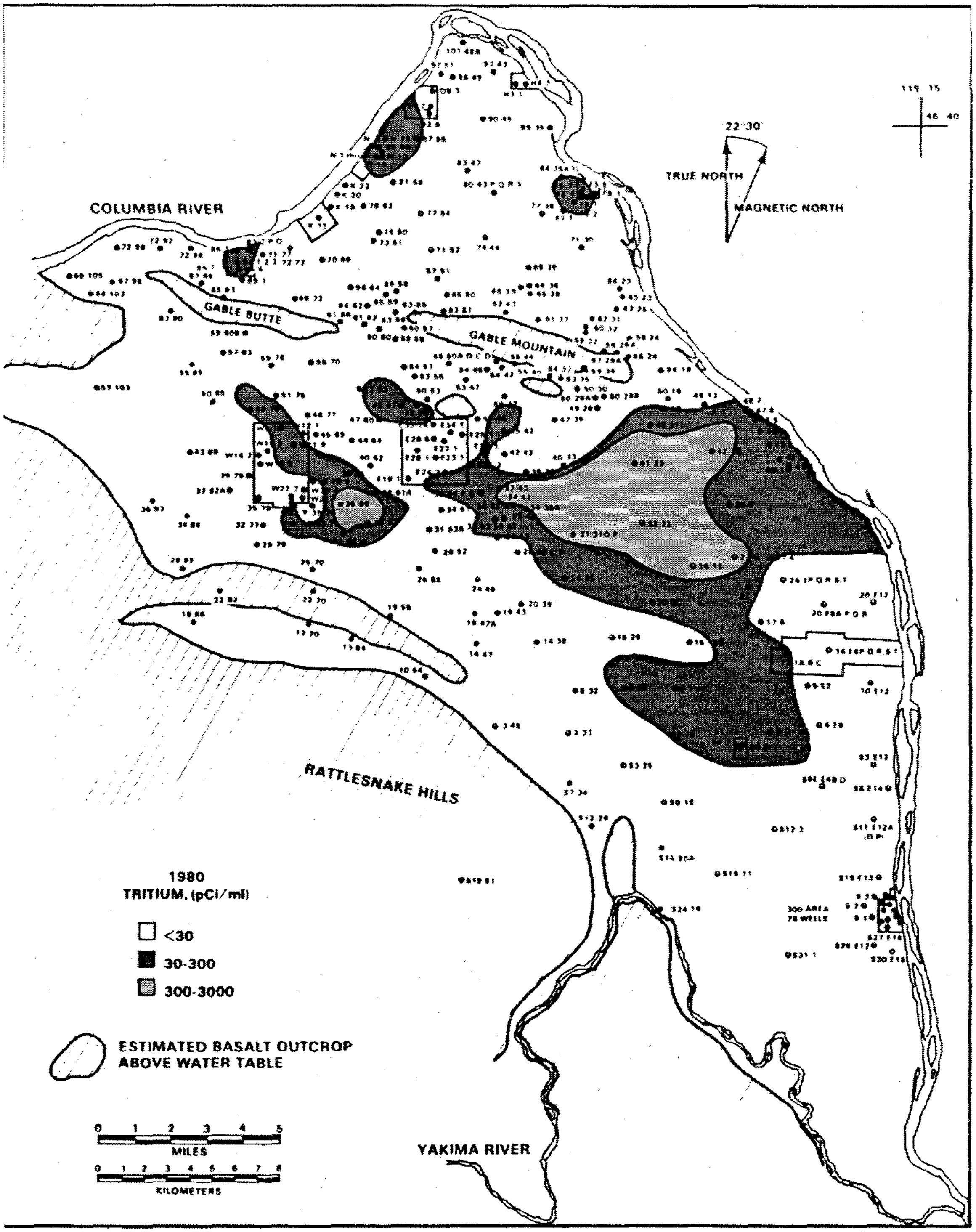

Figure 4.6. Tritium Plume as Reported in 1980 (Eddy and Wilbur 1981)

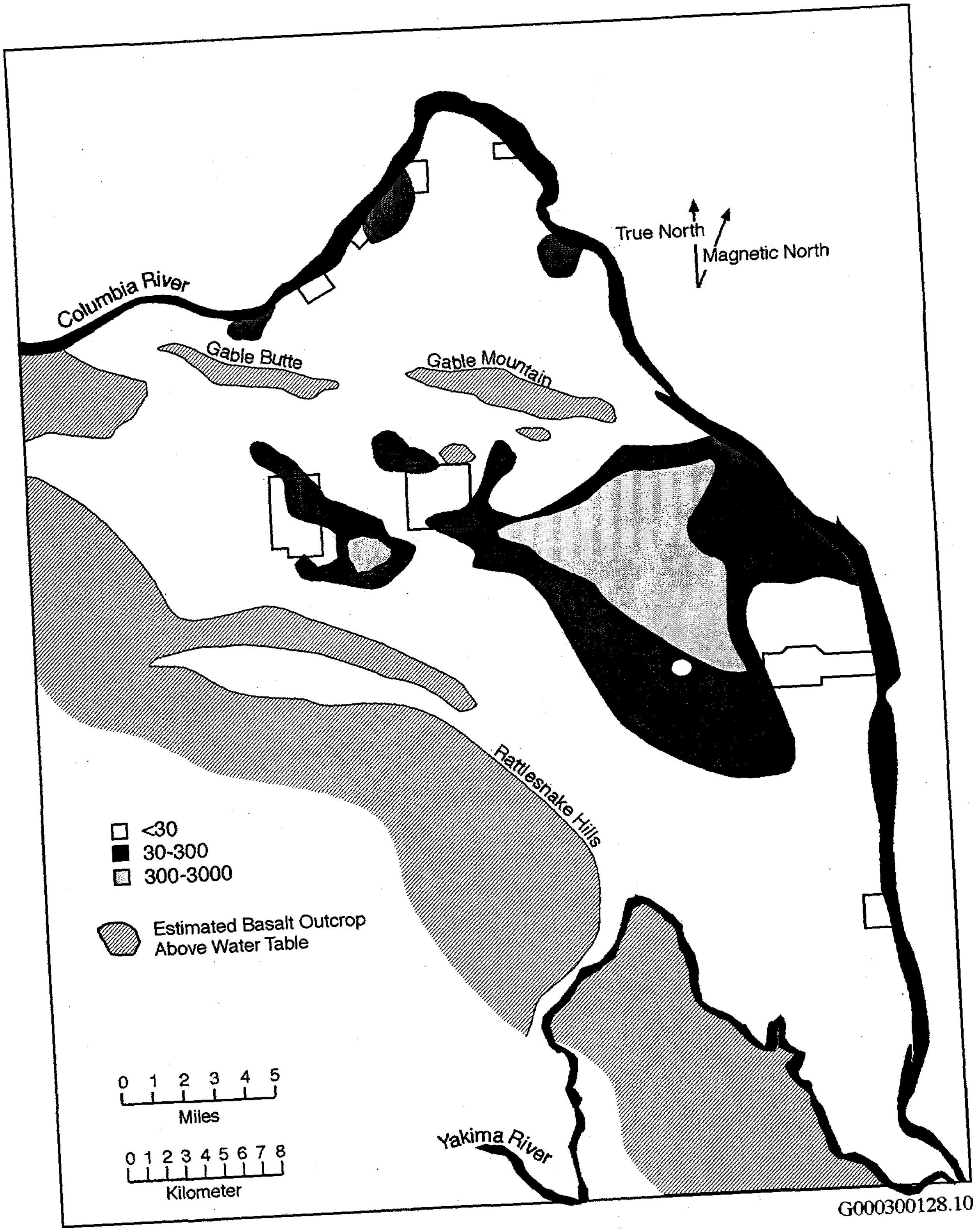

Figure 4.7. Tritium Plume Reported in 1980 Redrawn to Correct Incorrectly Contoured Points

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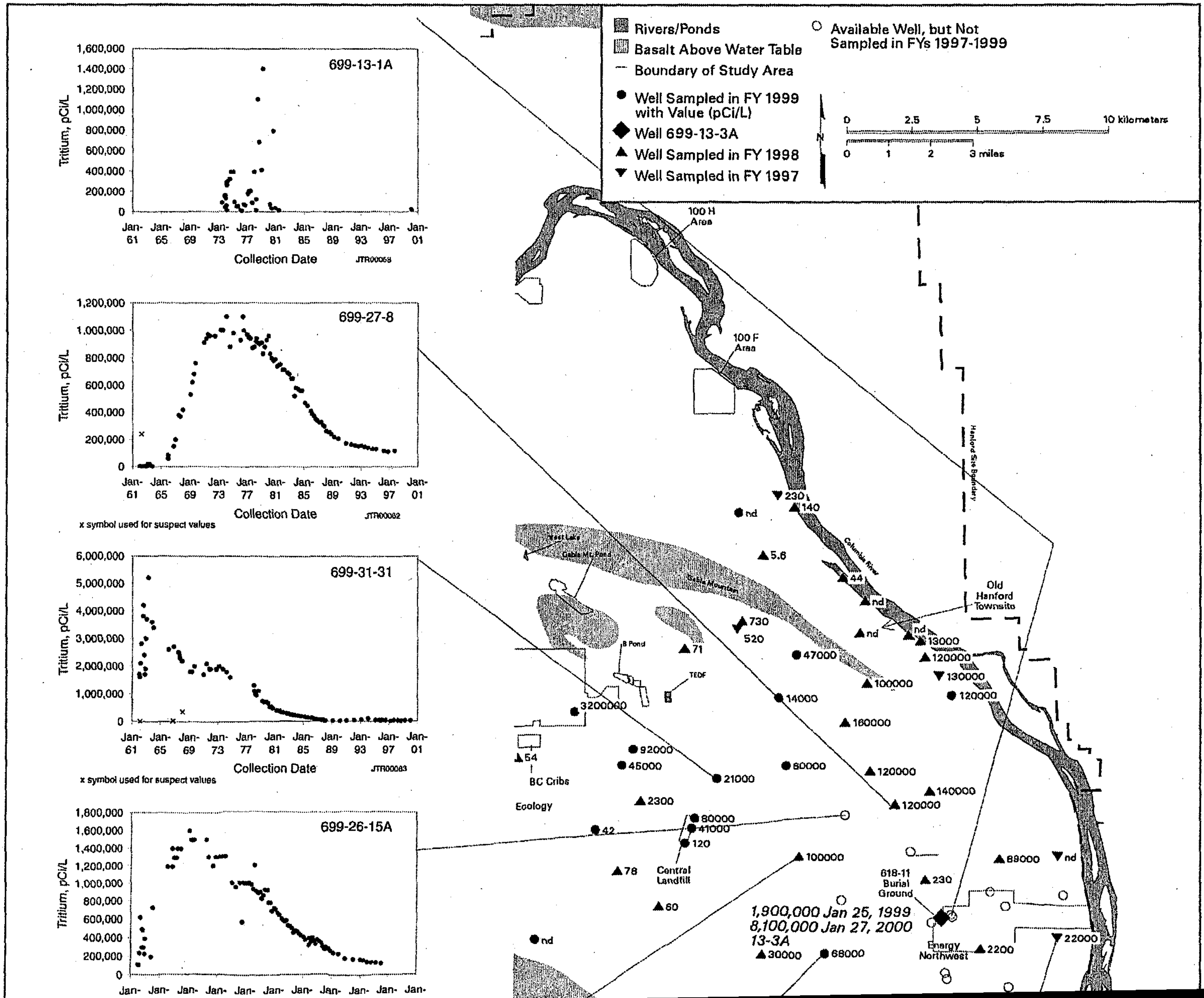
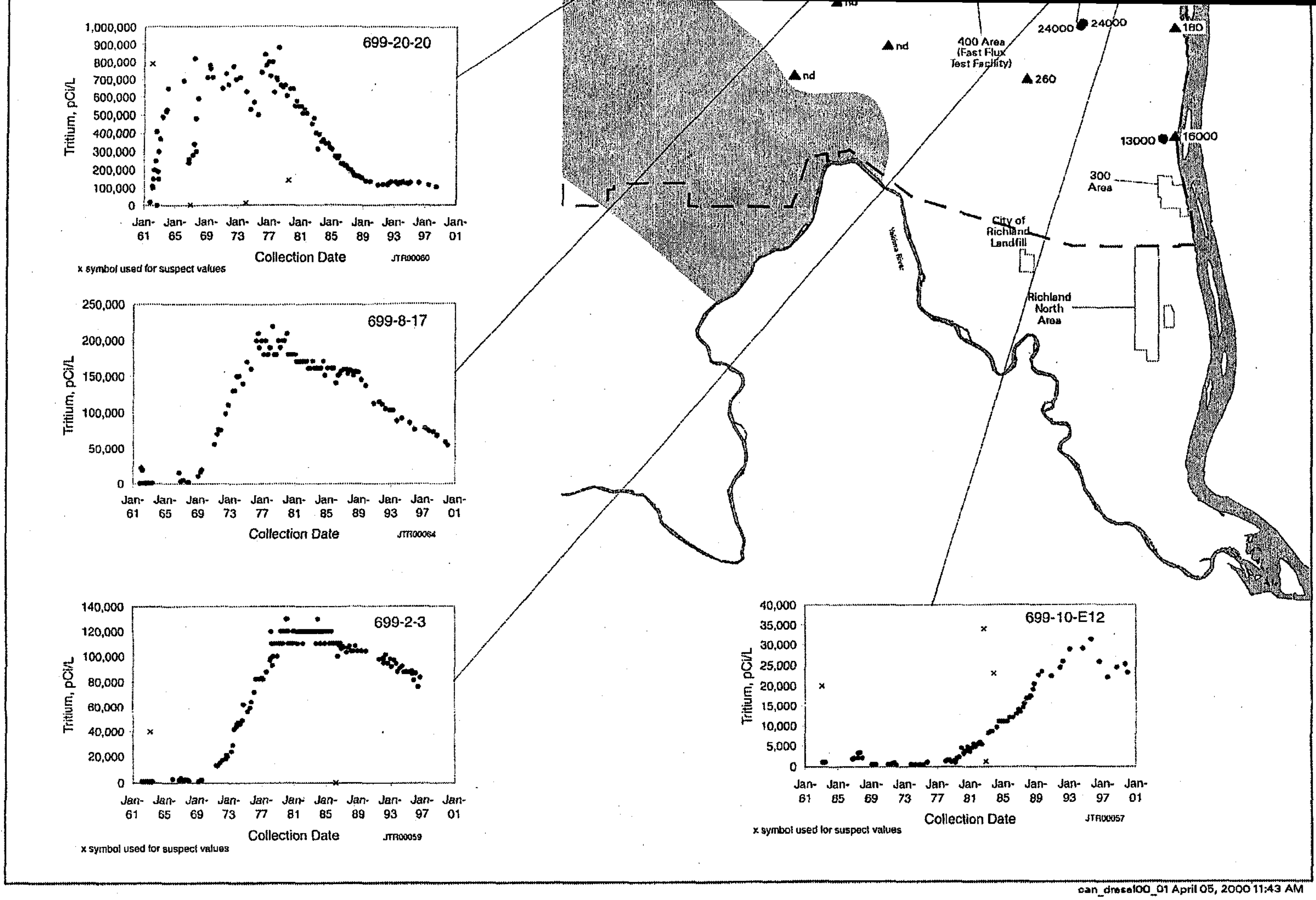
Figure 4.8. Digital Terrain Map of the Hanford Site and Surrounding Areas


▨ Rivers/Ponds
▨ Basalt Above Water Table
— Boundary of Study Area
● Well Sampled in FY 1999 with Value (pCi/L)
◆ Well 699-13-3A
▲ Well Sampled in FY 1998
▼ Well Sampled in FY 1997
○ Available Well, but Not Sampled in FYs 1997-1999
0 2.5 5 7.5 10 kilometers
0 1 2 3 miles
N
100 H Area
100 F Area
Hanford Site Boundary
Columbia River
Gable Mountain
West Lake
Gable Mt. Pond
B Pond
TEDF
BC Cribs
Ecology
Central Landfill
Old Hanford Townsite
618-11 Burial Ground
Energy Northwest
1,900,000 Jan 25, 1999
8,100,000 Jan 27, 2000
13-3A
230
140
nd
5.6
44
nd
nd
nd
13000
120000
130000
120000
730
520
71
47000
100000
14000
160000
3200000
92000
45000
60000
21000
120000
140000
120000
54
2300
80000
41000
120
42
78
60
100000
89000
nd
230
22000
2200
30000
68000
nd
699-13-1A
Tritium, pCi/L
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Jan-61 Jan-65 Jan-69 Jan-73 Jan-77 Jan-81 Jan-85 Jan-89 Jan-93 Jan-97 Jan-01
Collection Date
JTR00058
699-27-8
Tritium, pCi/L
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Jan-61 Jan-65 Jan-69 Jan-73 Jan-77 Jan-81 Jan-85 Jan-89 Jan-93 Jan-97 Jan-01
Collection Date
JTR00082
x symbol used for suspect values
699-31-31
Tritium, pCi/L
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Jan-61 Jan-65 Jan-69 Jan-73 Jan-77 Jan-81 Jan-85 Jan-89 Jan-93 Jan-97 Jan-01
Collection Date
JTR00083
x symbol used for suspect values
699-26-15A
Tritium, pCi/L
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Jan- Jan- Jan- Jan- Jan- Jan- Jan- Jan- Jan- Jan- Jan-



can_dresel00_01 April 05, 2000 11:43 AM

Figure 4.9. Tritium Concentration Trends in Selected Wells Upgradient and Near the 618-11 Burial Ground

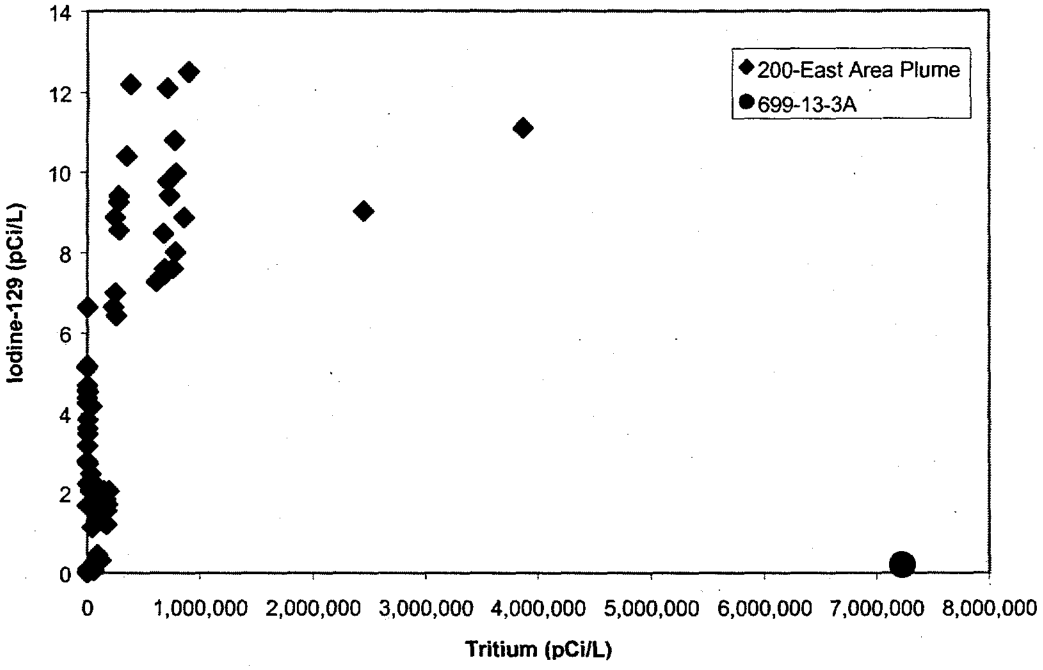


Figure 4.10. Comparison of Tritium vs. Iodine-129 for the 200 East Area Plume and Well 699-13-3A

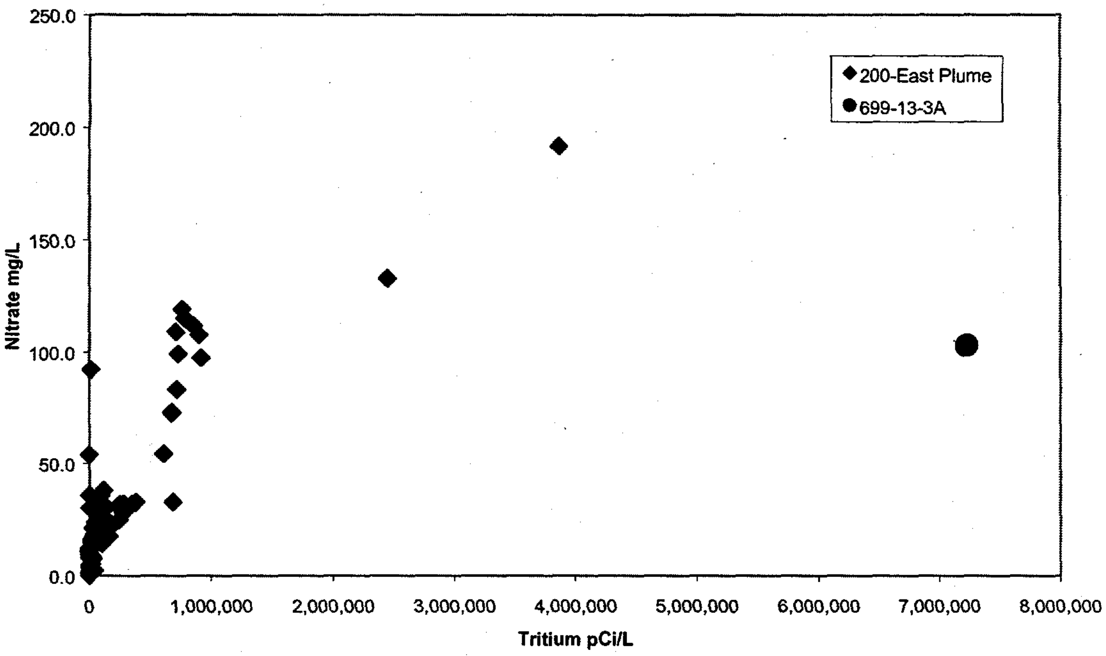


Figure 4.11. Comparison of Tritium vs. Nitrate for the 200 East Area Plume and Well 699-13-3A

5.0 Conclusions

The lack of high tritium concentrations upgradient from the 618-11 burial ground suggests that the burial ground is the source of the tritium. A local source is also suggested by the lack of correlation with downgradient wells. Currently the plume at concentration levels greater than seen in the regional tritium plume from the 200 East Area has only been identified in well 699-13-3A. This indicates a fairly narrow plume that cannot be tracked by the current well coverage. The levels of contamination do not appear explainable by either a source in the 200 East Area or from Energy Northwest activities. Iodine-129 and nitrate concentrations are low compared to the tritium concentration in well 699-13-3A producing a signature distinctly different from the 200 East Area plume. The lack of co-contaminants, with the possible exception of nitrate and minor amounts of technetium-99, suggests that the specific source either does not contain co-contaminants or that the tritium is migrating significantly faster than other contaminants. The identification of the burial ground as the probable source of tritium is consistent with circumstantial evidence of the history of tritium production research at the Hanford Site and the possible disposal of materials that may have been used in that research. However, it is possible that other transuranic materials known to have been disposed to the burial ground may have contained tritium impurities.

The source of the tritium at concentrations greater than 1,000,000 pCi/L seen in this vicinity in the late 1970s is still not unequivocally defined. However, the timing and magnitude of the arrival of tritium in water supply wells 699-13-1A and 699-13-1B are approximately what would be expected if the source of the tritium was in the 200 East Area. The presence of low-permeability sediments and historically low tritium concentrations in wells upgradient from the 618-11 burial ground, indicate geologic constraints on the transport of tritium into this area. A local source for the tritium seen in the 1970s must be considered a possibility since the current concentrations in well 699-13-3A indicate a source of tritium at the 618-11 burial ground. However, further assessment would be needed to determine if the possible release rate of tritium from the waste and travel time through the vadose zone and groundwater are rapid enough to account for the arrival of tritium in wells 699-13-1A and 699-13-1B in the late 1970s – approximately 15 years after the burial ground was used.

Gross beta measured in well 699-13-3A, located immediately downgradient of the 618-11 burial ground, was increasing slowly prior to the Phase I sampling. Gross beta measurements for the Phase I sample were somewhat lower. The gross beta content appears to be attributable to technetium-99 that is present in the regional plume from the 200 East Area. Thus, no causal relationship to the burial ground has been established.

No co-contaminants have been clearly associated with the tritium plume. Nitrate is present in this area at concentrations that are elevated compared to the regional tritium plume from the 200 East Area. The extent of the nitrate and the proportions of major anions in different wells indicate that the nitrate source probably is not the 618-11 burial ground. The region of elevated nitrate extends for considerable distance north of the burial ground. The source of the nitrate has not been determined.

A low level of carbon tetrachloride and trichloroethene in groundwater may also have a source in the 618-11 burial ground, but further monitoring is needed to rule out contamination issues and to establish a trend. The only semivolatile organic constituent detected, bis(2-ethylhexyl) phthalate is likely attributable to laboratory contamination.

Uranium was detected at levels above the proposed maximum contaminant level of 20 µg/L in several wells, but the distribution does not indicate a source in the 618-11 burial ground. Further monitoring would be needed to establish a source and to understand the variations in natural uranium concentrations that may result from lithologic variation in the area.

The wells sampled in this phase of the investigation place only rough boundaries on the extent of tritium contamination. The downgradient and lateral extent will be addressed in follow-on work. The Phase I investigation did not assess the vertical extent of contamination and that will also be addressed in subsequent work. The Phase I investigation was not designed to address specific sources within the burial ground. A strategy for investigating whether the tritium contamination can be tied to specific parts of the burial ground is being developed.

6.0 References

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Appendix A

Sample and Analysis Instructions for Special Sampling of High Concentration Tritium and Surrounding Wells Near the 618-11 Burial Ground

Revision 1

Sample and Analysis Instructions
For Special Sampling of High Concentration Tritium and Surrounding Wells Near the 618-11 Burial Ground

Revision 1

April 17, 2000

Revision 1 updates the attachments to the plan and includes minor editorial corrections.

Prepared by:

P. Evan Dresel   Date
Hanford Groundwater Project

Jane V. Borghese   Date
Groundwater Vadose Integration Project

Approval:

Stuart P. Luttrell   Date
Groundwater Monitoring Task Lead
Hanford Groundwater Project

James G. Bush   Date
Group Leader
Field Hydrology and Geochemistry Group
Pacific Northwest National Laboratory

Introduction

In January, 1999 a tritium level of 1,860,000 pCi/L was detected in well 699-13-3A, located near the 618-11 burial ground, just west of the Energy Northwest complex. This value was confirmed by reanalysis. A sample from January 2000 contained approximately 8,000,000 pCi/L of tritium. These levels are of concern because they are far above levels reported in the large tritium plume that extends from the 200 East Area through the area.

The immediate task is to determine the extent of the anomalously high tritium concentrations and to provide data to distinguish the source. Three potential sources are to be investigated:

- A large scale tritium plume extends from the 200 East Area through this vicinity. Other contaminants in this tritium plume include iodine-129, nitrate, and low levels of technetium-99. Cobalt-60 has been detected in this plume in the past, but levels are currently near or below the detection limit. The sampling will include a broad range of radionuclides, and nitrate to look for signatures indicative of a 200 Area source.
- Some tritium is released from reactor operations at Energy Northwest. Some of the tritium is discharged to ground with storm water run off or through other systems. This tritium is not expected to contain the other contaminants found in the large plume but full research of the concentrations and distribution of the tritium from Energy Northwest has not been performed. The sampling will provide information on spatial distribution and levels to compare to what may be possible from this source.
- The 618-11 burial grounds received a variety of transuranic and other radioactive waste from the 300 Area. The waste may have included tritium and organic compounds. The sampling will include a wide range of radionuclides to look for materials which may indicate a source in the burial ground and to support the definition of possible exposure scenarios.

Sampling will be restricted to existing wells that do not require rehabilitation activities prior to sampling. Wells with no dedicated pump will be sampled with a portable pump, bailer, or air-lift. The sampling will concentrate on wells completed at the top of the unconfined aquifer, but selected deeper wells will be screened for tritium. Wells downgradient and upgradient from the burial ground will be included.

This plan is the initial effort of what is expected to be a more complete evaluation of the contaminant distribution around the 618-11 burial round. Additional plans will control these activities. This plan will be considered a supplement to the Integrated Monitoring Plan for the Hanford Groundwater Monitoring Project (September 1999, PNNL-11989, Rev. 1). This plan was developed according to the attached data quality objectives Process documentation (Attachment 1).

Task Organization

These instructions were developed by the Hanford Groundwater Project at Pacific Northwest National Laboratory and the Environmental Restoration Contract Groundwater Vadose Integration Project. Coordination and scheduling of the sampling activity is performed by the Hanford Groundwater Project Sampling and Analysis Task. Environmental Restoration Contractor Field Support Group will provide support services. Sampling services will be provided by Waste Management Technical Services under contract to Pacific Northwest National Laboratory.

Analytes of Interest

The constituents for which sampling will be conducted and a brief rationale for their selection follows, not all constituents will be analyzed in all wells.

Tritium – This is the target constituent and has been detected at high levels. The concentrations in the surrounding area typically range between less than 1,000 to 80,000 pCi/L.

Iodine-129 – This is a co-contaminant in the 200 East Area tritium plume but typically is found at less than 1 pCi/L in the surrounding area.

Gross alpha – This is a general screen for alpha emitting radionuclides. It may also provide a quality control check on the measurement of specific alpha emitters such as uranium included in the analyte list.

Gross beta – This is a general screen for beta emitting radionuclides. It may also provide a quality control check on the measurement of specific beta emitters such as strontium-90 and technetium-99.

Gamma scan – This provides data on the potential presence of cobalt-60 and other gamma emitters. This will help to characterize sources and will provide assurance that other fission products are not being transported in groundwater.

Strontium-90 – This is indicative of reactor operations in some situations but is not expected from the 200 Area plumes.

Technetium-99 – Minor amounts of technetium-99 are found in the plume from the 200 East Area and will help define sources.

Uranium isotopes – The measurement of concentrations of the different uranium isotopes may help define sources of contamination because the different sources may have different isotopic ratios. For example, depeleted uranium has been found in the vicinity of the 618-10 burial ground, which received similar waste to the 618-11 burial ground.

Plutonium isotopes – Plutonium generally has a low mobility in Hanford groundwater. However, since the disposal at the burial ground included transuranic waste, plutonium will be included in the analyte list for selected near-by wells.

Anions – These constituents provide nitrate and general water quality data. Nitrate is known to occur in the plume from the 200 East Area.

Filtered metals – These constituents provide general water quality data, a screen for trace hazardous metals (e.g. chromium) and quality control on analysis through calculation of charge balance.

Alkalinity – Analysis for alkalinity provides general water quality data and quality control on analysis through calculation of charge balance.

Volatile Organic Compounds – These constituents may be present in the burial ground. Samples from wells in the immediate vicinity of the burial ground will be analyzed for these constituents.

SemiVolatile Organic Compounds – These constituents may be present in the burial ground. Samples from wells in the immediate vicinity of the burial ground will be analyzed for these constituents.

Samples will be analyzed for the above constituents under the Hanford Site Analytical Contract. See Attachment 2 for the Sample Analytical Form. Detection limits are specified in the contract for the primary analytical laboratory.

Field measurements will be performed for parameters, pH, specific conductance, temperature, dissolved oxygen, and turbidity.

Wells will be purged and sampled per documented procedures implemented by Waste Management Technical Services (WMNW-CM-004. 1998. Operational Environmental Monitoring. Waste Management Federal Services, Northwest Operations, Inc., Richland, Washington).

Target Wells

The wells to be sampled are included in Table 1, which also lists the analytes to be included with each well. Wells in Table 1 are grouped according to similar location and purpose. The grouping is for information only. As-built diagrams or other well construction information are available for many of the wells to be sampled and are attached as Attachment 3 to these instructions. The well locations are shown in Figures 1 and 2.

Schedule

The monitoring defined in this plan is for a one-time sampling event. Future monitoring will be based on the results of this sampling. In addition, well 699-13-3A will be sampled monthly for selected constituents until further notice.

Quality Control Samples

Quality control samples will be generated to evaluate aspects of the sampling and analysis process that may impact the reliability of groundwater data. For example, field blanks are collected and analyzed to assess the potential for sample contamination and false detection of constituents. Similarly, field duplicates and split samples provide measures of sampling and analysis precision and data comparability. Additional quality control samples such as method blanks, laboratory control samples, and matrix spikes are also prepared and analyzed by analytical laboratories to help to ensure that laboratory measurements are accurate and reliable.

For the 618-11 burial ground sampling event, field quality control samples shall include two full-trip blanks, two field duplicates, one split sample, and several field transfer and equipment blanks. In general, the field quality control samples shall be analyzed for all constituents monitored at the associated well. The split sample will be analyzed for tritium only and the field transfer blank is applicable only to volatile organic compounds. The split sample and one of the field duplicates shall be collected from well 699-13-3A to provide additional confirmation of previous elevated tritium measurements. At least two equipment blanks shall be collected for each type of nondedicated sampling equipment (e.g. portable pump, bailer, Kabis sampler) that is used for groundwater sampling to help ensure that groundwater samples are not contaminated from sampling equipment. One equipment blank shall be collected before sampling well 699-13-3A which will be sampled with a portable pump. A second equipment blank will be collected after the sampling of well 699-13-3A to ensure there is no transfer of contamination to sample collection at other wells. One additional portable pump equipment blank will be collected where the portable pump is used on other wells. One field transfer blank will be collected on each day where wells are sampled for volatile organic compounds. The field transfer blanks are used to check for sample contamination caused by conditions at the sampling site (e.g. exhaust fumes from vehicles).

Cosampling of wells by Washington State Department of Health, Washington State Department of Ecology, and Energy Northwest will be performed as requested.

Health and Safety

Subcontractors will follow their established health and safety procedures for groundwater sampling activities. Although higher than usual levels of tritium have been found in this area, the levels do not require additional actions to reduce exposure or additional monitoring of the work site.

Data Quality Objectives for initial follow-up sampling for high tritium levels detected near the 618-11 burial ground

1) Problem Statement

In January 1999 a tritium level of 1,860,000 pCi/L was detected in well 699-13-3A located near the 618-11 burial ground, just west of the Energy Northwest complex. This value was confirmed by reanalysis. A sample from January 2000 contained approximately 8,000,000 pCi/L of tritium. These levels are of concern because they are far above levels reported in the large tritium plume that extends from the 200 East Area through the eastern part of the Hanford Site.

The immediate task is to determine the extent of the anomalously high tritium concentrations and to provide data to distinguish the source.

2) Specify the Decision

Does the high level tritium extend beyond the known well and are co-contaminants present which point to one of three possible sources for the contamination:

- the PUREX plume
- the 616-11 burial ground
- the Energy Northwest reactor operations

3) Identify the Inputs to the Decision

Inputs include analytical results from samples collected in groundwater wells and results of field parameters measured in groundwater wells. Also water level measurements will be taken in wells.

4) Boundaries

The spatial and temporal boundaries on this initial investigation are as follows:

- Existing monitoring wells
- Downgradient from the burial ground to the river
- Nearby upgradient wells
- Wells which can be sampled immediately
- Emphasis in unconfined aquifer with possible screening in confined aquifer and lower unconfined.

5) Decision Rule

If the high-level tritium plume extends to other wells sampled, then use this information in defining locations for further monitoring and for evaluating transport rates. If the chemical signatures indicate a source in the burial ground, then use this information to plan further evaluation of the site. If the signatures indicate a source at Energy Northwest, inform that company. If the signatures indicate a 200 Area source, then investigate the transport mechanism and sources that would lead to this occurrence and implications for site decisions.

Screening samples in deeper aquifers will be for tritium only.

6) Specify Tolerable Limits on Decision Errors

All analytical results will be performed by standard methods and procedures in order to provide defensible data. No statistical evaluation of well sampling location is required. The data are not immediately expected to be evaluated using a statistical approach.

7) Optimize the Design

The design is developed in the sampling and analysis plan.

Attachment 2

Sample Authorization Form

PNNL
SAMPLING AUTHORIZATION FORM

SAF Number: Y00-001 **Rev:** 0

Program Type SURV **Project ID** PRIFEB00

Project Type Characterization **Operable Unit** N/A

Task ID **Round Number** 0

SAF Title SITEWIDE SURVEILLANCE PRIORITY GW, FEBRUARY 2000

Task Manager STEWART, DL **Requester** HENRY, PS

Charge Codes-

Analytical Services F08921

Project Coordinator STEWART, DL

Estimated Start Date 02/01/00 **Estimated Completion Date** 02/29/00

SampleArea Hanford Site **Estimated Number of Samples** 43

Sampling Organizations

WMFS, WW Operations

Laboratory/Turnaround/Data Deliverable **Matrix** Water

Primary: 300 Analytical Services/ 15 Days/Single Sheet Summary
Primary: Field Analysis Activities/ Field/Field
Primary: Quanterra Incorporated/ 7 Days/Single Sheet Summary
Primary: Quanterra St. Louis/ 7 Days/Single Sheet Summary
Primary: TMA/RECRA/ 7 Days/Single Sheet Summary
Primary: Waste Sampling & Characterization/ 24 Hours/Single Sheet Summary

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SAF Comment

PRIORITY TURNAROUND 7 DAYS FAX/45 DAYS SUMMARY AND 15 DAY FAX/45 DAYS SUMM. SEE COC FOR SPECIFIC TURNAROUND TIMES.
TOTAL ACTIVITY EXEMPTION DOES NOT APPLY FOR ALL SAMPLES
REPORT TRI-BUTYL PHOSPHATE W/SEMI-VOA 8270
Submit invoices & deliverables to DL STEWART, PNNL. BATCH ALL SAMPLES SUBMITTED UNDER THIS SAF INTO ONE SDG, NOT TO EXCEED PRIORITY TURNAROUND TIME.

COC Comments

PRIORITY TURNAROUND 7 DAYS FAX/45 DAYS SUMMARY AND 15 DAY FAX/45 DAYS SUMM. SEE COC FOR SPECIFIC TURNAROUND TIMES.

Date 02/05/00 SAFStatus: Final 2/4/00 10:30:00 PM

BHI-EE-002 (12/94)

PNNL

SAMPLING AUTHORIZATION FORM

SAF Number: Y00-001 **Rev:** 0

TOTAL ACTIVITY EXEMPTION DOES NOT APPLY FOR ALL SAMPLES
REPORT TRI-BUTYL PHOSPHATE W/SEMI-VOA 8270
Submit invoices & deliverables to DL STEWART, PNNL. BATCH ALL SAMPLES SUBMITTED UNDER THIS SAF INTO ONE SDG, NOT TO EXCEED PRIORITY TURNAROUND TIME.

Date 02/05/00 SAFStatus: Final 2/4/00 10:30:00 PM

BHI-EE-002 (12/94)

PNNL

Field Sampling Requirements

Laboratory Analysis

Laboratory: **300 Analytical Services**

Matrix: Water

Parameter / Analysis	Reference Method	Container / Volume	VolReq	Preservation	Holding Times
Technetium-99 Technetium-99	TC99_SEP_LSC	P 4000 mL	Minimum	HCl to pH <2	6 Months

Key to Container Types

G = Glass
Gs = Glass w/ septum cap
Gs*= Glass w/septum cap- no head space in container
P = Plastic (Polyethylene)

aG = Amber Glass
aGs = Amber Glass w/ septum cap
aGs*= Amber Glass w/septum cap- no head space in container

FSR Comment:

SAF Number: Y00-001 Rev: 0 Page 1 SAF Status: Final 2/4/00 10:30:00 PM

BHI-EE-001 (12/94)

PNNL

Field Sampling Requirements

Laboratory Analysis

Laboratory: **Field Analysis Activities**

Matrix: Water

Parameter / Analysis	Reference Method	Container / Volume	VolReq	Preservation	Holding Times
DISSOLVED OXYGEN Dissolved Oxygen	360.1_OXYGEN_FLD		None	None	ASAP
CONDUCTIVITY Conductivity	120.1_CONDUCT_FLD		None	None	None
TEMPERATURE Temperature	170.1_TEMP_FLD		None		
TURBIDITY Turbidity	180.1_TURBIDITY_FLD		None		
pH ANALYSIS pH Measurement	PH_ELECT_FLD		None	None	None

Key to Container Types

G = Glass
Gs = Glass w/ septum cap
Gs*= Glass w/septum cap-
no head space in container
P = Plastic (Polyethylene)

aG = Amber Glass
aGs = Amber Glass w/ septum cap
aGs*= Amber Glass w/septum cap-
no head space in container

FSR Comment:

SAF Number: Y00-001 Rev: 0 Page 2 SAF Status: Final 2/4/00 10:30:00 PM

BHI-EE-001 (12/94)

PNNL

Field Sampling Requirements

Laboratory Analysis

Laboratory: **Quanterra Incorporated**

Matrix: Water

Parameter / Analysis	Reference Method	Container / Volume	VolReq	Preservation	Holding Times
906.0_H3_LSC: Tritium (1) Tritium	906.0_H3_LSC	P 1000 mL	Full QC	None	6 Months
9310_ALPHABETA_GPC: Alpha + Gross alpha, Gross beta	9310_ALPHABETA_GPC	P 1000 mL	Full QC	HNO3 to pH <2	6 Months
Activity Scan No CAS	ACTIVITY_SCAN	P 20 mL	Minimum	None	6 Months
GAMMA_GS: List-1 (9) Antimony-125, Beryllium-7, Cesium-134, Cesium-137, Cobalt-60, Europium-154, Europium-155, Potassium-40, Ruthenium-106	GAMMA_GS	G/P 4000 mL	Full QC	HNO3 to pH <2	6 Months
I129_SEP_LEPS_GS: I-129 (1) Iodine-129	I129_SEP_LEPS_GS	G/P 4000 mL	Full QC	None	6 Months
PUISO_PLATE_AEA: Pu-238 + 23 Plutonium-238, Plutonium-239/240	PUISO_PLATE_AEA	G/P 1000 mL	Full QC	HNO3 to pH <2	6 Months
SRTOT_SEP_PRECIP_GPC: Tot Total beta radiostrontium	SRTOT_SEP_PRECIP_GPC	G/P 3x1000 mL	Full QC	HNO3 to pH <2	6 Months
TC99_ETVDSK_LSC: Tc-99 (1) Technetium-99	TC99_ETVDSK_LSC	P 500 mL	Full QC	HCl to pH <2	6 Months
UISO_PLATE_AEA: List-1 (3) Uranium-234, Uranium-235, Uranium-238	UISO_PLATE_AEA	G/P 1000 mL	Full QC	HNO3 to pH <2	6 Months
UTOT_KPA: Uranium (1) Uranium	UTOT_KPA	G/P 500 mL	Full QC	HNO3 to pH <2	6 Months

Key to Container Types

G = Glass
Gs = Glass w/ septum cap
Gs* = Glass w/septum cap- no head space in container
P = Plastic (Polyethylene)

aG = Amber Glass
aGs = Amber Glass w/ septum cap
aGs* = Amber Glass w/septum cap- no head space in container

FSR Comment:

SAF Number: Y00-001 Rev: 0 Page 3 SAF Status: Final 2/4/00 10:30:00 PM

BHI-EE-001 (12/94)

PNNL

Field Sampling Requirements

Laboratory Analysis

Laboratory: **Quanterra St. Louis**

Matrix: Water

Parameter / Analysis	Reference Method	Container / Volume	VolReq	Preservation	Holding Times
8260_VOA_GCMS: List-2 (55)	8260_VOA_GCMS	aGs* 3x40 mL	Full QC	HCl or H2SO4 to pH <2 Cool 4C	14 Days
1,1,1,2-Tetrachloroethane, 1,1,1-Trichloroethane, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, 1,1-Dichloroethane, 1,1-Dichloroethene, 1,2,3-Trichloropropane, 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, 1,2-Dichloroethane, 1,2-Dichloroethene(Total), 1,2-Dichloropropane, 1,4-Dioxane, 2-Butanone, 2-Hexanone, 4-Methyl-2-Pentanone, Acetone, Acetonitrile, Acrolein, Allyl chloride, Benzene, Bromodichloromethane, Bromoform, Bromomethane, Carbon disulfide, Carbon tetrachloride, Chlorobenzene, Chloroethane, Chloroform, Chloromethane, Chloroprene, Dibromochloromethane, Dibromomethane, Dichlorodifluoromethane, Ethyl cyanide, Ethyl methacrylate, Ethylbenzene, Iodomethane, Isobutyl alcohol, Methacrylonitrile, Methyl methacrylate, Methylenechloride, Styrene, Tetrachloroethene, Toluene, Trichloroethene, Trichloromonofluoromethane, Vinyl acetate, Vinyl chloride, Xylenes (total), cis-1,2-Dichloroethylene, cis-1,3-Dichloropropene, trans-1,2-Dichloroethylene, trans-1,3-Dichloropropene, trans-1,4-dichloro-2-butene					
6010_METALS_ICP: List-1 (19)	6010_METALS_ICP	G/P 500 mL	Full QC	HNO3 to pH <2	6 Months
Aluminum, Antimony, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Magnesium, Manganese, Nickel, Potassium, Silver, Sodium, Strontium (elemental), Vanadium, Zinc					
300.0_ANIONS_IC: List-1 (5)	300.0_ANIONS_IC	P 500 mL	Full QC	Cool 4C	28 Days/48 Hours
Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Sulfate					
310.1_ALKALINITY: Alkalinity (1)	310.1_ALKALINITY	G/P 500 mL	Full QC	Cool 4C	14 Days
Alkalinity					
Activity Scan	ACTIVITY_SCAN	P 20 mL	Minimum	None	ASAP
No CAS					
Semi-VOA - 8270A (App IX)	8270_SVOA_GCMS	aG 4x1000 mL	Full QC	Cool 4C	7/40 Days
1,2,4,5-Tetrachlorobenzene, 1,2,4-Trichlorobenzene, 1,2-Dichlorobenzene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, 1,4-Naphthoquinone, 1-Naphthylamine, 2,2'-Oxybis(1-chloropropane), 2,3,4,6-Tetrachlorophenol, 2,4,5-Trichlorophenol, 2,4,6-Trichlorophenol, 2,4-Dichlorophenol, 2,4-Dimethylphenol, 2,4-Dinitrophenol, 2,4-Dinitrotoluene, 2,6-Dichlorophenol, 2,6-Dinitrotoluene, 2-Acetylaminofluorene, 2-Chloronaphthalene, 2-Chlorophenol, 2-Methylnaphthalene, 2-Methylphenol (cresol, o-), 2-Naphthylamine, 2-Nitroaniline, 2-Nitrophenol, 2-Picoline, 2-secButyl-4,6-dinitrophenol(DNBP), 3,3'-Dichlorobenzidine, 3,3'-Dimethylbenzidine, 3-Methylcholanthrene, 3-Nitroaniline, 4,6-Dinitro-2-methylphenol, 4-Aminobiphenyl, 4-Bromophenylphenyl ether, 4-Chloro-3-methylphenol, 4-Chloroaniline, 4-Chlorophenylphenyl ether, 4-Methylphenol (cresol, p-), 4-Nitroaniline, 4-Nitrophenol, 4-Nitroquinoline-1-oxide, 5-Nitro-o-toluidine, 7,12-Dimethylbenz[a]anthracene, Acenaphthene, Acenaphthylene, Acetophenone, Aniline, Anthracene, Aramite, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(ghi)perylene, Benzo(k)fluoranthene, Benzyl alcohol, Bis(2-Chloroethoxy)methane, Bis(2-chloroethyl) ether, Bis(2-ethylhexyl) phthalate, Butylbenzylphthalate, Chlorobenzilate, Chrysene, Di-n-butylphthalate, Di-n-octylphthalate, Diallate, Dibenz[a,h]anthracene, Dibenzofuran, Diethylphthalate, Dimethoate, Dimethyl phthalate, Diphenylamine, Disulfoton, Ethyl methacrylate, Ethyl methanesulfonate, Famphur, Fluoranthene, Fluorene, Hexachlorobenzene, Hexachlorobutadiene, Hexachlorocyclopentadiene, Hexachloroethane, Hexachlorophene, Hexachloropropene, Indeno(1,2,3-cd)pyrene, Isodrin, Isophorone, Isosafrole, Kepone, Methapyrilene, Methyl methanesulfonate, Methyl parathion, N-Nitroso-di-n-dipropylamine, N-Nitrosodi-n-butylamine, N-Nitrosodiethylamine, N-Nitrosodimethylamine, N-Nitrosodiphenylamine, N-Nitrosomethylethylamine, N-Nitrosomorpholine, N-Nitrosopiperidine, Naphthalene, Nitrobenzene, Nitrosopyrrolidine, O,O,O-Triethyl phosphorothioate, O,O-Diethyl O-2-pyrazinyl phosphorothioate, Parathion, Pentachlorobenzene, Pentachloroethane, Pentachloronitrobenzene (PCNB), Pentachlorophenol, Phenacetin, Phenanthrene, Phenol, Phorate, Pronamide, Pyrene, Pyridine, Safrol, Tetraethyl dithiopyrophosphate, alpha,alpha-Dimethylphenethylamine, m-Cresol, m-Dinitrobenzene, o-Toluidine, p-Dimethylaminoazobenzene, p-Phenylenediamine, sym-Trinitrobenzene					

Key to Container Types

G = Glass
Gs = Glass w/ septum cap
Gs*= Glass w/septum cap-
no head space in container
P = Plastic (Polyethylene)

aG = Amber Glass
aGs = Amber Glass w/ septum cap
aGs*= Amber Glass w/septum cap-
no head space in container

FSR Comment:

Laboratory: **Quanterra St. Louis**

Matrix: Water

Semi-VOA -- 8270A (App IX Add-C Tributyl phosphate	8270_SVOA_GCMS	aG 0x1000 mL	Full QC	Cool 4C	7/40 Days

Key to Container Types

G = Glass	aG = Amber Glass
Gs = Glass w/ septum cap	aGs = Amber Glass w/ septum cap
Gs*= Glass w/septum cap- no head space in container	aGs*= Amber Glass w/septum cap- no head space in container
P = Plastic (Polyethylene)	

FSR Comment:

Field Sampling Requirements

Laboratory Analysis

Laboratory: **TMA/RECRA**

Matrix: Water

Parameter / Analysis	Reference Method	Container / Volume	VolReq	Preservation	Holding Times
Activity Scan No CAS	ACTIVITY_SCAN	P 20 mL	Minimum	None	6 Months
Tritium - H3 Tritium	TRITIUM_DIST_LSC	P 250 mL	Full QC	None	6 Months

Key to Container Types

G = Glass
Gs = Glass w/ septum cap
Gs*= Glass w/septum cap-
no head space in container
P = Plastic (Polyethylene)

aG = Amber Glass
aGs = Amber Glass w/ septum cap
aGs*= Amber Glass w/septum cap-
no head space in container

FSR Comment:

SAF Number: Y00-001 Rev: 0 Page 6 SAF Status: Final 2/4/00 10:30:00 PM

BHI-EE-001 (12/94)

Laboratory: **Waste Sampling & Characterization** **Matrix: Water**

Parameter / Analysis	Reference Method	Container / Volume	VolReq	Preservation	Holding Times
Activity Scan No CAS	ACTIVITY_SCAN	P 20 mL	Minimum	None	6 Months

Key to Container Types

G = Glass
Gs = Glass w/ septum cap
Gs*= Glass w/septum cap- no head space in container
P = Plastic (Polyethylene)

aG = Amber Glass
aGs = Amber Glass w/ septum cap
aGs*= Amber Glass w/septum cap- no head space in container

FSR Comment:

Attachment 3

Well Construction Information

No Well Information Available for Well 699-12-2A

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Air rotary(0→347-ft) Core (347→1,139-ft)
Drilling Fluid Used: Drilling mud
Driller's Name: Air rotary=Burns Core=not documented
Drilling Company: Air=Soil Sampling Core=Boyles Bros
Date Started: Air rotary ND Core 10Oct73

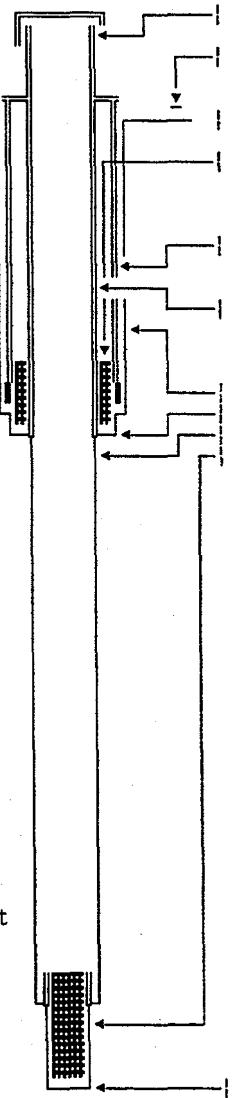
Sample Method: Air returns/ Wireline core
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Puyallup, WA Spokane, WA
Date Complete: Core 01Apr81

WELL NUMBER: 699-2-E14 A8124 TEMPORARY Corehole WELL NO: DB-1
Hanford Coordinates: N/S N 1,633 E/W E 13,572
State Coordinates: N N 406,971.10 E 2,308,893.10
Start Card #: Not documented T11N R28E S 14D1
Elevation Ground surface: 388.44-ft Brass cap

Depth to water: 3.6-ft 1978
(Ground surface)

GENERALIZED STRATIGRAPHY Geologist's Log

0→5: Light brown SILT
5→75: Cse GRAVEL w/SAND & SILT
75→79: Med→cse SAND w/SILT
79→80: Brown SILT w/wood fragments
80→140: GRAVEL w/med→cse SAND
140→145: GRAVEL w/green CLAY
145→165: Green SAND
165→170: Green CLAY
170→180: Green SAND
180→225: Med→cse GRAVEL w/green SAND
225→295: SILT, CLAY & SAND
322→447: Elephant Mountain BASALT
447→456: SANDSTONE [Rattlesnake Ridge Interbed]
456→613: Pomona BASALT
613→618: SANDSTONE [Selah Interbed]
613→672: Esquatzel BASALT, flow II
672→679: TUFF [Gable Mountain Interbed]
679→725: Esquatzel BASALT, flow I
725→732: Tuffaceous SANDSTONE [Cold Creek Interbed]
732→976: Umatilla BASALT
976→1,020: Tuffaceous SANDSTONE [Mabton Interbed]
1,020→>1,139: Priest Rapids BASALT
  1,020→1,104: Lolo flow
  1,104→>1,139: Rosalia flow



Elevation of reference point: [391.40-ft]
(top of 6-in casing)
Height of reference point above ground surface [2.96-ft]
Depth of surface seal [~300→347-ft]
Type of surface seal:
Cement grout between 4 and 6-in casings
6-in ID carbon steel casing (6⅝-in OD) +0.5→325.0-ft
4-in ID carbon steel casing (4½-in OD) +1.0→347.0-ft
Hole diameter.
0→325.0-ft, 7-in nominal
325→347-ft, 6-in nominal
347→1,030-ft, 3.937-in
1,030→1,139-ft, 3.032-in
Borehole drilled depth: [1,139-ft]

DRILLING NOTES:
DB-1 was drilled and cored to 990-ft in 1973. A removable piezometer tube was set @ 942-ft. In 1981 the tube was removed and the hole extended by coring to 1,030-ft using a workover rig. 3.5-in casing was set @ 1,030-ft and the hole was extended to 1,139-ft by coring.

BWIP borehole reclamation in 1988→89 cut the 3.5-in casing @ 1,000-ft and removed it. The remnant casing and open hole below the casing (1,032→1,139-ft) were then cemented.

✓ 7-7-95

1.64 ft 12/30/93

Drawing By: RKL/6N2E14.ASB
Date : 12Sep94
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 699-2-E14

WELL DESIGNATION : 699-2-E14
RCRA FACILITY : Not applicable
CERCLA UNIT : Not applicable
HANFORD COORDINATES : N 1,633 E 13,572 [Aug85-Plant]
LAMBERT COORDINATES : N 406,971.10 E 2,308,893.10 [Aug85-NAD27]
DATE DRILLED : Dec73/Extended Apr81
DEPTH DRILLED (GS) : 990.0-ft/Extended 1,139-ft
MEASURED DEPTH (GS) : Not documented
DEPTH TO WATER (GS) : 3.6-ft, 1978
CASING DIAMETER : 6-in, carbon steel, +0.5↔325.0-ft
4-in, carbon steel, +1.0↔347.0-ft
3.5-in carbon steel, 1,000↔1,030-ft
ELEV TOP CASING : 391.40-ft, (6-in) [15Jan74-Not documented]
ELEV GROUND SURFACE : 388.44-ft, Brass cap [Aug85-Not documented
PERFORATED INTERVAL : Not applicable
SCREENED INTERVAL : Not applicable - open 347↔1,030-ft
COMMENTS : FIELD INSPECTION,
OTHER;
AVAILABLE LOGS : Geologist
TV SCAN COMMENTS : Not applicable
DATE EVALUATED : Not applicable
EVAL RECOMMENDATION : Not applicable
LISTED USE : Waste management/BWIP geohydrologic investigation
CURRENT USER : PNL sitewide w/l monitoring,
PUMP TYPE : None documented
MAINTENANCE :

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Not documented
Driller's Name: Not documented
Drilling Company: USGS
Date Started: Not documented
Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: May50

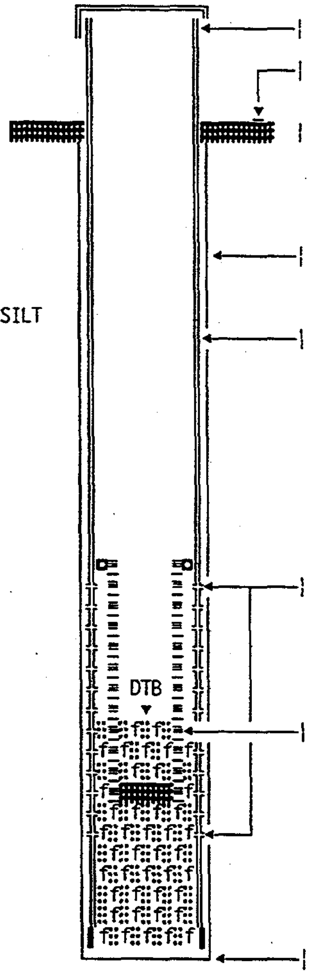
WELL NUMBER: 699-8-17 A5333 TEMPORARY USGS WELL NO: 8.2-17.2
Hanford Coordinates: N/S N 8,200 E/W W 17,125
State Coordinates: N 413,458 E 2,278,179
Start Card #: Not documented T 11N R 27E S 201
Elevation Ground surface: 520.4-ft Estimated

Depth to water: 124-ft 22Jun67
(Ground surface) 123.2-ft 01Jun94

GENERALIZED STRATIGRAPHY . Driller's Log

0-3: Silty SAND
3-13: SAND
13-26: SAND & GRAVEL
26-64: SAND, med-cse
64-103: SAND & GRAVEL
103-127: GRAVEL & SAND
127-132: SAND, fine-med
132-178: SAND & GRAVEL
178-190: SAND, GRAVEL & some tan SILT
190-191: Clayey SILT
191-200: SAND & clayey SILT

REMEDIATIONS:
Sep56 by Gentz
Perforated, 135-150-ft.
Cleaned well to bottom.
Jun67 by Bigham
Cleaned to 160-ft.
Installed screen w/packer.
Swedged liner and put
plug in bottom of screen.



Elevation of reference point: (top of casing) [522.44-ft]
Height of reference point above ground surface [2.0-ft]
Depth of surface seal [ND]
No surface seal documented:
Has 4-ft by 4-ft concrete pad
9-in nominal hole, 0-200-ft
8-in ID carbon steel casing, +2.0--200-ft
8-in casing perforations,
109-132-ft, 4 cuts/rd/ft
135-145, 4 holes/ft
145-150-ft, 1 hole/ft
151-166-ft, cuts not documented
8-in telescoping screen,
101-158-ft, slot not documented
Packer @ 103-ft (nominally lead)
Plug @ 157-ft
Borehole drilled depth: [200.0-ft]
DTB=Depth to bottom,
139.3-ft, 24Sep93

✓
TU 7-7-95

125.28 ft 12/8/94

Drawing By: RKL/6N08W17.ASB
Date : 12Sep94
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 699-8-17

WELL DESIGNATION : 699-8-17
RCRA FACILITY : Not applicable
CERCLA UNIT : Not applicable
HANFORD COORDINATES : N 8,200 W 17,125 [HANFORD WELLS]
LAMBERT COORDINATES : N 413,458 E 2,278,179 [HANCONV]
DATE DRILLED : May50
DEPTH DRILLED (GS) : 200.0-ft
MEASURED DEPTH (GS) : 139.3-ft, 24Sep93
DEPTH TO WATER (GS) : 124.0-ft, 22Jun67
123.2-ft, 01Jun94
CASING DIAMETER : 8-in, carbon steel, +2.0→200-ft (nominal)
ELEV TOP CASING : 522.44-ft, [HANFORD WELLS]
ELEV GROUND SURFACE : 520.4-ft, Estimated
PERFORATED INTERVAL : 109→166-ft
SCREENED INTERVAL : 101→158-ft [HANFORD WELLS]
COMMENTS : FIELD INSPECTION, 24Sep93,
8-in carbon steel casing. Capped and locked
Has 4-ft by 4-ft pad, no posts or permanent identification.
Not in radiation zone.
OTHER:
AVAILABLE LOGS : Driller
TV SCAN COMMENTS : Not applicable
DATE EVALUATED : Not applicable
EVAL RECOMMENDATION : Not applicable
LISTED USE : Sitewide annual water level measurement, 01May91→01Jun94;
CURRENT USER : WHC ES&M w/l monitoring,
PNL sitewide sampling and characterization
PUMP TYPE : Electric submersible
MAINTENANCE :

WELL NAME 699-8-17

CASING ELEV. 522.44 Feet

WELL DEPTH 158.00 Feet

DRILL DEPTH 200.00 Feet

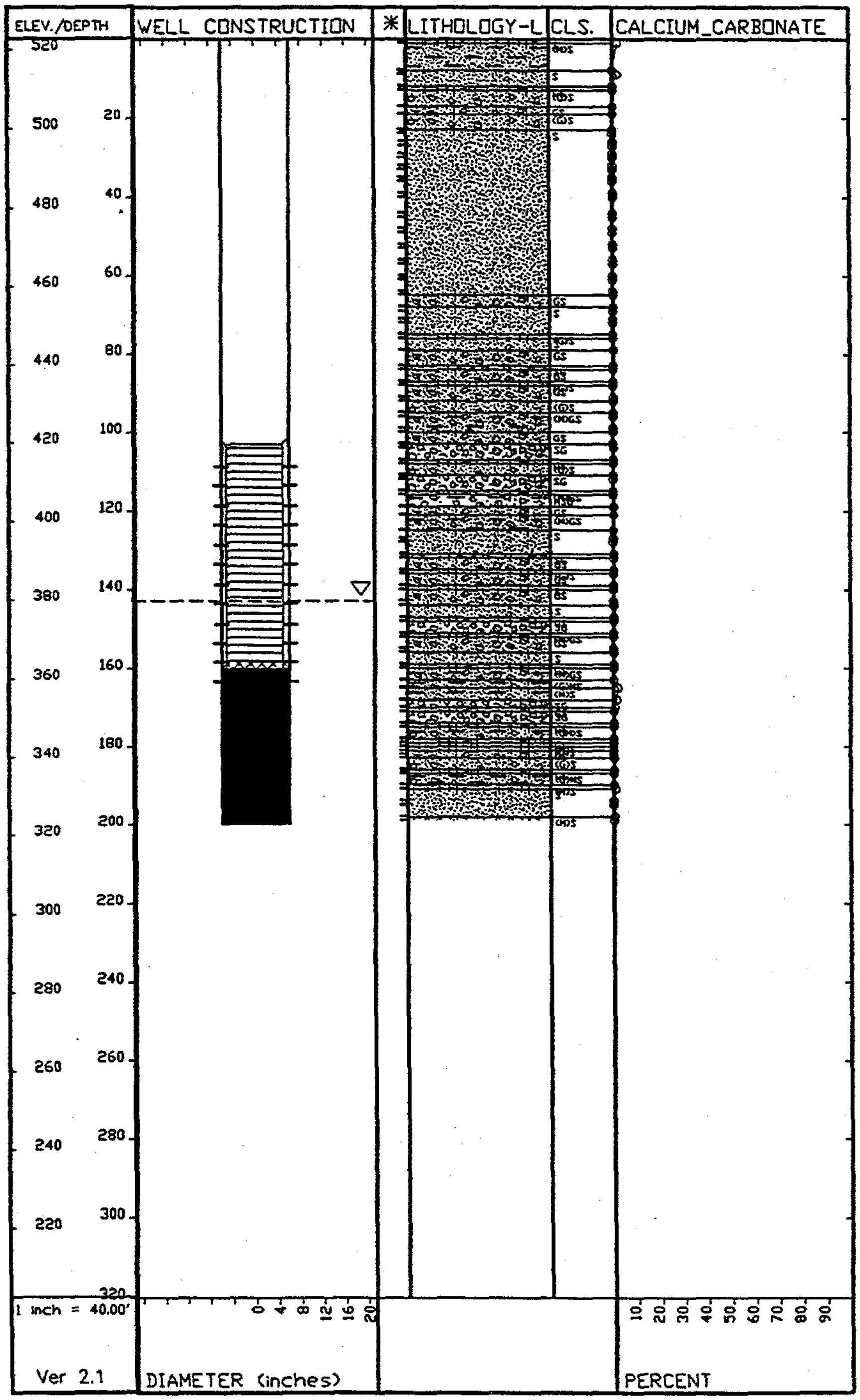
COORDINATES N-S 8200 P

E-W -17125 P

COMPLETION DATE 05/31/50

INITIAL DEPTH TO WATER 143.0 ft

PAGE 1 of 1



WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: H. Hatch
Drilling Company: Hatch Drilling Co
Date Started: 16Dec57

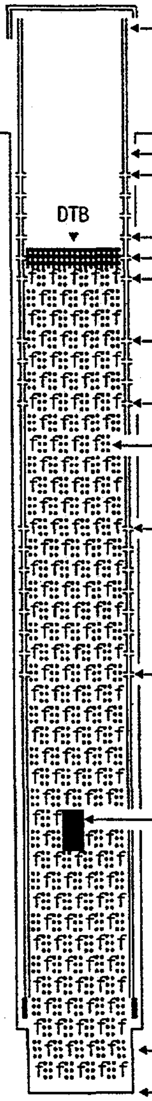
Sample Method: Hard tool (nom)
Additives Used: Bentonite
WA State Lic Nr: Not documented
Company Location: Pasco, WA
Date Complete: 17Jan58

WELL NUMBER: 699-9-E2 A5349 TEMPORARY WELL NO: 699-9-E4
Hanford Coordinates: N/S N 8,577 E/W E 2,324
State Coordinates: N 413,885 E 2,297,627
Start Card #: Not documented T 11N R 28E S 4N3
Elevation Ground surface: 416.1-ft Estimated

Depth to water: 30-ft 17Jan58
(Ground surface) 45.2-ft 01Jun93

GENERALIZED STRATIGRAPHY Driller's Log

0-10: SAND-SILT
10-25: SAND-GRAVEL-SILT
25-30: SAND-GRAVEL-clean
30-35: Cse SAND and clean GRAVEL
35-40: Cse SAND, clean GRAVEL, COBBLES
40-50: COBBLES-GRAVEL-SILT
50-55: COBBLES-GRAVEL-cemented
55-65: Cse SAND & GRAVEL, cemented
65-75: COBBLES-GRAVEL-cemented
75-80: Cemented GRAVEL
80-90: Loose SAND & GRAVEL
90-95: Cemented SAND
95-115: Cemented SAND & GRAVEL
115-134: SAND-GRAVEL
134-138: Fine SAND
138-145: SAND-GRAVEL
145-148: COBBLES-GRAVEL-SAND & SILT
148-150: COBBLES-GRAVEL-SAND
150-155: COBBLES-SAND-SILT
155-190: SAND & GRAVEL
190-195: Sandy blue CLAY
195-215: Mixed GRAVEL, CLAY & SAND
215-225: Hard packed grey CLAY w/GRAVEL
225-230: Grey sand CLAY w/GRAVEL
230-250: Grey sandy CLAY
250-280: Blue CLAY, GRAVEL particles
280-290: Grey CLAY w/GRAVEL
290-305: Grey CLAY w/GRAVEL & SAND
305-315: Grey CLAY w/SAND
315-325: Grey CLAY w/BASALT particles
325-335: Green CLAY w/SAND and BASALT particles
335-340: Black CLAY w/varied ROCK
340-370: Black CLAY w/no rock
370-385: Black CLAY w/ROCK particles
385-405: Black CLAY
405-410: Black CLAY w/SAND, softer
410-424: Basalt GRAVEL, SAND
424-454: BASALT



Elevation of reference point: [418.09-ft]
(top of casing)
Height of reference point above ground surface [-2.0-ft]
Depth of surface seal [ND]
No surface seal documented:
8-in ID carbon steel casing, -+2-424-ft
Cement plug @ 60-ft
8-in casing perforations,
15-75-ft, 1 cut/10-in
44-53-ft, 4 cuts/rd/ft
100-125-ft, 1 cut/12-in
190-255-ft, 1 cut/12-in
Assumed fill below plug
Lost pump @ -333-ft
8-in nominal hole, 424-454-ft
Borehole drilled depth: [454.0-ft]
DTB=Depth to bottom, 57.6-ft, 19Oct93

REMEDIATION/REHABILITATIONS:
Oct67-Nov67 by Hatch & Bigham
Attempted to remove pump. Set 6-in liner which was apparently later removed.
Sep70 by R. Brown & F. Steele
Cleaned well and developed to 333-ft.
May71 by Page
Set plug @ 60-ft? (ND) and perforated 44-53-ft.

✓

7-7-95

Drawing By: RKL/6N09E02.ASB
Date : 12Sep94
Reference : HANFORD WELLS

45.91 ft 12/6/94

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 699-9-E2

WELL DESIGNATION : 699-9-E2
CERCLA UNIT : Not applicable
RCRA FACILITY : Not applicable
HANFORD COORDINATES : N 8,577 E 2,324 [HANFORD WELLS]
LAMBERT COORDINATES : N 413,885 E 2,297,627 [HANCONV]
DATE DRILLED : Jan58
DEPTH DRILLED (GS) : 454-ft
MEASURED DEPTH (GS) : 57.6-ft, 19Oct93
DEPTH TO WATER (GS) : 30-ft, 17Jan58
45.2-ft, 01Jun93
CASING DIAMETER : 8-in, +0.6↔424-ft
ELEV TOP CASING : 418.09-ft, [HANFORD WELLS]
ELEV GROUND SURFACE : 416.1-ft, Estimated
PERFORATED INTERVAL : 15↔255-ft
SCREENED INTERVAL : Not applicable
COMMENTS : FIELD INSPECTION, 19Oct92.
8-in carbon steel casing. Capped and locked
No pad, posts or permanent identification.
Not in radiation zone.
OTHER:
AVAILABLE LOGS : Driller
TV SCAN COMMENTS : Not applicable
DATE EVALUATED : Not applicable
EVAL RECOMMENDATION : Not applicable
LISTED USE : Sitewide semiannual water level measurement, 11Jun91↔01Jun93,
CURRENT USER : WHC ES&M w/l monitoring,
PNL w/l monitoring
PUMP TYPE : Electric submersible
MAINTENANCE :

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Jacobson
Drilling Company: I Haden Drilling Co
Date Started: 06Jul62

Sample Method: Drive barrel Hard tool
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 17Aug62

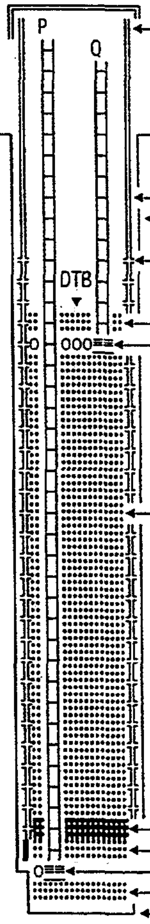
WELL NUMBER: 699-10-E12 A5065 TEMPORARY WELL NO:
Hanford Coordinates: N/S N 10,000 E/W E 12,000
State Coordinates: N 415,333 E 2,307,299
Start Card #: Not documented T 11N R 28E S 10J1
Elevation Ground surface: 428.9-ft Estimated

Depth to water: 74.0-ft 17Aug62
(Ground surface) 71.5-ft 01Jun93

GENERALIZED STRATIGRAPHY · Driller's Log

0-2: Gray SAND
2-10: 20% GRAVEL to fine SAND
10-35: Cemented GRAVEL
35-60: GRAVEL w/10-35% SAND
60-75: GRAVEL, w/25-30% SAND trace CALICHE (Damp)
75-85: GRAVEL & SAND
85-90: Cse SAND w/SILT binder
90-95: 60%SAND, GRAVEL w/SILT binder
95-100: Cse to 85% fine micaceous SAND
100-140: 15-65% SAND, GRAVEL w/SILT binder
140-175: Brown or gray CLAY, 10% GRAVEL and some SAND
175-210: GRAVEL & 30-60% SAND, SILT binder
210-220: GRAVEL & 20-40% SAND, SILT binder and tr white/gray CLAY
220-230: Gray CLAY w/GRAVEL & SAND
230-240: GRAVEL, w/SAND, trace CLAY
240-255: White micaceous SAND
255-260: White SAND, w/blgrn GRAVEL
260-265: GRAVEL w/sand, tr blk CLAY
265-275: Gray CLAY w/GRAVEL
275-293: Gray CLAY w/GRAVEL, some SAND
293-300: Green CLAY w/GRAVEL, some SAND
300-310: Green and black CLAY
310-315: Black CLAY
315-325: Black and blue CLAY
325-330: Blue CLAY
330-340: Blue SHALE
340-345: Blue SHALE/CLAY
345-350: Green SAND
350-358: Basalt GRAVEL & black SAND
358-368: BASALT rock cuttings

REMEDIATION/REHABILITATIONS:
Not documented - installed piezometer
Jan76 by M. Bultena
Removed piezometer and cleaned out to bottom.
Apr77 by M. Bultena
Set two piezometers on 1.5-in tubing.



Elevation of reference point: [430.86-ft]
(top of casing)
Height of reference point above [-2.0-ft]
ground surface

Depth of surface seal [ND]
No surface seal documented:

8-in ID carbon steel casing, +2.2-358-ft
9-in nominal hole, 0-358-ft
8-in casing perforations,
60-139-ft, 6 cuts/rd/ft
140-179-ft, 4 cuts/rd/2-ft
180-219-ft, 6 cuts/rd/ft
220-288-ft, 2 cuts/rd/2-ft
290-338-ft, 4 cuts/rd/2-ft
340-355-ft, 6 cuts/rd/ft

Sand fill, 85-95-ft
Q piezometer, 1.5-in tubing,
#60-slot screen, 95-100-ft
pea gravel pack, 95-100-ft

Sand fill, 100-340-ft

E12 = 73.92 ft 12/6/94
E12P = 37.92 ft 12/6/94
E12Q = 73.72 ft 12/6/94

Cement plug, 340-350-ft
Sand fill, 350-360-ft

P piezometer, 1.5-in tubing,
#60-slot screen, 360-365-ft
pea gravel pack, 360-365-ft

8-in nominal hole, 358-368-ft
Borehole drilled depth: [368.0-ft]

DTB=Depth to bottom,
75.9-ft, 18Oct93

E12 = ~~[illegible]~~ TY OCT 24 1995
E12P = ~~[illegible]~~ TB
E12Q = UU

Drawing By: RKL/6N10E12.ASB
Date : 12Sep94
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 699-10-E12

WELL DESIGNATION : 699-10-E12
CERCLA UNIT : Not applicable
RCRA FACILITY : Not applicable
HANFORD COORDINATES : N 10,000 E 12,000 [HANFORD WELLS]
LAMBERT COORDINATES : N 415,333 E 2,307,299 [HANCONV]
DATE DRILLED : Aug62
DEPTH DRILLED (GS) : 368-ft
MEASURED DEPTH (GS) : 75.9-ft, 18Oct93
DEPTH TO WATER (GS) : 74.0t, 17Aug62
71.5-ft, 01Jun93
CASING DIAMETER : 8-in, +2.2↔358-ft
ELEV TOP CASING : 430.86-ft, [HANFORD WELLS]
ELEV GROUND SURFACE : 428.9-ft, Estimated
PERFORATED INTERVAL : 60↔355-ft
SCREENED INTERVAL : Q piezometer, 95↔100-ft, #60-slot,
P piezometer, 360↔365-ft, #60-slot
COMMENTS : FIELD INSPECTION, 18Oct93,
8-in carbon steel casing. Capped and locked
No pad, posts or permanent identification.
Not in radiation zone.
OTHER:
AVAILABLE LOGS : Driller
TV SCAN COMMENTS : Not applicable
DATE EVALUATED : Not applicable
EVAL RECOMMENDATION : Not applicable
LISTED USE : Sitewide semiannual water level measurement, 01May91↔01Jun93.
CURRENT USER : WHC ES&M w/l monitoring,
PNL sampling, w/l monitoring and characterization
PUMP TYPE : Electric submersible
MAINTENANCE :

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Not documented
Driller's Name: J. Bultena
Drilling Company: Not documented
Date Started: 16Mar82

Sample Method: Drive barrel Button bit
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 02Apr82

WELL NUMBER: 699-12-4D A8252 TEMPORARY WELL NO: 699-12-4B
Hanford Coordinates: N/S N 12,290 E/W W 3,962
State Coordinates: N 417,582 E 2,291,331
Start Card #: Not documented T___ R___ S___
Elevation Ground surface: Not documented

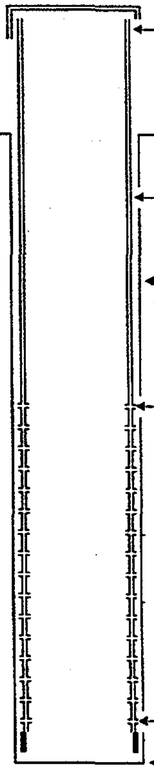
Depth to water: 65.0-ft 23Mar82
(Ground surface)

GENERALIZED STRATIGRAPHY - Driller's Log

0↔3: Brown SAND
3↔14: Brown SAND, COBBLES and BOULDERS
14↔52: Black SAND, small amount GRAVEL
52↔150: RINGOLD

Developed well with turbine pump
2.5-hrs @ 1,000gpm

16May84
D. Garcia removed pump



Elevation of reference point: (top of casing) [ND]
Height of reference point above ground surface [ND]
Depth of surface seal [ND]
No surface seal documented:
8-in ID carbon steel casing, +-0.6↔150.0-ft
9-in nominal hole, 0↔150-ft
8-in casing perforations, 65↔145-ft, 8 cuts/rd/6-in
Borehole drilled depth: [150.0-ft]

JU

OCT 24 1995

Drawing By: RKL/6N12W04D.ASB
Date : 13Sep94
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 699-12-4D

WELL DESIGNATION : 699-12-4D
RCRA FACILITY : Not applicable
CERCLA UNIT : Not applicable
HANFORD COORDINATES : N 12,290 W 3,962 [HANFORD WELLS]
LAMBERT COORDINATES : N 417,582 E 2,291,331 [HANCONV]
DATE DRILLED : Apr82
DEPTH DRILLED (GS) : 150-ft
MEASURED DEPTH (GS) : Not documented
DEPTH TO WATER (GS) : 65.0-ft, 23Mar82
CASING DIAMETER : 8-in, carbon steel, +~0.6↔150.0-ft
ELEV TOP OF CASING : Not documented
ELEV GROUND SURFACE : Not documented
PERFORATED INTERVAL : 65↔145-ft
SCREENED INTERVAL : Not applicable
COMMENTS : FIELD INSPECTION,
OTHER:
AVAILABLE LOGS : Driller
TV SCAN COMMENTS : Not applicable
DATE EVALUATED : Not applicable
EVAL RECOMMENDATION : Not applicable
LISTED USE : Drilled as 618-11 Burial Ground cleanup water supply well
CURRENT USER : PNL sitewide rehabilitation
PUMP TYPE : Electric submersible
MAINTENANCE :
REMEDIATIONS :

Well # 699-13-1A (WNP-2 Well #1)

Note: Carbon paper not ne   ry, as forms are impregnated with chemic   hich automatically reproduces the written material on each underlying copy.

File Original and First Copy with the Division of Water Resources
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. G3-20142
Permit No. G3-20142P

(1) OWNER: Name Washington Public Power Supply Address 301 5th, Richland, WA 99352

(2) LOCATION OF WELL: County Benton ____ ¼ SW ¼ Sec. 5 T. 11 N., R. 28 W.M.

Bearing and distance from section or subdivision corner Hanford Grid N. 12,830 W. 1,340.25

(3) PROPOSED USE: Domestic ☐ Industrial ☒ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☒

(4) TYPE OF WORK: Owner's number of well (if more than one).... 1

New well ☒ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Bored ☐ Cable ☒ Driven ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 8" inches.

Drilled 234 ft. Depth of completed well 244.5 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 8 " Diam. from 440 ft. to 195.5 ft.
Threaded ☐ ____ " Diam. from ____ ft. to ____ ft.
Welded ☒ ____ " Diam. from ____ ft. to ____ ft.

Perforations: Yes ☐ No ☒
Type of perforator used ____
SIZE of perforations ____ in. by ____ in.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.

Also Diam 8" Slot Size ____ F 250.5 To 240.5

Screens: Yes ☒ No ☐
Manufacturer's Name Everdor
Type Stainless Steel Model No. ____
Diam. 8" Slot size ____ from 361.5 ft. to 346.5 ft.
Diam. 8" Slot size ____ from 300.5 ft. to 290.5 ft.

Gravel packed: Yes ☒ No ☐ Size of gravel: 3/4"
Gravel placed from 425 ft. to 400 ft.

Surface seal: Yes ☒ No ☐ To what depth? 15 ft.
Material used in seal Cement Grout
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? — Depth of strata —
Method of sealing strata off —

(7) PUMP: Manufacturer's Name Layne & Bowler
Type: Vertical-line H.P. 25

(8) WATER LEVELS: Land-surface elevation above mean sea level.... 440 ft.
Static level 61.33 ft. below top of well Date 12-28-72
Artesian pressure — lbs. per square inch Date —
Artesian water is controlled by — (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? Hatch Drilling Co
Yield: 200 gal./min. with 17.17 ft. drawdown after 3 hrs.
" " " 20.67 " 16 "
" " " [illegible] " 24 "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
0 min	66.17	30 Min	63.97	60 Min	63.58
10 "	64.25	40 "	63.75	70 "	63.33
20 "	64.17	50 "	63.58	190 "	61.33

Date of test 12-28-72
Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.
Artesian flow — g.p.m. Date —
Temperature of water — Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Loose, Brown, Slightly Silty, Fine Sand	0	2.4
Medium dense to very dense, gray medium to coarse sand with traces of fine gravel (clean and dry)	2.4	43.5
Very dense, gray sand and fine grav	43.5	67.5
	47.5	67.5
Very dense, gray to brown, fine to coarse sand with scattered fine gravel	67.5	77.5
Fine to coarse gravel	77.5	95.5
Very dense, gray to brn., fine to coarse sand with scattered fine gravel	95.5	98.0
Very dns., gray, sandy, fine to crse. gravel	98.0	107.0
Very dns or hard, brn and gray clay, silt, sand and gray conglom.	107.0	117.5
Very dns, gray, silty sand and grav with cobbles (cemented and very compact)	117.5	141.0
Sand layer	141.0	161.5
Very dns, gray, silty sand and grav with cobbles (cemented and very compact)	161.5	167.0

Work started 9-19 19 72 Completed 3-16 19 72

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Hatch Drilling Company
(Person, firm, or corporation) (Type or print)

Address P. O. Box 7[illegible]1, Richland, Washington 99[illegible]

[Signed] ____
(Well Driller)

License No. 176 Date November 3 19 72

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. [illegible]—Rev. [illegible]

Well # 699-13-1B (WNP-2 Well #2)

Note: Carbon paper not nec ry, as forms are impregnated with chemic hich automatically reproduces the written aterial on each underlying copy.

File Original and First Copy with the Division of Water Resources
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. G3-20142

Permit No. G3-20142P

(1) OWNER: Name Wash. Pub. Power Supply System Address 301 5th, Richland, Wa 99352

(2) LOCATION OF WELL: County Benton — ¼ NW ¼ Sec. 5 T. 11 N., R. 28 W.M.

Bearing and distance from section or subdivision corner Hanford Grid N. 12,325 W. 1,130

(3) PROPOSED USE: Domestic ☐ Industrial ☒ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one).... II

New well ☒ Deepened ☐ Reconditioned ☐

Method: Dug ☐ Bored ☐ Cable ☒ Driven ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.

Drilled 236 ft. Depth of completed well 234.33 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 8 " Diam. from 437.5 ft. to 203.12 ft.

Threaded ☐ " Diam. from ft. to ft.

Welded ☐ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒

Type of perforator used

SIZE of perforations in. by in.

perforations from ft. to ft.

perforations from ft. to ft.

perforations from ft. to ft.

Screens: Yes ☐ No ☐ Also 264 to 254; 218 208

Manufacturer's Name [illegible]

Type Stainless Steel Model No.

Diam. 8" Slot size from 354.5 ft. to 334.5 ft.

Diam. 8" Slot size from 313.5 ft. to 303.5 ft.

Gravel packed: Yes ☒ No ☐ Size of gravel: 3/4"

Gravel placed from 422.5 ft. to 352 ft.

Surface seal: Yes ☒ No ☐ To what depth? 15 ft.

Material used in seal Cement Grout

Did any strata contain unusable water? Yes ☐ No ☒

Type of water? - Depth of strata -

Method of sealing strata off -

(7) PUMP: Manufacturer's Name Layne & Bowler

Type: Vertical Line H.P. 25

(8) WATER LEVELS: Land-surface elevation above mean sea level.... 437.5 ft.

Static level 57.75 ft. below top of well Date 10-17-72

Artesian pressure - lbs. per square inch Date -

Artesian water is controlled by - (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? Yes ☒ No ☐ If yes, by whom? Hatch Drilling Co.

Yield: 200 gal./min. with 29.50 ft. drawdown after 8 hrs.

" " " 29.75 " 16 "

" " " 30.00 " 24 "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
0 Min	87.25	30 Min	57	60 Min	57.4
10 "	60.50	40 "	56.5	70 "	57.75
20 "	58	50 "	56.3		

Date of test 10-19-72

Bailer test gal./min. with ft. drawdown after hrs.

Artesian flow - g.p.m. Date -

Temperature of water - Was a chemical analysis made? Yes ☒ No ☐

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Loose brn silt fine sand	0	1.5
Medium to dns, light brn to gray-brn becoming blk, fine to coarse sand and grav with cobble	1.5	14.0
Medium to dns, light brn to gray-brn, fine to coarse sand with scattered fine grav (dry)	14.0	43.0
Very dns, gray-brn, fine to coarse sandy grav with cobbles (dry to 60')	43.0	52.0
Very dns, gray-brn, fine to coarse sand and grav with occasional cobbles and boulders	52.0	81.5
Sandy, fine grav zone	81.5	110.0
Very dns, gray-brn, fine to coarse sand and grav with occasional cobbles and boulders	110.0	124.5
Hard, tan-brn, fine sandy silt becoming silty fine sand with depth	124.5	128.0
Sandy gravel	128.0	135.5
Very dns, tan, yellow-brn, bk and gray, slightly clayey, silty, fine to coarse sandy gravel	135.5	175.0
Sand, Silty fine sand	175.0	180.0

Work started 9-19 19 72 Completed 10-19 19 72

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Hatch Drilling Company (Person, firm, or corporation) (Type or print)

Address P. O. Box 741, Richland, Wa 99352

[Signed] (Well Driller)

License No. 176 Date November 5 19 73

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—Rev. 2-68)—2-66—326. 4316.

WELL COMPLETION REPORT

WPPSS WNP-2 Well #3

Well Number 699-13-1C
Former Designation
Computer Number

SURVEY DATA

Coordinates
Casing Elevation
Date Surveyed

COMPLETION DATA

Completion Depth 695
Static Water Depth 57.5
Date Drilled to 7/78
Date Modified to
Date Destroyed

DRILL METHOD

Air Rotary ☐
Mud Rotary ☐
Cable Tool ☒ Hatch
Auger ☐
Core ☐

Other

CASING DEPTH

4" -
6" -
8" -
10" -
~~None~~ 16" 0 - 136
12" 0 - 506
open 506 - 695

PERFORATION

Type None

Depths	Schedule
-	
-	
-	

SCREEN

Type Johnson #55
Length 35' (6")
Slot Size #55
Depths 506 - 521
563 - 573
685 695

GROUT

12" casing grouted into top of basalt (506' depth)

Interval	Volume
-	
-	
-	

ROCK SAMPLES

Interval 5'
Analyses Rockwell / Battelle
Logged by
Data Custodian
Storage Location Rockwell (Geo.Last)

WATER SAMPLES

Interval
Analyses
Data Custodian

Samples taken during pump test

WELL PURPOSE

potable water during plant operation and fire protection

COMMENTS

6" diameter screen section was lowered into open hole and then gravel packed with Monterey Sand Co. Aqua 8 (interval 506-695)

WELL CUSTODIAN

Name Department
Section Company

PUMP TEST COMPLETION REPORT

PUMP SITE

N

699-13-1A • N 12830 W 1320

699-13-1B • N12525 W 1130

• New well approx 100'E, 150'S of 13-1B

(Give Distance Between All Wells)

LOCATION

Pumped Well WPPSS WNP-2 Well #3

Observation Wells None

DIAMETER

12"

TEST DATA

Date Conducted 11-18-78 to 11-19-78

Drawdown ☒

Recovery ☒

Variable Discharge ☐ Rates

Constant Discharge ☒ Rate 275 gpm

Injection ☐ Volume

Other

Aquifer Tested top of basalt, Elephant Mtn and Rattlesnake Ridge

Percent Penetration 100%

Initial Water Level static 57.5'

Final Water Level 57.8'

results attached

DISCHARGE MEASUREMENTS

Flow Meter ☒

Orifice Weir ☐

Other

WATER LEVEL MEASUREMENTS

Electric Line ☒

Recorder ☐

Steel Tape ☐

Other

PUMP EQUIPMENT

Type gas-PTO-deep turbine

Make

Model

Setting suction 240'

INTERPRETATION

RESULTS

Hydraulic Conductivity

Transmissivity

Storage Coefficient

TECHNIQUE USED

COMMENTS

TEST CONDUCTED BY

Name W. Kiel (WPPSS) D. Bigham (Hatch)

Section/Dept./Co.

INTERPRETATION BY

Name

Section/Dept./Co.

WNP-2 Well - 5

DATE 11-18-78

STICK UP 2.0' to m.p.

START TIME 8:30 am

STATIC 57.5'

AVAILABLE DRAWDOWN 182.5

35 feet of #55 slot Johnson Well screen (6" diameter) gravel packed in a 12" open hole with Monterey Sand Company Aqua 8.

PAGE 1 of 2

ELAPSED TIME	PUMPING LEVEL	DRAWDOWN	G.P.M.	
3:00	178.5	121.0	400	Pump motor maintained constant RPM (1450) throughout entire test. GPM decreased as drawdown increased.
5:00	208.5	151.0	decreasing	
10:00	215.5	158.0	300	
15:00	217.5	160.0	decreasing	
30:00	217.75	160.25	275	Water Temp. 71°F
1:00:00	220.0	162.5	275	
1:30:00	220.0	162.5	275	
2:00:00	220.0	162.5	275	
2:30:00	220.75	163.25	275	
3:00:00	220.75	163.25	275	
3:30:00	220.75	163.25	275	Noon
5:30:00	220.75	163.25	275	
7:30:00	221.5	164.0	275	
9:30:00	221.0	163.5	275	
11:30:00	221.5	164.0	275	
13:30:00	221.5	164.0	275	
15:30:00	221.5	164.0	275	Midnight begin 11-19-78
17:30:00	221.5	164.0	275	
19:30:00	221.0	163.5	275	5am 11-19-78 Water Sample (6l)
21:30:00	221.0	163.5	275	
23:30:00	220.5	163.0	275	8am 11-19-78 Water Sample (6l)
25:10:00	220.9	163.4	275	
25:11:00	—	—	0	Pump Shut down see page 2 for recovery data
h:m:s				

WNP-2 Well #3

DATE 11-19-78

STICK UP 2.0' to m.p.

START TIME –

STATIC 57.5'

RECOVERY

PAGE 2 of 2

ELAPSED TIME	(PUMPING) LEVEL	DRAWDOWN	G.P.M.	
0:00	(220.9)	(163.4)	0	Pump Shut down after 25 hours 11 min of pumping at 275 gpm
1:00	150	92.5		
2:00	123	65.5		
3:00	105	47.5		
4:00	90	32.5		
5:00	80	22.5		
6:00	71	13.5		
7:00	69	11.5		
8:00	66.5	9.0		
9:00	64.5	7.0		
10:00	63.5	6.0		
11:00	63.0	5.5		
12:00	62.5	5.0		
13:00	62.5	5.0		
14:00	62.1	4.6		
15:00	61.9	4.4		
47:00	60.7	3.2		
1:27:00	60.5	3.0		
2:00:00	60.1	2.6		
25:39:00	57.8	0.3		Reading taken Monday 11-20-78
h:m:s				

300-FF-2 699-13-3A 0039154 5.2.5

WELL SUMMARY SHEET

Boring or Well No. B2540

Sheet 1 of 1

Location West of WPPSS Reactor #2

Project 300-FF-2, 618-11 Burial Ground

Prepared By Edward C. Rafuse / Edward C. Rafuse (Sign/Print Name) Date 09/12/95

Reviewed By Mark Darrach / Mark Darrach (Sign/Print Name) Date 9/25/95

CONSTRUCTION DATA

Description

4" Stainless steel Stickup - 1.0'

I & II type Portland cement 12.6'-2.0'

8 5/8" temporary casing set @ 77.6'

Bentonite crumbles 53.6'-12.6'

3/8" Bentonite pellets 53.6'-49.0'

Static groundwater 57.7'/9-11-95

Screen interval 76.28'-53.94'

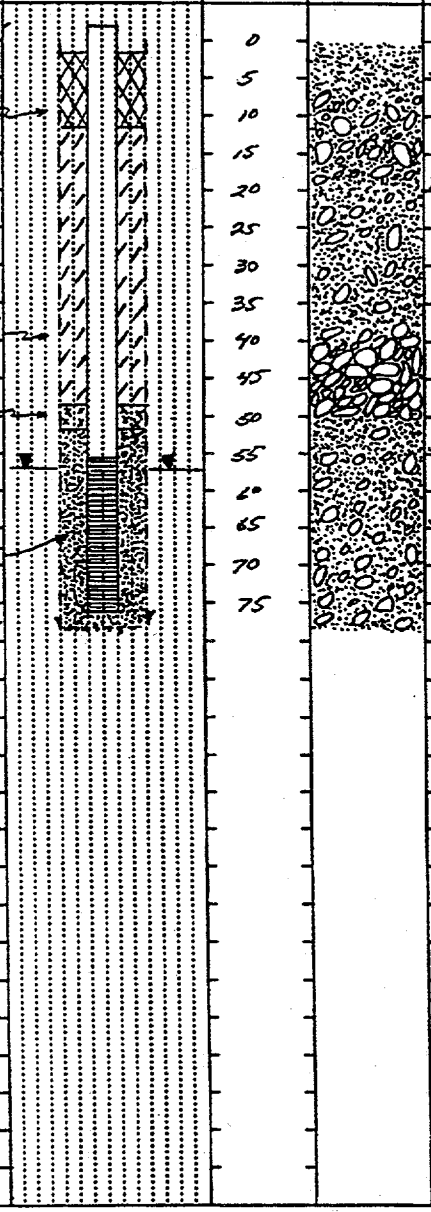
1534' of .45 slot; 5.0' .20 slot

Bottom 4" stainless steel 76.28'

8/16 Sand interval 77.6'-53.6'

Original Total Depth 77.9'

Slough 77.9-77.6 EC 09/11/95



GEOLOGIC/HYDROLOGIC DATA

Lithologic Description

0-6' Slightly silty Sand (m)S

6-18' Sandy Gravel sG

" "

18'-40' gravelly Sand gS

" "

" "

" "

" "

40'-50' Gravel G

"

50'-59' gravelly Sand gS

" "

59'-77.9' Sandy Gravel sG

" "

" "

" "

A-6000-384 (01/93)

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Mud Rotary
Drilling Fluid Used: Mud
Driller's Name: Wood/Lovdahl/Varner
Drilling Company: Not documented
Date Started: 07Feb66

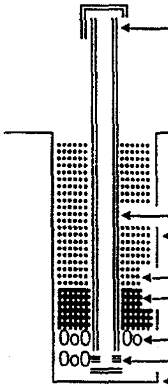
Sample Method: Mud return
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Cour d'Alene ID
Date Complete: 08Feb66

WELL NUMBER: 699-14-E6T A5070
TEMPORARY WELL NO: 14-E6-T
Hanford Coordinates: N/S N 13,869 E/W E 5,500
State Coordinates: N 419,185 E 2,300,789
Start Card #: Not documented T 12N R 28E S 33R5
Elevation Ground surface: 454.9-ft Estimated

Depth to water: 96-ft Feb66
(Ground surface) ~90-ft 14Jun91

GENERALIZED STRATIGRAPHY · Driller's Log

0–60: SAND and GRAVEL
60–75: SAND and GRAVEL, few COBBLES
75–90: SAND and GRAVEL, COBBLES and BOULDERS
90–105: GRAVEL, COBBLES, BOULDERS
105–122: COBBLES, BOULDERS, GRAVEL



Elevation of reference point: (top of casing) [458.38-ft]
Height of reference point above ground surface [~3.5-ft]
Depth of surface seal [ND]
No surface seal documented:
1.5-in ID carbon steel pipe, ~+3.5–110-ft
7-in nominal hole, 0–122-ft
(Hole size not documented)
Sand pack, 0–81-ft
Grout plug, 81–101-ft
Gravel pack, 101–122-ft
Screen, 110–120-ft
Borehole drilled depth: [122.0-ft]

OCT 24 1995

Drawing By: RKL/6N14E06T.ASB
Date : 13Sep94
Reference : HANFORD WELLS

92.99 ft 6/14/91

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 699-14-E6T

WELL DESIGNATION : 699-14-E6T
RCRA FACILITY : Not applicable
CERCLA UNIT : Not applicable
HANFORD COORDINATES : N 13.869 E 5.500 [HANFORD WELLS]
LAMBERT COORDINATES : N 419.185 E 2.300.789 [HANCONV]
DATE DRILLED : Feb66
DEPTH DRILLED (GS) : 390.0-ft
MEASURED DEPTH (GS) : Not documented
DEPTH TO WATER (GS) : 96-ft. Feb66.
~90-ft. 14Jun91
CASING DIAMETER : 1½-in. carbon steel.(nominal) ~+3.5-110.0-ft
ELEV TOP OF CASING : 458.38-ft. [HANFORD WELLS]
ELEV GROUND SURFACE : 454.9-ft. Estimated
PERFORATED INTERVAL : Not applicable
SCREENED INTERVAL : 110-120-ft
COMMENTS : FIELD INSPECTION. 190ct93.
1.5-in galvanized steel casing. Casing is bent. Not capped or locked
No pad. posts or permanent identification.
Not in radiation zone.
OTHER: Apparently has broken casing as noted
in water level measurements after 14Jun91
AVAILABLE LOGS : Driller
TV SCAN COMMENTS : Not applicable
DATE EVALUATED : Not applicable
EVAL RECOMMENDATION : Not applicable
LISTED USE : Sitewide semiannual water level measurement. 01May91-14Jun91
CURRENT USER : WHC ES&M w/l monitoring.
PUMP TYPE : None documented
MAINTENANCE :

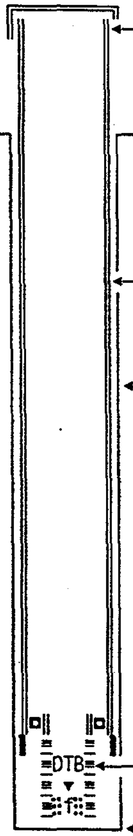
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Sample Method: Drive barrel Hard tool
WELL NUMBER: 699-15-15B A8318
TEMPORARY WELL NO: 699-15-15D
Drilling Fluid Used: Water
Additives Used: Not documented
Hanford Coordinates: N/S N 14,831 E/W W 14,991
Driller's Name: Evans
WA State Lic Nr: Not documented
State Coordinates: N 420,094 E 2,280,296
Drilling Company: Not documented
Company Location: Not documented
Start Card #: Not documented T 12N R 27E S 35J2
Date Started: 14Jun72
Date Complete: 26Jun72
Elevation Ground surface: 545.4-ft Estimated

Depth to water: 150-ft 20Jun72
(Ground surface) 147.6-ft 08Jul93

GENERALIZED STRATIGRAPHY Driller's -log

0⇔60: SAND
60⇔65: SAND & GRAVEL
65⇔115: SAND
115⇔157: SAND w/some GRAVEL
157⇔163: SAND & GRAVEL w/some SILT



Elevation of reference point: [548.36-ft]
(top of casing)
Height of reference point above ground surface [3.07-ft]
Depth of surface seal [ND]
No surface seal documented:

6-in ID carbon steel casing. +3.0⇔143-ft
Pulled back from total depth

7-in nominal hole. 0⇔163-ft

5-ft blank w/rubber packer. 136⇔141-ft
6-in stainless steel telescoping screen. 141⇔161-ft. #20-slot

Borehole drilled depth: [163.0-ft]

DTB=Depth to bottom. 154.7-ft. 08Jul93

√TU OCT 24 1995

Drawing By: RKL/6N15W15B.ASB
Date : 13Sep94
Reference : HANFORD WELLS

150.62 ft 7/30/93

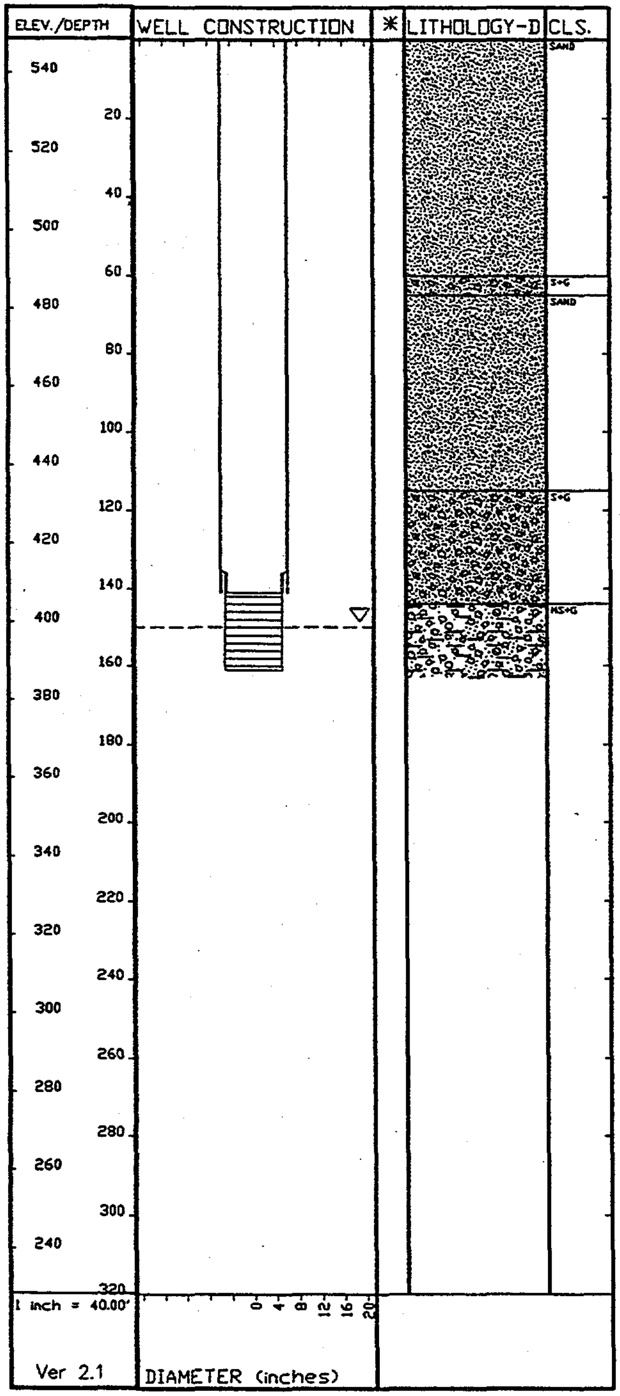
SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 699-15-15B

WELL DESIGNATION : 699-15-15B
CERCLA UNIT : Not applicable
RCRA FACILITY : Not applicable
HANFORD COORDINATES : N 14,831 W 14,991 [HANFORD WELLS]
LAMBERT COORDINATES : N 420,094 E 2.280.296 [HANCONV]
DATE DRILLED : Jun72
DEPTH DRILLED (GS) : 163.0-ft
MEASURED DEPTH (GS) : Not documented
DEPTH TO WATER (GS) : 150.0-ft. 20Jun72
CASING DIAMETER : 6-in ID carbon steel, +3.0↔143.0-ft
ELEV TOP CASING : 548.36-ft. [HANFORD WELLS]
ELEV GROUND SURFACE : 545.4-ft. Estimated
PERFORATED INTERVAL : Not applicable
SCREENED INTERVAL : 141↔161-ft. #20-slot
COMMENTS : FIELD INSPECTION, 08Jul93,
6-in carbon steel casing. Capped and locked
No pad, posts or permanent identification.
Not in radiation zone.
OTHER:
AVAILABLE LOGS : Driller
TV SCAN COMMENTS : Not applicable
DATE EVALUATED : Not applicable
EVAL RECOMMENDATION : Not applicable
LISTED USE : None documented
CURRENT USER : PNL sitewide characterization
PUMP TYPE : None documented
MAINTENANCE :

WELL NAME 699-15-15B
CASING ELEV. 548.36 Feet
WELL DEPTH 161.00 Feet
DRILL DEPTH 163.00 Feet
COORDINATES N-S 14831 P
E-W -14991 P

COMPLETION DATE 06/26/72
INITIAL DEPTH TO WATER 150.0 ft

PAGE 1 of 1



WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Air rotary(0–310-ft) Core (310–1,273-ft)
Sample Method: Air returns/ Wireline core
Drilling Fluid Used: Drilling mud
Additives Used: Not documented
Driller's Name: Air rotary=Burns Core=not documented
WA State Lic Nr: Not documented
Drilling Company: Air=Soil Sampling Core=Boyles Bros
Company Location: Puyallup, WA Spokane, WA
Date Started: Air rotary ND Core Nov80
Date Complete: Core Jan81

WELL NUMBER: 699-15-E13 A8338
TEMPORARY WELL NO: Corehole DB-2
Hanford Coordinates: N/S N 15,322 E/W E 12,714
State Coordinates: N N 420,656.56 E 2,308,999.94
Start Card #: Not documented T12N R28E S 34J1
Elevation Ground surface: 410.47-ft Brass cap

Depth to water: 25–31-ft 1971–79
(Ground surface)

GENERALIZED STRATIGRAPHY Geologist's Log

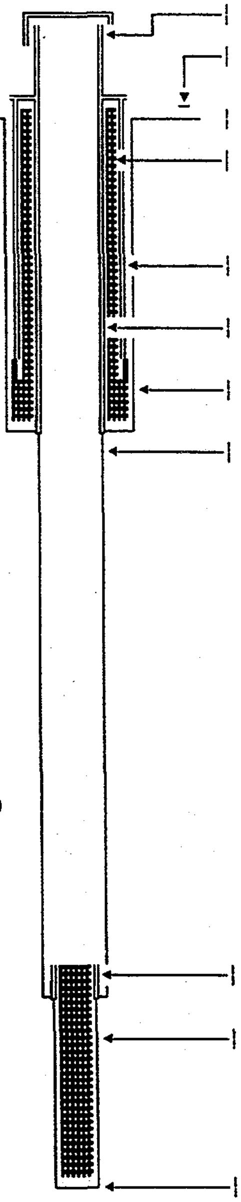
0–5: SILT and fine SAND
5–65: Cse GRAVEL w/med–fine SAND
65–70: Brown clayey SILT
70–115: Cse GRAVEL w/SAND & SILT
115–122: SILT & SAND w/medium GRAVEL
122–132: Clayey SILT
132–135: Brown tight CLAY
135–150: Fine SAND
150–172: Cse GRAVEL w/cse SAND
172–175: Brown SILT
175–210: Cse GRAVEL w/SAND & SILT
210–305: SAND, SILT & CLAY
305–417: Elephant Mountain BASALT
417–440: SANDSTONE (Rattlesnake Ridge Interbed)
440–582: Pomona BASALT
582–609: SANDSTONE (Selah interbed)
609–656: Esquatzel BASALT, flow II
656–660: TUFF (Gable Mountain interbed)
660–677: Esquatzel BASALT, flow I
677–680: Tuffaceous SANDSTONE (Cold Creek interbed)
680–705: Asotin BASALT
705–708: TUFF (Unnamwed interbed)
708–900: Umatilla BASALT
900–947: Tuffaceous SANDSTONE (Mabton interbed)
947–1,171: Priest Rapids BASALT
  947–1,031: Lolo flow
  1,031–1,031.2: Interbed
  1,031.2–1,103: Rosalia flow II
  1,103–1,171: Rosalia flow I
1,171–1,172: CLAYSTONE (Quincy interbed)
1,172–1,273: Roza BASALT

DRILLING NOTES:

DB-2 was cored from 310–924-ft Dec73–Feb74. It was extended for BWIP to 1,273-ft by a Shaefer Well Services workover rig in 1981

BWIP borehole reclamation in 1988–89 cut the existing 3.5-in OD casing @ 927-ft and removed it. The remnant casing and open hole below the casing (932–1,273-ft) were then cemented.

Drawing By: RKL/6N15E13.ASB
Date : 13Sep94
Reference : HANFORD WELLS



Elevation of reference point: [412.10-ft] (top of casing)

Height of reference point above ground surface [1.63-ft]

Depth of surface seal [~300–347-ft]
Type of surface seal: Cement grout between 4 and 6-in casings

6-in ID carbon steel casing (6⅝-in OD) +0.5–310.0-ft

4-in ID carbon steel casing (4½-in OD) +1.0–364.0-ft

6.625-in hole, 0–364-ft

3.937-in hole, 364–957-ft

VC

OCT 24 1995

3.5-in OD casing, 927–957-ft

3.032-in hole, 957–1,273-ft

Borehole drilled depth: [1,273-ft]

17.12 ft 12/6/94

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 699-15-E13

WELL DESIGNATION : 699-15-E13
RCRA FACILITY : Not applicable
CERCLA UNIT : Not applicable
HANFORD COORDINATES : N 15,322 E 12,714 [Aug85-Plant]
LAMBERT COORDINATES : N 420,656.56 E 2,308,999.94 [Aug85-NAD27]
DATE DRILLED : Feb74/Extended 1981
DEPTH DRILLED (GS) : 924.0-ft/Extended 1,273-ft
MEASURED DEPTH (GS) : Not documented
DEPTH TO WATER (GS) : 25↔31-ft, 1971↔79
CASING DIAMETER : 6-in, carbon steel, +0.5↔310.0-ft
4-in, carbon steel, +1.0↔364.0-ft
3.5-in, carbon steel, 927↔957-ft
ELEV TOP CASING : 412.10-ft, [HANFORD WELLS]
ELEV GROUND SURFACE : 410.47-ft, Brass cap [Aug85-Not documented
PERFORATED INTERVAL : Not applicable
SCREENED INTERVAL : Not applicable
COMMENTS : FIELD INSPECTION,
OTHER:
AVAILABLE LOGS : Geologist
TV SCAN COMMENTS : Not applicable
DATE EVALUATED : Not applicable
EVAL RECOMMENDATION : Not applicable
LISTED USE : Waste management/BWIP geohydrologic investigation
CURRENT USER : PNL sitewide w/l monitoring.
PUMP TYPE : None documented
MAINTENANCE :

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Not documented
Driller's Name: Stanberry/Robinson
Drilling Company: USGS
Date Started: Not documented

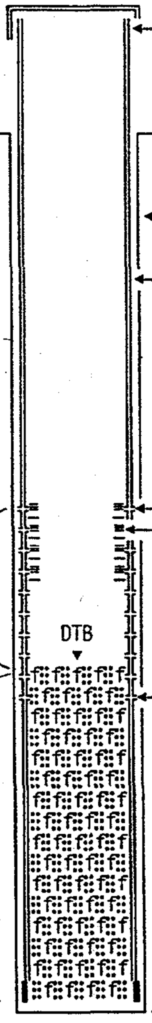
Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 05Dec50

WELL NUMBER: 699-17-5 A5073
TEMPORARY WELL NO: 17.4-4.5
Hanford Coordinates: N/S N 17,450 E/W W 4,500
State Coordinates: N 422,740 E 2,290,780
Start Card #: Not documented T 12N R 28E S 31A1
Elevation Ground surface: 431.7-ft Estimated

Depth to water: 62.0-ft 05Dec50
(Ground surface) 44.0-ft 02Jun93

GENERALIZED STRATIGRAPHY - Driller's Log

0-32: SAND, gravelly SILT
32-36: GRAVEL & SAND
36-40: SAND, fine-med (Ringold Fm?)
40-61: GRAVEL w/SAND
61-68: SAND w/GRAVEL
68-80: SAND, med some fine--Ringold Fm
80-97: SILT, clayey SAND
97-105: GRAVEL & SAND



Elevation of reference point: [433.19-ft]
(top of casing)
Height of reference point above ground surface [1.5-ft]
Depth of surface seal [ND]
No surface seal documented:
9-in nominal hole, 0-105-ft
8-in ID carbon steel casing, +1.5--105-ft
8-in casing perforations,
45-57-ft, not documented [HANFORD WELLS]
57-72-ft, cuts not documented
60-70-ft, 4 holes/.5-ft
HANFORD WELLS documents screen,
42-52-ft, #10-slot
Borehole drilled depth: [105-ft]
DTB=Depth to bottom,
62.5-ft, 08Jul93

(66 -46.49)(2.6) = 50.73gal

(105 - 66)(2.1)(0.3) = 30.42gal

Volume = 81.15 gal

3X Purge = 243

OCT 2 4 1995

45.98 ft 12/6/94

Drawing By: RKL/6N17W05.ASB
Date : 13Sep94
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 699-17-5

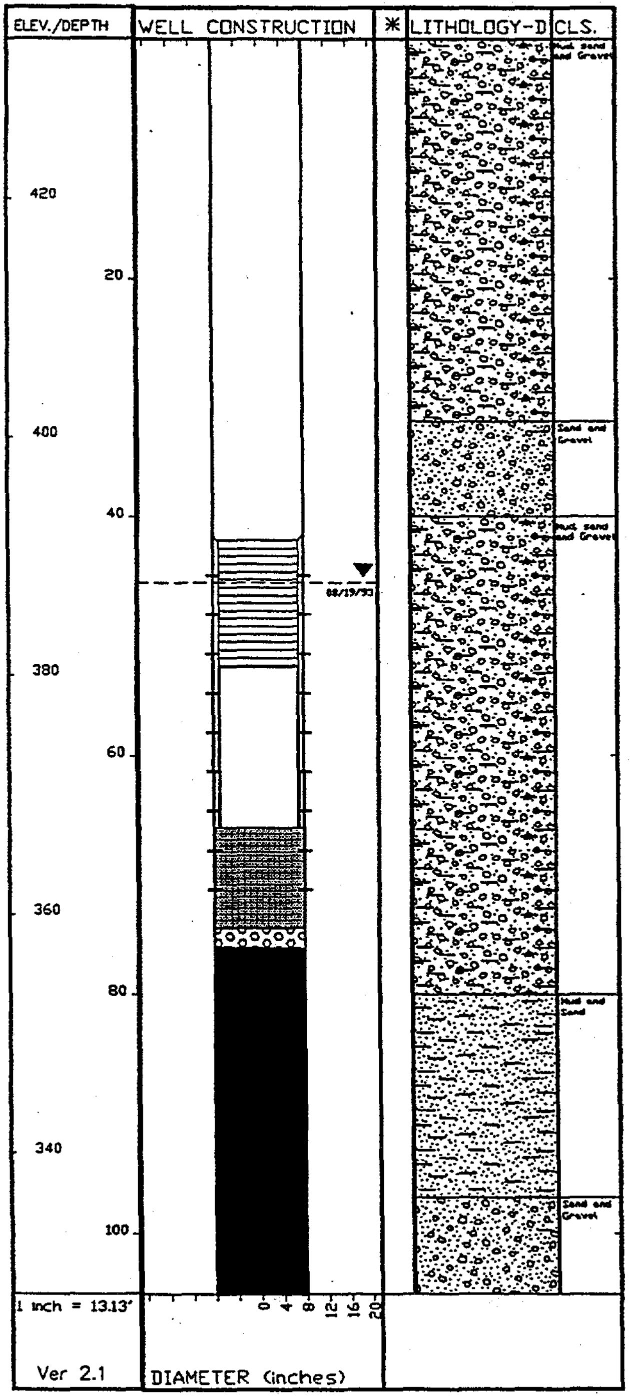
WELL DESIGNATION : 699-17-5
RCRA FACILITY : Not applicable
CERCLA UNIT : Not applicable
HANFORD COORDINATES : N 17,450 W 4,500 [HANFORD WELLS]
LAMBERT COORDINATES : N 422,740 E 2,290,780 [HANCONV]
DATE DRILLED : Dec50
DEPTH DRILLED (GS) : 105.0-ft
MEASURED DEPTH (GS) : 62.5-ft, 08Jul93
DEPTH TO WATER (GS) : 62.0-ft, 05Dec50,
44.0-ft, 02Jun93

CASING DIAMETER : 8-in, carbon steel, +1.5↔105-ft (nominal)
ELEV TOP CASING : 433.19-ft, [HANFORD WELLS]
ELEV GROUND SURFACE : 431.7-ft, Estimated
PERFORATED INTERVAL : 45↔70-ft
SCREENED INTERVAL : 42↔52-ft [HANFORD WELLS]
COMMENTS : FIELD INSPECTION, 08Jul93,
8-in carbon steel casing. Capped and locked
No pad, posts or permanent identification.
Not in radiation zone.
OTHER:

AVAILABLE LOGS : Driller
TV SCAN COMMENTS : Not applicable
DATE EVALUATED : Not applicable
EVAL RECOMMENDATION : Not applicable
LISTED USE : Sitewide annual water level measurement, 01May91↔02Jun93;
CURRENT USER : WHC ES&M w/l monitoring,
PNL sitewide sampling and w/l monitoring

PUMP TYPE : Electric submersible
MAINTENANCE :

WELL NAME 699-17-5
CASING ELEV. 433.19 Feet
WELL DEPTH 105.00 Feet
DRILL DEPTH 105.00 Feet
COORDINATES N–S 17450 P
E–W -4500 P
COMPLETION DATE 09/30/50
MOST RECENT DEPTH TO WATER 45.46 ft
PAGE 1 of 1



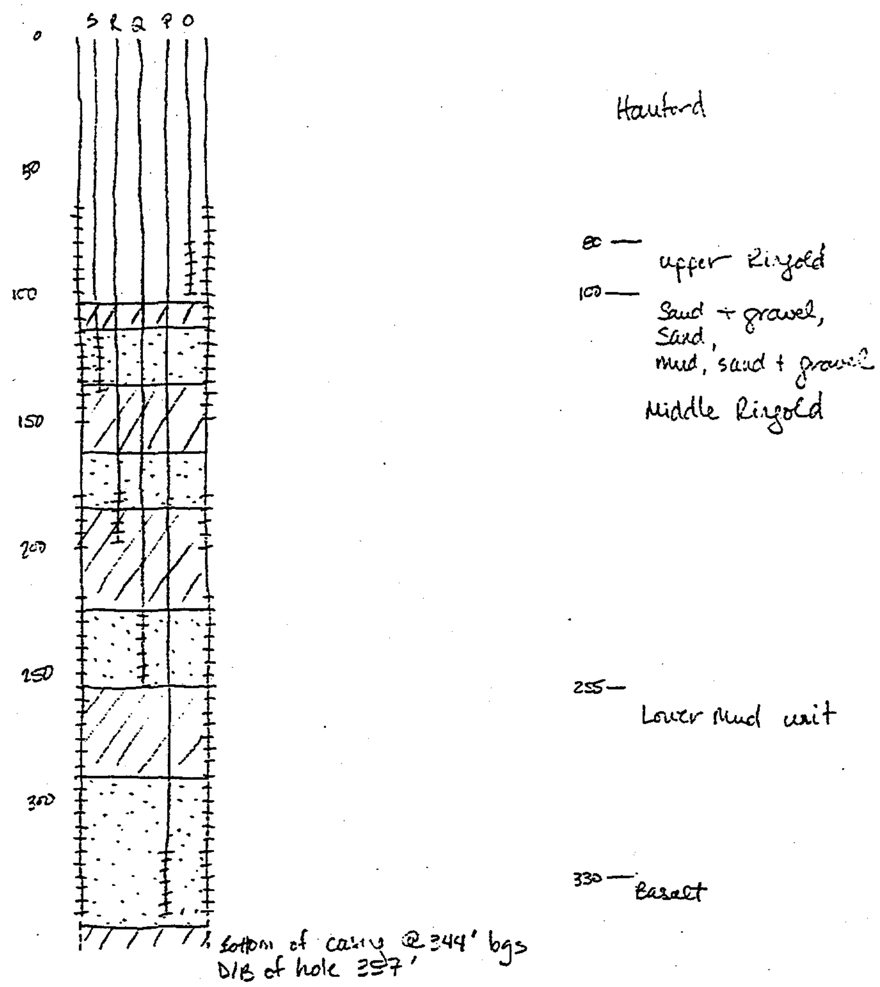
Battelle
Pacific Northwest Laboratories

CALCULATION WORKSHEET

Calc. No. ______

Page ______ of ______

699-20-E12



				head on 5/17/62	effective screened interval
	"O"	screened @	80-100	83.42	65 - 103'
1 =	P	" "	320-345	53.09	290'- 350'
2 =	Q	screened @	228-253	80.99	224- 252'
3 =	R	screened @	178- 198	81.11	163 -183'
4 =	S	screened @	113-138	82.07	114 - 134'

▨ cement
⬚ sand pack

Title

Project

Prepared by:

Date

Reviewed by:

Date

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 699-20-E12

WELL DESIGNATION : 699-20-E12
CERCLA UNIT : Not applicable
RCRA FACILITY : Not applicable
HANFORD COORDINATES : N 20,304 E 12,017 [HANFORD WELLS]
LAMBERT COORDINATES : N 425,637 E 2,307,290 [HANCONV]
DATE DRILLED : Nov61
DEPTH DRILLED (GS) : 357-ft
MEASURED DEPTH (GS) : Not documented
DEPTH TO WATER (GS) : 86.0-ft, 02Nov61
O piezometer - 77.5-ft, 06Jun94.
P piezometer - Not documented,
Q piezometer - 77.9-ft, 06Jun94.
R piezometer - 77.9-ft, 06Jun94.
S piezometer - 77.7-ft, 06Jun94.
CASING DIAMETER : 8-in, +2.0↔344-ft;
ELEV TOP CASING : 437.25-ft, [HANFORD WELLS]
ELEV GROUND SURFACE : 435.2-ft Estimated
PERFORATED INTERVAL : 65↔150 and 220↔344-ft
SCREENED INTERVAL : Not documented
COMMENTS : FIELD INSPECTION, 16Oct93,
8-in carbon steel casing. Capped and locked.
No pad, posts or permanent identification.
Contains five 1.5-in PVC piezometers;
O=+2.3↔100-ft
P=+2.5↔345-ft
Q=+2.5↔253-ft
R=+2.5↔198-ft
S=+2.5↔138-ft
AVAILABLE LOGS : Driller
TV SCAN COMMENTS : Not applicable
DATE EVALUATED : Not applicable
EVAL RECOMMENDATION : Not applicable
LISTED USE : Sitewide annual w/l measurement, 01May91↔06Jun94
CURRENT USER : WHC ES&M w/l monitoring.
PNL sitewide sampling and w/l monitoring
PUMP TYPE : None documented
MAINTENANCE :

WELL CONSTRUCTION AND COMPLETION SUMMARY

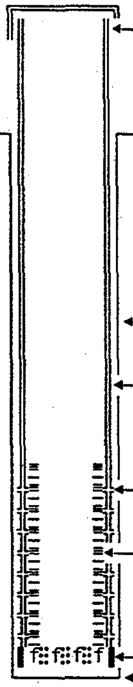
Drilling Method: Cable tool
Sample Method: Drive barrel
Drilling Fluid Used: Not documented
Additives Used: Not documented
Driller's Name: J Bultena
WA State Lic Nr: 0036
Drilling Company: Not documented
Company Location: Not documented
Date Started: 16Aug79
Date Complete: 28Aug79

WELL NUMBER: 699-21-6 A8438
TEMPORARY WELL NO: 699-23-7
Hanford Coordinates: N/S N 21,085 E/W W 6,320
State Coordinates: N N 426,371 E 2,288,951
Start Card #: Not documented T 12N R 28E S 30C1
Elevation Ground surface: 434.8-ft Estimated

Depth to water: 48-ft, 28Aug79
(Ground surface)

GENERALIZED STRATIGRAPHY. Driller's Log.

0↔10: Cse SAND
10↔15: GRAVEL
15↔20: Sandy GRAVEL
20↔30: GRAVEL
30↔35: Very cse SAND
35↔55: GRAVEL
55↔66: Gravelly SAND
66 : SAND



Elevation of reference point: [436.81-ft]
(top of casing)
Height of reference point above ground surface [2.0-ft]
Depth of surface seal [ND]
No surface seal documented:
7-in nominal hole. 0↔66-ft
6-in ID carbon steel casing. +2.0↔66-ft
6-in casing perforations. 43↔66-ft, 1 cut/rd/ft
6-in telescoping screen, 40.5↔62.0-ft, slot not documented
Installation not documented from HANFORD WELLS
Borehole drilled depth: [66-ft]

TU ED 4-27-95

Drawing By: RKL/6N21W06.ASB
Date : 14Sep94
Reference : HANFORD WELLS

46.97 ft 3/2/94

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 699-21-6

WELL DESIGNATION : 699-21-6
RCRA FACILITY : Not applicable
CERCLA UNIT : Not applicable
HANFORD COORDINATES : N 21,085 W 6,320 [HANFORD WELLS]
LAMBERT COORDINATES : N 426,371 E 2,288,951 [HANCONV]
DATE DRILLED : Aug79
DEPTH DRILLED (GS) : 66-ft
MEASURED DEPTH (GS) : Not documented
DEPTH TO WATER (GS) : 48-ft, 28Aug79
CASING DIAMETER : 6-in, carbon steel, +2.0↔66-ft
ELEV TOP CASING : 436.81-ft, [HANFORD WELLS]
ELEV GROUND SURFACE : 434.8-ft, Estimated
PERFORATED INTERVAL : 43↔66-ft
SCREENED INTERVAL : 40.5↔62.0-ft [HANFORD WELLS]
COMMENTS : FIELD INSPECTION,
OTHER:
AVAILABLE LOGS : Driller
DATE EVALUATED : None
EVAL RECOMMENDATION : Not applicable
LISTED USE : None documented
CURRENT USER : None documented
PUMP TYPE : Electric submersible

MONITORING WELL INSTALLATION LOG

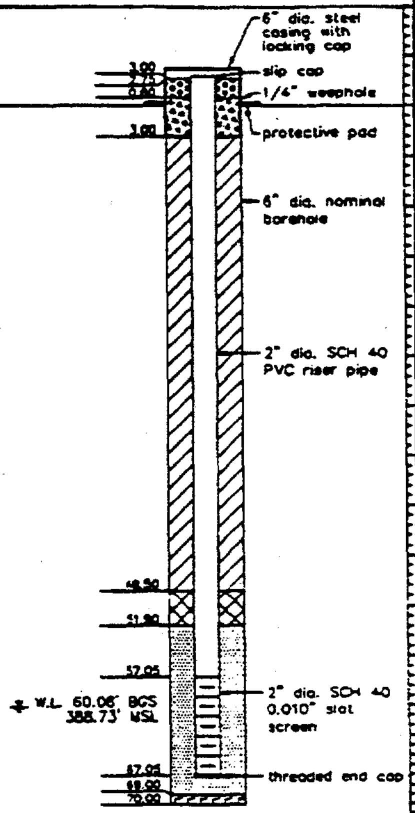
JOB NO. 954-2013001 PROJECT SUPPLY SYSTEM/WNP-2 LANDFILL RFI/WA. WELL NO. MW-1 SHEET 1 of 1
GA INSP. M. ANDERSON DRILLING METHOD 5 5/8" DIA. AIR ROTARY - TUBEX SYSTEM GROUND ELEV. 448.81 WATER DEPTH 60.08' BGS
WEATHER SUNNY/WARM DRILLING COMPANY ENVIRONMENTAL WEST EXPLORATION, INC. COLLAR ELEV. N/A TIME/DATE 0854/05-18-95
TEMP. 70° F DRILL RIG MOBILE B-80 DRILLER B. SHELDON STARTED 0945/05-11-95 COMPLETED 1145/05-11-95
TIME / DATE TIME / DATE
LOCATION / COORDINATES N 461272.0 E 1933402.6 (PLANT COORDINATES - N 11029.0 W 2018.4)

MATERIALS INVENTORY

WELL CASING 2 in. dia. 60.55 l.f. WELL SCREEN 2 in. dia. 10.0 l.f. BENTONITE SEAL BARIOD HOLE PLUG 1/8" CHIPS
CASING TYPE LONGYEAR PVC SCH 40 SCREEN TYPE LONGYEAR PVC SCH 40 INSTALLATION METHOD GRAVITY
JOINT TYPE FLUSH THREAD W/ O-RINGS SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. (4.0) 100 LB. BAGS
GROUT QUANTITY NONE USED CENTRALIZERS NONE USED FILTER PACK TYPE 10/20 CSSI SAND
GROUT TYPE NONE USED DRILLING MUD TYPE NONE USED INSTALLATION METHOD GRAVITY

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	0.0-47.5 ft. Compact to very dense, dusky brown (5 yr 2/2), coarse to fine SAND, little to some fine gravel (Hanford FM).
10.00	
20.00	
30.00	
40.00	
50.00	47.5-59.0 ft. Very dense, dusky brown (5 yr 2/2), fine to coarse GRAVEL, little fine to coarse sand (Hanford FM).
60.00	59.0-65.0 ft. Very dense, dark yellowish-brown (10 yr 4/2), fine to coarse GRAVEL, some to little sand, trace silt (Ringold FM).
70.00	65.0-70.0 ft. Very dense, dark yellowish-brown (10 yr 4/2), fine to medium SAND, some to little fine gravel, trace silt (Ringold FM).
80.00	Boring terminated at 70.0 ft. below ground surface.
90.00	
100.00	
110.00	

WELL SKETCH



INSTALLATION NOTES

Hole drilled with tubex system 5 5/8" bit. 5.5" temporary casing was withdrawn during well installation. The filter pack consisted of (4) 100 lb. bags of CSSI sand. 3.4' bentonite seal hydrated with 3 gallons of Safeway purified (distilled) water. The borehole was backfilled to 3' BGS with 12 bags of Bariod Hole Plug 3/8" bentonite chips. 6" steel casing was cemented in place. Three protective posts were installed around the monument.

WELL DEVELOPMENT NOTES

Well developed using a bailer on 05-12-95.

Gallons	Specific Conductivity	T °F	pH
30	1080	70.8	7.06
35	1049	73.0	7.07
37	972	69.6	7.05
38	953	68.6	7.03
39	1014	70.0	7.10

40 gallons removed during development.

LEGEND

▦	PEA GRAVEL
⁘	NEAT CEMENT
▨	3/8" BENTONITE CHIPS
⊠	BENTONITE SEAL
⬚	10/20 CSSI SAND
▧	SLOUGH

Golder Associates

MONITORING WELL INSTALLATION LOG

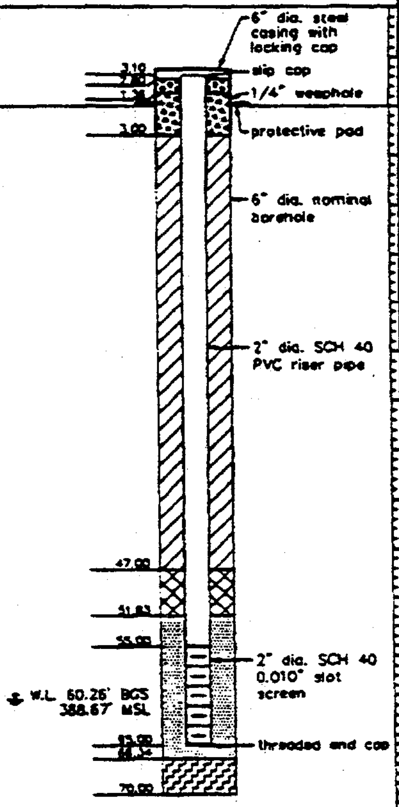
JOB NO. 954-2013001 PROJECT SUPPLY SYSTEM/WNP-2 LANDFILL RFI/WA WELL NO. MW-2 SHEET 1 of 1
GA INSP. M. ANDERSON DRILLING METHOD 5 5/8" DIA. AIR ROTARY – TUBEX SYSTEM GROUND ELEV. 448.93 WATER DEPTH 60.26' BGS
WEATHER SUNNY/WARM DRILLING COMPANY ENVIRONMENTAL WEST EXPLORATION, INC. COLLAR ELEV. N/A TIME/DATE 1255/05-20-95
TEMP. 70° F DRILL RIG MOBILE B-80 DRILLER B. SHELDON STARTED 1220/05-10-95 (TIME / DATE) COMPLETED 1500/05-10-95 (TIME / DATE)
LOCATION / COORDINATES N 415947.9 E 1933393.1 (PLANT COORDINATES – N 10705.0 W 2028.7)

MATERIALS INVENTORY

WELL CASING 2 in. dia. 58.6 L.F. WELL SCREEN 2 in. dia. 10.0 L.F. BENTONITE SEAL BAROID HOLE PLUG 3/8" CHIPS
CASING TYPE LONGYEAR PVC SCH 40 SCREEN TYPE LONGYEAR PVC SCH 40 INSTALLATION METHOD GRAVITY
JOINT TYPE FLUSH THREAD W/ O-RINGS SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. (3.0) 100 LB. BAGS
GROUT QUANTITY NONE USED CENTRALIZERS NONE USED FILTER PACK TYPE 10/20 CSSI SAND
GROUT TYPE NONE USED DRILLING MUD TYPE NONE USED INSTALLATION METHOD GRAVITY

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	0.0–1.0 ft. Compact, dark yellowish-brown (10 yr 6/2), fine to medium SAND, little to some silt, trace coarse sand.
10.00	1.0–43.5 ft. Compact to very dense, dusky brown (5 yr 2/2), coarse to fine SAND, little to some fine gravel (Hanford FM).
20.00	
30.00	
40.00	43.5–52.0 ft. Dense to very dense, dusky brown (5 yr 2/2), fine to coarse GRAVEL, little coarse to fine sand, trace silt (Hanford FM).
50.00	52.0–66.34 ft. Very dense, dark yellowish-brown (10 yr 4/2), fine to medium sand, trace silt (Ringold FM).
60.00	
70.00	Boring terminated at 70.0 ft. below ground surface.
80.00	
90.00	
100.00	
110.00	

WELL SKETCH



INSTALLATION NOTES

Hole drilled with tubex system 5 5/8" bit. 5.5" temporary casing was withdrawn during well installation. The filter pack consisted of (3) 100 lb. bags of CSSI sand. Bentonite seal hydrated with 3 gallons of Safeway purified (distilled) water. The borehole was backfilled to 3' BGS with 11 bags of Baroid Hole Plug 3/8" bentonite chips. The casing was very tight in the hole. Very hard to remove during intallation due to 3' of slough in the hole. 6" steel above ground monument cemented in place. Three protective posts were installed around monument.

WELL DEVELOPMENT NOTES

Well started to be developed on 05-11-95 with a Grundfos Redi-flow 2 submersible pump. Pump burned up impellers. Development finished on 05-12-95 with a bailer.

Gallons	Specific Conductivity	T °F	pH
52	1099	76.5	7.00
53	1131	70.0	7.00
54	1141	70.1	6.98
55	1034	71.1	7.11

55 gallons removed during development.

LEGEND

▦	PEA GRAVEL
⁘	NEAT CEMENT
▨	3/8" BENTONITE CHIPS
▩	BENTONITE SEAL
░	10/20 CSSI SAND
≋	SLOUGH

Golder Associates

MONITORING WELL INSTALLATION LOG

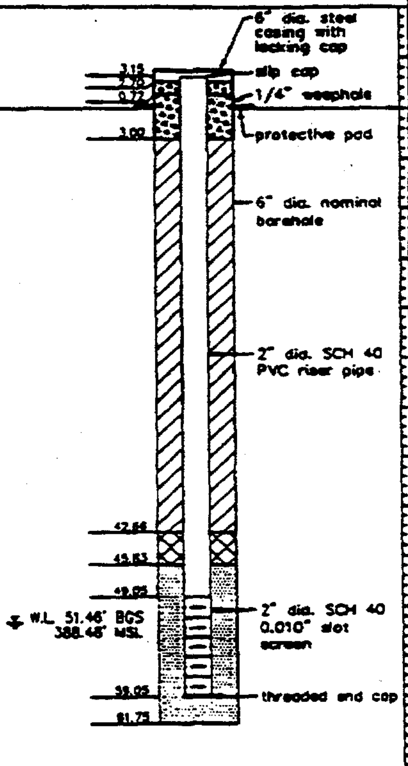
JOB NO. 954-2013001 PROJECT SUPPLY SYSTEM/WNP-2 LANDFILL RFI/WA WELL NO. MW-3 SHEET 1 of 1
QA INSP. M. ANDERSON DRILLING METHOD 5 5/8" DIA. AIR ROTARY - TUBEX SYSTEM GROUND ELEV. 439.94 WATER DEPTH 51.46' BGS
WEATHER RAINING DRILLING COMPANY ENVIRONMENTAL WEST EXPLORATION, INC. COLLAR ELEV. N/A TIME/DATE 1345/05-20-95
TEMP. 80° F DRILL RIG MOBILE B-80 DRILLER B. SHELDON STARTED 1725/05-09-95 TIME / DATE COMPLETED 1900/05-09-95 TIME / DATE
LOCATION / COORDINATES N 415686.3 E 1933717.3 (PLANT COORDINATES - N 10442.5 W 1705.1)

MATERIALS INVENTORY

WELL CASING 2 in. dia. 52.7 l.f. WELL SCREEN 2 in. dia. 10.0 l.f. BENTONITE SEAL BAROID HOLE PLUG 3/8" CHIPS
CASING TYPE LONGYEAR PVC SCH 40 SCREEN TYPE LONGYEAR PVC SCH 40 INSTALLATION METHOD GRAVITY
JOINT TYPE FLUSH THREAD W/ O-RINGS SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. (3.0) 100 LB. BAGS
GROUT QUANTITY NONE USED CENTRALIZERS NONE USED FILTER PACK TYPE 10/20 CSSI SAND
GROUT TYPE NONE USED DRILLING MUD TYPE NONE USED INSTALLATION METHOD GRAVITY

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	0.0-38.0 ft. Compact to very dense, dusky brown (5 yr 2/2), coarse to fine SAND, little to some fine to coarse gravel (Hanford FM).
10.00	
20.00	
30.00	
40.00	38.0-45.0 ft. Very dense, dusky brown (5 yr 2/2), fine to coarse GRAVEL with cobbles, little coarse to fine sand (Hanford FM).
50.00	45.0-48.0 ft. Very dense, dark yellowish-brown (10 yr 4/2), fine to coarse GRAVEL, little coarse to fine sand, trace silt (Ringold FM).
	48.0-59.0 ft. Very dense, dark yellowish-brown (10 yr 4/2), fine to medium SAND, trace coarse sand, trace silt (Ringold FM).
60.00	59.0-61.75 ft. Very dense, dark yellowish-brown (10 yr 4/2), fine to coarse GRAVEL, little coarse to fine sand, trace silt (Ringold FM).
70.00	Boring terminated at 61.75 ft. below ground surface.
80.00	
90.00	
100.00	
110.00	

WELL SKETCH



INSTALLATION NOTES

Hole drilled with tubex system 5 5/8" bit. 5.5" temporary casing was withdrawn during well installation. A 1.5' long stainless steel rod with duct tape was lost during well installation at approx. 18' BGS. The filter pack consisted of (3) 100 lb. bags of CSSI sand. A 3.17' bentonite seal hydrated with 3 gallons of Safeway purified (distilled) water. The borehole was backfilled to 3' BGS with 10 bags of Bariod Hole Plug 3/8" bentonite chips. Above ground monument was cemented in place. Three protective posts were installed around the monument.

WELL DEVELOPMENT NOTES

Well developed on 05-10-95 with a Grundfos Redi-flow 2 submersible pump.

Gallons	Specific Conductivity	T °F	pH
30	1237	68.9	6.94
40	1250	68.6	6.81
48	1295	68.1	6.85
49	1262	69.2	6.89
50	1286	67.7	6.79

54 gallons removed during development.

LEGEND

▩	PEA GRAVEL
▒	NEAT CEMENT
▨	3/8" BENTONITE CHIPS
⊠	BENTONITE SEAL
░	10/20 CSSI SAND

Golder Associates

MONITORING WELL INSTALLATION LOG

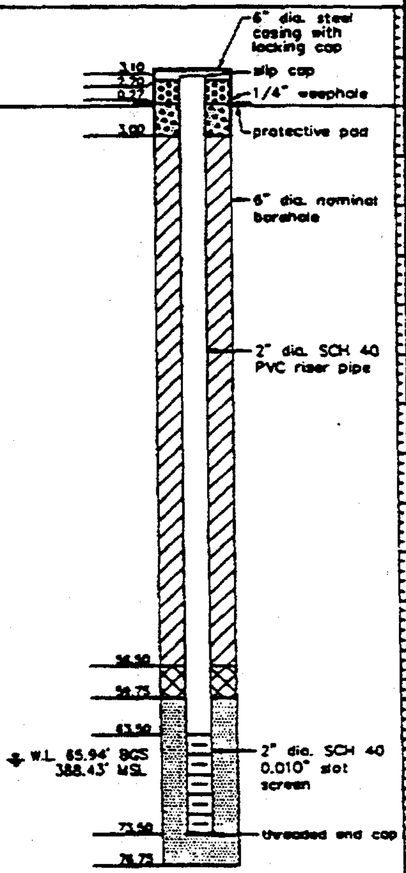
JOB NO. 954-2013001 PROJECT SUPPLY SYSTEM/WNP-2 LANDFILL RFI/WA WELL NO. MW-4 SHEET 1 of 1
GA INSP. M. ANDERSON DRILLING METHOD 5 5/8" DIA. AIR ROTARY - TUBEX SYSTEM GROUND ELEV. 454.37 WATER DEPTH 65.94' BGS
WEATHER SUNNY/WARM DRILLING COMPANY ENVIRONMENTAL WEST EXPLORATION, INC. COLLAR ELEV. N/A TIME/DATE 1455/05-20-95
TEMP. 70° F DRILL RIG MOBILE B-80 DRILLER B. SHELDON STARTED 1010/05-09-95 COMPLETED 1230/05-09-95
TIME / DATE TIME / DATE
LOCATION / COORDINATES N 415448.1 E 1933782.8 (PLANT COORDINATES - N 10202.1 W 1660.3)

MATERIALS INVENTORY

WELL CASING 2 in. dia. 67.1 l.f. WELL SCREEN 2 in. dia. 10.0 l.f. BENTONITE SEAL BARIOD HOLE PLUG 3/8" CHIPS
CASING TYPE LONGYEAR PVC SCH 40 SCREEN TYPE LONGYEAR PVC SCH 40 INSTALLATION METHOD GRAVITY
JOINT TYPE FLUSH THREAD W/ O-RINGS SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. (3.0) 100 LB. BAGS
GROUT QUANTITY NONE USED CENTRALIZERS NONE USED FILTER PACK TYPE 10/20 CSSI SAND
GROUT TYPE NONE USED DRILLING MUD TYPE NONE USED INSTALLATION METHOD GRAVITY

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	0.0-13.0 ft. Compact to dense, dark yellowish-brown (10 yr 6/2), fine to medium SAND, little silt, trace coarse sand. (Eolian)
10.00	
20.00	13.0-51.0 ft. Dense to very dense, dusky brown (5 yr 2/2), coarse to fine SAND, trace to little fine gravel, trace silt. (Hanford FM)
30.00	
40.00	
50.00	51.0-64.5 ft. Dense to very dense, dusky brown (5 yr 2/2), fine GRAVEL, little to some coarse to fine sand. (Hanford FM)
60.00	64.5-70.0 ft. Very dense, dark yellowish-brown (10 yr 4/2), fine to coarse GRAVEL, little coarse to fine sand, trace silt. (Ringold FM)
70.00	70.0-74.0 ft. Very dense, dark yellowish-brown (10 yr 4/2), fine to medium SAND, trace silt. (Ringold)
80.00	74.0-76.75 ft. Very dense, dark yellowish-brown (10 yr 4/2), fine to coarse GRAVEL with cobbles, little fine to medium sand, trace coarse sand, trace silt. (Ringold FM)
90.00	Boring terminated at 76.75 ft. below ground surface.
100.00	
110.00	

WELL SKETCH



INSTALLATION NOTES

Hole drilled with tubex system 5 5/8" bit. 5.5" temporary casing was withdrawn during well installation. The filter pack consisted of (3) 100 lb. bags of CSSI sand. A 3.25' bentonite seal was hydrated with 3 gallons of Safeway purified (distilled) water. The borehole was backfilled to 3' BGS with 11 bags of Bariod Hole Plug 3/8" bentonite chips. A protective pad and three protective posts were installed around the monument.

WELL DEVELOPMENT NOTES

Well developed on 05-10-95 with a Grundfos Redi-flow 2 submersible pump.

Gallons	Specific Conductivity	T °F	pH
0.1	375	70.5	6.79
15	850	64.5	6.75
32	758	77.4	6.98
42	745	74.7	7.01
50	791	•68.3	7.09
52	733	•68.9	7.15
53	717	•68.5	7.06

• Analyzed at time of removal, others sat for less than 24 hours.

54 gallons removed during development.

LEGEND

▦	PEA GRAVEL
▩	NEAT CEMENT
▨	3/8" BENTONITE CHIPS
☒	BENTONITE SEAL
░	10/20 CSSI SAND

MONITORING WELL INSTALLATION LOG

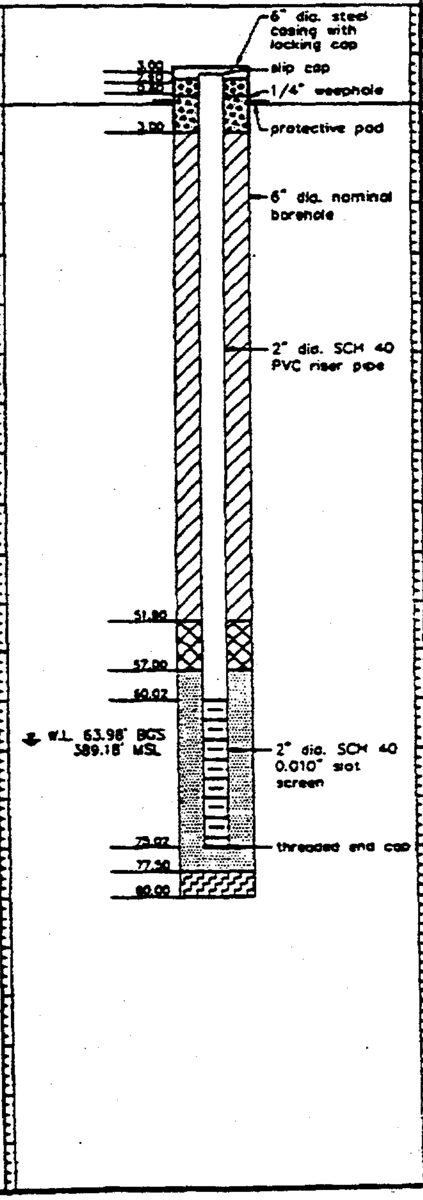
JOB NO. 954-2013001 PROJECT SUPPLY SYSTEM/WNP-2 LANDFILL RFI/WA. WELL NO. MW-5 SHEET 1 of 1
GA INSP. M. ANDERSON DRILLING METHOD 5 5/8" DIA. AIR ROTARY - TUBEX SYSTEM GROUND ELEV. 453.16 WATER DEPTH 63.98' BGS
WEATHER SUNNY/WARM DRILLING COMPANY ENVIRONMENTAL WEST EXPLORATION, INC. COLLAR ELEV. N/A TIME/DATE 1555/05-20-95
TEMP. 70° F DRILL RIG MOBILE B-80 DRILLER B. SHELDON STARTED 1305/05-08-95 COMPLETED 1555/05-08-95
TIME / DATE TIME / DATE
LOCATION / COORDINATES N 415683.9 E 1932501.4 (PLANT COORDINATES - N 10443.2 W 2921.2)

MATERIALS INVENTORY

WELL CASING 2 in. dia. 63.52 l.f. WELL SCREEN 2 in. dia. 15.0 l.f. BENTONITE SEAL BAROID HOLE PLUG 3/8" CHIPS
CASING TYPE LONGYEAR PVC SCH 40 SCREEN TYPE LONGYEAR PVC SCH 40 INSTALLATION METHOD GRAVITY
JOINT TYPE FLUSH THREAD W/ O-RINGS SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. (4.0) 100 LB. BAGS
GROUT QUANTITY NONE USED CENTRALIZERS NONE USED FILTER PACK TYPE 10/20 CSSI SAND
GROUT TYPE NONE USED DRILLING MUD TYPE NONE USED INSTALLATION METHOD GRAVITY

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.00	0.0–0.4 ft. Loose, moderate brown (5 yr 3/4) GRAVEL, some coarse to fine sand, trace silt.
10.00	0.4–7.0 ft. Compact, dark yellowish-brown (10 yr 4/2), medium to fine SAND, trace silt, trace coarse sand. (Eolian)
	7.0–58.5 ft. Dense to very dense, dark yellowish-brown (5 yr 2/2), coarse to fine gravel, trace silt. (Hanford Fm)
20.00	
30.00	
40.00	
50.00	
60.00	56.5–75.0 ft. Dense to very dense, dark yellowish-brown (10 yr 4/2), fine to coarse SAND, little fine gravel, trace silt. (Ringold FM)
70.00	
80.00	75.0–80.0 ft. Very dense, dark yellowish-brown (10 yr 4/2), fine to coarse GRAVEL, little fine to medium sand, trace silt. (Ringold FM)
	BORING TERMINATED AT 80.0 FT. BELOW GROUND SURFACE.
90.00	
100.00	
110.00	

WELL SKETCH



INSTALLATION NOTES

Hole drilled with tubex system 5 5/8" bit. 5.5" temporary casing was withdrawn during well installation. Approx. 25 gallons of water added to hole to help control heaving sands. The filter pack consisted of (4) 100 lb. bags of CSSI sand. A 3.25' bentonite seal was hydrated with 3 gallons of Safeway purified (distilled) water. The borehole was backfilled to 3' BGS with 14 bags of Bariod Hole Plug 3/8" bentonite chips. A 6" ground monument was cemented in place. A protective pad and three protective posts were installed around the monument.

WELL DEVELOPMENT NOTES

Well developed on 05-10-95 with a Grundfos Redi-flow 2 submersible pump.

Gallons	Specific Conductivity	T °F	pH
80	398	71.8	7.51

80 gallons removed during development.

LEGEND

- ⁘ PEA GRAVEL
- ⁙ NEAT CEMENT
- ▨ 3/8" BENTONITE CHIPS
- ⊠ BENTONITE SEAL
- ░ 10/20 CSSI SAND
- ≋ SLOUGH

Golder Associates

MONITORING WELL INSTALLATION LOG

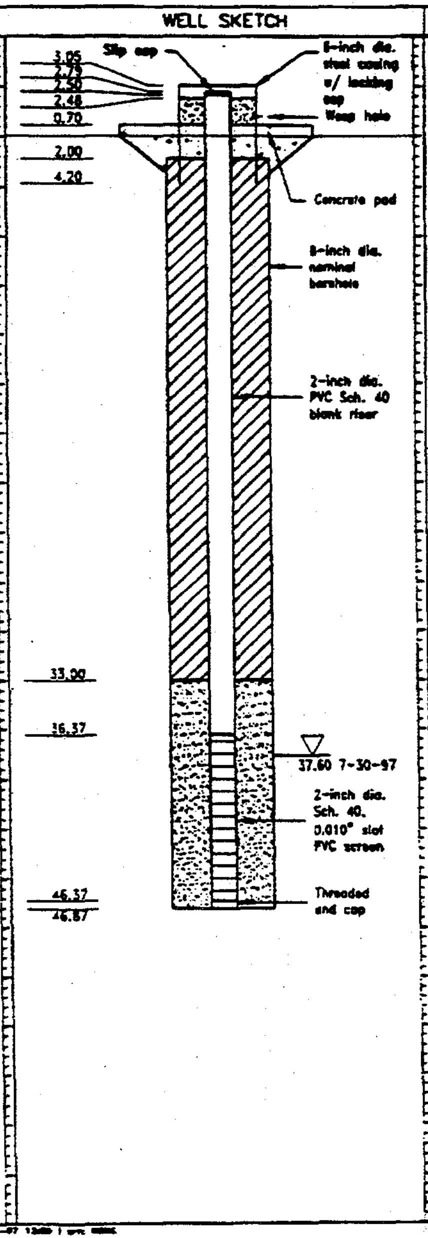
JOB NO. 973-9801.001 PROJECT SUPPLY SYSTEM/WNP2/WA WELL NO. MW-6 SHEET 1 OF 1
CA INSP. T. NORTON DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV. 423.5 WATER DEPTH 37.60 FT BGS
WEATHER COOL/DRIZZLE DRILLING COMPANY ENVIRONMENTAL WEST EXPLORATION, INC. COLLAR ELEV. 426.29 DATE/TIME 7-30-97/737
TEMP. 74° F DRILL RIG FOREMOST MOBILE B-90 DRILLER R. SHELDON STARTED 1715/7-28-97 (TIME / DATE) COMPLETED 930/7-29-97 (TIME / DATE)
LOCATION / COORDINATES N 415,739.62 E 1,934,920.55 (PLANT COORDINATES N 10,513.06 E -501.89)

MATERIALS INVENTORY

WELL CASING 2 in. dia. 38.83 l.f. WELL SCREEN 2 in. dia. 10 l.f. BENTONITE SEAL BAROID HOLE PLUG 3/8" CHIPS
CASING TYPE LONGYEAR PVC SCH 40 SCREEN TYPE LONGYEAR PVC SCH 40 INSTALLATION METHOD TREMIE THROUGH AUGERS
JOINT TYPE FLUSH THREAD W/ O-RINGS SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 4.25-100 LB. SACKS
GROUT QUANTITY NA CENTRALIZERS NA FILTER PACK TYPE 10-20 CSSI SILICA SAND
GROUT TYPE NA DRILLING MUD TYPE NA INSTALLATION METHOD TREMIE THROUGH AUGERS

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.0	0.0-3.0 Loose, pale yellowish brown (10YR6/2), silty fine SAND, trace subrounded gravel, damp (Eolian)
3.0	
6.0	
9.0	3.0-18.0 Compact, pale yellowish brown (10YR6/2), very fine to medium SAND, trace to little fine to coarse subrounded gravel, trace silt, damp (Hanford Fm)
12.0	
15.0	
18.0	
21.0	
24.0	
27.0	18.0-39.0 Compact, dark yellowish brown (10YR4/2), medium to coarse SAND, some subrounded gravel, trace silt, damp (Hanford Fm)
30.0	
33.0	
36.0	
39.0	39.0-46.8 Compact, dark yellowish brown (10YR4/2), fine to coarse SAND, little to some medium subrounded gravel, wet (Ringold Fm)
42.0	
45.0	
48.0	Total depth 46.87 ft. below ground surface
51.0	
54.0	
57.0	
60.0	
63.0	

WELL SKETCH



INSTALLATION NOTES

Drilled borehole using 4-inch I.D. (7 7/8-inch O.D.) hollow stem augers, collected standard 2-inch split spoon samples at 10 and 45 feet bgs. Augers were withdrawn from borehole in conjunction with monitoring well installation. 10 feet of PVC screen was placed to straddle the water table. The filter pack consisted of 4.25-100 lb. sacks of CSSI silica sand. 10-50 lb. sacks of Baroid 3/8" bentonite chips were placed and hydrated from the top of the sand pack to 2 feet bgs. A 8-inch dia. monument with locking cap was cemented in place and protective pad with three guard posts installed around the monument. The monument was filled with sand and a weep hole drilled in the monument.

WELL DEVELOPMENT NOTES

The well was developed on 7-29-97 using a BK positive displacement hand pump.

Gallons	Specific conductivity (μ mhos)	T°C	pH
10	485	18.2	7.65
85	496	17.1	7.46
120	489	17.0	7.44
160	494	17.0	7.43

LEGEND

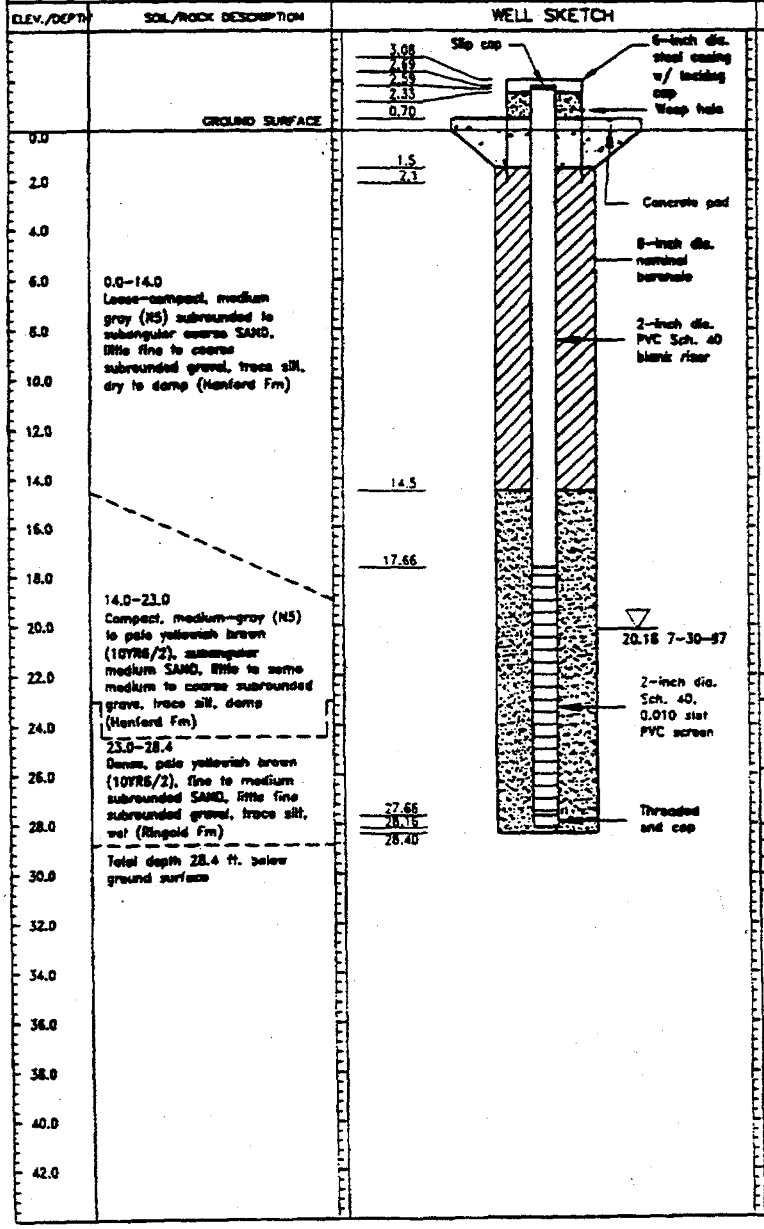
⁘	Neat cement
▨	3/8" Baroid bentonite chips
▒	10/20 CSSI silica sand

MONITORING WELL INSTALLATION LOG

JOB NO. 973-9801.001 PROJECT SUPPLY SYSTEM/WNP2/WA WELL NO. MW-7 SHEET 1 OF 1
GA INSP. T. NORTON DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV. 403.8 WATER DEPTH 20.18 FT BGS
WEATHER HOT DRILLING COMPANY ENVIRONMENTAL WEST EXPLORATION, INC. COLLAR ELEV. 406.49 DATE/TIME 7-30-97/1148
TEMP. 97° F DRILL RIG FOREMOST MOBILE B-90 DRILLER R. SHELDON STARTED 1345/7-28-97 (TIME / DATE) COMPLETED 1540/7-28-97 (TIME / DATE)
LOCATION / COORDINATES N 418,095.36 E 1,935,454.46 (PLANT COORDINATES N 12,847.66 E 38.22)

MATERIALS INVENTORY

WELL CASING 2 in. dia. 20.16 l.f. WELL SCREEN 2 in. dia. 10 l.f. BENTONITE SEAL BAROID HOLE PLUG 3/8" CHIPS
CASING TYPE LONGYEAR PVC SCH 40 SCREEN TYPE LONGYEAR PVC SCH 40 INSTALLATION METHOD TREMIE THROUGH AUGERS
JOINT TYPE FLUSH THREAD W/ O-RINGS SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 4.25-100 LB. SACKS
GROUT QUANTITY NA CENTRALIZERS NA FILTER PACK TYPE 10-20 CSSI SILICA SAND
GROUT TYPE NA DRILLING MUD TYPE NA INSTALLATION METHOD TREMIE THROUGH AUGERS



0.0-14.0
Loose-compact, medium gray (N5) subrounded to subangular coarse SAND, little fine to coarse subrounded gravel, trace silt, dry to damp (Hanford Fm)

14.0-23.0
Compact, medium-gray (N5) to pale yellowish brown (10YR6/2), subangular medium SAND, little to some medium to coarse subrounded grave, trace silt, damp (Hanford Fm)

23.0-28.4
Dense, pale yellowish brown (10YR6/2), fine to medium subrounded SAND, little fine subrounded gravel, trace silt, wet (Ringold Fm)

Total depth 28.4 ft. below ground surface

INSTALLATION NOTES

Drilled borehole using 4-inch I.D. (7 7/8-inch O.D.) hollow stem augers, collected standard 2-inch split spoon samples at 10 and 28 feet bgs. Augers were withdrawn from borehole in conjunction with monitoring well installation. 10 feet of PVC screen was placed to straddle the water table. The filter pack consisted of 4.25-100 lb. sacks of CSSI silica sand. 4.5-50 lb. sacks of Baroid 3/8" bentonite chips were placed and hydrated from the top of the sand pack to 1.5 feet bgs. A 6-inch dia. monument with locking cap was cemented in place with three guard posts installed around the monument. The monument was filled with sand and a weep hole drilled in the monument.

WELL DEVELOPMENT NOTES

The well was developed on 7-29-97 using a BK positive displacement hand pump.

Gallons	Specific conductivity (μ mhos)	T°C	pH
5	225	19.5	7.22
55	167	16.5	8.30
135	159	16.5	8.08
195	161	16.5	8.10

LEGEND

⠂	Neat cement
▨	3/8" Baroid bentonite chips
▒	10/20 CSSI silica sand

[illegible] Golder Associates

MONITORING WELL INSTALLATION LOG

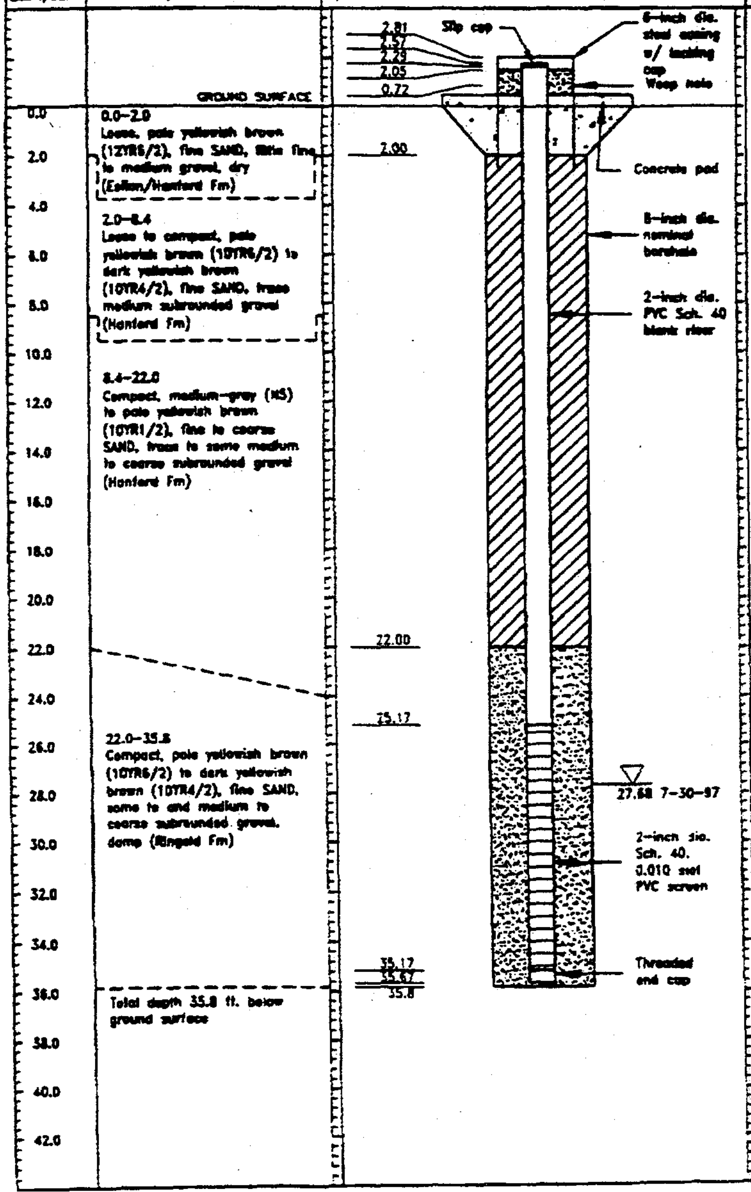
JOB NO. 973-9801.001 PROJECT SUPPLY SYSTEM/WNP2/WA WELL NO. MW-8 SHEET 1 OF 1
GA INSP. T. NORTON DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV. 410.9 WATER DEPTH 27.68 FT BGS
WEATHER COOL/DRIZZLE DRILLING COMPANY ENVIRONMENTAL WEST EXPLORATION, INC. COLLAR ELEV. 413.47 DATE/TIME 7-30-97/1304
TEMP. 74° F DRILL RIG FOREMOST MOBILE B-90 DRILLER R. SHELDON STARTED 1040/7-29-97 (TIME / DATE) COMPLETED 1430/7-29-97 (TIME / DATE)
LOCATION / COORDINATES N 417,941.38 E 1,335,296.23 (PLANT COORDINATES N 12,694.08 E -120.43)

MATERIALS INVENTORY

WELL CASING 2 in. dia. 27.46 l.f. WELL SCREEN 2 in. dia. 10 l.f. BENTONITE SEAL BAROID HOLE PLUG 3/8" CHIPS
CASING TYPE LONGYEAR PVC SCH 40 SCREEN TYPE LONGYEAR PVC SCH 40 INSTALLATION METHOD TREMIE THROUGH AUGERS
JOINT TYPE FLUSH THREAD W/ O-RINGS SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 3.5-100 LB. SACKS
GROUT QUANTITY NA CENTRALIZERS NA FILTER PACK TYPE 10-20 CSSI SILICA SAND
GROUT TYPE NA DRILLING MUD TYPE NA INSTALLATION METHOD TREMIE THROUGH AUGERS

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
	GROUND SURFACE
0.0	0.0-2.0 Loose, pale yellowish brown (12YR6/2), fine SAND, little fine to medium gravel, dry (Eolian/Hanford Fm)
2.0	2.0-8.4 Loose to compact, pale yellowish brown (10YR6/2) to dark yellowish brown (10YR4/2), fine SAND, trace medium subrounded gravel (Hanford Fm)
8.4	8.4-22.0 Compact, medium-grey (N5) to pale yellowish brown (10YR1/2), fine to coarse SAND, trace to some medium to coarse subrounded gravel (Hanford Fm)
22.0	22.0-35.8 Compact, pale yellowish brown (10YR6/2) to dark yellowish brown (10YR4/2), fine SAND, some to and medium to coarse subrounded gravel, damp (Ringold Fm)
35.8	Total depth 35.8 ft. below ground surface

WELL SKETCH



INSTALLATION NOTES

Drilled borehole using 4-inch I.D. (7 7/8-inch O.D.) hollow stem augers, collected standard 2-inch split spoon samples at 10 and 30 feet bgs. Augers were withdrawn from borehole in conjunction with monitoring well installation. 10 feet of PVC screen was placed to straddle the water table. The filter pack consisted of 3.5-100 lb. sacks of CSSI silica sand. 6-50 lb. sacks of Baroid 3/8" bentonite chips were placed and hydrated from the top of the sand pack to 2 feet bgs. A 6-inch dia. monument with locking cap was cemented in place and protective pad with three guard posts installed around the monument. The monument was filled with sand and a weep hole drilled in the monument.

WELL DEVELOPMENT NOTES

The well was developed on 7-29-97 using a BK positive displacement hand pump.

Gallons	Specific conductivity (μ mhos)	T°C	pH
10	505	17.3	7.88
40	476	16.9	7.85
70	489	16.1	7.86
100	489	15.9	7.82

LEGEND

⁘	Neat cement
▨	3/8" Baroid bentonite chips
▒	10/20 CSSI silica sand

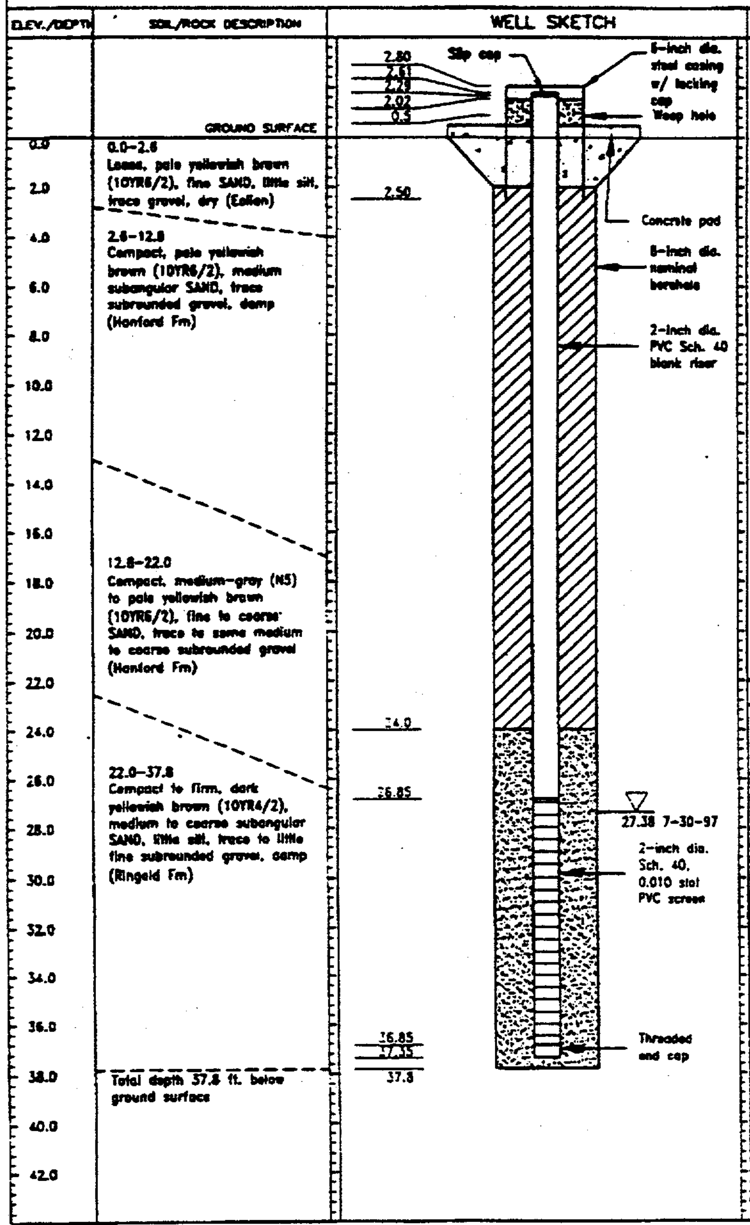
MONITORING WELL INSTALLATION LOG

JOB NO. 973-9801.001 PROJECT SUPPLY SYSTEM/WNP2/WA WELL NO. MW-9 SHEET 1 OF 1
GA INSP. T. NORTON DRILLING METHOD HOLLOW STEM AUGER GROUND ELEV. 410.1 WATER DEPTH 27.38 FT BGS
WEATHER HOT DRILLING COMPANY ENVIRONMENTAL WEST EXPLORATION, INC. COLLAR ELEV. 412.71 DATE/TIME 7-30-97/1002
TEMP. 95° F DRILL RIG FOREMOST MOBILE B-90 DRILLER R. SHELDON STARTED 1035/7-28-97 (TIME / DATE) COMPLETED 1335/7-28-97 (TIME / DATE)
LOCATION / COORDINATES N 418,052.71 E 1,934,917.15 (PLANT COORDINATES N 12,806.42 E -499.27)

MATERIALS INVENTORY

WELL CASING 2 in. dia. 29.10 l.f. WELL SCREEN 2 in. dia. 10 l.f. BENTONITE SEAL BAROID HOLE PLUG 3/8" CHIPS
CASING TYPE LONGYEAR PVC SCH 40 SCREEN TYPE LONGYEAR PVC SCH 40 INSTALLATION METHOD TREMIE THROUGH AUGERS
JOINT TYPE FLUSH THREAD W/ O-RINGS SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 3.5-100 LB. SACKS
GROUT QUANTITY NA CENTRALIZERS NA FILTER PACK TYPE 10-20 CSSI SILICA SAND
GROUT TYPE NA DRILLING MUD TYPE NA INSTALLATION METHOD TREMIE THROUGH AUGERS

ELEV./DEPTH | SOIL/ROCK DESCRIPTION | WELL SKETCH



0.0-2.6
Loose, pale yellowish brown (10YR6/2), fine SAND, little silt, trace gravel, dry (Eolian)

2.6-12.8
Compact, pale yellowish brown (10YR6/2), medium subangular SAND, trace subrounded gravel, damp (Hanford Fm)

12.8-22.0
Compact, medium-gray (N5) to pale yellowish brown (10YR6/2), fine to coarse SAND, trace to some medium to coarse subrounded gravel (Hanford Fm)

22.0-37.8
Compact to firm, dark yellowish brown (10YR4/2), medium to coarse subangular SAND, little silt, trace to little fine subrounded gravel, damp (Ringold Fm)

Total depth 37.8 ft. below ground surface

INSTALLATION NOTES

Drilled borehole using 4-in I.D. (7 7/8-inch O.D.) hollow stem augers, collected standard split spoon samples at 10 and 36 feet bgs. Augers were withdrawn from borehole in conjunction with monitoring well installation. 10 feet of PVC screen was placed to straddle the water table. The filter pack consisted of 3.5-100 lb. sacks of CSSI silica sand. 5-50 lb. sacks of Baroid 3/8" bentonite chips were placed and hydrated from the top of the sand pack to 2 feet bgs. A 6-inch dia. monument with locking cap was cemented in place and protective pad with three guard posts installed around the monument. The monument was filled with sand and a weep hole drilled in the monument.

WELL DEVELOPMENT NOTES

The well was developed on 7-29-97 using a 8K positive displacement hand pump.

Gallons	Specific conductivity (µ mhos)	T°C	pH
10	1230	17.5	7.44
40	1220	17.1	7.48
70	1210	17.1	7.45
100	1190	17.1	7.44

LEGEND

⁘	Neat cement
▨	3/8" Baroid bentonite chips
▒	10/20 CSSI silica sand

Golder Associates

RECEIVED
JAN 19 1976
WPPSS

united engineers & constructors inc.
P.O. Box 460,
Richland, Washington 99352

January 15, 1976

UEWP-76-5020

File: 2.7

Mr. J. E. Woolsey, WNP 1/4 Site Manager
Washington Public Power Supply System
3000 George Washington Way
Richland, Washington 99352

Dear Mr. Woolsey:

WPPSS Nuclear Project No. 1 & 4
<u>Well #1 & #2 Boring Logs</u>

Attached are copies of Well #1 & #2 Boring Logs. These are being transmitted to you for your information.

Very truly yours,

Henry W Phillips

Henry W. Phillips
Resident Construction Manager

HWP:JCG:jc

in triplicate

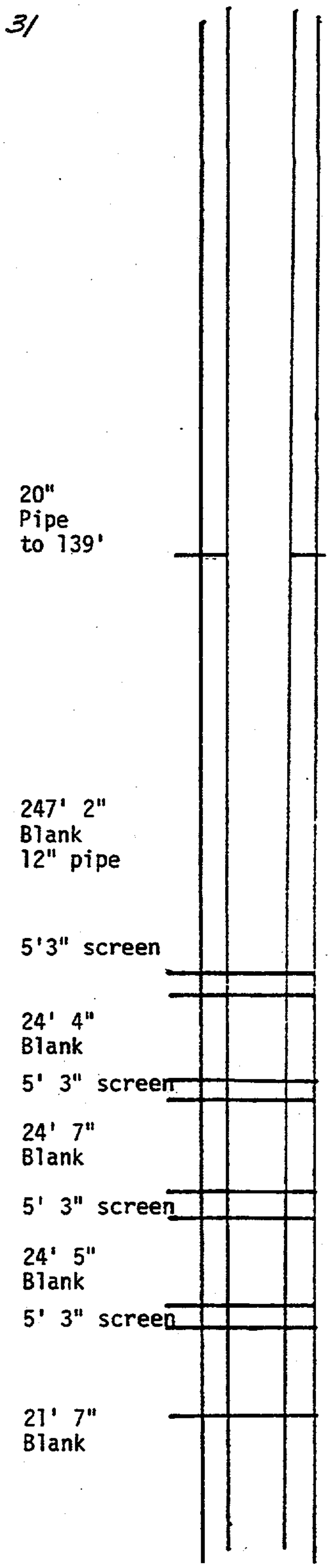
cc: JE Woolsey, WPPSS
JP Thomas, WPPSS
EC Nagle, UE&C
JR Schmieder, UE&C

ROUTING N P 1 & 4	
	INFO
a.H. Walker	CC
THOMAS, J. P.	
ORGAN, C. B.	
DAVIS, J. R.	
TRAPP, O. E.	
HOSLER, A. G.	
~~[illegible]~~	
PROJ. ENG. (M)	
PROJ. COM. REV	a.h.
~~COMMIT.~~ CONTROL	a.h.
McLEOD, B. K.	
FILES 1 & 4	
WOOLSEY, J. E.	

HANFORD 1 & 4 Well No. 1

Energy Northwest REMP Sta 31

0-7	Brown Sand
7-74	Coarse Black Sand some gravel
74-88	Fine to coarse gravel
88-96	Coarse Black sand some gravel
96-111	StH. sand and gravel, hard
111-119	Fine sand and gravel (water)
119-205	Ringold conglomerate
205-206	Brown sand (water)
206-232	Ringold conglomerate
232-233	Fine Brown sand (little water)
235-251	Ringold conglomerate
251-305	H Brown clay some gravel
305-319	Gray blue clay
219-324	Ringold conglomerate
324-332	Blue green claystone hard & sticky
332-370	Ringold conglomerate
370-380	Blue Clay

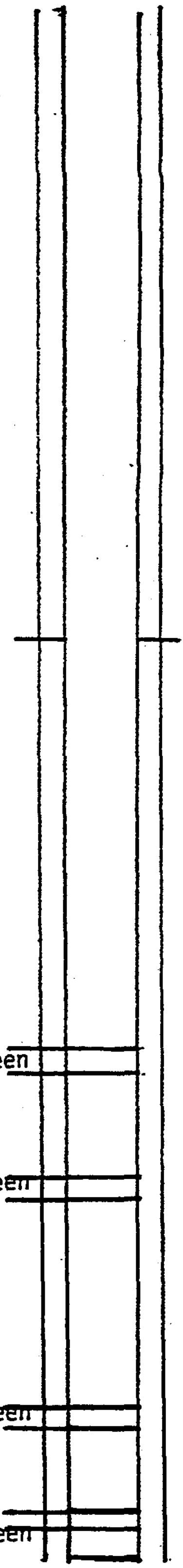


380-420	Dark Brown	119' 7" 10" pipe
400-438	Blue clay	Bottom 10' torch
438-457	Broken Basalt and Blue Clay	cut
457-465	Black sand and broken basalt (water)	

Hanford No. 1 & 4 Well Lo No. 2

Energy Northwest REMP Sta 32

0-11	Brown sand
11-82	Coarse Black sand
90-102	Brown sand and small to med. gravel (some water)
102-120	Silt - sand and gravel, hard
120-125	sand and gravel (water)
125-152	Ringold conglomerate
152-154	Brown sand (water)
154-178	Ringold conglomerate
178-179	Brown sand (water)
179-214	Ringold conglomerate
214-215	Brown sand (water)
215-222	Ringold conglomerate
222-224	Brown sand (water)
224-230	Ringold conglomerate
230-235	Brown sand (water)
235-267	Ringold conglomerate
267-292	H brown clay sticky
292-295	Ringold conglomerate
295-324	Blue clay hard and sticky
324-329	Ringold conglomerate
329-344	Blue clay hard and sticky gravel to 3"
344-367	Ringold conglomerate
367-372	H. brown clay some gravel



Appendix B

Groundwater Sampling Reports for Phase I Evaluation of the 618-11 Burial Ground

GROUNDWATER SAMPLE REPORT

Project: SURV / 600 DOH

Date: FEB 0 8 2000

Page 1 of 3

Sampling FY Quarter: FEB/2000

QC Type: NA

Well Number: 699-10-E12

A#: 5065

Total Purge Volume (gal):

Purge Flow Rate (gal/min): 6

Calculations: 42/6 = 7 min purge see comments

Pump Type:	Time on:	Water:	Purge:	Samp.:	Off:
ElECTRIC	1240	1241	1248	1301	1318

SAMPLES COLLECTED

B0XJV8	300 Analytical Services	COC No.: Y00-001-99
1362020 1;4000mL;P	Technetium-99 (HCl to pH <2)	
B0XJW7	Quanterra Incorporated	COC No.: Y00-001-101
1235040 1;1000mL;P	906.0_H3_LSC: Tritium (1) (None)	
1;20mL;P	Activity Scan (None)	
B0XJY8 (Filtered)	Quanterra St. Louis	COC No.: Y00-001-5
7318010 1;500mL;G/P	6010_METALS_ICP: List-1 (19) (HNO3 to pH <2)	

Total No. Bottles: 25

Containment Code: 730

Collector: K.J. YOUNG

FIELD MEASUREMENTS

Water Level (TOC): 72.85 TOP CASE

Drawdown (TOC): 73.11

Oil Sheen Yes ☐ No ☒

Prev. pH: N/A

Prev. DTW: N/A

E-Tape No.: 525

Time	1244	1246	1252	1300	1318					
pH	7.45	7.40	7.40	7.40	7.38					
Temp. (°C)	17.2	17.6	17.6	17.4	17.7					
Cond. (us/cm)	595	606	608	609	608					
Turb. (NTU)	52.2	37.3	20.2	4.61	4.13					
D. O. (mg/L)										
				*						

2-8-00 RK

FIELD OBSERVATIONS

Weather: OVERCAST 30 – 35°F

Field Comments:

POST CHECK YSI COND = 449 STD = 445 uS

Pre Check: 7.09 AT 15.1°C

STD = 7.04 AT 15°C

Post Check: 7.11 AT 15.1°C

STD = 7.04 AT 15°C

Comments: Near river

Collect (1) 4L non preserved jug of water for Dept. of Ecology. Mark date, time + well number on container. No CoC required.

Well capped and locked: ☒ ~~Yes~~ ☐ No

Logbook/Pg#: WM-SAWS H33, PAGE 2

Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☒ No

FEB 0 8 2000

Data Recorded by: RR FOX (RPS)

Print and sign name

Date

Data Checked by: EK HAWORTH (WMNW) Elliott Haworth

Print and sign name

Date 2/9/00

NO DUMP

GROUNDWATER SAMPLE REPORT

Project: SURV / 600					Date: 2-7-00	Page 1 of 3
Sampling FY Quarter: FEB/2000	QC Type: NA				Calculations: ~~168~~ 111	
Well Number: 699-12-4D	A#: 8252					
Total Purge Volume (gal): 282	Purge Flow Rate (gal/min): 6 gpm					
Pump Type: Electric	Time on: 1259	Water: 1300	Purge: 1318	Samp.: 1335	Off: 1347	

SAMPLES COLLECTED

B0XJV6 (Filtered) Quanterra St. Louis COC No.: Y00-001-21

1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2) 9182040

B0XJV7 Quanterra St. Louis COC No.: Y00-001-21

3;40mL;aGs* 8260_VOA_GCMS: List-2 (55) (HCl or H2SO4 to pH <2 Cool 4C) 9153060
1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C) 9293010
1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C) 9182040
1;20mL;P Activity Scan (None)
4;1000mL;aG Semi-VOA - 8270A (App IX); Semi-VOA – 8270A (App IX Add-On) {Tributyl phosphate} (Cool 4C) 8265010

Total Activity

REG. TRUCK

R.T SICKLE

Total No. Bottles: 25 Containment Code: 270 Collector:

FIELD MEASUREMENTS

Water Level (TOC): 57.50 Drawdown (TOC): 57.67 Oil Sheen Yes ☐ No ☑

Prev. pH: NA Prev. DTW: NA E-Tape No.:

Time	1310	1313	1316	1319	1325	1330	1335	1346		
pH	7.94	7.94	7.95	7.94	7.95	7.55	7.94	7.94		
Temp. (°C)	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.2		
Cond. (us/cm)	413	412	412	412	412	412	413	413		
Turb. (NTU)	25.3	20.7	17.8	13.0	11.0	10.2	10.6	5.77		EH
D. O. (mg/L)										2/8/00
							*			

FIELD OBSERVATIONS

Weather: Overcast & cold

Field Comments:
Scott Authorized the purge to be changed from 168 to 111 gallons
Jerry From Dept of Ecology wanted a 4L Sample
Exhaust Fumes Present From Generator Due to Wind Shift while Sampling.

Pre Check: PH = 7.08/13° COND = 440
STND = 7.04/15° STND = 445

Post Check: PH 7.12/14° COND = 437
STND 7.04/15 STND = 445

Comments: At Burial Ground/Requires extended purge

Well capped and locked: ☑ Yes ☐ No Logbook/Pg#: WM-SML-H25 pg. 80

Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: J.H. NEER J.H. Neer Date 2-7-00

Print and sign name

Data Checked by: EK HAWORTH Elliott Haworth Date 2/8/00

Print and sign name

No Dump

GROUNDWATER SAMPLE REPORT

Project: SURV / 600
Date: 2-8-00
Page 1 of 3

Sampling FY Quarter: FEB/2000
QC Type: NA

Well Number: 699-13-1A
A# : NONE

Total Purge Volume (gal): 146
Purge Flow Rate (gal/min): 2

Calculations:
Portable Grundfos ~~990~~ R25 2-8-00 100 gallons

Pump Type:	Time on:	Water:	Purge:	Samp.:	Off:
Grunfuse 1473	0915	0918	1008	1014	1031

SAMPLES COLLECTED

Total Activity

B0XJT7	300 Analytical Services		COC No.: Y00-001-98
1;4000mL;P	Technetium-99 (HCl to pH <2)	8362020	
B0XJW5 (Filtered)	Quanterra St. Louis		COC No.: Y00-001-29
1;500mL;G/P	6010_METALS_ICP: List-1 (19) (HNO3 to pH <2)	9182040	
B0XJW6	Quanterra St. Louis		COC No.: Y00-001-29
3;40mL;aGs*	8260_VOA_GCMS: List-2 (55) (HCl or H2SO4 to pH <2 Cool 4C)	9153060	
1;500mL;P	300.0_ANIONS_IC: List-1 (5) (Cool 4C)	9293010	
1;500mL;G/P	310.1_ALKALINITY: Alkalinity (1) (Cool 4C)	9293010	
1;20mL;P	Activity Scan (None)	NA	
4;1000mL;aG	Semi-VOA - 8270A (App IX); Semi-VOA -- 8270A (App IX Add-On) {Tributyl phosphate} (Cool 4C)	8265010	

Total No. Bottles: 25
Containment Code: 542
Collector: R.T SICKLE

FIELD MEASUREMENTS

Water Level (TOC): 57.36 TOC
Drawdown (TOC):
Oil Sheen Yes ☐ No ☑

Prev. pH: NA
Prev. DTW: NA
E-Tape No.: 99-5

Time	0924	0930	0935	0940	0945	0957	1002	1008	1010	1012
pH	7.43	7.63	7.81	7.87	7.92	7.95	7.97	8.08	8.07	8.09
Temp. (°C)	13.5	13.2	13.0	12.8	12.7	17.6	16.3	17.4	17.4	17.4
Cond. (us/cm)	286	288	289	292	294	295	300	300	302	307
Turb. (NTU)	8.94	7.80	6.14	4.92	4.28	2.87	2.99	1.92	1.77	1.85
D. O. (mg/L)										
										*

FIELD OBSERVATIONS

Weather: Overcast ; Raining 41°F NO WIND

Field Comments: USEING GRUNFUSE PUMP 1473
BAD READING FROM 0924→0957 Temp WAY OFF Due to Valve on Purge Truck Being Closed. Situation Corrected by Sampler Sickle.

Pre Check: PH = 7.0 / 25° COND 445
STND = 7.0 / 25° STND = 445

Post Check: PH = 7.14 / 13° COND 438
STND = 7.04 / 15° STND = 445

Comments: Energy NW
Place pump at 86.5 ft.

Well capped and locked: ☐ Yes ☑ No
Logbook/Pg# : WM-SML-H25
Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: J.H. NEER J.H. Neer
Print and sign name
Date 2-8-00

Data Checked by: EK HAWORTH Elliott Haworth
Print and sign name
Date 2/9/00

GROUNDWATER SAMPLE REPORT

Project: SURV / 600	Date: 2-8-00	Page 1 of 3

Sampling FY Quarter: FEB/2000
QC Type: ~~NA~~ EBL123
Well Number: 699-13-1B /EBL 123
A#: NONE
Total Purge Volume (gal): 130
Purge Flow Rate (gal/min): 2
Calculations: 825 ~~1015~~ 100 gallons/2=50min Portable Grundfos

Pump Type:	Time on:	Water:	Purge:	Samp.:	Off:
Grunfose	1104	1105	1155	1157	1210

SAMPLES COLLECTED

B0XJX4 (Filtered) Quanterra St. Louis COC No.: Y00-001-35

1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2) 7318010

B0XJX5 Quanterra St. Louis COC No.: Y00-001-35

1;20mL;P Activity Scan (None) NA
1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C) 9293010
1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C) 9293010

TOTAL ACTIVITY
825 2-7-00 ~~HPT~~
REG. TRUCK

Total No. Bottles: 15 Containment Code: 1081 Collector: R.T SICKLE

FIELD MEASUREMENTS

Water Level (TOC): 54.85 TOC
Drawdown (TOC):
Oil Sheen Yes ☐ No ☑
Prev. pH: NA
Prev. DTW: NA
E-Tape No.: 99-5

Time	1108	1115	1125	1135	1145	1155	1207			
pH	8.15	8.21	8.22	8.23	8.23	8.23	8.24			
Temp. (°C)	16.0	17.0	17.0	17.1	17.1	17.1	16.8			
Cond. (µs/cm)	288	289	289	289	289	289	288		EH	
Turb. (NTU)	474	30.9	21.5	18.4	19.0	12.2	36.3		2/9/00	
D. O. (mg/L)										
						*				

FIELD OBSERVATIONS

Weather: Cold; Rainy 39°F NO WIND
Field Comments: WELL IS LOCATED IN Bldg 40
Sampler Sickler Noticed Exhaust Fumes Present From Generator while sampling

Pre Check: PH= 7.14/13° COND = 438
STND= 7.04/15° STND = 445

Post Check: PH 7.13/13° COND 440
STND 7.04/15 STND= 445

Comments: **Energy NW**
No HPT required per Scott Conley. Place pump at 92.5 ft.

Well capped and locked: ☐ Yes ☑ No
Logbook/Pg#: WM-SML-HL5 pg 81
Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: J.H. NEER J.H. Neer Date 2-8-00
Print and sign name

Data Checked by: EK HAWORTH (WNNW) Elliott Haworth Date 2/9/00
Print and sign name

GROUNDWATER SAMPLE REPORT

RZS
2-7-00

Project: SURV / 600					Date: 2-8-00	Page 1 of 3
Sampling FY Quarter: FEB/2000		QC Type: NIT			Calculations: ? 20 MIN	
Well Number: 699-13-1C		A# : NIT				
Total Purge Volume (gal): 4500		Purge Flow Rate (gal/min): 50 ?				
Pump Type: Turbine	Time on: 1220	Water: 1220	Purge: 1257	Samp.: 1300	Off: 1312	

SAMPLES COLLECTED

B0XJX8 (Filtered)	Quanterra St. Louis	COC No.: Y00-001-41	
1;500mL;G/P	6010_METALS_ICP: List-1 (19) (HNO3 to pH <2)	7318010	
B0XJX9	Quanterra St. Louis	COC No.: Y00-001-41	
1;20mL;P	Activity Scan (None) NIT		
1;500mL;G/P	310.1_ALKALINITY: Alkalinity (1) (Cool 4C)	9293010	
1;500mL;P	300.0_ANIONS_IC: List-1 (5) (Cool 4C)	9293010	

TOTAL ACTIVITY
~~HPT~~
~~REG. TRUCK~~ RZS 2-7-00

Total No. Bottles: 15 Containment Code: NO LISTED Collector: R.T SICKLE

FIELD MEASUREMENTS

Water Level (TOC): NO DATA			Drawdown (TOC): NO DATA			Oil Sheen Yes ☐ No ☑				
Prev. pH: NA			Prev. DTW: NA			E-Tape No.: 99-5				
Time	1230	1235	1239	1244	1250	1257	1310			
pH	9.16	9.13	8.65	8.48	8.46	8.44	7.49			
Temp. (°C)	17.7	18.6	20.5	20.6	20.4	20.8	20.6			
Cond. (us/cm)	512	469	338	332	332	330	332			
Turb. (NTU)	21.1		117.0	92.7	43.6	30.3	18.2		EH	
D. O. (mg/L)										2/9/00
						*				

FIELD OBSERVATIONS

Weather: Cold ; Cloudy 38° F NO WIND

Field Comments: NO DEPTH TO WATER NO ACCESS PORT, Scott Says to Guess Flow Rate at 50 GPM ; 30 MIN INTO PURGE REDUCED PUMP RATE 15 gPM. SAMPLED FROM PWC-PV-434 VALVE

Pre Check: PH = 7.13 / 13° COND 440
STND = 7.04 / 15° STND = 445

Post Check: PH = 7.08 / 13° COND 441
STND = 7.04 / 15° STND = 445

Comments: **Energy NW**
No purge truck or HPT required per Scott Conley

Well capped and locked: ☐ Yes ☑ No Logbook/Pg# : WM-SML-H25 pg 81

Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: **J.H. NEER** J.H. Neer Date 2-8-00
Print and sign name

Data Checked by: EK HAWORTH Elliott Haworth Date 2/9/00
Print and sign name

NO DUMP

GROUNDWATER SAMPLE REPORT

Project: SURV / 600 DOH
Date: 2-7-00
Page 1 of 5
Sampling FY Quarter: FEB/2000
QC Type: ~~DUP/SPLIT~~ 2-6-2000
Well Number: 699-13-3A / EBL121 EBL122
~~A#~~: B2540
Total Purge Volume (gal): 184
Purge Flow Rate (gal/min): 2 GPM
Calculations: 100 per Scott Conley
~~57~~/2 = 50 MIN
(1123)

Pump Type:	Time on:	Water:	Purge:	Samp.:	Off:
Grunfose	1032	1033	1123	1125	1205

SAMPLES COLLECTED

B0XJT2 (Filtered) Quanterra St. Louis COC No.: Y00-001-49 TOTAL ACTIVITY

1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2) 9182040 REG. TRUCK

B0XJT3 Quanterra St. Louis COC No.: Y00-001-49

3;40mL;aGs* 8260_VOA_GCMS: List-2 (55) (HCl or H2SO4 to pH <2 Cool 4C) 9153060
1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C) 9182040
1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C) 9182040
1;20mL;P Activity Scan (None) NA
4;1000mL;aG Semi-VOA - 8270A (App IX); Semi-VOA -- 8270A (App IX Add-On) {Tributyl phosphate} (Cool 4C) 8265010

B0XJT5 TMA/RECRA COC No.: Y00-001-51

1;20mL;P Activity Scan (None) NA
1;250mL;P Tritium - H3 (None) L/2321106O

Total No. Bottles: 52 Containment Code: 255 Collector: R.T SICKLE

FIELD MEASUREMENTS

Water Level (TOC): 61.36 TOC
Drawdown (TOC): NO DATA
Oil Sheen Yes ☐ No ☑
Prev. pH: NA
Prev. DTW: NA
E-Tape No.: 99-5

Time	1038	1045	1050	1055	1110	1105	1110	1115	1120	1123
pH	7.45	7.65	7.67	7.69	7.68	7.69	7.70	7.70	7.69	7.70
Temp. (°C)	16.6	16.8	16.9	17.0	17.0	17.0	16.9	17.0	17.0	17.1
Cond. (us/cm)	602	629	633	610	621	621	620	629	617	624
Turb. (NTU)	9.22	2.15	8.02	16.8	15.0	8.94	8.71	8.17	5.46	5.19
D. O. (mg/L)										
										*

FIELD OBSERVATIONS

Weather: Overcast 52°F NO WIND
Field Comments: Pump Measured at 65'

Pre Check: PH = 7.0/25° COND 445
STND = 7.0/25° STND = 445
Post Check: PH 7.08/13° COND 440
STND 7.04/15° STND 445

Comments: At Burial Ground (QC WITH THIS WELL: DUP/SPLIT/EBL121/EBL122/ FTB322)

Well capped and locked: ☑ Yes ☐ No
Logbook/Pg#: WM-SML H25 Pg.80
Samples Surveyed for Gamma Radiation by RPTs: ☑ Yes ☐ No

Data Recorded by: J.H. NEER J.H. Neer Date 2-7-00
Print and sign name
Data Checked by: EX HAWORTH (WMNW) Date 2/8/00
Print and sign name

GROUNDWATER SAMPLE REPORT

Project: SURV / 600					Date: FEB 0 8 2000	Page 1 of 3
Sampling FY Quarter: FEB/2000	QC Type: NA				Calculations:	
Well Number: 699-15-15B	A# : 8318				~~20~~ 61 / 7 = 8.71	
Total Purge Volume (gal): 161	Purge Flow Rate (gal/min): 7				9 MIN. PURGE	
Pump Type: ELECTRIC	Time on: 0959	Water: 0959	Purge: 1008	Samp.: 1013	Off: 1022	

SAMPLES COLLECTED

B0XK18 (Filtered) Quanterra St. Louis COC No.: Y00-001-57

318010 1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2)

B0XK19 Quanterra St. Louis COC No.: Y00-001-57

1;20mL;P Activity Scan (None)

055030 1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C)

1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C)

RZS 2-7-00

TOTAL ACTIVITY
~~HPT~~
REG. TRUCK

Total No. Bottles: 13 Containment Code: NONE Collector: K.J. YOUNG

FIELD MEASUREMENTS

Water Level (TOC): 252.31 TOP
Drawdown (TOC): 254.19
Oil Sheen Yes ☐ No ☒
Prev. pH: N/A CASE
Prev. DTW: N/A
E-Tape No.: 525

Time	1002	1005	1008	1012	1022					
pH	8.14	8.01	8.02	7.98	7.92					
Temp. (°C)	18.5	18.7	18.8	18.9	18.6					
Cond. (us/cm)	478	481	480	481	483					
Turb. (NTU)	12.8	11.8	5.06	3.44	2.35					
D. O. (mg/L)										
				✗						

2-8-00

FIELD OBSERVATIONS

Weather: OVERCAST 25 - 30°F

Field Comments:

POST CHECK YSI COND = 447 STD = 445 uC

Pre Check: 7.00 & 10.00 AT 25°C
STD = 7.00 AT 25°C

Post Check: 7.07 AT 15.9°C
STD = 7.04 AT 15°C

Comments: **Upgradient**

No HPT required per Scott Conley

Well capped and locked: ☒ Yes ☐ No
Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☒ No
Logbook/Pg# : WM - SNWS H33, PAGE 2

Data Recorded by: RR FOX (RFS) Date: FEB 0 8 2000
Print and sign name

Data Checked by: EK HAWORTH (WMNW) Elliott Haworth Date: 2/9/00
Print and sign name

GROUNDWATER SAMPLE REPORT

Project: SURV / 600 DOH

Date: FEB 0 7 2000

Page 1 of 3

Sampling FY Quarter: FEB/2000

QC Type: MF 2-7-00

Well Number: 699-17-5

A#: 5073

Total Purge Volume (gal): APPROX 30

Purge Flow Rate (gal/min): ~~6~~ .5

Pump Type: ELECTRIC

Time on: 1051

Water: 1051

Purge: 1106

Samp.: ~~122~~

Off: 1231

Calculations:

~~296~~ 88/6 = 14.66

15 min purge

See Comments

SAMPLES COLLECTED R.R. Fox 2-7-00

B0XK13 (Filtered) Quanterra St. Louis COC No.: Y00-001-63

718010 1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2)

B0XK14 Quanterra St. Louis COC No.: Y00-001-63

1;20mL;P Activity Scan (None)

310010 1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C)

1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C)

Total Activity

REG. TRUCK

pump on 2ND Time 1210

WATER TO SURFACE 1211

FLOW RATE = .5 GALLONS PER MINUTE

SAMPLE WELL 1223

Total No. Bottles: 13

Containment Code: 1052

Collector: K.J. YOUNG

FIELD MEASUREMENTS

Pump off 1231

Water Level (TOC): 46.04 TOP CASE

Drawdown (TOC): 61.87

Oil Sheen Yes ☐ No ☑

Prev. pH: N/A

Prev. DTW: N/A

E-Tape No.: 525

Time	1213	1216	1219	1222	1231					
pH	8.95	8.78	8.69	8.61	8.32					
Temp. (°C)	16.0	17.3	17.4	17.8	17.6					
Cond. (us/cm)	356	398	412	425	463					
Turb. (NTU)	16.8	14.6	12.6	10.6	10.9					
D. O. (mg/L)										

2-7-00 MK

FIELD OBSERVATIONS

Weather: Slight overcast 35-40°F

Field Comments: PURGE VOLUME HAS BEEN REDUCED TO 88 GALLONS PER Bill WEBERS REQUEST, PER EVAN DRESEL REQUEST, AFTER WELL RECOVERS, GET STABLE READINGS AND SAMPLE WELL, POST CHECK YSICOND = 444, STD = 445uS

Pre Check: 7.08 AT 15.6°C
STD = 7.09 AT 15°C

Post Check: 6.97 AT 17.6°C
STD = 7.04 AT 15°C

Comments: Upgradient/Recovers poorly, Pump AT NORMAL RATE 6 GALLONS PER MINUTE PER SCOTT CONLEY REQUEST LOSS WATER TO SURFACE AT 1055 SHUT DOWN TO RECOVER WELL

Well capped and locked: ☑ Yes ☐ No

Logbook/Pg#: WM-SAWS H 33, PAGE 1

Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: RR FOX (RFS)
Print and sign name

Date FEB 0 7 2000

Data Checked by: EX HAWORTH (HAWNW) Elliott Haworth
Print and sign name

Date 2/8/00

GROUNDWATER SAMPLE REPORT

Project: SURV / 600

Date: FEB 0 7 2000

Page 1 of 3

Sampling FY Quarter: FEB/2000

QC Type: FTB323 ~~pA~~

Well Number: 699-21-6 / FTB323

A#: 8438

Total Purge Volume (gal): 56

Purge Flow Rate (gal/min): 2.5

Calculations: 20 / 2.5 = 8 MIN PURGE

Pump Type:	Time on:	Water:	Purge:	Samp.:	Off:
ELECTRIC	0955	0955	1003	1007	1016

SAMPLES COLLECTED

Total Activity

REG TRUCK

B0XK21 (Filtered) Quanterra St. Louis COC No.: Y00-001-73

1182040 1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2)

B0XK22 Quanterra St. Louis COC No.: Y00-001-73

1;20mL;P Activity Scan (None)

-318010 1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C)

1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C)

Total No. Bottles: 13

Containment Code: 464

Collector: K.J. YOUNG

FIELD MEASUREMENTS

Water Level (TOC): 42.66 TOP CASE

Drawdown (TOC): NO DATA

Oil Sheen Yes ☐ No ☒

Prev. pH: N/A

Prev. DTW: N/A

E-Tape No.: 525

Time	0958	1003	1006	1016						
pH	7.96	7.95	8.00	7.84						
Temp. (°C)	16.7	17.0	17.1	17.0						
Cond. (us/cm)	332	331	334	349						
Turb. (NTU)	4.20	3.49	3.40	4.43						
D. O. (mg/L)										?
			*							

2-7-00 RM

FIELD OBSERVATIONS

Weather: SLIGHT OVERCAST 35-40°F

Field Comments: WATER CAME UP FAST, THEN SLOW DOWN TO 2.5 GALLONS PER MINUTE, PUMP SEEMED TO SURGE

POST CHECK YSI COND = 448 STD = 445 uS

Pre Check: 7.00 & 10.00 AT 25°C
STD = 7.00 AT 25°C

Post Check: 7.08 AT 15.6°C
STD = 7.04 AT 15°C

Comments: Upgradient

Well capped and locked: ☒ Yes ☐ No

Logbook/Pg#: WM-SAWS H33, PAGE 1

Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☒ No

Data Recorded by: RR FOX (RFS) Date FEB 0 7 2000
Print and sign name

Data Checked by: EK HAWORTH (WHAW) Elliott Haworth Date 2/8/00
Print and sign name

GROUNDWATER SAMPLE REPORT

Project: SURV / 600

Date: FEB 0 8 2000

Page 1 of 2

Sampling FY Quarter: FEB/2000

QC Type: NA

Well Number: 699-8-17

A# : 5337

Total Purge Volume (gal): 200

Purge Flow Rate (gal/min): 5

Calculations: ~~#7~~ 160 / 5 = 32 min. PURGE

Pump Type:	Time on:	Water:	Purge:	Samp.:	Off:
ELECTRIC	1049	1050	1122	1123	1130

SAMPLES COLLECTED

B0XK10 (Filtered) Quanterra St. Louis COC No.: Y00-001-77

1182040 1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2)

B0XK11 Quanterra St. Louis COC No.: Y00-001-77

1;20mL;P Activity Scan (None)

1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C)

1055030 1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C)

Total No. Bottles: 12

Containment Code: 700

Collector: K.J. YOUNG

FIELD MEASUREMENTS

Water Level (TOC): 126.64 TOP CASE

Drawdown (TOC): NO DATA

Oil Sheen Yes ☐ No ☒

Prev. pH: N/A

Prev. DTW: N/A

E-Tape No.: 525

Time	1053	1105	1115	1122	1130					
pH	8.34	8.16	8.17	8.19	8.19					
Temp. (°C)	17.8	18.0	18.1	18.1	17.7					
Cond. (us/cm)	402	422	424	426	428					
Turb. (NTU)	1.82	3.27	1.41	1.47	1.71					
D. O. (mg/L)										

2-8-00 Rm

FIELD OBSERVATIONS

Weather: OVERCAST RAIN 25 - 31 °F

Field Comments:

POST CHECK YSI COND = 447 STD = 445 US

Pre Check: 7.07 AT 15.9 °C

STD = 7.04 AT 15 °C

Post Check: 7.09 AT 15.1 °C

STD = 7.04 AT 15 °C

Comments: **Upgradient**

No purge truck required per Scott Conley.

Well capped and locked: ☒ Yes ☐ No

Logbook/Pg# : WMA - SHW S H33, PAGE 2

Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☒ No

Data Recorded by: RR FOX (RFS) Print and sign name

Date FEB 0 8 2000

Data Checked by: EK HAWORTH (WMNW) Print and sign name Elliott Haworth

Date 2/9/00

GROUNDWATER SAMPLE REPORT

Project: SITEWIDE SURVEILLANCE PRIO
Date: 2-9-00
Page 1 of 2
Sampling FY Quarter: FEB/2000
QC Type: NA
Well Number: ENW-MW1
A#: NONE
Total Purge Volume (gal): ~~5.75~~ 22
Purge Flow Rate (gal/min):
Calculations: 10 min @ ~~2 gallons.~~ 1 gal

Pump Type:	Time on:	Water:	Purge:	Samp.:	Off:
PG	1156	1210	1220	1221	1232

SAMPLES COLLECTED

B0XK75	Quanterra Incorporated	COC No.: Y00-001-140	TOTAL ACTIVITY
1 20mL P	ACTIVITY SCAN		dew 2-8-2000 ~~HPT~~
1;1000mL;P	906.0_H3_LSC: Tritium (1) (None)	9236020	REG. TRUCK
B0XK87 (Filtered)	Quanterra St. Louis	COC No.: Y00-001-164	
1;500mL;G/P	6010_METALS_ICP: List-1 (19) (HNO3 to pH <2)	9182040	
B0XK99	Quanterra St. Louis	COC No.: Y00-001-164	
1;20mL;P	Activity Scan (None)		
1;500mL;G/P	310.1_ALKALINITY: Alkalinity (1) (Cool 4C)	9182040	
1;500mL;P	300.0_ANIONS_IC: List-1 (5) (Cool 4C)	9182040	

Total No. Bottles: ~~12~~ 13
Containment Code: NOT LISTED
Collector: R.T SICKLE

FIELD MEASUREMENTS

Water Level (TOC): 63.23 TOC
Drawdown (TOC):
Oil Sheen Yes ☐ No ☑
Prev. pH: NA
Prev. DTW: NA
E-Tape No.: 99-5

Time	1213	1216	1219	1231						
pH	7.15	7.12	7.13	7.18						
Temp. (°C)	16.3	16.3	16.4	16.7						
Cond. (us/cm)	752	762	827	790						
Turb. (NTU)	24.2	19.2	16.0	16.6						
D. O. (mg/L)	7.15	6.74	6.39	6.22						
			*							

EH 2/10/00

FIELD OBSERVATIONS

Weather: Clear ; Sunny
Field Comments: PUMP SET AT 68 feet
GRUNFOSE PUMP #7

Pre Check: pH = 7.10/12° COND = 438
STND = 7.06/10 STND = 445
Post Check: pH = 7.11/12° COND = 433
STND = 7.04/15° STND = 445

Comments: Energy Northwest

Well capped and locked: ☑ Yes ☐ No
Logbook/Pg#: WM-SMCHL5 pg 85
Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: J.H. NEER J.H. Neer — Date 2-9-00
Print and sign name
Data Checked by: EK HAWORTH (WMNW) — Date 2/10/00
Print and sign name

GROUNDWATER SAMPLE REPORT

Project: SITEWIDE SURVEILLANCE PRIO				Date: 2-10-00	Page 1 of 2
Sampling FY Quarter: FEB/2000	QC Type: NA			Calculations: 10/	
Well Number: ENW-MW2	A#: NONE				
Total Purge Volume (gal): ~~15~~ ~~10~~ 37	Purge Flow Rate (gal/min): 1				
Pump Type: PG	Time on: 0837	Water: 0842	Purge: 0852	Samp.: 0905	Off: 0920

RECORD COPY
PROJ. 28023
CAT. T3.3
WORKING COPY

F ✓

SAMPLES COLLECTED

B0XK76 Quanterra Incorporated COC No.: Y00-001-141
1 20mL P ACTIVITY SCAN
1;1000mL;P 906.0_H3_LSC: Tritium (1) (None) 9236620
B0XK88 (Filtered) Quanterra St. Louis COC No.: Y00-001-165
1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2) 9182040
B0XKB0 Quanterra St. Louis COC No.: Y00-001-165
1;20mL;P Activity Scan (None) NA
1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C) 9182040
1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C) 9182040

TOTAL ACTIVITY
~~HPT~~ dm 2-8-2000
REG. TRUCK

Total No. Bottles: ~~12~~ 13 RT Containment Code: NOT LISTED Collector: R.T SICKLE

FIELD MEASUREMENTS

Water Level (TOC): 63.37 TOC	Drawdown (TOC): NO DATA	Oil Sheen Yes ☐ No ☑
Prev. pH: NA	Prev. DTW: NA	E-Tape No.: 99-5

Time	0845	0849	0852	0854	0859	0903	0918.			
pH	7.01	7.17	7.19	7.20	7.17	7.19	7.14			
Temp. (°C)	J.N. 15.9 ~~346~~	15.8	15.7	16.0	16.5	17.1	16.6			
Cond. (us/cm)	515	845	851	889	934	927	988		EH	
Turb. (NTU)	128	147	52.4	36.6	39.0	8.62	15.7			2/11/00
✓ D. O. (mg/L)	6.94	5.99	5.88	6.40	6.43	6.26	6.05			
						*				

FIELD OBSERVATIONS

Weather: Clear & Cold 35°F

Field Comments: USEING PUMP # 1473
TEMP OFF, & Conductivity Going Up, Turbity? Scott says Sample

Pre Check: PH 7.0/25° COND 445
STND 7.0/25° STND 445

Post Check: PH 7.12/9° COND 435
STND 7.04/15° STND 445

Comments: Energy Northwest
Pump Slow. Does not recover well

Well capped and locked: ☑ Yes ☐ No
Logbook/Pg#: WM-SML-H25 pg 86
Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: **J.H. NEER** J.H. Neer Date 2-10-00
Print and sign name

Data Checked by: EK HAWORTH (WMNW) Elliott Haworth Date 2/11/00
Print and sign name

GROUNDWATER SAMPLE REPORT

Project: SITEWIDE SURVEILLANCE PRIO
Date: 2-10-00
Page 1 of 2
Sampling FY Quarter: FEB/2000
QC Type: NA
Calculations: 15/
Well Number: ENW-MW3
A# : NONE
Total Purge Volume (gal): ~~25~~ ~~15~~ 33
Purge Flow Rate (gal/min): 1

Pump Type:	Time on:	Water:	Purge:	Samp.:	Off:
PG	0945	0946	1001	1007	1019

SAMPLES COLLECTED

B0XK77 Quanterra Incorporated COC No.: Y00-001-142
1 20 ml P Activity Scan
1;1000mL;P 906.0_H3_LSC: Tritium (1) (None) 9236020
B0XK89 (Filtered) Quanterra St. Louis COC No.: Y00-001-166
1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2) 9182040
B0XKB1 Quanterra St. Louis COC No.: Y00-001-166
1;20mL;P Activity Scan (None) NA
1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C) 9182040
1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C) 9182040

TOTAL ACTIVITY
~~HPT~~
2-8-2000 REG. TRUCK

Total No. Bottles: ~~12~~ 13 RTS
Containment Code: NOT LISTED
Collector: R.T SICKLE

FIELD MEASUREMENTS

Water Level (TOC): 53.57
Drawdown (TOC): NO DATA
Oil Sheen Yes ☐ No ☑
Prev. pH: NA
Prev. DTW: NA
E-Tape No.: 99-5

Time	0948	0952	0955	1000	1005	1018				
pH	7.30	7.10	6.97	6.96	6.95	6.97				
Temp. (°C)	11.5	12.8	16.8	17.1	17.5	17.0				
Cond. (us/cm)	379	994	1011	1060	1075	1069			EH	
Turb. (NTU)	37.5	44.7	16.5	15.5	4.83	1.63			2/11/00	
D. O. (mg/L)	8.61	6.07	4.40	4.17	4.12	4.06				
					*					

FIELD OBSERVATIONS

Weather: CLEAR; COLD 41° F
Field Comments:

Pre Check: PH 7.12/9° COND 435
STND ~~7.04/15°~~ 7.06/10 STND 445
Post Check: PH = 7.10/9° COND = 435
STND = 7.06/10° STND = 445

Comments: Energy Northwest

Well capped and locked: ☑ Yes ☐ No
Logbook/Pg# : WM-SML-H25 pg 86
Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: J.H. NEER J.H. Neer Date 2-10-00
Print and sign name
Data Checked by: HAWORTH (WMNW Elliott Haworth Date 2/11/00
Print and sign name

GROUNDWATER SAMPLE REPORT

Project: SITEWIDE SURVEILLANCE PRIO / DOH

Date: 2-10-00

Page 1 of 2

Sampling FY Quarter: FEB/2000

QC Type:

Calculations: 15

Well Number: ENW-MW4

A# : NONE

Total Purge Volume (gal): ~~18~~ 38 RS

Purge Flow Rate (gal/min): 1

Pump Type:	Time on:	Water:	Purge:	Samp.:	Off:
PG	1045	1046	1101	1108	1124

SAMPLES COLLECTED

B0XK78 Quanterra Incorporated COC No.: Y00-001-143

1 20 mL P ACTIVITY SCAN

1;1000mL;P 906.0_H3_LSC: Tritium (1) (None) 9236020

TOTAL ACTIVITY
~~HPT~~
REG. TRUCK

JHN 2-8-2000

B0XK90 (Filtered) Quanterra St. Louis COC No.: Y00-001-167

1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2) 9182040

B0XKB2 Quanterra St. Louis COC No.: Y00-001-167

1;20mL;P Activity Scan (None) NA 9182040

1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C) 9182040

1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C)

Total No. Bottles: ~~12~~ 13 RS

Containment Code: NOT LISTED

Collector: R.T SICKLE

FIELD MEASUREMENTS

Water Level (TOC): 69.0 TOC

Drawdown (TOC): NO DATA

Oil Sheen Yes ☐ No ☑

Prev. pH: NA

Prev. DTW: NA

E-Tape No.: 99-5

Time	1054	1058	1100	1105	1122					
pH	7.29	7.30	7.30	7.30	7.31					
Temp. (°C)	15.6	16.0	16.3	16.6	17.2					
Cond. (us/cm)	605	605	616	623	619					
Turb. (NTU)	63.9	36.2	29.1	15.0	7.19					
D. O. (mg/L)	7.62	7.26	7.12	7.01	6.95					
				*						

EH 2/11/00

FIELD OBSERVATIONS

Weather: CLEAR ; Cold 41°F

Field Comments: USEING PUMP#7

Pre Check: PH= 7.10/9° COND= 435
STND= 7.06/10° STND= 445

Post Check: PH= 7.20/9.5° COND= 435
STND= 7.06/10° STND= 445

Comments: Energy Northwest

Well capped and locked: ☑ Yes ☐ No

Logbook/Pg# : WM-SML-H25 Pg86

Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: J.H. NEER J.H. Neer Date 2-10-00

Print and sign name

Data Checked by: EK HAWORTH (WMNW) Elliott Haworth Date 2/11/00

Print and sign name

GROUNDWATER SAMPLE REPORT

Project: SITEWIDE SURVEILLANCE PRIO
Date: FEB 0 9 2000
Page 1 of 2

Sampling FY Quarter: FEB/2000
QC Type: FXR 552
Well Number: ENW-MW5 EBL124
A# : NONE
Total Purge Volume (gal): 32
Purge Flow Rate (gal/min): 1
Pump Type: GRUND FOS
Time on: 0939
Water: 0942
Purge: 1002
Samp.: 1004
Off: 1015

Calculations:
20 gallon Purge / 1 GPM

SAMPLES COLLECTED

B0XK79 Quanterra Incorporated COC No.: Y00-001-144
1 20 mL Activity Scan
1;1000mL;P 906.0_H3_LSC: Tritium (1) (None) 9236020
B0XK91 (Filtered) Quanterra St. Louis COC No.: Y00-001-168
1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2) 9182040
B0XKB3 Quanterra St. Louis COC No.: Y00-001-168
1;20mL;P Activity Scan (None) NA
1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C) 9182040
1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C) 9182040

TOTAL ACTIVITY
~~HPT~~ JN 2-8-2000
REG. TRUCK

Total No. Bottles: ~~12~~ 13 JN.
Containment Code: NOT LISTED
Collector: R.T SICKLE

FIELD MEASUREMENTS

Water Level (TOC): 66.97 TOC
Drawdown (TOC):
Oil Sheen Yes ☐ No ☑
Prev. pH: NA
Prev. DTW: NA
E-Tape No.: 99-5

Time	0946	0950	0953	0957	1001	1014				
pH	7.09	7.48	7.60	~~7.72~~	7.74	7.81				
Temp. (°C)	15.6°	17.1	17.3	17.8	17.8	16.7				
Cond. (us/cm)	394	398	398	446	448	449				
Turb. (NTU)	19.3	14.6	8.39	4.87	2.68	1.19				
D. O. (mg/L)	7.14	7.02	7.04	7.00	6.99	7.03				
					*					

SH 2/10/00

FIELD OBSERVATIONS

Weather: Sunny; Clear 50°F NO WIND
Field Comments: DATE 2-8-00
TIME 1620 Signature R.R. Fox
PUMP ID # 1324
"THE PUMP WAS DECONTAMINATED IN ACCORDANCE WITH SP 3-2."
Pre Check: PH = 7.0/25° COND = 445
STND = 7.0/25° STND = 445
Post Check: PH = 7.09/12° COND = 434
STND = 7.01/15° STND = 445

Comments: Energy Northwest

Well capped and locked: ☑ Yes ☐ No
Logbook/Pg# : WIM-SML-1425 / 94
Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: J.H. NEER J.H. Neer
Print and sign name
Date FEB 0 9 2000

Data Checked by: EX HAWORTH (WMNW)
Print and sign name
Date 2/10/00

GROUNDWATER SAMPLE REPORT

Project: SITEWIDE SURVEILLANCE PRIO	Date: 2-9-00	Page 1 of 2

Sampling FY Quarter: FEB/2000

QC Type: EB4124 ~~NA~~ SH FXR522

Well Number: ENW-MW6

A# : NONE

Total Purge Volume (gal): ~~15~~ S.H. 34

Purge Flow Rate (gal/min): 1

Pump Type: PC

Time on:	Water:	Purge:	Samp.:	Off:
1050	1051	1107	1112	1125

Calculations:

15 gallon purge / 1 GPM

SAMPLES COLLECTED

B0XK80 Quanterra Incorporated COC No.: Y00-001-145

1;1000mL;P 906.0_H3_LSC: Tritium (1) (None) 9236020

B0XK92 (Filtered) Quanterra St. Louis COC No.: Y00-001-169

1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2) 9182040

B0XKB4 Quanterra St. Louis COC No.: Y00-001-169

1;20mL;P Activity Scan (None) NA

1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C) 9182040

1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C) 9182040

TOTAL ACTIVITY
~~HPT~~ REG. TRUCK
2-8-2000

Total No. Bottles: ~~12~~ J.N. 13

Containment Code: NOT LISTED

Collector: R.T. SICKLE

FIELD MEASUREMENTS

Water Level (TOC): 41.14 TOC

Drawdown (TOC):

Oil Sheen Yes ☐ No ☑

Prev. pH: NA

Prev. DTW: NA

E-Tape No.:

Time	1054	1100	1103	1107	1110	1122				
pH	7.62	7.46	7.47	7.48	7.48	7.48				
Temp. (°C)	14.7	15.8	16.8	17.3	17.5	17.2				
Cond. (us/cm)	464	677	687	688	689	684				
Turb. (NTU)	0.48	0.92	2.31	1.94	1.39	1.37				
D. O. (mg/L)	5.15	4.83	4.71	4.67	4.60	4.65				
					*					

SH 2/10/00

FIELD OBSERVATIONS

Weather: Sunny; Clear 50° F NO WIND

Field Comments: PUMP LOWERED TO 44 feet

DATE 2-8-00

TIME 1620 "THE PUMP WAS DECONTAMINATED IN ACCORDANCE

PUMP ID# 1473 WITH SP-32" Signature R.R. FOX

Pre Check: PH = 7.09/12° COND = 434

STND = 7.04/15° STND = 445

Post Check: PH = 7.10/12 COND = 438

STND = 7.06/10 STND = 445

Comments: Energy Northwest

Well capped and locked: ☑ Yes ☐ No

Logbook/Pg# : WM-SML-H25

Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: J.H. NEER J.H. Neer Date 2-9-00

Print and sign name

Data Checked by: EK HAWORTH (WMNW) Elliot Haworth Date 2/10/00

Print and sign name

GROUNDWATER SAMPLE REPORT

Project: SITEWIDE SURVEILLANCE PRIO					Date: 2-15-00	Page 1 of 2
Sampling FY Quarter: FEB/2000		QC Type: NA			Calculations: 10/ 1/2 GPM	
Well Number: ENW-MW7		A#: NONE				
Total Purge Volume (gal): ~~10~~ 25		Purge Flow Rate (gal/min): 1/2 GPM				
Pump Type: PG #7	Time on: 0943	Water: 0945	Purge: 1005	Samp.: 1008	Off: 1035	

F

SAMPLES COLLECTED

B0XK81 Quanterra Incorporated COC No.: Y00-001-146
1 20 mLP Activity SCAN
1;1000mL;P 906.0_H3_LSC: Tritium (1) (None) 9236020
B0XK93 (Filtered) Quanterra St. Louis COC No.: Y00-001-170
1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2) 9125010
B0XKB5 Quanterra St. Louis COC No.: Y00-001-170
1;20mL;P Activity Scan (None) NA
1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C) 9182040
1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C) 9182040

TOTAL ACTIVITY
~~HPT~~ REG. TRUCK
2-8-2000

RECORD COPY
PROJ. 28023
CAT. T3.3
WORKING COPY

Total No. Bottles: ~~12~~ 13 BTS Containment Code: NOT LISTED Collector: KB HULSE

00
102
Cal
Soa

FIELD MEASUREMENTS

Water Level (TOC): 24.25 TOC			Drawdown (TOC):			Oil Sheen Yes ☐ No ☑				
Prev. pH: NA			Prev. DTW: NA			E-Tape No.: 99-5				
Time	0948	0958	1000	1005	1033					
pH	7.75	7.17	7.31	7.29	7.16					
Temp. (°C)	13.5°	14.1	13.8	13.6	12.0					
Cond. (us/cm)	11.7	9.1	9.7	10.0	154.8					
Turb. (NTU)	0.84	1.09	2.32	1.37	210					
D. O. (mg/L)	103.0	104.7	104.5	102.7	80.5					
				*						

FIELD OBSERVATIONS

Weather:

Field Comments: Pump Set At 30 feet; Problem with well Running out of water
#1 WATER VERY DIRTY THE LONGER WELL SAMPLED AT 1/2 GPM.
#2 NO VERIFICATION ON HOW FAR DOWN TO PLACE PUMP
#3 Discovered The Samples Taken were DI WATER POSSIBLY DUE TO LOW COND READINGS

Pre Check: PH = 7.0/25° COND 445
STND = 7.0/25° STND 445

Post Check: PH = 7.19/12° COND = 433
STND = 7.04/15° STND = 445

Comments: Energy Northwest

Well capped and locked: ☑ Yes ☐ No Logbook/Pg#: WM-SML-HLS pg 90
Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: J.H. NEER J.H. Neer FEB 15 2000
Print and sign name Date

Data Checked by: EX HAWORTH Elliott Haworth 2/16/00
Print and sign name Date

GROUNDWATER SAMPLE REPORT

Project: SITEWIDE SURVEILLANCE PRIO					Date: 2-11-00	Page 1 of 2
Sampling FY Quarter: FEB/2000	QC Type: NA				Calculations: 10/	
Well Number: ENW-MW8	A#: NONE					
Total Purge Volume (gal): ~~25~~ ~~10~~ 26	Purge Flow Rate (gal/min): 1					
Pump Type: PC	Time on: 1112	Water: 1114	Purge: 1124	Samp.: 1132	Off: 1140	

RECORD COPY
PROJ. 28023
CAT. T33
WORKING COPY

SAMPLES COLLECTED

B0XK82 Quanterra Incorporated COC No.: Y00-001-147✓
1 20ml P ACTIVITY SCAN
1;1000mL;P 906.0_H3_LSC: Tritium (1) (None) 9236020
B0XK94 (Filtered) Quanterra St. Louis COC No.: Y00-001-171✓
1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2) 9182040
B0XKB6 Quanterra St. Louis COC No.: Y00-001-171✓
1;20mL;P Activity Scan (None) NA
1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C) 9182040
1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C) 9182040

TOTAL ACTIVITY
~~HPT~~ JHN 2-8-2000
REG. TRUCK

Total No. Bottles: 12 Containment Code: NOT LISTED Collector: R.T SICKLE

FIELD MEASUREMENTS

Water Level (TOC): 31.80 TOC Drawdown (TOC): Oil Sheen Yes ☐ No ☑
Prev. pH: NA Prev. DTW: NA E-Tape No.: 99-5

Time	1117	1122	1124	1128	1130	1139				
pH	7.17	7.26	7.51	7.66	7.67	7.70				
Temp. (°C)	13.2	13.6	14.7	15.8	15.9	15.9				
Cond. (us/cm)	224	226	502	519	520	517			J.H. Neer	
Turb. (NTU)	278	68.4	51.3	4.00	2.29	8.05				
D. O. (mg/L)	8.83	7.70	7.74	7.70	7.72	7.79				
					*					

FIELD OBSERVATIONS

Weather: Overcast & Cold 41°F WIND @ 15 mph SW
Field Comments: JIM FROM ENERGY NORTHWEST is taking 1L Sample USEING PUMP# 1324

Pre Check: PH 7.0/25° COND 445 STND 7.0/25° STND 445
Post Check: PH 7.19/9.5° COND 443 STND 7.06/10° STND 445

Comments: Energy Northwest

Well capped and locked: ☑ Yes ☐ No
Logbook/Pg#: WM-SML-1125 PG 88
Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: J.H. NEER J.H. Neer Date 2-11-00
Print and sign name
Data Checked by: EK HAWORTH (W......) Elliott Haworth Date 2/14/00
Print and sign name

GROUNDWATER SAMPLE REPORT

No Dump

Project: SITEWIDE SURVEILLANCE PRIO / DOH						Date: 2/11/00	Page 1 of 4
Sampling FY Quarter: FEB/2000		QC Type: DUP				Calculations: 35/1	
Well Number: ENW-MW9		A#: NONE					
Total Purge Volume (gal): ~~85~~ ~~15~~ 35		Purge Flow Rate (gal/min): 1					
Pump Type: PG	Time on: 1212	Water: 1218	Purge: 1233	Samp.: 1234	Off: 1253		

SAMPLES COLLECTED

B0XK83 Quanterra Incorporated COC No.: Y00-001-148 ✓
1 20ml;P ACTIVITY SCAN
1;1000mL;P 906.0_H3_LSC: Tritium (1) (None) 9236020
B0XK84 Quanterra Incorporated COC No.: Y00-001-149 ✓
1 20ml;P ACTIVITY
1;1000mL;P 906.0_H3_LSC: Tritium (1) (None) 9236020
B0XK95 (Filtered) Quanterra St. Louis COC No.: Y00-001-172 ✓
1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2) 9182040
B0XK96 (Filtered) Quanterra St. Louis COC No.: Y00-001-173 ✓
1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2) 9182040

TOTAL ACTIVITY
~~HPT~~
REG. TRUCK

2-8-2000

Total No. Bottles: ~~28~~ RS 75 Containment Code: NOT LISTED Collector: R.T SICKLE

FIELD MEASUREMENTS

Water Level (TOC): 31.55 TOC			Drawdown (TOC):			Oil Sheen Yes ☐ No ☑				
Prev. pH: NA			Prev. DTW: NA			E-Tape No.: 99-5				
Time	1221	1225	1229	1233	1252					
pH	7.76	7.59	7.58	7.57	7.58					
Temp. (°C)	14.8	16.6	16.9	16.9	17.0		J.H.N.			
Cond. (us/cm)	570	1175	1181	1179	1160					
Turb. (NTU)	47.1	4.19	2.18	2.27	6.55					
D. O. (mg/L)	7.21	7.07	7.15	7.21	7.83					
				*						

FIELD OBSERVATIONS

Weather: OVERCAST & Cold 43°F WIND @ 15 SW

Field Comments: USES IN PUMP # M73

Pre Check: PH = 7.19/9.5° COND 443
STND = 7.06/10° STND 445

Post Check: PH = 7.18/11° COND = 439
STND 7.06/10° STND = 445

Comments: Energy Northwest

Well capped and locked: ☑ Yes ☐ No

Logbook/Pg#: WM-SML-H25 pg 88

Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: J.H. NEER J.H. Neer Date 2-11-00
Print and sign name

Data Checked by: EK HAWORTH (WMNW) Elliott Haworth Date 2/14/00
Print and sign name

JM 2-7-2000

GROUNDWATER SAMPLE REPORT

Project: SITEWIDE SURVEILLANCE PRIO /DOH

Date: FEB 0 8 2000

Page 1 of 2

Sampling FY Quarter: FEB/2000

QC Type: —0—

Calculations:

Well Number: ENW-31 (MW31)

A#: —0—

Total Purge Volume (gal): —0—

Purge Flow Rate (gal/min): —0—

Pump Type: —0—

Time on:	Water:	Purge:	Samp.:	Off:
0930	0930	0955	0956	1009

SAMPLES COLLECTED

B0XK85 Quanterra Incorporated COC No.: Y00-001-150

1;1000mL;P 906.0_H3_LSC: Tritium (1) (None) 9236020

B0XK97 (Filtered) Quanterra St. Louis COC No.: Y00-001-174

1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2) 7318010

B0XKB9 Quanterra St. Louis COC No.: Y00-001-174

1;20mL;P Activity Scan (None)
1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C) 9182040
1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C) ↓

JM ~~TOTAL ACTIVITY~~
~~HPT~~
~~REC. TRUCK~~

Energy NorthWest
Drinking Water Well

Total No. Bottles: 11

Containment Code:

Collector: **H. JONES**

FIELD MEASUREMENTS

Water Level (TOC): NA

Drawdown (TOC): NA

Oil Sheen Yes ☐ No ☐ NA

Prev. pH: Unknown

Prev. DTW: unknown

E-Tape No.: NA

Time	0947	0953	1010							
pH	8.02	8.08	8.12							
Temp. (°C)	18.2	18.2	17.7							
Cond. (us/cm)	353	354	352							
Turb. (NTU)	2.71	1.75	1.30							
D. O. (mg/L)	1.09	.91	~~1.30~~	per 2/8/00						
			1.05							
		*								

DRB 2/8/00

FIELD OBSERVATIONS

Weather: overcast, approx 39°

Field Comments: cond. 442 standard 445

Pre Check: 7.00 AT 25°C
Calibrated

Post Check: 7.06 AT 23°C
7.00 AT 25°C

Comments: ENW supply well

Well capped and locked: ☑ Yes ☐ No

Logbook/Pg#: WM-SML-H19 page 78

Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: D. R. BREWINGTON D. R. Brewington Date: FEB 0 8 2000

Print and sign name

Data Checked by: Date: 2/9/00

Print and sign name

2-7-2000

GROUNDWATER SAMPLE REPORT

Project: SITEWIDE SURVEILLANCE PRIO /DOH		Date: FEB 0 8 2000	Page 1 of 2
Sampling FY Quarter: FEB/2000	QC Type: ~~0~~	Calculations:	
Well Number: ENW-32 (MW32)	A# : NA		
Total Purge Volume (gal): NA	~~Purge Flow Rate (gal/min):~~ →		

Pump Type:	Time on:	Water:	Purge:	Samp.:	Off:
NA	0930	0930	1046	1047	1105

SAMPLES COLLECTED

B0XK86 Quanterra Incorporated COC No.: Y00-001-151

1;1000mL;P 906.0_H3_LSC: Tritium (1) (None) 9236020

B0XK98 (Filtered) Quanterra St. Louis COC No.: Y00-001-175

1;500mL;G/P 6010_METALS_ICP: List-1 (19) (HNO3 to pH <2) ~~9135010~~ 9182040 DRB 2/8/00

B0XKC0 Quanterra St. Louis COC No.: Y00-001-175

1;20mL;P Activity Scan (None)

1;500mL;G/P 310.1_ALKALINITY: Alkalinity (1) (Cool 4C) 9182040

1;500mL;P 300.0_ANIONS_IC: List-1 (5) (Cool 4C)

~~TOTAL ACTIVITY~~
~~HPT~~
~~REG. TRUCK~~

Energy Northwest
Drinking Water Well

Total No. Bottles: 11 Containment Code: Collector: H. JONES

FIELD MEASUREMENTS

Water Level (TOC): NA	Drawdown (TOC): NA	Oil Sheen Yes ☐ No ☑	
Prev. pH: unknown	Prev. DTW: unknown	E-Tape No.: NA	

Time	1035	1042	1045	1100						
pH	7.95	8.07	8.08	8.08						
Temp. (°C)	17.4	17.0	17.0	16.8						
Cond. (us/cm)	351	353	354	350						
Turb. (NTU)	.95	.45	.56	.55						
D. O. (mg/L)	.15	~~.45~~	.18	.15						
		DRB 2/8/00 .19								
			X							

DRB 2/8/00

FIELD OBSERVATIONS

Weather: overcast, approx 39°

Field Comments:

cond. 444 standard 445

Pre Check: 7.06 AT 23°C
7.00 AT 25°C

Post Check: 7.07 AT 22.1°C
7.02 AT 20°C

Comments: ENW supply well

Well capped and locked: ☑ Yes ☐ No

Logbook/Pg# : WM-SML-H19 page 78

Samples Surveyed for Gamma Radiation by RPTs: ☐ Yes ☑ No

Data Recorded by: D. R. BREWINGTON D.R. Brewington Date FEB 0 8 2000

Print and sign name

Data Checked by: EK HAWORTH (WMNW) Date 2/9/00

Print and sign name

Appendix C

Analytical Results for Phase I Evaluation of the 618-11 Burial Ground

Table C.1. Tritium Results for 618-11 Burial Ground Investigation, February 2000

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier(a)	MDA
Tritium	BOXJW7	699-10-E12	02/08/2000	2.32E+04	pCi/L		2.73E+02
Tritium	BOXK00	699-12-4D	02/07/2000	1.85E+03	pCi/L		2.71E+02
Tritium	BOXK01	699-13-1A	02/08/2000	2.33E+04	pCi/L		2.57E+02
Tritium(b)	BOXK01 DUP	699-13-1A DUP	02/08/2000	2.40E+04	pCi/L		2.57E+02
Tritium	BOXK29	699-13-1B	02/08/2000	3.00E+02	pCi/L	J	2.58E+02
Tritium	BOXK30	699-13-1C	02/08/2000	1.10E+02	pCi/L	U	2.55E+02
Tritium	B0XK47	699-13-3A	02/07/2000	7.23E+06	pCi/L		4.87E+02
Tritium	B0XK48	699-13-3A	02/07/2000	6.89E+06	pCi/L		4.73E+02
Tritium	BOXK49	699-15-15B	02/08/2000	7.00E+01	pCi/L	U	2.57E+02
Tritium	BOXK55	699-17-5	02/07/2000	8.15E+01	pCi/L	U	2.73E+02
Tritium	BOXK57	699-21-6	02/07/2000	2.13E+04	pCi/L		2.73E+02
Tritium	BOXK58	699-8-17	02/08/2000	5.44E+04	pCi/L		2.73E+02
Tritium	BOXK59	699-9-E2	02/10/2000	1.75E+03	pCi/L		2.80E+02
Tritium(b)	BOXK59 DUP	699-9-E2 DUP	02/10/2000	1.67E+03	pCi/L		2.82E+02
Tritium	BOXK75	C3071/ENW-MW1	02/09/2000	1.04E+04	pCi/L		2.72E+02
Tritium(b)	BOXK75 DUP	C3071/ENW-MW1 DUP	02/09/2000	1.00E+04	pCi/L		2.72E+02
Tritium	BOXK76	C3072/ENW-MW2	02/10/2000	1.85E+03	pCi/L		2.79E+02
Tritium	BOXK77	C3073/ENW-MW3	02/10/2000	1.16E+03	pCi/L		2.82E+02
Tritium	BOXK78	C3074/ENW-MW4	02/10/2000	1.20E+04	pCi/L		2.79E+02
Tritium	BOXK79	C3075/ENW-MW5	02/09/2000	1.41E+04	pCi/L		2.72E+02
Tritium	BOXK80	C3076/ENW-MW6	02/09/2000	3.79E+03	pCi/L		2.73E+02
Tritium	B0XK81	C3077/ENW-MW7	02/15/2000	5.10E+01	pCi/L	U	2.69E+02
Tritium(b)	B0XK81 DUP	C3077/ENW-MW7 DUP	02/15/2000	6.48E+01	pCi/L	U	2.73E+02
Tritium	B0XK82	C3078/ENW-MW8	02/11/2000	3.51E+02	pCi/L	J	3.09E+02
Tritium(b)	B0XK82 DUP	C3078/ENW-MW8 DUP	02/11/2000	5.02E+02	pCi/L		3.04E+02
Tritium	B0XK83	C3079/ENW-MW9	02/11/2000	2.43E+03	pCi/L		3.01E+02
Tritium	B0XK84	C3079/ENW-MW9	02/11/2000	2.84E+03	pCi/L		3.03E+02
Tritium	BOXK85	ENW-31	02/08/2000	-3.98E+01	pCi/L	U	2.74E+02
Tritium	BOXK86	ENW-32	02/08/2000	-3.51E+01	pCi/L	U	2.72E+02
Quality Control Samples							
Tritium(c)	BOXK60	EBL 121/699-13-3A	02/07/2000	9.93E+01	pCi/L	U	2.72E+02
Tritium(b,c)	BOXK60 DUP	EBL 121/699-13-3A DUP	02/07/2000	1.76E+02	pCi/L	U	2.72E+02
Tritium(d)	BOXK61	EBL 122/699-13-3A	02/07/2000	1.79E+02	pCi/L	U	2.74E+02
Tritium	BOXK62	EBL123/699-13-1B	02/08/2000	8.45E+01	pCi/L	U	2.73E+02
Tritium	BOXK63	EBL124/C3075/ENW-MW5	02/09/2000	2.31E+02	pCi/L	U	2.56E+02
Tritium	BOXK66	FTB 322/699-13-3A	02/07/2000	7.04E+01	pCi/L	U	2.72E+02
Tritium	BOXK67	FTB 323 /699-21-6	02/07/2000	1.30E+02	pCi/L	U	2.73E+02

(a) U = Result is less than the minimum detectable activity (MDA).
J = Estimated result (J qualifier has not been assigned to all preliminary data).
(b) Lab duplicate.
(c) Before sampling.
(d) After sampling.

Table C.2. Tritium Results for 618-11 Burial Ground Investigation, Thermo NUtech Laboratory, February 2000

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier	MDA
Tritium	B0XJT5	699-13-3A	02/07/2000	7.41E+06	pCi/L		2200
Tritium[(a)]	B0XJT5 DUP	699-13-3A DUP	02/07/2000	7.55E+06	pCi/L		2200

(a) Lab duplicate.
MDA = Minimum detectable activity.

Table C.3. Radionuclide Results for 618-11 Burial Ground Investigation, February 2000

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[(a)]	Reporting Limit	MDA
Antimony-125	B0XK02	699-10-E12	02/08/2000	-9.51E+00	pCi/L	U	1.83E+01	1.83E+01
Beryllium-7	B0XK02	699-10-E12	02/08/2000	-2.02E+01	pCi/L	U	5.44E+01	5.44E+01
Cesium-134	B0XK02	699-10-E12	02/08/2000	-2.97E+00	pCi/L	U	7.35E+00	7.35E+00
Cesium-137	B0XK02	699-10-E12	02/08/2000	3.97E-01	pCi/L	U	9.09E+00	9.09E+00
Cobalt-60	B0XK02	699-10-E12	02/08/2000	-1.01E+00	pCi/L	U	8.87E+00	8.87E+00
Europium-152	B0XK02	699-10-E12	02/08/2000	-2.55E+00	pCi/L	U	2.11E+01	2.11E+01
Europium-154	B0XK02	699-10-E12	02/08/2000	2.11E+00	pCi/L	U	2.33E+01	2.33E+01
Europium-155	B0XK02	699-10-E12	02/08/2000	4.97E+00	pCi/L	U	1.72E+01	1.72E+01
Gross alpha	B0XK02	699-10-E12	02/08/2000	3.71E+00	pCi/L		1.79E+00	1.79E+00
Gross beta	B0XK02	699-10-E12	02/08/2000	1.09E+01	pCi/L		2.99E+00	2.99E+00
Iodine-129	B0XK02	699-10-E12	02/08/2000	1.78E-02	pCi/L	U	2.69E-01	2.69E-01
Plutonium-238	B0XK02	699-10-E12	02/08/2000	-2.75E-02	pCi/L	U	3.04E-01	3.04E-01
Plutonium-239/240	B0XK02	699-10-E12	02/08/2000	-3.93E-03	pCi/L	U	1.98E-01	1.98E-01
Potassium-40	B0XK02	699-10-E12	02/08/2000	-5.01E+01	pCi/L	U	1.96E+02	1.96E+02
Ruthenium-106	B0XK02	699-10-E12	02/08/2000	-1.46E+01	pCi/L	U	6.72E+01	6.72E+01
Technetium-99	B0XK02	699-10-E12	02/08/2000	8.55E+01	pCi/L		1.23E+01	1.23E+01
Total beta radiostrontium	B0XK02	699-10-E12	02/08/2000	-8.58E-02	pCi/L	U	8.11E-01	8.11E-01
Uranium	B0XK02	699-10-E12	02/08/2000	5.15E+00	ug/L		7.29E-02	7.29E-02
Uranium-234	B0XK02	699-10-E12	02/08/2000	2.37E+00	pCi/L		3.61E-01	3.61E-01
Uranium-235	B0XK02	699-10-E12	02/08/2000	9.23E-02	pCi/L	U	2.62E-01	2.62E-01
Uranium-238	B0XK02	699-10-E12	02/08/2000	1.43E+00	pCi/L		3.49E-01	3.49E-01
Uranium-234[(b)]	B0XK02 DUP	699-10-E12 DUP	02/08/2000	1.88E+00	pCi/L			1.24E+00
Uranium-235[(b)]	B0XK02 DUP	699-10-E12 DUP	02/08/2000	1.31E-01	pCi/L	U		1.24E+00
Uranium-238[(b)]	B0XK02 DUP	699-10-E12 DUP	02/08/2000	1.04E+00	pCi/L	U		1.09E+00
Antimony-125	B0XJW0	699-12-4D	02/07/2000	-5.16E+00	pCi/L	U		1.94E+01
Beryllium-7	B0XJW0	699-12-4D	02/07/2000	-9.76E+00	pCi/L	U		6.89E+01
Cesium-134	B0XJW0	699-12-4D	02/07/2000	-4.53E+00	pCi/L	U		5.77E+00
Cesium-137	B0XJW0	699-12-4D	02/07/2000	3.09E+00	pCi/L	U		9.67E+00
Cobalt-60	B0XJW0	699-12-4D	02/07/2000	-1.41E+00	pCi/L	U		7.81E+00
Europium-152	B0XJW0	699-12-4D	02/07/2000	-4.75E+00	pCi/L	U		2.23E+01
Europium-154	B0XJW0	699-12-4D	02/07/2000	-8.12E+00	pCi/L	U		2.10E+01
Europium-155	B0XJW0	699-12-4D	02/07/2000	2.67E+00	pCi/L	U		1.51E+01
Gross alpha	B0XJW0	699-12-4D	02/07/2000	3.44E+00	pCi/L			1.80E+00
Gross beta	B0XJW0	699-12-4D	02/07/2000	7.63E+00	pCi/L			2.81E+00
Iodine-129	B0XJW0	699-12-4D	02/07/2000	-1.88E-02	pCi/L	U		2.93E-01
Plutonium-238	B0XJW0	699-12-4D	02/07/2000	-3.55E-03	pCi/L	U		1.78E-01
Plutonium-239/240	B0XJW0	699-12-4D	02/07/2000	0.00E+00	pCi/L	U		1.20E-01

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[(a)]	Reporting Limit	MDA
Potassium-40	B0XJW0	699-12-4D	02/07/2000	6.15E+01	pCi/L	U		1.05E+02
Ruthenium-106	B0XJW0	699-12-4D	02/07/2000	-1.11E+01	pCi/L	U		6.97E+01
Strontium-89/90	B0XJW0	699-12-4D	02/07/2000	-1.20E-01	pCi/L	U		6.06E-01
Technetium-99	B0XJW0	699-12-4D	02/07/2000	5.17E+00	pCi/L	U		1.23E+01
Uranium	B0XJW0	699-12-4D	02/07/2000	5.87E+00	ug/L			7.29E-02
Uranium-234	B0XJW0	699-12-4D	02/07/2000	1.80E+00	pCi/L			3.53E-01
Uranium-235	B0XJW0	699-12-4D	02/07/2000	2.35E-02	pCi/L	U		2.68E-01
Uranium-238	B0XJW0	699-12-4D	02/07/2000	1.91E+00	pCi/L			3.01E-01
Uranium[(b)]	B0XJW0 DUP	699-12-4D DUP	02/07/2000	5.70E+00	ug/L			7.29E-02
Antimony-125	B0XJW9	699-13-1A	02/08/2000	-9.44E+00	pCi/L	U	2.12E+01	2.12E+01
Beryllium-7	B0XJW9	699-13-1A	02/08/2000	7.57E+00	pCi/L	U	7.52E+01	7.52E+01
Cesium-134	B0XJW9	699-13-1A	02/08/2000	-4.72E+00	pCi/L	U	8.59E+00	8.59E+00
Cesium-137	B0XJW9	699-13-1A	02/08/2000	-2.66E+00	pCi/L	U	7.86E+00	7.86E+00
Cobalt-60	B0XJW9	699-13-1A	02/08/2000	1.08E+00	pCi/L	U	1.06E+01	1.06E+01
Europium-152	B0XJW9	699-13-1A	02/08/2000	6.04E+00	pCi/L	U	2.47E+01	2.47E+01
Europium-154	B0XJW9	699-13-1A	02/08/2000	-1.45E+01	pCi/L	U	2.41E+01	2.41E+01
Europium-155	B0XJW9	699-13-1A	02/08/2000	1.28E+01	pCi/L	U	2.19E+01	2.19E+01
Gross alpha	B0XJW9	699-13-1A	02/08/2000	4.16E+00	pCi/L		1.93E+00	1.93E+00
Gross beta	B0XJW9	699-13-1A	02/08/2000	9.61E+00	pCi/L		2.99E+00	2.99E+00
Iodine-129	B0XJW9	699-13-1A	02/08/2000	1.29E-01	pCi/L	U	2.52E-01	2.52E-01
Plutonium-238	B0XJW9	699-13-1A	02/08/2000	0.00E+00	pCi/L	U	9.84E-02	9.84E-02
Plutonium-239/240	B0XJW9	699-13-1A	02/08/2000	0.00E+00	pCi/L	U	9.84E-02	9.84E-02
Potassium-40	B0XJW9	699-13-1A	02/08/2000	-1.06E+02	pCi/L	U	2.06E+02	2.06E+02
Ruthenium-106	B0XJW9	699-13-1A	02/08/2000	6.06E+00	pCi/L	U	7.94E+01	7.94E+01
Technetium-99	B0XJW9	699-13-1A	02/08/2000	3.01E+01	pCi/L		1.22E+01	1.22E+01
Total beta radiostrontium	B0XJW9	699-13-1A	02/08/2000	2.02E-01	pCi/L	U	6.93E-01	6.93E-01
Uranium-234	B0XJW9	699-13-1A	02/08/2000	2.77E+00	pCi/L		2.46E-01	2.46E-01
Uranium-235	B0XJW9	699-13-1A	02/08/2000	-1.04E-02	pCi/L	U	2.17E-01	2.17E-01
Uranium-238	B0XJW9	699-13-1A	02/08/2000	1.29E+00	pCi/L		2.32E-01	2.32E-01
Gross alpha[(b)]	B0XJW9 DUP	699-13-1A DUP	02/08/2000	4.29E+00	pCi/L			2.06E+00
Plutonium-238[(b)]	B0XJW9 DUP	699-13-1A DUP	02/08/2000	0.00E+00	pCi/L	U		9.52E-02
Plutonium-239/240[(b)]	B0XJW9 DUP	699-13-1A DUP	02/08/2000	0.00E+00	pCi/L	U		9.52E-02
Antimony-125	B0XJX6	699-13-1B	02/08/2000	3.58E+00	pCi/L	U	2.10E+01	2.10E+01
Beryllium-7	B0XJX6	699-13-1B	02/08/2000	2.42E+01	pCi/L	U	6.19E+01	6.19E+01
Cesium-134	B0XJX6	699-13-1B	02/08/2000	-4.64E+00	pCi/L	U	6.92E+00	6.92E+00
Cesium-137	B0XJX6	699-13-1B	02/08/2000	1.03E+00	pCi/L	U	8.19E+00	8.19E+00

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[a]	Reporting Limit	MDA
Cobalt-60	B0XJX6	699-13-1B	02/08/2000	3.49E-01	pCi/L	U	9.82E+00	9.82E+00
Europium-152	B0XJX6	699-13-1B	02/08/2000	-2.28E+00	pCi/L	U	2.00E+01	2.00E+01
Europium-154	B0XJX6	699-13-1B	02/08/2000	8.71E+00	pCi/L	U	2.96E+01	2.96E+01
Europium-155	B0XJX6	699-13-1B	02/08/2000	-9.32E+00	pCi/L	U	1.65E+01	1.65E+01
Gross alpha	B0XJX6	699-13-1B	02/08/2000	2.24E+00	pCi/L	J	1.69E+00	1.69E+00
Gross beta	B0XJX6	699-13-1B	02/08/2000	6.52E+00	pCi/L		2.96E+00	2.96E+00
Iodine-129	B0XJX6	699-13-1B	02/08/2000	-3.53E-02	pCi/L	U	2.98E-01	2.98E-01
Potassium-40	B0XJX6	699-13-1B	02/08/2000	-6.82E+01	pCi/L	U	1.28E+02	1.28E+02
Ruthenium-106	B0XJX6	699-13-1B	02/08/2000	-1.15E+01	pCi/L	U	7.05E+01	7.05E+01
Technetium-99	B0XJX6	699-13-1B	02/08/2000	1.58E+00	pCi/L	U	1.22E+01	1.22E+01
Total beta radiostrontium	B0XJX6	699-13-1B	02/08/2000	-4.72E-02	pCi/L	U	7.05E-01	7.05E-01
Antimony-125	B0XJY0	699-13-1C	02/08/2000	-2.00E-01	pCi/L	U	1.87E+01	1.87E+01
Beryllium-7	B0XJY0	699-13-1C	02/08/2000	2.05E+01	pCi/L	U	6.62E+01	6.62E+01
Cesium-134	B0XJY0	699-13-1C	02/08/2000	-3.37E+00	pCi/L	U	8.45E+00	8.45E+00
Cesium-137	B0XJY0	699-13-1C	02/08/2000	-1.26E+00	pCi/L	U	8.61E+00	8.61E+00
Cobalt-60	B0XJY0	699-13-1C	02/08/2000	2.19E+00	pCi/L	U	1.15E+01	1.15E+01
Europium-152	B0XJY0	699-13-1C	02/08/2000	2.20E+00	pCi/L	U	2.21E+01	2.21E+01
Europium-154	B0XJY0	699-13-1C	02/08/2000	-2.03E+00	pCi/L	U	3.11E+01	3.11E+01
Europium-155	B0XJY0	699-13-1C	02/08/2000	3.43E+00	pCi/L	U	1.71E+01	1.71E+01
Gross alpha	B0XJY0	699-13-1C	02/08/2000	5.59E-01	pCi/L	U	1.88E+00	1.88E+00
Gross beta	B0XJY0	699-13-1C	02/08/2000	7.32E+00	pCi/L		3.02E+00	3.02E+00
Iodine-129	B0XJY0	699-13-1C	02/08/2000	1.18E-01	pCi/L	U	2.88E-01	2.88E-01
Potassium-40	B0XJY0	699-13-1C	02/08/2000	-2.12E+01	pCi/L	U	2.04E+02	2.04E+02
Ruthenium-106	B0XJY0	699-13-1C	02/08/2000	-1.29E+00	pCi/L	U	7.28E+01	7.28E+01
Technetium-99	B0XJY0	699-13-1C	02/08/2000	-5.68E+00	pCi/L	U	1.23E+01	1.23E+01
Total beta radiostrontium	B0XJY0	699-13-1C	02/08/2000	2.84E-01	pCi/L	U	7.37E-01	7.37E-01
Antimony-125[b]	B0XJY0 DUP	699-13-1C DUP	02/08/2000	-9.30E+00	pCi/L	U		2.09E+01
Beryllium-7[b]	B0XJY0 DUP	699-13-1C DUP	02/08/2000	5.08E+00	pCi/L	U		7.46E+01
Cesium-134[b]	B0XJY0 DUP	699-13-1C DUP	02/08/2000	-3.24E+00	pCi/L	U		7.76E+00
Cesium-137[b]	B0XJY0 DUP	699-13-1C DUP	02/08/2000	2.52E+00	pCi/L	U		9.02E+00
Cobalt-60[b]	B0XJY0 DUP	699-13-1C DUP	02/08/2000	-1.08E+00	pCi/L	U		8.29E+00
Europium-152[b]	B0XJY0 DUP	699-13-1C DUP	02/08/2000	-3.08E+00	pCi/L	U		2.12E+01
Europium-154[b]	B0XJY0 DUP	699-13-1C DUP	02/08/2000	7.67E+00	pCi/L	U		2.99E+01
Europium-155[b]	B0XJY0 DUP	699-13-1C DUP	02/08/2000	3.05E-01	pCi/L	U		1.57E+01
Potassium-40[b]	B0XJY0 DUP	699-13-1C DUP	02/08/2000	3.54E+00	pCi/L	U		2.53E+02
Ruthenium-106[b]	B0XJY0 DUP	699-13-1C DUP	02/08/2000	2.78E+00	pCi/L	U		7.58E+01
Antimony-125	BOXJT8	699-13-3A	02/07/2000	-7.46E+00	pCi/L	U		1.49E+01
Antimony-125	BOXJT9	699-13-3A	02/07/2000	-6.24E+00	pCi/L	U		2.11E+01
Beryllium-7	BOXJT8	699-13-3A	02/07/2000	-1.21E+01	pCi/L	U		5.27E+01

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[(a)]	Reporting Limit	MDA
Beryllium-7	BOXJT9	699-13-3A	02/07/2000	-3.24E+00	pCi/L	U		6.41E+01
Cesium-134	BOXJT8	699-13-3A	02/07/2000	7.69E-02	pCi/L	U		7.12E+00
Cesium-134	BOXJT9	699-13-3A	02/07/2000	2.54E-01	pCi/L	U		8.54E+00
Cesium-137	BOXJT8	699-13-3A	02/07/2000	-1.47E+00	pCi/L	U		7.49E+00
Cesium-137	BOXJT9	699-13-3A	02/07/2000	-3.27E+00	pCi/L	U		8.21E+00
Cobalt-60	BOXJT8	699-13-3A	02/07/2000	1.54E+00	pCi/L	U		8.89E+00
Cobalt-60	BOXJT9	699-13-3A	02/07/2000	9.89E-01	pCi/L	U		8.75E+00
Europium-152	BOXJT8	699-13-3A	02/07/2000	1.20E+01	pCi/L	U		1.76E+01
Europium-152	BOXJT9	699-13-3A	02/07/2000	1.05E+01	pCi/L	U		2.47E+01
Europium-154	BOXJT8	699-13-3A	02/07/2000	-4.40E+00	pCi/L	U		2.17E+01
Europium-154	BOXJT9	699-13-3A	02/07/2000	4.22E+00	pCi/L	U		2.59E+01
Europium-155	BOXJT8	699-13-3A	02/07/2000	-4.66E+00	pCi/L	U		1.31E+01
Europium-155	BOXJT9	699-13-3A	02/07/2000	-1.33E+00	pCi/L	U		1.46E+01
Gross alpha	BOXJT8	699-13-3A	02/07/2000	6.06E+00	pCi/L			1.78E+00
Gross alpha	BOXJT9	699-13-3A	02/07/2000	6.15E+00	pCi/L			2.28E+00
Gross beta	BOXJT8	699-13-3A	02/07/2000	1.50E+01	pCi/L			3.00E+00
Gross beta	BOXJT9	699-13-3A	02/07/2000	2.08E+01	pCi/L			2.96E+00
Iodine-129	BOXJT8	699-13-3A	02/07/2000	-1.13E-01	pCi/L	U		2.37E-01
Iodine-129	BOXJT9	699-13-3A	02/07/2000	2.31E-01	pCi/L	U		3.40E-01
Plutonium-238	BOXJT8	699-13-3A	02/07/2000	0.00E+00	pCi/L	U		1.02E-01
Plutonium-238	BOXJT9	699-13-3A	02/07/2000	3.51E-02	pCi/L	U		9.52E-02
Plutonium-239/240	BOXJT8	699-13-3A	02/07/2000	0.00E+00	pCi/L	U		1.02E-01
Plutonium-239/240	BOXJT9	699-13-3A	02/07/2000	0.00E+00	pCi/L	U		9.52E-02
Potassium-40	BOXJT8	699-13-3A	02/07/2000	-3.28E+01	pCi/L	U		2.51E+02
Potassium-40	BOXJT9	699-13-3A	02/07/2000	1.56E+00	pCi/L	U		7.26E+01
Ruthenium-106	BOXJT8	699-13-3A	02/07/2000	2.72E+01	pCi/L	U		7.45E+01
Ruthenium-106	BOXJT9	699-13-3A	02/07/2000	2.41E+01	pCi/L	U		8.56E+01
Strontium-89/90	BOXJT8	699-13-3A	02/07/2000	-3.15E-02	pCi/L	U		8.69E-01
Technetium-99	BOXJT8	699-13-3A	02/07/2000	1.86E+04	pCi/L			2.88E+01
Technetium-99	BOXJT9	699-13-3A	02/07/2000	1.36E+04	pCi/L			2.88E+01
Uranium	BOXJT8	699-13-3A	02/07/2000	1.03E+01	ug/L			7.29E-02
Uranium	BOXJT9	699-13-3A	02/07/2000	9.91E+00	ug/L			7.29E-02
Uranium-234	BOXJT8	699-13-3A	02/07/2000	4.35E+00	pCi/L			2.40E-01
Uranium-234	BOXJT9	699-13-3A	02/07/2000	3.80E+00	pCi/L			2.49E-01
Uranium-235	BOXJT8	699-13-3A	02/07/2000	2.86E-01	pCi/L			2.11E-01
Uranium-235	BOXJT9	699-13-3A	02/07/2000	8.26E-02	pCi/L	U		3.23E-01
Uranium-238	BOXJT8	699-13-3A	02/07/2000	3.55E+00	pCi/L			1.94E-01
Uranium-238	BOXJT9	699-13-3A	02/07/2000	3.62E+00	pCi/L			3.23E-01
Antimony-125[(b)]	BOXJT8DUP	699-13-3A DUP	02/07/2000	-1.93E+00	pCi/L	U		1.89E+01
Beryllium-7[(b)]	BOXJT8DUP	699-13-3A DUP	02/07/2000	-2.33E+01	pCi/L	U		5.50E+01

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier(a)	Reporting Limit	MDA
Cesium-134(b)	BOXJT8DUP	699-13-3A DUP	02/07/2000	-1.32E+00	pCi/L	U		8.10E+00
Cesium-137(b)	BOXJT8DUP	699-13-3A DUP	02/07/2000	-1.23E+00	pCi/L	U		7.14E+00
Cobalt-60(b)	BOXJT8DUP	699-13-3A DUP	02/07/2000	8.54E-01	pCi/L	U		9.82E+00
Europium-152(b)	BOXJT8DUP	699-13-3A DUP	02/07/2000	5.57E+00	pCi/L	U		2.17E+01
Europium-154(b)	BOXJT8DUP	699-13-3A DUP	02/07/2000	-8.96E+00	pCi/L	U		2.26E+01
Europium-155(b)	BOXJT8DUP	699-13-3A DUP	02/07/2000	-7.34E-01	pCi/L	U		1.88E+01
Iodine-129(b)	BOXJT8DUP	699-13-3A DUP	02/07/2000	1.12E-01	pCi/L	U		3.53E-01
Potassium-40(b)	BOXJT8DUP	699-13-3A DUP	02/07/2000	1.88E+01	pCi/L	U		1.53E+02
Ruthenium-106(b)	BOXJT8DUP	699-13-3A DUP	02/07/2000	-1.90E+01	pCi/L	U		6.17E+01
Technetium-99(b)	BOXJT9 DUP	699-13-3A DUP	02/07/2000	1.50E+04	pCi/L			2.88E+01
Antimony-125	B0XK20	699-15-15B	02/08/2000	-1.84E+00	pCi/L	U	1.85E+01	1.85E+01
Beryllium-7	B0XK20	699-15-15B	02/08/2000	-3.90E+00	pCi/L	U	6.33E+01	6.33E+01
Cesium-134	B0XK20	699-15-15B	02/08/2000	-2.23E+00	pCi/L	U	7.39E+00	7.39E+00
Cesium-137	B0XK20	699-15-15B	02/08/2000	-3.50E-01	pCi/L	U	7.61E+00	7.61E+00
Cobalt-60	B0XK20	699-15-15B	02/08/2000	4.77E-01	pCi/L	U	7.00E+00	7.00E+00
Europium-152	B0XK20	699-15-15B	02/08/2000	-5.69E+00	pCi/L	U	1.78E+01	1.78E+01
Europium-154	B0XK20	699-15-15B	02/08/2000	1.44E+01	pCi/L	U	2.91E+01	2.91E+01
Europium-155	B0XK20	699-15-15B	02/08/2000	-1.09E+00	pCi/L	U	1.47E+01	1.47E+01
Gross alpha	B0XK20	699-15-15B	02/08/2000	4.22E+00	pCi/L		2.23E+00	2.23E+00
Gross beta	B0XK20	699-15-15B	02/08/2000	8.56E+00	pCi/L		3.00E+00	3.00E+00
Iodine-129	B0XK20	699-15-15B	02/08/2000	-1.27E-02	pCi/L	U	2.89E-01	2.89E-01
Potassium-40	B0XK20	699-15-15B	02/08/2000	-8.84E+01	pCi/L	U	2.30E+02	2.30E+02
Ruthenium-106	B0XK20	699-15-15B	02/08/2000	1.78E+01	pCi/L	U	7.32E+01	7.32E+01
Technetium-99	B0XK20	699-15-15B	02/08/2000	-4.61E+00	pCi/L	U	1.22E+01	1.22E+01
Uranium-234	B0XK20	699-15-15B	02/08/2000	3.39E+00	pCi/L		4.05E-01	4.05E-01
Uranium-235	B0XK20	699-15-15B	02/08/2000	1.20E-01	pCi/L	U	3.27E-01	3.27E-01
Uranium-238	B0XK20	699-15-15B	02/08/2000	2.28E+00	pCi/L		3.88E-01	3.88E-01
Iodine-129(b)	B0XK20 DUP	699-15-15B DUP	02/08/2000	-5.04E-02	pCi/L	U		2.21E-01
Uranium-234(b)	B0XK20 DUP	699-15-15B DUP	02/08/2000	3.03E+00	pCi/L			2.74E-01
Uranium-235(b)	B0XK20 DUP	699-15-15B DUP	02/08/2000	3.51E-02	pCi/L	U		2.31E-01
Uranium-238(b)	B0XK20 DUP	699-15-15B DUP	02/08/2000	2.55E+00	pCi/L			3.18E-01
Antimony-125	B0XK15	699-17-5	02/07/2000	-1.05E-01	pCi/L	U	1.85E+01	1.85E+01
Beryllium-7	B0XK15	699-17-5	02/07/2000	2.83E+01	pCi/L	U	6.40E+01	6.40E+01
Cesium-134	B0XK15	699-17-5	02/07/2000	-5.37E+00	pCi/L	U	6.30E+00	6.30E+00
Cesium-137	B0XK15	699-17-5	02/07/2000	3.19E+00	pCi/L	U	8.55E+00	8.55E+00
Cobalt-60	B0XK15	699-17-5	02/07/2000	-8.42E-01	pCi/L	U	8.28E+00	8.28E+00

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[(a)]	Reporting Limit	MDA
Europium-152	B0XK15	699-17-5	02/07/2000	6.42E+00	pCi/L	U	2.09E+01	2.09E+01
Europium-154	B0XK15	699-17-5	02/07/2000	1.37E+00	pCi/L	U	2.16E+01	2.16E+01
Europium-155	B0XK15	699-17-5	02/07/2000	-8.78E-01	pCi/L	U	1.51E+01	1.51E+01
Gross alpha	B0XK15	699-17-5	02/07/2000	2.48E+00	pCi/L	J	2.04E+00	2.04E+00
Gross beta	B0XK15	699-17-5	02/07/2000	7.92E+00	pCi/L		2.82E+00	2.82E+00
Iodine-129	B0XK15	699-17-5	02/07/2000	-7.25E-02	pCi/L	U	2.08E-01	2.08E-01
Potassium-40	B0XK15	699-17-5	02/07/2000	4.77E+01	pCi/L	U	4.85E+01	4.85E+01
Ruthenium-106	B0XK15	699-17-5	02/07/2000	-1.48E+01	pCi/L	U	6.52E+01	6.52E+01
Technetium-99	B0XK15	699-17-5	02/07/2000	2.18E+00	pCi/L	U	1.23E+01	1.23E+01
Uranium-234	B0XK15	699-17-5	02/07/2000	1.36E+00	pCi/L		4.08E-01	4.08E-01
Uranium-235	B0XK15	699-17-5	02/07/2000	1.12E-01	pCi/L	U	3.17E-01	3.17E-01
Uranium-238	B0XK15	699-17-5	02/07/2000	9.85E-01	pCi/L	J	3.77E-01	3.77E-01
Antimony-125[(b)]	B0XK15 DUP	699-17-5 DUP	02/07/2000	4.57E+00	pCi/L	U		1.92E+01
Beryllium-7[(b)]	B0XK15 DUP	699-17-5 DUP	02/07/2000	-1.52E+01	pCi/L	U		6.35E+01
Cesium-134[(b)]	B0XK15 DUP	699-17-5 DUP	02/07/2000	1.43E+00	pCi/L	U		8.07E+00
Cesium-137[(b)]	B0XK15 DUP	699-17-5 DUP	02/07/2000	1.94E+00	pCi/L	U		8.31E+00
Cobalt-60[(b)]	B0XK15 DUP	699-17-5 DUP	02/07/2000	-2.24E+00	pCi/L	U		7.84E+00
Europium-152[(b)]	B0XK15 DUP	699-17-5 DUP	02/07/2000	-2.01E+00	pCi/L	U		1.76E+01
Europium-154[(b)]	B0XK15 DUP	699-17-5 DUP	02/07/2000	2.98E+00	pCi/L	U		2.52E+01
Europium-155[(b)]	B0XK15 DUP	699-17-5 DUP	02/07/2000	3.05E+00	pCi/L	U		1.35E+01
Potassium-40[(b)]	B0XK15 DUP	699-17-5 DUP	02/07/2000	3.15E+01	pCi/L	U		7.00E+01
Ruthenium-106[(b)]	B0XK15 DUP	699-17-5 DUP	02/07/2000	-1.13E+01	pCi/L	U		6.59E+01
Antimony-125	B0XK23	699-21-6	02/07/2000	-1.69E+01	pCi/L	U	2.02E+01	2.02E+01
Beryllium-7	B0XK23	699-21-6	02/07/2000	1.30E+01	pCi/L	U	7.62E+01	7.62E+01
Cesium-134	B0XK23	699-21-6	02/07/2000	-4.93E+00	pCi/L	U	8.80E+00	8.80E+00
Cesium-137	B0XK23	699-21-6	02/07/2000	-1.44E+00	pCi/L	U	8.53E+00	8.53E+00
Cobalt-60	B0XK23	699-21-6	02/07/2000	2.63E+00	pCi/L	U	1.09E+01	1.09E+01
Europium-152	B0XK23	699-21-6	02/07/2000	2.93E+00	pCi/L	U	2.30E+01	2.30E+01
Europium-154	B0XK23	699-21-6	02/07/2000	8.80E+00	pCi/L	U	3.18E+01	3.18E+01
Europium-155	B0XK23	699-21-6	02/07/2000	2.92E+00	pCi/L	U	2.13E+01	2.13E+01
Gross alpha	B0XK23	699-21-6	02/07/2000	2.08E+00	pCi/L	J	1.77E+00	1.77E+00
Gross beta	B0XK23	699-21-6	02/07/2000	9.52E+00	pCi/L		2.72E+00	2.72E+00
Iodine-129	B0XK23	699-21-6	02/07/2000	7.73E-02	pCi/L	U	3.33E-01	3.33E-01

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier$^{(a)}$	Reporting Limit	MDA
Potassium-40	B0XK23	699-21-6	02/07/2000	-2.29E+01	pCi/L	U	2.24E+02	2.24E+02
Ruthenium-106	B0XK23	699-21-6	02/07/2000	-1.79E+01	pCi/L	U	7.15E+01	7.15E+01
Technetium-99	B0XK23	699-21-6	02/07/2000	5.18E+01	pCi/L		1.23E+01	1.23E+01
Uranium-234	B0XK23	699-21-6	02/07/2000	1.56E+00	pCi/L		2.62E-01	2.62E-01
Uranium-235	B0XK23	699-21-6	02/07/2000	-1.11E-02	pCi/L	U	2.31E-01	2.31E-01
Uranium-238	B0XK23	699-21-6	02/07/2000	9.58E-01	pCi/L	J	2.47E-01	2.47E-01
Antimony-125	B0XK12	699-8-17	02/08/2000	2.65E+00	pCi/L	U	2.26E+01	2.26E+01
Beryllium-7	B0XK12	699-8-17	02/08/2000	-1.26E+01	pCi/L	U	5.62E+01	5.62E+01
Cesium-134	B0XK12	699-8-17	02/08/2000	-6.01E+00	pCi/L	U	6.60E+00	6.60E+00
Cesium-137	B0XK12	699-8-17	02/08/2000	3.55E+00	pCi/L	U	9.57E+00	9.57E+00
Cobalt-60	B0XK12	699-8-17	02/08/2000	7.01E-01	pCi/L	U	7.81E+00	7.81E+00
Europium-152	B0XK12	699-8-17	02/08/2000	1.46E+01	pCi/L	U	2.45E+01	2.45E+01
Europium-154	B0XK12	699-8-17	02/08/2000	3.71E+00	pCi/L	U	2.68E+01	2.68E+01
Europium-155	B0XK12	699-8-17	02/08/2000	3.74E+00	pCi/L	U	1.59E+01	1.59E+01
Gross alpha	B0XK12	699-8-17	02/08/2000	3.83E+00	pCi/L		1.53E+00	1.53E+00
Gross beta	B0XK12	699-8-17	02/08/2000	2.18E+01	pCi/L		2.80E+00	2.80E+00
Iodine-129	B0XK12	699-8-17	02/08/2000	1.72E-01	pCi/L	U	2.96E-01	2.96E-01
Potassium-40	B0XK12	699-8-17	02/08/2000	2.12E+01	pCi/L	U	2.53E+02	2.53E+02
Ruthenium-106	B0XK12	699-8-17	02/08/2000	-2.20E+01	pCi/L	U	6.98E+01	6.98E+01
Technetium-99	B0XK12	699-8-17	02/08/2000	1.56E+02	pCi/L		1.23E+01	1.23E+01
Uranium-234	B0XK12	699-8-17	02/08/2000	1.53E+00	pCi/L		2.56E-01	2.56E-01
Uranium-235	B0XK12	699-8-17	02/08/2000	4.32E-02	pCi/L	U	2.35E-01	2.35E-01
Uranium-238	B0XK12	699-8-17	02/08/2000	1.32E+00	pCi/L		2.74E-01	2.74E-01
Antimony-125	B0XJY4	699-9-E2	02/10/2000	2.38E+00	pCi/L	U	2.08E+01	2.08E+01
Beryllium-7	B0XJY4	699-9-E2	02/10/2000	-1.40E+00	pCi/L	U	6.60E+01	6.60E+01
Cesium-134	B0XJY4	699-9-E2	02/10/2000	-3.58E+00	pCi/L	U	7.24E+00	7.24E+00
Cesium-137	B0XJY4	699-9-E2	02/10/2000	-2.92E+00	pCi/L	U	6.93E+00	6.93E+00
Cobalt-60	B0XJY4	699-9-E2	02/10/2000	2.31E+00	pCi/L	U	1.00E+01	1.00E+01
Europium-152	B0XJY4	699-9-E2	02/10/2000	4.51E+00	pCi/L	U	2.25E+01	2.25E+01
Europium-154	B0XJY4	699-9-E2	02/10/2000	2.82E+00	pCi/L	U	3.20E+01	3.20E+01
Europium-155	B0XJY4	699-9-E2	02/10/2000	-2.13E+00	pCi/L	U	1.88E+01	1.88E+01
Gross alpha	B0XJY4	699-9-E2	02/10/2000	1.98E+00	pCi/L	J	1.32E+00	1.32E+00
Gross beta	B0XJY4	699-9-E2	02/10/2000	7.35E+00	pCi/L		3.11E+00	3.11E+00
Iodine-129	B0XJY4	699-9-E2	02/10/2000	1.83E-01	pCi/L	U	3.52E-01	3.52E-01
Potassium-40	B0XJY4	699-9-E2	02/10/2000	-3.63E+01	pCi/L	U	1.44E+02	1.44E+02
Ruthenium-106	B0XJY4	699-9-E2	02/10/2000	-1.07E+01	pCi/L	U	6.23E+01	6.23E+01
Technetium-99	B0XJY4	699-9-E2	02/10/2000	-3.32E+00	pCi/L	U	1.25E+01	1.25E+01
Total beta radiostrontium	B0XJY4	699-9-E2	02/10/2000	-5.44E-02	pCi/L	U	6.42E-01	6.42E-01
Uranium-234	B0XJY4	699-9-E2	02/10/2000	1.28E+00	pCi/L		3.96E-01	3.96E-01

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[(a)]	Reporting *Limit*	*MDA*
Uranium-235	B0XJY4	699-9-E2	02/10/2000	7.15E-02	pCi/L	U	3.07E-01	3.07E-01
Uranium-238	B0XJY4	699-9-E2	02/10/2000	1.13E+00	pCi/L		3.88E-01	3.88E-01
Antimony-125[(b)]	B0XJY4 DUP	699-9-E2 DUP	02/10/2000	6.22E-01	pCi/L	U		2.24E+01
Beryllium-7[(b)]	B0XJY4 DUP	699-9-E2 DUP	02/10/2000	1.72E+01	pCi/L	U		8.90E+01
Cesium-134[(b)]	B0XJY4 DUP	699-9-E2 DUP	02/10/2000	-5.94E+00	pCi/L	U		8.72E+00
Cesium-137[(b)]	B0XJY4 DUP	699-9-E2 DUP	02/10/2000	1.63E+00	pCi/L	U		9.54E+00
Cobalt-60[(b)]	B0XJY4 DUP	699-9-E2 DUP	02/10/2000	-1.84E+00	pCi/L	U		9.25E+00
Europium-152[(b)]	B0XJY4 DUP	699-9-E2 DUP	02/10/2000	7.70E+00	pCi/L	U		2.39E+01
Europium-154[(b)]	B0XJY4 DUP	699-9-E2 DUP	02/10/2000	4.22E+00	pCi/L	U		2.81E+01
Europium-155[(b)]	B0XJY4 DUP	699-9-E2 DUP	02/10/2000	-9.94E-01	pCi/L	U		1.99E+01
Potassium-40[(b)]	B0XJY4 DUP	699-9-E2 DUP	02/10/2000	-2.14E+01	pCi/L	U		2.28E+02
Ruthenium-106[(b)]	B0XJY4 DUP	699-9-E2 DUP	02/10/2000	7.23E+00	pCi/L	U		8.75E+01
Technetium-99[(b)]	B0XJY4 DUP	699-9-E2 DUP	02/10/2000	2.66E+00	pCi/L	U		1.25E+01
Total beta radiostrontium[(b)]	B0XJY4 DUP	699-9-E2 DUP	02/10/2000	-5.14E-02	pCi/L	U		7.41E-01
Antimony-125	B0XKC1	C3071/ENW-MW1	02/09/2000	-3.60E+00	pCi/L	U	2.00E+01	2.00E+01
Beryllium-7	B0XKC1	C3071/ENW-MW1	02/09/2000	6.28E+00	pCi/L	U	8.34E+01	8.34E+01
Cesium-134	B0XKC1	C3071/ENW-MW1	02/09/2000	2.48E+00	pCi/L	U	8.47E+00	8.47E+00
Cesium-137	B0XKC1	C3071/ENW-MW1	02/09/2000	3.44E-01	pCi/L	U	8.06E+00	8.06E+00
Cobalt-60	B0XKC1	C3071/ENW-MW1	02/09/2000	5.09E+00	pCi/L	U	1.24E+01	1.24E+01
Europium-152	B0XKC1	C3071/ENW-MW1	02/09/2000	5.08E-01	pCi/L	U	2.19E+01	2.19E+01
Europium-154	B0XKC1	C3071/ENW-MW1	02/09/2000	1.23E+01	pCi/L	U	3.14E+01	3.14E+01
Europium-155	B0XKC1	C3071/ENW-MW1	02/09/2000	2.20E-01	pCi/L	U	1.61E+01	1.61E+01
Gross alpha	B0XKC1	C3071/ENW-MW1	02/09/2000	5.23E+00	pCi/L		3.23E+00	3.23E+00
Gross beta	B0XKC1	C3071/ENW-MW1	02/09/2000	3.07E+01	pCi/L		3.39E+00	3.39E+00
Iodine-129	B0XKC1	C3071/ENW-MW1	02/09/2000	5.62E-02	pCi/L	U	2.68E-01	2.68E-01
Potassium-40	B0XKC1	C3071/ENW-MW1	02/09/2000	2.08E+01	pCi/L	U	9.38E+01	9.38E+01
Ruthenium-106	B0XKC1	C3071/ENW-MW1	02/09/2000	1.88E+01	pCi/L	U	7.90E+01	7.90E+01
Technetium-99	B0XKC1	C3071/ENW-MW1	02/09/2000	8.84E+01	pCi/L		1.26E+01	1.26E+01
Uranium-234	B0XKC1	C3071/ENW-MW1	02/09/2000	5.93E+00	pCi/L		4.68E-01	4.68E-01
Uranium-235	B0XKC1	C3071/ENW-MW1	02/09/2000	3.38E-01	pCi/L	U	3.63E-01	3.63E-01
Uranium-238	B0XKC1	C3071/ENW-MW1	02/09/2000	5.09E+00	pCi/L		4.33E-01	4.33E-01
Antimony-125[(b)]	B0XKC1 DUP	C3071/ENW-MW1 DUP	02/09/2000	2.24E+00	pCi/L	U		2.36E+01
Beryllium-7[(b)]	B0XKC1 DUP	C3071/ENW-MW1 DUP	02/09/2000	-1.72E+01	pCi/L	U		7.28E+01
Cesium-134[(b)]	B0XKC1 DUP	C3071/ENW-MW1 DUP	02/09/2000	-6.55E+00	pCi/L	U		8.11E+00
Cesium-137[(b)]	B0XKC1 DUP	C3071/ENW-MW1 DUP	02/09/2000	1.01E+00	pCi/L	U		9.54E+00
Cobalt-60[(b)]	B0XKC1 DUP	C3071/ENW-MW1 DUP	02/09/2000	5.22E+00	pCi/L	U		1.15E+01

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier(a)	Reporting Limit	MDA
Europium-152(b)	B0XKC1 DUP	C3071/ENW-MW1 DUP	02/09/2000	-5.36E+00	pCi/L	U		2.18E+01
Europium-154(b)	B0XKC1 DUP	C3071/ENW-MW1 DUP	02/09/2000	1.20E+01	pCi/L	U		3.39E+01
Europium-155(b)	B0XKC1 DUP	C3071/ENW-MW1 DUP	02/09/2000	-2.45E+00	pCi/L	U		2.04E+01
Gross alpha(b)	B0XKC1 DUP	C3071/ENW-MW1 DUP	02/09/2000	7.26E+00	pCi/L			2.86E+00
Potassium-40(b)	B0XKC1 DUP	C3071/ENW-MW1 DUP	02/09/2000	-5.15E+01	pCi/L	U		2.20E+02
Ruthenium-106(b)	B0XKC1 DUP	C3071/ENW-MW1 DUP	02/09/2000	2.59E+01	pCi/L	U		8.74E+01
Technetium-99(b)	B0XKC1 DUP	C3071/ENW-MW1 DUP	02/09/2000	8.82E+01	pCi/L			1.27E+01
Antimony-125	B0XKC2	C3072/ENW-MW2	02/10/2000	-2.39E+00	pCi/L	U	2.05E+01	2.05E+01
Beryllium-7	B0XKC2	C3072/ENW-MW2	02/10/2000	2.17E+01	pCi/L	U	8.33E+01	8.33E+01
Cesium-134	B0XKC2	C3072/ENW-MW2	02/10/2000	-2.68E+00	pCi/L	U	7.80E+00	7.80E+00
Cesium-137	B0XKC2	C3072/ENW-MW2	02/10/2000	3.09E+00	pCi/L	U	8.90E+00	8.90E+00
Cobalt-60	B0XKC2	C3072/ENW-MW2	02/10/2000	-3.01E+00	pCi/L	U	9.21E+00	9.21E+00
Europium-152	B0XKC2	C3072/ENW-MW2	02/10/2000	3.31E+00	pCi/L	U	2.34E+01	2.34E+01
Europium-154	B0XKC2	C3072/ENW-MW2	02/10/2000	-1.71E+00	pCi/L	U	2.63E+01	2.63E+01
Europium-155	B0XKC2	C3072/ENW-MW2	02/10/2000	-1.29E+00	pCi/L	U	1.52E+01	1.52E+01
Gross alpha	B0XKC2	C3072/ENW-MW2	02/10/2000	2.21E+01	pCi/L		3.16E+00	3.16E+00
Gross beta	B0XKC2	C3072/ENW-MW2	02/10/2000	2.29E+01	pCi/L		4.47E+00	4.47E+00
Iodine-129	B0XKC2	C3072/ENW-MW2	02/10/2000	-6.29E-02	pCi/L	U	2.41E-01	2.41E-01
Potassium-40	B0XKC2	C3072/ENW-MW2	02/10/2000	1.10E+01	pCi/L	U	8.86E+01	8.86E+01
Ruthenium-106	B0XKC2	C3072/ENW-MW2	02/10/2000	-1.12E+01	pCi/L	U	7.43E+01	7.43E+01
Technetium-99	B0XKC2	C3072/ENW-MW2	02/10/2000	9.96E+00	pCi/L	U	1.25E+01	1.25E+01
Uranium-234	B0XKC2	C3072/ENW-MW2	02/10/2000	1.22E+01	pCi/L		2.17E-01	2.17E-01
Uranium-235	B0XKC2	C3072/ENW-MW2	02/10/2000	5.80E-01	pCi/L	J	2.79E-01	2.79E-01
Uranium-238	B0XKC2	C3072/ENW-MW2	02/10/2000	1.09E+01	pCi/L		3.24E-01	3.24E-01
Gross alpha(b)	B0XKC2 DUP	C3072/ENW-MW2 DUP	02/10/2000	2.59E+01	pCi/L			2.83E+00
Iodine-129(b)	B0XKC2 DUP	C3072/ENW-MW2 DUP	02/10/2000	1.66E-02	pCi/L	U		3.36E-01
Antimony-125	B0XKC3	C3073/ENW-MW3	02/10/2000	5.63E+00	pCi/L	U	1.84E+01	1.84E+01
Beryllium-7	B0XKC3	C3073/ENW-MW3	02/10/2000	2.96E+01	pCi/L	U	6.79E+01	6.79E+01
Cesium-134	B0XKC3	C3073/ENW-MW3	02/10/2000	-1.30E+00	pCi/L	U	6.76E+00	6.76E+00
Cesium-137	B0XKC3	C3073/ENW-MW3	02/10/2000	2.14E+00	pCi/L	U	8.49E+00	8.49E+00
Cobalt-60	B0XKC3	C3073/ENW-MW3	02/10/2000	1.15E+00	pCi/L	U	7.67E+00	7.67E+00
Europium-152	B0XKC3	C3073/ENW-MW3	02/10/2000	3.01E+00	pCi/L	U	1.81E+01	1.81E+01
Europium-154	B0XKC3	C3073/ENW-MW3	02/10/2000	6.78E+00	pCi/L	U	2.49E+01	2.49E+01

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier(a)	Reporting Limit	MDA
Europium-155	B0XKC3	C3073/ENW-MW3	02/10/2000	-3.16E-01	pCi/L	U	1.38E+01	1.38E+01
Gross alpha	B0XKC3	C3073/ENW-MW3	02/10/2000	1.84E+01	pCi/L		2.56E+00	2.56E+00
Gross beta	B0XKC3	C3073/ENW-MW3	02/10/2000	1.44E+01	pCi/L		3.94E+00	3.94E+00
Iodine-129	B0XKC3	C3073/ENW-MW3	02/10/2000	8.33E-03	pCi/L	U	2.09E-01	2.09E-01
Potassium-40	B0XKC3	C3073/ENW-MW3	02/10/2000	-6.32E+01	pCi/L	U	2.22E+02	2.22E+02
Ruthenium-106	B0XKC3	C3073/ENW-MW3	02/10/2000	-7.06E-01	pCi/L	U	6.84E+01	6.84E+01
Technetium-99	B0XKC3	C3073/ENW-MW3	02/10/2000	3.82E+00	pCi/L	U	1.25E+01	1.25E+01
Uranium-234	B0XKC3	C3073/ENW-MW3	02/10/2000	7.67E+00	pCi/L		5.05E-01	5.05E-01
Uranium-235	B0XKC3	C3073/ENW-MW3	02/10/2000	7.94E-01	pCi/L	J	4.63E-01	4.63E-01
Uranium-238	B0XKC3	C3073/ENW-MW3	02/10/2000	7.96E+00	pCi/L		5.72E-01	5.72E-01
Gross beta(b)	B0XKC3 DUP	C3073/ENW-MW3 DUP	02/10/2000	1.57E+01	pCi/L			3.83E+00
Antimony-125	B0XKC4	C3074/ENW-MW4	02/10/2000	-9.66E+00	pCi/L	U	1.53E+01	1.53E+01
Beryllium-7	B0XKC4	C3074/ENW-MW4	02/10/2000	2.00E+01	pCi/L	U	7.40E+01	7.40E+01
Cesium-134	B0XKC4	C3074/ENW-MW4	02/10/2000	-1.44E+00	pCi/L	U	6.56E+00	6.56E+00
Cesium-137	B0XKC4	C3074/ENW-MW4	02/10/2000	1.59E+00	pCi/L	U	7.53E+00	7.53E+00
Cobalt-60	B0XKC4	C3074/ENW-MW4	02/10/2000	-1.24E+00	pCi/L	U	8.99E+00	8.99E+00
Europium-152	B0XKC4	C3074/ENW-MW4	02/10/2000	1.32E+01	pCi/L	U	2.38E+01	2.38E+01
Europium-154	B0XKC4	C3074/ENW-MW4	02/10/2000	-2.61E+00	pCi/L	U	2.34E+01	2.34E+01
Europium-155	B0XKC4	C3074/ENW-MW4	02/10/2000	1.97E+00	pCi/L	U	1.47E+01	1.47E+01
Gross alpha	B0XKC4	C3074/ENW-MW4	02/10/2000	6.50E+00	pCi/L		1.37E+00	1.37E+00
Gross beta	B0XKC4	C3074/ENW-MW4	02/10/2000	1.40E+01	pCi/L		3.20E+00	3.20E+00
Iodine-129	B0XKC4	C3074/ENW-MW4	02/10/2000	-6.91E-02	pCi/L	U	2.59E-01	2.59E-01
Potassium-40	B0XKC4	C3074/ENW-MW4	02/10/2000	2.74E+01	pCi/L	U	1.87E+02	1.87E+02
Ruthenium-106	B0XKC4	C3074/ENW-MW4	02/10/2000	7.40E-01	pCi/L	U	7.35E+01	7.35E+01
Technetium-99	B0XKC4	C3074/ENW-MW4	02/10/2000	2.81E+01	pCi/L		1.25E+01	1.25E+01
Uranium-234	B0XKC4	C3074/ENW-MW4	02/10/2000	2.01E+00	pCi/L		7.31E-01	7.31E-01
Uranium-235	B0XKC4	C3074/ENW-MW4	02/10/2000	1.93E-01	pCi/L	U	5.47E-01	5.47E-01
Uranium-238	B0XKC4	C3074/ENW-MW4	02/10/2000	2.57E+00	pCi/L		6.79E-01	6.79E-01
Uranium-234(b)	B0XKC4 DUP	C3074/ENW-MW4 DUP	02/10/2000	1.98E+00	pCi/L			6.94E-01
Uranium-235(b)	B0XKC4 DUP	C3074/ENW-MW4 DUP	02/10/2000	2.19E-01	pCi/L	U		5.16E-01
Uranium-238(b)	B0XKC4 DUP	C3074/ENW-MW4 DUP	02/10/2000	2.44E+00	pCi/L			6.33E-01
Antimony-125	B0XKC5	C3075/ENW-MW5	02/09/2000	-9.89E-01	pCi/L	U	1.81E+01	1.81E+01
Beryllium-7	B0XKC5	C3075/ENW-MW5	02/09/2000	1.12E+01	pCi/L	U	7.61E+01	7.61E+01
Cesium-134	B0XKC5	C3075/ENW-MW5	02/09/2000	-5.96E+00	pCi/L	U	5.84E+00	5.84E+00
Cesium-137	B0XKC5	C3075/ENW-MW5	02/09/2000	-3.31E+00	pCi/L	U	6.16E+00	6.16E+00
Cobalt-60	B0XKC5	C3075/ENW-MW5	02/09/2000	5.77E-01	pCi/L	U	8.45E+00	8.45E+00
Europium-152	B0XKC5	C3075/ENW-MW5	02/09/2000	4.32E+00	pCi/L	U	1.99E+01	1.99E+01

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier$^{(a)}$	Reporting Limit	MDA
Europium-154	B0XKC5	C3075/ENW-MW5	02/09/2000	-7.33E-01	pCi/L	U	2.37E+01	2.37E+01
Europium-155	B0XKC5	C3075/ENW-MW5	02/09/2000	3.68E+00	pCi/L	U	1.52E+01	1.52E+01
Gross alpha	B0XKC5	C3075/ENW-MW5	02/09/2000	3.51E+00	pCi/L		1.85E+00	1.85E+00
Gross beta	B0XKC5	C3075/ENW-MW5	02/09/2000	1.13E+01	pCi/L		3.15E+00	3.15E+00
Iodine-129	B0XKC5	C3075/ENW-MW5	02/09/2000	7.26E-02	pCi/L	U	3.20E-01	3.20E-01
Potassium-40	B0XKC5	C3075/ENW-MW5	02/09/2000	1.42E+01	pCi/L	U	1.82E+02	1.82E+02
Ruthenium-106	B0XKC5	C3075/ENW-MW5	02/09/2000	3.18E+00	pCi/L	U	7.17E+01	7.17E+01
Technetium-99	B0XKC5	C3075/ENW-MW5	02/09/2000	2.87E+01	pCi/L		1.26E+01	1.26E+01
Uranium-234	B0XKC5	C3075/ENW-MW5	02/09/2000	1.45E+00	pCi/L		3.61E-01	3.61E-01
Uranium-235	B0XKC5	C3075/ENW-MW5	02/09/2000	1.60E-02	pCi/L	U	2.86E-01	2.86E-01
Uranium-238	B0XKC5	C3075/ENW-MW5	02/09/2000	9.28E-01	pCi/L	J	3.39E-01	3.39E-01
Gross beta$^{(b)}$	B0XKC5 DUP	C3075/ENW-MW5 DUP	02/09/2000	1.08E+01	pCi/L			3.16E+00
Iodine-129$^{(b)}$	B0XKC5 DUP	C3075/ENW-MW5 DUP	02/09/2000	6.23E-02	pCi/L	U		2.95E-01
Antimony-125	B0XKC6	C3076/ENW-MW6	02/09/2000	2.52E+00	pCi/L	U	2.42E+01	2.42E+01
Beryllium-7	B0XKC6	C3076/ENW-MW6	02/09/2000	-3.46E+01	pCi/L	U	6.77E+01	6.77E+01
Cesium-134	B0XKC6	C3076/ENW-MW6	02/09/2000	-1.48E+00	pCi/L	U	8.88E+00	8.88E+00
Cesium-137	B0XKC6	C3076/ENW-MW6	02/09/2000	2.91E+00	pCi/L	U	9.79E+00	9.79E+00
Cobalt-60	B0XKC6	C3076/ENW-MW6	02/09/2000	-2.24E+00	pCi/L	U	9.99E+00	9.99E+00
Europium-152	B0XKC6	C3076/ENW-MW6	02/09/2000	5.04E+00	pCi/L	U	2.34E+01	2.34E+01
Europium-154	B0XKC6	C3076/ENW-MW6	02/09/2000	-5.49E-01	pCi/L	U	3.03E+01	3.03E+01
Europium-155	B0XKC6	C3076/ENW-MW6	02/09/2000	-1.26E+00	pCi/L	U	2.02E+01	2.02E+01
Gross alpha	B0XKC6	C3076/ENW-MW6	02/09/2000	7.66E+00	pCi/L		2.49E+00	2.49E+00
Gross beta	B0XKC6	C3076/ENW-MW6	02/09/2000	1.26E+01	pCi/L		3.17E+00	3.17E+00
Iodine-129	B0XKC6	C3076/ENW-MW6	02/09/2000	7.98E-02	pCi/L	U	3.43E-01	3.43E-01
Potassium-40	B0XKC6	C3076/ENW-MW6	02/09/2000	2.74E+01	pCi/L	U	2.39E+02	2.39E+02
Ruthenium-106	B0XKC6	C3076/ENW-MW6	02/09/2000	-4.86E+01	pCi/L	U	7.68E+01	7.68E+01
Technetium-99	B0XKC6	C3076/ENW-MW6	02/09/2000	7.13E+00	pCi/L	U	1.26E+01	1.26E+01
Uranium-234	B0XKC6	C3076/ENW-MW6	02/09/2000	4.14E+00	pCi/L		2.23E-01	2.23E-01
Uranium-235	B0XKC6	C3076/ENW-MW6	02/09/2000	2.16E-01	pCi/L	J	2.04E-01	2.04E-01
Uranium-238	B0XKC6	C3076/ENW-MW6	02/09/2000	4.36E+00	pCi/L		2.38E-01	2.38E-01
Uranium-234$^{(b)}$	B0XKC6 DUP	C3076/ENW-MW6 DUP	02/09/2000	5.18E+00	pCi/L			2.29E-01
Uranium-235$^{(b)}$	B0XKC6 DUP	C3076/ENW-MW6 DUP	02/09/2000	1.12E-01	pCi/L	U		2.84E-01
Uranium-238$^{(b)}$	B0XKC6 DUP	C3076/ENW-MW6 DUP	02/09/2000	4.92E+00	pCi/L			3.25E-01
Antimony-125	B0XKC7	C3077/ENW-MW7	02/15/2000	-8.47E+00	pCi/L	U		1.54E+01
Beryllium-7	B0XKC7	C3077/ENW-MW7	02/15/2000	-1.27E+00	pCi/L	U		5.69E+01
Cesium-134	B0XKC7	C3077/ENW-MW7	02/15/2000	1.52E+00	pCi/L	U		7.91E+00

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[(a)]	Reporting Limit	MDA
Cesium-137	B0XKC7	C3077/ENW-MW7	02/15/2000	1.34E+00	pCi/L	U		7.69E+00
Cobalt-60	B0XKC7	C3077/ENW-MW7	02/15/2000	6.67E+00	pCi/L	U		1.20E+01
Europium-152	B0XKC7	C3077/ENW-MW7	02/15/2000	8.88E+00	pCi/L	U		2.18E+01
Europium-154	B0XKC7	C3077/ENW-MW7	02/15/2000	4.43E+00	pCi/L	U		2.66E+01
Europium-155	B0XKC7	C3077/ENW-MW7	02/15/2000	8.04E+00	pCi/L	U		1.73E+01
Gross alpha	B0XKC7	C3077/ENW-MW7	02/15/2000	3.01E+01	pCi/L			4.14E+00
Gross beta	B0XKC7	C3077/ENW-MW7	02/15/2000	4.25E+01	pCi/L			5.09E+00
Iodine-129	B0XKC7	C3077/ENW-MW7	02/15/2000	3.61E-02	pCi/L	U		3.03E-01
Potassium-40	B0XKC7	C3077/ENW-MW7	02/15/2000	-2.03E+01	pCi/L	U		1.98E+02
Ruthenium-106	B0XKC7	C3077/ENW-MW7	02/15/2000	9.93E+00	pCi/L	U		6.76E+01
Technetium-99	B0XKC7	C3077/ENW-MW7	02/15/2000	-2.01E-01	pCi/L	U		1.21E+01
Uranium-234	B0XKC7	C3077/ENW-MW7	02/15/2000	1.18E+00	pCi/L			2.29E-01
Uranium-235	B0XKC7	C3077/ENW-MW7	02/15/2000	8.45E-02	pCi/L	U		2.10E-01
Uranium-238	B0XKC7	C3077/ENW-MW7	02/15/2000	1.32E+00	pCi/L			2.45E-01
Antimony-125[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	-1.10E+00	pCi/L	U		2.26E+01
Beryllium-7[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	-2.72E+01	pCi/L	U		7.14E+01
Cesium-134[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	-7.55E+00	pCi/L	U		7.74E+00
Cesium-137[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	2.74E+00	pCi/L	U		9.13E+00
Cobalt-60[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	-3.69E-01	pCi/L	U		8.88E+00
Europium-152[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	-7.75E+00	pCi/L	U		2.16E+01
Europium-154[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	-3.63E+00	pCi/L	U		2.58E+01
Europium-155[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	-5.70E+00	pCi/L	U		1.89E+01
Gross alpha[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	3.50E+01	pCi/L			2.15E+00
Gross beta[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	4.43E+01	pCi/L			5.14E+00
Iodine-129[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	-6.19E-02	pCi/L	U		2.74E-01
Potassium-40[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	-5.16E+01	pCi/L	U		2.20E+02
Ruthenium-106[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	1.94E+01	pCi/L	U		8.71E+01
Technetium-99[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	7.20E+00	pCi/L	U		1.21E+01
Uranium-234[(b)]	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	1.24E+00	pCi/L			3.33E-01

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier(a)	Reporting Limit	MDA
Uranium-235(b)	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	7.69E-02	pCi/L	U		2.44E-01
Uranium-238(b)	B0XKC7 DUP	C3077/ENW-MW7 DUP	02/15/2000	9.74E-01	pCi/L	J		3.05E-01
Antimony-125	B0XKC8	C3078/ENW-MW8	02/11/2000	-2.90E+00	pCi/L	U		2.10E+01
Beryllium-7	B0XKC8	C3078/ENW-MW8	02/11/2000	-1.92E+01	pCi/L	U		6.36E+01
Cesium-134	B0XKC8	C3078/ENW-MW8	02/11/2000	-5.66E-01	pCi/L	U		7.59E+00
Cesium-137	B0XKC8	C3078/ENW-MW8	02/11/2000	8.34E-02	pCi/L	U		9.01E+00
Cobalt-60	B0XKC8	C3078/ENW-MW8	02/11/2000	2.26E+00	pCi/L	U		9.21E+00
Europium-152	B0XKC8	C3078/ENW-MW8	02/11/2000	-3.48E+00	pCi/L	U		2.16E+01
Europium-154	B0XKC8	C3078/ENW-MW8	02/11/2000	4.68E+00	pCi/L	U		2.36E+01
Europium-155	B0XKC8	C3078/ENW-MW8	02/11/2000	-9.85E-01	pCi/L	U		1.70E+01
Gross alpha	B0XKC8	C3078/ENW-MW8	02/11/2000	6.32E+00	pCi/L			1.41E+00
Gross beta	B0XKC8	C3078/ENW-MW8	02/11/2000	8.12E+00	pCi/L			3.13E+00
Iodine-129	B0XKC8	C3078/ENW-MW8	02/11/2000	-6.64E-03	pCi/L	U		2.43E-01
Potassium-40	B0XKC8	C3078/ENW-MW8	02/11/2000	-3.72E+01	pCi/L	U		2.51E+02
Ruthenium-106	B0XKC8	C3078/ENW-MW8	02/11/2000	1.79E+01	pCi/L	U		7.89E+01
Technetium-99	B0XKC8	C3078/ENW-MW8	02/11/2000	-6.56E-01	pCi/L	U		1.26E+01
Uranium-234	B0XKC8	C3078/ENW-MW8	02/11/2000	3.00E+00	pCi/L			2.64E-01
Uranium-235	B0XKC8	C3078/ENW-MW8	02/11/2000	1.82E-01	pCi/L	U		3.27E-01
Uranium-238	B0XKC8	C3078/ENW-MW8	02/11/2000	2.96E+00	pCi/L			3.94E-01
Antimony-125(b)	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	1.89E+00	pCi/L	U		2.38E+01
Beryllium-7(b)	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	3.89E+00	pCi/L	U		8.30E+01
Cesium-134(b)	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	-4.49E+00	pCi/L	U		8.32E+00
Cesium-137(b)	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	-1.63E+00	pCi/L	U		9.52E+00
Cobalt-60(b)	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	-4.75E+00	pCi/L	U		9.02E+00
Europium-152(b)	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	-4.10E+00	pCi/L	U		2.25E+01
Europium-154(b)	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	6.88E+00	pCi/L	U		2.97E+01
Europium-155(b)	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	5.93E+00	pCi/L	U		2.06E+01
Gross alpha(b)	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	2.20E+01	pCi/L			3.15E+00
Gross beta(b)	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	1.30E+01	pCi/L			4.04E+00
Iodine-129(b)	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	1.42E-01	pCi/L	U		2.53E-01

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[(a)]	Reporting Limit	MDA
Potassium-40[(b)]	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	1.95E+00	pCi/L	U		2.28E+02
Ruthenium-106[(b)]	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	9.11E+00	pCi/L	U		8.17E+01
Technetium-99[(b)]	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	-1.40E+00	pCi/L	U		1.26E+01
Uranium-234[(b)]	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	2.35E+00	pCi/L			3.84E-01
Uranium-235[(b)]	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	2.15E-01	pCi/L	U		3.37E-01
Uranium-238[(b)]	B0XKC8 DUP	C3078/ENW-MW8 DUP	02/11/2000	2.97E+00	pCi/L			3.19E-01
Antimony-125	B0XKC9	C3079/ENW-MW9	02/11/2000	2.56E+00	pCi/L	U		2.19E+01
Antimony-125[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	-6.06E+00	pCi/L	U		1.68E+01
Beryllium-7	B0XKC9	C3079/ENW-MW9	02/11/2000	-1.40E+01	pCi/L	U		7.54E+01
Beryllium-7[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	-9.20E+00	pCi/L	U		7.13E+01
Cesium-134	B0XKC9	C3079/ENW-MW9	02/11/2000	-2.61E-01	pCi/L	U		7.60E+00
Cesium-134[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	-2.39E+00	pCi/L	U		7.19E+00
Cesium-137	B0XKC9	C3079/ENW-MW9	02/11/2000	3.30E+00	pCi/L	U		9.66E+00
Cesium-137[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	-1.74E+00	pCi/L	U		6.44E+00
Cobalt-60	B0XKC9	C3079/ENW-MW9	02/11/2000	-2.09E+00	pCi/L	U		9.21E+00
Cobalt-60[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	2.06E+00	pCi/L	U		8.67E+00
Europium-152	B0XKC9	C3079/ENW-MW9	02/11/2000	-3.62E+00	pCi/L	U		2.23E+01
Europium-152[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	-7.83E+00	pCi/L	U		1.75E+01
Europium-154	B0XKC9	C3079/ENW-MW9	02/11/2000	-2.56E+00	pCi/L	U		2.36E+01
Europium-154[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	3.99E+00	pCi/L	U		2.86E+01
Europium-155	B0XKC9	C3079/ENW-MW9	02/11/2000	2.78E+00	pCi/L	U		1.66E+01
Europium-155[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	4.52E+00	pCi/L	U		1.37E+01
Gross alpha	B0XKC9	C3079/ENW-MW9	02/11/2000	2.21E+01	pCi/L			3.22E+00
Gross alpha[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	2.28E+01	pCi/L			3.15E+00
Gross beta	B0XKC9	C3079/ENW-MW9	02/11/2000	1.61E+01	pCi/L			4.03E+00
Gross beta[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	1.59E+01	pCi/L			4.10E+00
Iodine-129	B0XKC9	C3079/ENW-MW9	02/11/2000	3.48E-02	pCi/L	U		3.65E-01
Iodine-129[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	3.41E-02	pCi/L	U		3.09E-01
Potassium-40	B0XKC9	C3079/ENW-MW9	02/11/2000	-6.76E+01	pCi/L	U		2.40E+02
Potassium-40[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	6.17E+01	pCi/L	U		8.26E+01
Ruthenium-106	B0XKC9	C3079/ENW-MW9	02/11/2000	4.09E+01	pCi/L	U		8.94E+01
Ruthenium-106[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	1.04E+01	pCi/L	U		7.13E+01
Technetium-99	B0XKC9	C3079/ENW-MW9	02/11/2000	4.73E+00	pCi/L	U		1.26E+01
Technetium-99[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	5.66E-01	pCi/L	U		1.26E+01
Uranium-234	B0XKC9	C3079/ENW-MW9	02/11/2000	1.26E+01	pCi/L			3.37E-01
Uranium-234[(c)]	B0XKD0	C3079/ENW-MW9	02/11/2000	1.37E+01	pCi/L			3.97E-01

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier(a)	Reporting Limit	MDA
Uranium-235	B0XKC9	C3079/ENW-MW9	02/11/2000	5.24E-01	pCi/L			2.62E-01
Uranium-235(c)	B0XKD0	C3079/ENW-MW9	02/11/2000	4.24E-01	pCi/L			2.95E-01
Uranium-238	B0XKC9	C3079/ENW-MW9	02/11/2000	1.23E+01	pCi/L			3.04E-01
Uranium-238(c)	B0XKD0	C3079/ENW-MW9	02/11/2000	1.14E+01	pCi/L			3.71E-01
Gross alpha(b)	B0XKC9 DUP	C3079/ENW-MW9 DUP	02/11/2000	2.20E+01	pCi/L			3.15E+00
Gross beta(b)	B0XKD0 DUP	C3079/ENW-MW9 DUP	02/11/2000	1.30E+01	pCi/L			4.04E+00
Iodine-129(b)	B0XKC9 DUP	C3079/ENW-MW9 DUP	02/11/2000	1.42E-01	pCi/L	U		2.53E-01
Antimony-125	B0XKD1	ENW-31	02/08/2000	-4.50E+00	pCi/L	U	1.83E+01	1.83E+01
Beryllium-7	B0XKD1	ENW-31	02/08/2000	1.61E+01	pCi/L	U	6.50E+01	6.50E+01
Cesium-134	B0XKD1	ENW-31	02/08/2000	-5.11E-01	pCi/L	U	7.79E+00	7.79E+00
Cesium-137	B0XKD1	ENW-31	02/08/2000	2.28E+00	pCi/L	U	7.97E+00	7.97E+00
Cobalt-60	B0XKD1	ENW-31	02/08/2000	-3.41E+00	pCi/L	U	6.87E+00	6.87E+00
Europium-152	B0XKD1	ENW-31	02/08/2000	8.88E-01	pCi/L	U	2.00E+01	2.00E+01
Europium-154	B0XKD1	ENW-31	02/08/2000	-8.76E+00	pCi/L	U	2.51E+01	2.51E+01
Europium-155	B0XKD1	ENW-31	02/08/2000	1.06E+00	pCi/L	U	1.46E+01	1.46E+01
Gross alpha	B0XKD1	ENW-31	02/08/2000	1.19E+00	pCi/L	U	1.97E+00	1.97E+00
Gross beta	B0XKD1	ENW-31	02/08/2000	6.57E+00	pCi/L		2.86E+00	2.86E+00
Iodine-129	B0XKD1	ENW-31	02/08/2000	-2.14E-02	pCi/L	U	3.15E-01	3.15E-01
Potassium-40	B0XKD1	ENW-31	02/08/2000	-1.69E+01	pCi/L	U	2.50E+02	2.50E+02
Ruthenium-106	B0XKD1	ENW-31	02/08/2000	-3.53E+00	pCi/L	U	6.41E+01	6.41E+01
Technetium-99	B0XKD1	ENW-31	02/08/2000	-1.53E+00	pCi/L	U	1.23E+01	1.23E+01
Uranium-234	B0XKD1	ENW-31	02/08/2000	1.05E+00	pCi/L		2.77E-01	2.77E-01
Uranium-235	B0XKD1	ENW-31	02/08/2000	1.79E-01	pCi/L	U	2.13E-01	2.13E-01
Uranium-238	B0XKD1	ENW-31	02/08/2000	2.46E-01	pCi/L	U	3.10E-01	3.10E-01
Antimony-125	B0XKD2	ENW-32	02/08/2000	5.17E+00	pCi/L	U	1.80E+01	1.80E+01
Beryllium-7	B0XKD2	ENW-32	02/08/2000	-1.41E+01	pCi/L	U	5.96E+01	5.96E+01
Cesium-134	B0XKD2	ENW-32	02/08/2000	7.41E-01	pCi/L	U	8.61E+00	8.61E+00
Cesium-137	B0XKD2	ENW-32	02/08/2000	-2.35E+00	pCi/L	U	7.49E+00	7.49E+00
Cobalt-60	B0XKD2	ENW-32	02/08/2000	-1.08E+00	pCi/L	U	8.81E+00	8.81E+00
Europium-152	B0XKD2	ENW-32	02/08/2000	-6.21E+00	pCi/L	U	1.83E+01	1.83E+01
Europium-154	B0XKD2	ENW-32	02/08/2000	-5.71E-01	pCi/L	U	2.29E+01	2.29E+01
Europium-155	B0XKD2	ENW-32	02/08/2000	6.65E-01	pCi/L	U	1.74E+01	1.74E+01
Gross alpha	B0XKD2	ENW-32	02/08/2000	2.16E+00	pCi/L	J	1.95E+00	1.95E+00
Gross beta	B0XKD2	ENW-32	02/08/2000	8.35E+00	pCi/L		2.87E+00	2.87E+00
Iodine-129	B0XKD2	ENW-32	02/08/2000	5.78E-02	pCi/L	U	2.43E-01	2.43E-01
Potassium-40	B0XKD2	ENW-32	02/08/2000	-5.63E+01	pCi/L	U	1.17E+02	1.17E+02
Ruthenium-106	B0XKD2	ENW-32	02/08/2000	-2.26E+01	pCi/L	U	6.45E+01	6.45E+01
Technetium-99	B0XKD2	ENW-32	02/08/2000	2.96E+00	pCi/L	U	1.23E+01	1.23E+01

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[(a)]	Reporting Limit	MDA
Uranium-234	B0XKD2	ENW-32	02/08/2000	1.12E+00	pCi/L		4.09E-01	4.09E-01
Uranium-235	B0XKD2	ENW-32	02/08/2000	2.79E-02	pCi/L	U	3.18E-01	3.18E-01
Uranium-238	B0XKD2	ENW-32	02/08/2000	5.92E-01	pCi/L	J	3.90E-01	3.90E-01
Quality Control Samples								
Antimony-125[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	2.28E+00	pCi/L	U		2.13E+01
Beryllium-7[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	-4.67E+00	pCi/L	U		6.51E+01
Cesium-134[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	-1.16E+00	pCi/L	U		8.09E+00
Cesium-137[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	5.71E-01	pCi/L	U		9.00E+00
Cobalt-60[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	-2.80E+00	pCi/L	U		6.36E+00
Europium-152[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	1.49E+01	pCi/L	U		2.27E+01
Europium-154[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	-4.48E+00	pCi/L	U		2.33E+01
Europium-155[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	-1.02E+01	pCi/L	U		1.46E+01
Gross alpha[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	4.17E-01	pCi/L	U		6.82E-01
Gross beta[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	0.00E+00	pCi/L	U		2.71E+00
Iodine-129[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	-2.19E-02	pCi/L	U		2.35E-01
Plutonium-238[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	-2.99E-03	pCi/L	U		1.51E-01
Plutonium-239/240[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	2.99E-03	pCi/L	U		1.50E-01
Potassium-40[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	2.50E+01	pCi/L	U		2.19E+02
Ruthenium-106[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	1.79E+01	pCi/L	U		7.61E+01
Strontium-89/90[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	-9.09E-03	pCi/L	U		6.79E-01
Technetium-99[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	-3.33E+00	pCi/L	U		1.22E+01
Uranium[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	4.36E-03	ug/L	U		7.29E-02
Uranium-234[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	3.96E-02	pCi/L	U		2.15E-01
Uranium-235[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	7.16E-02	pCi/L	U		2.80E-01
Uranium-238[(d)]	B0XK43	EBL 121/699-13-3A	02/07/2000	-4.15E-02	pCi/L	U		3.33E-01
Strontium-89/90[(b)]	B0XK43 DUP	EBL 121/699-13-3A DUP	02/07/2000	1.84E-01	pCi/L	U		6.41E-01
Antimony-125[(e)]	B0XK46	EBL 122/699-13-3A	02/07/2000	2.05E+00	pCi/L	U		2.20E+01
Beryllium-7[(e)]	B0XK46	EBL 122/699-13-3A	02/07/2000	1.22E+01	pCi/L	U		7.79E+01
Cesium-134[(e)]	B0XK46	EBL 122/699-13-3A	02/07/2000	-8.49E+00	pCi/L	U		8.09E+00
Cesium-137[(e)]	B0XK46	EBL 122/699-13-3A	02/07/2000	-4.64E+00	pCi/L	U		8.49E+00
Cobalt-60[(e)]	B0XK46	EBL 122/699-13-3A	02/07/2000	-5.49E+00	pCi/L	U		6.68E+00
Europium-152[(e)]	B0XK46	EBL 122/699-13-3A	02/07/2000	1.02E+01	pCi/L	U		2.39E+01
Europium-154[(e)]	B0XK46	EBL 122/699-13-3A	02/07/2000	2.89E+00	pCi/L	U		2.92E+01
Europium-155[(e)]	B0XK46	EBL 122/699-13-3A	02/07/2000	-8.77E-01	pCi/L	U		1.89E+01
Gross alpha[(e)]	B0XK46	EBL 122/699-13-3A	02/07/2000	1.02E-02	pCi/L	U		9.34E-01
Gross beta[(e)]	B0XK46	EBL 122/699-13-3A	02/07/2000	7.25E-01	pCi/L	U		2.67E+00
Iodine-129[(e)]	B0XK46	EBL 122/699-13-3A	02/07/2000	9.97E-02	pCi/L	U		3.10E-01
Plutonium-238[(e)]	B0XK46	EBL 122/699-13-3A	02/07/2000	-2.79E-03	pCi/L	U		1.40E-01
Plutonium-239/240[(e)]	B0XK46	EBL 122/699-13-3A	02/07/2000	0.00E+00	pCi/L	U		9.43E-02

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier(a)	Reporting Limit	MDA
Potassium-40(e)	B0XK46	EBL 122/699-13-3A	02/07/2000	-4.41E+01	pCi/L	U		2.30E+02
Ruthenium-106(e)	B0XK46	EBL 122/699-13-3A	02/07/2000	2.87E+01	pCi/L	U		9.08E+01
Strontium-89/90(e)	B0XK46	EBL 122/699-13-3A	02/07/2000	-2.00E-01	pCi/L	U		6.51E-01
Technetium-99(e)	B0XK46	EBL 122/699-13-3A	02/07/2000	-3.90E+00	pCi/L	U		1.22E+01
Uranium(e)	B0XK46	EBL 122/699-13-3A	02/07/2000	6.05E-03	ug/L	U		7.29E-02
Uranium-234(e)	B0XK46	EBL 122/699-13-3A	02/07/2000	2.66E-02	pCi/L	U		2.51E-01
Uranium-235(e)	B0XK46	EBL 122/699-13-3A	02/07/2000	3.37E-02	pCi/L	U		2.22E-01
Uranium-238(e)	B0XK46	EBL 122/699-13-3A	02/07/2000	-1.42E-02	pCi/L	U		2.37E-01
Gross beta(b)	B0XK46 DUP	EBL 122/699-13-3A DUP	02/07/2000	2.58E-01	pCi/L	U		2.71E+00
Technetium-99(b)	B0XK46 DUP	EBL 122/699-13-3A DUP	02/07/2000	4.46E+00	pCi/L	U		1.23E+01
Antimony-125	B0XK32	EBL 123/699-13-1B	02/08/2000	-1.72E+00	pCi/L	U		1.84E+01
Beryllium-7	B0XK32	EBL 123/699-13-1B	02/08/2000	-4.00E+00	pCi/L	U		6.21E+01
Cesium-134	B0XK32	EBL 123/699-13-1B	02/08/2000	-2.25E+00	pCi/L	U		6.65E+00
Cesium-137	B0XK32	EBL 123/699-13-1B	02/08/2000	1.91E+00	pCi/L	U		9.48E+00
Cobalt-60	B0XK32	EBL 123/699-13-1B	02/08/2000	-1.90E+00	pCi/L	U		8.09E+00
Europium-152	B0XK32	EBL 123/699-13-1B	02/08/2000	5.18E+00	pCi/L	U		1.84E+01
Europium-154	B0XK32	EBL 123/699-13-1B	02/08/2000	-5.30E+00	pCi/L	U		2.15E+01
Europium-155	B0XK32	EBL 123/699-13-1B	02/08/2000	3.29E+00	pCi/L	U		1.77E+01
Gross alpha	B0XK32	EBL 123/699-13-1B	02/08/2000	2.33E-01	pCi/L	U		8.90E-01
Gross beta	B0XK32	EBL 123/699-13-1B	02/08/2000	3.34E-01	pCi/L	U		2.64E+00
Iodine-129	B0XK32	EBL 123/699-13-1B	02/08/2000	5.29E-02	pCi/L	U		3.23E-01
Plutonium-238	B0XK32	EBL 123/699-13-1B	02/08/2000	-7.04E-03	pCi/L	U		2.01E-01
Plutonium-239/240	B0XK32	EBL 123/699-13-1B	02/08/2000	-7.04E-03	pCi/L	U		2.01E-01
Potassium-40	B0XK32	EBL 123/699-13-1B	02/08/2000	-1.16E+00	pCi/L	U		1.32E+02
Ruthenium-106	B0XK32	EBL 123/699-13-1B	02/08/2000	-1.13E+01	pCi/L	U		5.79E+01
Strontium-89/90	B0XK32	EBL 123/699-13-1B	02/08/2000	1.01E-01	pCi/L	U		6.83E-01
Technetium-99	B0XK32	EBL 123/699-13-1B	02/08/2000	-8.21E+00	pCi/L	U		1.23E+01
Uranium	B0XK32	EBL 123/699-13-1B	02/08/2000	1.54E-02	ug/L	U		7.29E-02
Uranium-234	B0XK32	EBL 123/699-13-1B	02/08/2000	8.06E-02	pCi/L	U		2.28E-01
Uranium-235	B0XK32	EBL 123/699-13-1B	02/08/2000	-2.56E-02	pCi/L	U		2.83E-01
Uranium-238	B0XK32	EBL 123/699-13-1B	02/08/2000	4.39E-02	pCi/L	U		3.41E-01
Plutonium-238(b)	B0XK32 DUP	EBL 123/699-13-1B DUP	02/08/2000	-7.14E-03	pCi/L	U		2.04E-01
Plutonium-239/240(b)	B0XK32 DUP	EBL 123/699-13-1B DUP	02/08/2000	4.45E-02	pCi/L	U		1.21E-01
Antimony-125	B0XJW1	EBL 124/ENW-MW5	02/09/2000	-1.07E+00	pCi/L	U	2.12E+01	2.12E+01
Beryllium-7	B0XJW1	EBL 124/ENW-MW5	02/09/2000	-1.61E+01	pCi/L	U	5.56E+01	5.56E+01
Cesium-134	B0XJW1	EBL 124/ENW-MW5	02/09/2000	-3.50E+00	pCi/L	U	7.07E+00	7.07E+00
Cesium-137	B0XJW1	EBL 124/ENW-MW5	02/09/2000	2.57E+00	pCi/L	U	8.70E+00	8.70E+00

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[a]	Reporting Limit	MDA
Cobalt-60	B0XJW1	EBL 124/ENW-MW5	02/09/2000	-3.62E+00	pCi/L	U	7.18E+00	7.18E+00
Europium-152	B0XJW1	EBL 124/ENW-MW5	02/09/2000	-9.53E+00	pCi/L	U	1.64E+01	1.64E+01
Europium-154	B0XJW1	EBL 124/ENW-MW5	02/09/2000	-2.37E+00	pCi/L	U	1.85E+01	1.85E+01
Europium-155	B0XJW1	EBL 124/ENW-MW5	02/09/2000	7.00E+00	pCi/L	U	1.59E+01	1.59E+01
Gross alpha	B0XJW1	EBL 124/ENW-MW5	02/09/2000	-8.97E-02	pCi/L	U	9.09E-01	9.09E-01
Gross beta	B0XJW1	EBL 124/ENW-MW5	02/09/2000	8.27E-01	pCi/L	U	2.67E+00	2.67E+00
Iodine-129	B0XJW1	EBL 124/ENW-MW5	02/09/2000	7.08E-02	pCi/L	U	3.53E-01	3.53E-01
Plutonium-238	B0XJW1	EBL 124/ENW-MW5	02/09/2000	0.00E+00	pCi/L	U	9.26E-02	9.26E-02
Plutonium-239/240	B0XJW1	EBL 124/ENW-MW5	02/09/2000	0.00E+00	pCi/L	U	9.26E-02	9.26E-02
Potassium-40	B0XJW1	EBL 124/ENW-MW5	02/09/2000	1.16E+01	pCi/L	U	1.85E+02	1.85E+02
Ruthenium-106	B0XJW1	EBL 124/ENW-MW5	02/09/2000	5.43E+00	pCi/L	U	6.18E+01	6.18E+01
Technetium-99	B0XJW1	EBL 124/ENW-MW5	02/09/2000	2.90E+00	pCi/L	U	1.22E+01	1.22E+01
Total beta radiostrontium	B0XJW1	EBL 124/ENW-MW5	02/09/2000	2.93E-01	pCi/L	U	7.57E-01	7.57E-01
Uranium	B0XJW1	EBL 124/ENW-MW5	02/09/2000	2.72E-03	ug/L	U	7.29E-02	7.29E-02
Uranium-234	B0XJW1	EBL 124/ENW-MW5	02/09/2000	3.04E-02	pCi/L	U	3.86E-01	3.86E-01
Uranium-235	B0XJW1	EBL 124/ENW-MW5	02/09/2000	-3.04E-02	pCi/L	U	3.05E-01	3.05E-01
Uranium-238	B0XJW1	EBL 124/ENW-MW5	02/09/2000	8.92E-02	pCi/L	U	3.62E-01	3.62E-01
Gross beta[b]	B0XJW1 DUP	EBL 124/ENW-MW5 DUP	02/09/2000	5.01E-01	pCi/L	U		2.67E+00
Technetium-99[b]	B0XJW1 DUP	EBL 124/ENW-MW5 DUP	02/09/2000	1.51E+00	pCi/L	U		1.22E+01
Total beta radiostrontium[b]	B0XJW1 DUP	EBL 124/ENW-MW5 DUP	02/09/2000	2.43E-01	pCi/L	U		7.37E-01
Uranium[b]	B0XJW1 DUP	EBL 124/ENW-MW5 DUP	02/09/2000	1.03E-02	ug/L	U		7.29E-02
Antimony-125	B0XJV5	FTB 322/699-13-3A	02/07/2000	1.61E+00	pCi/L	U		1.89E+01
Beryllium-7	B0XJV5	FTB 322/699-13-3A	02/07/2000	-2.34E+01	pCi/L	U		5.79E+01
Cesium-134	B0XJV5	FTB 322/699-13-3A	02/07/2000	-2.14E+00	pCi/L	U		6.93E+00
Cesium-137	B0XJV5	FTB 322/699-13-3A	02/07/2000	2.37E+00	pCi/L	U		7.95E+00
Cobalt-60	B0XJV5	FTB 322/699-13-3A	02/07/2000	3.08E+00	pCi/L	U		1.04E+01
Europium-152	B0XJV5	FTB 322/699-13-3A	02/07/2000	5.97E-01	pCi/L	U		1.97E+01
Europium-154	B0XJV5	FTB 322/699-13-3A	02/07/2000	2.84E+00	pCi/L	U		2.22E+01
Europium-155	B0XJV5	FTB 322/699-13-3A	02/07/2000	-1.83E-01	pCi/L	U		1.50E+01
Gross alpha	B0XJV5	FTB 322/699-13-3A	02/07/2000	2.14E-01	pCi/L	U		9.28E-01
Gross beta	B0XJV5	FTB 322/699-13-3A	02/07/2000	7.76E-01	pCi/L	U		2.67E+00
Iodine-129	B0XJV5	FTB 322/699-13-3A	02/07/2000	1.43E-01	pCi/L	U		3.46E-01
Plutonium-238	B0XJV5	FTB 322/699-13-3A	02/07/2000	0.00E+00	pCi/L	U		9.30E-02
Plutonium-239/240	B0XJV5	FTB 322/699-13-3A	02/07/2000	-2.75E-03	pCi/L	U		1.38E-01
Potassium-40	B0XJV5	FTB 322/699-13-3A	02/07/2000	-1.08E+01	pCi/L	U		1.65E+02
Ruthenium-106	B0XJV5	FTB 322/699-13-3A	02/07/2000	7.21E+00	pCi/L	U		7.43E+01

Table C.3. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier(a)	Reporting Limit	MDA
Strontium-89/90	B0XJV5	FTB 322/699-13-3A	02/07/2000	2.20E-01	pCi/L	U		6.17E-01
Technetium-99	B0XJV5	FTB 322/699-13-3A	02/07/2000	-2.51E+00	pCi/L	U		1.22E+01
Uranium	B0XJV5	FTB 322/699-13-3A	02/07/2000	1.18E-03	ug/L	U		7.29E-02
Uranium-234	B0XJV5	FTB 322/699-13-3A	02/07/2000	1.12E-01	pCi/L	U		2.64E-01
Uranium-235	B0XJV5	FTB 322/699-13-3A	02/07/2000	1.16E-01	pCi/L	U		2.52E-01
Uranium-238	B0XJV5	FTB 322/699-13-3A	02/07/2000	1.19E-01	pCi/L	U		2.38E-01
Gross alpha(b)	B0XJV5 DUP	FTB 322/699-13-3A DUP	36563	2.33E-01	pCi/L	U		8.34E-01
Antimony-125	B0XK24	FTB 323/699-21-6	02/07/2000	-1.06E+01	pCi/L	U	1.76E+01	1.76E+01
Beryllium-7	B0XK24	FTB 323/699-21-6	02/07/2000	-1.52E+01	pCi/L	U	5.70E+01	5.70E+01
Cesium-134	B0XK24	FTB 323/699-21-6	02/07/2000	8.49E-01	pCi/L	U	8.44E+00	8.44E+00
Cesium-137	B0XK24	FTB 323/699-21-6	02/07/2000	-1.84E+00	pCi/L	U	8.17E+00	8.17E+00
Cobalt-60	B0XK24	FTB 323/699-21-6	02/07/2000	1.73E-01	pCi/L	U	7.81E+00	7.81E+00
Europium-152	B0XK24	FTB 323/699-21-6	02/07/2000	4.80E+00	pCi/L	U	2.32E+01	2.32E+01
Europium-154	B0XK24	FTB 323/699-21-6	02/07/2000	-8.12E+00	pCi/L	U	2.10E+01	2.10E+01
Europium-155	B0XK24	FTB 323/699-21-6	02/07/2000	1.21E+01	pCi/L	U	1.79E+01	1.79E+01
Gross alpha	B0XK24	FTB 323/699-21-6	02/07/2000	3.12E-01	pCi/L	U	9.16E-01	9.16E-01
Gross beta	B0XK24	FTB 323/699-21-6	02/07/2000	1.13E+00	pCi/L	U	2.52E+00	2.52E+00
Iodine-129	B0XK24	FTB 323/699-21-6	02/07/2000	-1.83E-02	pCi/L	U	3.18E-01	3.18E-01
Potassium-40	B0XK24	FTB 323/699-21-6	02/07/2000	1.33E+02	pCi/L		6.69E+01	6.69E+01
Ruthenium-106	B0XK24	FTB 323/699-21-6	02/07/2000	-1.03E+01	pCi/L	U	7.68E+01	7.68E+01
Technetium-99	B0XK24	FTB 323/699-21-6	02/07/2000	-4.05E-01	pCi/L	U	1.23E+01	1.23E+01
Uranium-234	B0XK24	FTB 323/699-21-6	02/07/2000	-1.06E-02	pCi/L	U	2.21E-01	2.21E-01
Uranium-235	B0XK24	FTB 323/699-21-6	02/07/2000	-1.06E-02	pCi/L	U	2.21E-01	2.21E-01
Uranium-238	B0XK24	FTB 323/699-21-6	02/07/2000	2.66E-02	pCi/L	U	2.50E-01	2.50E-01
Iodine-129(b)	B0XK24 DUP	FTB 323/699-21-6 DUP	02/07/2000	1.27E-01	pCi/L	U		2.79E-01

(a) U = Value reported is less than the MDA.
(b) Lab duplicate.
(c) Field duplicate.
(d) Before sampling.
(e) After sampling.
EBL = Equipment blank; FTB = Full trip blank; MDA = Minimum detectable activity.

Table C.4. Radionuclide Results for 618-11 Burial Ground Investigation, 325 Radiochemical Processing Group, February 2000

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier	Comments
Tc-99 Rad Disks	B0XJT6	699-13-3A	02/07/2000	5.45E+01	pCi/L		Measured Activities
Tc-99 Rad Disks	B0XJT6 DUP	699-13-3A DUP	02/07/2000	5.77E+01	pCi/L		Measured Activities/Lab Duplicate
Sr-90 Rad Disks	B0XJT6	699-13-3A	02/07/2000	<2	pCi/L		Measured Activities/Corrected(a)
Sr-90 Rad Disks	B0XJT6 DUP	699-13-3A DUP	02/07/2000	<2	pCi/L		Measured Activities/ Corrected(a)/Lab Duplicate

(a) Based on recount 8 days after separation.

Table C.5. Anion and Alkalinity Results for 618-11 Burial Ground Investigation, February 2000

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier(a)	Dilution Factor	Reporting Limit	MDL
Chloride	B0XJY9	699-10-E12	02/08/2000	11.2	mg/L		10	2	0.35
Fluoride	B0XJY9	699-10-E12	02/08/2000	0.26	mg/L		1	0.1	0.01
Nitrate as N	B0XJY9	699-10-E12	02/08/2000	6.8	mg/L		10	0.2	0.11
Nitrite as N	B0XJY9	699-10-E12	02/08/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XJY9	699-10-E12	02/08/2000	35.4	mg/L		10	5	1.1
Total Alkalinity	B0XJY9	699-10-E12	02/08/2000	252	mg/L		1	5	2.2
Chloride	B0XJV7	699-12-4D	02/07/2000	11	mg/L		10	2	0.35
Fluoride	B0XJV7	699-12-4D	02/07/2000	0.31	mg/L		1	0.1	0.01
Nitrate as N	B0XJV7	699-12-4D	02/07/2000	6.3	mg/L		10	0.2	0.11
Nitrite as N	B0XJV7	699-12-4D	02/07/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XJV7	699-12-4D	02/07/2000	47.7	mg/L		10	5	1.1
Total Alkalinity	B0XJV7	699-12-4D	02/07/2000	128	mg/L		1	5	2.2
Chloride	B0XJW6	699-13-1A	02/08/2000	2.8	mg/L		1	0.2	0.035
Fluoride	B0XJW6	699-13-1A	02/08/2000	0.36	mg/L		1	0.1	0.01
Nitrate as N	B0XJW6	699-13-1A	02/08/2000	1.6	mg/L		2	0.04	0.021
Nitrite as N	B0XJW6	699-13-1A	02/08/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XJW6	699-13-1A	02/08/2000	25.1	mg/L		2	1	0.22
Total Alkalinity	B0XJW6	699-13-1A	02/08/2000	152	mg/L		1	5	2.2
Chloride	B0XJX5	699-13-1B	02/08/2000	1.4	mg/L		1	0.2	0.035
Fluoride	B0XJX5	699-13-1B	02/08/2000	0.36	mg/L		1	0.1	0.01
Nitrate as N	B0XJX5	699-13-1B	02/08/2000	0.021	mg/L		1	0.02	0.011
Nitrite as N	B0XJX5	699-13-1B	02/08/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XJX5	699-13-1B	02/08/2000	20.6	mg/L		2	1	0.22
Total Alkalinity	B0XJX5	699-13-1B	02/08/2000	128	mg/L		1	5	2.2
Chloride	B0XJX9	699-13-1C	02/08/2000	14.4	mg/L		5	1	0.17
Fluoride	B0XJX9	699-13-1C	02/08/2000	2.3	mg/L		1	0.1	0.01
Nitrate as N	B0XJX9	699-13-1C	02/08/2000	0.023	mg/L		1	0.02	0.011
Nitrite as N	B0XJX9	699-13-1C	02/08/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XJX9	699-13-1C	02/08/2000	2	mg/L		1	0.5	0.11
Total Alkalinity	B0XJX9	699-13-1C	02/08/2000	158	mg/L		1	5	2.2
Chloride	BOXJT3	699-13-3A	02/07/2000	14.9	mg/L		5	1	0.17
Chloride(b)	BOXJV1	699-13-3A	02/07/2000	14.8	mg/L		5	1	0.17
Fluoride	BOXJT3	699-13-3A	02/07/2000	0.26	mg/L		1	0.1	0.01
Fluoride(b)	BOXJV1	699-13-3A	02/07/2000	0.26	mg/L		1	0.1	0.01
Nitrate as N	BOXJT3	699-13-3A	02/07/2000	22.8	mg/L		50	1	0.53
Nitrate as N(b)	BOXJV1	699-13-3A	02/07/2000	23.3	mg/L		50	1	0.53
Nitrite as N	BOXJT3	699-13-3A	02/07/2000	ND	mg/L	U	1	0.02	0.0074
Nitrite as N(b)	BOXJV1	699-13-3A	02/07/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	BOXJT3	699-13-3A	02/07/2000	62.4	mg/L		5	2.5	0.54
Sulfate(b)	BOXJV1	699-13-3A	02/07/2000	62.7	mg/L		5	2.5	0.54
Total Alkalinity	BOXJT3	699-13-3A	02/07/2000	150	mg/L		1	5	2.2
Total Alkalinity(b)	BOXJV1	699-13-3A	02/07/2000	152	mg/L		1	5	2.2
Chloride(c)	BOXJT3 DUP	699-13-3A DUP	02/07/2000	14.8	mg/L		5	1	0.17
Fluoride(c)	BOXJT3 DUP	699-13-3A DUP	02/07/2000	0.27	mg/L		1	0.1	0.01

Table C.5. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[(a)]	Dilution Factor	Reporting Limit	MDL
Nitrate as N[(c)]	BOXJT3 DUP	699-13-3A DUP	02/07/2000	22.5	mg/L		50	1	0.53
Nitrite as N[(c)]	BOXJT3 DUP	699-13-3A DUP	02/07/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate[(c)]	BOXJT3 DUP	699-13-3A DUP	02/07/2000	62.2	mg/L		5	2.5	0.54
Total Alkalinity[(c)]	BOXJT3 DUP	699-13-3A DUP	02/07/2000	146	mg/L		1	5	2.2
Chloride	B0XK19	699-15-15B	02/08/2000	8.6	mg/L		10	2	0.35
Fluoride	B0XK19	699-15-15B	02/08/2000	0.34	mg/L		1	0.1	0.01
Nitrate as N	B0XK19	699-15-15B	02/08/2000	6.1	mg/L		10	0.2	0.11
Nitrite as N	B0XK19	699-15-15B	02/08/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XK19	699-15-15B	02/08/2000	90.6	mg/L		10	5	1.1
Total Alkalinity	B0XK19	699-15-15B	02/08/2000	124	mg/L		1	5	2.2
Chloride	B0XK14	699-17-5	02/07/2000	12.4	mg/L		5	1	0.17
Fluoride	B0XK14	699-17-5	02/07/2000	0.26	mg/L		1	0.1	0.01
Nitrate as N	B0XK14	699-17-5	02/07/2000	16.4	mg/L		50	1	0.53
Nitrite as N	B0XK14	699-17-5	02/07/2000	0.097	mg/L		1	0.02	0.0074
Sulfate	B0XK14	699-17-5	02/07/2000	46.5	mg/L		5	2.5	0.54
Total Alkalinity	B0XK14	699-17-5	02/07/2000	102	mg/L		1	5	2.2
Chloride	B0XK22	699-21-6	02/07/2000	10.7	mg/L		5	1	0.17
Fluoride	B0XK22	699-21-6	02/07/2000	0.19	mg/L		1	0.1	0.01
Nitrate as N	B0XK22	699-21-6	02/07/2000	9.5	mg/L		20	0.4	0.21
Nitrite as N	B0XK22	699-21-6	02/07/2000	0.044	mg/L		1	0.02	0.0074
Sulfate	B0XK22	699-21-6	02/07/2000	28.9	mg/L		5	2.5	0.54
Total Alkalinity	B0XK22	699-21-6	02/07/2000	102	mg/L		1	5	2.2
Chloride	B0XK11	699-8-17	02/08/2000	10.4	mg/L		5	1	0.17
Fluoride	B0XK11	699-8-17	02/08/2000	0.38	mg/L		1	0.1	0.01
Nitrate as N	B0XK11	699-8-17	02/08/2000	7	mg/L		10	0.2	0.11
Nitrite as N	B0XK11	699-8-17	02/08/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XK11	699-8-17	02/08/2000	54.8	mg/L		10	5	1.1
Total Alkalinity	B0XK11	699-8-17	02/08/2000	121	mg/L		1	5	2.2
Chloride	B0XJY3	699-9-E2	02/10/2000	11.5	mg/L		5	1	0.17
Fluoride	B0XJY3	699-9-E2	02/10/2000	0.34	mg/L		1	0.1	0.01
Nitrate as N	B0XJY3	699-9-E2	02/10/2000	3.2	mg/L		5	0.1	0.22
Nitrite as N	B0XJY3	699-9-E2	02/10/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XJY3	699-9-E2	02/10/2000	41.6	mg/L		5	2.5	0.54
Total Alkalinity	B0XJY3	699-9-E2	02/10/2000	138	mg/L		1	5	2.2
Chloride	B0XK99	C3071/ ENW-MW1	02/09/2000	16.5	mg/L		20	4	0.69
Fluoride	B0XK99	C3071/ ENW-MW1	02/09/2000	0.23	mg/L		1	0.1	0.01
Nitrate as N	B0XK99	C3071/ ENW-MW1	02/09/2000	12.4	mg/L		20	0.4	0.21
Nitrite as N	B0XK99	C3071/ ENW-MW1	02/09/2000	ND	mg/L	U	1	0.02	0.0074

Table C.5. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[(a)]	Dilution Factor	Reporting Limit	MDL
Sulfate	B0XK99	C3071/ ENW-MW1	02/09/2000	82.8	mg/L		20	10	2.2
Total Alkalinity	B0XK99	C3071/ ENW-MW1	02/09/2000	268	mg/L		1	5	2.2
Chloride	B0XKB0	C3072/ ENW-MW2	02/10/2000	53.3	mg/L		20	4	0.69
Fluoride	B0XKB0	C3072/ ENW-MW2	02/10/2000	0.24	mg/L		1	0.1	0.01
Nitrate as N	B0XKB0	C3072/ ENW-MW2	02/10/2000	14.2	mg/L		20	0.4	0.21
Nitrite as N	B0XKB0	C3072/ ENW-MW2	02/10/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XKB0	C3072/ ENW-MW2	02/10/2000	117	mg/L		10	5	1.1
Total Alkalinity	B0XKB0	C3072/ ENW-MW2	02/10/2000	306	mg/L		1	5	2.2
Chloride	B0XKB1	C3073/ ENW-MW3	02/10/2000	17.5	mg/L		20	4	0.69
Fluoride	B0XKB1	C3073/ ENW-MW3	02/10/2000	0.14	mg/L		1	0.1	0.01
Nitrate as N	B0XKB1	C3073/ ENW-MW3	02/10/2000	6.6	mg/L		20	0.4	0.21
Nitrite as N	B0XKB1	C3073/ ENW-MW3	02/10/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XKB1	C3073/ ENW-MW3	02/10/2000	142	mg/L		20	10	2.2
Total Alkalinity	B0XKB1	C3073/ ENW-MW3	02/10/2000	448	mg/L		1	5	2.2
Chloride	B0XKB2	C3074/ ENW-MW4	02/10/2000	12.5	mg/L		10	2	0.35
Fluoride	B0XKB2	C3074/ ENW-MW4	02/10/2000	0.29	mg/L		1	0.1	0.01
Nitrate as N	B0XKB2	C3074/ ENW-MW4	02/10/2000	6.9	mg/L		10	0.2	0.11
Nitrite as N	B0XKB2	C3074/ ENW-MW4	02/10/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XKB2	C3074/ ENW-MW4	02/10/2000	65.2	mg/L		10	5	1.1
Total Alkalinity	B0XKB2	C3074/ ENW-MW4	02/10/2000	222	mg/L		1	5	2.2
Chloride	B0KXB3	C3075/ ENW-MW5	02/09/2000	10.7	mg/L		1	0.2	0.035
Fluoride	B0KXB3	C3075/ ENW-MW5	02/09/2000	0.34	mg/L		1	0.1	0.01
Nitrate as N	B0KXB3	C3075/ ENW-MW5	02/09/2000	8.4	mg/L		10	0.2	0.11

Table C.5. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[a]	Dilution Factor	Reporting Limit	MDL
Nitrite as N	B0KXB3	C3075/ ENW-MW5	02/09/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0KXB3	C3075/ ENW-MW5	02/09/2000	50.9	mg/L		10	5	1.1
Total Alkalinity	B0KXB3	C3075/ ENW-MW5	02/09/2000	144	mg/L		1	5	2.2
Chloride	B0KXB4	C3076/ ENW-MW6	02/09/2000	16.6	mg/L		10	2	0.35
Fluoride	B0KXB4	C3076/ ENW-MW6	02/09/2000	0.26	mg/L		1	0.1	0.01
Nitrate as N	B0KXB4	C3076/ ENW-MW6	02/09/2000	7.8	mg/L		10	0.2	0.11
Nitrite as N	B0KXB4	C3076/ ENW-MW6	02/09/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0KXB4	C3076/ ENW-MW6	02/09/2000	102	mg/L		10	5	1.1
Total Alkalinity	B0KXB4	C3076/ ENW-MW6	02/09/2000	222	mg/L		1	5	2.2
Chloride	B0XKB5	C3077/ ENW-MW7	02/15/2000	4.8	mg/L		1	0.2	0.035
Fluoride	B0XKB5	C3077/ ENW-MW7	02/15/2000	0.22	mg/L		1	0.1	0.01
Nitrate as N	B0XKB5	C3077/ ENW-MW7	02/15/2000	0.36	mg/L		1	0.02	0.011
Nitrite as N	B0XKB5	C3077/ ENW-MW7	02/15/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XKB5	C3077/ ENW-MW7	02/15/2000	21.5	mg/L		2	1	0.22
Total Alkalinity	B0XKB5	C3077/ ENW-MW7	02/15/2000	172	mg/L		1	5	2.2
Chloride	B0XKB6	C3078/ ENW-MW8	02/11/2000	12.7	mg/L	C	10	2	0.35
Fluoride	B0XKB6	C3078/ ENW-MW8	02/11/2000	0.3	mg/L		1	0.1	0.01
Nitrate as N	B0XKB6	C3078/ ENW-MW8	02/11/2000	0.35	mg/L		1	0.02	0.011
Nitrite as N	B0XKB6	C3078/ ENW-MW8	02/11/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XKB6	C3078/ ENW-MW8	02/11/2000	47.4	mg/L		10	5	1.1
Total Alkalinity	B0XKB6	C3078/ ENW-MW8	02/11/2000	216	mg/L		1	5	2.2
Chloride	B0XKB7	C3079/ ENW-MW9	02/11/2000	26.7	mg/L	C	20	4	0.69
Chloride[b]	B0XKB8	C3079/ ENW-MW9	02/11/2000	26.6	mg/L	C	20	4	0.69

Table C.5. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier(a)	Dilution Factor	Reporting Limit	MDL
Fluoride	B0XKB7	C3079/ ENW-MW9	02/11/2000	0.23	mg/L		1	0.1	0.01
Fluoride(b)	B0XKB8	C3079/ ENW-MW9	02/11/2000	0.23	mg/L		1	0.1	0.01
Nitrate as N	B0XKB7	C3079/ ENW-MW9	02/11/2000	32.5	mg/L		50	1	0.53
Nitrate as N(b)	B0XKB8	C3079/ ENW-MW9	02/11/2000	33.6	mg/L		50	1	0.53
Nitrite as N	B0XKB7	C3079/ ENW-MW9	02/11/2000	ND	mg/L	U	1	0.02	0.0074
Nitrite as N(b)	B0XKB8	C3079/ ENW-MW9	02/11/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XKB7	C3079/ ENW-MW9	02/11/2000	259	mg/L		20	10	2.2
Sulfate(b)	B0XKB8	C3079/ ENW-MW9	02/11/2000	251	mg/L		20	10	2.2
Total Alkalinity	B0XKB7	C3079/ ENW-MW9	02/11/2000	182	mg/L		1	5	2.2
Total Alkalinity(b)	B0XKB8	C3079/ ENW-MW9	02/11/2000	202	mg/L		1	5	2.2
Chloride(c)	B0XKB7 DUP	C3079/ENW-MW9 DUP	02/11/2000	27.7	mg/L	C	20	3.8	0.69
Fluoride(c)	B0XKB7 DUP	C3079/ENW-MW9 DUP	02/11/2000	0.23	mg/L		1	0.44	0.01
Nitrate as N(c)	B0XKB7 DUP	C3079/ENW-MW9 DUP	02/11/2000	32.6	mg/L		50	0.19	0.53
Nitrite as N(c)	B0XKB7 DUP	C3079/ENW-MW9 DUP	02/11/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate(c)	B0XKB7 DUP	C3079/ENW-MW9 DUP	02/11/2000	257	mg/L		20	0.47	2.2
Total Alkalinity(c)	B0XKB7 DUP	C3079/ENW-MW9 DUP	02/11/2000	180	mg/L		1	1.1	2.2
Chloride	B0XKB9	ENW-31	02/08/2000	4.4	mg/L		1	0.2	0.035
Fluoride	B0XKB9	ENW-31	02/08/2000	1.1	mg/L		1	0.1	0.01
Nitrate as N	B0XKB9	ENW-31	02/08/2000	0.033	mg/L		1	0.02	0.011
Nitrite as N	B0XKB9	ENW-31	02/08/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XKB9	ENW-31	02/08/2000	16.4	mg/L		1	0.5	0.11
Total Alkalinity	B0XKB9	ENW-31	02/08/2000	170	mg/L		1	5	2.2
Chloride	B0XKC0	ENW-32	02/08/2000	3.9	mg/L		1	0.2	0.035
Fluoride	B0XKC0	ENW-32	02/08/2000	0.7	mg/L		1	0.1	0.01
Nitrate as N	B0XKC0	ENW-32	02/08/2000	0.02	mg/L		1	0.02	0.011
Nitrite as N	B0XKC0	ENW-32	02/08/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XKC0	ENW-32	02/08/2000	15.5	mg/L		1	0.5	0.11
Total Alkalinity	B0XKC0	ENW-32	02/08/2000	164	mg/L		1	5	2.2
Quality Control Samples									
Chloride(d)	B0XK45	EBL 121/ 699-13-3A	02/07/2000	ND	mg/L	U	1	0.2	0.035

Table C.5. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[a]	Dilution Factor	Reporting Limit	MDL
Fluoride[d]	B0XK45	EBL 121/ 699-13-3A	02/07/2000	ND	mg/L	U	1	0.1	0.01
Nitrate as N[d]	B0XK45	EBL 121/ 699-13-3A	02/07/2000	ND	mg/L	U	1	0.02	0.011
Nitrite as N[d]	B0XK45	EBL 121/ 699-13-3A	02/07/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate[d]	B0XK45	EBL 121/ 699-13-3A	02/07/2000	ND	mg/L	U	1	0.5	0.11
Total Alkalinity[d]	B0XK45	EBL 121/ 699-13-3A	02/07/2000	ND	mg/L	U	1	5	2.2
Chloride[e]	B0XK06	EBL 122/ 699-13-3A	02/07/2000	0.11	mg/L	B	1	0.2	0.035
Fluoride[e]	B0XK06	EBL 122/ 699-13-3A	02/07/2000	ND	mg/L	U	1	0.1	0.01
Nitrate as N[e]	B0XK06	EBL 122/ 699-13-3A	02/07/2000	ND	mg/L	U	1	0.02	0.011
Nitrite as N[e]	B0XK06	EBL 122/ 699-13-3A	02/07/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate[e]	B0XK06	EBL 122/ 699-13-3A	02/07/2000	ND	mg/L	U	1	0.5	0.11
Total Alkalinity[e]	B0XK06	EBL 122/ 699-13-3A	02/07/2000	ND	mg/L	U	1	5	2.2
Chloride	B0XK34	EBL 123/ 699-13-1B	02/08/2000	ND	mg/L	U	1	0.2	0.35
Fluoride	B0XK34	EBL 123/ 699-13-1B	02/08/2000	ND	mg/L	U	1	0.1	0.01
Nitrate as N	B0XK34	EBL 123/ 699-13-1B	02/08/2000	ND	mg/L	U	1	0.02	0.011
Nitrite as N	B0XK34	EBL 123/ 699-13-1B	02/08/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XK34	EBL 123/ 699-13-1B	02/08/2000	ND	mg/L	U	1	0.5	0.11
Total Alkalinity	B0XK34	EBL 123/ 699-13-1B	02/08/2000	5	mg/L	U	1	5	2.2
Chloride	B0XJW3	EBL 124/C3075/ ENW-MW5	02/09/2000	0.12	mg/L	B	1	0.2	0.035
Fluoride	B0XJW3	EBL 124/C3075/ ENW-MW5	02/09/2000	ND	mg/L	U	1	0.1	0.01
Nitrate as N	B0XJW3	EBL 124/C3075/ ENW-MW5	02/09/2000	0.02	mg/L		1	0.02	0.011
Nitrite as N	B0XJW3	EBL 124/C3075/ ENW-MW5	02/09/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XJW3	EBL 124/C3075/ ENW-MW5	02/09/2000	ND	mg/L	U	1	0.5	0.11
Total Alkalinity	B0XJW3	EBL 124/C3075/ ENW-MW5	02/09/2000	5	mg/L	U	1	5	2.2

Table C.5. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier$^{(a)}$	Dilution Factor	Reporting Limit	MDL
Chloride	B0XJV3	FTB 322/ 699-13-3A	02/07/2000	ND	mg/L	U	1	0.2	0.035
Fluoride	B0XJV3	FTB 322/ 699-13-3A	02/07/2000	ND	mg/L	U	1	0.1	0.01
Nitrate as N	B0XJV3	FTB 322/ 699-13-3A	02/07/2000	ND	mg/L	U	1	0.02	0.011
Nitrite as N	B0XJV3	FTB 322/ 699-13-3A	02/07/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XJV3	FTB 322/ 699-13-3A	02/07/2000	ND	mg/L	U	1	0.5	0.11
Total Alkalinity	B0XJV3	FTB 322/ 699-13-3A	02/07/2000	5	mg/L	U	1	5	2.2
Chloride	B0XK26	FTB 323/ 699-21-6	02/07/2000	ND	mg/L	U	1	0.2	0.035
Fluoride	B0XK26	FTB 323/ 699-21-6	02/07/2000	ND	mg/L	U	1	0.1	0.01
Nitrate as N	B0XK26	FTB 323/ 699-21-6	02/07/2000	0.016	mg/L	B	1	0.02	0.011
Nitrite as N	B0XK26	FTB 323/ 699-21-6	02/07/2000	ND	mg/L	U	1	0.02	0.0074
Sulfate	B0XK26	FTB 323/ 699-21-6	02/07/2000	ND	mg/L	U	1	0.5	0.11
Total Alkalinity	B0XK26	FTB 323/ 699-21-6	02/07/2000	5	mg/L	U	1	5	2.2

(a) ND/U = Result is non-detect.
B = Estimated value. Result less than the reporting limit.
C = Blank contamination.
(b) Field duplicate.
(c) Lab duplicate.
(d) Before sampling.
(e) After sampling.
EBL = Equipment blank; FTB = Full trip blank; MDL = Minimum detection level.

Table C.6. Filtered Metal Results for 618-11 Burial Ground Investigation, February 2000 (detects only)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier$^{(a)}$	Reporting Limit	MDL
Barium	B0XJY8	699-10-E12	02/08/2000	58.6	ug/L	B	200	6.7
Calcium	B0XJY8	699-10-E12	02/08/2000	71,900	ug/L		5,000	103
Chromium	B0XJY8	699-10-E12	02/08/2000	3.6	ug/L	B	10	3
Iron	B0XJY8	699-10-E12	02/08/2000	54.5	ug/L	B	100	8.6
Magnesium	B0XJY8	699-10-E12	02/08/2000	22,300	ug/L		5,000	99.2
Potassium	B0XJY8	699-10-E12	02/08/2000	5,970	ug/L		5,000	1,700
Sodium	B0XJY8	699-10-E12	02/08/2000	16,700	ug/L		5,000	102
Strontium	B0XJY8	699-10-E12	02/08/2000	547	ug/L		50	3.1
Vanadium	B0XJY8	699-10-E12	02/08/2000	12	ug/L	B	50	2
Zinc	B0XJY8	699-10-E12	02/08/2000	8.8	ug/L	B	20	3
Barium	B0XJV6	699-12-4D	02/07/2000	48.5	ug/L	B	200	6.7
Calcium	B0XJV6	699-12-4D	02/07/2000	47,000	ug/L		5,000	103
Chromium	B0XJV6	699-12-4D	02/07/2000	3.4	ug/L	B	10	3
Iron	B0XJV6	699-12-4D	02/07/2000	45.6	ug/L	B	100	8.6
Magnesium	B0XJV6	699-12-4D	02/07/2000	12,500	ug/L		5,000	99.2
Manganese	B0XJV6	699-12-4D	02/07/2000	2.5	ug/L	B	15	1.1
Potassium	B0XJV6	699-12-4D	02/07/2000	7,290	ug/L		5,000	1,700
Sodium	B0XJV6	699-12-4D	02/07/2000	16,700	ug/L		5,000	102
Strontium	B0XJV6	699-12-4D	02/07/2000	266	ug/L		50	3.1
Vanadium	B0XJV6	699-12-4D	02/07/2000	9.4	ug/L	B	50	2
Zinc	B0XJV6	699-12-4D	02/07/2000	10.2	ug/L	B	20	3
Aluminum	B0XJW5	699-13-1A	02/08/2000	1,060	ug/L		200	19.7
Barium	B0XJW5	699-13-1A	02/08/2000	28.3	ug/L	B	200	6.7
Calcium	B0XJW5	699-13-1A	02/08/2000	26,800	ug/L		5,000	103
Iron	B0XJW5	699-13-1A	02/08/2000	204	ug/L		100	8.6
Magnesium	B0XJW5	699-13-1A	02/08/2000	10,200	ug/L		5,000	99.2
Manganese	B0XJW5	699-13-1A	02/08/2000	49.2	ug/L		15	1.1
Potassium	B0XJW5	699-13-1A	02/08/2000	7,780	ug/L		5,000	1,700
Sodium	B0XJW5	699-13-1A	02/08/2000	22,200	ug/L		5,000	102
Strontium	B0XJW5	699-13-1A	02/08/2000	262	ug/L		50	3.1
Vanadium	B0XJW5	699-13-1A	02/08/2000	7.7	ug/L	B	50	2
Zinc	B0XJW5	699-13-1A	02/08/2000	7.5	ug/L	B	20	3
Barium	B0WJX4	699-13-1B	02/08/2000	36.9	ug/L	B	200	6.7
Calcium	B0WJX4	699-13-1B	02/08/2000	23,600	ug/L		5,000	103
Iron	B0WJX4	699-13-1B	02/08/2000	84.9	ug/L	B	100	8.6
Magnesium	B0WJX4	699-13-1B	02/08/2000	9,420	ug/L		5,000	99.2
Manganese	B0WJX4	699-13-1B	02/08/2000	94.2	ug/L		15	1.1
Potassium	B0WJX4	699-13-1B	02/08/2000	7,350	ug/L		5,000	1,700
Sodium	B0WJX4	699-13-1B	02/08/2000	21,900	ug/L		5,000	102
Strontium	B0WJX4	699-13-1B	02/08/2000	224	ug/L		50	3.1
Zinc	B0WJX4	699-13-1B	02/08/2000	5.9	ug/L	B	20	3
Aluminum	B0WJX8	699-13-1C	02/08/2000	39.3	ug/L	B	200	19.7
Barium	B0WJX8	699-13-1C	02/08/2000	26.2	ug/L	B	200	6.7
Calcium	B0WJX8	699-13-1C	02/08/2000	11,700	ug/L		5,000	103
Iron	B0WJX8	699-13-1C	02/08/2000	172	ug/L		100	8.6
Magnesium	B0WJX8	699-13-1C	02/08/2000	2,760	ug/L	B	5,000	99.2
Manganese	B0WJX8	699-13-1C	02/08/2000	19.6	ug/L		15	1.1

Table C.6. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier(a)	Reporting Limit	MDL
Potassium	B0WJX8	699-13-1C	02/08/2000	7,700	ug/L		5,000	1,700
Sodium	B0WJX8	699-13-1C	02/08/2000	53,300	ug/L		5,000	102
Strontium	B0WJX8	699-13-1C	02/08/2000	73.2	ug/L		50	3.1
Zinc	B0WJX8	699-13-1C	02/08/2000	11.6	ug/L	B	20	3
Aluminum	BOXJT2	699-13-3A	02/07/2000	20.4	ug/L	B	200	19.7
Barium	BOXJT2	699-13-3A	02/07/2000	85.3	ug/L	B	200	6.7
Barium(b)	BOXJV0	699-13-3A	02/07/2000	83.8	ug/L	B	200	6.7
Calcium	BOXJT2	699-13-3A	02/07/2000	76,600	ug/L		5,000	103
Calcium(b)	BOXJV0	699-13-3A	02/07/2000	74,300	ug/L		5,000	103
Iron	BOXJT2	699-13-3A	02/07/2000	87	ug/L	B	100	8.6
Iron(b)	BOXJV0	699-13-3A	02/07/2000	89.6	ug/L	B	100	8.6
Magnesium	BOXJT2	699-13-3A	02/07/2000	18,300	ug/L		5,000	99.2
Magnesium(b)	BOXJV0	699-13-3A	02/07/2000	17,700	ug/L		5,000	99.2
Manganese	BOXJT2	699-13-3A	02/07/2000	5.6	ug/L	B	15	1.1
Manganese(b)	BOXJV0	699-13-3A	02/07/2000	5.5	ug/L	B	15	1.1
Potassium	BOXJT2	699-13-3A	02/07/2000	7,980	ug/L		5,000	1,700
Potassium(b)	BOXJV0	699-13-3A	02/07/2000	8,460	ug/L		5,000	1,700
Sodium	BOXJT2	699-13-3A	02/07/2000	21,600	ug/L		5,000	102
Sodium(b)	BOXJV0	699-13-3A	02/07/2000	20,700	ug/L		5,000	102
Strontium	BOXJT2	699-13-3A	02/07/2000	389	ug/L		50	3.1
Strontium	BOXJV0	699-13-3A	02/07/2000	381	ug/L		50	3.1
Vanadium	BOXJT2	699-13-3A	02/07/2000	13.5	ug/L	B	50	2
Vanadium(b)	BOXJV0	699-13-3A	02/07/2000	14.7	ug/L	B	50	2
Zinc	BOXJT2	699-13-3A	02/07/2000	33	ug/L		20	3
Zinc(b)	BOXJV0	699-13-3A	02/07/2000	21.7	ug/L		20	3
Barium	B0XK18	699-15-15B	02/08/2000	46.7	ug/L	B	200	6.7
Calcium	B0XK18	699-15-15B	02/08/2000	52,400	ug/L		5,000	103
Chromium	B0XK18	699-15-15B	02/08/2000	4.5	ug/L	B	10	3
Iron	B0XK18	699-15-15B	02/08/2000	37.2	ug/L		100	8.6
Magnesium	B0XK18	699-15-15B	02/08/2000	10,800	ug/L		5,000	99.2
Manganese	B0XK18	699-15-15B	02/08/2000	1.8	B		15	1.1
Potassium	B0XK18	699-15-15B	02/08/2000	8,550	ug/L		5,000	1,700
Sodium	B0XK18	699-15-15B	02/08/2000	21,100	ug/L		5,000	102
Strontium	B0XK18	699-15-15B	02/08/2000	276	ug/L		50	3.1
Vanadium	B0XK18	699-15-15B	02/08/2000	13	ug/L	B	50	2
Zinc	B0XK18	699-15-15B	02/08/2000	136	ug/L		20	3
Aluminum	B0XK13	699-17-5	02/07/2000	46.4	ug/L	B	200	19.7
Barium	B0XK13	699-17-5	02/07/2000	65.4	ug/L	B	200	6.7
Calcium	B0XK13	699-17-5	02/07/2000	52,300	ug/L		5,000	103
Chromium	B0XK13	699-17-5	02/07/2000	3.4	ug/L	B	10	3
Iron	B0XK13	699-17-5	02/07/2000	138	ug/L		100	8.6
Magnesium	B0XK13	699-17-5	02/07/2000	14,300	ug/L		5,000	99.2
Manganese	B0XK13	699-17-5	02/07/2000	37	ug/L		15	1.1
Potassium	B0XK13	699-17-5	02/07/2000	7,160	ug/L		5,000	1,700
Sodium	B0XK13	699-17-5	02/07/2000	13,000	ug/L		5,000	102
Strontium	B0XK13	699-17-5	02/07/2000	318	ug/L		50	3.1
Zinc	B0XK13	699-17-5	02/07/2000	17.4	ug/L	B	20	3

Table C.6. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[(a)]	Reporting Limit	MDL
Barium	B0XK21	699-21-6	02/07/2000	59.2	ug/L	B	200	6.7
Calcium	B0XK21	699-21-6	02/07/2000	43,500	ug/L		5,000	103
Chromium	B0XK21	699-21-6	02/07/2000	3	ug/L	B	10	3
Iron	B0XK21	699-21-6	02/07/2000	378	ug/L		100	8.6
Magnesium	B0XK21	699-21-6	02/07/2000	9,860	ug/L		5,000	99.2
Manganese	B0XK21	699-21-6	02/07/2000	50.1	ug/L		15	1.1
Potassium	B0XK21	699-21-6	02/07/2000	6,320	ug/L		5,000	1,700
Sodium	B0XK21	699-21-6	02/07/2000	8,580	ug/L		5,000	102
Strontium	B0XK21	699-21-6	02/07/2000	242	ug/L		50	3.1
Vanadium	B0XK21	699-21-6	02/07/2000	6.6	ug/L	B	50	2
Zinc	B0XK21	699-21-6	02/07/2000	8.6	ug/L	B	20	3
Aluminum	B0XK10	699-8-17	02/08/2000	29.1	ug/L	B	200	19.7
Barium	B0XK10	699-8-17	02/08/2000	38.2	ug/L	B	200	6.7
Calcium	B0XK10	699-8-17	02/08/2000	45,500	ug/L		5,000	103
Chromium	B0XK10	699-8-17	02/08/2000	5.9	ug/L	B	10	3
Iron	B0XK10	699-8-17	02/08/2000	37.4	ug/L		100	8.6
Magnesium	B0XK10	699-8-17	02/08/2000	12,300	ug/L		5,000	99.2
Manganese	B0XK10	699-8-17	02/08/2000	2.5	ug/L	B	15	1.1
Potassium	B0XK10	699-8-17	02/08/2000	8,200	ug/L		5,000	1,700
Sodium	B0XK10	699-8-17	02/08/2000	20,800	ug/L		5,000	102
Strontium	B0XK10	699-8-17	02/08/2000	254	ug/L		50	3.1
Vanadium	B0XK10	699-8-17	02/08/2000	10	ug/L	B	50	2
Zinc	B0XK10	699-8-17	02/08/2000	116	ug/L		20	3
Barium	B0XJY2	699-9-E2	02/10/2000	51.1	ug/L	B	200	6.7
Calcium	B0XJY2	699-9-E2	02/10/2000	40,500	ug/L		5,000	103
Iron	B0XJY2	699-9-E2	02/10/2000	60.4	ug/L	B	100	8.6
Magnesium	B0XJY2	699-9-E2	02/10/2000	13,700	ug/L		5,000	99.2
Manganese	B0XJY2	699-9-E2	02/10/2000	6.3	ug/L	B	15	1.1
Potassium	B0XJY2	699-9-E2	02/10/2000	7,310	ug/L		5,000	1,700
Sodium	B0XJY2	699-9-E2	02/10/2000	24,700	ug/L		5,000	102
Strontium	B0XJY2	699-9-E2	02/10/2000	289	ug/L		50	3.1
Zinc	B0XJY2	699-9-E2	02/10/2000	12.8	ug/L	B	20	3
Barium	B0XK87	C3071/ ENW-MW1	02/09/2000	79.3	ug/L	B	200	6.7
Calcium	B0XK87	C3071/ ENW-MW1	02/09/2000	106,000	ug/L		5,000	103
Iron	B0XK87	C3071/ ENW-MW1	02/09/2000	122	ug/L		100	8.6
Magnesium	B0XK87	C3071/ ENW-MW1	02/09/2000	24,400	ug/L		5,000	99.2
Potassium	B0XK87	C3071/ ENW-MW1	02/09/2000	9,770	ug/L		5,000	1,700
Sodium	B0XK87	C3071/ ENW-MW1	02/09/2000	23,700	ug/L		5,000	102
Strontium	B0XK87	C3071/ ENW-MW1	02/09/2000	506	ug/L		50	3.1

Table C.6. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[(a)]	Reporting Limit	MDL
Vanadium	B0XK87	C3071/ ENW-MW1	02/09/2000	6	ug/L	B	50	2
Zinc	B0XK87	C3071/ ENW-MW1	02/09/2000	19.5	ug/L	B	20	3
Barium	B0XK88	C3072/ ENW-MW2	02/10/2000	76.7	ug/L	B	200	6.7
Calcium	B0XK88	C3072/ ENW-MW2	02/10/2000	139,000	ug/L		5,000	103
Chromium	B0XK88	C3072/ ENW-MW2	02/10/2000	4.6	ug/L	B	10	3
Iron	B0XK88	C3072/ ENW-MW2	02/10/2000	148	ug/L		100	8.6
Magnesium	B0XK88	C3072/ ENW-MW2	02/10/2000	32,600	ug/L		5,000	99.2
Potassium	B0XK88	C3072/ ENW-MW2	02/10/2000	10,600	ug/L		5,000	1,700
Sodium	B0XK88	C3072/ ENW-MW2	02/10/2000	34,700	ug/L		5,000	102
Strontium	B0XK88	C3072/ ENW-MW2	02/10/2000	670	ug/L		50	3.1
Vanadium	B0XK88	C3072/ ENW-MW2	02/10/2000	5.8	ug/L	B	50	2
Zinc	B0XK88	C3072/ ENW-MW2	02/10/2000	8.2	ug/L	B	20	3
Aluminum	B0XK89	C3073 ENW-MW3	02/10/2000	33.5	ug/L	B	200	19.7
Barium	B0XK89	C3073/ ENW-MW3	02/10/2000	75.8	ug/L	B	200	6.7
Calcium	B0XK89	C3073/ ENW-MW3	02/10/2000	166,000	ug/L		5,000	103
Chromium	B0XK89	C3073/ ENW-MW3	02/10/2000	3.7	ug/L	B	10	3
Iron	B0XK89	C3073/ ENW-MW3	02/10/2000	81.2	ug/L	B	100	8.6
Magnesium	B0XK89	C3073/ ENW-MW3	02/10/2000	36,000	ug/L		5,000	99.2
Potassium	B0XK89	C3073/ ENW-MW3	02/10/2000	11,800	ug/L		5,000	1,700
Sodium	B0XK89	C3073/ ENW-MW3	02/10/2000	44,900	ug/L		5,000	102
Strontium	B0XK89	C3073/ ENW-MW3	02/10/2000	731	ug/L		50	3.1
Vanadium	B0XK89	C3073/ ENW-MW3	02/10/2000	6.6	ug/L	B	50	2
Zinc	B0XK89	C3073/ ENW-MW3	02/10/2000	9.6	ug/L	B	20	3

Table C.6. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier(a)	Reporting Limit	MDL
Aluminum	B0XK90	C3074/ENW-MW4	02/10/2000	27.8	ug/L	B	200	19.7
Barium	B0XK90	C3074/ENW-MW4	02/10/2000	70.4	ug/L		200	6.7
Calcium	B0XK90	C3074/ENW-MW4	02/10/2000	79,300	ug/L		5,000	103
Chromium	B0XK90	C3074/ENW-MW4	02/10/2000	4.3	ug/L	B	10	3
Iron	B0XK90	C3074/ENW-MW4	02/10/2000	121	ug/L		100	8.6
Magnesium	B0XK90	C3074/ENW-MW4	02/10/2000	18,000	ug/L		5,000	99.2
Potassium	B0XK90	C3074/ENW-MW4	02/10/2000	7,560	ug/L		5,000	1,700
Sodium	B0XK90	C3074/ENW-MW4	02/10/2000	27,200	ug/L		5,000	102
Strontium	B0XK90	C3074/ENW-MW4	02/10/2000	374	ug/L		50	3.1
Vanadium	B0XK90	C3074/ENW-MW4	02/10/2000	7.4	ug/L	B	50	2
Zinc	B0XK90	C3074/ENW-MW4	02/10/2000	14.1	ug/L	B	20	3
Barium	B0XK91	C3075/ENW-MW5	02/09/2000	48	ug/L	B	200	6.7
Calcium	B0XK91	C3075/ENW-MW5	02/09/2000	49,200	ug/L		5,000	103
Chromium	B0XK91	C3075/ENW-MW5	02/09/2000	4.3	ug/L	B	10	3
Magnesium	B0XK91	C3075/ENW-MW5	02/09/2000	13,000	ug/L		5,000	99.2
Potassium	B0XK91	C3075/ENW-MW5	02/09/2000	7,580	ug/L		5,000	1,700
Sodium	B0XK91	C3075/ENW-MW5	02/09/2000	19,500	ug/L		5,000	102
Strontium	B0XK91	C3075/ENW-MW5	02/09/2000	268	ug/L		50	3.1
Vanadium	B0XK91	C3075/ENW-MW5	02/09/2000	9.3	ug/L	B	50	2
Zinc	B0XK91	C3075/ENW-MW5	02/09/2000	8.6	ug/L	B	20	3
Barium	B0XK92	C3076/ENW-MW6	02/09/2000	75.8	ug/L	B	200	6.7
Calcium	B0XK92	C3076/ENW-MW6	02/09/2000	82,200	ug/L		5,000	103
Chromium	B0XK92	C3076/ENW-MW6	02/09/2000	3	ug/L	B	10	3

Table C.6. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[a]	Reporting Limit	MDL
Iron	B0XK92	C3076/ ENW-MW6	02/09/2000	38.4	ug/L	B	100	8.6
Magnesium	B0XK92	C3076/ ENW-MW6	02/09/2000	20,400	ug/L		5,000	99.2
Potassium	B0XK92	C3076/ ENW-MW6	02/09/2000	9,610	ug/L		5,000	1,700
Sodium	B0XK92	C3076/ ENW-MW6	02/09/2000	26,300	ug/L		5,000	102
Strontium	B0XK92	C3076/ ENW-MW6	02/09/2000	462	ug/L		50	3.1
Zinc	B0XK92	C3076/ ENW-MW6	02/09/2000	6.8	ug/L	B	20	3
Barium	B0XK93	C3077/ ENW-MW7	02/15/2000	35.7	ug/L	B	200	0.9
Calcium	B0XK93	C3077/ ENW-MW7	02/15/2000	38,100	ug/L		5,000	65.3
Iron	B0XK93	C3077/ ENW-MW7	02/15/2000	30.6	ug/L	B	100	30.3
Magnesium	B0XK93	C3077/ ENW-MW7	02/15/2000	7,840	ug/L		5,000	101
Manganese	B0XK93	C3077/ ENW-MW7	02/15/2000	7.7	ug/L	B	15	0.9
Potassium	B0XK93	C3077/ ENW-MW7	02/15/2000	5,510	ug/L		5,000	1,810
Sodium	B0XK93	C3077/ ENW-MW7	02/15/2000	9,140	ug/L		5,000	44.2
Strontium	B0XK93	C3077/ ENW-MW7	02/15/2000	186	ug/L		50	0.4
Vanadium	B0XK93	C3077/ ENW-MW7	02/15/2000	6.9	ug/L	B	50	4.7
Zinc	B0XK93	C3077/ ENW-MW7	02/15/2000	18.5	ug/L	B	20	4.2
Barium	B0XK94	C3078/ ENW-MW8	02/11/2000	55.6	ug/L	B	200	6.7
Calcium	B0XK94	C3078/ ENW-MW8	02/11/2000	68,200	ug/L		5,000	103
Iron	B0XK94	C3078/ ENW-MW8	02/11/2000	175	ug/L		100	8.6
Magnesium	B0XK94	C3078/ ENW-MW8	02/11/2000	15,700	ug/L		5,000	99.2
Manganese	B0XK94	C3078/ ENW-MW8	02/11/2000	1.3	ug/L	B	15	1.1
Potassium	B0XK94	C3078/ ENW-MW8	02/11/2000	6,730	ug/L		5,000	1,700
Sodium	B0XK94	C3078/ ENW-MW8	02/11/2000	25,300	ug/L		5,000	102

Table C.6. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[(a)]	Reporting Limit	MDL
Strontium	B0XK94	C3078/ ENW-MW8	02/11/2000	329	ug/L		50	3.1
Vanadium	B0XK94	C3078/ ENW-MW8	02/11/2000	9.3	ug/L	B	50	2
Zinc	B0XK94	C3078/ ENW-MW8	02/11/2000	37.9	ug/L		20	3
Barium	B0XK95	C3079/ ENW-MW9	02/11/2000	46.5	ug/L	B	200	6.7
Barium[(b)]	B0XK96	C3079/ ENW-MW9	02/11/2000	49.2	ug/L	B	200	6.7
Calcium	B0XK95	C3079/ ENW-MW9	02/11/2000	146,000	ug/L		5,000	103
Calcium[(b)]	B0XK96	C3079/ ENW-MW9	02/11/2000	156,000	ug/L		5,000	103
Chromium[(b)]	B0XK96	C3079/ ENW-MW9	02/11/2000	3.4	ug/L	B	10	3
Cobalt	B0XK95	C3079/ ENW-MW9	02/11/2000	3.1	ug/L	B	50	2.8
Cobalt[(b)]	B0XK96	C3079/ ENW-MW9	02/11/2000	3	ug/L	B	50	2.8
Iron	B0XK95	C3079/ ENW-MW9	02/11/2000	71.7	ug/L	B	100	8.6
Iron[(b)]	B0XK96	C3079/ ENW-MW9	02/11/2000	262	ug/L		100	8.6
Magnesium	B0XK95	C3079/ ENW-MW9	02/11/2000	35,300	ug/L		5,000	99.2
Magnesium[(b)]	B0XK96	C3079/ ENW-MW9	02/11/2000	37,700	ug/L		5,000	99.2
Potassium	B0XK95	C3079/ ENW-MW9	02/11/2000	9,950	ug/L		5,000	1,700
Potassium[(b)]	B0XK96	C3079/ ENW-MW9	02/11/2000	10,400	ug/L		5,000	1,700
Sodium	B0XK95	C3079/ ENW-MW9	02/11/2000	53,300	ug/L		5,000	102
Sodium[(b)]	B0XK96	C3079/ ENW-MW9	02/11/2000	56,700	ug/L		5,000	102
Strontium	B0XK95	C3079/ ENW-MW9	02/11/2000	700	ug/L		50	3.1
Strontium[(b)]	B0XK96	C3079/ ENW-MW9	02/11/2000	742	ug/L		50	3.1
Vanadium	B0XK95	C3079/ ENW-MW9	02/11/2000	6	ug/L	B	50	2
Vanadium[(b)]	B0XK96	C3079/ ENW-MW9	02/11/2000	6	ug/L	B	50	2
Zinc	B0XK95	C3079/ ENW-MW9	02/11/2000	7.8	ug/L	B	20	3

Table C.6. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier(a)	Reporting Limit	MDL
Zinc(b)	B0XK96	C3079/ ENW-MW9	02/11/2000	9.2	ug/L	B	20	3
Barium	B0XK97	ENW-31	02/08/2000	59.8	ug/L	B	200	6.7
Calcium	B0XK97	ENW-31	02/08/2000	20,800	ug/L		5,000	103
Iron	B0XK97	ENW-31	02/08/2000	42.4	ug/L	B	100	8.6
Magnesium	B0XK97	ENW-31	02/08/2000	6,080	ug/L		5,000	99.2
Manganese	B0XK97	ENW-31	02/08/2000	13.4	ug/L	B	15	1.1
Potassium	B0XK97	ENW-31	02/08/2000	7,580	ug/L		5,000	1,700
Sodium	B0XK97	ENW-31	02/08/2000	49,500	ug/L		5,000	102
Strontium	B0XK97	ENW-31	02/08/2000	154	ug/L		50	3.1
Zinc	B0XK97	ENW-31	02/08/2000	9.2	ug/L	B	20	3
Aluminum	B0XK98	ENW-32	02/08/2000	84.1	ug/L	B	200	19.7
Barium	B0XK98	ENW-32	02/08/2000	55.6	ug/L	B	200	6.7
Calcium	B0XK98	ENW-32	02/08/2000	22,400	ug/L		5,000	103
Iron	B0XK98	ENW-32	02/08/2000	194	ug/L		100	8.6
Magnesium	B0XK98	ENW-32	02/08/2000	6,380	ug/L		5,000	99.2
Manganese	B0XK98	ENW-32	02/08/2000	29.5	ug/L		15	1.1
Potassium	B0XK98	ENW-32	02/08/2000	8,220	ug/L		5,000	1,700
Sodium	B0XK98	ENW-32	02/08/2000	43,600	ug/L		5,000	102
Strontium	B0XK98	ENW-32	02/08/2000	164	ug/L		50	3.1
Zinc	B0XK98	ENW-32	02/08/2000	9.5	ug/L	B	20	3
Quality Control Samples								
Aluminum(c)	B0XJY5	EBL 121/ 699-13-3A	02/07/2000	32.2	ug/L	B	200	19.7
Calcium(c)	B0XJY5	EBL 121/ 699-13-3A	02/07/2000	180	ug/L	B	5,000	103
Iron(c)	B0XJY5	EBL 121/ 699-13-3A	02/07/2000	68.4	ug/L	B	100	8.6
Sodium(c)	B0XJY5	EBL 121/ 699-13-3A	02/07/2000	226	ug/L	B	5,000	102
Zinc(c)	B0XJY5	EBL 121/ 699-13-3A	02/07/2000	21	ug/L		20	3
Aluminum(d)	B0XK44	EBL 122/ 699-13-3A	02/07/2000	23.7	ug/L	B	200	19.7
Calcium(d)	B0XK44	EBL 122/ 699-13-3A	02/07/2000	217	ug/L	B	5,000	103
Iron(d)	B0XK44	EBL 122/ 699-13-3A	02/07/2000	86.6	ug/L	B	100	8.6
Sodium(d)	B0XK44	EBL 122/ 699-13-3A	02/07/2000	207	ug/L	B	5,000	102
Zinc(d)	B0XK44	EBL 122/ 699-13-3A	02/07/2000	26.1	ug/L		20	3
Calcium	B0XK33	EBL 123/ 699-13-1B	02/08/2000	347	ug/L	B	5,000	103
Sodium	B0XK33	EBL 123/ 699-13-1B	02/08/2000	401	ug/L	B	5,000	102

Table C.6. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier[a]	Reporting Limit	MDL
Zinc	B0XK33	EBL 123/ 699-13-1B	02/08/2000	6.7	ug/L	B	20	3
Calcium	B0XJW2	EBL 124/ ENW-MW5	02/09/2000	354	ug/L	B	5,000	103
Sodium	B0XJW2	EBL 124 /ENW-MW5	02/09/2000	468	ug/L	B	5,000	102
Zinc	B0XJW2	EBL 124/ ENW-MW5	02/09/2000	7.6	ug/L	B	20	3
Calcium	B0XJV2	FTB 322/ 699-13-3A	02/07/2000	174	ug/L	B	5,000	103
Cobalt	B0XJV2	FTB 322/ 699-13-3A	02/07/2000	4.3	ug/L	B	50	2.8
Iron	B0XJV2	FTB 322/ 699-13-3A	02/07/2000	55.3	ug/L	B	100	8.6
Sodium	B0XJV2	FTB 322/ 699-13-3A	02/07/2000	219	ug/L	B	5,000	102
Zinc	B0XJV2	FTB 322/ 699-13-3A	02/07/2000	17.6	ug/L	B	20	3
Aluminum	B0XK25	FTB 323/ 699-21-6	02/07/2000	35.3	ug/L	B	200	19.7
Calcium	B0XK25	FTB 323/ 699-21-6	02/07/2000	411	ug/L	B	5,000	103
Iron	B0XK25	FTB 323/ 699-21-6	02/07/2000	371	ug/L		100	8.6
Sodium	B0XK25	FTB 323/ 699-21-6	02/07/2000	462	ug/L	B	5,000	102
Zinc	B0XK25	FTB 323/ 699-21-6	02/07/2000	8.7	ug/L	B	20	3

(a) B = Estimated result. Value is less than reporting limit.
(b) Field duplicate.
(c) Before sample.
(d) After sample.
Note: Samples reported as non-detect are omitted.
EBL = Equipment blank; FTB = Full trip blank; MDL = Minimum detection level.

Table C.7. Organic Results for 618-11 Burial Ground Investigation, February 2000

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units	Lab Qualifier$^{(a)}$	Reporting Limit	MDL
Methylene Chloride	BOXJT3	699-13-3A	02/07/2000	3.4	ug/L	B	1	0.37
Carbon Tetrachloride	BOXJT3	699-13-3A	02/07/2000	0.24	ug/L	J	1	0.23
Trichloroethene	BOXJT3	699-13-3A	02/07/2000	0.32	ug/L	J	1	0.16
bis(2-Ethylhexyl) phthalate	BOXJT3	699-13-3A	02/07/2000	1.4	ug/L	J	10	1.3
Methylene Chloride	BOXJV1	699-13-3A	02/07/2000	3	ug/L	B	1	0.37
Carbon Tetrachloride	BOXJV1	699-13-3A	02/07/2000	0.24	ug/L	J	1	0.23
Chlorobenzene	B0XJV7	699-12-4D	02/07/2000	0.41	ug/L	J	1	0.28
Methylene Chloride	B0XJW6	699-13-1A	02/08/2000	0.68	ug/L	J	1	0.37
Quality Control Samples								
Methylene Chloride	B0XK50	FXR 520/ 699-13-3A	02/07/2000	0.51	ug/L	J	1	0.37
Chloroform	B0XK50	FXR 520/ 699-13-3A	02/07/2000	0.59	ug/L	J	1	0.23
Chloroform	B0XJV3	FTB 322/ 699-13-3A	02/07/2000	0.54	ug/L	J	1	0.23
Chloroform$^{(b)}$	B0XK45	EBL 121/ 699-13-3A	02/07/2000	17	ug/L		1	0.23
Bromodichloromethane$^{(b)}$	B0XK45	EBL 121/ 699-13-3A	02/07/2000	0.43	ug/L	J	1	0.2
Chloroform$^{(c)}$	B0XK06	EBL 122/ 699-13-3A	02/07/2000	11	ug/L		1	0.23
Trichloroethene$^{(c)}$	B0XK06	EBL 122/ 699-13-3A	02/07/2000	0.21	ug/L	J	1	0.16
Bromodichloromethane$^{(c)}$	B0XK06	EBL 122/ 699-13-3A	02/07/2000	0.33	ug/L	J	1	0.2
bis(2-Ethylhexyl) phthalate$^{(c)}$	B0XK06	EBL 122/ 699-13-3A	02/07/2000	2.3	ug/L	JB	10	1.3
Methylene Chloride	B0XK51	FXR 521/ 699-13-1A	02/08/2000	0.82	ug/L	J	1	0.37
Chloroform	B0XK51	FXR 521/ 699-13-1A	02/08/2000	0.57	ug/L	J	1	0.23
Chloroform	B0XK34	EBL 123/ 699-13-1B	02/08/2000	10	ug/L		1	0.23
Methylene Chloride	B0XJW3	EBL 124/C3075/ ENW-MW5	02/09/2000	0.72	ug/L	J	1	0.37
Bromodichloromethane	B0XJW3	EBL 124/C3075/ ENW-MW5	02/09/2000	0.51	ug/L	J	1	0.2
Chloroform	B0XJW3	EBL 124/C3075/ ENW-MW5	02/09/2000	23	ug/L		1	0.23
bis(2-Ethylhexyl) phthalate	B0XJW3	EBL 124/C3075/ ENW-MW5	02/09/2000	1.7	ug/L	JB	10	1.3
Methylene Chloride	B0XK52	FXR 522/C3076/ ENW-MW6	02/09/2000	0.98	ug/L	JB	1	0.37
Chloroform	B0XK52	FXR 522/C3076/ ENW-MW6	02/09/2000	0.55	ug/L	J	1	0.23

(a) B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result. Result is less than reporting limit.
(b) Before sampling.
(c) After sampling.
Note: Samples reported as non-detect are omitted.
EBL = Equipment blank; FTB = Full trip blank; MDL = Minimum detection level.

Table C.8. Field Parameter Results for 618-11 Burial Investigation, February 2000

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units
Conductivity	B0XJY9	699-10-E12	02/08/2000	609	uS/cm
pH Measurement	B0XJY9	699-10-E12	02/08/2000	7.4	pH
Temperature	B0XJY9	699-10-E12	02/08/2000	17.6	Deg C
Turbidity	B0XJY9	699-10-E12	02/08/2000	4.61	NTU
Conductivity	B0XJV7	699-12-4D	02/07/2000	413	uS/cm
pH Measurement	B0XJV7	699-12-4D	02/07/2000	7.94	pH
Temperature	B0XJV7	699-12-4D	02/07/2000	17.1	Deg C
Turbidity	B0XJV7	699-12-4D	02/07/2000	10.6	NTU
Conductivity	B0XJW6	699-13-1A	02/08/2000	307	uS/cm
pH Measurement	B0XJW6	699-13-1A	02/08/2000	8.09	pH
Temperature	B0XJW6	699-13-1A	02/08/2000	17.4	Deg C
Turbidity	B0XJW6	699-13-1A	02/08/2000	1.85	NTU
Conductivity	B0XJX5	699-13-1B	02/08/2000	289	uS/cm
pH Measurement	B0XJX5	699-13-1B	02/08/2000	8.23	pH
Temperature	B0XJX5	699-13-1B	02/08/2000	17.1	Deg C
Turbidity	B0XJX5	699-13-1B	02/08/2000	12.2	NTU
Conductivity	B0XJX9	699-13-1C	02/08/2000	330	uS/cm
pH Measurement	B0XJX9	699-13-1C	02/08/2000	8.44	pH
Temperature	B0XJX9	699-13-1C	02/08/2000	20.8	Deg C
Turbidity	B0XJX9	699-13-1C	02/08/2000	30.3	NTU
Conductivity	B0XJT3	699-13-3A	02/07/2000	624	uS/cm
pH Measurement	B0XJT3	699-13-3A	02/07/2000	7.7	pH
Temperature	B0XJT3	699-13-3A	02/07/2000	17.1	Deg C
Turbidity	B0XJT3	699-13-3A	02/07/2000	5.19	NTU
Conductivity	B0XK19	699-15-15B	02/08/2000	481	uS/cm
pH Measurement	B0XK19	699-15-15B	02/08/2000	7.98	pH
Temperature	B0XK19	699-15-15B	02/08/2000	18.9	Deg C
Turbidity	B0XK19	699-15-15B	02/08/2000	3.44	NTU
Conductivity	B0XK14	699-17-5	02/07/2000	425	uS/cm
pH Measurement	B0XK14	699-17-5	02/07/2000	8.61	pH
Temperature	B0XK14	699-17-5	02/07/2000	17.8	Deg C
Turbidity	B0XK14	699-17-5	02/07/2000	10.6	NTU
Conductivity	B0XK22	699-21-6	02/07/2000	334	uS/cm
pH Measurement	B0XK22	699-21-6	02/07/2000	8	pH
Temperature	B0XK22	699-21-6	02/07/2000	17.1	Deg C
Turbidity	B0XK22	699-21-6	02/07/2000	3.4	NTU
Conductivity	B0XK11	699-8-17	02/08/2000	426	uS/cm
pH Measurement	B0XK11	699-8-17	02/08/2000	8.19	pH
Temperature	B0XK11	699-8-17	02/08/2000	18.1	Deg C
Turbidity	B0XK11	699-8-17	02/08/2000	1.47	NTU
Conductivity	B0XJY3	699-9-E2	02/10/2000	380	uS/cm
Dissolved Oxygen	B0XJY3	699-9-E2	02/10/2000	0.99	mg/L
pH Measurement	B0XJY3	699-9-E2	02/10/2000	7.99	pH
Temperature	B0XJY3	699-9-E2	02/10/2000	17.1	Deg C
Turbidity	B0XJY3	699-9-E2	02/10/2000	0.8	NTU
Conductivity	B0XK99	C3071/ENW-MW1	02/09/2000	827	uS/cm
Dissolved Oxygen	B0XK99	C3071/ENW-MW1	02/09/2000	6.39	mg/L
pH Measurement	B0XK99	C3071/ENW-MW1	02/09/2000	7.13	pH
Temperature	B0XK99	C3071/ENW-MW1	02/09/2000	16.4	Deg C
Turbidity	B0XK99	C3071/ENW-MW1	02/09/2000	16	NTU
Conductivity	B0XKB0	C3072/ENW-MW2	02/10/2000	927	uS/cm
Dissolved Oxygen	B0XKB0	C3072/ENW-MW2	02/10/2000	6.26	mg/L

Table C.8. (contd)

Constituent	Sample Number	Well Name	Sample Date	Value Reported	Units
pH Measurement	B0XKB0	C3072/ENW-MW2	02/10/2000	7.19	pH
Temperature	B0XKB0	C3072/ENW-MW2	02/10/2000	17.1	Deg C
Turbidity	B0XKB0	C3072/ENW-MW2	02/10/2000	8.62	NTU
Conductivity	B0XKB1	C3073/ENW-MW3	02/10/2000	1,075	uS/cm
Dissolved Oxygen	B0XKB1	C3073/ENW-MW3	02/10/2000	4.12	mg/L
pH Measurement	B0XKB1	C3073/ENW-MW3	02/10/2000	6.95	pH
Temperature	B0XKB1	C3073/ENW-MW3	02/10/2000	17.5	Deg C
Turbidity	B0XKB1	C3073/ENW-MW3	02/10/2000	4.83	NTU
Conductivity	B0XKB2	C3074/ENW-MW4	02/10/2000	623	uS/cm
Dissolved Oxygen	B0XKB2	C3074/ENW-MW4	02/10/2000	7.01	mg/L
pH Measurement	B0XKB2	C3074/ENW-MW4	02/10/2000	7.3	pH
Temperature	B0XKB2	C3074/ENW-MW4	02/10/2000	16.6	Deg C
Turbidity	B0XKB2	C3074/ENW-MW4	02/10/2000	15	NTU
Conductivity	B0XKB3	C3075/ENW-MW5	02/09/2000	448	uS/cm
Dissolved Oxygen	B0XKB3	C3075/ENW-MW5	02/09/2000	6.99	mg/L
pH Measurement	B0XKB3	C3075/ENW-MW5	02/09/2000	7.74	pH
Temperature	B0XKB3	C3075/ENW-MW5	02/09/2000	17.8	Deg C
Turbidity	B0XKB3	C3075/ENW-MW5	02/09/2000	2.68	NTU
Conductivity	B0XKB4	C3076/ENW-MW6	02/09/2000	689	uS/cm
Dissolved Oxygen	B0XKB4	C3076/ENW-MW6	02/09/2000	4.6	mg/L
pH Measurement	B0XKB4	C3076/ENW-MW6	02/09/2000	7.48	pH
Temperature	B0XKB4	C3076/ENW-MW6	02/09/2000	17.5	Deg C
Turbidity	B0XKB4	C3076/ENW-MW6	02/09/2000	1.39	NTU
Conductivity	B0XKB5	C3077/ENW-MW7	02/15/2000	10	uS/cm
pH Measurement	B0XKB5	C3077/ENW-MW7	02/15/2000	7.29	pH
Temperature	B0XKB5	C3077/ENW-MW7	02/15/2000	13.6	Deg C
Turbidity	B0XKB5	C3077/ENW-MW7	02/15/2000	1.37	NTU
Conductivity	B0XKB6	C3078/ENW-MW8	02/11/2000	520	uS/cm
Dissolved Oxygen	B0XKB6	C3078/ENW-MW8	02/11/2000	7.72	mg/L
pH Measurement	B0XKB6	C3078/ENW-MW8	02/11/2000	7.67	pH
Temperature	B0XKB6	C3078/ENW-MW8	02/11/2000	15.9	Deg C
Turbidity	B0XKB6	C3078/ENW-MW8	02/11/2000	2.29	NTU
Conductivity	B0XKB9	ENW-31	02/08/2000	354	uS/cm
Dissolved Oxygen	B0XKB9	ENW-31	02/08/2000	0.91	mg/L
pH Measurement	B0XKB9	ENW-31	02/08/2000	8.08	pH
Temperature	B0XKB9	ENW-31	02/08/2000	18.2	Deg C
Turbidity	B0XKB9	ENW-31	02/08/2000	1.75	NTU
Conductivity	B0XKC0	ENW-32	02/08/2000	354	uS/cm
Dissolved Oxygen	B0XKC0	ENW-32	02/08/2000	0.18	mg/L
pH Measurement	B0XKC0	ENW-32	02/08/2000	8.08	pH
Temperature	B0XKC0	ENW-32	02/08/2000	17	Deg C
Turbidity	B0XKC0	ENW-32	02/08/2000	0.56	NTU
Conductivity	B0XKB7	C3079/ENW-MW9	02/11/2000	1,179	uS/cm
Dissolved Oxygen	B0XKB7	C3079/ENW-MW9	02/11/2000	7.21	mg/L
pH Measurement	B0XKB7	C3079/ENW-MW9	02/11/2000	7.57	pH
Temperature	B0XKB7	C3079/ENW-MW9	02/11/2000	16.9	Deg C
Turbidity	B0XKB7	C3079/ENW-MW9	02/11/2000	2.27	NTU

Table C.9. Total Activity Parameter Results for 618-11 Burial Ground Investigation, February 2000

Constituent	Sample Number	Well Name	Sample Date	Alpha by Liquid Scintillation Result pCi/mL MDL=.20	Alpha Error by LC %	Lab Qualifier	Beta by Liquid Scintillation Result pCi/mL MDL=.30	Beta Error by LC %	Units
ACTIVITY_SCAN	B0XJW4	699-12-4D	02/07/2000	4.40E-02	1.00E+03	U	1.90E+00	5.00E+01	pCi/L
ACTIVITY_SCAN	B0XJX3	699-13-1A	02/08/2000	3.00E+00	2.50E+01		1.60E+01	1.50E+01	pCi/L
ACTIVITY_SCAN	B0XJX7	699-13-1B	02/08/2000	3.30E+00	2.50E+01		3.10E+00	3.10E+01	pCi/L
ACTIVITY_SCAN	B0XJY1	699-13-1C	02/08/2000	-2.00E-01	2.25E+02	U	1.00E+00	8.50E+01	pCi/L
ACTIVITY_SCAN	B0XJV4	699-13-3A	02/07/2000	5.00E-01	1.10E+02		3.80E+03	1.00E+01	pCi/L
ACTIVITY_SCAN	B0XK68	699-15-15B	02/08/2000	6.00E-01	9.00E+01		1.20E+00	7.00E+01	pCi/L
ACTIVITY_SCAN	B0XK70	699-17-5	02/07/2000	-3.00E-01	1.50E+02	U	7.00E-01	1.00E+01	pCi/L
ACTIVITY_SCAN	B0XK73	699-21-6	02/07/2000	-3.00E-01	1.45E+02	U	1.20E+01	1.50E+01	pCi/L
ACTIVITY_SCAN	B0XK74	699-9-E2	02/10/2000	1.90E+00	3.50E+01		3.00E+00	3.10E+01	pCi/L
ACTIVITY_SCAN	B0XKD3	C3071/ENW-MW1	02/09/2000	1.10E+00	5.20E+01		7.00E+00	2.00E+01	pCi/L
ACTIVITY_SCAN	B0XKD4	C3072/ENW-MW2	02/10/2000	4.00E-01	1.11E+02		2.10E+00	4.20E+01	pCi/L
ACTIVITY_SCAN	B0XKD5	C3073/ENW-MW3	02/10/2000	8.00E-01	6.50E+01		2.00E+00	4.50E+01	pCi/L
ACTIVITY_SCAN	B0XKD6	C3074/ENW-MW4	02/10/2000	5.00E-01	1.01E+02		7.80E+00	2.00E+01	pCi/L
ACTIVITY_SCAN	B0XKD7	C3075/ENW-MW5	02/09/2000	2.10E-02	1.00E+03	U	8.40E+00	2.00E+01	pCi/L
ACTIVITY_SCAN	B0XKD8	C3076/ENW-MW6	02/09/2000	8.00E-01	6.50E+01		3.50E+00	3.00E+01	pCi/L
ACTIVITY_SCAN	B0XKD9	C3077/ ENW-MW7	02/15/2000	-2.00E-01	1.70E+02	U	1.00E+00	8.00E+01	pCi/L
ACTIVITY_SCAN	B0XKF0	C3078/ENW-MW8	02/11/2000	7.00E-01	7.50E+01		1.40E+00	6.00E+01	pCi/L
ACTIVITY_SCAN	B0XKF1	C3079/ENW-MW9	02/11/2000	9.00E-01	6.00E+01		2.60E+00	4.00E+01	pCi/L

(a) U = Result is non-detect.

Appendix D

Quality Control Sample Definitions

Appendix D

Quality Control Sample Definitions

D.1 Field Quality Samples

Equipment Blank (EBL) – A field blank sample that is used to check for sample contamination caused by unclean sampling equipment or the sampling equipment itself. Generally, equipment blanks are only collected at wells that are sampled using non-dedicated pumps. Equipment blanks are prepared by passing Type II reagent water through the pump or manifold after the equipment has been decontaminated (sometimes just prior to sampling a well) and collecting the rinsate in preserved bottles.

Field Duplicate – A replicate sample used to determine the repeatability of the sampling and analytical measurement process by comparing results with an identical sample collected at the same time and location.

Field Transfer Blank – A field blank sample that is used to check for in-the-field sample contamination by volatile organic compounds. Field transfer blanks are prepared near a well sampling site by filling preserved VOA sample bottles with Type II reagent water that has been transported to the field. Field transfer blanks are normally prepared at the same time VOA samples are being collected from the well. After collection, the field transfer blank bottles are sealed and placed in the same sample storage container as the rest of the samples. Field transfer blanks are not removed from the storage container until they have been delivered to the lab.

Full Trip Blank (FTB) – A field blank sample that is used to check for sample contamination resulting from sample bottles, preservatives, and sample storage and handling. Full trip blanks are initially prepared in the laboratory by filling a preserved bottle set with Type II reagent water. After the bottles have been sealed, they are transported to the field in the same storage container that will be used for groundwater samples collected that day. Full trip blanks are not removed from the storage container until they have been delivered to the laboratory.

Split Samples – Replicate samples sequentially collected from the same location and analyzed by different laboratories.

D.2 Laboratory Quality Control Samples

Laboratory Control Sample – A sample of Type II reagent water that is spiked with known amounts of target analyte(s). The sample is extracted (if appropriate) and analyzed to monitor the performance of the analytical method.

Matrix Duplicate – A replicate analysis of a regular (i.e., groundwater) sample. Matrix duplicates and matrix spike duplicates are used to evaluate the precision of an analysis.

Matrix Spikes/Matrix Spike Duplicates – Samples that are prepared by adding known quantities of one or more target analytes to a sample prior to extraction and analysis. Comparison of the original (unspiked) sample and matrix spike results provides information about the suitability of an analysis for the sample matrix. Matrix spike duplicates are replicate matrix spike samples that are used to assess the precision of an analysis.

Method Blank – A sample of Type II reagent water that is prepared in the laboratory, extracted (if appropriate), and analyzed as if it were a regular sample. Method blanks are used to monitor the possible introduction of contaminants during sample preparation and analysis.

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