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Assessment Groundwater Monitoring Plan for Single Shell Tank Waste Management Area B-BX-BY

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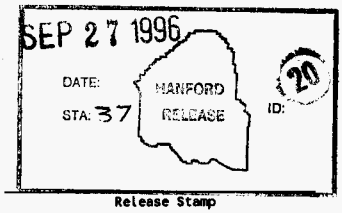
Abstract: Single Shell Tank Waste Management Area B-BX-BY has been placed into groundwater quality assessment monitoring under interim-status regulations. This document presents background and an assessment groundwater monitoring plan to evaluate any impacts of risks/spills from these Single Shell Tanks in WMA B-BX-BY on groundwater quality.



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METRIC CONVERSION CHART

Into metric units

If you know	Multiply by	To get
Length		
inches	25.40	millimeters
inches	2.54	centimeters
feet	0.3048	meters
yards	0.914	meters
miles	1.609	kilometers
Area		
square inches	6.4516	square centimeters
square feet	0.092	square meters
square yards	0.836	square meters
square miles	2.59	square kilometers
acres	0.404	hectares
Mass (weight)		
ounces	28.35	grams
pounds	0.453	kilograms
short ton	0.907	metric ton
Volume		
fluid ounces	29.57	milliliters
quarts	0.95	liters
gallons	3.79	liters
cubic feet	0.03	cubic meters
cubic yards	0.76456	cubic meters
Temperature		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius
Force		
pounds per square inch	6.895	kilopascals

Out of metric units

If you know	Multiply by	To get
Length		
millimeters	0.0393	inches
centimeters	0.393	inches
meters	3.2808	feet
meters	1.09	yards
kilometers	0.62	miles
Area		
square centimeters	0.155	square inches
square meters	10.7639	square feet
square meters	1.20	square yards
square kilometers	0.39	square miles
hectares	2.471	acres
Mass (weight)		
grams	0.0352	ounces
kilograms	2.2046	pounds
metric ton	1.10	short ton
Volume		
milliliters	0.03	fluid ounces
liters	1.057	quarts
liters	0.26	gallons
cubic meters	35.3147	cubic feet
cubic meters	1.308	cubic yards
Temperature		
Celsius	multiply by 9/5ths, then add 32	Fahrenheit
Force		
kilopascals	1.4504×10^{-4}	pounds per square inch

Source: *Engineering Unit Conversions*, M. R. Lindeburg, PE., Second Ed., 1990, Professional Publications, Inc., Belmont, California.

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GROUNDWATER QUALITY ASSESSMENT MONITORING PLAN FOR THE SINGLE-SHELL TANK SYSTEM WASTE MANAGEMENT AREA B-BX-BY

J.A. Caggiano, C.J. Chou, and V.G. Johnson,
Westinghouse Hanford Company

1.0 INTRODUCTION

The groundwater monitoring program conducted for the Single-Shell Tank (SST) System waste management area (WMA) B-BX-BY (Figure 1) will be changed from detection-level monitoring to a groundwater quality assessment program as described in Washington State Department of Ecology (Ecology) *Dangerous Waste Regulations*, Washington Administrative Code (WAC) 173-303-400 [refer to 40 Code of Federal Regulations (CFR) 265 Subpart F] because of elevated specific conductance. The average of quadruplicate measurements of groundwater samples collected on February 6, 1996 from downgradient well 299-E33-32 was 369 micromhos per centimeter, which exceeded the background level of 365.7 micromhos per centimeter for this parameter. Required verification sampling was conducted on June 21, 1996 [40 CFR 265.93 (c)(2)]. Results of the verification sampling (two sets of quadruplicate measurements) averaged 427 micromhos per centimeter thereby confirming that the initial increase statistically was significant. Additionally, nitrate and chloride have more than doubled in this well since the inception of groundwater monitoring in 1990. Nearby downgradient wells do not exhibit a similar pattern. Ecology was notified of the exceedances and that the SST System may be affecting groundwater quality [40 CFR 265.93(d)(1)]. This plan satisfies requirements specified in 40 CFR 265.93(d)(3).

2.0 SCOPE AND OBJECTIVES

The purpose of this document is to present a groundwater quality assessment monitoring plan for the WMA B-BX-BY in accordance with *Resource Conservation and Recovery Act* (RCRA) *of 1976* interim-status regulations (WAC 173-303-400 and 40 CFR 265 Subpart F). The primary objective is to determine if the observed changes in groundwater quality are due to the regulated unit, and if so, identify source(s), driving force(s), and pathway(s) to groundwater so that corrective measures can be taken [40 CFR 265.93(d)(4)]. A two-phased groundwater monitoring program is proposed. The first determination will be focused on a false positive investigation [40 CFR 265.93(d)(5)]. Key to this investigation is the development of a conceptual model. This involves conceptualization of waste migration through the vadose zone to groundwater and is an integral part of the data quality objective (DQO) process.

Based on the results of the first determination, if it is found that no dangerous waste or dangerous waste constituents from the SST System WMA B-BX-BY have entered the groundwater, the site will be reinstated to a detection-level monitoring program [40 CFR 265.93(d)(6)]. If, however, the first determination confirms that the SST System WMA B-BX-BY is the source of contamination or is inconclusive, a second phase assessment program will be

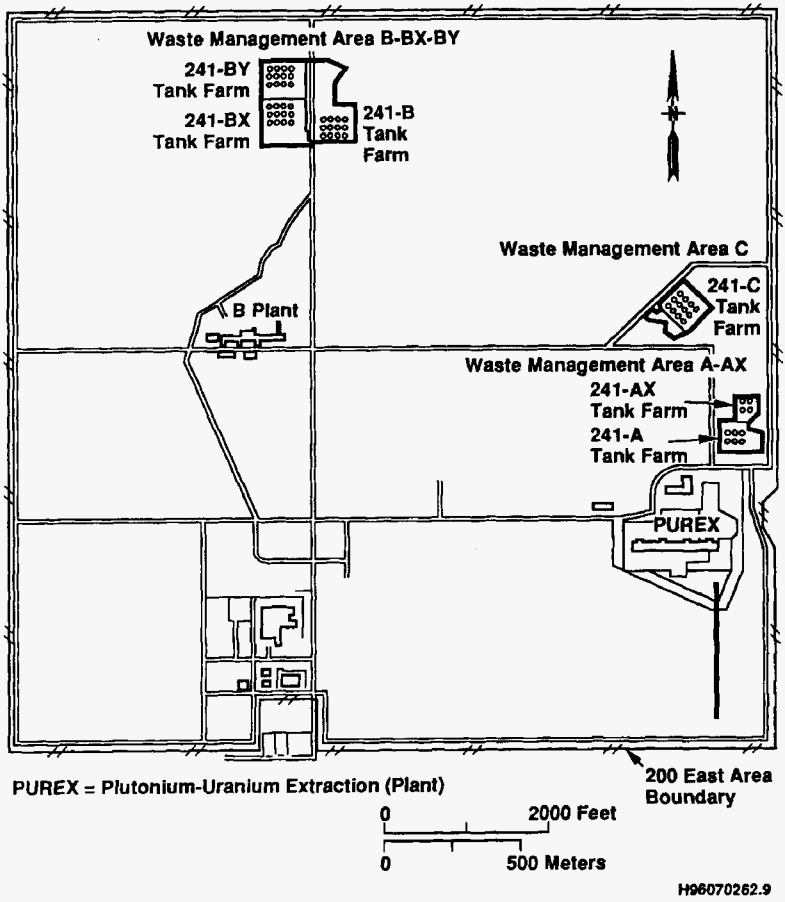

Figure 1. Location Map of Waste Management Area B-BX-BY.

initiated to fully characterize the rate and extent of contaminant migration [40 CFR 265.93(d)(7)]. Any vadose zone investigations will be a part of the more comprehensive vadose zone characterization program being instituted by the Tank Waste Remediation System (TWRS) organization. Figure 2 is a flow chart depicting the sequence of events that illustrates the process adopted for the WMA B-BX-BY groundwater quality assessment plan. Key elements of this plan are discussed in the following sections. Historical background on tank dimensions, construction, waste processing, and tank monitoring for conceptual model development is provided in Appendix A.

3.0 HYDROGEOLOGIC CONDITIONS

Understanding the hydrogeology near the regulated unit is fundamental to interpretation of contaminant sources, subsurface contaminant migration, and plume distribution patterns. Therefore, this section summarizes the existing stratigraphic and hydrologic information relevant to assessing possible contaminant sources and pathways to groundwater beneath the WMA B-BX-BY.

3.1 STRATIGRAPHY

Geology of the 241-B, 241-BX, and 241-BY Tank Farms was first reported by Price and Fecht (1976a, 1976b, 1976c) shortly after the dry well boreholes were completed in the 1970s. Drilling logs are available for many of these boreholes, but the level of detail is inadequate to make current stratigraphic interpretations. Geology and hydrogeology of WMA B-BX-BY are discussed in the groundwater monitoring plan (Caggiano and Goodwin 1991). Geology also has been described for the adjoining 200-BP-1 operable unit (the 216-BY cribs located north of the 241-BY Tank Farm) (Hoffman 1992).

The major stratigraphic units of the suprabasalt unconfined aquifer present beneath WMA B-BX-BY are three facies of the Hanford formation: the lower gravel, sand, and upper gravel units (in ascending order). Some undifferentiated Ringold gravel could be present beneath the southern part of WMA B-BX-BY (Lindsey 1992).

Three units of the Hanford formation are present: an upper coarse unit, a middle fine to medium-grained sandy unit, and a lower coarse unit. Both the upper and lower coarse units consist of pebble and cobble gravel with interbedded plane bedded to planar cross-bedded medium to coarse, basaltic sand. In places, the gravel could be openwork and clast supported, while elsewhere the clasts occur in a matrix of medium to coarse basaltic sand. The sandy sequence consists mostly of plane to planar cross-bedded medium to coarse sand, with some fine sand and silt present as thin laminae or lenses. Clasts could be present as isolated pebbles or as pebbly sandy units or sandy gravels much like the overlying and underlying gravel sequences. These units rest directly atop the Elephant Mountain member and generally thicken toward the south into the Cold Creek Syncline. Basalt was reached at a depth of 255 and 252 feet in RCRA groundwater monitoring wells 299-E33-31 and 299-E33-33, located west and east of WMA B-BX-BY, respectively.

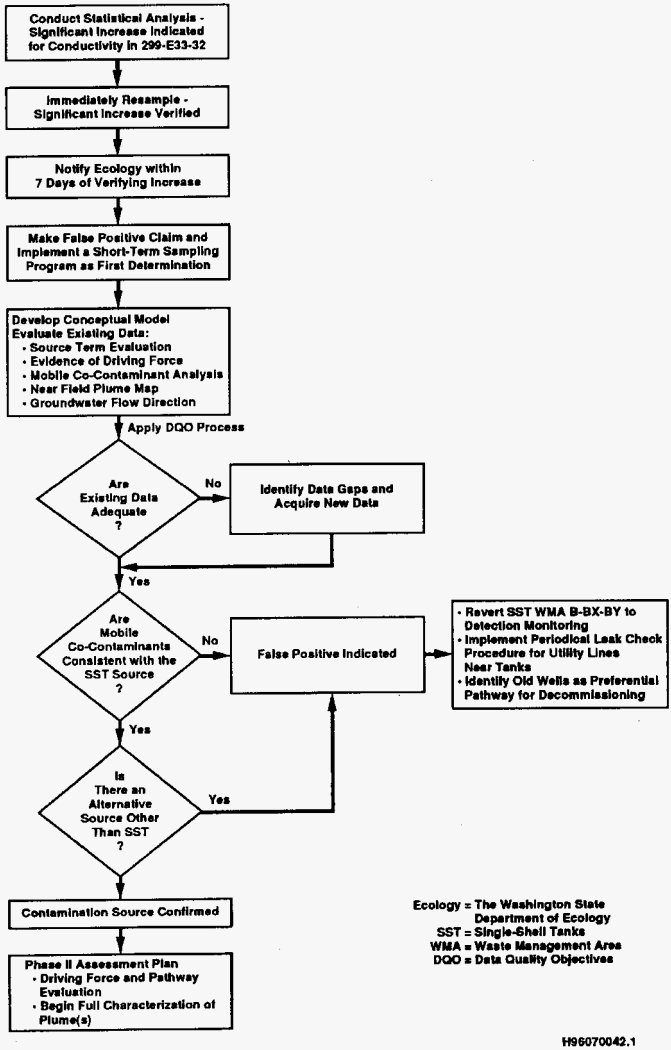

Figure 2. Flow Chart for Phase I Groundwater Quality Assessment Monitoring Program.

Basalt was reached at 238 and 229 feet below ground in well 299-E33-38 and 299-E33-39 (respectively), reflecting the general southward dip of the Elephant Mountain member of Columbia River Basalt toward the axis of the Cold Creek Syncline. The thickness of suprabasalt sediments generally increases to the south toward the axis of the Cold Creek Syncline. North-south and east-west cross-sections beneath WMA B-BX-BY are shown on Figure 3.

Backfill is a mix of Hanford formation coarse and fine sandy units that is a slightly silty medium to coarse sand and gravel from which the larger clasts were removed before placing back in the excavation. The backfill was placed in 4-foot lifts, so some compaction occurred during construction with the movement of vehicles and equipment across the existing surface. No concerted effort was made to compact the fill, which is about 39 to 42 feet thick (the base of the tanks) in the 241-B and 241-BX Tank Farms and about 49 feet thick beneath the 241-BY Tank Farm.

Clastic Dikes as Preferential Pathways. Clastic dikes are common in the Hanford formation and are generally 6 to 16 inches wide. Clastic dikes were detected but not mapped in drilling dry well boreholes in the 241-B, 241-BX, and 241-BY Tank Farms (Price and Fecht 1976a, 1976b, 1976c). Clastic dikes commonly have exterior margins of thin (less than 0.25 inch) clayey silt (locally termed clay skins). There could be several laminae of similar texture and composition within the interior of a dike. Within any one dike, strata could be well sorted and continuous while others are discontinuous. Delicate sedimentary structures could be present in some, while others contain more massive bedding. The vertical and lateral variation in grain size and strata within a dike can be abrupt and extreme. From any one dike, smaller dikes and/or sills can branch. Clastic dikes were mapped recently in the excavation for the Environmental Restoration Disposal Facility in sandy units of the Hanford formation (Fecht and Weekes 1996). Clastic dikes also have been observed in the excavation for disposal vaults of the Grout Treatment Facility east of the PUREX Facility in the 200 East Area. Clastic dikes also have been observed in the excavation for WMA 2 of the Low-Level Burial Grounds (trench 94 of the 218-E-12B Burial Ground) in the northeast corner of the 200 East Area.

The mechanism(s) of formation of clastic dikes is not well known, but is likely some form of soft-sediment deformation attributable to liquefaction in rapidly deposited sediments. Rapid sedimentation in hydraulically dammed water north of Wallula Gap likely represents the conditions of deposition responsible for the formation of the dikes.

Where clastic dikes intersect the ground surface, they form patterned ground that can be recognized from aerial photographs as zones of more intense vegetation (presumably because of greater water retention capacity than the surrounding 'host rock'). Fecht and others (1994) have found a relationship between the size of the clastic dikes and the diameter of the polygons that

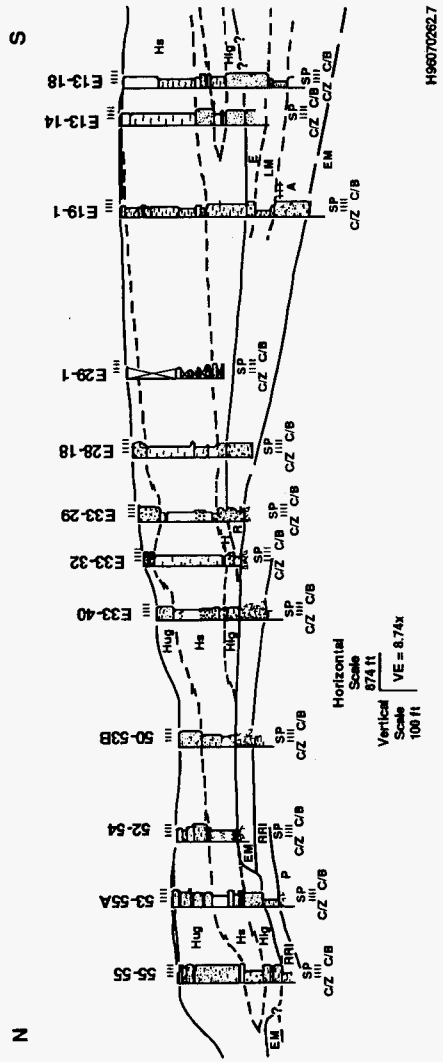

Figure 3a. North-South Geologic Cross-Sections Beneath Waste Management Area B-BX-BY.

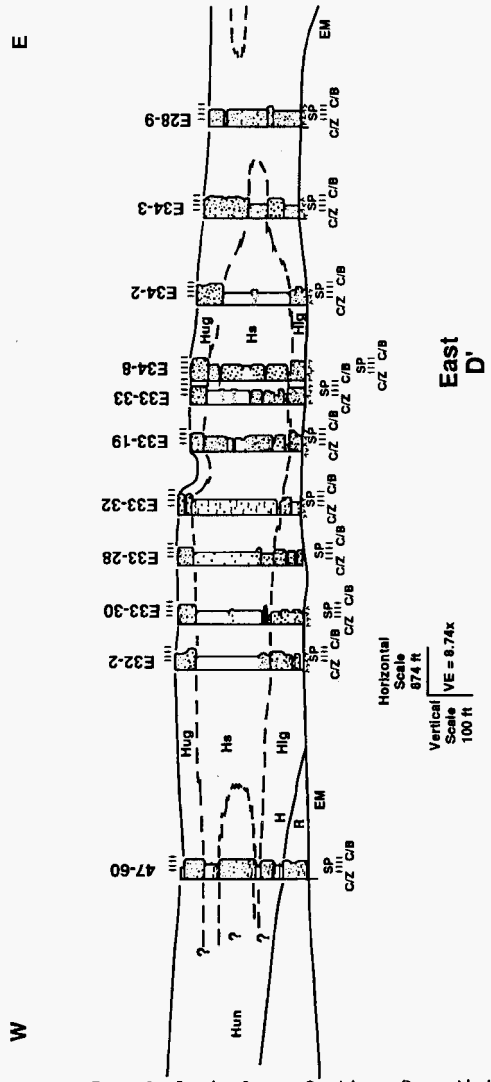

Figure 3b. West-East Geologic Cross-Sections Beneath Waste Management Area B-BX-BY.

these form. The clastic dikes in WMA B-BX-BY generally are not exposed, but can be of a width that the polygons formed are on the order of 50 to 90 feet in diameter. Considering that the SSTs in WMA B-BX-BY are 75-foot diameter with 100 feet between adjacent tank centers, it is highly likely that several clastic dikes are intercepted by tanks or dry wells within WMA B-BX-BY and could serve as preferential pathways to influence both lateral and vertical movement of liquids and contaminants. Clastic dikes could intersect the bottom and sides of the excavation for the tanks, could intersect the bottom of a tank or lateral lines beneath a tank, could intersect various other structures within the farm that could release liquids, or could intercept one of numerous unsealed boreholes or partially sealed groundwater monitoring wells within WMA B-BX-BY.

Clastic dikes can have a significant effect on the movement of liquids and thus the transport of contaminants. If liquid is added directly above a clastic dike, the 'clay skins' could restrict and confine infiltration to the width of the dike, thereby preferentially enhancing vertical transport. If liquid impinges laterally on a dike, fluids could be 'dammed' temporarily before the clay skin becomes saturated to permit infiltration into the interior of a dike. Varying grain sizes of units and bedding within could further influence the movement of liquids within a dike.

3.2 HYDROLOGY

Groundwater movement beneath WMA B-BX-BY is influenced by both historical discharges and water table gradients in the immediate area and by the hydrogeology of the aquifer.

3.2.1 Water Levels

The water table occurs in the lower coarse unit of the Hanford formation at a depth that varies from about 239 to 261 feet below ground surface (water table elevation is about 400 feet above sea level). With the decline of the water table beneath WMA B-BX-BY (Caggiano 1996), the saturated zone above basalt slowly is diminishing. The saturated thickness of the suprabasalt aquifer generally is less than 10 feet in most of WMA B-BX-BY.

3.2.2 Groundwater Flow Direction

The WMA B-BX-BY is located in an area of very low hydraulic gradient between the water table mound beneath 216-B-3 Pond and eastward moving water from the 200 West Area (Serkowski et al. 1996). The B Pond System (216-B-3 Pond and three smaller lobes) received about 250,000,000 gallons of liquid effluent from 1945 to 1995. By 1960, this resulted in a rise of about 35 feet in the water table elevation from the pre-Hanford Site water table. This water table mound caused eastward flowing groundwater following the regional gradient to divert around the areas with higher hydraulic head and resulted in radial flow out from the apex of the mound. The B Pond water table mound has controlled the direction of groundwater flow in the suprabasalt aquifer beneath WMA B-BX-BY since the inception of PUREX Facility

operations in 1956. Before the rapid buildup of the water table mound beneath B Pond, groundwater flow in the suprabasalt aquifer from the northern part of the 200 East Area was to the southeast towards the PUREX Facility. The large volume of liquid effluent disposed to the 216-BY cribs and the low volume of liquid effluent discharged to B Pond before the startup of the PUREX Facility accounts for this early 1950s groundwater flow direction. With the development and expansion of the water table mound and the rise of the water table, groundwater was able to flow north across subsurface ridges in the basalt such that contaminants in the suprabasalt aquifer from the 216-BY cribs have migrated north toward Gable Gap (e.g., Serkowski and Jordan 1989; Serkowski et al. 1988). However, for any high density waste that might sink to the base of the suprabasalt aquifer, transport to the south might have occurred as the basalt surface and the Elephant Mountain member dip southward into the axis of the Cold Creek Syncline.

The elevation of the water table has continued to decline beneath the 200 East Area because discharges to cribs, unlined trenches, and B Pond have decreased. All liquid effluent discharges to the ground ceased in June 1995 except for facilities that were granted operating permits by Ecology. The decline and shrinkage of the B Pond mound has lowered the hydraulic head beneath WMA B-BX-BY resulting in a nearly flat water table and an uncertain present direction of groundwater flow (refer to Section 4.1).

3.3.3 Aquifer Communication

North of the 200 East Area, two wells (699-55-55 and 699-53-55) have passed from the Hanford formation directly into the Rattlesnake Ridge interbed. The Elephant Mountain member (of the Columbia River Basalt) that usually is the base of the suprabasalt aquifer in the 200 East Area and separates the Hanford formation from the Rattlesnake Ridge member is absent (Hoffman 1992). The extent of this window is unknown, but hydraulic communication between the Rattlesnake Ridge and the suprabasalt aquifer occurs in this area of stratigraphic superposition. The bottom of the uppermost aquifer in this window through the Elephant Mountain member is the Pomona member--the flow below the Rattlesnake Ridge interbed. Whether the exchange of groundwater is upward from the Rattlesnake Ridge to the Hanford formation or vice versa is a function of the difference in the hydraulic head between the two aquifers. Water will move from areas of higher hydraulic head to lower head. Except in the area of the B Pond mound, the head in the Rattlesnake Ridge typically is higher than in the suprabasalt aquifer and is likely to remain so with a continually declining water table beneath WMA B-BX-BY. However, as discussed previously, contaminants generated on the Hanford Site have been found in the Rattlesnake Ridge in well 299-E33-12 (completed in the Rattlesnake Ridge member), suggesting that communication between the suprabasalt and Rattlesnake Ridge aquifer has occurred in the past, perhaps only as a result of this poorly sealed well.

4.0 DESCRIPTION OF DETECTION MONITORING SYSTEM

This section describes the detection monitoring system for the RCRA groundwater monitoring program. Historic surveillance conducted to monitor the integrity of the SST System is described in Appendix A.

4.1 WELL NETWORK

Seven RCRA wells constitute the monitoring network for WMA B-BX-BY (Figure 4): two wells installed as upgradient wells (299-E33-33 and 299-E33-36) and five wells installed as downgradient wells (299-E33-31, 299-E33-32, 299-E33-42, 299-E33-43 and 299-E33-41). With the present uncertainty of groundwater flow direction, these "upgradient" and "downgradient" designations remain enigmatic. Well 299-E33-41 is located within WMA B-BX-BY east of the perimeter fence of the 241-BX Tank Farm. The other four wells are located along the western perimeter fence of the 241-BX and 241-BY Tank Farms. In addition, two wells (299-E33-38 and 299-E33-39), north and northeast of WMA B-BX-BY constructed to WAC 173-160 specifications during investigations for the 200-BP-1 operable unit, are used for supplemental sampling and water level information. The RCRA well as-built diagrams are provided in Appendix B. These wells were constructed between 1989 and 1991 in accordance with the original groundwater monitoring plan for the SST System (Jensen et al. 1989), its revision (Caggiano and Goodwin 1991), or the remedial investigation/feasibility study work plan for the 200-BP-1 operable unit. All post-1986 wells were constructed using cable tool methods and were completed as 4-inch diameter wells with stainless steel casing and screens, filter pack, full annular (bentonite crumbles) and surface seals (Caggiano 1992; 1993). All RCRA wells comply with construction specifications in WAC 173-160. All wells have a 20-foot screen, the bottom of which is at or close to the top of basalt. All wells were located outside the perimeter fences of tank farms and at least 100 feet from the nearest tank by agreement with Ecology to prevent the driving of contaminants deeper into the vadose zone during well construction.

Several older carbon steel wells are located within and around WMA B-BX-BY (refer to Figure 4). These wells were constructed of carbon steel casing that is perforated over different lengths within the uppermost aquifer. Many of the older wells were constructed adjacent to cribs and were used to monitor these facilities. These older wells can be used to supplement data from RCRA wells, but cannot be used to sample for dangerous constituents per the policy on existing wells jointly issued by EPA and Ecology in July 1990. Regulatory decisions regarding these sites must be based on sampling of dangerous constituents from RCRA-compliant wells. A fitness-for-use evaluation will be made of some of these older wells to test their suitability for use in an expanded groundwater monitoring network under assessment monitoring status.

Three of the older wells are located within the perimeter fences of WMA B-BX-BY: 299-E33-9 is adjacent to the 241-BY-102 tank; 299-E33-27 is adjacent to the 241-BX-102 tank; 299-E33-18 is adjacent to and north of the 200-series tanks in the 241-B Tank Farm. Wells 299-E33-19 and 299-E33-20 are

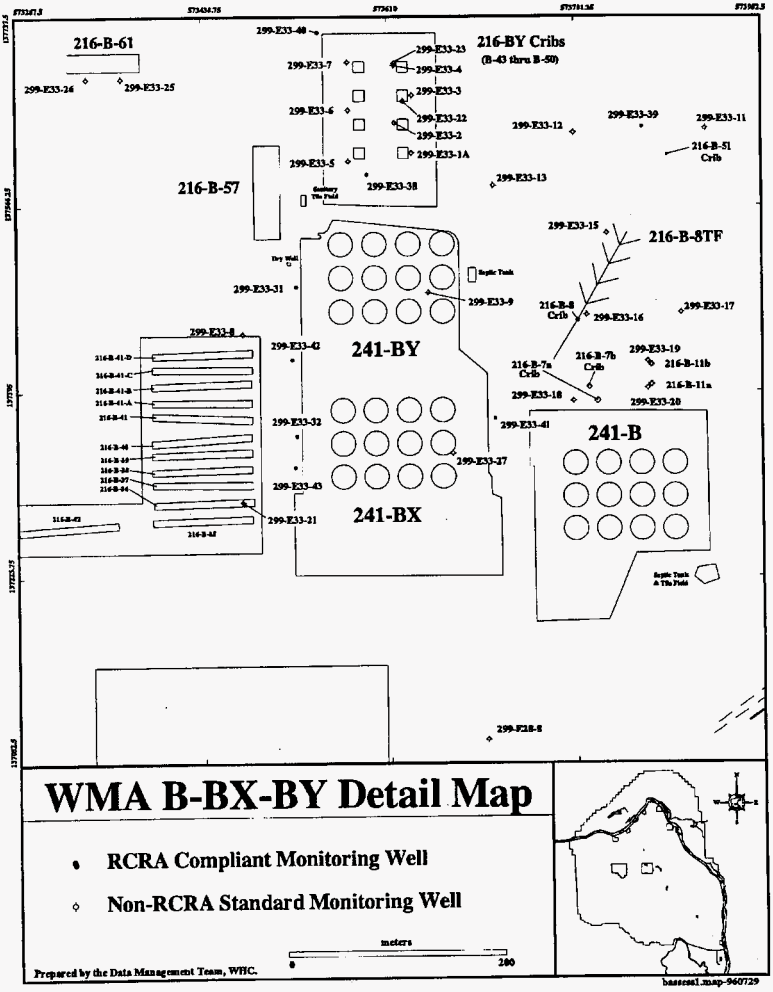

Figure 4. Map of Groundwater Monitoring Wells Around Waste Management Area B-BX-BY.

located north of the 241-B Tank Farm and were constructed to monitor the nearby 216-B-11A and B reverse wells. Other older wells are located north and west of WMA B-BX-BY and were constructed to monitor nearby cribs and trenches (refer to Figure 4), such as the 216-BY cribs (200 BP-1) that are located north of the 241-BY Tank Farm. One well worthy of note is well 299-E33-12, an 8-inch well drilled in 1953 to the Rattlesnake Ridge interbed, with the screen actually landing in what appeared to be the flow top of the Pomona member of Columbia River Basalt.

The RCRA groundwater monitoring network was designed in 1989 for a west to west northwest direction of groundwater flow in the suprabasalt aquifer. The MEMO indicates that the efficiency of the network is about 85 to 88 percent for a west to west northwest direction of groundwater flow (Caggiano and Goodwin 1991, p. 104). Hydrographs of RCRA wells (Figure 5) indicated that well 299-E33-33 has had a higher hydraulic head than those on the west side of WMA B-BX-BY and was the upgradient well when the network was designed and installed. The decline and shrinkage of the B Pond mound has lowered the hydraulic head beneath WMA B-BX-BY resulting in a nearly flat water table and an uncertain present direction of groundwater flow. Figure 5 also shows the long-term trend in water levels near WMA B-BX-BY. The rapid increase in the late 50's and early 60's followed by a moderate decline in the early 70's was attributed to PUREX Facility operations from 1955 through 1971. The return to higher water levels in the mid 80's was due to resumption of fuel reprocessing at the PUREX Facility in 1983 that continued until 1989. The significance is that the mound created by waste water discharges to PUREX Facility cribs and B Pond has persisted for 35 years and probably has sustained an overall flow reversal (west-to-east to southeast-to-northwest) over this period. The steep decline in recent years, however, could be causing a shift in flow direction.

Borehole flow meter measurements in 1995 in several wells (including 299-E33-31, a WMA B-BX-BY downgradient well) in 200-BP-1 (located north of WMA B-BX-BY) indicate that groundwater flow now appears to be more to the south to southwest. However, the water table beneath 200 East Area is extremely flat. The measured difference in hydraulic head between wells 299-E33-33 and 299-E33-31 in February 1996 was 0.03 foot. These two wells are about 1,950 feet apart. The maximum difference in hydraulic head among all wells in the network for February 1996 is 0.75 foot, well within the combined measurement errors for all the variables involved in depth to water measurements. A new simultaneous geodetic survey of all wells has been requested because different dates, field crews, and bench marks were used to obtain the present surveyed elevations of these wells.

4.2 SUMMARY OF RCRA SAMPLING AND ANALYSIS RESULTS

Required quarterly sampling for drinking water standards (DWS), water quality parameters, general contamination indicator parameters, and site-specific constituents was completed in 1992. Semi-annual sampling in accordance with the groundwater monitoring plan has been conducted since 1992.

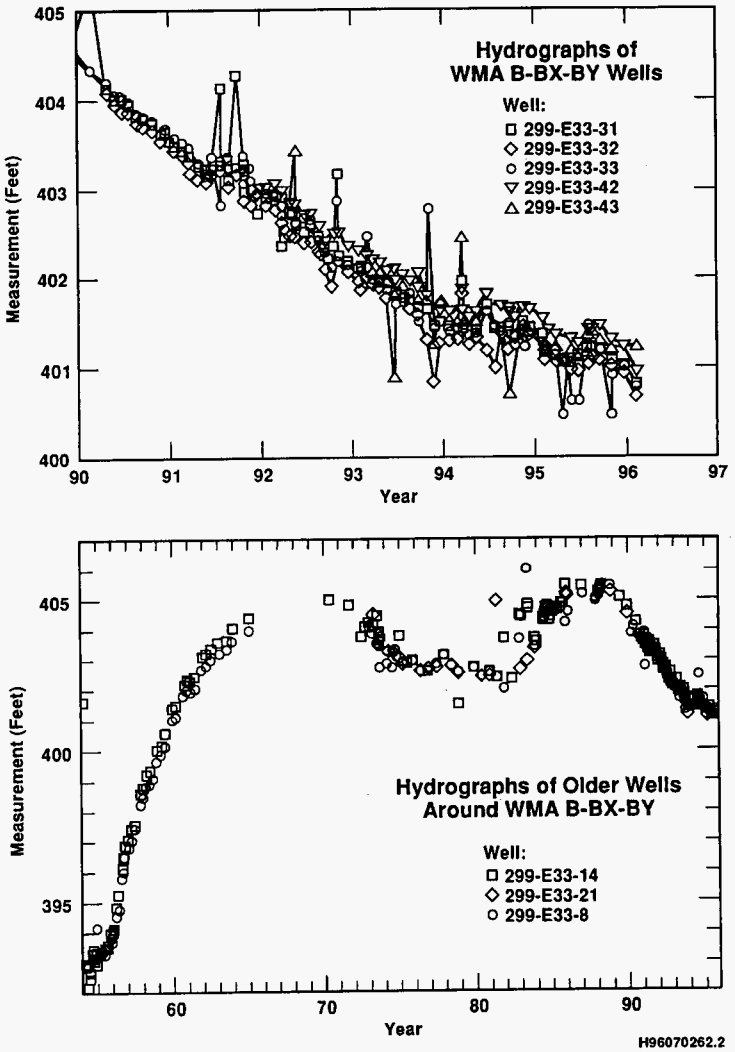

Figure 5. Hydrographs of RCRA and Older Wells Around Waste Management Area B-BX-BY.

The only exceedance of a DWS at WMA B-BX-BY has been a single value of 1,000 picocuries per liter for technetium-99 in well 299-E33-31 in early 1993, which appears to be an outlier. All other results for this isotope are 500 picocuries per liter or below in this and other wells. Radioisotopes that were a characteristic of the waste disposed to WMA B-BX-BY (e.g., cesium-137, strontium-90, cobalt-60, hydrogen-3) are below regulatory limits and barely above detection limits except for tritium. The exceedance of the critical mean for specific conductance in well 299-E33-32 in February 1996 appears to be caused by a steady increase in nitrate and chloride in this well. Since the inception of monitoring in this well in 1990, chloride has risen from 4,200 parts per billion in 1990 to 10,000 parts per billion in February 1996, while nitrate has risen from 8,200 parts per billion in 1990 to 29,000 parts per billion in 1996. Chloride also has been on the rise in nearby well 299-E33-43, but nitrate has not been increasing. Nitrate has not exceeded the DWS of 45,000 parts per billion in any well in WMA B-BX-BY. Technetium-99 also has risen during the period 1990 to 1996 from about 20 picocuries per liter to over 200 picocuries per liter in well 299-E33-32. Time series plots of selected constituents are shown on Figures 6 and 7. Variation of field specific conductance with time is shown in Figure 8. Map of boreholes surrounding tanks in 241-BY Tank Farm is shown in Figure 9.

4.3 NON-RCRA GROUNDWATER MONITORING

A jointly issued policy by Ecology and the EPA in July 1990 restricts groundwater sampling for regulatory decisions regarding dangerous waste constituents to wells that comply with construction specifications in WAC 173-160. Older wells that do not comply with these specifications could be used to collect supplemental information (e.g., water levels, radionuclides). Four older wells are present within and close to WMA B-BX-BY. Well 299-E33-9 was drilled adjacent to the BY-102 tank in 1949 to a depth of 275 feet (top of basalt). The well was modified in 1978 with the installation of a partial annular seal and, presumably at that time, placement of a grout plug from 261 to 275 feet. This well has been monitored as dry well 22-02-07 as part of the gross gamma surveillance program by the Tank Waste Remediation System organization and its predecessors but was not logged by RUST because of high radiation exceeding conditions of the Radiation Work Permit.

Groundwater monitoring data for well 299-E33-9 date back to 1956 and show extremely high values for gross beta (multiple values exceeding 1,000,000 picocuries per liter regularly between November 1956 and early 1957, with values regularly exceeding 500,000 picocuries per liter through 1959). Values for nitrate, cobalt-60, and sodium also are very high for this same period. Strontium-90 values are up to 260 and 200 picocuries per liter (multiple values of 200 picocuries per liter for strontium-90 indicate this is a detection limit). Single values for strontium-90 for three other older wells at this time range up to 25,000 picocuries per liter, but this validity could not be substantiated. Ruthenium-106 was not analyzed in samples from this well before 1978. Technetium-99 was not analyzed before 1986, but the very high values for gross beta and relatively low strontium-90 and ruthenium-106 suggest that technetium-99 might have been a significant contributor (as well as cobalt-60) to the high gross beta values. Spectral gamma logging in dry wells in the 241-BY Tank Farm indicate the presence of

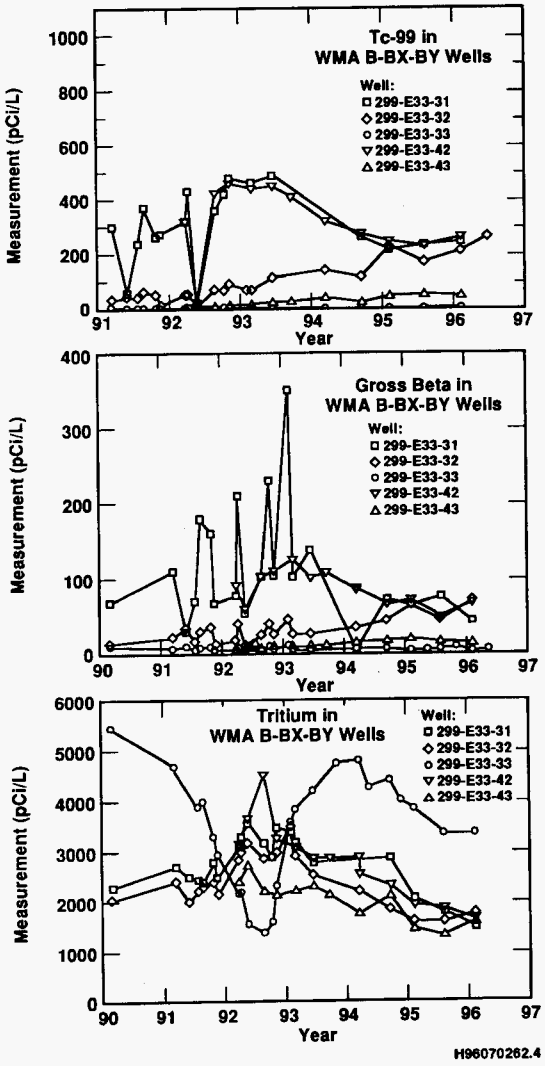

Figure 6. Time Series Plot of Selected Radionuclides for Waste Management Area B-BX-BY.

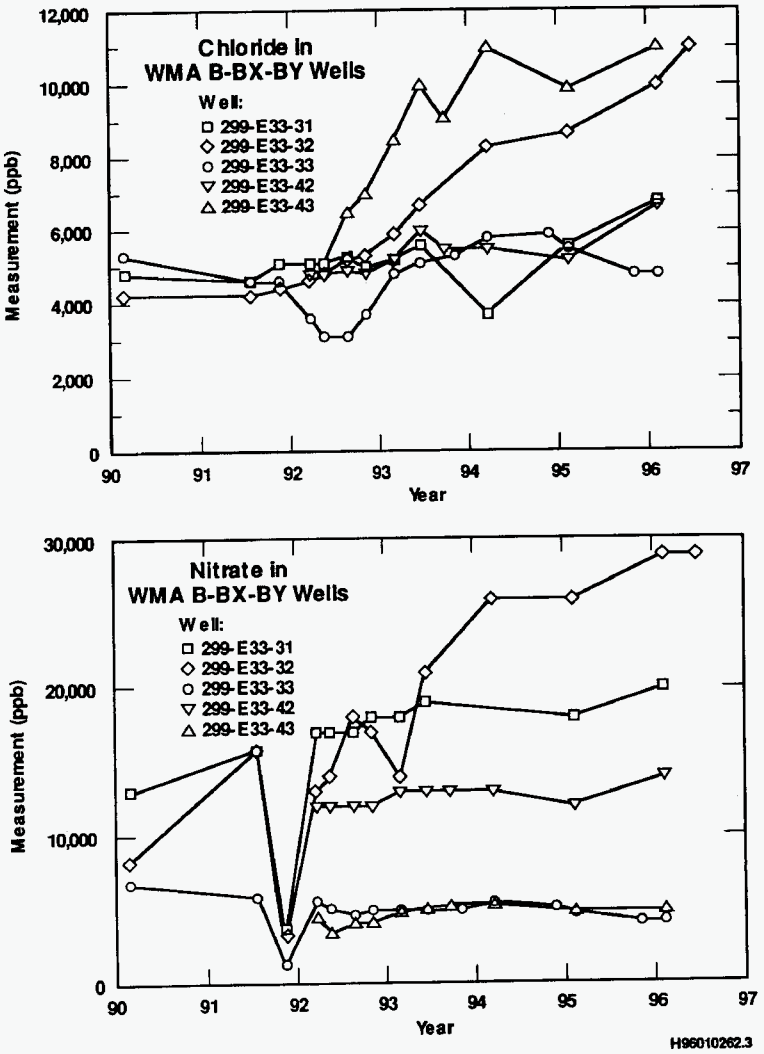

Figure 7. Time Series Plot of Selected Constituents for Waste Management Area B-BX-BY.

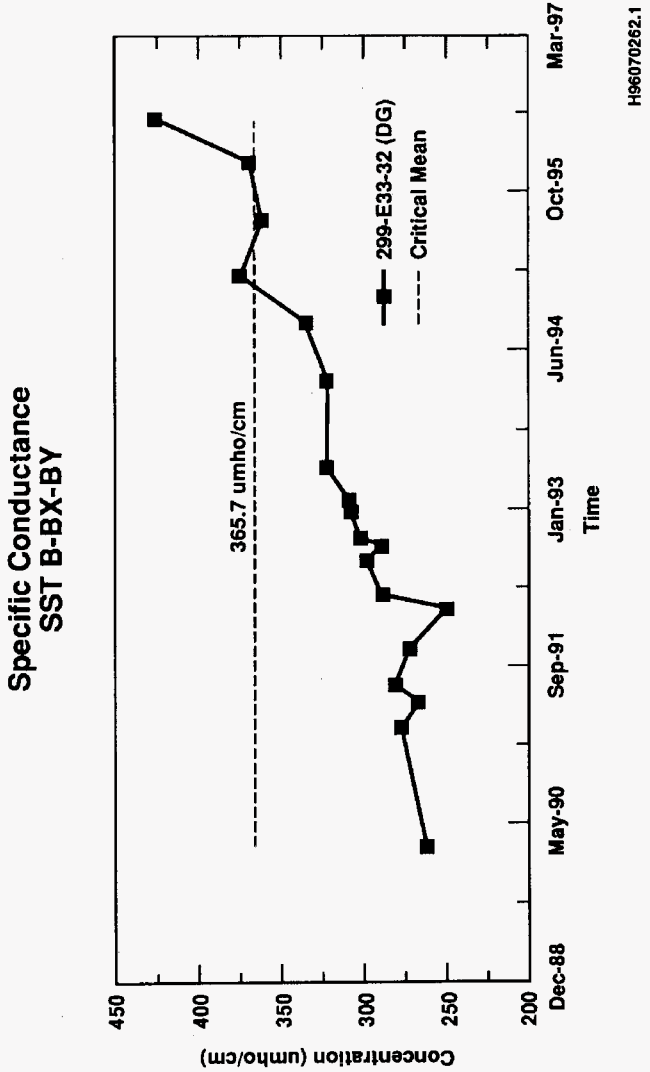

Figure 8. Time Series Plot of Specific Conductance for Waste Management Area B-BX-BY.

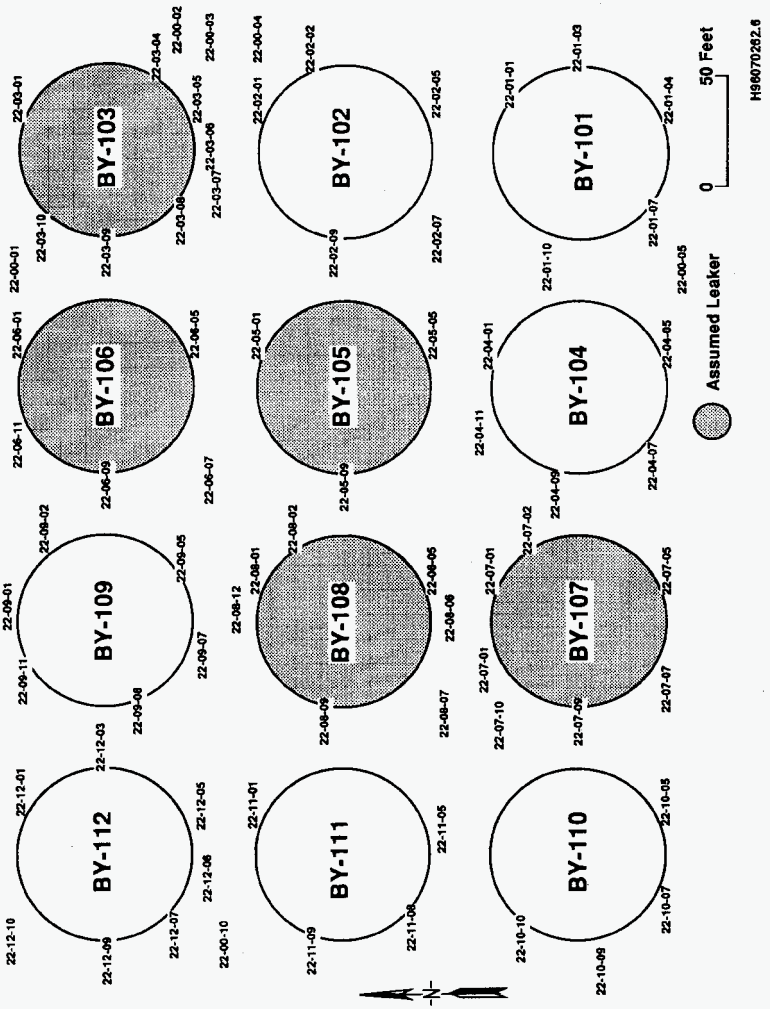

Figure 9. Map of Boreholes Surrounding Tanks in 241-BY Tank Farm.

antimony-125 in the soils, which might also contribute to the gross beta results (antimony-125 was not analyzed in groundwater samples in the 1950s). The BY-102 tank is classified as a sound tank; it is clear that waste that escaped containment was clearly getting to groundwater from some unspecified source. However, because the bottom of this well is at the top of basalt, the waste could have been part of a high salt discharge (with a density greater than 1.0) that migrated along the southward-dipping basalt from some location to the north, such as the 216-BY cribs that were active at this time.

Well 299-E33-27 was constructed in 1970 to a depth of 265 feet using 6-inch diameter casing and cable tool drilling methods. The well was drilled through the area where the plume of waste leaked from the adjacent 241-BX-102 tank in 1971 and was unsealed until 1976. An estimated 30,000 to 90,000 gallon spill between the 241-BX-102 and 241-BX-103 tanks occurred in 1951 (Womack and Larkin 1971), and this well might have been drilled through at least a part of the contaminated soil remaining from that spill. The driller's notes report contamination was encountered during drilling from 214 to 254 feet, with a maximum of 10,000 counts per minute at 214 feet. Contamination decreased with depth, suggesting that at least some contamination was smeared downward (there was no sealing and downsizing of the casing string proceeding through the contaminated zone). The well was remediated with installation of a 4-inch casing in 1976, at which time the 6-inch casing was perforated and cement grout was emplaced. Groundwater samples taken from this well in 1971 showed 34,000 and 36,000 picocuries per liter gross beta and continued above 1,000 picocuries per liter through at least 1983. Analyses for cesium-137 in 1972 reached 8,000 picocuries per liter and were about 7,000 picocuries per liter in 1977. Womack and Larkin (1971) report that cesium-137 activity was higher in groundwater when sampled in 1971, but below the then established (and unspecified) Atomic Energy Commission release limit. However, the value for cesium-137 was higher in this well than in groundwater from wells monitoring the BY cribs to the north. It was concluded that the cesium-137 in groundwater beneath the BX-102 tank likely was carried to groundwater by drilling through contaminated sediments in the vadose zone. The few ruthenium-106 values obtained from this well are below 200 picocuries per liter for the period 1977 to 1983. Several values of tritium in the period 1978 to 1983 exceeded 30,000 picocuries per liter, with a peak of 48,000 picocuries per liter in 1983.

Waste from WMA B-BX-BY and/or surrounding cribs and trenches clearly had reached groundwater by the early 1970s. Womack and Larkin (1971) reported that breakthrough to groundwater had occurred in 1957 and 1959, presumably referring to the 216-BY cribs north of WMA B-BX-BY, but perhaps also to the 216-B-35 through 216-B-42 specific retention trenches west of WMA B-BX-BY.

A pair of wells completed in the Rattlesnake Ridge interbed provide conflicting results that illustrate the possible effects of poorly sealed wells. Well 299-E33-12 was completed in the Rattlesnake Ridge aquifer in 1953 and was not adequately sealed. Well 299-E33-40 was completed into the Rattlesnake Ridge aquifer in 1991 and was sealed. Analysis of groundwater samples from 299-E33-40 reveal essentially no contamination; data from 299-E33-12 reveal significant contamination suggesting that the well was poorly sealed and served as a pathway at a time when uranium scavenging and use of the 216-BY cribs was in full swing. Gross beta above

60,000,000 picocuries per liter, cobalt-60 up to 450,000 picocuries per liter and nitrate approaching 6,000,000 parts per billion in 1957 to 58 provide clear evidence of anthropogenic contaminants reaching the Rattlesnake Ridge during the operational history of WMA B-BX-BY. Data for the period 1991 to present for gross beta, technetium-99, nitrate, and sodium provide clear evidence that contamination still exists in well 299-E33-12, but not in well 299-E33-40. The implication is that contamination is not widespread in the Rattlesnake Ridge and that the poorly sealed well 299-E33-12 provided a preferential pathway that led to local contamination of the Rattlesnake Ridge. However, hydraulic communication between the suprabasalt aquifer and the Rattlesnake Ridge exists to the north of the 200 East Area, suggesting other possible scenarios for contamination reaching the Rattlesnake Ridge.

5.0 GROUNDWATER QUALITY ASSESSMENT PROGRAM

A two-phased program of investigation is proposed. Initially, Phase I investigations (3 to 6 months) will focus on whether the elevated conductivity could be a 'false positive'; i.e., the constituents causing elevated conductivity are not coming from the regulated unit. If the SSTs are the cause of groundwater contamination or the source is indeterminate and could be the SSTs, a Phase II assessment monitoring program to fully characterize the plume(s) will commence. Because Phase II investigations will be contingent on the outcome of Phase I activities, a separate Phase II assessment monitoring plan will be prepared. Phase II investigations would target the identification of pathways and sources of fluid as driving forces of contaminants to groundwater. The overall objectives of the Phase I investigation are as follows:

- Substantiate or negate the false positive claim
- Implement near-term corrective measures as needed.

Descriptions of proposed activities to accomplish the Phase I objectives are discussed in the following sections.

5.1 CONCEPTUAL MODEL

A conceptual model of hypothetical pathways and driving forces that would be required to account for the occurrence of tank farm related constituents in groundwater will be developed as the first step in the Phase I investigation. This is also the initial activity required for applying the DQO process. For this purpose, the conceptual model for the WMA S-SX (Caggiano et al. 1996) will be modified as necessary to accommodate different source term characteristics and hydrogeologic conditions at WMA B-BX-BY.

5.2 EVALUATION OF EXISTING DATA

As indicated in Figure 2, existing data will be reviewed to determine if information is adequate for a first determination to support the false

positive claim. Specific data and information that will be required and evaluated for this purpose are as follows.

Driving Force Evaluation. Possible driving forces that could account for the occurrence of tank farm constituents in groundwater will be evaluated. This will consist of first reviewing the status of water distribution lines near the SST's to ensure there are no potential sources of water in or adjacent to the SST's. Proximity of water lines to adjacent cribs and trenches will be noted as well. If active water lines are identified, the water purveyor will be contacted and alternatives will be explored for either rerouting or eliminating this potential driving force. Other sources of water include enhanced natural infiltration due to cover type and depressions or other topographic features. Such conditions will be noted and mapped to the extent possible. Based on this review, the solute transport modeling performed for the WMA S-SX assessment plan could be modified to accommodate differing conditions at WMA B-BX-BY.

The information from this task will be used to assess the likelihood that tank waste constituents in the soil column could reach groundwater at a rate and over a period consistent with the observed trend in co-contaminants in downgradient monitoring wells.

Source Term. Evaluation of waste composition based on available SST System sampling results and on process chemical knowledge will be conducted to identify the most likely mobile constituents that potentially could migrate to groundwater from a tank leak. The source term will be evaluated by reviewing available data on discharges (dates, volumes, constituents) to SSTs in WMA B-BX-BY and to cribs, trenches, reverse wells, and french drains surrounding WMA B-BX-BY. Waste handling and treatment processes for tanked versus cribbed waste (especially any fractionation of the waste into components that were discharged to different types of facilities) will be reviewed and evaluated.

Mobile Co-contaminant Analysis. Co-contaminant ratios for SST waste, as identified in the source term evaluation, will be compared with observed ratios in groundwater. Concordance between source term ratios and ratios observed in groundwater would indicate there is a tank farm source (or an adjacent crib source that intentionally received liquid waste from the tank farm). The ratios $^{99}Tc/U$ and $^{3}H/^{99}Tc$ have been used to indicate that two contaminant populations (one from cribs and another from tanks) are present in groundwater at WMA S-SX and these approximate fractionated components of the waste that leaked or was discharged to soils (Caggiano et al. 1996). Similar analyses will be performed for WMA B-BX-BY to determine whether different populations of groundwater contaminants could be present and whether these can be attributed to different sources.

Near Field Plume Maps. Areal contaminant distribution patterns will be evaluated in the vicinity of the tank farms. Available groundwater data will be contoured to produce plume maps to the extent possible. Plume maps might provide clues to groundwater flow direction/source relationships and if there is evidence of more than one plume source. For example, there are some trends apparent in a few constituents (specific conductance, nitrate, chloride, technetium-99) in downgradient wells 299-E33-32 and 299-E33-43 that are not present in other downgradient wells at WMA B-BX-BY. These differences imply

that different contaminant populations might be present and that a contaminant plume from a localized unknown source might be impinging on these wells. This information could be used to either reject the tank farm as the source or to identify alternate sources such as adjacent cribs. However, if there is inadequate well coverage, supplemental sampling might be needed.

Groundwater Flow Direction. Water level data and water table maps will be compiled to determine the present direction of groundwater flow as it might affect the distribution of contaminants. To the extent possible, the borehole velocity flowmeter will be run in key wells at different levels in the well screen to determine actual direction of groundwater flow. Data on groundwater flow direction and velocity will be used to compare the plume maps and changes in the distribution patterns with time. Wells in the RCRA monitoring network (and some beyond the immediate area of WMA B-BX-BY) will be resurveyed to a common datum to provide consistent top of casing elevations. The present geodetic surveys of wells were performed at the completion of well construction in three different years using different field crews and bench marks and these differences could account for some of the scatter in water level data (refer to hydrograph on Figure 5).

New geodetic survey elevations for the top of casing will be obtained, along with a water table map showing the present configuration of the water table and estimated groundwater flow direction. Tables and plots illustrating the interpretation of groundwater flow direction and velocity will be prepared for the assessment report. Any differences in the direction of flow with depth in the screens also will be plotted to determine whether any changes in flow direction might help explain the distribution of contaminants in relationship to a tank farm source or an alternative.

5.3 NEAR-TERM DECISIONS TO BE MADE

The DQO process will be used to design a cost efficient short-term sampling program (if required) based on the outcome of the review of existing data. Even if no new data are required, the DQO logic process will be used to address the following key questions or decisions:

- Are mobile co-contaminants in downgradient groundwater consistent with a SST source?
- Is the pattern observed in key well 2-E33-32 consistent with flow directions and an SST source? (i.e., is there an alternative source other than SSTs?).

The same general process and test parameters as described in WMA S-SX assessment plan (Caggiano et al. 1996) will be followed. The product of the DQO process will be a sampling and analysis plan (SAP) to guide the acquisition of any additional or new data needed to address the key decisions.

Decision Rule

The expected mobile constituents in SST waste that could be transported through the soil column to groundwater include, but are not limited, to the constituents listed in Table 1.

Table 1. Mobile Constituents Expected in Groundwater if Single-Shell System Tank is the Source.

Mobile constituent (chemical form)	Comments
Chromate (CrO_4^{2-})	Might be present because of REDOX waste transferred to B-BX-BY tank farm
Technetium-99 (TcO_4^-)	Common fission product in all SST System waste
Nitrate (NO_3^-)	From multimolar nitric acid used in dissolution of irradiated fuel
Chloride (Cl^-)	A co-contaminant in the sodium hydroxide used to neutralize the nitric acid
Fluoride (F^-)	Used in a chemical separation step in the bismuth phosphate process
Cobalt-60 (as Co^{2+} in CN^- complex)	Normally immobile but formed anionic complex with cyanide used to separate strontium/cesium from waste stream before discharge to cribs and trenches

These constituents could be extended or modified depending on available SST System sampling results and inferences from process knowledge (Agnew 1995).

Rule Number 1. If the expected mobile co-contaminants are covariant in the downgradient monitoring well(s), and approximate their relative concentrations (e.g., ratio of constituent to technetium-99 or nitrate) in soluble fractions of tank waste, this will be taken as evidence of a SST (or related) source. An affirmative result for the *contaminant consistency test*, however, would not be conclusive evidence of a tank farm source because similar waste also was discharged to adjacent trenches and cribs.

Rule Number 2. The groundwater flow direction in relation to potential source locations is critical for distinguishing between an SST System source and a crib source. Flow velocity and direction (based on in situ measurements) in at least well 2-E33-32, and inferred flow directions based on contaminant plumes, will be used to determine if the monitoring well lies within a likely

contaminant dispersion corridor from any upgradient SST. An affirmative for both rules 1 and 2 would implicate the tank farm as a source and the decision would be made to proceed to Phase II. The Phase II step also would be initiated in the case of an affirmative result for rule 1 and an inconclusive result for rule 2.

5.4 DELIVERABLE

A report summarizing the findings of the Phase I effort will be prepared and submitted within 3 months following completion of the 3- to 6-month investigation. A detailed description of the content of the Phase I report is provided in Section 7.0.

6.0 QUALITY ASSURANCE PROGRAM

Groundwater sampling procedures, sample collection documentation, and chain-of-custody will be performed in accordance with onsite standard operating methods.

6.1 SAMPLING PROCEDURES

All field sampling activities will be recorded in the proper field logbook. Before sampling each well, the static water level will be measured and recorded. Based on the measured water level and well construction details, the volume of water in the well will be calculated and documented on the well sampling form or field notebook. Each well will be purged until the approved criteria are met. Purgewater will be managed according to the *Purgewater Monitoring Plan* [Attachment 5 of the Hanford Facility RCRA Permit (Ecology 1994)]. If a well pumps dry because of very slow recharge or low water levels, samples will be collected after recharge.

Overall quality assurance (QA) program requirements are defined by onsite programs and Article 31 of the Hanford Federal Facility Agreement and Consent Order (Ecology et al. 1996). The RCRA sampling and analysis program is presently transitioning to Pacific Northwest National Laboratory (PNNL). Equivalent PNNL procedures will be used as applicable and relevant for preservation of samples and chain of custody.

6.2 ANALYTICAL PROCEDURES

Procedures for field measurements (e.g., pH, conductivity, etc.) are specified in the user's manuals for the meters used. Most of the analytical methods (WHC 1995) are selected from those provided in SW-846 (EPA 1992). For constituents with no analytical method specified by SW-846, other methods will be selected by PNNL.

7.0 PHASE I ASSESSMENT REPORT

After completing Phase I investigations, all data will be compiled, analyzed, interpreted, and reported in a Phase I assessment report. The objective will be to determine whether the SSTs in WMA B-BX-BY have had any significant effect on groundwater quality. If the SSTs in WMA B-BX-BY have had no impact on groundwater quality, the site will return to interim status detection-level monitoring. If the analysis indicates that groundwater could have been impacted, a Phase II investigation will be planned and implemented contingent on the results of the Phase I investigation. Phase II, if needed, likely would expand on the investigations conducted for Phase I to provide additional information/data for a more complete analysis. Phase II investigations would be incorporated into TWRS characterization of the nature and extent of waste in the vadose zone beneath the tank farms to facilitate remediation/closure. Data obtained in Phase I assessment investigation will be used to guide and/or support operational decisions affecting tank farm operations and the repair and/or maintenance of utility lines.

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APPENDIX A

REVIEW OF SOURCE FACILITIES/PROCESSES

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APPENDIX A

REVIEW OF SOURCE FACILITIES/PROCESSES

The SSTs in WMA B-BX-BY are part of the SST System, a RCRA treatment, storage and/or disposal (TSD) unit that stores mixed waste remaining from the chemical processing of spent fuel rods to recover and refine weapons grade plutonium and uranium. No waste has been added to these tanks since November 1980, and many ceased receiving waste earlier than 1980 because of failed integrity (refer to Table H-1 in Hanlon 1996). All the SSTs will be closed as RCRA TSD units under WAC 173-303-610. A closure work plan for the SSTs was submitted to Ecology in 1989; revision A of this plan was submitted to Ecology in June 1995, and revision 1 incorporating Ecology comments was submitted in June 1996 (DOE/RL-89-16). The WMA B-BX-BY is coincident with *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* 200-BP-7 operable unit. Anderson (1990) documents the history of tank farm operations. Chemical and radioactive waste inventories of SSTs are documented (WHC 1993).

High-level waste streams from the processing of spent fuel rods, mostly using the bismuth-phosphate process in B Plant were discharged to various tanks in WMA B-BX-BY. Records (Anderson 1990) indicate that some REDOX, tributyl phosphate, and hot semi-works waste was transferred to different tanks in WMA B-BX-BY at some point in their history. The waste was discharged to the SSTs as alkaline slurries, with pH increased to above 9 by the addition of NaOH before release of the waste to tanks. These tanks also were used in the uranium scavenging operations from 1954 to 1957. Uranium originally discharged to these tanks as waste from BiPO4 operations was recovered and processed for use as a special nuclear material (Gerber 1993), with high-level waste returning to SSTs for storage and precipitation. Potassium ferrocyanide was added to the tanks to precipitate cesium-137. Most of the strontium-90 also precipitated in the tanks, initially unassisted and later with the addition of either calcium or strontium nitrate. Supernatant from this process was discharged to the 216-BY cribs (200-BP-1) or the 216-BC cribs, or to specific retention trenches 216-B-35 through 216- B-42 located west of the 241-BX Tank Farm. Liquid effluent facilities surrounding WMA B-BX-BY are listed on Table A1.

All the SSTs in WMA B-BX-BY are constructed of reinforced concrete with a single liner of ASTM A283 Grade C carbon steel. The 100 series of tanks are all 75 feet in diameter and are buried from 6 to 8 feet below ground surface. The cylindrical tank beneath the domed top of each tank extends to varying depth depending on the capacity of the tank and its position in a cascade sequence. Smaller 200-series tanks are 20 feet in diameter and held 55,000 gallons, but these are found only in the original four tank farms (241-B is one of the original tank farms,). Twelve (of 16) SSTs in the 241-B Tank Farm are 100-series tanks, each of which held 530,000 gallons and were constructed in 1943 and 1944. There are also four 200-series tanks in the 241-B Tank Farm. Ten (of 16) tanks in the 241-B Tank Farm are 'assumed leakers'. The 12 SSTs in the 241-BX Tank Farm are all 100-series tanks, each of which held 530,000 gallons, and were constructed in 1946 and 1947. Five of

the 12 tanks in the 241-BX Tank Farm are assumed leakers, including the 241-BX-102 tank, which leaked an estimated 70,000 gallons in 1971 [the second largest known Hanford Site tank leak (Womack and Larkin 1971)]. The 12 100-series tanks in the 241-BY Tank Farm were constructed in 1948 and 1949, with each holding 758,000 gallons. Five tanks in the 241-BY Tank Farm are classified as assumed leakers. All the 100-series tanks in each of these farms have a dished bottom; i.e., a curving intersection of the sidewall and bottom. Only the 241-B Tank Farm contains the smaller 200-series tanks.

All of the tanks in the 241-B, 241-BX, and 241-BY Tank Farms were constructed such that waste could flow laterally (i.e., cascade) through connecting pipes from one tank into another once waste exceeded the level of the cascade line in a tank. Waste would be placed initially in the first tank and allowed to cascade to the other two tanks in a cascade line. There were four rows of cascading tanks (three in each line) in each of the 241-B, 241-BX, and 241-BY Tank Farms. In addition, the end tank in a cascade in the 241-BX Tank Farm was plumbed such that waste could cascade from the BX Tank Farm to the first tank in a cascade line in the BY Tank Farm. Thus, the 241-BX-103 tank would cascade to 241-BY-101; BX-106 tank would cascade to 241-BY-104, etc.

Cascade lines connecting groups of tanks were plugged on several occasions and also were not sealed adequately at the junction with tanks (cascade lines were welded to the liner), thereby leading to escape of waste from containment. Waste went from processing plants through settling tanks and diversion boxes to the SSTs and was directed to various tanks by valves allowing flow of waste along transfer lines coming out of diversion boxes. There are several sets of diversion boxes in WMA B-BX-BY, with transfer lines emanating from each to the various tanks. None of the transfer lines were double contained and leaks were known to have occurred along each. As with cascade lines, the junction of lines with the tank either was not properly sealed or developed leaks during operations, for these intersections were routes of egress of waste from tanks to the soil. Leak testing of the tank liners during construction was performed after welding of the constituent plates was completed and the liner was finished. Photos of the tanks under construction reveal this process, but no evidence of additional testing of the tanks was found to indicate additional testing after the cascade and transfer lines were plumed into the tanks.

MONITORING THE SINGLE SHELL TANKS

Historic Surveillance

The SSTs were monitored to detect leaks using in-tank measurements of liquid levels and gross gamma surveillance logging in external boreholes (Welty 1988). A drop of liquid levels between successive readings would signify possible loss of fluids which, if not explained by other phenomena, suggested a loss of integrity of the tank. Gross gamma logging in radially disposed boreholes adjacent the tanks (refer to Figure 9 in text) was used to confirm the loss of liquid from a tank and/or to monitor the movement of fluids once escaped from a tank. Any sudden change in the amplitude or depth of an above-background peak was cause for suspicion about failed integrity and would trigger further study. Once declared to be leaking, waste would be

pumped from the subject tank to other sound SSTs or double-shell tanks and the tank would await interim stabilization.

Current Monitoring Program

Spectral gamma logging is now conducted in boreholes surrounding the SSTs. Spectral gamma logging can be used to identify and quantify the specific gamma-emitting isotope present at a given level in a borehole. Spectral gamma logging in the SST System is being conducted by RUST Geotech contracted directly to DOE-RL. In logging these boreholes, 100-second counting times at increments of 0.5 foot are taken in each borehole. These data are reduced, interpreted, and plotted as continuous logs in individual tank data reports (refer to list of reports for the 241-BY Tank Farm at end of references) for baseline logging. Results of logging in the BY Tank Farm are summarized on Table A2. Cesium-137, antimony-125, and cobalt-60 are the principal anthropogenic isotopes that have been identified in boreholes in the BY Tank Farm and represent some of the waste that has escaped these tanks. Ruthenium-106, with a half life of 1.02 years, has been used to monitor the depth of penetration of waste in tank farms and certainly was among some of the short half-life isotopes that were present in the waste discharged to WMA B-BX-BY. Like many of the short-lived isotopes, ruthenium-106 has decayed to ground state and can no longer be detected. However, some of the high gross beta levels in groundwater from historic data are likely the result of the presence of this isotope in groundwater, as it is very mobile.

Waste Migration

Once waste escaped containment, natural and artificial recharge has enhanced mobility and led to deeper infiltration of the waste. The proportion of natural recharge that infiltrates beneath the top few feet is not known with any precision. Where coarse cover materials have been placed as cover materials and vegetation is prohibited (as has been true for tank farms), natural precipitation (mean annual is 6.25 inches per year) could infiltrate deeper than in areas covered with finer soils and vegetation (Gee et al. 1992). By severely restricting evapotranspiration through placement of gravel and restricting vegetation, recharge from natural precipitation is enhanced. The domed roof of each tank serves to collect and channel infiltrating liquids along the tank margins where both unsealed boreholes and leaked waste could be present. Natural recharge can be further enhanced through other preferential pathways that channel infiltration deeper into the vadose zone. For example, unsealed boreholes in the WMA B-BX-BY might have assisted the further infiltration of natural and artificial recharge. Sudden melting of snowcover following prolonged periods of subfreezing weather have occurred during several winters since the 1940s when these tanks were constructed. Chinook winds rapidly melt snow producing meltwater that cannot infiltrate into frozen substrate. This phenomenon leads to ponding of water in tank farms that can preferentially infiltrate along unsealed boreholes and/or clastic dikes. Water also has been indiscriminately added to the soils in and around tank farms through hydrocompacting of fill in newly excavated trenches and through leaks in raw and sanitary water distribution lines.

Lateral and vertical spreading of artificial recharge (discharge of liquid effluent to surrounding cribs and french drains) also has assisted in mobilizing and transporting waste that has escaped containment. A well documented case of such phenomena occurred in the 200 West Area when effluent discharged in 1985 to the 216-U-16 crib served to mobilize uranium previously discharged to the 216-U-1 and 216-U-2 cribs (Law and Schatz 1986). Uranium eventually was recovered through extraction, pumping, and treatment of contaminated groundwater by an ion exchange process.

Lateral spreading of fluids discharged to soils is enhanced by stratification in the sediments. Not only are there significant differences in unsaturated hydraulic conductivity between various units of the Hanford formation, but also between superposed sedimentation units within the formation. Thin and discontinuous beds/lenses of mud-rich units are present in the various cyclic sedimentation units in the Hanford formation and these favor lateral spreading. Lateral spreading waste also can encounter other preferential pathways (e.g., unsealed boreholes, wells, clastic dikes) that can enhance vertical infiltration and short circuit natural interstitial infiltration.

INTERIM STABILIZATION

A program of interim stabilization has been instituted in the SST System. The objective of interim stabilization is to minimize the risk of further leaks by removing as much liquid from the tanks as possible. All but three of the 40 tanks in WMA B-BX-BY have been interim stabilized. Only BY-103, BY-105, and BY-109 remain to be stabilized (Hanlon 1996). The 241-BY 103 and 241-BY-105 tanks are assumed leakers.

Table A1. Liquid Effluent Facilities Surrounding Waste Management Area B-BX-BY.

Table A1

Facility	Type	Operating Dates	Volume (gals.)#	Waste Type##	Nitrate (kg)	Ammon. Nitrate (kg)
216-B-7A & B	Crib	10/46 - 5/67	11,519,200	Effluent from 224-B (via settling tank) , cell drainage from 221-B and decon waste from 22	1,800,000	22,000
216-B-8**	Crib & Tile Field	4/48 - 7/53	7,186,262	2nd cycle supernatant, cell drainage from 221-B; decon waste from 224-B	1,400,000	160,000
216-B-11A & B	Reverse Wells	12/51 - 12/54	7,820,340	Process condensate from 242-B Evaporator	NA	NA
216-B-35**	Trench+	2/54 - 3/54	280,000	1st cycle supernatant from 221-B	90,000	
216-B-36**	Trench+	3/54 - 4/54	510,000	1st cycle supernatant from 221-B	160,000	
216-B-37**	Trench+	8/54 - 8/54	1,140,000	1st cycle supernatant from 242-B Evaporator	1,700,000	
216-B-38**	Trench+	7/54 - 7/54	380,000	1st cycle supernatant from 221-B	120,000	
216-B-39**	Trench+	12/53 - 11/54	390,000	1st cycle supernatant from 221-B	120,000	
216-B-40**	Trench+	4/54 - 7/54	430,000	1st cycle supernatant from 221-B	210,000	
216-B-41**	Trench+	11/54 - 11/54	380,000	1st cycle supernatant from 221-B	2,100,000	
216-B-42**	Trench	1/55 - 2/55	396,301	Scavenged TBP supernatant from 221-U	210,000	NA
216-B-43**	Crib	11/54 - 11/54	560,106	Scavenged TBP supernatant from 221-U	400,000	NA
216-B-44**	Crib	11/54 - 3/55	1,479,520	Scavenged TBP supernatant from 221-U	800,000	NA
216-B-45**	Crib	4/55 - 6/55	1,299,870	Scavenged TBP supernatant from 221-U	90,000	NA
216-B-46**	Crib	9/55 - 12/55	1,770,150	Scavenged TBP supernatant from 221-U	1,200,000	NA
216-B-47**	Crib	9/55 - 9/55	980,185	Scavenged supernatant from 221-U	700,000	NA
216-B-48**	Crib	11/55 - 11/55	1,080,580	Scavenged TBP supernatant from 221-U	1,000,000	NA
216-B-49**	Crib	11/55 - 12/55	1,770,150	Scavenged TBP supernatant from 221-U	1,500,000	NA
216-B-50	Crib	1/65 - 1/74	14,478,200	Storage tank condensate from ITS#1 in 241-BY Tank Farm	1,500	10,000
216-B-51	French Drain	1/56 - 1/58	264	Flush drainage from BC Crib pipeline	190	NA
216-B-57	Crib	2/68 - 5/73	22,298,500	Storage tank condensate from ITS#2 in 241-BY Tank Farm		

NOTES

*Ru-106 was among the original radionuclides discharged to these facilities, but it has decayed to non-detectable levels in soils and groundwater (half life of 1.02 yr)

** Facility received high-salt waste

+ Specific retention trench (i.e., fluid added to trench until calculated specific retention equalled)

Volume estimates from WIDS

##All facilities received Cs-137, Sr-90, Pu and U

Table A2. Summary of Spectra-Gamma Logging Results in the BY Tank Farm. (sheet 1 of 3)

Tank No.	Tk. Farm No.	Hanford No.	Constructed	Diam. (in.)	Depth (ft.)	Surface Contam.	Cs-137 Contamination	Co-60 Contam.	Sb-125 (or other) Contam.	Detector Sat.
BY-101	22-01-01	E33-176	12/22/71	6	100	0 - 35'; <110 pCi/g)	<2 pCi/g; 35 - 98'	ND		No
	22-01-03	E33-245	4/31/74	6	100	0 - 20'; <20 pCi/g	<0.9 pCi/g; 28 - 32'	ND		No
	22-01-04	E33-177	12/20/71	6	100	0 - 33'; <120 pCi/g	<120 pCi/g @ 25'; ,20 p(Ci/g @ 31'	28 - 55, peak ,2 pCi/g @ 29'; <0.5 pCi/g @ 70 - 82'		No
	22-01-07	E33-178	12/16/71	6	100	0 - 43'; <300 pCi/g	10 pCi/g @ 11,; 3 pCi/g @ 23'; 1 pCi/g @100'	1 - 2' <3 pCi/g; <0.5 pCi/g @46 & 50'		No
	22-01-10	E33-246	5/7/74	6	100	0 - 99'; <80 pCi/g	<30 pCi/g @21 & 28'; <10 pCi/g @100'	ND		No
BY-102	22-02-01	E33-101	7/10/70	6	100	0 - 100'; <100 pCi/g	<300 pCi/g @ 44 - 52; <3 pCi/g @60'; <4 pCi/g @ 100'	<0.6 pCi/g @ 83 - 99'		No
	22-02-02***	E33-227	10/27/73	6	100	0 - 37'; <200 pCi/g	Spotty >37'; <1 pCi/g	ND		No
	22-02-05	E33-228	10/16/73	6	100	0 - 38'; <200 pCi/g	Spotty <1 pCi/g , 38'	ND		No
	22-02-07	E33-9++	7/31/49	8, 4	275					
	22-02-09+++	E33-102	9/2/70	6	100	0 - 100'; <30 pCi/g	<2 pCi/g @ 45'; <1 pCi/g @100'	<1 pCi/g @24 - 25'; <2 pCi/g @31 - 50'; <0.5 pCi/g @61 - 63'		No
BY-103	22-03-01	E33-104	8/7/70	6	100	0-96'; <100 pCi/g	<100 pCi/g @0 - 10'; continuous to bottom <2 pCi/g >10'	ND		No
	22-03-04	E33-211	12/5/72	6	100	0-31'; <400 pCi/g;	<1 pCi/g @ 35 - 39'; <1 pCi/g @ 45 - 50'; <2 pCi/g @ 101'	<1 pCi/g @ 45 - 60'; <1.5 pCi/g @ 66 - 81'; <1 pCi/g @ 101'	<1.5 pCi/g @ 50 - 52'	No
	22-03-05	E33-103	8/12/70	6	100	0 - 100'; <1,100 pCi/g	10 - >1,000 pCi/g 0 - 100'	<10 pCi/g @46 - 100'	ND	Yes 24 - 45'
	22-03-06	E33-210	12/22/72	6	100	0 - 58'; <400 pCi/g	Continuous 10 - ~200 pCi/g 0 - 25'; >25', peaks of <5 pCi/g 30 - 35'; <100 pCi/g@ 41 - 50'	<1.1 pCi/g 41 - 47'; <0.5 pCi/g 78 - 99'; <2 pCi/g @ 100'	<6 pCi/g @ 42 - 48'	No
	22-03-07	E33-242	12/17/73	6	100	0 - 23" <100+ pCi/g	Spotty @31, 50, and 100 ' < 1 pCi/g	52 - 95'; <0.5 pCi/g	ND	No
	22-03-08	E33-244	12/6/73	6	100	0 - 12'; <50 pCi/g	<3 pCi/g @ 19 - 25'	<0.5 pCi/g @ 45 - 51'; <0.4 pCi/g @90 - 97'	ND	No
	22-03-09	E33-105	8/6/70	6	100	0 - 40'; <80 pCi/g	1 - 10 pCi/g @ 0 - 32'; 11 pCi/g peak @ 16'; spotty < 2 pCi/g >32' (Eu-154 <3 pCi/g 5 - 7')	< 1 pCi/g 5 - 8'; spotty ,1 pCi/g 30 - 50'; <11 pCi/g 61 - 98'	ND	No
	22-03-10	E33-243	12/7/73	6	100	0 - 50'; <40 pCi/g	Broad peaks 1 - 10 pCi/g @ 14 - 50'; spotty < 1 pCi/g. 50'; <2 pCi/g @ 100'	ND	ND	No
BY-104	22-04-01	E33-106	9/2/70	6	100	0- 100'; <90 pCi/g	Peaks 90 pCi/g @0 '; <11 pCi/g @ 100'; 0.5 - 10 pCi/g continuous 1 - 98'	ND	ND	No
	22-04-05	E33-107	7/21/70	6	100	0 - 38'; <6 pCi/g	Spotty <0.5 pCi/g >40'; <2 pCi/g 95 - 98'	ND	ND	No
	22-04-07	E33-248	5/13/74	6	100	0 - 35'; <40 pCi/g	Few detections < 0.5 pCi/g > 35'	<3 pCi/g 90 - 100'	ND	No
	22-04-09#	E33-108	8/31/70	6	125@	0 - 60'; <40 pCi/g	Spotty >60'; <0.5 pCi/g	<10 pCi/g @ 86 - 125'	ND	No
	22-04-11	E33-249	6/1/74	6	100	0 - 44'; <100 pCi/g	Broad peak 1 - 10 pCi/g @ 11 - 36'; <7 pCi/g 38 - 43'; few detections <0.5 pCi/g > 44'	<3 pCi/g @99 - 100'	ND	No
BY-105*	22-05-01	E33-109	7/9/70	6	100	0 - 41'; >100 pCi/g @ ground surface	<1 pCi/g 8 - 41'; <1 pCi/g 50 - 61'; <2 pCi/g @ 98'	<0.6 pCi/g @ 84 - 98'	ND	Yes (0 - 3')
	22-05-05	E33-110	7/15/70	6	100	0 - 97'; <25 pCi/g	Continuous <2 pCi/g @5 - 95'; <5 pCi/g @ 96'	ND	ND	No
	22-05-09	E33-111	7/27/70	6	100	0 - 45'; <9 pCi/g	<2 pCi/g 4 - 45', few detections >45', ,1 pCi/g @ 98'	<1 pCi/g 61 - 70'; <1 pCi/g 75 - 96'; <5 pCi/g 95 - 98'	ND	No
BY-106*	22-06-01	E33-112	8/3/70	6	100	0 - 99'; <70 pCi/g	<2 pCi/g @ 5 - 98'; 1 pCi/g peaks @ 36 & 45'; <6 pCi/g 98 - 99'	<1.5 pCi/g@ 46 - 49'; <1 pCi/g @ 55 - 64'	ND	No
	22-06-05	E33-113	7/14/70	6	100	0 - 38'; <50 pCi/g	Few detections >40'; <1 pCi/g	<11 pCi/g @28 - 87'; broad peak <2 pCi/g @ 63 - 82'	ND	No
	22-06-07**	E33-86	8/31/49	7	150	0 - 28'; <80 pCi/g	Continuous 38' - 131'; peaks : 5pCi/g @45'; <11 pCi/g @49'; 10 pCi/g @74'; 6 pCi/g @ 95'	Continuous 56 - 82'; peaks 1.5 pCi/g @57'; 2 pCi/g @ 70'; <0.5 pCi/g @ 126 - 130'	ND	No
	22-06-09	E33-114	7/31/70	6	100	0 - 32'; <50 pCi/g	Nearly continuous <1 pCi/g @38 - 96'	Spotty detections <0.25 pCi/g @72 - 90'	ND	No
	22-06-11	E33-250	5/3/74	6	100	0 - 38'; <25 pCi/g	Few detections <0.6 pCi/g @ 44-48'; 60'	ND	ND	No
BY-107*	22-07-01	E33-115	8/25/70	6	100	0 - 99'; <246 pCi/g	<3 pCi/g continuously @12 - 99'; <6 pCi/g @98 - 99'	<1 pCi/g @46 - 51'; continuous 56 - 97'; <7 pCi/g. broad peak 59 - 86'	ND	No
	22-07-02	E33-206	1/5/73	6	100	0 - 40'; <11 pCi/g	<0.8 pCi/g @37 - 44'; 45 - 96' scattered detections <1 pCi/g; <3 pCi/g @ 96 - 100'	<1 pCi/g 1 - 7'; few detects <0.5 pCig @ 31 - 41'; continuous 48 - 100', <10 pCi/g	ND	No

Table A2. Summary of Spectra-Gamma Logging Results in the BY Tank Farm. (sheet 2 of 3)

Tank No.	Tk. Farm No.	Hanford No.	Constructed	Diam. (in.)	Depth (ft.)	Surface Contam.	Cs-137 Contamination	Co-60 Contam.	Sb-125 (or other) Contam.	Detector Sat.
	22-07-05	E33-116	7/23/70	6	100	0 - 31'; <12 pCi/g	Scattered detects <1 pCi/g @ 34 - 97'	Scattered detects <1 pCi/g @28 - 39'; continuous <1 pCi/g 41 - 55'; broad peak <8 pCi/g 57 - 98	ND	No
	22-07-07	E33-251	5/8/74	6	100	0 - 36'; <50 pCi/g	Continuous <1 pCi/g @ 3 - 42';<2 pCi/g @ 100'	Scattered detects <0.5 pCi/g @ 41 - 43' , 59 - 61', 66'; broad peak @86 - 99' <3 pCi/g	ND	No
	22-07-09	E33-117	8/25/70	6	100	0 - 100'; <200 pCi/g	10 -100 pCi/g @ 0 - 33', peak 3,000 pCi/g @24'; 10 pCi/g @35'; broad peak <5 pCi/g @ 42', continuous <1 pCi/g to 100'	<0.5 pCi/g 40 - 41'; Broad peak <8 pCi/g 77 - 100'	ND	No
	22-07-10	E33-252	7/31/70	6	100	0 - 44'; <150 pCi/g	10 - 100 pCi/g @ 0 - 18' & 21 - 40'; <2 pCi/g @ 60 - 69'; few detects >70';	ND	ND	No
BY-108*	22-08-01	E33-118	7/22/70	6	100	0-36'; >10 pCi/g	Continuous surface to 36'; 0 - 8' 1 - >10 pCi/g; 8 - 36'; few detects 36 - 94'; <1 pCi/g; <1 pCi/g 98 - 100'	Continuous 28 - 41', <5 pCi/g; <11 pCi/g 44 - 99'; peaks @ 43' (4 pCi/g) & 56' (<11 pCi/g)	ND	Yes (2 - 4')
	22-08-02	E33-208	1/9/73	6	103	0 - 51', >500 pCi/g	Continuous to 51', 0 - 18' >1 pCi/g; <1 pCi/g 18 - 26'; >1 pCi/g 26 - 41'; <1 pCi/g 41 - 51'	Continuous 50 - 103'; <1 pCi/g 50 - 68'; >1 pCi/g 68 - 71', <1 pCi/g 71 - 74', >1 pCi/g to 96'; broad peak @78 - 83' >10 pCi/g	ND	Yes (0 - 4')
	22-08-05	E33-119	7/20/70	6	100	0 - 44'; <70 pCi/g	Continuous 0 - 44'; 0 - 3' >10 pCi/g; 3 - 31' >1 pCi/g; <1 pCi/g 31 - 44'; <1 pCi/g 49 -52'; few detects 52 - 96'; <3 pCi/g 96 - 99'	Continuous 39 - 80' ; >1 pCi/g 48 - 50', 56 - 58', 66 - 78'; <1 pCi/g 96 - 98'	ND	No
	22-08-06	E33-207	1/31/73	6	100	0 - 40'; <100 pCi/g	Continuous 10 - 100 pCi/g 0 - 12', 1 - 10 pCi/g; 12 - 26' >1 pCi/g; <1 pCi/g @26 - 40'; few detects >40'	Spotty <0.2 pCi/g 3 - 11 & 50 - 56'; continuous 64 - 74' <4 pCi/g; 77 - 93' @ <1 pCi/g	ND	No
	22-08-07	E33-87**	8/17/49	8	150	0 - 4', <150 pCi/g	0 - 4'; >1 pCi/g; spotty detects <1 pCi/g @ 6 - 24'; continuous 39 - 90' mostly >1 pCi/g 39 - 69'; <1 pCi/g 70 - 98'; <2 p Ci/g @ 127 - 131'	<1 pCi/g @96 - 98'	ND	No
	22-08-09	E33-120	7/28/70	6	100	0-100'; >10 pCi/g 1 - 6'	>1 pCi/g 6 - 17'; <1 pCi/g 17 - 99'; <2 pCi/g 99 - 100'	ND	ND	No
	22-08-12	E33-209	126/73	6	104	0 - 40'; 10 - 800 pCi/g @ 1 - 6'	>12 pCi/g 7 - 30'; <1 pCi/g 30 - 40'; few detects >40'	<1 pCi/g @ 3-4'; 0.1 - 8 pCi/g 45 - 57'; 0.1 - 3 pCi/g @ 69 - 80'	ND	No
BY-109	22-09-01	E33-123	2/28/70	6	100	0 - 37'; <60 pCi/g	>1 pCi/g @ 0 - 8'; 0.2 - 1 pCi/g @ 8 - 38'; few detects <0.5 pCi/g 38 -96'; <2 pCi/g 96 - 98'	<0.5 pCi/g @ 44 - 47'	ND	No
	22-09-02	E33-259	6/10/74	6	100	0 - 49'; <200 pCi/g	10 - 200 pCi/g @ 0 - 31'; 10 - 100 pCi/g @ 31 - 40'; <1 pCi/g 49 - 49'; few detects <0.9 pCi/g 49 - 98'; <2 pCi/g 98 - 100'	Few spotty detections <0.1 pCi/g @ 70, 90, 92, and 95'	ND	No
	22-09-05	E33-122	2/20/70	6	100	0 - 11'; <6 pCi/g	1 - 6 pCi/g @ 0 - 3'; <1 pCi/g 3 - 97'; 2 pCi/g @ 98'	2 detections <0.2 pCi/g @ 49 & 61'	ND	No
	22-09-07	E33-260	6/30/74	6	100	0 - 20'; <11 pCi/g	~1 - 11 pCi/g 0 - 13'; <1 pCi/g 13 - 20'; 1 detect >20' @0.2 pCi/g	Continuous 25 - 60' @<2 pCi/g; peak 2.5 pCi/g @59'; <1 pCi/g @ 66 - 73'; <0.5 pCi/g 79 - 83'	ND	No
	22-09-08	E33-121	2/28/70	6	100	0 - 26'; <11,00 pCi/g	0.8 - 3 pCi/g @ 0 - 21'; 1 - 11,00 pCi/g @ 21 - 26'; spotty detections <1 pCi/g 29 - 61'; <0.8 pCi/g @ 98'	<1 pCi/g @ 28 - 35'; 0.1 - 1.5 pCi/g @ 40 - 51'; 0.2 - 2.5 pCi/g @ 81 - 89'	ND	No
	22-09-11	E33-253	5/31/74	6	100	0 - 30'; <100 pCi/g	10 - 100 pCi/g @ 2 - 10';1 - 10 pCi/g @ 10 - 2010 - 12 pCi/g @ 20 - 21'; 1 - 10 pCi/g @ 21 - 25'; <1 pCi/g @ 25 - 34'; few detects >35' <0.5 pCi/g	Spotty detections <0.3 pCi/g @ 21 - 50'	ND	No
BY-110	22-10-05	E33-124	8/31/70	6	100	0 - 31'; <13 pCi/g	1 - 13 pCi/g @ 0 - 18'; <1 pCi/g @ 18 - 31'; few detections 31 - 98'; <2 pCi/g @ 98 - 99'	Continuous detections <0.5 pCi/g @ 48 - 76'; <0.5 pCi/g @ 97 - 99'	ND	No
	22-10-07	E33-254	5/31/74	6	100	Missing data 0 - 22'	1 - 3 pCi/g @ 22 - 30'; <1 pCi/g @ 30 - 33'; no detects >36'	0.1 - 0.5 pCi/g @ 48 - 60'	ND	No
	22-10-09	E33-255	5/31/74	6	100	0 - 20'; <5 pCi/g	Mostly >1 pCi/g 0 - 4'; <1 pCi/g @ 4 - 20' <0.5 pCi/g	ND	ND	No

Table A2. Summary of Spectra-Gamma Logging Results in the BY Tank Farm. (sheet 3 of 3)

Tank No.	Tk. Farm No.	Hanford No.	Constructed	Diam. (in.)	Depth (ft.)	Surface Contam.	Cs-137 Contamination	Co-60 Contam.	Sb-125 (or other) Contam.	Detector Sat.
	22-10-10	E33-125	8/31/70	6	100	0 - 24'; <6 pCi/g	1 - 6 pCi/g @ 0 - 3'; <1 pCi/g @ 3 - 24'; few detects > 25' <1 pCi/g	<1 pCi/g @ 65 - 74'; <0.6 pCi/g @ 85 - 93'	ND	No
BY-111	22-11-01	E33-126	8/31/70	6	100	0 - 35'; <100 pCi/g; 10 - 100 pCi/g @ 0 - 8'	0.1 - 3 pCi/g @ 8 - 35'; peak <3 pCi/g @ 22 - 25'; few detects > 35' 0.2 - 8 pCi/g @ 95 - 101'	Scattered detects <0.2 pCi/g @ 97 , 101'	ND	No
	22-11-05	E33-127	8/31/70	6	100	0 - 36'; <200 pCi/g	10 - 200 pCi/g @ 3 - 6'; 1 - 10 pCi/g @ 0 - 3', 6 - 10'; 0.4 - 2 pCi/g @ 10 - 36'; few detect >36'	<0.5 pCi/g @ 2 - 4'; <0.2 pCi/g @ 56 - 58'	<0.5 pCi/g Eu-154 @ 2'	No
	22-11-08	E33-56	12/31/44	6	100##	0 - 29'; <5 pCi/g	1 - 5 pCi/g @ 1 - 9'; <1 pCi/g 9 - 20'; 1 - 4 pCi/g @ 20 - 27' ; <1 pCi/g 27 - 29'; few detects <0.6 pCi/g > 30'	ND	<12 pCi/g Pa-234 @62'	No
	22-11-09	E33-128	8/31/70	6	100	0 - 21'; <8 pCi/g	1 - 8 pCi/g @ 2 - 5'; <1 pCi/g @ 5 - 31'; 0.05 pCi/g @ 100'	<0.2 pCi/g @ 3 - 5'; 1 - 3 pCi/g @ 26'; <1 pCi/g @ 27 - 56'	ND	No
BY-112	22-12-01	E33-100	11/30/67	6	1016	0 - 39'; <5 pCi/g	1 - 10 pCi/g (MOstly) @0 - 8'; 1 - 3 pCi/g @ 11 - 14'; 0.1 - 1 pCi/g @ 24 - 39'; few detects > 40' (<1 pCi/g); <5 pCi/g @ 98 - 100'	Single detect <0.2 pCi/g @ 100'	ND	No
	22-12-03	E33-94	11/30/67	6	100	0 - 46'; >1000 pCi/g	0 - 5' 10 - >1000 pCi/g; 10 - 20 pCi/g @ 7 - 19'; <1 pCi/g @ 19 - 23'; 1 - 10 pCi/g @ 23 - 40'; <1 pCi/g @ 40 - 46'; few detects <1 pCi/g >46'; 0.5 - 2 pCi/g @ 90 - 100'	0.1 - >100 pCi/g @ 0 - 5'; 1 - 11 pCi/g @ 6 - 8'; few detects <1 pCi/g @ 84 - 99'	0.1 - >1,000 pCi/g Eu-154 @ 0 - 5'; 0.3 - 25 pCi/g @ 7 - 9'	Yes (5 - 7')
	22-12-05	E33-95	11/30/67	6	100	Continuous 0 - 100'; <50 pCi/g	1 - 50 pCi/g @ 0 - 20';;<1 pCi/g @ 21 - 26'; 1 - 4 pCi/g @ 27 - 34'; <2 pCi/g 34 - 100'; peak 4 pCi/g @ 32'	1 detect <0.2 pCi/g @ 52'	ND	No
	22-12-06	E33-96	12/31/67	6	102	0 - 39'; <100 pCi/g	1 - 100 pCi/g @ 0 - 18'; <1 - 3 pCi/g @ 18 - 39'; undetected 40 - 98'; <1 pCi/g @ 99-100'	0.2 - 0.6 pCi/g @ 4 - 6'; scattered detects <0.2 pCi/g @ 57 - 62'	<1 pCi/g Eu-154 @ 4 - 6'	No
	22-12-07	E33-97	11/30/67	6	102	0 - 5'; <11 pCi/g	Few scattered detections > 5' <0.7 pCi/g	ND	ND	No
	22-12-09	E33-98	12/31/67	6	102	0 - 21'; <11 pCi/g	<0.5 pCi/g @ 20 - 49'; undetected 49 - 99'; <4 pCi/g @ 100-101'	ND	ND	No
	22-12-10	E33-99	12/31/67	6	100	0 - 15'; <60 pCi/g	>1 pCi/g @ 0 - 1'; 8 - 9'; <1 pCi/g @ 9 - 99'; <2 pCi/g @ 100'	ND	ND	No
BY Farm	22-00-01**	E33-85	8/3/49	8	150	0-101'; <12 pCi	Broad peak ,12 pCi/g @ 40 - 60'; <10 pCi/g 75 - 81'; <11 pCi/g @ 90 - 98'; <1 pCi/g 100-102'	ND	ND	No
	22-00-02	E33-240	12/7/73	6	100	0 - 15'; <400 pCi/g	Spotty 20 - 48'; <1 pCi/g; 1 pCi/g @ 100'	<0.5 pCi/g 50 - 60'; <2 pCi/g @65 - 97'	<1 pCi/g @52 - 53'	No
	22-00-03**	E33-84	7/22/49	8	150	0 - 101'; <300 pCi/g	Continuous <20 pCi/g @ 5 - 101'; <1 pCi/g @ 141 - 146'	<5 pCi/g @ 45 - 146; peaks <12 pCi/g @ 124' & <5 pCi/g @ 137'	<5 pCi/g @ 52 -72'	No
	22-00-04	E33-241	12/12/73	6	100	0 - 35'; <12 pCi/g	Spotty >35'; <20 pCi/g @95 - 100'	<0.6 pCi/g @56 - 86'	ND	
	22-00-05									
	22-00-10**	E33-88	8/18/49	8	150**	0 - 5'; <6 pCi/g	<7 pCi/g @ 41 - 58'; <1 pCi/g @ 67 - 68'; <2 pCi/g @ 79 - 92'	ND	ND	No

NOTES
* Tank is an assumed leaker
** Borehole is perforated ~40 - 100'
***Driller noted that samples at 35 and 45 ft. were "dripping wet"
+ 3 ft. casing may have been welded to top of original casing, as borehole occurs in small bern.
++ Well constructed as a groundwater monitoring well and remediated in 1978 with installation of 4 1/2 inch liner. Original casing perforated 252 - 262'.
+++ Samples collected from 26 - 51 ft showed contamination.
@ Borehole deepened from 100 to 125 feet in 1983
# Some grout added to a part of the borehole
Borhole originally drilled to 150 ft in 1944. May be grounted between casing strings of different diameter.

APPENDIX B

AS-BUILT DIAGRAMS OF SINGLE-SHELL TANK SYSTEM WASTE MANAGEMENT AREA B-BX-BY GROUNDWATER MONITORING WELLS

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WELL CONSTRUCTION AND COMPLETION SUMMARY

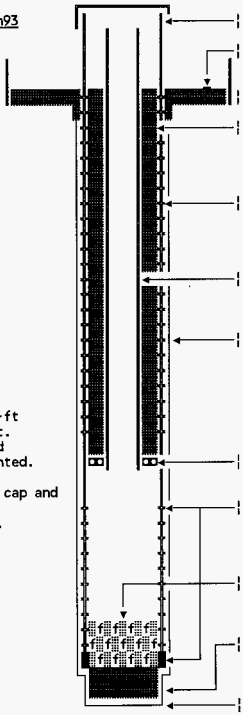
Drilling Method: Cable tool	Sample Method: Hard tool (nom)	WELL NUMBER: 299-E33-1A	TEMPORARY 241-BY-9 WELL NO: 2-E33-1
Drilling Fluid Used: Water	Additives Used: Bentonite	Hanford Coordinates: N/S N 46,376	E/W W 53,334
Driller's Name: Row, Jahnke	WA State Lic Nr: Not documented	State NAD83 N 137,614.4m	E 573,632.6m
Drilling Company: Not documented	Company Location: Not documented	Coordinates: N 451,541	E 2,241,872
Date Started: 16Aug54	Date Complete: 26Aug54	Start Card #: Not documented	T ___ R ___ S ___
		Elevation Ground surface: 629.52-ft Brass cap	

Depth to water: 230-ft Aug54
(Ground surface) 227.3-ft 23Jun93

GENERALIZED STRATIGRAPHY / Driller's Log

0-10; TOP SOIL, GRAVEL, SAND, SILT
10-25: GRAVEL, SAND, some SILT
25-35: SAND, SILT
35-40: SAND
40-85: SAND, GRAVEL, SILT
85-130: SAND, some SILT
130-170: SAND
170-200: SAND, GRAVEL, SILT
200-220: GRAVEL, little SAND
220-235: SAND & GRAVEL
235 : GRAVEL, little SAND

REMEDIATION:
Mar79 by Bultena.
Installed 4-½ OD casing on packer to 210-ft.
Perforated 8-in casing 0-205-ft and grouted w/418-gals cement.
A cement plug has been placed 235-240-ft. Date not documented.
Jun92 by WHC-GWS.
Installed surface pad, brass cap and protective posts.
Extended 8-in casing 1.46-ft.
Painted.



Elevation of reference point: [632.11-ft] (top of casing)
Height of reference point above ground surface [2.59-ft]
Depth of surface seal [0-205-ft]
Type of surface seal:
Cement grout between 4-in liner and 8-in (perforated) casing
Has 4-ft x 4-ft concrete surface pad
8-in ID carbon steel casing, +2.6-235-ft
Perforated during remediation, 0-205-ft
4-in ID carbon steel liner, +2.5-210-ft
Hole diameter, 9-in nominal, 0-235-ft
Packer set @ 210-ft
8-in casing perforations, 0-205-ft, 2 cuts/rd
215-235-ft, not documented
Measured depth to bottom: 233.4-ft, 26Sep90
Hole diameter, 8-in nominal, 235-240-ft
Borehole drilled depth: [240-ft]
Grouted 235-240-ft

Drawing By: RKL/2E33-01A.ASB
Date : 10Sep93
Reference : HANFORD WELLS WHC-S-053

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-1A

WELL DESIGNATION	:	299-E33-1A
RCRA FACILITY	:	SST-241-BY-Farm
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 46,376 W 53,334 [13Aug92-200E]
LAMBERT COORDINATES	:	N 451,540 E 2,241,871 [HANCONV] N 137,614.4m E 573,632.6m [13Aug92-NAD83]
DATE DRILLED	:	Aug54
DEPTH DRILLED (GS)	:	240-ft
MEASURED DEPTH (GS)	:	233.4-ft, 26Sep90
DEPTH TO WATER (GS)	:	230-ft Aug54; 227.3-ft, 23Jun93
CASING DIAMETER	:	8-in carbon steel, +2.59-235-ft; 4-in carbon steel, +2.5-210-ft
ELEV TOP OF CASING	:	632.11-ft, [13Aug92-NGVD'29] NOTE: 629.04-ft before remediation
ELEV GROUND SURFACE	:	629.52-ft, Brass cap [13Aug92-NGVD'29] NOTE: 625.89-ft before remediation
PERFORATED INTERVAL	:	0-205-ft and 215-235-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 23Oct89, Carbon steel casing, (2). 2-ft round pad, no posts, capped, not locked. Brass cap in pad. FIELD INSPECTION, 17Jun92, 4 and 8-in carbon steel casings. Capped and locked. 4-ft by 4-ft concrete pad, 4 posts. Identification stamped on brass marker in pad. In underground radiation zone. OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Depths referenced to ground surface; 07Nov89; Depth to bottom: 231-ft Bottom of casing: 231-ft Depth to water: 219-ft Perforations began at 210 ft, 6 rd/ft. Scale/crud buildup below water level excessive making perforations indistinguishable. Some perforations were visible at bottom of casing. The camera travel knocked enough crud off casing on trip in that nothing could be seen coming out due to the murky water. This well requires scrubbing and redevelopment. 20Sep90; Depth to bottom: 233-ft, soft silty looking. Depth to water: 221.4-ft, some floating debris. Perforations began at 211-ft, 6 per rd/ft. Those perforations visible were open. Because of going from 4-in to 8-in casing, the 8-in didn't come real clean. Most of the real heavy rust and scale has been removed. Water is clear.
DATE EVALUATED	:	13Nov90
EVAL RECOMMENDATION	:	1. Remove existing 2-ft round concrete collar. 2. Install protective posts and concrete pad per WAC 173-160-510 and field conditions. 3. Survey to water level measurement standards.
LISTED USE	:	SST monthly water levels measurement, 27Oct54-23Jun93;
CURRENT USER	:	WHC ER characterization, WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Electric submersible, intake at 226.1.0-ft, (GS).
MAINTENANCE	:	27Oct89; Pulled electric submersible pump. No contamination encountered. 07Nov89; TV camera survey. 01Dec89; Installed electric submersible pump. 10Jul90; Pulled submersible pump and scrubbed casing. Bailed debris. 30Aug90-05Sep90; Bailed and developed with pump to <5 NTU. 20Sep90; TV camera survey. 26Sep90; Set pump and installed new cap.
REMEDIATION	:	02-09Jun92 - Remediation rig set up. Checked depth to concrete between 4 & 8-in casing. Placed fill around wellhead. Excavated for and set 4 posts. Poured 4-ft by 4-ft concrete pad & installed brass cap. 10-11Jun92 - Extended 8-in casing 1.46-ft. Cleaned site. 18Jun92; Primed, painted and stenciled numbers on casing, cap and posts.

WELL CONSTRUCTION AND COMPLETION SUMMARY

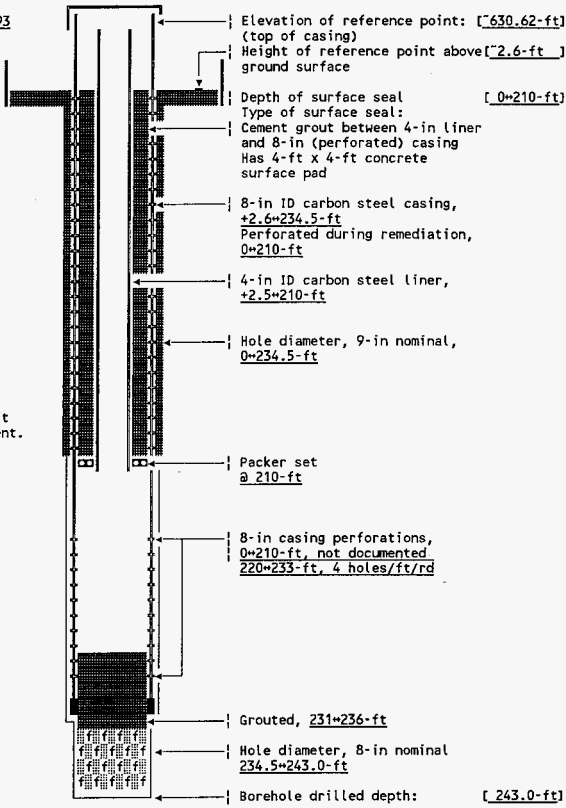
Drilling Method: Cable tool	Sample Method: Hard tool (nom)	WELL NUMBER: 299-E33-2	TEMPORARY WELL NO: 241-BY-10
Drilling Fluid Used: Water	Additives Used: Not documented	Hanford Coordinates: N/S N 46,465.5	E/W W 53,384.1
Driller's Name: Row, Jahnke	WA State Lic Nr: Not documented	State 137,641.56m	573,617.22m
Drilling Company: Not documented	Company Location: Not documented	Coordinates: N 451,630	E 2,241,822
Date Started: 15Oct54	Date Complete: 02Nov54	Start Card #: Not documented	T ___ R ___ S ___
		Elevation Ground surface: 628.0-ft Estimated	

Depth to water: 232-ft Oct54
(Ground surface) 227.0-ft 23Jun93

GENERALIZED STRATIGRAPHY — Driller's Log

0-20: BACKFILL-BOULDER & GRAVEL
20-25: SAND and GRAVEL
25-150: SAND
150-155: SAND and some SILT
155-175: Cse SAND
175-190: SAND and GRAVEL
190-234.5: GRAVEL
234.5-243: BASALT

REMEDIATION:
Mar79 by Bultena.
Installed 4½-in OD casing on packer to 210-ft.
Perforated 8-in casing 0-210-ft and grouted w/568-gals of cement.
A cement plug was also placed 231-236-ft, (18-gals)
Jun92 by GWWS
Installed pad and posts.
Extended casing 0.625-ft.
Painted casing, posts and well number.



Drawing By: RKL/2E33-02.ASB
Date : 10Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-2

WELL DESIGNATION	:	299-E33-2
RCRA FACILITY	:	SST-241-BY-Farm
CERCLA UNIT	:	200 Aggregate Area Management Study
HANFORD COORDINATES	:	N 46,465.5 W 53,384.1 [13Apr91-200E]
LAMBERT COORDINATES	:	N 451,630 E 2,241,822 [HANCONV]
	:	N 137,641.56m E 573,617.22m [13Apr91-NAD83]
DATE DRILLED	:	Nov54
DEPTH DRILLED (GS)	:	243-ft
MEASURED DEPTH (GS)	:	234.6-ft, Sep90
DEPTH TO WATER (GS)	:	232-ft, Oct54; 227.0-ft, 23Jun93
CASING DIAMETER	:	8-in, carbon steel, +2.6~234.5-ft 4-in, carbon steel, +2.0~210-ft
ELEV TOP OF CASING	:	~630.62-ft,
ELEV GROUND SURFACE	:	628.0-ft, Estimated
PERFORATED INTERVAL	:	0~210-ft and 220~233-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 29Mar91, Carbon steel casing (2). 2-ft round pad, no posts,not capped or locked. Brass cap in pad with stamped well number. FIELD INSPECTION, 17Jun92, 4 and 8-in casing, capped and locked. 4-ft by 4-ft concrete pad, 4 posts. Identifcation stamped on brass marker in pad. In underground radiation zone. OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Depths referenced to ground surface 07Nov89; Depth to bottom: 234-ft Bottom of casing: 4-in surface to 215-ft, 8-in to bottom? Depth to water: 219-ft Perforations start at 217-ft and were visible to the bottom at 234-ft. Water remained clear while running the camera. Appeared to be a seperation in the 8-in casing at 230-ft. Will require further review. 20Sep90; Depth to bottom: 233-ft, debris on bottom. Depth to water: 223.4-ft, some floating debris. Perforations start at 219-ft. Those visible above and below water were open. Appeared to be open hole below the 8-in casing at 230-233-ft. Heavy rust and scale removed but light stuff to some extent was left.
DATE EVALUATED	:	13Nov90
EVAL RECOMMENDATION	:	1. Remove existing 2-ft round concrete collar. 2. Install protective posts and concrete pad per WAC 173-160-510 and field conditions. 3. Survey to water level measurement standards.
LISTED USE	:	200 BP-1 quarterly water level measurement, 22Dec54~23Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring,
PUMP TYPE	:	Electric submersible,
MAINTENANCE	:	27Oct89; Removed electric submersible pump. 6,000 dpm contamination encountered. 07Nov89; TV camera survey. 01Dec89; Installed submersible pump. 12~13Jul90; Removed submersible pump, brushed casing and bailed debris. 06~07Sep90; Developed well by pumping to <5 NTU. 20Sep90; TV camera survey. 26Sep90; Installed electric submersible pump and new cap.
REMEDIATION:	:	02Jun92~11Jun92; Tagged grout between 4&8-in casing. Cut windows in 8-in casing. Pulled pump. Excavated for posts and pad. Installed 4 posts and protective pad. Extended 8-in casing 0.625-ft. Set and stamped brass marker in pad. Cleaned site. 18Jun92; Primed and painted post, casing and cap. Stenciled well number.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Row, Jahnke
Drilling Company: Not documented
Date Started: 04Nov54

Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 23Nov54

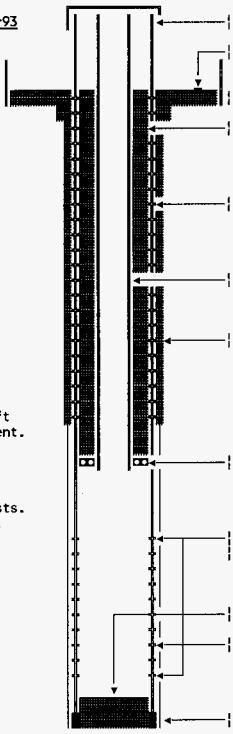
WELL NUMBER: 299-E33-3
TEMPORARY WELL NO: 241-BY-11
Hanford Coordinates: N/S N 46,546,7 E/W W 53,330.9
State 137,666.4m 573,633.4m
Coordinates: N 451,712 E 2,241,875
Start Card #: Not documented T___ R___ S_____
Elevation Ground surface: 628.02-ft Brass cap

Depth to water: 226-ft Nov54
(Ground surface): 226.1-ft 12Mar93

GENERALIZED STRATIGRAPHY — Driller's Log

0-10: TOP SOIL, BOULDERS
10-50: SAND and GRAVEL
50-55: GRAVEL
55-80: GRAVEL and SAND
80-95: SAND, GRAVEL and SILT
95-105: SAND
105-125: SAND, SILT
125-175: SAND
175-190: SAND, SILT
190-192: SAND
192-223: GRAVEL
232-236: BASALT

REMEDIATION:
Feb-Mar79 by Bultena.
Installed 4½-in OD casing on packer to 212-ft.
Perforated 8-in casing 0-207-ft and grouted w/408-gals of cement.
A cement plug was also placed 231-236-ft.
Jun92 by WHC-GWS
Excavated for and installed surface pad and protective posts.
Extended 8-in casing 0.625-ft.



Elevation of reference point: [630.62-ft]
(top of casing)
Height of reference point above ground surface [2.6-ft]
Depth of surface seal [0-207-ft]
Type of surface seal:
Cement grout between 4-in liner and 8-in (perforated) casing
Has 4-ft x 4-ft concrete surface pad
8-in ID carbon steel casing, +2.6-~236-ft
Perforated during remediation, 0-207-ft
4-in ID carbon steel liner, +ND-212-ft
Hole diameter, 9-in nominal, 0-236-ft
Packer set @ 212-ft
8-in casing perforations, 0-207-ft, 2 cuts/rd/ft
219-231-ft, not documented
Measured depth to bottom: 234.6-ft, 26Sep90
Possible parted casing at 230-ft by TV
Borehole drilled depth: [236-ft]
Grouted ~231-236-ft

Drawing By: RKL/2E33-03.ASB
Date : 10Sep93
Reference : HANFORD WELLS
WHC-S-053

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-3

WELL DESIGNATION	:	299-E33-3
RCRA FACILITY	:	SST-241-BY-Farm
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 46,546.7 W 53,330.9 [13Aug92-200E]
LAMBERT COORDINATES	:	N 451,712 E 2,241,875 [HANCONV]
	:	N 137,666.4m E 573,633.4m [13Aug92-NAD83]
DATE DRILLED	:	Nov54
DEPTH DRILLED (GS)	:	236-ft
MEASURED DEPTH (GS)	:	234.6-ft, Sep90
DEPTH TO WATER (GS)	:	226-ft, Nov54; 226.1-ft, 12Mar93
CASING DIAMETER	:	8-in, carbon steel, +2.6'236-ft; 4-in, carbon steel, +ND'212-ft
ELEV TOP OF CASING	:	630.62-ft, [13Aug92-NGVD'29]
ELEV GROUND SURFACE	:	628.02-ft, Brass cap [13Aug92-NGVD'29]
PERFORATED INTERVAL	:	0'207-ft and 219'231-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 29Mar91, Carbon steel casing (2). 2-ft round pad, no posts,not capped or locked. Brass cap in pad with stamped well number. FIELD INSPECTION, 17Jun92, 4 and 8-in casing, capped and locked. 4-ft by 4-ft concrete pad, 4 posts. Identifcation stamped on brass marker in pad. In underground radiation zone. OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Depths referenced to ground surface 07Nov89; Depth to bottom: 234-ft Bottom of casing: 4-in surface to 215-ft, 8-in to bottom? Depth to water: 219-ft Perforations start at 217-ft and were visible to the bottom at 234-ft. Water remained clear while running the camera. Appeared to be a seperation in the 8-in casing at 230-ft. Will require further review. 20Sep90; Depth to bottom: 233-ft, debris on bottom. Depth to water: 223.4-ft, some floating debris. Perforations start at 219-ft. Those visible above and below water were open. Appeared to be open hole below the 8-in casing at 230-233-ft. Heavy rust and scale removed but light stuff to some extent was left.
DATE EVALUATED	:	13Nov90
EVAL RECOMMENDATION	:	1. Remove existing 2-ft round concrete collar. 2. Install protective posts and concrete pad per WAC 173-160-510 and field conditions. 3. Survey to water level measurement standards.
LISTED USE	:	200 BP-1 quarterly water level measurement, 22Dec54'28Jun93;
CURRENT USER	:	WHC ER characterization, WHC ES&M w/l monitoring, PNL sitewide sampling 93
PUMP TYPE	:	Electric submersible,
MAINTENANCE	:	27Oct89; Removed electric submersible pump. 6,000 dpm contamination encountered. 07Nov89; TV camera survey. 01Dec89; Installed submersible pump. 12'13Jul90; Removed submersible pump, brushed casing and bailed debris. 06'07Sep90; Developed well by pumping to <5 NTU. 20Sep90; TV camera survey. 26Sep90; Installed electric submersible pump and new cap.
REMEDIATION:	:	02Jun92'11Jun92; Tagged grout between 4&8-in casing. Cut windows in 8-in casing. Pulled pump. Excavated for posts and pad. Installed 4 posts and protective pad. Extended 8-in casing 0.625-ft. Set and stamped brass marker in pad. Cleaned site. 18Jun92; Primed and painted post, casing and cap. Stenciled well number.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Gentz
Drilling Company: Not documented
Date Started: 11Dec54

Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 16Dec54

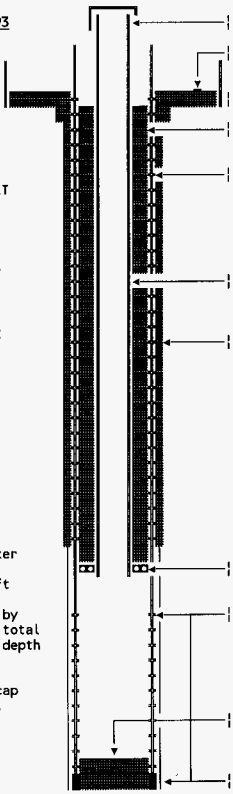
WELL NUMBER: 299-E33-4
TEMPORARY WELL NO: 241-BY-12
Hanford Coordinates: N/S N 46,635.6 E/W W 53,384.4
State NAD83 137,693.40m 573,616.97m
Coordinates: N 451,800 E 2,241,821
Start Card #: Not documented T___ R___ S___
Elevation Ground surface: 627.18-ft Brass cap

Depth to water: 222-ft Dec54
(Ground surface) 225.1-ft 28Jun93

GENERALIZED STRATIGRAPHY — Driller's Log

0-15: NOT DOCUMENTED
15-20: BACKFILL
20-35: Small and coarse GRAVEL
35-65: SAND and GRAVEL
65-85: Fine and coarse SAND
85-95: Fine SAND with little SILT
95-135: Fine and coarse SAND
135-145: Fine and coarse SAND and little SILT
145-150: Coarse SAND and GRAVEL
150-155: Small and coarse GRAVEL and little SAND
155-195: Fine and coarse SAND
195-205: SAND and coarse GRAVEL
205-229: Small and coarse GRAVEL
229-231: GRAVEL, SAND and BASALT
231 : BASALT

REMEDIATION:
Mar79 by Bultena,
Installed 4½-in casing on packer to ~210-ft.
Perforated 8-in casing 0-205-ft and grouted w/438-gals cement.
Placed cement plug 231-236-ft by driller's log. However, well total depth was 231-ft and measured depth is now 228-ft.
Jun92 by WHC-GWS
Installed surface pad, brass cap and protective posts. Painted.



Elevation of reference point: [629.84-ft] (top of casing)
Height of reference point above ground surface [2.66-ft]
Depth of surface seal [0-205-ft]
Type of surface seal:
Cement grout between 4-in liner and 8-in (perforated) casing
8-in ID carbon steel casing, +~2.5-231-ft
Perforated during remediation, 0-205-ft
4-in ID carbon steel liner, +2.7-~210-ft
Hole diameter, 9-in nominal 0-231-ft
Packer set (5-ft above water) @ ~210-ft
8-in casing perforations 0-205-ft, 2 cuts/rd/ft 215-231-ft, not documented
Grouted (see REMEDIATION note) ~228-231-ft
Borehole drilled depth: [231-ft]

Drawing By: RKL/2E33-04.ASB
Date : 10Sep93
Reference : HANFORD WELLS
WHC-S-053

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-4

WELL DESIGNATION	:	299-E33-4
RCRA FACILITY	:	SST-241-BY-Farm
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 46,635.6 W 53,384.4 [13Aug92-200E]
LAMBERT COORDINATES	:	N 451,800 E 2,241,821 [HANCONV] N 137,693.40m E 573,616.97m [13Aug92-NAD83]
DATE DRILLED	:	Dec54
DEPTH DRILLED (GS)	:	231-ft
MEASURED DEPTH (GS)	:	228-ft, Sep90
DEPTH TO WATER (GS)	:	221.1-ft Dec54; 225.1-ft, 28Jun93
CASING DIAMETER	:	8-in, carbon steel, ~+2.5~231-ft;
	:	4-in, carbon steel, +2.66~210-ft
ELEV TOP OF CASING	:	629.84-ft, [13Aug92-NGVD'29]
ELEV GROUND SURFACE	:	627.18-ft, Brass cap [13Aug92-NGVD'29]
PERFORATED INTERVAL	:	0~205-ft and 215~231-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 20Mar91, Carbon steel casing (2). No pad, no posts, capped not locked. No permanent identification. FIELD INSPECTION, 17Jun92, 4 and 8-in carbon steel casings, capped and locked. 4-ft by 4-ft concrete pad, 4 posts, identification stamped on brass marker in pad. In underground radiation zone. OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Depths referenced to ground surface; Jan90; Depth to bottom: 221-ft Depth to water: 209-ft Could not determine perforation location. Hung up at 212-ft coming out. 20Sep90; Depth to bottom: 229-ft, gravel on bottom. Depth to water: 221.1-ft. Perforations start at 219-ft. Some visible and open below water surface. 8-in casing below water had some scale because of the way the well had to be cleaned. Water very clear.
DATE EVALUATED	:	13Nov90
EVAL RECOMMENDATION	:	1. Install protective posts and concrete pad per WAC 173-160-510 and field conditions. 2. Survey to water level measurement standards.
LISTED USE	:	200 BP-1 quarterly water level measurment, 22Dec54~28Jun93,
CURRENT USER	:	WHC ES&M w/l monitoring, WHC ER characterization
PUMP TYPE	:	Hydrostar, intake at 227.7-ft, (top-of-casing).
MAINTENANCE	:	08Aug90; Brushed casing and bailed debris. No contamination encountered. 12~13Sep90; Bailed and developed well with pump to <5 NTU. 20Sep90; TV camera survey. 27Sep90; Installed Hydrostar pump and new cap.
REMEDIATION:	:	01~11Jun92: Pulled pump. Tagged grout between 8~4-in casing. Cut windows in 8-in casing. Excavated for posts and pad. Installed 4 posts protective pad, and brass marker in pad. Stamped number on marker. Cleaned site. Did not extend casing. 18Jun92: Primed and painted posts, casing and cap. Stenciled well number.

WELL CONSTRUCTION AND COMPLETION SUMMARY

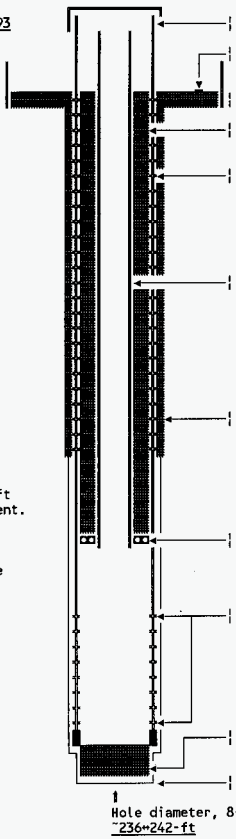
Drilling Method: Cable tool	Sample Method: Hard tool (nom)	WELL NUMBER: 299-E33-5	TEMPORARY WELL NO: 241-BY-16
Drilling Fluid Used: Water	Additives Used: Not documented	Hanford Coordinates: N/S N 46,351.5	E/W W 53,524.8
Driller's Name: Row, Jahnke	WA State Lic Nr: Not documented	State NAD83 N 137,606.71	E 573,574.44
Drilling Company: Not documented	Company Location: Not documented	Coordinates: N 451,516	E 2,241,681
Date Started: 14Jun55	Date Complete: 23Jun55	Start Card #: Not documented	T ___ R ___ S ___
		Elevation Ground surface: 632.16-ft Brass cap	

Depth to water: 232.5-ft Jun55
(Ground surface) 230.0-ft 23Jun93

GENERALIZED STRATIGRAPHY — Driller's Log

0-25: BACKFILL
25-75: GRAVEL, SAND
75-100: SAND, some SILT
100-180: SAND
180-190: SAND, GRAVEL, SILT
190-225: GRAVEL
225-236: GRAVEL, SAND
236-242: BASALT

REMEDIATION:
Feb79 by Bultena
Installed 4-1/2-in OD casing on packer to 212-ft.
Perforated 8-in casing 0-200-ft and grouted with 375-gals cement.
A cement plug was also placed 237-242-ft.
Jun92 by WHC GWWS
Installed 4-ft by 4-ft surface pad and 4 protective posts.
Extended 8-in casing 1.83-ft.



Elevation of reference point: [634.72-ft] (top of casing)
Height of reference point above ground surface [2.56-ft]
Depth of surface seal [0-200-ft]
Type of surface seal: Cement grout between 4-in liner and 8-in (perforated) casing
8-in ID carbon steel casing, +2.5-~236-ft
Perforated during remediation, 0-200-ft
4-in ID carbon steel liner, +~1.5-212-ft
Hole diameter, 9-in nominal, 0-~236-ft
Packer set: @ 212-ft
8-in casing perforations, 0-200-ft, 2 cuts/rd/ft 218-235.5-ft, 4 holes/ft
Grouted, 237-242-ft
Borehole drilled depth: [242-ft]
Hole diameter, 8-in nominal, ~236-242-ft

Drawing By: RKL/2E33-05.ASB
Date : 10Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-5

WELL DESIGNATION	:	299-E33-5
RCRA FACILITY	:	SST-241-BY-Farm
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 46,351.5 W 53,524.8 [13Aug92-200E]
LAMBERT COORDINATES	:	N 451,516 E 2,241,681 [HANCONV] N 137,606.71m E 573,574.44m [13Aug92-NAD83]
DATE DRILLED	:	Jun55
DEPTH DRILLED (GS)	:	242-ft
MEASURED DEPTH (GS)	:	238-ft, Sep90 TV
DEPTH TO WATER (GS)	:	232.5-ft, Jun55; 230.0-ft, 23Jun93
CASING DIAMETER	:	8-in, carbon steel, +2.56'-236-ft; 4-in, carbon steel, -+1.5'-212-ft
ELEV TOP OF CASING	:	634.72-ft, [13Aug92-NGVD'29]
ELEV GROUND SURFACE	:	632.16-ft, Brass cap [13Aug92-NGVD'29]
PERFORATED INTERVAL	:	0-200-ft and 218-235.5-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 29Mar91 Carbon steel casing (2). 2-ft round pad, no posts, capped not locked. Brass cap in pad with stamped well number. FIELD INSPECTION, 17Jun92 4 and 8-in carbon steel casing, capped and locked. 4-ft by 4-ft concrete pad, 4 posts, identification stamped on brass marker in pad. In underground radiation zone. OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Depths referenced to ground surface Nov89; Depth to bottom: 236-ft Bottom of casing: 4-in surface to 212-ft, 8-in to 236-ft Depth to water: 226-ft Perforations start at 217-ft and were fairly visible below the water level clear to the bottom at 236-ft. No appreciable scale buildup. 20Sep90; Depth to bottom: 238-ft, silty Depth to water: 225-ft Perforations began at 219-ft, those visible below the water level were open. Light scale below water because of the way the well was cleaned. Water clear.
DATE EVALUATED	:	13Nov90
EVAL RECOMMENDATION	:	1. Remove existing 2-ft round concrete collar. 2. Install protective posts and concrete pad per WAC 173-160-510 and field conditions. 3. Survey to water level measurement standards.
LISTED USE	:	SST monthly water level measurement, 19Aug55-23Jun93,
CURRENT USER	:	WHC ES&M w/l monitoring, WHC ER characterization, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	27Oct89; Removed electric submersible pump. 07Nov89; TV camera survey. 13-15Nov89; Fished pipe and pump from well. 01Dec89; Installed electric sumersible pump. 16Jul90; Removed pump and cleaned well. 28-29Aug90; Bailed clean, developed with pump to <5 NTU. 20Sep90; TV camera survey. 28Sep90; Set electric submersible pump and installed new cap on well.
REMEDIATION	:	02-10Jun92; Pulled pump. Cut windows in 8-in casing. Placed fill around well site. Excavated for posts and pad. Installed 4 posts, protective pad and brass marker. Stamped well number on marker. Extended 8-in casing 1.83-ft. Cleaned site. 18Jun92; Primed and painted post, casing and cap. Stenciled well number on casing and post.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Row, Richards
Drilling Company: Not documented
Date Started: 13Apr55

Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 27Jun55

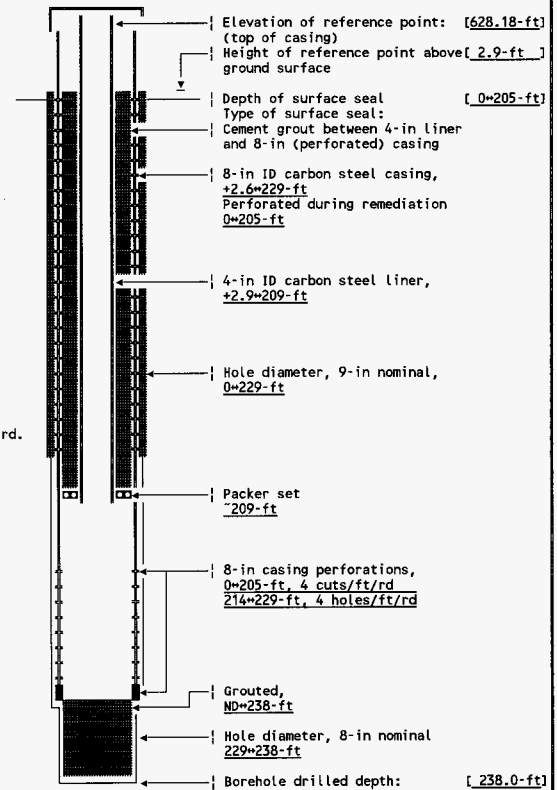
WELL NUMBER: 299-E33-6
TEMPORARY WELL NO: 241-BY-15
Hanford Coordinates: N/S N 46,503.0 E/W W 53,524.5
State NAD83 Coordinates: N 137,652.87m E 573,574.40m
Start Card #: 451,667 E 2,241,681
Not documented T ___ R ___ S ___
Elevation Ground surface: 625.3-ft Estimated

Depth to water: 225-ft Apr55
(Ground surface)

GENERALIZED STRATIGRAPHY — Driller's Log

0-15: BACKFILL - BOULDERS
15-25: BOULDERS
25-30: GRAVEL - SAND
30-55: SAND - GRAVEL
55-70: SAND - SILT
70-120: SAND, some SILT
120-190: SAND
190-206: GRAVEL - SAND
210-225: Pure GRAVEL
225-229: GRAVEL - SAND
229-238: BASALT

REMEDIATION:
Mar79 by Bultena.
Cleaned hole out and perforated 8-in casing 0-205-ft, 4 cuts/ft/rd.
Installed 4-in ID casing to 209-ft on packer.
Grouted annulus w/cement grout.
Also placed 18-gal cement plug at bottom of borehole ND-238-ft.



Drawing By: RKL/2E33-06.ASB
Date : 10Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-6

WELL DESIGNATION	:	299-E33-6
RCRA FACILITY	:	SST-241-BY-Farm
CERCLA UNIT	:	200 Aggregate Area Management Study
HANFORD COORDINATES	:	N 46,503.0 W 53,524.5 [13Apr91-200E]
LAMBERT COORDINATES	:	N 451,667 E 2,241,681 [HANCONV]
	:	N 137,652.87m E 573,574.40m [13Apr91-NAD83]
DATE DRILLED	:	Apr55, extended Jun55
DEPTH DRILLED (GS)	:	238-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	225-ft, Apr55;
CASING DIAMETER	:	8-in, carbon steel, +2.6↔229.0-ft
		4-in, carbon steel, +2.9↔209-ft
ELEV TOP OF CASING	:	628.18-ft, [13Apr91-NGVD'29]
ELEV GROUND SURFACE	:	625.3-ft, Estimated
PERFORATED INTERVAL	:	0↔205-ft and 214↔229-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 02Mar91,
		4 and 8-in carbon steel casing.
		No pad, no posts, capped not locked.
		In surface radiation zone.
		OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	Water levels measured 28Apr55↔04Feb86,
CURRENT USER	:	None documented
PUMP TYPE	:	None
MAINTENANCE	:	Casing extended 07May91?
		casing lowered 18Jun91, amount not documented.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Row, Richards
Drilling Company: Not documented
Date Started: 29Feb55

Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 08Apr55

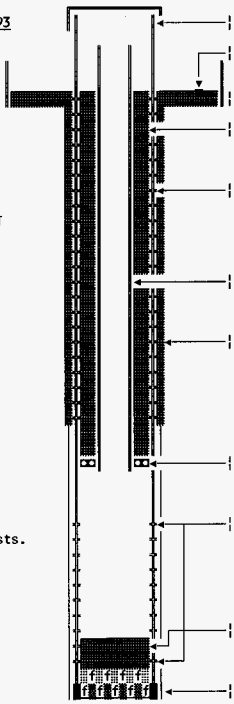
WELL NUMBER: 299-E33-7
TEMPORARY WELL NO:
Hanford Coordinates: N/S N 46,619 E/W W 53,520
State (NAD83) N 137,696.2m 573,574.3m
Coordinates: N 451,783 E 2,241,685
Start Card #: Not documented T R S
Elevation Ground surface: 622.6-ft Estimated

Depth to water: 225-ft Apr55
(Ground surface) 223.2-ft 28Jun93

GENERALIZED STRATIGRAPHY — Driller's Log

0↔20: BACKFILL
20↔55: GRAVEL and SAND
55↔110: SAND and SILT
110↔150: SAND
150↔165: SAND and SILT
165↔192: SAND
192↔230: GRAVEL
230↔233: GRAVEL, SAND and BASALT

REMEDIATION:
Feb79 by Bultena.
Installed 4½-in OD casing on packer to 210-ft, (nom).
Perforated 8-in casing 0↔~205-ft and grouted with 733-gals. of cement.
A cement plug was also placed 228↔231-ft.
Jun92 by WHC-GWWS
Placed fill around well site.
Excavated for and installed surface pad and protective posts.
Extended 8-in casing 0.83-ft



Elevation of reference point: [626.58-ft] (top of casing)
Height of reference point above ground surface [4.0-ft]
Depth of surface seal [0↔~205-ft]
Type of surface seal: Cement grout between 4-in liner and 8-in (perforated) casing
8-in ID carbon steel casing, +2.5↔233-ft
Perforated during remediation, 0↔~205-ft
4-in ID carbon steel casing, +~1.5↔~210-ft
Hole diameter, 9-in nominal 0↔233-ft
Packer set: @ ~210-ft
8-in casing perforations, 0↔85-ft, 2 cuts/rd/ft
85↔205-ft, not documented
215↔231-ft, 4 holes/ft
Grouted 228↔231-ft
Borehole drilled depth: [233-ft]

Drawing By: RKL/2E33-07.ASB
Date : 10Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-7

WELL DESIGNATION	:	299-E33-7
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 46,645.3 W 53,524.5 [13Aug92-200E]
LAMBERT COORDINATES	:	N 451,810783 E 2,241,681 [HANCONV] N 137,696.24m E 573,574.28m [13Aug92-NAD83]
DATE DRILLED	:	Apr55
DEPTH DRILLED (GS)	:	233-ft
MEASURED DEPTH (GS)	:	234-ft, Sep90 TV
DEPTH TO WATER (GS)	:	225-ft, Apr55; 223.2-ft, 28Jun93
CASING DIAMETER	:	8-in, carbon steel, +2.54↔231-ft; 4-in, carbon steel, ~+1.5↔~210-ft
ELEV TOP OF CASING	:	627.82-ft, [13Aug92-NGVD'29]
ELEV GROUND SURFACE	:	625.28-ft, Brass cap [13Aug92-NGVD'29]
PERFORATED INTERVAL	:	0↔85-ft, 85↔200-ft and 215↔231-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 23Oct89, Carbon steel casing (2). 2-ft round pad, no posts, capped not locked. No permanent identification. FIELD INSPECTION, 17Jun92, 4 and 8-in carbon steel casing, capped and locked. 4-ft by 4-ft concrete pad, 4 posts, identification on brass marker in pad. In underground radiation zone. OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Depths referenced to ground surface; Nov89; Depth to bottom: Unable to determine Bottom of casing: 4-in surface to 212-ft Depth to water: 213-ft Small pipe, possibly bailer at 224-ft. Wire in hole at 226-ft. Perforations start at 214-ft. 20Sep90; Depth to bottom: 234-ft Depth to water: 219.5-ft, some floating debris. Perforations start at 213-ft, 4 cuts/ft. Perfs above water good, those visible below water open. Some debris on bottom, looked like plastic or metal of some kind. Well had extensive fishing trying to remove pump and other debris.
DATE EVALUATED	:	13Nov90
EVAL RECOMMENDATION	:	1. Remove existing 2-ft round concrete collar. 2. Install protective posts and concrete pad per WAC 173-160-510 and field conditions. 3. Survey to water level measurement standards.
LISTED USE	:	200 BP-1 monthly water level measurement, 28Apr55↔28Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring, WHC ER characterization, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar,
MAINTENANCE	:	20Jul89; PNL TV camera survey. 17↔26Jul90; Cleaned junk/debris from well, and scrubbed casing. 14↔17Sep90; Bailed and developed well with pump to <5 NTU. 20Sep90; TV camera survey. 27Sep90; Set Hydrostar pump and installed new cap.
REMEDIATION	:	01↔11Jun92; Placed fill material around well site. Excavated for posts and pad. Cut windows in 8-in casing. Installed 4 posts, surface pad and brass marker in pad. Stamped well number on brass marker. Extended 8-in casing 0.83-ft. Cleaned site. 18Jun92; Primed and painted posts, casing and cap. Stenciled well number on casing and post.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Gentz
Drilling Company: Not documented
Date Started: 24Sep53

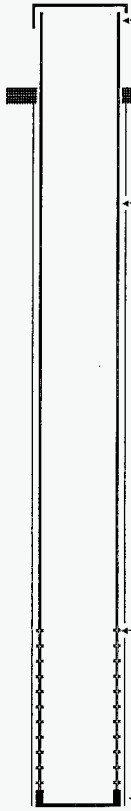
Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 060ct53

WELL NUMBER: 299-E33-8
TEMPORARY WELL NO:
Hanford Coordinates: N/S N 45,832.4 E/W W 53,850.9
State NAD83 N 137,448.22m 573,475.51m
Coordinates: N 450,996 E 2,241,356
Start Card #: Not documented T R S
Elevation Ground surface: 647.1-ft Estimated

Depth to water: 246-ft Oct53
(Ground surface) 245.2-ft 24Jun93

GENERALIZED STRATIGRAPHY / Driller's Log

0-10: SAND, GRAVEL, BOULDERS
10-25: SAND and GRAVEL
25-30: GRAVEL
30-40: SAND and GRAVEL
40-50: SAND
50-60: SAND and GRAVEL
60-65: SAND with SILT and GRAVEL
65-90: SAND with SILT
90-95: SAND with SILT and BOULDERS
95-160: SAND with SILT
160-165: SAND
165-205: SAND with SILT
205-210: Coarse SAND
210-220: GRAVEL
220-230: SAND and GRAVEL
230-257: GRAVEL
257 : BASALT



Elevation of reference point: [650.73-ft] (top of casing)
Height of reference point above ground surface [3.6-ft]
Depth of surface seal [ND]
Type of surface seal:
None documented, has
2-ft round concrete collar, depth ND
8-in ID carbon steel casing, +3.6-257-ft
8-in casing perforations, 230-257-ft, 5 holes/ft
Borehole drilled depth: [257-ft]

Drawing By: RKL/2E33-08.ASB
Date : 10Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-8

WELL DESIGNATION	:	299-E33-8
RCRA FACILITY	:	SST-241-BY-Farm
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 45,832.4 W 53,850.9 [17Sep90-200E]
LAMBERT COORDINATES	:	N 450,996 E 2,241,356 [HANCONV] N 137,448.22m E 573,475.51m [17Sep90-NAD83]
DATE DRILLED	:	Oct53
DEPTH DRILLED (GS)	:	257-ft
MEASURED DEPTH (GS)	:	257+-ft, Nov89 TV
DEPTH TO WATER (GS)	:	246-ft, Oct53; 245.2-ft, 24Jun93
CASING DIAMETER	:	8-in, carbon steel, +3.6↔257-ft
ELEV TOP OF CASING	:	650.73-ft, [17Sep90-200E]
ELEV GROUND SURFACE	:	647.2-ft, Estimated
PERFORATED INTERVAL	:	230↔257-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 01Feb90, Carbon steel casing. 2-ft round pad, no posts, capped and locked. Brass cap in pad with stamped identification. OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Depths referenced to ground surface; Nov89; Depth to bottom: 259-ft Bottom of casing: 257-ft Depth to water: 246.3-ft The perforations started at ~225-ft, 4 perfs rd/ft. The perforations couldn't be distinguished below the water level, but could occasionally be picked out. Casing has heavy scale and crud build-up. Will require scrubbing and redevelopment prior to use.
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	SST monthly water level measurement, 21Jan54↔24Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring,
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	05Sep89; Installed cap and hasp and locked well. 12Oct89; Removed electric submersible pump. 02Nov89; TV camera survey. 29↔30Nov89; Installed electric submersible pump. 15May90; Removed electric submersible pump. 16May90; Scrubbed casing and bailed debris.

WELL CONSTRUCTION AND COMPLETION SUMMARY

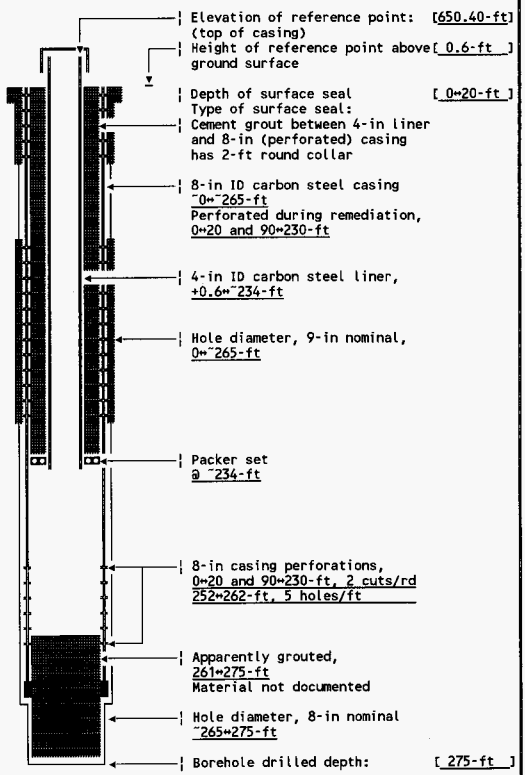
Drilling Method: Cable tool	Sample Method: Hard tool (nom)	WELL NUMBER: 299-E33-9	TEMPORARY WELL NO: 241-BY-2
Drilling Fluid Used: Water	Additives Used: Not documented	Hanford Coordinates: N/S N 45,960	E/W W 53,285
Driller's Name: Chausse, Row	WA State Lic Nr: Not documented	State Coordinates: N 451,125	E 2,241,922
Drilling Company: Not documented	Company Location: Not documented	Start Card #: Not documented	T ___ R ___ S ___
Date Started: 27Jun49	Date Complete: 21Jul49	Elevation Ground surface: 649.8-ft Estimated	

Depth to water: 255-ft Jul49
(Ground surface) 245.3-ft Mar90 TV

GENERALIZED STRATIGRAPHY — Driller's Log

0-38: GRAVEL and SAND
38-57: GRAVEL, SAND and SILT
57-75: SAND
75-150: SAND and SILT
150-160: SAND
160-185: SAND and SILT
185-205: SAND, some SILT and CLAY
205-225: SAND, BASALT GRAVEL, SILT
225-264: GRAVEL, SAND, little SILT
264-265: "ROCK", SAND
265-275: BASALT

NOTE: Remediation May78. By Evans. Installed 4-1/2-in OD casing on packer to 234-ft, (nom). Perforated 8-in casing 0-20 and 90-230-ft and grouted with 124-cu ft of cement. A cement plug was apparently also placed from 261-275-ft.



Drawing By: RKL/2E33-09.ASB
Date : 10Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-9

WELL DESIGNATION	:	299-E33-9
RCRA FACILITY	:	SST-241-BY-Farm
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 46,960 W 53,285
LAMBERT COORDINATES	:	N 451,125 E 2,241,922
DATE DRILLED	:	Jul49
DEPTH DRILLED (GS)	:	275-ft
MEASURED DEPTH (GS)	:	260-ft, Mar90 TV
DEPTH TO WATER (GS)	:	255.5-ft Jul49; 245.3-ft Mar90 TV
CASING DIAMETER	:	8-in, carbon steel, 0↔~265-ft; 4-in, carbon steel, +0.6↔234-ft
ELEV TOP OF CASING	:	650.40-ft
ELEV GROUND SURFACE	:	649.8-ft Estimated
PERFORATED INTERVAL	:	0↔20-ft, 90↔230-ft, and 252↔262-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 27Oct89, Carbon steel casing. 2-ft round pad, no posts, capped and locked. No permanent identification. Access to well seriously impeded by structures. In radiation zone >4 mrem dose rate, also asbestos hazard zone. OTHER: Surface/annular seal by remediation in 1979. 4-in liner grouted to 234-ft integrity indeterminate.
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	28Mar90, depths referenced to ground surface; Depth to bottom: 259.8-ft, silty. May have large rock on bottom. Bottom of casing: Not determined. Depth to water: 245.3-ft, floating debris. Water murky, dislodged scale and suspended debris. Vadose zone casing: Some rust. Submerged casing: Some scale. Perforations not observed.
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	Water levels measured 12Sep49↔29Mar56, removed from w/l schedule
CURRENT USER	:	WHC TWRS radiation monitoring
PUMP TYPE	:	None documented
MAINTENANCE	:	28Mar90; TV camera survey.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Gentz
Drilling Company: Not documented
Date Started: 01Apr55

Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 20Apr55

WELL NUMBER: 299-E33-10
TEMPORARY WELL NO: 241-BY-14
Hanford Coordinates: N/S N 45,216 E/W W 54,566
State Coordinates: N 450,378 E 2,240,643
Start Card #: Not documented T ___ R ___ S ___
Elevation Ground surface: 668.3-ft Estimated

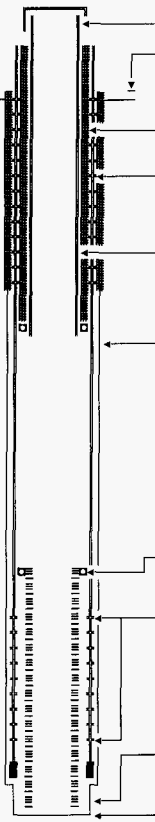
Depth to water: 276-ft Apr55
(Ground surface) 267-ft Dec90

GENERALIZED STRATIGRAPHY / Driller's Log

0-20: SAND, SILT, GRAVEL, BOULDERS
20-28: GRAVEL, COBBLES, SAND
28-30: GRAVEL, COBBLES
30-58: GRAVEL, SAND
58-70: SAND
70-105: SAND, little SILT
105-170: SAND and SILT
170-195: SAND
195-210: SAND and SILT
210-240: SAND, SILT, GRAVEL
240-260: GRAVEL
260-265: GRAVEL and SAND
265-275: GRAVEL
275-285: GRAVEL and SAND
285-287: SAND, little GRAVEL
287-290: BASALT

REMEDIATION:
Jun87 by Bigham
Perforated 259-265-ft
and set 40-ft of telescoping screen.

Evans Mar84
Perforated 0-115-ft and
installed 6-in liner.
Grouted annulus, (216-gals).



Elevation of reference point: [671.18-ft] (top of casing)
Height of reference point above ground surface [2.86-ft]
Depth of surface seal [0-115-ft]
Type of surface seal:
Cement grout between 6-in liner and 8-in (perforated) casing.
8-in ID carbon steel casing, ~+2.5-287-ft
Perforated during remediation, 0-115-ft
6-in ID carbon steel liner, +2.9-122-ft
Hole diameter, 9-in nominal 0-287-ft
Telescoping screen w/lead packer 250-290-ft KAI, slot not documented
8-in casing perforations, 259-265-ft, 4 cuts/rd/ft 265-285-ft, not documented
Hole diameter, 8-in nominal 287-290-ft
Borehole drilled depth: [290-ft]

Drawing By: RKL/2E33-10.ASB
Date : 10Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-10

WELL DESIGNATION	:	299-E33-10
RCRA FACILITY	:	216-B-Trenches
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-5)
HANFORD COORDINATES	:	N 45,216 W 54,566
LAMBERT COORDINATES	:	N 450,378 E 2,240,643
DATE DRILLED	:	Apr55
DEPTH DRILLED (GS)	:	290.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	276-ft, Apr55, 267.0-ft, Dec90
CASING DIAMETER	:	8-in, carbon steel, +3.0↔287.0-ft; 6-in carbon steel, +2.86↔122-ft
ELEV TOP CASING	:	671.18-ft
ELEV GROUND SURFACE	:	668.3-ft Estimated
PERFORATED INTERVAL	:	0↔115-ft; 259↔285-ft
SCREENED INTERVAL	:	250↔290-ft
COMMENTS	:	FIELD INSPECTION, 23Mar92 No pad. Capped and locked. No posts, no permanent identification. 8-in and 6-in carbon steel casing. In underground radiation zone.
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	Water levels measured 28Apr55↔20Dec90
CURRENT USER	:	PNL sitewide sampling 93
PUMP TYPE	:	Electric submersible
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Row, Jahnke
Drilling Company: Not documented
Date Started: 13Jan54

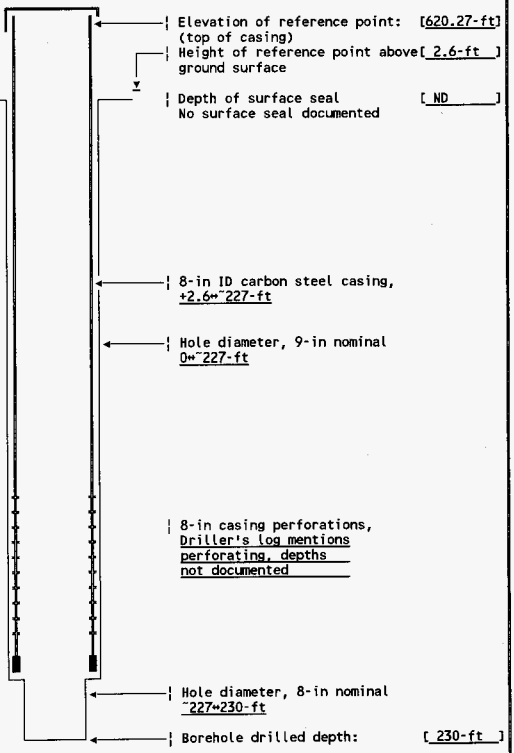
Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 01Feb54

WELL NUMBER: 299-E33-11
TEMPORARY WELL NO: 241-B-19
Hanford Coordinates: N/S N 46,444 E/W W 52,452
State Coordinates: N 451,611 E 2,242,754
Start Card #: Not documented T___ R___ S___
Elevation Ground surface: 617.7-ft Estimated

Depth to water: 225.5-ft Feb54
(Ground surface) 215-ft Nov89 TV

GENERALIZED STRATIGRAPHY — Driller's Log

0↔2: TOPSOIL
2↔5: BOULDERS, GRAVEL and TOPSOIL
5↔15: BOULDERS, GRAVEL and SILT
15↔20: BOULDERS, GRAVEL and SAND
20↔75: SAND, very little SILT
75↔95: SAND and GRAVEL
95↔115: SAND, GRAVEL and SILT
115↔125: Coarse SAND
125↔170: Coarse SAND and SILT
170↔195: SILT, fine GRAVEL, and SAND
195↔205: GRAVEL and SAND
205↔226.5: Pure GRAVEL



Drawing By: RKL/2E33-11.ASB
Date : 10Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-11

WELL DESIGNATION	:	299-E33-11
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 46,444 W 52,452
LAMBERT COORDINATES	:	N 451,611 E 2,242,754
DATE DRILLED	:	Feb54
DEPTH DRILLED (GS)	:	230-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	225.5-ft Feb54; 215-ft Nov89 TV
CASING DIAMETER	:	8-in, carbon steel, +2.6↔227-ft
ELEV TOP OF CASING	:	620.27-ft,
ELEV GROUND SURFACE	:	617.7-ft Estimated
PERFORATED INTERVAL	:	Not documented
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 07Feb90, 8-in carbon steel casing. No pad, no posts, capped and locked. No permanent identification. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	02Nov89, depths referenced to ground surface; Depth to bottom: Could not determine. Bottom of casing: ~227-ft Depth to water: ~215-ft Casing extremely scaled over below the water level. The scale/crud build-up was so bad it interfered with the camera travel. The camera knocked so much debris off the well casing that nothing could be seen on the trip out. A bailer and cable were found at the bottom of the well. No perforations could be distinguished.
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	Water levels measured 18Feb54↔29Mar56
CURRENT USER	:	None documented
PUMP TYPE	:	None documented
MAINTENANCE	:	02Nov89; PNL TV camera survey.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Not documented
Driller's Name: Jahnke,Blankenship,Row
Drilling Company: Not documented
Date Started: 27Jul53

Sample Method: Hard tool (nom)
Additives Used:Not documented
WA State Lic Nr: Not documented
Company Location:Not documented
Date Complete: 21Sep53

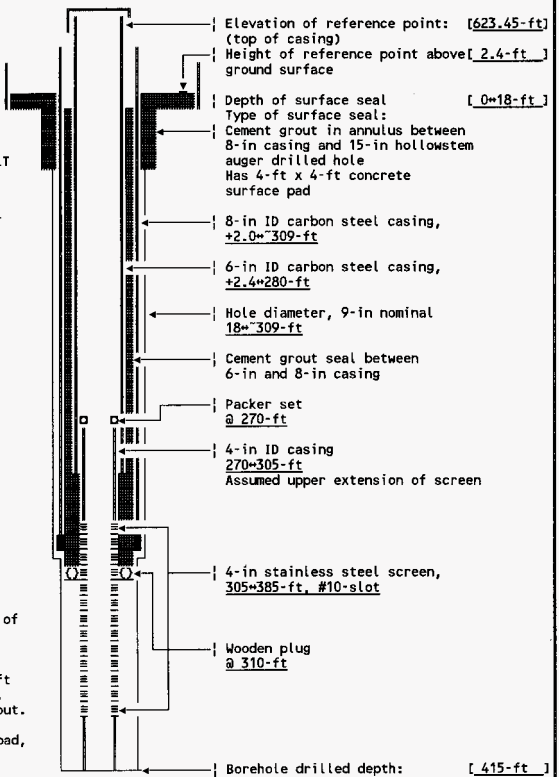
WELL NUMBER: 299-E33-12
TEMPORARY WELL NO: 241-B-15
Hanford Coordinates: N/S N 46,434.2 E/W W 52,847.8
State NAD83 N 137,632.54m E 573,780.69m
Coordinates: N 451,600 E 2,242,358
Start Card #:Not documented T___ R___ S_____
Elevation Ground surface: 621.00-ft Brass cap

Depth to water: 230-ft Aug54
(Ground surface)218.8-ft 28Jun93

GENERALIZED STRATIGRAPHY / Driller's Log

0-20: GRAVEL
20-45: GRAVEL and SAND
45-110: SAND and SILT
110-120: Fine GRAVEL, SAND and SILT
120-160: Coarse SAND and very little SILT
160-180: SAND, SILT, and GRAVEL
180-188: SAND and GRAVEL with SILT
188-205: GRAVEL and SAND
205-231: GRAVEL
231-232: GRAVEL and SAND
232-309: BASALT
309-315: BASALT, SHALE and fine GRAVEL
315-325: SHALE, fine GRAVEL, SAND, CLAY and LAVA MUD
325-335: SHALE
335-355: SANDSTONE and ASHY CLAY
355-360: SANDSTONE
360-374: ASHY CLAY
374-405: BASALT
405-415: Porous BASALT

REMEDIATION:
May82 by Evans and Bultena
Pumped 300-gals grout between 6 and 8-in casing. No mention of perforating 8-in casing for annular seal.
Sep-Oct92 by WHC GWWS
Overdrilled 8-in casing to 18-ft with 15-in OD hollowstem auger. Grouted annulus with cement grout. Excavated for and installed 4-ft by 4-ft concrete surface pad, brass survey marker and four protective posts. Primed and painted.



Elevation of reference point: [623.45-ft] (top of casing)
Height of reference point above ground surface [2.4-ft]
Depth of surface seal [0-18-ft]
Type of surface seal:
Cement grout in annulus between 8-in casing and 15-in hollowstem auger drilled hole
Has 4-ft x 4-ft concrete surface pad
8-in ID carbon steel casing, +2.0-~309-ft
6-in ID carbon steel casing, +2.4-280-ft
Hole diameter, 9-in nominal 18-~309-ft
Cement grout seal between 6-in and 8-in casing
Packer set @ 270-ft
4-in ID casing 270-305-ft
Assumed upper extension of screen
4-in stainless steel screen, 305-385-ft, #10-slot
Wooden plug @ 310-ft
Borehole drilled depth: [415-ft]

Drawing By: RKL/2E33-12.ASB
Date : 10Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-12

WELL DESIGNATION	:	299-E33-12
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 46,434.2 W 52,847.8 [27Oct92-200E]
LAMBERT COORDINATES	:	N 451,600 E 2,242,358 [HANCONV]
		N 137,632.54m E 573,780.69m [27Oct92-NAD83]
DATE DRILLED	:	Sep53/Remediation-May82
DEPTH DRILLED (GS)	:	415-ft
MEASURED DEPTH (GS)	:	414-ft, Aug90 TV
DEPTH TO WATER (GS)	:	230.5-ft, Aug54;
		218.8-ft, 28Jun93
CASING DIAMETER	:	8-in, carbon steel, +2.0↔~309-ft;
		6-in, carbon steel, +2.45↔280-ft;
ELEV TOP OF CASING	:	623.45-ft, [27Oct92-NGVD'29]
ELEV GROUND SURFACE	:	621.00-ft, Brass cap [27Oct92-NGVD'29]
PERFORATED INTERVAL	:	None documented
SCREENED INTERVAL	:	4-in stainless steel
		telescoping, 305↔385-ft
COMMENTS	:	FIELD INSPECTION, 06Oct89,
		Three carbon steel casings.
		No pad, no posts, capped and locked.
		No permanent identification.
		OTHER: Driller's log shows 6-in liner to 280-ft, grouted 0↔290-ft, 4-in to 415-ft.
		No mention of perforating 8-in. 4-in casing assumed to be bottom blank section
		attached to 4-in screen.
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Depths referenced to ground surface;
		Jan90;
		Depth to bottom: ~407-ft, soft muck
		Bottom of casing: 4-in surface to 265-ft
		Depth to water: 214.5-ft
		Top of water cruddy, cleaned up at 220-ft. Top of screen 300↔301-ft.
		Screen crudded up. Blank casing from 384↔385-ft to bottom.
		27Aug90;
		Depth to Bottom: 414-ft, soft silt
		Bottom of Casing: 4-in to 280-ft
		Depth to Water: 216.9-ft, top of water floating debris, dislodged scale
		and suspended debris. Quality improves from 305-ft to bottom. Screen 305↔385-ft.
		Blank casing from 384↔385-ft to bottom.
DATE EVALUATED	:	13Nov90
EVAL RECOMMENDATION	:	1. Install surface seal to at least 18-ft.
		2. Install protective posts and concrete pad per WAC 173-160-510 and
		field conditions.
		3. Shorten monitored interval to approximately 15-ft by plugging back to
		approximately 325-ft below ground surface.
		4. Survey to water level measurement standards.
LISTED USE	:	200 BP-1 quarterly water level measurement, 21Jan54↔28Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring,
		WHC ER characterization,
		PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar,
MAINTENANCE	:	18 Jul89; PNL TV survey.
		16↔17May90 - Removed obstruction at top of screen and cleaned screen.
		17&20Aug90 - Bailed and developed well with pump. Minimum NTU 27,
		<5 NTU not achieved.
		27Aug90; TV camera survey.
		31Aug90; Installed Hydrostar pump.
REMEDIATION	:	15↔17Jun92: Geophysically logged hole.
		21Sep92; Removed pump, geophysically logged hole.
		22↔24Sep92; Prepared site.
		25Sep92; Overdrilled 8-in casing w/10¼-in ID/15-in OD hollowstem auger to 18-ft.
		28↔30Sep92; Cemented annulus outside 8-in casing w/20 sacks cement.
		15↔19Oct92; Excavated for posts, set form. Poured concrete pad,
		set brass marker in pad. Stamped well number on marker. Set posts.
		27Oct92; Primed, painted and stenciled well head.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Gentz
Drilling Company: Not documented
Date Started: 19Oct53

Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 28Oct53

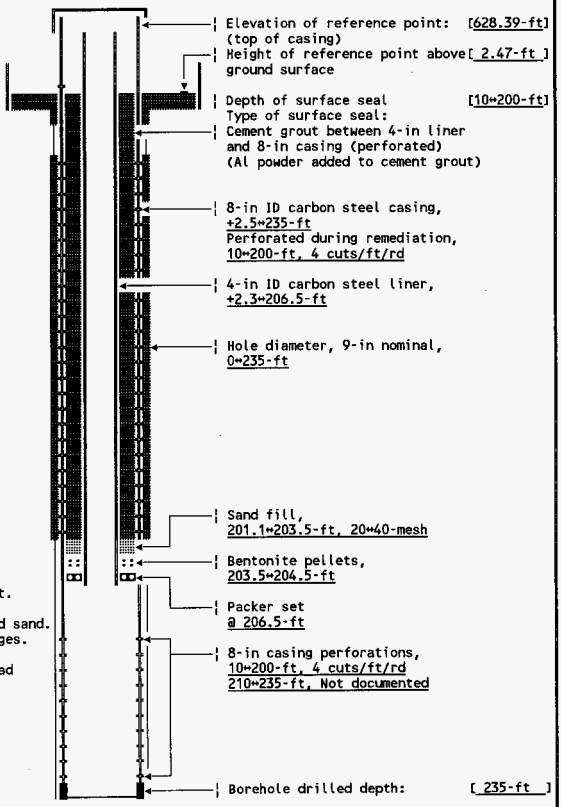
WELL NUMBER: 299-E33-13
TEMPORARY WELL NO: 241-B-17
Hanford Coordinates: N/S N 46,278.2 E/W W 53,091.1
State Coordinates: N 451,444 E 2,242,115
Start Card #: Not documented T ___ R ___ S ___
Elevation Ground surface: 625.92-ft Brass cap

Depth to water: 229-ft Oct53
(Ground surface) 224.1-ft 28Jun93

GENERALIZED STRATIGRAPHY — Driller's Log

0-20: GRAVEL and SAND
20-40: SAND
40-85: Coarse SAND
85-165: Fine SAND, little SILT
165-185: Coarse SAND
185-205: Coarse GRAVEL
205-220: Coarse GRAVEL and SAND
220-235: Coarse GRAVEL
235 : Coarse GRAVEL and BASALT

REMEDIATION:
Sep-Oct92 by WHC GWWS
Perforated 8-in casing 10-200-ft.
Set 4-in ID liner to 206.5-ft on packer. Placed bentonite and sand.
Grouted 0-201.1-ft in three stages.
Excavated for and installed 4-ft by 4-ft concrete surface pad and four protective posts.
Primed and painted.



Drawing By: RKL/2E33-13.ASB
Date : 10Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-13

WELL DESIGNATION	:	299-E33-13
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 46,278.2 W 52,091.1 [27Oct92-200E]
LAMBERT COORDINATES	:	N 451,444 E 2,242,115 [HANCONV]
		N 137,584.72m E 573,706.68m [27Oct92-NAD83]
DATE DRILLED	:	Oct53
DEPTH DRILLED (GS)	:	235-ft
MEASURED DEPTH (GS)	:	231-ft, Sep90 TV
DEPTH TO WATER (GS)	:	229-ft, Oct54;
		224.1-ft, 28Jun93
CASING DIAMETER	:	8-in, carbon steel, +2.47↔235-ft;
		4-in, carbon steel, +2.3↔206.5-ft
ELEV TOP OF CASING	:	628.39-ft, [27Oct92-NGVD'29]
ELEV GROUND SURFACE	:	625.92-ft, Brass cap [27Oct92-NGVD'29]
PERFORATED INTERVAL	:	210↔235-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 23Oct89,
		Carbon steel casing. No pad, no posts, capped not locked.
		No permanent identification. In surface radiation zone.
		FIELD INSPECTION, 18Oct92,
		8-in carbon steel casing, capped and locked.
		4-ft by 4-ft concrete surface pad, identification stamped on brass marker in pad.
		Not in radiation zone.
		OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Depths referenced to ground surface;
		Nov89;
		Depth to bottom: 231-ft Bottom of casing: 231-ft Depth to water: 219-ft
		Perforations began at 210-ft, 6 rd/ft. Scale/crud build-up below water
		level excessive making perforations indistinguisable. Some perforations
		were visible at bottom of casing. The camera knocked enough crud off
		casing on trip in that nothing could be seen coming out due to the murky
		water. This well requires scrubbing and redevelopment.
		20Sep90;
		Depth to Bottom: 231-ft, gravel, Depth to Water: 219-ft
		Perforations began at 209-ft, 6 per rd/ft. Some visible every now and then.
		The casing below water had some algae buildup. Water was clear.
DATE EVALUATED	:	13Nov90
EVAL RECOMMENDATION	:	1. Perforate per WAC 173-160-415(2) to approximately 200-ft.
		2. Install 4-in liner with cement basket to approximately 205-ft.
		Pressure grout by use of tremie pipe.
		3. Install protective posts and concrete pad per WAC 173-160-510 and
		field conditions.
		4. Survey to water level measurement standards.
LISTED USE	:	200 BP-1 quarterly water level measurement, 18Feb54↔28Ju 93;
CURRENT USER	:	WHC ES&M w/l monitoring,
		WHC ER characterization
PUMP TYPE	:	Electric submersible
MAINTENANCE	:	21Jul89; PNL TV camera survey.
		07Nov89; TV camera survey.
		03Aug90; Scrubbed casing and bailed debris.
		Contamination to 1,500 cpm encountered.
		10↔11Sep90; Developed well to <5 NTU.
		25Sep90; Installed electric submersible pump.
REMEDIATION	:	28Aug↔11Sep92; Site surveyed and contamination found.
		Contamination removed and fill placed for contamination control.
		15↔17Sep92; Perforated casing 10↔200-ft, 4 cuts/rd/ft.
		17↔23Sep92; Set 4½-in OD liner, 2-in below top of 8-in casing
		to 206.5-ft below ground surface.
		Placed 2.5-gal of ½-in bentonite pellets 203.5↔204.8-ft.
		Placed 6-gals silica sand 201.1↔203.5-ft.
		Grouted annulus with cement grout (Al powder added) in three stages.
		193.2↔201.1-ft, 102.3↔193.2-ft and ground surface↔102.3-ft.
		24Sep92; Excavated for pad and posts.
		28↔30Sep92; Installed 4-ft by 4-ft concrete surface pad, brass marker in pad
		and four protective posts. Stamped identification on brass marker
		01Oct92; Installed drain hole in 8-in casing.
		19Oct92; Primed and painted casing and posts.

WELL CONSTRUCTION AND COMPLETION SUMMARY

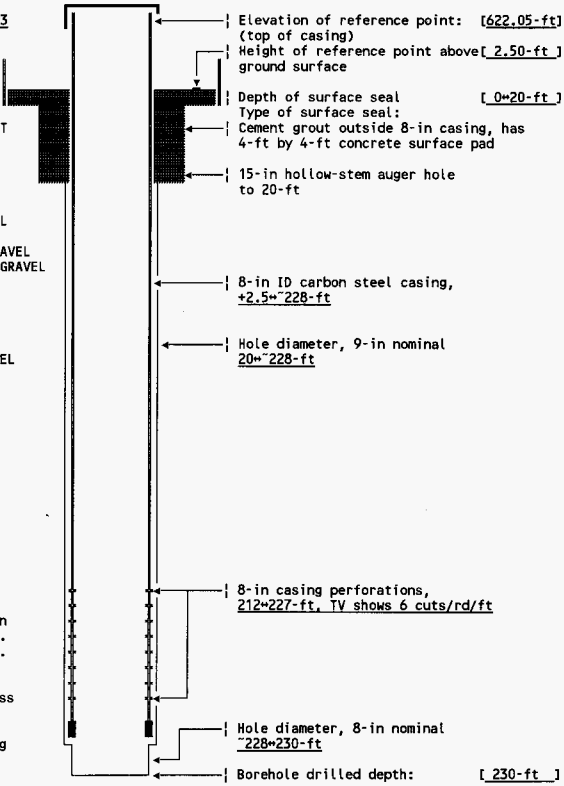
Drilling Method: Cable tool	Sample Method: Hard tool (nom)	WELL NUMBER: 299-E33-14	TEMPORARY WELL NO: 241-B-18
Drilling Fluid Used: Water	Additives Used: Not documented	Hanford Coordinates: N/S N 46,223	E/W W 52,177
Driller's Name: Blankenship/Row/Jack	WA State Lic Nr: Not documented	State Coordinates: N 451,391	E 2,243,030
Drilling Company: Not documented	Company Location: Not documented	Start Card #: Not documented	T ___ R ___ S ___
Date Started: 01Dec53	Date Complete: 15Dec53	Elevation Ground surface: 619.55-ft Brass cap	

Depth to water: 221-ft Dec53
(Ground surface) 217.4-ft 28Jun93

GENERALIZED STRATIGRAPHY / Driller's Log

0-10: COBBLES, GRAVEL, SAND&SILT
10-15: BASALTIC GRAVEL, SAND&SILT
15-19: BASALTIC GRAVEL & SAND
19-30: SAND
30-35: SAND & GRAVEL
35-45: Coarse SAND
45-52: SAND
52-65: QUARTZITE, BASALTIC GRAVEL & Coarse SAND
65-78: Coarse SAND & BASALTIC GRAVEL
78-85: GRANITIC rock & BASALTIC GRAVEL
85-100: SAND & GRAVEL
100-120: SAND & GRAVEL-SILT
120-135: SAND - very little SILT
135-160: SAND - more SILT
160-170: SAND - some SILT
170-174: SAND, heavy SILT & GRAVEL
174-216: GRAVEL & SILT
216-228: GRAVEL & SAND
228-230: BASALT

REMEDIATION:
22Nov-13Dec91 by WHC GWWS
Overdrilled 8-in casing w/15-in hollow-stem auger bit to 20-ft. Grouted annulus w/cement grout. Excavated for surface pad and protective posts. Installed 4-ft by 4-ft concrete pad, brass marker and posts. Primed and painted cap, casing and posts. Stenciled well number on casing and post.



Drawing By: RKL/2E33-14.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-14

WELL DESIGNATION	:	299-E33-14
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 46,223 W 52,177
LAMBERT COORDINATES	:	N 451,391 E 2,243,030 [HANCONV]
DATE DRILLED	:	Dec53
DEPTH DRILLED (GS)	:	230-ft
MEASURED DEPTH (GS)	:	229.6-ft, Aug90 TV
DEPTH TO WATER (GS)	:	221-ft, Dec53; 217.4-ft, 28Jun93
CASING DIAMETER	:	8-in, carbon steel, +2.5'-228-ft
ELEV TOP OF CASING	:	622.05-ft, [25Feb92-NGVD'29]
ELEV GROUND SURFACE	:	619.55-ft, Brass cap [25Feb92-NGVD'29]
PERFORATED INTERVAL	:	212'227-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 07Feb90, Carbon steel casing. No pad, no posts, capped and locked. No permanent identification. FIELD INSPECTION, 15Oct92, 8-in carbon steel csing, capped and locked. 4-ft by 4-ft pad, 4 posts, identification stamped on brass marker in pad. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Depths referenced to ground surface; Nov89; Depth to bottom: 226-ft, soft/silty-apparently fill. Bottom of casing: Could not determine Depth to water: 215-ft Perforations start at 212-ft, 6 per rd/ft. Perforations were distinguishible to some extent below the water level. Slight scale build-up. This well will require scrubbing and redevelopment prior to use. 27Aug90; Depth to Bottom: 229.6-ft, silt, debris Depth to Water: 217.2-ft Perforations start at 215-ft. Some open slots visible. Submerged casing appeared to have corrosion but may be algae.
DATE EVALUATED	:	13Nov90
EVAL RECOMMENDATION	:	1. Install a 2-in void surface seal outside 8-in casing to approximately 18-ft, OR; Perforate 3'18-ft and install a 4-in liner with cement basket to approximately 20-ft. Pressure grout to 40-psi. 2. Install protective posts and concrete pad per WAC 173-160-510 and field conditions. 3. Survey to water level measurement standards.
LISTED USE	:	200 BP-1 water level measurement, 18Feb54'28Jun93,
CURRENT USER	:	WHC ES&M w/l monitoring, WHC ER characterization PNL sitewide w/l monitoring 93
PUMP TYPE	:	Hydrostar,
MAINTENANCE	:	02Nov89; TV camera survey. 11May90; Scrubbed casing and bailed debris. 09'14Aug90; Developed well with pump to <5 NTU. 30Aug90; Installed Hydrostar pump.
REMEDIATION	:	22Nov91; Removed vegetation and concrete pad. 27Nov91; Overdrilled 8-in casing to 20-ft w/15-in hollow-stem auger bit. Grouted annulus w/cement grout (Al powder added). 04Dec91; Excavated for surface pad and protective posts. 06Dec91; Installed 4-ft by 4-ft concrete surface pad, placed brass marker and 4 protective posts. 09Dec91; Repaired casing. Casing was not extended. 13Dec91; Primed and painted cap, casing and posts.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Row
Drilling Company: Not documented
Date Started: 26Jan48

Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 10Feb53

WELL NUMBER: 299-E33-15
TEMPORARY WELL NO: 241-B-11
Hanford Coordinates: N/S N 46,133.8 E/W W 52,751.0
State NAD83 N 137,386.32m E 573,779.39m
Coordinates: N 451,300 E 2,242,456
Start Card #: Not documented T___ R___ S_____
Elevation Ground surface: 624.78-ft Brass cap

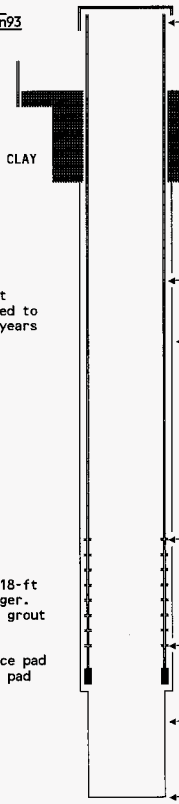
Depth to water: 232-ft Feb53
(Ground surface) 223.0-ft 28Jun93

GENERALIZED STRATIGRAPHY — Driller's Log

0-10: TOPSOIL and BACKFILL
10-20: BACKFILL
20-25: BASALT ROCKS and SAND
25-35: Coarse BASALT, SAND and CLAY
35-150: SAND and CLAY
150-180: SANDY SILT
180-195: SAND, GRAVEL and SILT
195-238.5: GRAVEL and SAND
238.5-251: BASALT

NOTE: Well was completed at 150-ft, then continued to total depth several years later.

REMEDIATION:
Oct92 by WHC GWWS
Overdrilled 8-in casing to 18-ft with 15-in OD hollowstem auger.
Grouted annulus with cement grout with Al powder additive.
Excavated for and installed 4-ft by 4-ft concrete surface pad with brass survey marker in pad and four protective posts.
Primed and painted.



Elevation of reference point: [627.29-ft] (top of casing)
Height of reference point above ground surface [2.51-ft]
Depth of surface seal [0-18-ft]
Type of surface seal:
Cement grout outside 8-in casing, has 4-ft by 4-ft concrete pad
15-in hollowstem auger overdrilled hole to 18-ft
8-in ID carbon steel casing, +2.5-~238.5-ft
Hole diameter, 9-in nominal 18-~238.5-ft
8-in casing perforations, 222-237-ft, 5 holes/ft
Hole diameter, 8-in nominal ~238.5-251-ft
Borehole drilled depth: [251-ft]

Drawing By: RKL/2E33-15.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-15

WELL DESIGNATION	:	299-E33-15
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 46,133.8 W 52,751.0 [27Oct92-200E]
LAMBERT COORDINATES	:	N 451,300 E 2,242,456 [HANCONV] N 137,386.32m E 573,779.39m [27Oct92-NAD83]
DATE DRILLED	:	Feb53
DEPTH DRILLED (GS)	:	251-ft
MEASURED DEPTH (GS)	:	250-ft, Sep90
DEPTH TO WATER (GS)	:	232-ft, Feb53; 223.0-ft, 28Jun93
CASING DIAMETER	:	8-in, carbon steel, +2.51↔~238.5-ft
ELEV TOP OF CASING	:	627.29-ft, [27Oct92-NGVD'29]
ELEV GROUND SURFACE	:	624.78-ft, Brass cap [27Oct92-NGVD'29]
PERFORATED INTERVAL	:	222↔237-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 24Oct89, Carbon steel casing. No pad, no posts, capped not locked. No permanent identification. FIELD INSPECTION, 20Oct92, 8-in carbon steel casing, capped and locked. 4-ft by 4-ft concrete pad w/identification stamped on brass survey marker in pad. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Depths referenced to ground surface; 07Nov89: Depth to bottom: 249-ft Bottom of casing: 240-ft Depth to water: 221-ft Perforations could be seen beginning at 222-ft. Excessive scale/crub build-up made it difficult to distinguish perforations. Nothing could be seen coming out of hole with camera due to debris knocked off casing while running in. Well needs scrubbing and redevelopment. 20Sep90; Depth to bottom: 250.3-ft Depth to water: 219.8-ft Perforations could be seen beginning at 222-ft and extending to 237-ft at 6 cuts/rd/ft. Apparent open hole from 237-ft to bottom.
DATE EVALUATED	:	13Nov90
EVAL RECOMMENDATION	:	1. Install a 2-in void surface seal outside 8-in casing to approximately 18-ft, OR; Perforate 3↔18-ft and install a 4-in liner with cement basket to approximately 20-ft. Pressure grout to 40-psi. 2. Install protective posts and concrete pad per WAC 173-160-510 and field conditions. 3. Survey to water level measurement standards.
LISTED USE	:	200 BP-1 water level measurement, 18Feb53↔28Jun93;
CURRENT USER	:	WHC ES&M W/l monitoring, WHC ER characterization
PUMP TYPE	:	Electric submersible,
MAINTENANCE	:	07Nov89; TV camera survey. 02Aug90; Brushed casing and bailed debris. 18↔19Sep90; Bailed and developed with pump to <5 NTU. 20Sep90; TV camera survey.
REMEDIATION	:	01↔05Oct92; Overdrilled 8-in casing to 18-ft w/15-in OD hollowstem auger. Grouted annulus with 13 sacks cement w/Al powder additive. 15↔16Oct92; Excavated for and installed 4-ft by 4-ft concrete pad, brass survey marker in pad and 4 protective posts. 19Oct92; Extended casing 1.04-ft. Stamped well number on survey marker. 27Oct92; Primed and painted wellhead and protective posts.

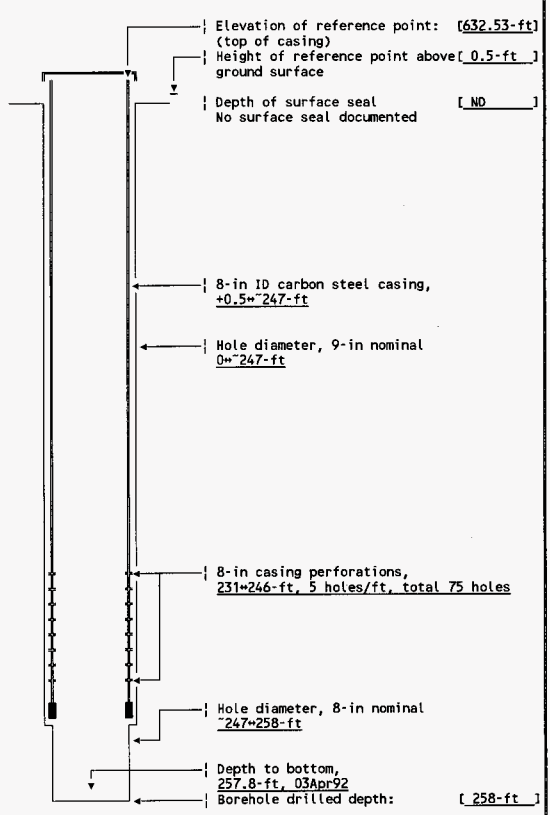
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Hard tool (nom)	WELL NUMBER: 299-E33-16	TEMPORARY WELL NO: 241-B-5
Drilling Fluid Used: Water	Additives Used: Not documented	Hanford Coordinates: N/S N 45,887	E/W W 52,815
Driller's Name: Rodda/Row	WA State Lic Nr: Not documented	State Coordinates: N 451,053	E 2,242,392
Drilling Company: Not documented	Company Location: Not documented	Start Card #: Not documented	T ___ R ___ S ___
Date Started: 28Nov47	Date Complete: 26Jan53	Elevation Ground surface: 632.0-ft Estimated	

Depth to water: 240-ft Jan53
(Ground surface) 231.4-ft Apr92

GENERALIZED STRATIGRAPHY — Driller's Log

0↔5: BACKFILL
5↔14: SAND and GRAVEL
14↔24: Coarse SAND and fine GRAVEL
24↔40: SAND
40↔50: Coarse SAND and fine GRAVEL
50↔77: Coarse SAND
77↔110: SAND
110↔135: SAND with little CLAY
135↔140: SAND
140↔150: SAND and CLAY
▲ 09Dec47 ▲
▼ 17Dec52 ▼
150↔161: Sandy SILT
161↔164: SAND, GRAVEL and SILT
164↔193: SAND and SILT
193↔200: SAND
210↔203: GRAVEL and SAND
203↔227: SILT
227↔229: SILT and GRAVEL
229↔247.25: GRAVEL and SAND
247.25↔258: BASALT



Drawing By: RKL/2E33-16.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-16

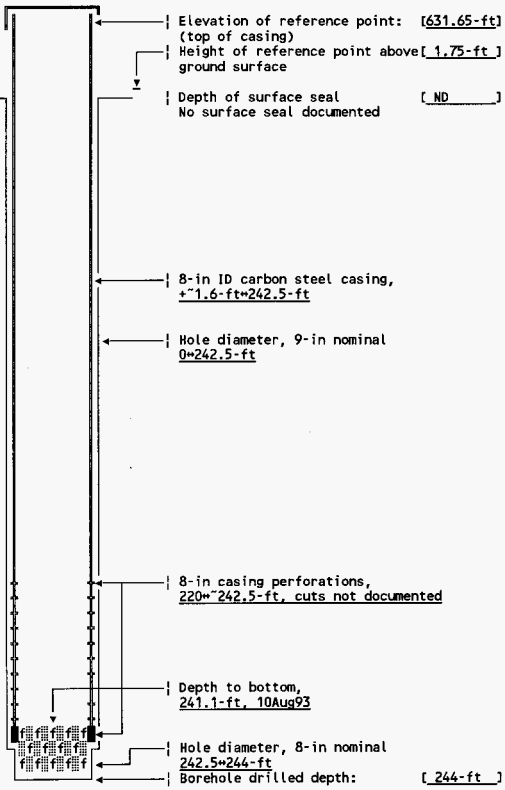
WELL DESIGNATION	:	299-E33-16
RCRA FACILITY	:	216-B-8 Crib
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-5)
HANFORD COORDINATES	:	N 45,887 W 52,815
LAMBERT COORDINATES	:	N 451,053 E 2,242,392 [HANCONV]
DATE DRILLED	:	Jan53
DEPTH DRILLED (GS)	:	258.0-ft
MEASURED DEPTH (GS)	:	257.8-ft
DEPTH TO WATER (GS)	:	240.3-ft, Jan53, 231.4-ft, 03Apr92
CASING DIAMETER	:	8-in, carbon steel, +0.5↔~247.0-ft;
ELEV TOP CASING	:	632.53-ft
ELEV GROUND SURFACE	:	632.0-ft, Estimated
PERFORATED INTERVAL	:	231↔246-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 03Apr92 No pad. Capped, not locked. No posts, no permanent identification. 8-in carbon steel casing. No pump installed.
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	Water levels measured 22Jan53↔29Mar56
CURRENT USER	:	None documented
PUMP TYPE	:	None documented
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Hard tool (nom)	WELL NUMBER: 299-E33-17 / TEMPORARY WELL NO: 241-B-16
Drilling Fluid Used: Water	Additives Used: Not documented	Hanford Coordinates: N/S N 45,894 E/W W 52,529
Driller's Name: Gentz	WA State Lic Nr: Not documented	State Coordinates: N 451,061 E 2,242,678
Drilling Company: Not documented	Company Location: Not documented	Start Card #: Not documented T ___ R ___ S ___
Date Started: 22Sep53	Date Complete: 15Oct53	Elevation Ground surface: 629.9-ft Estimated

Depth to water: 240-ft Oct53
(Ground surface) 227.8-ft 09Jun93

GENERALIZED STRATIGRAPHY	Driller's Log
	0-25: SAND, SILT and GRAVEL
	25-45: Coarse SAND
	45-55: SAND, very little SILT
	55-65: Coarse SAND
	65-110: SAND, little SILT
	110-115: SAND, SILT, little CLAY
	115-120: SAND and SILT
	120-125: Coarse SAND
	125-160: SAND
	160-175: SAND and SILT
	175-185: SAND
	185-202: Coarse SAND
	202-208: SAND, SILT and CLAY
	208-215: GRAVEL
	215-244: Coarse GRAVEL
	244 : BASALT



Drawing By: RKL/2E33-17.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-17

WELL DESIGNATION	:	299-E33-17
RCRA FACILITY	:	216-B-8 Crib
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-5)
HANFORD COORDINATES	:	N 45,894 W 52,529
LAMBERT COORDINATES	:	N 451,061 E 2,242,678 [HANCONV]
DATE DRILLED	:	Oct53
DEPTH DRILLED (GS)	:	244.0-ft
MEASURED DEPTH (GS)	:	241.1-ft, 10Aug93
DEPTH TO WATER (GS)	:	240.0-ft, Oct53, 227.8-ft, 09Jun93
CASING DIAMETER	:	8-in, carbon steel, +1.75"-242.5-ft;
ELEV TOP CASING	:	631.65-ft
ELEV GROUND SURFACE	:	630.0-ft, Estimated
PERFORATED INTERVAL	:	220-242.5-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 10Aug93 No pad. Not capped or locked. No posts, no permanent identification. 8-in carbon steel casing. No pump installed.
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	Seperations area semiannual water level measurement, 19Nov53-09Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring,
PUMP TYPE	:	None documented
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Hash/Row
Drilling Company: Not documented
Date Started: 29May47

Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 23Feb50

WELL NUMBER: 299-E33-18
TEMPORARY WELL NO: 224-B-4
Hanford Coordinates: N/S N 45,626.5 E/W W 52,854.4
State NAD83 N 137,386.32m E 573,779.39m
Coordinates: N 450,793 E 2,242,354
Start Card #: Not documented T___ R___ S___
Elevation Ground surface: 649.34-ft Brass cap

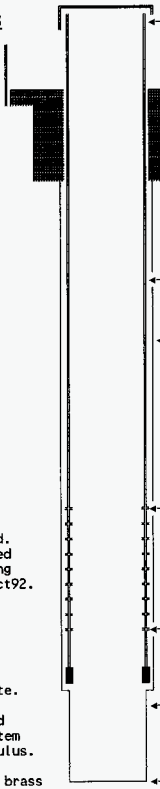
Depth to water: 255-ft Feb50
(Ground surface) 247.1-ft 24Jun93

GENERALIZED STRATIGRAPHY / Driller's Log

0-15: NOT DOCUMENTED
15-22: SAND and GRAVEL
22-25: SAND
25-36: SAND and GRAVEL
36-45: CLAY and GRAVEL
45-52: SAND
52-55: GRAVEL
55-65: GRAVEL and CLAY
65-120: CLAY and SAND
120-139: SILT
139-160: SAND
160-165: SAND and fine GRAVEL
165-180: Coarse SAND
180-195: SAND and fine GRAVEL
195-200: CLAY and fine GRAVEL
200-210: Coarse SAND, light CLAY
210-239: CLAY
239-248: Coarse SAND, some CLAY
248-250: SAND
250-255: Coarse SAND
255-257: LAVA dust
257-264: LAVA rock
264-265: SAND
265-269.5: LAVA rock
269.5-270: Fine SAND
270-272.5: UNDOCUMENTED
272.5-278: BASALT

NOTE: Above depths are as-drilled. About 6-ft of fill was added to ground surface and casing extended 8-ft in Apr and Oct92.

REMEDIATION:
21Apr92 by WHC GWWS
Extended 8-in casing. Amount not documented.
Not documented
About 6-ft of fill added to site.
Oct92 by WHC GWWS.
Removed old pad and overdrilled 8-in casing w/15-in OD hollowstem auger to 18.5-ft. Grouted annulus. Excavated for and installed 4-ft by 4-ft concrete pad with brass survey marker and 4 protective posts. Extended casing 17-in (total of ~8-ft). Primed and painted casing and protective posts.



Elevation of reference point: [651.86-ft] (top of casing)
Height of reference point above ground surface [2.52-ft]
Depth of surface seal [0-18.5-ft]
Type of surface seal: Cement grout outside 8-in casing, has 4-ft by 4-ft concrete pad
15-in hollowstem auger overdrilled hole to 18.5-ft
8-in ID carbon steel casing, +2.5-271-ft (after extension)
Hole diameter, 9-in nominal 0-~271-ft (after extension)
8-in casing perfortions, 240-260-ft, 2 holes/ft/rd 246-266 ft after extension
Hole diameter, 8-in nominal ~265-278-ft as-drilled 271-284-ft after extension
Borehole drilled depth: [278-ft] *284-ft

*=Present estimated depth from ground surface

Drawing By: RKL/2E33-18.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-18

WELL DESIGNATION	:	299-E33-18
RCRA FACILITY	:	SST-241-B Farm
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 45,626.5 W 52,854.4 [27Oct92-200E]
LAMBERT COORDINATES	:	N 450,793 E 2,242,354 [HANCONV]
		N 137,386.32m E 573,779.39m [27Oct92-NAD83]
DATE DRILLED	:	Feb50
DEPTH DRILLED (GS)	:	278-ft
MEASURED DEPTH (GS)	:	262.5-ft, Aug90 TV
DEPTH TO WATER (GS)	:	255-ft, Feb50;
		247.1-ft, 24Jun93
CASING DIAMETER	:	8-in, carbon steel, +2.52↔~265-ft
ELEV TOP OF CASING	:	651.86-ft, [27Oct92-NGVD'29] was 643.62-ft (17Sep90-200E)
ELEV GROUND SURFACE	:	649.34-ft, Brass cap [27Oct92-NGVD'29] was 643.0-ft Estimated
PERFORATED INTERVAL	:	240↔260-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 24Oct89,
		Carbon steel casing. 2-ft round pad, no posts, capped not locked.
		Identification on brass cap.
		FIELD INSPECTION, 20Oct92,
		8-in carbon steel casing, capped and locked.
		4-ft by 4-ft concrete pad, identification stamped on brass marker in pad.
		Not in radiation zone.
		OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Depths referenced to ground surface;
		Nov89;
		Depth to bottom: 259-ft; Bottom of casing: 252-ft; Depth to water: 236-ft
		Sample bottle floating at 236-ft. Another sample bottle was suspended at
		245-ft and two more sample bottles were on bottom. Perforations could not
		be seen due to the scale build-up. Sample bottles need to be removed from the well.
		The well needs to be scrubbed and redeveloped.
		27Aug90;
		Depth to bottom: 262.5-ft, sample bottle on bottom;
		Bottom of casing: 255-ft; Depth to water: 238.8-ft
		Perforations started at 250-ft, last perf seen at 251-ft. Water clear.
DATE EVALUATED	:	13Nov90
EVAL RECOMMENDATION	:	1. Remove 2-ft collar and install a 2-in void grout surface seal outside 8-in casing to approximately 18-ft, OR;
		2. Perforate 3↔18-ft and install a 4-in liner with cement basket to approximately 20-ft. Pressure grout to 40-psi.
		3. Install protective posts and concrete pad per WAC 173-160-510 and field conditions.
		4. Perforate 8-in casing approximately 238↔250-ft.
		5. Shorten monitored interval to approximately 15-ft by plugging back to approximately 260-ft below ground surface.
		6. Survey to water level measurement standards.
LISTED USE	:	SST monthly water level measurement, 17Aug50↔24Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling,
		WHC ER characterization
PUMP TYPE	:	Electric submersible
MAINTENANCE	:	09Nov89; Removed electric submersible pump.
		13Nov89; TV camera survey.
		29Nov89; Installed electric submersible pump.
		27Jul&01Aug90; Pulled pump, brushed casing and bailed debris.
		20↔21Aug90; Bailed and developed with pump to <5 NTU.
		31Aug90; Removed 2 sample bottles. Installed pump and capped well.
REMEDIATION	:	21Apr92; Casing extended, amount not documented.
		05↔07Oct92; Overdrilled 8-in casing to ~5-ft.
		Obstruction encountered, probable undocumented 10-in casing.
		08↔10Oct92; Removed old pad.
		12Oct92; Overdrilled to 18.5-ft w/15-in OD, 10.25-in ID hollowstem auger.
		13Oct92; Grouted annulus between 8-in casing and overdrilled hole with 19 sacks cement, Al powder added.
		14Oct92; Excavated for pad and posts.
		16Oct92; Installed 4-ft by 4-ft concrete surface pad with brass survey marker and 4 protective posts.
		19Oct92; Extended 8-in casing 17-in. Stamped identification on survey marker.
		27Oct92; Primed and painted wellhead and posts.

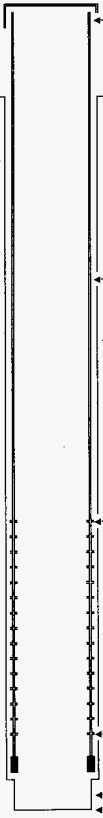
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Hard tool (nom)	WELL NUMBER: 299-E33-19 / TEMPORARY WELL NO: 241-B-20
Drilling Fluid Used: Water	Additives Used: Not documented	Hanford
Driller's Name: Rydman	WA State Lic Nr: Not documented	Coordinates: N/S N 45,745.7 E/W W 52,629.4
Drilling Company: Not documented	Company Location: Not documented	State NAD83 137,422.86m 573,847.84m
Date Started: 18Jun56	Date Complete: 25Jun56	Coordinates: N 450,913 E 2,242,579
		Start Card #: Not documented T___ R___ S___
		Elevation Ground surface: 636.7-ft Estimated

Depth to water: 242-ft Jun56
(Ground surface) 231.9-ft Apr90

GENERALIZED STRATIGRAPHY	Driller's Log
0↔22:	GRAVEL and SAND
22↔29:	Coarse SAND, some GRAVEL
29↔34:	GRAVEL, SILT and SAND
34↔78:	Coarse SAND, some SILT and GRAVEL
77↔112:	SAND, some SILT
112↔128:	Coarse SAND
128↔139:	Medium coarse SAND
139↔157:	Coarse SAND
157↔200:	Coarse SAND and SILT, some GRAVEL
200↔209:	Coarse SAND, some SILT and GRAVEL
209↔221:	SILT
221↔249:	GRAVEL and SAND, large GRAVEL and BOULDERS
249↔252:	Black BASALT

NOTE;
Well is in high-level radiation zone and caving area.



Elevation of reference point: [638.72-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, +2.0↔~249-ft
Hole diameter, 9-in nominal 0↔~249-ft
8-in casing perforations, 217↔248 ft @ 5 holes/ft
Hole diameter, 8-in nominal ~249↔252-ft
Borehole drilled depth: [252-ft]

Drawing By: RKL/2E33-19.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-19

WELL DESIGNATION	:	299-E33-19
RCRA FACILITY	:	SST-241-B-Farm
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-5)
HANFORD COORDINATES	:	N 45,745.7 W 52,629.4 [17Sep90-200East]
LAMBERT COORDINATES	:	N 450,913 E 2,242,579; [HANCONV] N 137,422.86m E 573,847.84m [17Sep90-NAD83]
DATE DRILLED	:	Jun56
DEPTH DRILLED (GS)	:	252-ft
MEASURED DEPTH (GS)	:	236.5-ft
DEPTH TO WATER (GS)	:	242-ft, Jun56; ~231.9-ft, Apr90
CASING DIAMETER	:	8-in, carbon steel, +2.0'~249-ft.
ELEV TOP CASING	:	638.72-ft, [17Sep90-200East]
ELEV GROUND SURFACE	:	637.0-ft, Estimated
PERFORATED INTERVAL	:	217'~248-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION 01Apr92, 8-in carbon steel. No posts, no pad, capped, not locked. No permanent identification. No pump. Well in high-level radiation zone, also surface caving. OTHER;
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	10Apr90; Depth to bottom: 236.5-ft Depth to water: 231.9-ft, floating debris. Dislodged scale and floating debris. Vadose zone casing: Scale/rust visible, a piece of rusted casing was protruding into well. Perforations not visible. Submerged casing: Casing in bad shape, scale/rust. Areas of rusted casing protruding into well.
DATE EVALUATED	:	Aug90
EVAL RECOMMENDATION	:	DECOMMISSION: Decommissioning required. This well has extremely degraded casing, is located in a radiation zone and is in a crib cave-in area. Access is difficult for equipment or personnel. Any modification or maintenance is dependent on gaining required access. 1) Perforate from 3-ft below ground surface to total depth. 2) Install sand plug 230-ft to total depth. Set bentonite plug 225'~230-ft. 3) Place cement grout 3'~225-ft. 4) Cut casing at 3-ft. Fill excavation and compact to grade.
LISTED USE	:	Water level measurered Apr72'~Jul74
CURRENT USER	:	None documented
PUMP TYPE	:	None documented
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Rydman
Drilling Company: Not documented
Date Started: 26Jun56

Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 05Jul56

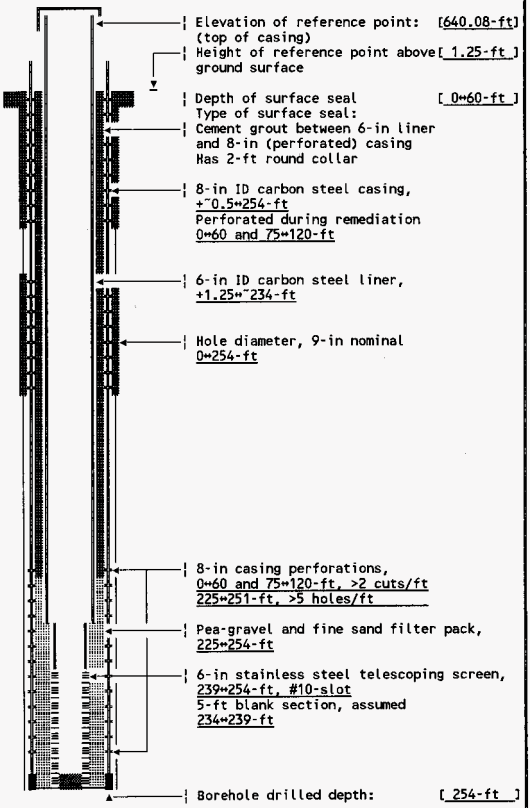
WELL NUMBER: 299-E33-20
TEMPORARY WELL NO: 603-B-2
Hanford Coordinates: N/S N 45,664.5 E/W W 52,629.7
State NAD83 N 137,398.11m E 573,847.82m
Coordinates: N 450,832 E 2,242,578
Start Card #: Not documented T ___ R ___ S ___
Elevation Ground surface: 638.8-ft Estimated

Depth to water: 243-ft Jul56
(Ground surface) ~234-ft Nov89 TV

GENERALIZED STRATIGRAPHY / Driller's Log

0-8: SAND and GRAVEL
8-36: GRAVEL, some SAND
36-82: Coarse SAND, some GRAVEL and SILT
82-162: Medium to coarse SAND, some SILT
162-198: Coarse SAND, some GRAVEL and SILT
198-203: Medium to coarse SAND
203-226: SILT and fine SAND
226-254: GRAVEL, SAND and BOULDERS
254 : BASALT

NOTE: Remediation Jun83. By David (Garcia?)



Drawing By: RKL/2E33-20.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-20

WELL DESIGNATION	:	299-E33-20
RCRA FACILITY	:	SST-241-B-Farm
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 45,664.5 W 52,629.7 [17Sep90-200 East]
LAMBERT COORDINATES	:	N 450,832 E 2,242,578; [HANCONV]
		N 137,389.11m E 573,847.82m [17Sep90-NAD83]
DATE DRILLED	:	Jul56/Remediation - Jun83
DEPTH DRILLED (GS)	:	254-ft
MEASURED DEPTH (GS)	:	254-ft, Nov89 TV
DEPTH TO WATER (GS)	:	243-ft, Jul56;
		234-ft, Nov89 TV
CASING DIAMETER	:	8-in, carbon steel, ~0.5↔254-ft;
		6-in carbon steel, +1.2↔~234-ft
ELEV TOP OF CASING	:	640.87-ft
ELEV GROUND SURFACE	:	639.6-ft Estimated
PERFORATED INTERVAL	:	0↔60, 75↔120 and 225↔251-ft
SCREENED INTERVAL	:	239↔254-ft, 6-in telescoping,
		stainless steel, 10-slot
COMMENTS	:	FIELD INSPECTION, 01Apr92,
		Carbon steel casing (2). 2-ft round pad,
		capped not locked, no posts.
		No permanent identification.
		Ground caving area and high radiation zone.
		OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Nov89, depths referenced to ground surface;
		Depth to bottom: 254-ft
		Bottom of casing: 254-ft
		Depth to water: 234-ft
		Screen started at 236-ft and ended at 254-ft. Very little scale build-up
		on casing or screen. Sediment build-up on bottom.
		Well can be used as is.
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	Water levels measured 18Aug65↔04Feb86
CURRENT USER	:	None documented
PUMP TYPE	:	None documented
MAINTENANCE	:	07Nov89; TV camera survey.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Not documented
Driller's Name: Gentz
Drilling Company: Not documented
Date Started: 19Feb57

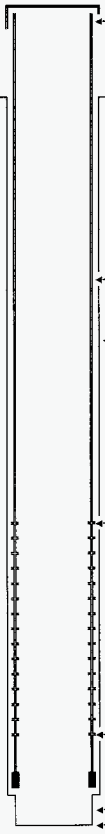
Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 05Apr57

WELL NUMBER: 299-E33-21
TEMPORARY WELL NO:
Hanford Coordinates: N/S N 45,324.4 E/W W 53,855.1
State NAD83 N 137,293.40m E 573,474.67m
Coordinates: N 450,488 E 2,241,354
Start Card #: Not documented T ___ R ___ S ___
Elevation Ground surface: 663.5-ft Estimated

Depth to water: 261-ft Apr57
(Ground surface) 261.7-ft 23Jun93

GENERALIZED STRATIGRAPHY — Driller's Log

0-15: COBBLES, GRAVEL, SAND and SILT
15-20: BOULDERS, COBBLES, GRAVEL and SAND
20-26: COBBLES, GRAVELS and SAND
26-46: COBBLES and GRAVEL
46-72: Coarse SAND
72-90: SAND - little SILT
90-95: SAND and SILT
95-140: Coarse SAND
140-155: Fine and coarse SAND
155-165: SAND
165-185: SAND - little SILT
185-190: Fine and coarse SAND
190-200: SAND and GRAVEL
200-210: Coarse SAND and GRAVEL
210-215: Coarse SAND
215-225: SAND - little SILT
225-245: SAND, SILT and GRAVEL
245-250: Coarse GRAVEL - COBBLES
250-255: Small GRAVEL
255-260: SAND and GRAVEL
260-275: Coarse GRAVEL and SAND
275-279: COBBLES, GRAVEL and SAND
279-282: BASALT



Elevation of reference point (top of casing): [668.13-ft]
Height of reference point above ground surface: [4.6-ft]
Depth of surface seal: [ND]
No surface seal documented
8-in ID carbon steel casing, +4.6-~279-ft
Hole diameter, 9-in nominal 0-~279-ft
8-in casing perforations, 235-270-ft, 6 cuts/ft; 270-275-ft, 2 cuts/ft
Hole diameter, 8-in nominal ~279-282-ft
Borehole drilled depth: [282-ft]

Drawing By: RKL/2E33-21.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-21

WELL DESIGNATION	:	299-E33-21
RCRA FACILITY	:	SST-241-BX-Farm
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-5)
HANFORD COORDINATES	:	N 45,324.4 W 53,855.1 [17Sep90-200E]
LAMBERT COORDINATES	:	N 450,488 E 2,241,354 [HANCONV]
		N 137,293.40m E 573,474.67m [17Sep90-NAD83]
DATE DRILLED	:	Apr57
DEPTH DRILLED (GS)	:	282-ft
MEASURED DEPTH (GS)	:	279-ft
DEPTH TO WATER (GS)	:	261-ft, Apr57; 261.7-ft, 23Jun93
CASING DIAMETER	:	8-in, carbon steel, +4.6"-279-ft.
ELEV TOP CASING	:	668.13-ft, [17Sep90-200E]
ELEV GROUND SURFACE	:	663.5-ft, Estimated
PERFORATED INTERVAL	:	235-275-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 23Oct89, Carbon steel. No pad, no posts, capped, not locked. No permanent identification. Submersible pump installed. OTHER;
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	20Mar90; Depth to bottom: 278.8-ft Depth to water: 259.1-ft, floating debris. Water clear with some dislodged scale. Vadose zone casing: Considerable scale from 257.5-ft to water. Submerged casing: Heavy scale below water. Perforations started at 236.8-ft, 4 cuts/rd/ft. Clean and in good shape above water. Not visible below water.
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	SST water level measurement, 20Apr73-23Jun93:
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling
PUMP TYPE	:	Electric submersible
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

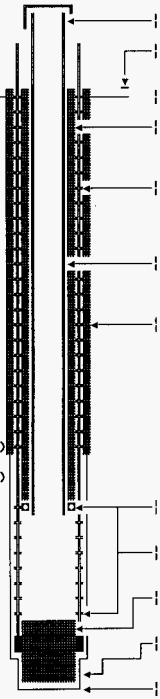
Drilling Method: Cable tool	Sample Diamond Drill Method: 4" drive barrel	WELL NUMBER: 299-E33-22	TEMPORARY WELL NO: 299-E33-2A
Drilling Fluid Used: Not documented	Additives Used: Not documented	Hanford Coordinates: N/S N 46,529.4	E/W W 53,358.6
Driller's Name: H Hatch	WA State Lic Nr: Not documented	State NAD83 N 137,661.06m	E 573,624.94m
Drilling Company: Hatch Drilling Co	Company Location: Pasco, WA	Coordinates: N 451,694	E 2,241,847
Date Started: 23Jul65	Date Complete: 06Aug65	Start Card #: Not documented T ___ R ___ S ___	
		Elevation Ground surface: 626.6-ft Estimated	

Depth to water: 224-ft Aug65
(Ground surface)

GENERALIZED STRATIGRAPHY — Engineer's Log

0-14.5: Not documented
14.5: Not documented (Low level contam)
17-19: SAND and GRAVEL (4Rad)
20: Fine SAND & GRAVEL (High exposure)
24.5: Med SAND (4.5Rad)
25.5: (2.5Rad)
27,29: Med SAND, few PEBBLES (3.5Rad)
30,31: Med-cse SAND (2,500mrβ-1,000mrγ)
34,36: Cse-med SAND and pea GRAVEL
38: Fine SAND & pea GRAVEL, some SILT
42,45,47: Fine SAND & pea GRAVEL
52: Fine SAND, SILT & pea GRAVEL
55: Cse SAND, layer/GRAVEL (20mrβ-10mrγ)
59,62: Cse SAND & gravel (10mrβ-5mrγ)
62: SAND(Next day) (100mrβ-40mrγ)
64: SAND
67-80: Med-cse SAND
80: Finer SAND
86: Cse SAND, some pea GRAVEL
95,97-101 Drive Sample: SAND
106: Fine SAND, some fine GRAVEL
111: CLAY lens 4-6-in thick, between SAND
115-125: Cse-med SAND (very little contam)
125-129: Not documented
129-131: Cse SAND, few PEBBLES (no contam)
132: SAND & PEBBLES
138: SAND w/few balls of SILT/CLAY
142-160: SAND and pea GRAVEL
160-161: Fine SAND, some SILT
168,174: SAND and pea GRAVEL
179: SAND, GRAVEL & PEBBLES
184,190: Cse SAND and GRAVEL
192: SAND w/some CLAY & GRAVEL
194,198: SAND & GRAVEL
204: SILT & GRAVEL
210,216: SILT, SAND & GRAVEL
220: SAND, SILT & GRAVEL
224,230,233: SAND & GRAVEL

REMEDIATION:
Mar79 by Bultena
Set cement plug, depth not documented.
Perforated 217-231-ft, 1 cut/rd/ft
and 0-207-ft, 2 cuts/rd/ft.
Installed 4-in liner to 217-ft.
Cemented annulus.



Elevation of reference point: [629.20-ft]
(top of casing)
Height of reference point above ground surface [2.6-ft]
Depth of surface seal [0-207-ft]
Type of surface seal:
Cement grout between 4-in liner and 6-in (perforated) casing, has 18-in round collar
6-in ID carbon steel casing, +1.75-232-ft
Perforated during remediation
0-207-ft, 2 cuts/rd/ft
4-in ID carbon steel liner, +2.6-217-ft
Hole diameter, 7-in nominal
0-232-ft
Packer set:
@ 217-ft
8-in casing perforations,
0-207-ft, 2 cuts/rd/ft
217-231-ft, 1 cut/rd/ft
Cement plug,
Depth not documented
Hole diameter, 6-in nominal
232-234-ft
Borehole drilled depth: [234-ft]

Drawing By: RKL/2E33-22.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-22

WELL DESIGNATION	:	299-E33-22
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 Aggregate Area Management Study
HANFORD COORDINATES	:	N 46,529.4 W 53,358.6 [200E-13Apr91]
LAMBERT COORDINATES	:	N 451,694 E 2,241,847 [HANCONV]
		N 137,661.06m E 573,624.94m [NAD83-13Apr91]
DATE DRILLED	:	Aug65
DEPTH DRILLED (GS)	:	234-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	224-ft, Aug65
CASING DIAMETER	:	6-in, carbon steel, +1.75'232-ft;
		4-in, carbon steel, +2.60'217-ft
ELEV TOP CASING	:	629.20-ft
ELEV GROUND SURFACE	:	626.6-ft, Estimated
PERFORATED INTERVAL	:	0'207, 217'231-ft
SCREENED INTERVAL	:	FIELD INSPECTION, 29Mar91
		4 and 6-in carbon steel casing. Capped, not locked
		No pad, no permanent identification, no posts.
		In surface radiation zone.
COMMENTS	:	
AVAILABLE LOGS	:	Driller, Engineer
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	No water level data;
CURRENT USER	:	None documented
PUMP TYPE	:	None
MAINTENANCE	:	Casing extended Apr91?
		18Jun91 - Casing lowered, amount not documented

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: 18Aug65

Sample Diamond Drill Method: 4" drive barrel
Drilling Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Pasco, WA
Date Complete: 01Sep65

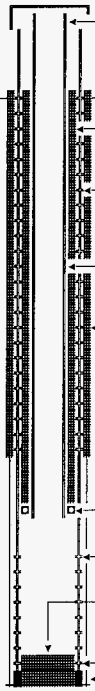
WELL NUMBER: 299-E33-23
TEMPORARY WELL NO: 299-E33-4A
Hanford Coordinates: N/S N 46,642.2 E/W W 53,383.4
State NAD83 N 137,695.42m E 573,617.28m
Coordinates: N 451,807 E 2,241,822
Start Card #: Not documented T ___ R ___ S ___
Elevation Ground surface: 625.3-ft Estimated

Depth to water: 222-ft Aug65
(Ground surface)

GENERALIZED STRATIGRAPHY / Engineer's Log

0-15: Backfill-COBBLES, GRAVEL, SAND
15: Cse GRAVEL, SAND & SILT (80mr/hr)
16: Cse GRAVEL, SAND & SILT (125mr/hr)
17: SAND & SILT (300mr/hr)
20: Cse GRAVEL & SAND (1,000mr/hr)
21: SAND & pea GRAVEL (200mr/hr)
22.5: Cse SAND (30mr/hr)
26: Cse SAND & SILT (10mr/hr)
27: Cse SAND & SILT (5mr/hr)
29: Cse SAND (<5mr/hr)
29.5: Fine-med SAND (8,000cpm)
31: Fine-med SAND & SILT
33,34: Fine-cse SAND
35: Cse SAND & pea GRAVEL (7,500cpm)
36.5: Med SAND & pea GRAVEL (5,000cpm)
37.5: Cse SAND & small GRAVEL
40: Fine-cse SAND (5,000cpm)
41,42: Fine-cse SAND
43: Med SAND
43.5: Fine SAND & GRAVEL (3,500cpm)
44: Fine GRAVEL & cse SAND
45,47: Cse SAND, wet (800cpm)
48: Cse SAND & fine GRAVEL
49: Fine-med SAND/sm GRAVEL (2,500cpm)
50,51.5: Med SAND/fine GRAVEL (800cpm)
52: Cse SAND & fine GRAVEL-wet (600cpm)
53-61: Med-cse SAND (200-500cpm)
some small ROCKS
61: Cse SAND & fine GRAVEL
62-82: SILT/SAND-SAND/SILT (200-300cpm)
82-90: SILT, SAND & CLAY (2,000-200cpm)
90-102.5: SAND; 102.5-105: SILT & SAND
105-110: SAND, some SILT 110: CLAY
112-118: SAND 118-135: SAND & SILT
135-145: SAND 145-150: SAND & SILT
150-160: SAND 160-173: SAND, small ROCKS
173-192: SAND 192-196: SAND/SILT/GRAVEL
196-208: SAND & GRAVEL 208: GRAVEL
208-220: SAND/SILT/GRAVEL
220-228: GRAVEL, SAND, some SILT
228-230: SAND/SILT w/GRAVEL
(No contamination)
(Contamination @ 205,210,215,220)

REMEDIATION, Mar79 by Bultena
Set cement, plug, perforated 218-230 and 0-208-ft. Set 4-in liner to 213-ft on packer and grouted annulus w/158 gals cement grout.



Elevation of reference point: [628.44-ft] (top of casing)
Height of reference point above ground surface [3.1-ft]
Depth of surface seal [0-208-ft]
Type of surface seal:
Cement grout between 4-in liner and 6-in (perforated) casing
6-in ID carbon steel casing, +ND-230-ft
Perforated during remediation, 0-208-ft, 2 cuts/rd/ft
4-in ID carbon steel liner, +3.1-213-ft
Hole diameter, 7-in nominal 0-230-ft
Packer set: @ 213-ft
6-in casing perforations, 218-230-ft, 1 cut/rd/ft
Cement plug, Depth not documented
Borehole drilled depth: [230-ft]

Drawing By: RKL/2E33-23.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-23

WELL DESIGNATION	:	299-E33-23
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 Aggregate Area Management Study
HANFORD COORDINATES	:	N 46,642.2 W 53,383.4 [200E-13Apr91]
LAMBERT COORDINATES	:	N 451,807 E 2,241,822 [HANCONV]
		N 137,695.42m E 573,617.28m [NAD83-13Apr91]
DATE DRILLED	:	Sep65
DEPTH DRILLED (GS)	:	230-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	222-ft, Aug65
CASING DIAMETER	:	6-in, carbon steel, +ND-230-ft;
		4-in, carbon steel, +3.12-213-ft
ELEV TOP CASING	:	628.44-ft, [NGVD'29-29Mar91]
ELEV GROUND SURFACE	:	625.3-ft, Estimated
PERFORATED INTERVAL	:	0-207, 217-231-ft
SCREENED INTERVAL	:	Not documented
COMMENTS	:	FIELD INSPECTION, 29Mar91
		4 and 6-in carbon steel casing. Capped, not locked
		No pad, no permanent identification, no posts.
		In surface radiation zone.
AVAILABLE LOGS	:	Driller, Engineer
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	No water level data;
CURRENT USER	:	None documented
PUMP TYPE	:	None
MAINTENANCE	:	15Apr91 - Casing extended, amount not documented.
		17Jun91 - Casing lowered, amount not documented.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Hatch/Bigham
Drilling Company: Not documented
Date Started: 17Apr67

Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: 0036
Company Location: Not documented
Date Complete: 11May67

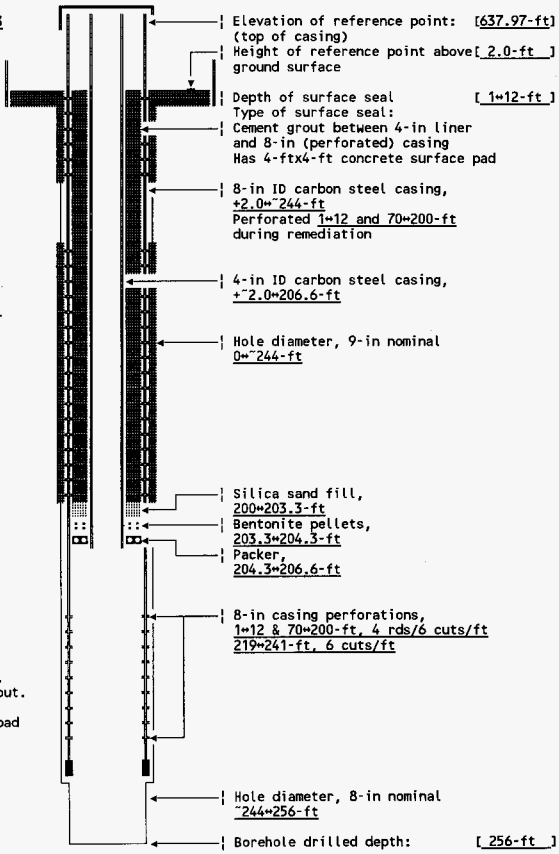
WELL NUMBER: 299-E33-24
TEMPORARY WELL NO:
Hanford Coordinates: N/S N 46,260.7 E/W W 53,790.1
State NAD83 N 137,578.78m E 573,493.66m
Coordinates: N 451,425 E 2,241,416
Start Card #: Not documented T___ R___ S___
Elevation Ground surface: 635.98-ft Brass cap

Depth to water: 230-ft May67
(Ground surface) 234.4-ft 22Apr93

GENERALIZED STRATIGRAPHY / Driller's Log

10-20: COBBLES, SAND and SILT
20-25: NOT DOCUMENTED
25-30: SAND, GRAVEL and COBBLES
30-35: SAND and GRAVEL
35-55: SAND and SILT
55-60: SAND
60-85: Coarse SAND and SILT
85-100: SAND and SILT
100-130: Coarse SAND and SILT
130-145: SAND
145-180: SILT and SAND
180-197: SILT and SAND with some small GRAVEL
197-200: Cemented SILT and GRAVEL
200-205: Clean COBBLES
205-244: Clean GRAVEL
244-256: BASALT

REMEDIATION:
Aug-Oct92 by WHC GWWS
Perforated 8-in casing.
Set 4½-in OD liner to 206.6-ft.
Grouted annulus with cement grout.
Excavated for and placed 4-ft by 4-ft concrete surface pad with brass marker and 4 protective posts.



Drawing By: RKL/2E33-24.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-24

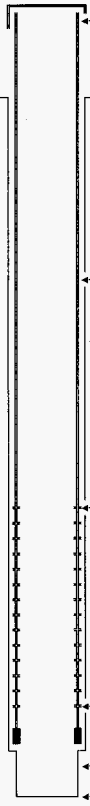
WELL DESIGNATION	:	299-E33-24
RCRA FACILITY	:	SST-241-BY-Farm
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 46,260.7 W 53,790.1 [27Oct92-200E]
LAMBERT COORDINATES	:	N 451,425 E 2,241,416 [HANCONV]
		N 137,578.78m E 573,493.66m [27Oct92-NAD83]
DATE DRILLED	:	May67
DEPTH DRILLED (GS)	:	256-ft
MEASURED DEPTH (GS)	:	250-ft, Sep90 TV
DEPTH TO WATER (GS)	:	230-ft, May67;
		234.4-ft, 22Apr93
CASING DIAMETER	:	8-in, carbon steel, +2.0↔~244-ft;
		4-in, carbon steel, ~+2.0↔207-ft
ELEV TOP OF CASING	:	637.97-ft, [27Oct92-NGVD'29]
ELEV GROUND SURFACE	:	635.98-ft, Brass cap [27Oct92-NGVD'29]
PERFORATED INTERVAL	:	219↔241-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 23Oct89,
		Carbon steel casing. 2-ft round pad, capped not locked, no posts.
		Identification stamped on brass cap in pad.
		FIELD INSPECTION, 19Oct92,
		8-in carbon steel casing, capped and locked. 4-ft by 4-ft concrete pad
		with survey marker. 4 protective posts. Not in radiation zone.
		OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Depths referenced to ground surface;
		07Nov89;
		Depth to bottom: 248-ft; Bottom of casing: ~248-ft; Depth to water: 231-ft
		Perforations start at 217-ft, 6 per rd/ft. Perforations could not
		be seen below the water level due to scale build-up.
		Well needs to be scrubbed and redeveloped.
		20Sep90;
		Depth to bottom: 250-ft, silty; Depth to water: 231-ft
		Perforations start at 217-ft, 6 per rd/ft. The perfs above water level
		looked good. There were a lot visible below water and they were open.
DATE EVALUATED	:	13Nov90
EVAL RECOMMENDATION	:	1. Remove existing 2-ft pad and perforate per WAC 173-160-415(2) to approximately 200-ft.
		2. Install 4-in liner with cement basket to approximately 205-ft. Pressure grout by use of a tremie pipe.
		3. Install protective posts and concrete pad per WAC 173-160-510 and field conditions.
		4. Survey to water level measurement standards.
		09Sep93
		1. Decommission. Well is in crib stabilization area and would penetrate impermeable pad to be installed.
LISTED USE	:	SST monthly water level measurement, 04Feb86↔23Jun93,
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling,
		WHC ER characterization
		PNL sitewide sampling 93
PUMP TYPE	:	Electric submersible, intake at 239.4-ft, (top-of-casing).
MAINTENANCE	:	27Oct89; Pulled electric submersible pump.
		07Nov89: TV camera survey.
		01Dec89; Installed electric submersible pump.
		24&29May90; Pulled pump. Brushed casing. Bailed debris.
		24&27Aug90; Bailed and developed well with pump to <5 NTU.
		20Sep90; TV camera survey.
		28Sep90; Installed pump and replaced cap.
REMEDIATION	:	17Aug92; Perforated 70↔200 and 1↔12-ft.
		18Aug↔02Sep92; Welded casing packer on 4½-in OD casing. Ran casing to 206.6-ft, top of packer @204.3-ft. Placed 2-gal bentonite pellets, 203.3↔204.3-ft. Placed 6-gal silica sand, 200↔203.3-ft. Tremie grouted annulus between 4 and 8-in casing with cement grout back to 1-ft, (Al powder added to cement).
		11Sep92; Excavated for posts and pad.
		28Sep92; Installed 4-ft by 4-ft concrete pad, brass survey marker and 4 protective posts.
		01Oct92; Extended casing to 24-in and stamped well identification on marker.
		19Oct92; Primed and painted wellhead and protective posts.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Drive barrel Method: Hard tool	WELL NUMBER: 299-E33-25
Drilling Fluid Used: Water	Additives Used: Not documented	TEMPORARY WELL NO:
Driller's Name: Bigham	WA State Lic Nr: 0036	Hanford Coordinates: N/S N 46,600 E/W W 54,210
Drilling Company: Hatch Drilling Co	Company Location: Pasco, WA	State Coordinates: N 451,763 E 2,240,996
Date Started: 07Dec68	Date Complete: 14Feb69	Start Card #: Not documented T R S
		Elevation Ground surface: 627.8-ft Estimated

Depth to water: 223-ft Feb69
(Ground surface) 222.6-ft Mar88

GENERALIZED STRATIGRAPHY	Driller's Log
	0-25: GRAVEL and COBBLES
	25-30: SAND & GRAVEL
	30- : SAND
	30-130: Not documented
	130-140: SAND & SILT
	140-150: SAND, SILT, some pea GRAVEL
	150-200: SAND & GRAVEL
	200-220: GRAVEL & COBBLES
	220-235: SAND, GRAVEL, COBBLES
	235-240: BASALT



- Elevation of reference point: [631.02-ft] (top of casing)
- Height of reference point above ground surface [3.17-ft]
- Depth of surface seal [ND] — No surface seal documented
- 6-in ID carbon steel casing, +3.2-235-ft
- Hole diameter, 7-in nominal 0-235-ft
- 6-in casing perforations, 199-233-ft, 6 cuts/ft
- Hole diameter, 6-in nominal 235-240-ft
- Borehole drilled depth: [240-ft]

Drawing By: RKL/2E33-25.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-25

WELL DESIGNATION	:	299-E33-25
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 Aggregate Area Management Study
HANFORD COORDINATES	:	N 46,600 W 54,210
LAMBERT COORDINATES	:	N 451,763 E 2,240,996 [HANCONV]
DATE DRILLED	:	Feb69
DEPTH DRILLED (GS)	:	240-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	223-ft, 14Feb69 222.6-ft, 31Mar88
CASING DIAMETER	:	6-in, carbon steel, +3.17-235-ft
ELEV TOP OF CASING	:	631.02-ft,
ELEV GROUND SURFACE	:	627.85-ft, Estimated
PERFORATED INTERVAL	:	199-233-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 06Feb90, 6-in carbon steel casing. Capped and locked, no posts. No pad. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	Water levels measured, 04Feb86-31Mar88
CURRENT USER	:	None documented
PUMP TYPE	:	None documented
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Bigham
Drilling Company: Not documented
Date Started: 18Feb69

Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: 0036
Company Location: Not documented
Date Complete: 05Mar69

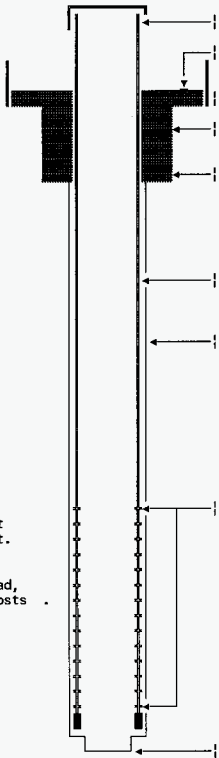
WELL NUMBER: 299-E33-26
TEMPORARY WELL NO:
Hanford Coordinates: N/S N 46,600 E/W W 54,315
State Coordinates: N 451,762 E 2,240,891
Start Card #: Not documented T R S
Elevation Ground surface: 630.34-ft Brass cap

Depth to water: 214-ft Mar69
(Ground surface) 229.4-ft 28Jun93

GENERALIZED STRATIGRAPHY / Driller's Log

0-10: GRAVEL and COBBLES
10-15: GRAVEL, COBBLES&BOULDERS
15-25: GRAVEL and BOULDERS
25-30: GRAVEL and COBBLES
30-31: SAND and COBBLES
31-35: SILT, SAND and GRAVEL
35-70: SAND and GRAVEL
70-95: SAND and SILT
95-115: SAND
115-140: SAND and SILT
140-190: SILT and GRAVEL
190-205: SAND, GRAVEL and COBBLES
205-235: SAND and GRAVEL
235-239: SAND, GRAVEL and COBBLES
239-240: BASALT

REMEDIATION:
22Nov-13Dec91 by WHC GWWS
Overdrilled 6-in casing to 19-ft
with 15-in hollow-stem auger bit.
Grouted annulus w/cement grout.
Excavated for and installed
4-ft by 4-ft concrete surface pad,
brass marker and 4 protective posts .



Elevation of reference point: [632.77-ft] (top of casing)
Height of reference point above ground surface [2.43-ft]
Depth of surface seal [0-19-ft]
Type of surface seal:
Cement grout outside 6-in casing, has 4-ft by 4-ft concrete surface pad
15-in hollow-stem auger overdrilled hole to 19-ft
6-in ID carbon steel casing, +2.4-239-ft
Hole diameter, 7-in nominal 19-239-ft
6-in casing perforations, 199->220-ft, 6 cuts/ft by TV
Perforations extend below water
Borehole drilled depth: [240-ft]

Drawing By: RKL/2E33-26.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-26

WELL DESIGNATION	:	299-E33-26
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 46,600 W 54,315
LAMBERT COORDINATES	:	N 451,762 E 2,240,891 [HANCONV]
DATE DRILLED	:	Mar69
DEPTH DRILLED (GS)	:	240-ft
MEASURED DEPTH (GS)	:	241-ft Aug90 TV
DEPTH TO WATER (GS)	:	214-ft, Mar69; 229.4-ft, 28Jun93
CASING DIAMETER	:	6-in, carbon steel, +2.43~239-ft
ELEV TOP OF CASING	:	632.77-ft, [25Feb92-NGVD'29]
ELEV GROUND SURFACE	:	630.34-ft, Brass cap [25Feb92-NGVD'29]
PERFORATED INTERVAL	:	~199~Not documented-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 06Feb90, Carbon steel casing. Capped and locked, no posts. 2-ft round pad, identification stamped on brass cap in pad. FIELD INSPECTION, 15Oct92, 6-in carbon steel casing, capped and locked. 4-ft by 4-ft concrete pad with identification stamped on marker, 4 protective posts OTHER:
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Depths referenced to ground surface; 02Nov89; Depth to bottom: 237-ft; Bottom of casing: Not detected; Depth to water: 226-ft Vadose zone casing: corrosion/scale present. The perforations started at 199-ft. Found 6 perforations per rd/ft extending down to ~220-ft. Perforations couldn't be distinguished below the water level. Submerged casing: The casing is corroded and scaled over and requires scrubbing prior to use. Following scrubbing the well should be redeveloped. 27Aug90; Depth to bottom: 241-ft, gravel; Depth to water: 229-ft, floating debris Vadose zone casing was clean. Perforations started at 199-ft, 6 rd/ft. Submerged casing clean. Some perfs visible. Water clear, some suspended debris, probably algae.
DATE EVALUATED	:	13Nov90
EVAL RECOMMENDATION	:	1. Remove 2-ft collar and install a 2-in void grout surface seal outside 8-in casing to approximately 18-ft, OR; 2. Perforate 3~18-ft and install a 4-in liner with cement basket to approximately 20-ft. Pressure grout to 40-psi. 3. Install protective posts and concrete pad per WAC 173-160-510 and field conditions. 4. Survey to water level measurement standards.
LISTED USE	:	200BP-1 monthly water level measurement, 04Feb86~28Jun93,
CURRENT USER	:	WHC ES&M W/l monitoring, WHC ER characterization, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar, intake at 234.9-ft, (top-of-casing).
MAINTENANCE	:	12Oct89; Removed electric submersible pump. 02Nov89; TV camera survey. 28Nov89; Installed suibmersible pump. 14May90; Pulled pump, scrubbed casing, bailed debris and fill. 15&16Aug90; Bailed and developed with pump to <5 NTU. 27Aug90; TV camera survey. 28Aug90; Installed hydrostar pump.
REMEDIATION	:	22Nov91; Removed concrete pad. 02Dec91; Overdrilled 6-in casing to 19-ft w/15-in auger. Grouted annulus w/cement grout (Al powder added). 05Dec91; Excavated for surface pad and protective posts. 06Dec91; Installed concrete pad, brass marker and 4 protective posts. 09Dec91; Repaired casing, stamped number on brass cap. Did not extend casing. 12~13Dec91; Primed and painted cap, casing and posts.

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Rodda/Baker
Drilling Company: Not documented
Date Started: 27Apr70

Sample Method: Hard tool (nom)
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Not documented
Date Complete: 23Jul70

WELL NUMBER: 299-E33-27
TEMPORARY WELL NO:
Hanford Coordinates: N/S N 45,470 E/W W 53,220
State Coordinates: N 450,635 E 2,241,988
Start Card #: Not documented T R S
Elevation Ground surface: 655.88-ft Brass cap

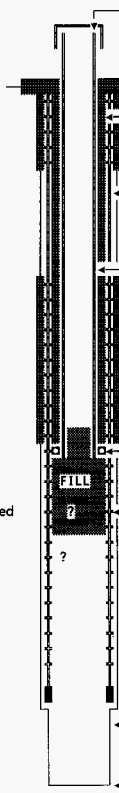
Depth to water: 255-ft Jul70
(Ground surface) 228.4-ft Feb91

GENERALIZED STRATIGRAPHY — Driller's Log

0-20: GRAVEL and COBBLES
20-44: SAND and GRAVEL
44-242: SAND and SILT
242-255: SAND
255-265: Not documented (1976)

REMEDIATION: May74, by Rodda
Apr76, by Hatch
Aug-Oct76, by Bultena and Evans.
Perforated 6-in casing and installed packer at 240-ft. Grouted between casing 0-236 ft.

NOTE: Mar90 TV run noted fill at 230.9-ft, debris and silt. Depth to water is about 27-ft above previous and expected.



Elevation of reference point: [656.17-ft]
(top of casing)
Height of reference point above ground surface [0.3-ft]

Depth of surface seal [0-20-ft]
Type of surface seal:
Cement grout between 4-in liner and 6-in (perforated) casing. Has 2-ft round cement pad.

6-in ID carbon steel casing, 0-255-ft
Perforated during remediation, 0-20 & 90-230-ft, 2 cuts/ft

4-in ID carbon steel liner, +0.3-240-ft

Hole diameter, 7-in nominal 0-255-ft

Packer set: [240-ft]
@ 240-ft

6-in casing perforations, Not documented during drilling

Hole diameter, 6-in nominal 255-265-ft

Borehole drilled depth: [265-ft]

Drawing By: RKL/2E33-27.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-27

WELL DESIGNATION	:	299-E33-27
RCRA FACILITY	:	SST-241-BX-Farm
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-5)
HANFORD COORDINATES	:	N 45,470.5 W 53,219.3 [17Sep90-200E]
LAMBERT COORDINATES	:	N 450,635 E 2,241,989 [HANCONV]
DATE DRILLED	:	Jul70
DEPTH DRILLED (GS)	:	265-ft
MEASURED DEPTH (GS)	:	231-ft
DEPTH TO WATER (GS)	:	255-ft, Jul70; 228.4-ft, 01Feb91
CASING DIAMETER	:	6-in, carbon steel, ~0↔255-ft. 4-in, carbon steel, +0.3↔~240-ft
ELEV TOP CASING	:	656.17-ft, [17Sep90-200E]
ELEV GROUND SURFACE	:	655.88-ft, Brass cap [17Sep90-200E]
PERFORATED INTERVAL	:	Original 6-in not documented; remediation 0↔20 & 90↔230-ft, 2 cuts/rd.
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 27Oct89, Carbon steel casing, capped, not locked. 2-ft round pad, no posts. Well number marked on brass cap. No pump. In surface radiation zone. OTHER;
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	28Mar90; Depth to bottom: 230.9-ft, debris and silt. Depth to water: 227.6-ft, may be of outside origin. Depth should be about 255-ft. Vadose zone casing: Some rust. Camera did not get out of 4-in casing. Well has apparently filled in.
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	Water levels measured 29May90↔01Feb91
CURRENT USER	:	WHC TWRS radiation monitoring
PUMP TYPE	:	None documented
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: 200 E Water Supply
Driller's Name: Watkins/Cordon
Drilling Company: Kaiser Engineers
Date Started: 24Sep87 Date Complete: 150ct87

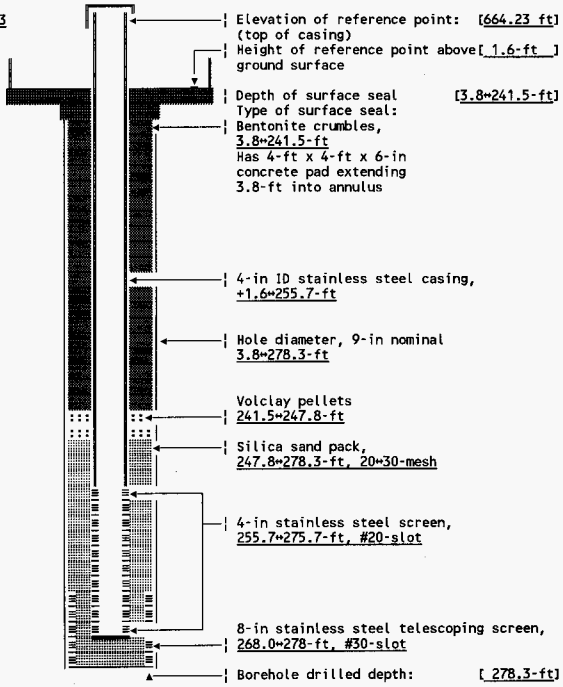
Sample Method: Drive barrel
Additives Used: Not documented
WA State Lic Nr: 1271/0079
Company Location: Hanford

WELL NUMBER: 299-E33-28
TEMPORARY WELL NO:
Hanford Coordinates: N/S N 45,596 E/W W 54,668
State Coordinates: N 450,758 E 2,240,540
Start Card #: Not documented T R S
Elevation Ground surface: 662.66-ft (Brass cap)

Depth to water: 257-ft Oct87
(Ground surface)260.8-ft 25Jun93

GENERALIZED Geologist's STRATIGRAPHY Log
(Sl=Slightly)

5-40: Silty sandy GRAVEL
40-50: Gravelly SAND
50-60: Sl gravelly, sl silty SAND
60-75: Sl silty gravelly SAND
75-80: Sl gravelly SAND
80-85: Gravelly SAND
85-90: SAND
95-105: Sl gravelly SAND
105-110: SAND
110-115: Silty SAND
115-120: Sl gravelly silty SAND
120-130: Sl GRAVELLY, sl silty SAND
130-135: Sl silty gravelly SAND
135-160: SAND
160-165: Sl silty gravelly SAND
165-170: Sl gravelly, sl silty SAND
170-175: Sl silty gravelly SAND
175-185: Silty sandy GRAVEL
185-210: SAND
210-245: Silty sandy GRAVEL
245-250: Sl silty gravelly SAND
250-265: Silty sandy GRAVEL
265-270: Sl silty gravelly SAND
270-275: Silty sandy GRAVEL



Drawing By: RKL/2E33-28.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-28

WELL DESIGNATION	:	299-E33-28
RCRA FACILITY	:	Low Level Burial Grounds - WMA-1
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-1)
HANFORD COORDINATES	:	N 45,596 W 54,668 [07Dec87-200E]
LAMBERT COORDINATES	:	N 450,758 E 2,240,540 [HANCONV]
DATE DRILLED	:	Nov87
DEPTH DRILLED (GS)	:	278-ft
MEASURED DEPTH (GS)	:	275-ft, Nov89 TV
DEPTH TO WATER (GS)	:	257-ft, Oct87; 260.8-ft, 25Jun93
CASING DIAMETER	:	4-in, stainless steel, +1.6~255.7-ft
ELEV TOP OF CASING	:	664.23-ft, [07Dec87-200E]
ELEV GROUND SURFACE	:	662.66, Brass cap [07Dec87-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	255.7~275.7-ft, 4-in, #20-slot stainless steel
COMMENTS	:	FIELD INSPECTION, 06Feb90 4-in stainless steel casing. 4x4-ft concrete pad. 4 posts. Well identification stamped on brass cap in pad. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist
TV SCAN COMMENTS	:	19Nov89, depths referenced to ground surface; Depth to bottom: 275-ft Bottom of casing: 275-ft Depth to water: 259.9-ft Screen: 256~275-ft Clean, ready for sampling.
DATE EVALUATED	:	13Nov90
EVAL RECOMMENDATION	:	1. No remediation required. Surface seal is 3 3/4-ft, not >18-ft per WAC 173-160.
LISTED USE	:	LLBG monthly water level measurement, 02Dec87~25Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, WHC ER monitoring
PUMP TYPE	:	Hydrostar, intake at 274.9-ft, (top-of-casing).
MAINTENANCE	:	12Oct89; Removed hydrostar pump for camera survey. 19Oct89; TV camera survey. 02Nov89; TV camera survey. 28Nov89; Reinstalled hydrostar pump.

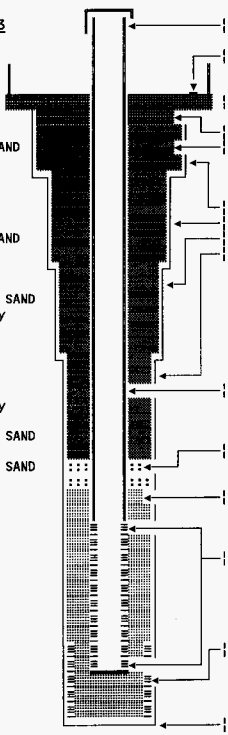
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel Hard tool	WELL NUMBER: 299-E33-29
Drilling Fluid Used: 200 E Water Supply	Additives Used: Not documented	TEMPORARY WELL NO:
Driller's Name: Murphy/Robinson	WA State Lic Nr:	Hanford Coordinates: N/S N 45,124 E/W W 54,665
Drilling Company: Kaiser Engineers	Company Location: Hanford	State Coordinates: N 450,285 E 2,240,544
Date Started: 17Aug87	Date Complete: 30Sep87	Start Card #: Not documented T R S
		Elevation Ground surface: 671.53-ft (Brass cap)

Depth to water: 265.7-ft Sep87
(Ground surface) 269.7-ft 25Jun93

GENERALIZED Geologist's STRATIGRAPHY Log

0-5: GRAVEL
5-55: Silty sandy GRAVEL
55-60: Slightly silty gravelly SAND
60-70: Slightly silty, slightly gravelly SAND
70-75: Slightly silty SAND
75-80: Slightly gravelly SAND
80-85: Gravelly SAND
85-90: Slightly silty gravelly SAND
90-95: SAND
95-105: Slightly gravelly SAND
105-120: SAND
120-125: Slightly silty gravelly SAND
125-130: Slightly silty, slightly gravelly SAND
130-135: Slightly silty SAND
135-140: SAND
140-145: Slightly silty SAND
145-150: Slightly gravelly SAND
150-160: Slightly silty, slightly gravelly SAND
160-165: Slightly silty gravelly SAND
165-180: Slightly gravelly SAND
180-185: Slightly silty gravelly SAND
185-205: SAND
205-215: Sandy SILT
215-250: Silty sandy GRAVEL
250-255: Sandy GRAVEL
255-280: Silty sandy GRAVEL
280-285: SAND
285-290: GRAVEL
290 : BASALT



Elevation of reference point: [673.77-ft] (top of casing)
Height of reference point above ground surface [2.2-ft]
Depth of surface seal [0-252.2-ft]
Type of surface seal
Portland cement to 5.0-ft
Bentonite crumbles, 5-252.2-ft
Hole diameter
0-57.4-ft, 17-in nominal
57.4-134.5-ft, 13-in nominal
134.5-204.2-ft, 11-in nominal
204.2-290.5-ft, 9-in nominal
4-in ID stainless steel casing, +2.2-252.2-ft
Bentonite pellets, 252.2-257.0-ft
Silica sand pack, 257.0-290.5-ft, 20-30 mesh
4-in stainless steel screen, 262.8-282.8-ft, #20-slot
8-in stainless steel telescoping screen, 279.5-289.5-ft, #30-slot
Borehole drilled depth: [290.5-ft]

Drawing By: RKL/2E33-29.ASB
Date : 13Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-29

WELL DESIGNATION	:	299-E33-29
RCRA FACILITY	:	Low Level Burial Grounds, 218-E-10
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-5)
HANFORD COORDINATES	:	N 45,124 W 54,665 [07Dec87]
LAMBERT COORDINATES	:	N 450,285 E 2,240,544 [HANCONV]
DATE DRILLED	:	Sep87
DEPTH DRILLED (GS)	:	290.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	265.7-ft, Sep87, 269.7-ft, 25Jun93
CASING DIAMETER	:	4-in, stainless steel, +2.2↔262.8-ft.
ELEV TOP CASING	:	673.77-ft, [07Dec87]
ELEV GROUND SURFACE	:	671.53-ft, Brass cap [07Dec87]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	4-in, 262.8↔282.8-ft; 8-in, 279.5↔289.5-ft
COMMENTS	:	FIELD INSPECTION, 02Jun90, 4-in stainless steel casing, no protective casing. Capped and locked. 4-ft by 4-ft concrete pad, 4 posts, brass marker with stamped ID. OTHER;
AVAILABLE LOGS	:	Geologist, Driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	LLBG monthly water level measurement, 01Dec87↔25Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, WHC ER characterization
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

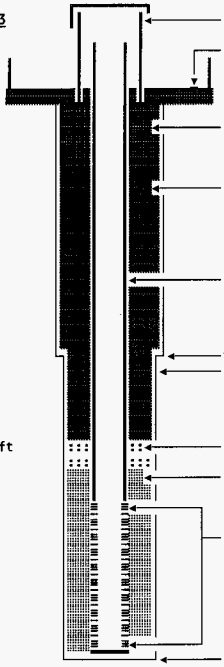
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel Hard tool	WELL NUMBER: 299-E33-31	TEMPORARY WELL NO:
Drilling Fluid Used: 200 E Water Supply	Additives Used: Not documented	Hanford Coordinates: N/S N 45,974.7	E/W W 53,687.4
Driller's Name: Thoresen	WA State Lic Nr: Not documented	State NAD83 N 137,491.7m	E 573,525.2m
Drilling Company: Kaiser Engineers	Company Location: Hanford	Coordinates: N 451,139	E 2,241,520
Date Started: 11Jul89	Date Complete: 11Sep89	Start Card #: Not documented	T R S
		Elevation Ground surface: 644.44-ft Brass cap	

Depth to water: 239.2-ft Sep89
(Ground surface) 242.5-ft 23Jun93

GENERALIZED Geologist's STRATIGRAPHY Log

0-5: Muddy sandy GRAVEL
5-10: Sandy GRAVEL
10-20: Muddy sandy GRAVEL
20-25: Sandy GRAVEL
25-40: Gravelly SAND
40-50: Sandy GRAVEL
50-55: SAND
55-60: Sl. gravelly SAND
60-65: Gravelly SAND
65-70: Sl. gravelly SAND
70-80: SAND (FS-VFS)
80-85: Muddy SAND
85-90: SAND
90-100: Sl. gravelly SAND
100-120: SAND
120-130: Sl. gravelly SAND
130-140: SAND
140-150: Sl. gravelly SAND
150-155: Gravelly SAND
155-165: SAND
165-170: Gravelly SAND
170-175: Sandy GRAVEL
175-205: SAND, CLAY lens at 202-ft
205-210: Sandy GRAVEL
210-215: Muddy sandy GRAVEL
215-255.6: Sandy GRAVEL
255.6 : BASALT



Elevation of reference point: [647.50-ft]
(top of 6-in casing)
Height of reference point above ground surface [3.06-ft]

Depth of surface seal [2-19.7-ft]
Type of surface seal:
Cement grout to 19.7-ft, has 4-ft x 4-ft x 6-in concrete pad extending 2-ft into annulus

Bentonite crumbles, 19.7-226.0-ft, 8-20-mesh

4-in ID stainless steel casing, +0.7-234.9-ft

Hole diameter, 2-154.0-ft, 11-in nominal
154.0-255.9-ft, 9-in nominal

¼-in Volclay pellets, 226.0-231.2-ft

Silica sand pack, 231.2-255.9-ft, 20-40-mesh

4-in stainless steel screen, 234.9-255.9-ft, #10-slot
Has channel pack and bottom cap

Borehole drilled depth: [255.9-ft]

Drawing By: RKL/2E33-31.ASB
Date : 13Sep93
Reference : WHC-MR-0209

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-31

WELL DESIGNATION	:	299-E33-31
RCRA FACILITY	:	Single Shell Tanks, 241-B-BX-BY Farms
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-5)
HANFORD COORDINATES	:	N 45,974.7 W 53,687.4 [04Jan90-200E]
LAMBERT COORDINATES	:	N 451,139 E 2,241,520 [HANCONV]
		N 137,491.7m E 573,525,2m [04Jan90-NAD83]
DATE DRILLED	:	Sep89
DEPTH DRILLED (GS)	:	255.9-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	239.2-ft, Sep89,
		242.5-ft, 23Jun93
CASING DIAMETER	:	4-in, stainless steel, +0.7↔234.9-ft.
		6-in, stainless steel, +3.06↔~0.5-ft
ELEV TOP CASING	:	647.50-ft, [26Feb92-NGVD'29]
ELEV GROUND SURFACE	:	644.44-ft, Brass cap [26Feb92-NGVD'29]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	4-in stainless steel with channel pack, 234.9↔255.9-ft
COMMENTS	:	FIELD INSPECTION,
		OTHER;
AVAILABLE LOGS	:	Geologist, Driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	SST monthly water level measurement, 01Dec89↔23Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling,
		WHC ER characterization
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: 200 E Water Supply
Driller's Name: Watkins
Drilling Company: Kaiser Engineers
Date Started: 11Jul89

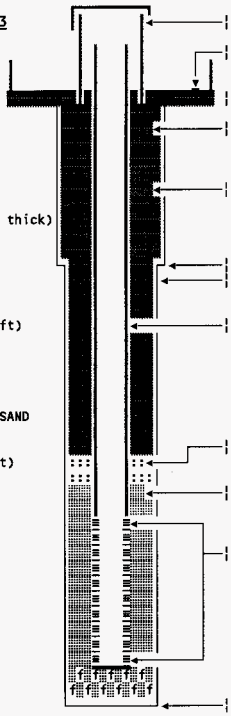
Sample Method: Drive barrel Hard tool
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Hanford
Date Complete: 05Sep89

WELL NUMBER: 299-E33-32
TEMPORARY WELL NO:
Hanford Coordinates: N/S N 45,523.7 E/W W 53,689.2
State NAD83 N 137,354.3m 573,525.0m
Coordinates: N 450,688 E 2,241,519
Start Card #: Not documented T R S
Elevation Ground surface: 656.96-ft Brass cap

Depth to water: 251.6-ft Aug89
(Ground surface) 255.0-ft 23Jun93

GENERALIZED Geologist's STRATIGRAPHY Log

0-10: Muddy sandy GRAVEL
10-15: Sandy GRAVEL
15-20: Gravelly SAND
20-25: Sandy GRAVEL
25-30: GRAVEL
30-60: Gravelly SAND
60-65: Sl. gravelly SAND
65-70: SAND (MUD at 68-ft, ~9-in thick)
70-75: Sandy gravelly MUD
75-85: Sl. gravelly SAND
85-90: SAND
90-95: Sl. gravelly SAND
95-100: SAND
100-105: Sl. gravelly SAND
105-120: SAND (Sandy MUD at 118-ft)
120-125: Sl. muddy SAND
125-140: SAND
140-155: Sl. muddy SAND
155-170: SAND
170-175: Gravelly muddy SAND
175-180: Sl. gravelly sl. muddy SAND
180-190: Gravelly SAND
190-210: Sl. gravelly SAND
210-225: SAND (MUDSTONE at 223-ft)
225-240: Gravelly SAND
240-250: Sandy GRAVEL
250-255: Gravelly SAND
255-260: SAND
260-265: Sl. gravelly SAND
265-271: Gravelly SAND
271 : BASALT



Elevation of reference point: [660.05-ft] (top of 6-in casing)
Height of reference point above ground surface [3.09-ft]
Depth of surface seal [2-20.5-ft]
Type of surface seal:
Cement grout to 20.5-ft, has 4-ft x 4-ft x 6-in concrete pad extending 2-ft into annulus
Bentonite crumbles, 20.5-239.6-ft, 8-20-mesh
Hole diameter, 0-75.0-ft, 11-in nominal
75.0-270.3-ft, 9-in nominal
4-in ID stainless steel casing, +0.6-246.4-ft
¼-⅜-in Volclay pellets, 239.6-243.2-ft
Silica sand pack, 243.2-~267.4-ft, 20-40-mesh
4-in stainless steel screen, 246.4-267.4-ft, #10-slot W/channel pack and bottom cap
Borehole drilled depth: [270.3-ft]

Drawing By: RKL/2E33-32.ASB
Date : 13Sep93
Reference : WHC-MR-0209

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-32

WELL DESIGNATION	:	299-E33-32
RCRA FACILITY	:	Single Shell Tanks, 241-B-BX-BY Farms
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-5)
HANFORD COORDINATES	:	N 45,523.7 W 53,689.2 [04Jan90-200E]
LAMBERT COORDINATES	:	N 450,688 E 2,241,519 [HANCONV]
		N 137,354.3m E 573,525.0m [04Jan90-NAD83]
DATE DRILLED	:	Sep89
DEPTH DRILLED (GS)	:	270.3-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	251.6-ft, Aug89,
		255.0-ft, 23Jun93
CASING DIAMETER	:	4-in, stainless steel, +0.6~246.4-ft.
		6-in, stainless steel, +3.09~~0.5-ft
ELEV TOP CASING	:	660.05-ft, [26Feb92-NGVD'29]
ELEV GROUND SURFACE	:	656.96-ft, Brass cap [26Feb92-NGVD'29]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	4-in stainless steel with channel pack, 246.4~267.4-ft
COMMENTS	:	FIELD INSPECTION, 05Feb90;
		6-in stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID.
		Not in radiation zone.
		OTHER;
AVAILABLE LOGS	:	Geologist, Driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	SST monthly water level measurement, 01Dec89~23Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling,
		WHC ER characterization
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

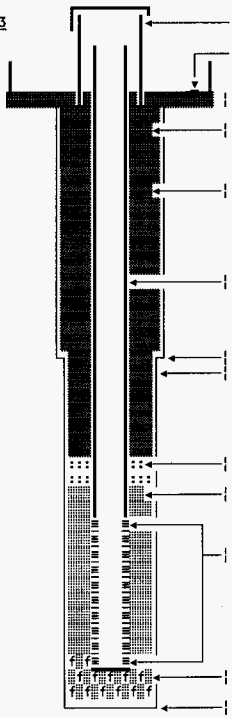
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Drive barrel Method: Hard tool	WELL NUMBER: 299-E33-33 TEMPORARY WELL NO:
Drilling Fluid Used: 200 E Water Supply	Additives Used: Not documented	Hanford Coordinates: N/S N 45,348 E/W W 51,868
Driller's Name: Wamsley	WA State Lic Nr: Not documented	State NAD83 N 137,302.2m E 574,080.3m
Drilling Company: Kaiser Engineers	Company Location: Hanford	Coordinates: N 450,517 E 2,243,341
Date Started: 17Jul89	Date Complete: 29Aug89	Start Card #: Not documented T R S
		Elevation Ground surface: 637.18-ft Brass cap

Depth to water: 232.8-ft Aug89
(Ground surface) 235.4-ft 23Jun93

GENERALIZED Geologist's STRATIGRAPHY Log

0-5: Muddy sandy GRAVEL
5-30: Sandy GRAVEL
30-35: Gravelly SAND
35-60: SAND
60-70: Sl. gravelly SAND
70-75: SAND
75-80: Sl. gravelly SAND
80-85: Gravelly SAND
85-90: Sl. gravelly SAND
90-95: Sl. muddy SAND
95-110: SAND
110-115: Sl. muddy SAND
115-130: SAND
130-145: Sl. gravelly SAND
145-150: SAND
150-165: Sl. gravelly SAND
(3-in MUD at 157-ft)
165-170: Sl. gravelly muddy SAND
170-180: Sl. muddy SAND
180-185: Muddy SAND
185-195: Sl. gravelly muddy SAND
195-200: Gravelly muddy SAND
200-205: Muddy SAND
205-210: Muddy SAND
210-215: SAND
215-252: Muddy sandy GRAVEL
252 : BASALT



Elevation of reference point: [640.17-ft]
(top of 6-in casing)
Height of reference point above ground surface [2.99-ft]
Depth of surface seal [2-18.7-ft]
Type of surface seal:
Cement grout to 18.7-ft, has
4-ft x 4-ft x 6-in concrete pad
extending 2-ft into annulus
Bentonite crumbles,
18.7-239.6-ft, 8-20-mesh
4-in ID stainless steel casing,
+0.6-246.4-ft
Hole diameter,
0-154.0-ft, 11-in nominal
154.0-252.0-ft, 9-in nominal
¼-in Volclay pellets,
220.2-224.2-ft
Silica sand pack,
224.2-246.8-ft, 20-40-mesh
4-in stainless steel screen,
227.3-248.3-ft, #10-slot
w/channel pack and bottom cap
Fill
246.8-252-ft
Borehole drilled depth: [252.0-ft]

Drawing By: RKL/2E33-33.ASB
Date : 13Sep93
Reference : WHC-MR-0209

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-33

WELL DESIGNATION	:	299-E33-33
RCRA FACILITY	:	Single Shell Tanks, 241-B-BX-BY Farms
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-5)
HANFORD COORDINATES	:	N 45,348 W 51,868 [08Dec89-200E]
LAMBERT COORDINATES	:	N 450,517 E 2,243,341 [HANCONV] N 137,302m E 574,080.3m [08Dec89-NAD83]
DATE DRILLED	:	Aug89
DEPTH DRILLED (GS)	:	252.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	232.8-ft, Aug89, 235.4-ft, 23Jun93
CASING DIAMETER	:	4-in, stainless steel, +0.5~227.3-ft.; 6-in, stainless steel, +3.0~0.5-ft
ELEV TOP CASING	:	640.39-ft, [26Feb92-NGVD'29]
ELEV GROUND SURFACE	:	637.40-ft, Brass cap [26Feb92-NGVD'29]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	4-in stainless steel with channel pack, 227.3~248.3-ft
COMMENTS	:	FIELD INSPECTION, 06Feb90; 6-in stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER;
AVAILABLE LOGS	:	Geologist, Driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	SST monthly water level measurement, 08Dec89~23Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, WHC ER characterization, PNL sitewide w/l monitoring 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

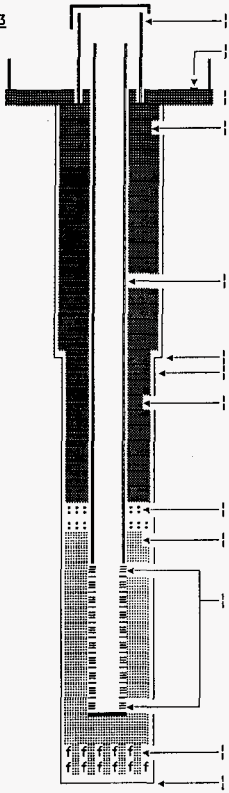
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Hard tool	WELL NUMBER: 299-E33-36
Drilling Fluid Used: 200 E Water Supply	Additives Used: Not documented	TEMPORARY WELL NO:
Driller's Name: Lyden	WA State Lic Nr: Not documented	Hanford Coordinates: N/S N 45,145 E/W W 51,906
Drilling Company: Kaiser Engineers	Company Location: Hanford	State NAD 83 N 137,240.28 m E 574,068.76 m
Date Started: 04Dec89	Date Complete: 17Apr90	Coordinates: N 450,314 E 2,243,303
		Start Card #: Not documented T___ R___ S___
		Elevation Ground surface: 643.66-ft (Brass cap)

Depth to water: 239.8-ft Jan90
(Ground surface) 243.2-ft 14Jun93

GENERALIZED Geologist's STRATIGRAPHY Log

0-25: Sandy GRAVEL
25-30: Sl. gravelly SAND
30-35: Gravelly SAND
35-62: SAND
62-75: Sl. gravelly SAND
75-80: Gravelly SAND
80-85: Sandy GRAVEL
85-90: Gravelly SAND
90-130: SAND
130-135: Sl. gravelly SAND
135-160: SAND
160-165: SL. gravelly SAND
165-175: SAND
175-200: Sl. gravelly SAND
200-205: Gravelly SAND
205-230: Sandy GRAVEL
230-235: No sample
235-240: SAND
240-245: Gravelly SAND
245-250: SAND
250-263.8: Sandy GRAVEL
263.8 : BASALT



Elevation of reference point: [646.67-ft] (top of 6-in casing)
Height of reference point above ground surface [3.0-ft]
Depth of surface seal [2-18.6-ft]
Type of surface seal:
Cement grout to 18.6-ft, has 4-ft x 4-ft x 6-in concrete pad extending 2-ft into annulus
4-in ID stainless steel casing, +1.8-234.4-ft
Hole diameter,
0-153.5-ft, 11-in nominal
153.5-263.8-ft, 9-in nominal
Bentonite crumbles, 18.6-227.1-ft, 8-20 mesh
¾-in Volclay pellets, 227.1-230.4-ft
Silica sand pack, 230.4-259.0-ft, 20-40-mesh
4-in stainless steel screen, 234.4-255.4-ft, #10-slot w/channel pack
Backfill, 259.0-263.8-ft
Borehole drilled depth: [263.8-ft]

Drawing By: RKL/2E33-36.ASB
Date : 13Sep93
Reference : WHC-MR-0207

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-36

WELL DESIGNATION	:	299-E33-36
RCRA FACILITY	:	216-B-63 Trench
CERCLA UNIT	:	200 Aggregate Area Management Study (200-BP-5)
HANFORD COORDINATES	:	N 45,145 W 51,906 [19Apr90-200E]
LAMBERT COORDINATES	:	N 450,314 E 2,243,303 [HANCONV] N 137,240.28m E 574,068.76m [19Apr90-NAD83]
DATE DRILLED	:	Apr90
DEPTH DRILLED (GS)	:	264.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	239.8-ft, Dec89, 243.2-ft, 14Jun93
CASING DIAMETER	:	4-in, stainless steel, +1.8~234.4-ft. 6-in, stainless steel, +3.0~0.5-ft
ELEV TOP CASING	:	646.67-ft [19Apr90-200E]
ELEV GROUND SURFACE	:	643.66-ft, Brass cap [19Apr90-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	234.4~255.4-ft, 4-in stainless steel with channel pack
COMMENTS	:	FIELD INSPECTION, 10Aug93; 4 and 6-in stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable. Capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER;
AVAILABLE LOGS	:	Geologist, Driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	B-63 Trench quarterly water level measurement, 01Jan91~14Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water 200E Area
Driller's Name: D. Garcia
Drilling Company: Kaiser Engineers
Date Started: 16Nov90

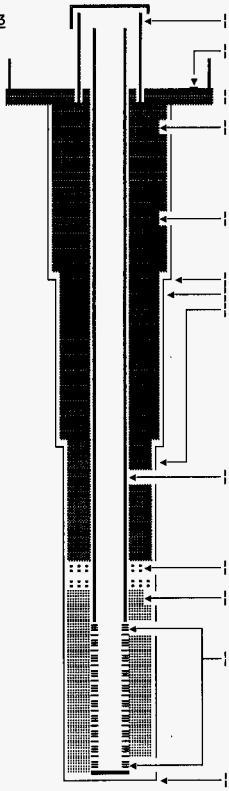
Sample Method: Drive barrel Hard toool
Additives Used: None
WA State Lic Nr:
Company Location: Hanford
Date Complete: 01Apr91

WELL NUMBER: 299-E33-38
TEMPORARY WELL NO:
Hanford Coordinates: N/S N 46,312 E/W W 53,469
State NAD83 N 137,594.78m 573,591.39m
Coordinates: N 451,477 E 2,241,737
Start Card #: Not documented T R S
Elevation Ground surface: 629.97-ft (Brass cap)

Depth to water: 226.6-ft Jan91
(Ground surface)228.1-ft 28Jun93

GENERALIZED Geologist's STRATIGRAPHY Log
Sl = slightly

0↔3.8: Silty GRAVEL
3.8↔6.2: Gravelly silty SAND
6.2↔13.1: Silty sandy GRAVEL
13.1↔13.9: SILT lens
13.9↔50: Sl silty gravelly SAND
50↔55: Gravelly SAND
55↔78: Sl gravelly SAND
78↔79: SILT lens
79↔89: Sl gravelly SAND
89↔165: SAND
165↔183: Gravelly SAND
183↔189.4: SAND
189.4↔190: SILT
190↔210: Sandy GRAVEL
210↔228.6: Silty sandy GRAVEL
228.6↔236: GRAVEL
236↔238: SAND
238↔239.6: BASALT



Elevation of reference point: [631.95-ft]
(top of casing)
Height of reference point above ground surface [2.0-ft]

Depth of surface seal [2.7↔18.4-ft]
Type of surface seal:
Cement grout to 18.4-ft, has 4x4-ft x 6-in concrete pad extending 2.7-ft into annulus

Bentonite crumbles,
18.4↔208.1-ft, 8↔20-mesh

Hole diameter,
0↔76.5-ft, 14-in nominal
76.5↔227.0-ft, 11¾-in
227.0↔239.6-ft, 9.3-in

4-in ID T304 stainless steel casing,
+ND↔218.6-ft

¾-in bentonite pellets,
208.1↔212.5-ft

Silica sand pack,
212.5↔239.6-ft, 8↔12-mesh

4-in T304 stainless steel screen,
218.6↔239.6-ft, #20-slot w/cap

Borehole drilled depth: [239.6-ft]

Drawing By: RKL/2E33-38.ASB
Date : 13Sep93
Reference :

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-38

WELL DESIGNATION	:	299-E33-38
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 BP-1 (200 Aggregate Area Management Study)
HANFORD COORDINATES	:	N 46,312 W 53,469 [20Mar91-200E]
LAMBERT COORDINATES	:	N 451,477 E 2,241,737 [HANCONV]
		N 137,594.78m E 573,591.39m [20Mar91-NAD83]
DATE DRILLED	:	Apr91
DEPTH DRILLED (GS)	:	239.6-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	226.6-ft, 10Jan91;
		228.1-ft, 28Jun93
CASING DIAMETER	:	6-in, stainless steel, +2.0↔-0.5-ft;
		4-in, stainless steel, +ND↔218.6-ft
ELEV TOP CASING	:	631.95-ft [20Mar91-NGVD'29]
ELEV GROUND SURFACE	:	629.97-ft, Brass cap [20Mar91-NGVD'29]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	218.6↔239.6-ft, 4-in stainless steel, #20-slot
COMMENTS	:	FIELD INSPECTION, 24Mar91;
		6-in stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID.
		Not in radiation zone.
AVAILABLE LOGS	:	Geologist
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	200-BP-1 monthly water level measurement, 01Mar91↔28Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling,
		WHC ER characterization
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

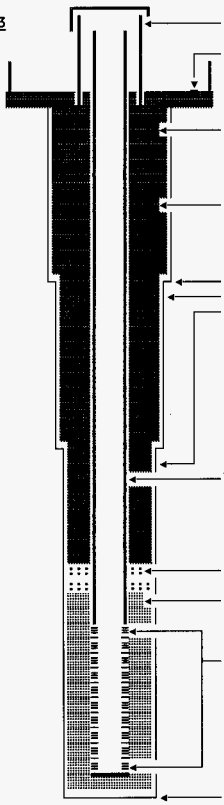
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Hard toool	WELL NUMBER: 299-E33-39	TEMPORARY WELL NO:
Drilling Fluid Used: Water 200E Area	Drive barrel Additives Used: None	Hanford	
Driller's Name: T. Gifford	WA State Lic Nr: Not documented	Coordinates: N/S N 46,451 State NAD83 N 137,637.65m	E/W W 52,641 573,843.75m
Drilling Company: Kaiser Engineers	Company Location: Hanford	Coordinates: N 451,618 Start	E 2,242,565
Date Started: 03Dec90	Date Complete: 08Feb91	Card #: Not documented Elevation	T___ R___ S___
		Ground surface: 620.42-ft (Brass cap)	

Depth to water: 218.6-ft Jan91
(Ground surface) 218.7-ft 28Jun93

GENERALIZED Geologist's STRATIGRAPHY Log
Sl = slightly

0-11: Silty sandy GRAVEL
11-15: Sl gravelly SAND
15-29: Gravelly SAND
29-34: SAND
34-44: Sl gravelly SAND
44-50: Gravelly SAND
50-59: Sl gravelly SAND
59-64: Gravelly SAND
64-69: SAND
69-89: Gravelly SAND
89-114: Sl gravelly SAND
114-125: Gravelly SAND
125-139: SAND
139-159: Gravelly SAND
159-175: Silty SAND
175-178: Gravelly SAND
178-185: Sandy GRAVEL
185-190: Gravelly SAND
190-229: Silty sandy GRAVEL
229-229.5: SAND
229.5-230.1: BASALT



Elevation of reference point: [623.32-ft] (top of casing)
Height of reference point above ground surface [2.9-ft]
Depth of surface seal [2.0-20.0-ft]
Type of surface seal:
Cement grout to 20.0-ft, has 4x4-ft x 6-in concrete pad extending 2.0-ft into annulus
Bentonite crumbles, 20.0-199.6-ft
Hole diameter,
0-101-ft, 14-in nominal
101-ND-ft, 12-in nominal
ND-230.1-ft, 9.3-in
4-in ID T304 stainless steel casing, +ND-208.2-ft
Bentonite pellets, 199.6-203.1-ft
Silica sand pack, 203.1-230.1-ft, 8-12-mesh
4-in T304 stainless steel screen, 208.2-229.2-ft, #20-slot w/cap
Borehole drilled depth: [230.1-ft]

Drawing By: RKL/2E33-39.ASB
Date : 13Sep93
Reference :

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-39

WELL DESIGNATION	:	299-E33-39
RCRA FACILITY	:	Single Shell Tanks, WMA-B-BX-BY
CERCLA UNIT	:	200 BP-1 (200 Aggregate Area Management Study)
HANFORD COORDINATES	:	N 46,451 W 52,641 [20Mar91-200E]
LAMBERT COORDINATES	:	N 451,618 E 2,242,565 [HANCONV]
		N 137,637.65m E 573,843.75m [20Mar91-NAD83]
DATE DRILLED	:	Feb91
DEPTH DRILLED (GS)	:	230.1-ft
MEASURED DEPTH (GS)	:	229.8-ft, 13May91
DEPTH TO WATER (GS)	:	218.6-ft, 17Jan91; 218.7-ft, 28Jun93
CASING DIAMETER	:	6-in, stainless steel, +2.9↔~0.5-ft; 4-in, stainless steel, +ND↔208.2-ft
ELEV TOP CASING	:	623.32-ft [20Mar91-NGVD'29]
ELEV GROUND SURFACE	:	620.42-ft, Brass cap [20Mar91-NGVD'29]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	208.2↔229.2-ft, 4-in stainless steel, #20-slot
COMMENTS	:	FIELD INSPECTION, 13May91; 6-in stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. In underground radiation zone. DTW 220.2-ft, DTB 232.7-ft Top of pump suppport.
AVAILABLE LOGS	:	Geologist
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	200-BP-1 monthly water level measurement, 01Mar91↔28Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, WHC ER characterization
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: C. Wamsley
Drilling Company: Kaiser Engineers
Date Started: 18Nov90

Sample Method: Drive barrel
Additives Used: None
Lic Nr: Not documented
Company Location: Hanford
Date Complete: 01Apr91

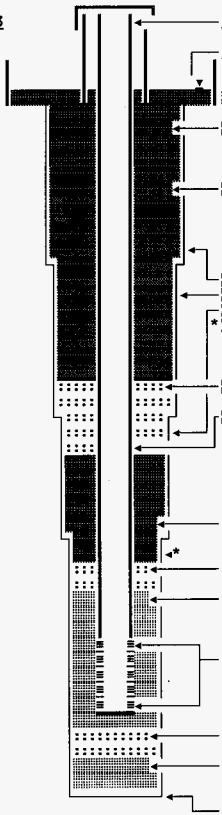
WELL NUMBER: 299-E33-40
Hanford Coordinates: N/S N 46,735 E/W W 53,616
State NAD83 N 137,723.4m 573,546.4m
Coordinates: N 451,899 E 2,241,589
Start Card #: Not documented T___ R___ S___
Elevation Ground surface: 621.26-ft (Brass cap)

TEMPORARY WELL NO:

Depth to water: 217.6-ft Jan91
(Ground surface) 219.4-ft 28Jun93

GENERALIZED Geologist's STRATIGRAPHY Log
Sl = slightly

0-25: Silty sandy GRAVEL
25-50: Sandy GRAVEL
50-70: SAND
70-75: Sl gravelly SAND
75-110: SAND
110-130: Sl gravelly SAND
130-160: Gravelly SAND
160-170: Sandy GRAVEL
170-185: Gravelly SAND
185-191: Sandy GRAVEL
191-196: Sandy SILT
196-228: Silty sandy GRAVEL
228-303: BASALT
303-304.5: BASALT flow bottom
304.5-308: Gray CLAY
308-315: Clayey SAND
315-318: SAND



Elevation of reference point: [624.58-ft] (top of casing)
Height of reference point above ground surface [3.32-ft]
Depth of surface seal [2.6-20.1-ft]
Type of surface seal:
Cement grout to 20.1-ft, has 4x4-ft x 6-in concrete pad extending 2.6-ft into annulus
Bentonite crumbles, 20.1-90.4-ft
Bentonite slurry, 90.4-197.2-ft
Hole diameter,
0-83.1-ft, 17-in nominal
83.1-228.3-ft, 14-in nominal
228.3-240.3-ft, 12-in nominal
240.3-318.0-ft, 10-in nominal
Holeplug bentonite, 197.2-230.9-ft
4-in ID T304 stainless steel casing, +3.3-293.9-ft
Cement grout, 230.9-280.9-ft
Holeplug bentonite chunks, 280.6-286.1-ft
Silica sand pack, 286.1-304.6-ft, 20-40-mesh
304.6-308.1-ft, 4-8-mesh
4-in T304 stainless steel screen, 293.9-304.9-ft, #20-slot w/cap
Bentonite holeplug chunks, 308.1-312.3-ft
Silica sand pack, 312.3-316.6-ft, 4-8 & 8-12-mesh
Borehole drilled depth: [318.0-ft]

Drawing By: RKL/2E33-40.ASB
Date : 13Sep93
Reference :

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-40

WELL DESIGNATION	:	299-E33-40
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 BP-1 (200 Aggregate Area Management Study)
HANFORD COORDINATES	:	N 46,735 W 53,616 [30Jul91-200E]
LAMBERT COORDINATES	:	N 451,899 E 2,241,589 [HANCONV]
		N 137,723.38m E 573,546.44m [30Jul91-NAD83]
DATE DRILLED	:	Apr91
DEPTH DRILLED (GS)	:	318.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	217.6-ft, 02Jan91;
		219.4-ft, 28Jun93
CASING DIAMETER	:	6-in, stainless steel, ~+3.0~0.5-ft;
		4-in, stainless steel, +3.32~293.9-ft
ELEV TOP CASING	:	624.58-ft [30Jul91-NGVD'29]
ELEV GROUND SURFACE	:	621.26-ft, Brass cap [30Jul91-NGVD'29]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	293.9~304.9-ft, 4-in stainless steel, #20-slot
COMMENTS	:	FIELD INSPECTION, 13May91;
		6-in stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID.
		In underground radiation zone.
AVAILABLE LOGS	:	Geologist
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	200-BP-1 monthly water level measurement, 01May91~28Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring,
		WHC ER characterization
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

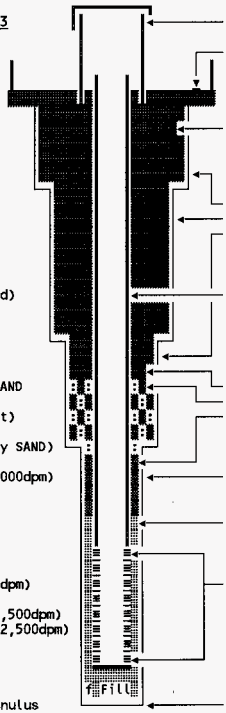
Drilling Method: Cable tool	Sample Method: Drive barrel Hard tool	WELL NUMBER: 299-E33-41	TEMPORARY WELL NO: None
Drilling Fluid Used: Raw water	Additives Used: None	Hanford Coordinates: N/S N 45,573.4	E/W W 53,091.4
Driller's Name: M Thorosen L Watkins/B Strode	WA State Lic Nr: Not documented	State NAD83 137,369.94m Coordinates: N 450,739	573,707.19m E 2,242,117
Drilling Company: Kaiser Engineers	Company Location: Hanford	Start Card #: Not documented	T ___ R ___ S ___
Date Started: 31Jan91	Date Complete: 28Mar91	Elevation Ground surface: 651.53-ft Brass cap	

Depth to water: 252.4-ft Apr91
(Ground surface) 249.6-ft 23Jun93

GENERALIZED Geologist's STRATIGRAPHY Log
Sl=slightly

0-5: GRAVEL and SAND
5-10: Sl silty gravelly SAND
10-15: Gravelly SAND
15-20: Sl silty sandy GRAVEL
20-25: Gravelly SAND
25-35: Sandy GRAVEL
35-45: SAND
45-50: Sl gravelly SAND
50-60: SAND
60-65: Sl gravelly SAND
65-70: Gravelly SAND
70-73: Sl gravelly SAND
(Contamination encountered)
73-74: Interbedded SAND and SILT
74-80: Gravelly SAND
(4,000dpm @ 78-ft)
80-95: Sl gravelly SAND
95-102.5: SAND
102.5-104.5: Interbedded silty SAND and cse SAND (Wet)
104.5-110: SAND (PEBBLES @ 106-ft)
110-115: Sl gravelly SAND
115-125: SAND (Stringers of silty SAND)
125-140: Sl gravelly SAND
(SILT lens @ 137-ft; 4,000dpm)
140-164: SAND
(2,000dpm @ 160-ft)
164-164.5: Sandy SILT
164.5-170: SL gravelly SAND
170-217: Gravelly SAND
217-218: Sandy GRAVEL
218-220: Sl clayey SILT (25,000dpm)
220-230: Sl clayey sandy SILT
(Contamination 30,000>2,500dpm)
230-242: Sl clayey silt SAND (~2,500dpm)
242-262.7: Sandy GRAVEL
262.7-263: BASALT

DRILLIING NOTE:
Well was completed with 1-in annulus 240.7-263.0-ft with variance granted by Ecology



Elevation of reference point: [654.95-ft] (top of casing)
Height of reference point above ground surface [3.42-ft]
Depth of surface seal [2.5-20.4-ft]
Type of surface seal:
Cement grout to 20.4-ft, has 4x4-ft x 6-in concrete pad extending 2.5-ft into annulus
Hole diameter,
0-20-ft, 13-in nominal
20-158.7-ft, 11-in nominal
158.7-263.0-ft, 9-in nominal
4-in ID stainless steel casing, +0.5-244.9-ft
Bentonite,
20.4-172.6-ft, 8-20-mesh crumbles
172.6-239.9-ft, slurry
239.9-243.1-ft, 8-20-mesh crumbles
Hole diameter, 7-in nominal
240.7-263.0-ft
Silica sand pack,
243.1-262.0-ft, 10-20-mesh
4-in stainless steel screen,
244.9-261.0-ft, #10-slot
W/channel pack
Borehole drilled depth: [263.0-ft]

Drawing By: RKL/2E33-41.ASB
Date : 13Sep93
Reference : WHC-SD-EN-DP-041

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-41

WELL DESIGNATION	:	299-E33-41
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	Single Shell Tanks
HANFORD COORDINATES	:	N 45,573.4 W 53,091.4 [200E-11Jul91]
LAMBERT COORDINATES	:	N 450,739 E 2,242,117 [HANCONV]
	:	N 137,369.94m E 573,707.19m [NAD83-11Jul91]
DATE DRILLED	:	Apr91
DEPTH DRILLED (GS)	:	263.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	252.4-ft, 29Apr91; 249.6-ft, 23Jun93
CASING DIAMETER	:	4-in stainless steel, +0.5~279.2-ft; 6-in stainless steel, +3.4~0.5-ft
ELEV TOP CASING	:	654.95-ft, [NGVD'29-11Jul91]
ELEV GROUND SURFACE	:	651.53-ft, Brass cap [NGVD'29-11Jul91]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	244.9~261.0-ft, 4-in #10-slot stainless steel, with channel pack
COMMENTS	:	FIELD INSPECTION, OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	SST monthly water level measurement, 01Jun91~23Jun93,
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling,
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

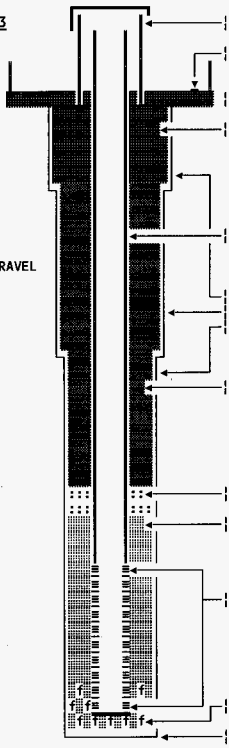
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Drive barrel Method: Hard tool	WELL NUMBER: 299-E33-42 / TEMPORARY WELL NO:
Drilling Fluid Used: Raw water	Additives Used: None	Hanford Coordinates: N/S N 45,753.8 E/W W 53,701.9
Driller's Name: J McKnight	WA State Lic Nr: Not documented	State NAD83 N 137,424.38m E 573,520.99m
Drilling Company: Kaiser Engineers	Company Location: Hanford	Coordinates: N 450,918 E 2,241,506
Date Started: 29Aug91	Date Complete: 06Nov91	Start Card #: Not documented T___ R___ S___
		Elevation Ground surface: 650.88-ft (Brass cap)

Depth to water: ~247.0-ft Nov91
(Ground surface) 248.9-ft 23Jun93

GENERALIZED Geologist's STRATIGRAPHY Log
Sl=slightly

0-5: Not documented
5-30: Sandy GRAVEL
30-35: Sl gravelly SAND
35-50: Sl gravelly sl silty SAND
50-55: Sandy GRAVEL
55-150: SAND
150-160: Sl gravelly SAND
160-170: SAND
170-175: Sl gravelly SAND
175-200: SAND w/trace GRAVEL
200-260: SAND, w/SILT CLAY and GRAVEL



Elevation of reference point: [654.30-ft]
(top of casing)
Height of reference point above ground surface [3.42-ft]

Depth of surface seal [2.0-18.0-ft]
Type of surface seal:
Cement grout to 18.0-ft, has 4x4-ft x 6-in concrete pad extending 2.0-ft into annulus

4-in ID stainless steel casing, ~+1.0-238.5-ft

Hole diameter,
2.0-19.2-ft, 13-in nominal
19.2-168.6-ft, 11-in nominal
168.6-260.2-ft, 9-in nominal

Bentonite crumbles,
18.0-229.5-ft, 8-20-mesh

¾-in bentonite pellets,
229.5-233.0-ft

Silica sand pack,
233.0-256.8-ft, 10-20-mesh

4-in T304 stainless steel screen,
238.5-259.5-ft, #20-slot

Fill,
256.8-260.2-ft

Borehole drilled depth: [260.2-ft]

Drawing By: RKL/2E33-42.ASB
Date : 15Sep93
Reference :

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-42

WELL DESIGNATION	:	299-E33-42
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	SST/BX-BY Tank Farm
HANFORD COORDINATES	:	N 45,753.8 W 53,701.9 [200E-12Dec91]
LAMBERT COORDINATES	:	N 451,649 E 2,238,486 [HANCONV]
		N 137,424.38m E 573,520.99m [NAD83-12Dec91]
DATE DRILLED	:	Nov91
DEPTH DRILLED (GS)	:	260.2-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	247.0-ft, 04Nov91
		248.9-ft, 23Jun93
CASING DIAMETER	:	4-in stainless steel, ~1.0~238.5-ft;
		6-in stainless steel, +3.42~~0.5-ft
ELEV TOP CASING	:	654.30-ft, [NGVD'29-12Dec91]
ELEV GROUND SURFACE	:	650.88-ft, Brass cap [NGVD'29-12Dec91]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	238.5~259.5-ft, 4-in #20-slot stainless steel;
COMMENTS	:	FIELD INSPECTION, 19May93;
		4 and 6-in stainless steel casing.
		4-ft by 4-ft concrete pad, 4 posts, 1 removable.
		Capped and locked, brass cap in pad with well ID.
		Not in radiation zone.
		OTHER:
AVAILABLE LOGS	:	Geologist
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	SST monthly water level measurement, 31Dec91~23Jun93,
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling,
PUMP TYPE	:	Hydrostar, intake @ 254.0-ft
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Raw water
Driller's Name: B Smith/G Howel
Drilling Company: Kaiser Engineers
Date Started: 30Aug91

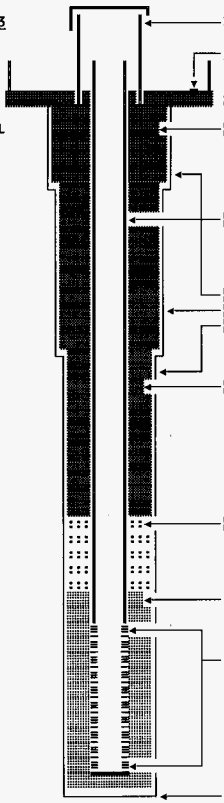
Sample Method: Drive barrel
Hard tool
Additives Used: None
WA State Lic Nr: Not documented
Company Location: Hanford
Date Complete: 05Nov91

WELL NUMBER: 299-E33-43
TEMPORARY WELL NO:
Hanford Coordinates: N/S N 45,429.1 E/W W 53,695.6
State NAD83 N 137,325.43m E 573,523.19m
Coordinates: N 450,593 E 2,241,513
Start Card #: Not documented T R S
Elevation Ground surface: 659.18-ft (Brass cap)

Depth to water: 255.5-ft Oct91
(Ground surface) 257.3-ft 23Jun93

GENERALIZED Geologist's STRATIGRAPHY Log
Sl=slightly

0-45: GRAVEL w/SAND
45-240: SAND w/SILT, CLAY, GRAVEL
240-273.7: SAND/GRAVEL



Elevation of reference point: [662.68-ft]
(top of casing)
Height of reference point above ground surface [3.50-ft]

Depth of surface seal [2.2-19.3-ft]
Type of surface seal:
Cement grout to 19.3-ft, has 4x4-ft x 6-in concrete pad extending 2.2-ft into annulus

4-in ID stainless steel casing, +1.0-250.2-ft

Hole diameter,
0-19.7-ft, 13-in nominal
19.7-166.1-ft, 11-in nominal
166.1-273.7-ft, 9-in nominal

Bentonite crumbles,
19.3-236.9-ft, 8-20 mesh

⅜-in bentonite pellets,
236.9-246.9-ft

Silica sand pack,
246.9-273.7-ft, 10-20-mesh

4-in T304 stainless steel screen,
250.2-271.3-ft, #20-slot

Borehole drilled depth: [273.7-ft]

Drawing By: RKL/2E33-43.ASB
Date : 13Sep93
Reference :

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E33-43

WELL DESIGNATION	:	299-E33-43
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	SST/BX Tank Farm
HANFORD COORDINATES	:	N 45,429.1 W 53,695.6 [200E-12Dec91]
LAMBERT COORDINATES	:	N 450,593 E 2,241,513 [HANCONV]
		N 137,325.43m E 573,523.19m [NAD83-12Dec91]
DATE DRILLED	:	Nov91
DEPTH DRILLED (GS)	:	273.7-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	255.5-ft, 01Nov91;
		257.3-ft, 23Jun93
CASING DIAMETER	:	4-in stainless steel, ~+1.0↔250.2-ft;
		6-in stainless steel, +3.50↔~0.5-ft
ELEV TOP CASING	:	662.68-ft, [NGVD'29-12Dec91]
ELEV GROUND SURFACE	:	659.18-ft, Brass cap [NGVD'29-12Dec91]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	250.2↔271.3-ft, 4-in #20-slot stainless steel;
COMMENTS	:	FIELD INSPECTION, 19May93;
		4 and 6-in stainless steel casing.
		4-ft by 4-ft concrete pad, 4 posts, 1 removable.
		Capped and locked, brass cap in pad with well ID.
		Not in radiation zone.
		OTHER:
AVAILABLE LOGS	:	Geologist
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	SST monthly water level measurement, 31Dec91↔23Jun93,
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling
PUMP TYPE	:	Hydrostar, intake @ 268.5-ft
MAINTENANCE	:	

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Assessment Groundwater Monitoring Plan for Single Shell Tank Waste Management Area B-BX-BY		ECN No. N/A

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