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7. Abstract

The 216-A-29 Ditch has received chemical sewer wastewater from the Plutonium Uranium Extraction (PUREX) Plant in the 200 East Area since 1955. The facility is operated by the U.S. Department of Energy Richland Operations and co-operated by the Westinghouse Hanford Company. Groundwater underlying the 216-A-29 Ditch is monitored under the Resource Conservation and Recovery Act of 1976 and under regulatory requirements of Washington Administrative Code. Data from wells around the 216-A-29 Ditch indicate that specific conductance in downgradient well 299-E25-35 is statistically greater than the background established for this parameter at this facility. This requires development of a groundwater quality assessment plan. The groundwater quality assessment program will progress in phases. The objective of Phase 1 of the program, described in this report, will be to determine if elevated values of specific conductance in well 299-E25-35 indicates that contamination in the groundwater originates in the 216-A-29 Ditch.

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1.0 INTRODUCTION

The 216-A-29 Ditch (A-29 Ditch) is a manmade earthen ditch that has been in use since 1955. The A-29 Ditch receives discharge from the Plutonium Uranium Extraction (PUREX) Plant chemical sewer line. The A-29 Ditch, an interim-status dangerous waste disposal facility, is owned by the U.S. Department of Energy (DOE) and operated by the Westinghouse Hanford Company (DOE 1988). The A-29 Ditch is regulated under Washington State Department of Ecology (Ecology) Dangerous Waste Regulations, Washington Administrative Code (WAC) 173-303 (Ecology 1989). The A-29 Ditch has been designated to close as a surface impoundment under the Resource Conservation and Recovery Act of 1976 (RCRA) regulations in accordance with the Hanford Federal Facility Agreement and Consent Order (Ecology et al. 1989).

Ground water underlying the A-29 Ditch is monitored following the requirements found in WAC 173-303-400, and by reference, requirements found in 40 CFR 265, Subparts F through R. Ground water wells monitoring the A-29 Ditch have been sampled quarterly for 1 yr, and background values were established after the August 1989 sampling. The statistical analyses required by 40 CFR 265.93(b) have been completed for the January 1990 data collected at the A-29 Ditch. Results from the January analysis indicated that specific conductance in downgradient well 299-E25-35 was statistically greater than the background levels in the initial evaluation and in follow-up verification (resample) analyses. Due to the increase in specific conductance in the ground water, the initiation of a ground water quality assessment program is required by 40 CFR 265.93(d)(2). This document contains the ground water quality assessment plan addressing the requirements of 40 CFR 265.93 and 265.94.

2.0 BACKGROUND INFORMATION

The following information on the A-29 Ditch, its geology, and hydrology has been condensed from 216-A-29 Ditch Preliminary Closure/Post Closure Plan (DOE 1987), 216-B-3 Pond System Closure/Post Closure Plan (DOE 1989), and Liquid Waste Land Disposal Units Report (DOE 1986). More detailed information and data tables are available in these reports.

2.1 FACILITY INFORMATION

The A-29 Ditch (approximately 6 ft wide, 3,600 ft long, with depth varying from 2 to 3 ft at the upper end to 15 ft at the lower end) has received chemical sewer wastewater from the PUREX Plant in the 200 East Area since 1955. The point of discharge to the ditch is approximately 900 ft west of the east perimeter fenceline of the 200 East Area. The ditch passes beneath the fence and runs northeast to the 216-B-3-3 Ditch, which discharges to the 216-B-3 Pond (Figure 2-1). The 216-B-3 Pond (B-Pond) is part of the B Pond System (a series of unlined, interconnected waster disposal ponds that consist of the B Pond, the 216-B-3A, 216-B-3B, 216-B-3C Lobes, the 216-B-3-3 Ditch, and part of an inactive overflow area.

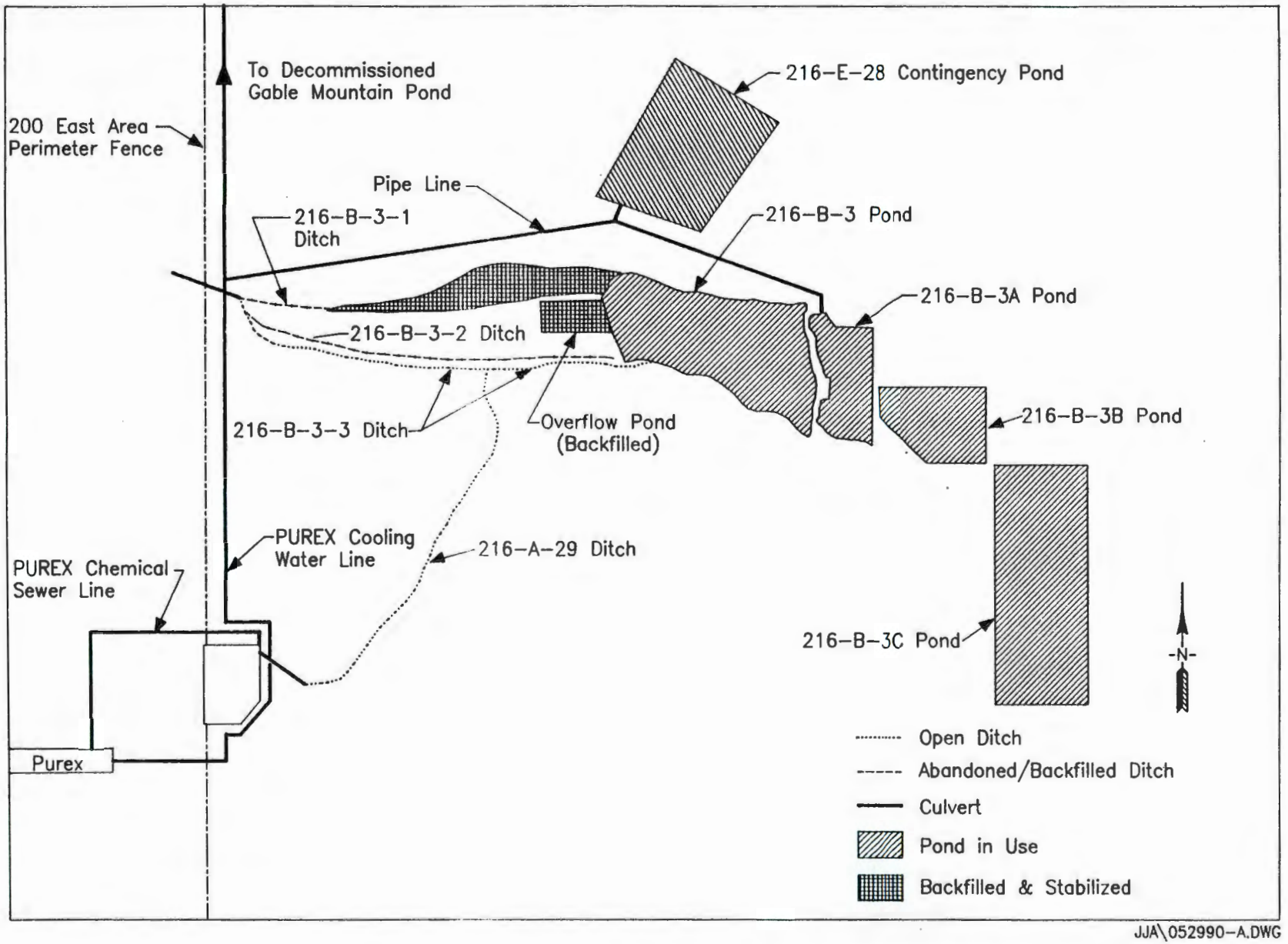


Figure 2-1. Location Map of 200 East Area and 216-A-29 Ditch.

2.2 WASTE DISPOSAL PRACTICES

All discharges to the A-29 Ditch occur within the 200 East Area perimeter fence and come from the PUREX chemical sewer line. The A-29 Ditch received intermittent batches of potentially hazardous spilled chemical materials and/or off-specification process chemicals. Additionally, periodic corrosive effluents were discharged from the plant demineralizer regeneration system. The discharges of sodium hydroxide and sulfuric acid solutions from demineralizer operations occurred daily from 1955 until February 1986.

In 1984, administrative and physical controls were modified to avoid inadvertent discharges of chemicals to the waste stream. Because the A-29 Ditch was not expected to receive additional hazardous substances, the DOE Richland Operations Office (DOE-RL) proposed that the A-29 Ditch be closed under RCRA interim status (DOE 1988). As part of the B Pond bypass system, a diversion box designed to reroute flow out of the A-29 Ditch and into the PUREX Plant cooling water pipeline will be placed into operation during the second half of FY 1990. After the structure is operational, the A-29 Ditch will be operationally closed and the surface of the A-29 Ditch will be stabilized.

3.0 SITE DESCRIPTION

The Hanford Site lies within the Columbia Plateau, which is generally characterized by a thick sequence of tholeiitic basalt flows called the Columbia River Basalt Group (Swanson et al. 1979). These flows have been folded and faulted, creating broad structural and topographic basins separated by asymmetric anticlinal structures (i.e., ridges). The Hanford Site lies within one of these basins, the Pasco Basin (Figure 3-1).

3.1 GEOLOGY

3.1.1 Surface Physiography

The A-29 Ditch lies in an area of relatively low relief at an elevation of approximately 550 ft. The A-29 Ditch drops approximately 100 ft to an elevation of 575 ft at its junction with the 216-B-3-3 Ditch. The topographic surface of this area is primarily the result of Pleistocene cataclysmic flooding and Holocene eolian activity. An erosional channel runs east-southeast between Gable Mountain and Gable Butte and north of the 200 East Area. The A-29 Ditch lies on the edge of this paleoflood channel. The A-29 Ditch is also situated at the east end of Cold Creek bar, a topographic high that extends to the west and consists of sand and gravel deposited by cataclysmic floods (Figure 3-2). A well-developed dune field is situated immediately south of the A-29 Ditch and consists of east- to northeast-trending, discontinuous, longitudinal dunes (linear sand ridges). Closed topographic depressions occur locally between the dunes. Where dunes are absent, a thin sheet of sand often blankets flood topography.

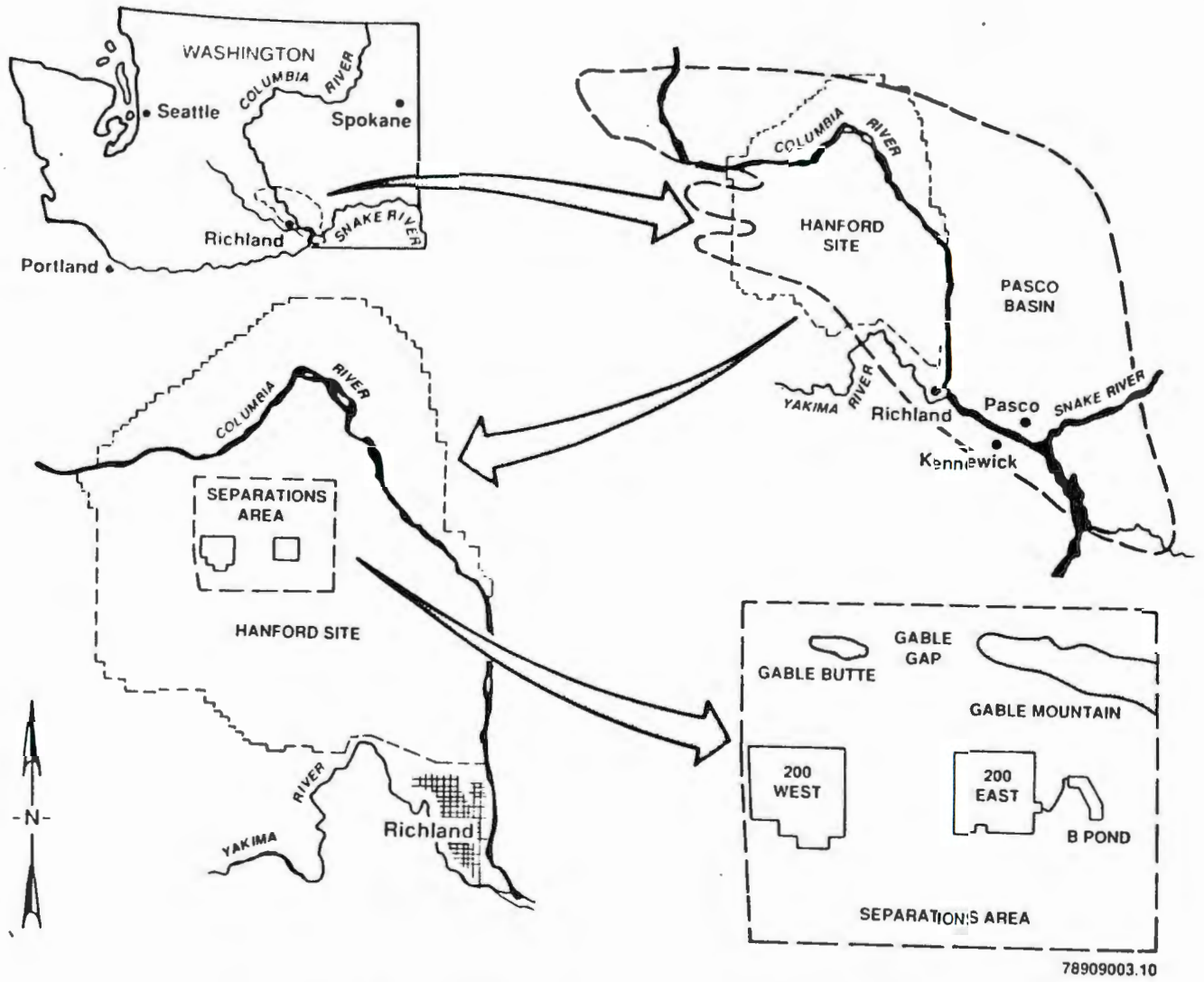


Figure 3-1. Location Map of the Hanford Site.

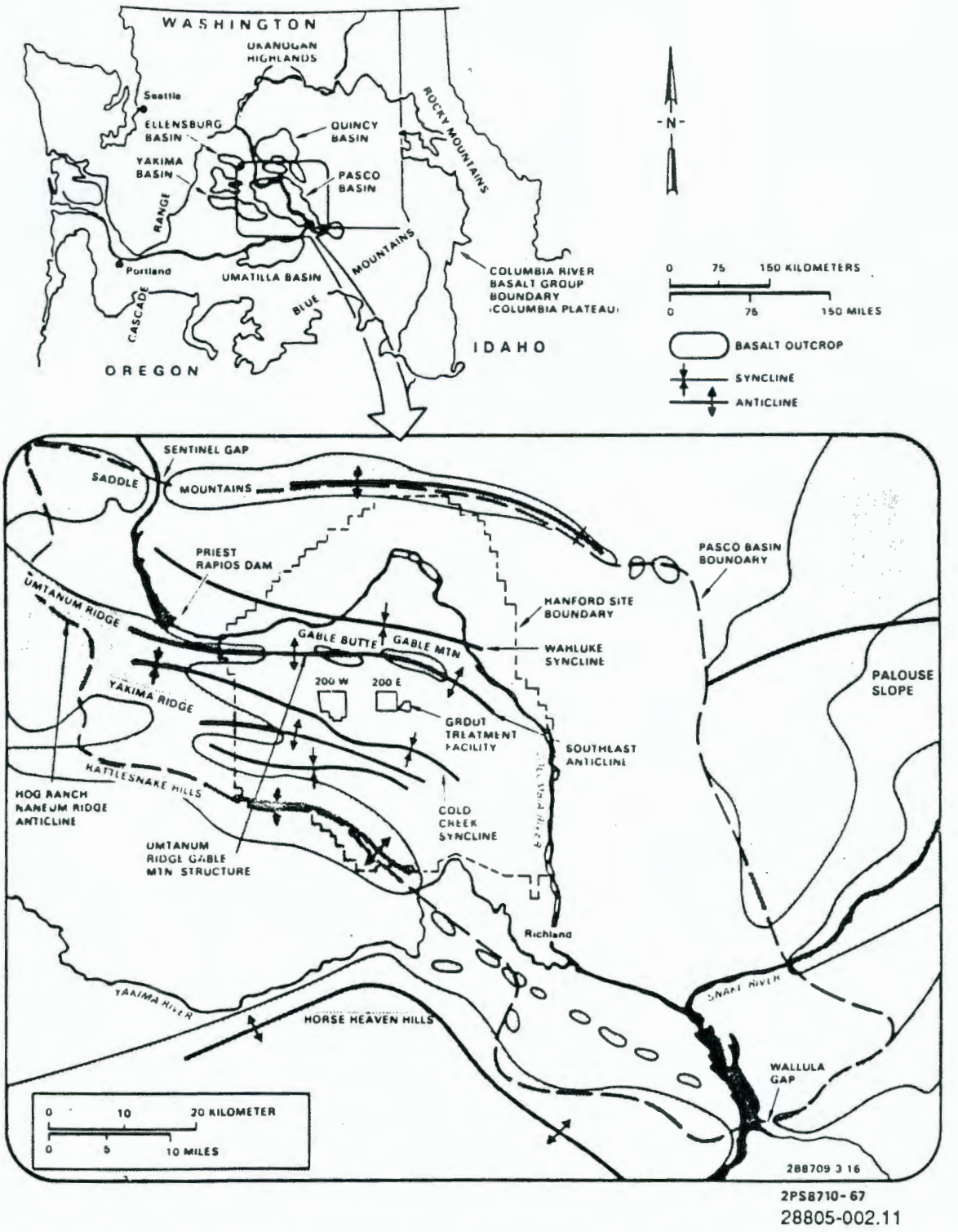


Figure 3-2. Generalized Structural Features of the Pasco Basin, Wasington.

3.1.2 Stratigraphy

The four uppermost stratigraphic units present at the A-29 Ditch are, in ascending order, the Saddle Mountains Basalt, Ringold Formation, Hanford formation, and recent eolian sands.

3.1.2.1 Saddle Mountains Basalt. The Saddle Mountains Basalt is the uppermost formation of the Columbia River Basalt Group, consisting of the Pomona Member, Rattlesnake Ridge interbed, and the Elephant Mountain Member. The Elephant Mountain Member forms the bedrock surface beneath the A-29 Ditch and is estimated to be 80 ft thick (Graham et al. 1984). This surface generally dips 250 ft/mi to the south as determined through various borehole investigations (Graham et al. 1984; Swanson et al. 1988). In the vicinity of the A-29 Ditch, basalt has been encountered in well 299-E25-28, 299-E25-32P, and 299-E25-33 at 319, 319, and 289 ft above mean sea level (MSL), respectively. Basalt was not encountered during drilling in any other wells near the A-29 Ditch; however, none of the wells penetrated depths below 360 ft above MSL.

3.1.2.2 Ringold Formation. The Ringold Formation is approximately 50 to 150 ft thick beneath the A-29 Ditch and disconformably overlies the Elephant Mountain basalt. The Ringold Formation in the vicinity of the A-29 Ditch contains a wide variety of sediment types or lithofacies ranging from coarse sandy gravel to mud. Gravel facies dominate the Ringold Formation in the western part of this area.

3.1.2.3 Hanford Formation. The Hanford formation consists of a highly variable sequence of mud, fine- to coarse-grained sand, and granule to cobble gravel. The Hanford formation is continuous across the B Pond System area and ranges in thickness from 100 ft in the northeast to over 200 ft in the Cold Creek bar, southwest of the B Pond System. Muddy sandy gravels, sandy gravels, and gravelly sands dominated Hanford formation sediment in the A-29 Ditch area.

3.1.2.4 Eolian Sands. A thin veneer of eolian sand to silty sand locally overlies the Hanford Formation, particularly in the area south and west of the B Pond System where sand dunes are well developed. However, eolian sand is generally lacking in areas where the surface has been disturbed by man. The contact between eolian deposits and the Hanford formation is well defined.

3.2 HYDROLOGY

Ground water beneath the Hanford Site occurs under both unconfined and confined conditions. The unconfined aquifer is contained primarily within the middle unit of the Ringold and Hanford formations. The source of natural recharge to the unconfined aquifer and some of the confined aquifers occurs from rainfall and runoff from the higher elevations and water infiltration from small ephemeral streams. A primary source of recharge to the unconfined aquifer is artificial recharge from liquid waste disposal areas. Two ground water mounds have formed in response to large volume of discharge to the B Pond System and 216-U-10 Pond (U Pond). The U Pond (in 200 West Area) was deactivated in 1984. The water table mound has risen

more than 30 ft from pre-Hanford water levels (pre-1943) beneath the B Pond System and more than 85 ft under U Pond. Discharge from the unconfined aquifer is primarily to the Columbia River. The major hydrologic units include the unsaturated zone, the suprabasalt aquifer system, and the basalt and interbed aquifer system.

3.2.1 Surface Water

Surface water features in the area include the A-29 Ditch and the B Pond System. Water from these liquid waste disposal facilities infiltrates into the ground and provides recharge to the suprabasalt aquifer and possibly to the shallow basalt aquifer system.

3.2.2 Unsaturated Zone

The unsaturated zone beneath the A-29 Ditch is mainly of sand and gravel with some lenses of finer-grained material and ranges in thickness from 250 to 270 ft. The unsaturated zone receives rainfall and infiltration from the B Pond System.

3.2.3 Suprabasalt Aquifer System

The suprabasalt aquifer system includes primarily coarse-grained sediments (sand and gravel) and discontinuous fine-grained sediments (silt and clay) of the Ringold Formation and some of the Hanford formation in the western part of the area. The saturated thickness of the unconfined aquifer beneath the A-29 Ditch is about 50 to 70 ft. The uppermost aquifer has been characteristically referred to as unconfined; however, hydrogeologic data from some of the 1988 and 1989 wells indicate that on a regional scale part of the aquifer within the suprabasalt sediments is confined or semiconfined. These conditions are a result of an upper fine-grained unit of the Ringold Formation overlying coarser-grained sediments.

3.2.4 Basalt Aquifer System

The uppermost aquifer beneath the A-29 Ditch is unconfined and occurs within the undifferentiated Hanford/Ringold Formation, while confined aquifers exist within the basalt. In the A-29 Ditch area, the shallowest aquifers in the basalt system are the Elephant Mountain interflow zone and the Rattlesnake Ridge interbed.

3.2.5 Ground Water Flow System

The ground water flow system in the vicinity of the A-29 Ditch is dominated by recharge from the B Pond System. The B Pond System has created a large potentiometric mound in the uppermost aquifer, which causes ground water to flow radially outward. The water table or potentiometric surface in the unconfined aquifer beneath the A-29 Ditch ranges in elevation from approximately 405 to 410 ft above mean sea level. On the basis of

information from existing wells near the A-29 Ditch, depth to the water table is about 250 to 270 ft below land surface. The direction of the ground water flow is generally from northeast to southwest across the A-29 Ditch. The 1989 water table map (Figure 3-3) shows the configuration of the water table beneath the A-29 Ditch and adjacent B Pond System. This map is still indicative of the water levels taken during the most recent measurements. The horizontal ground water gradient can be determined from head change along a presumed flow path and ranges from 0.001 to 0.003. There is also a downward vertical hydraulic gradient of about 0.001 recognized within the suprabasalt aquifer at well 299-E25-28. The downward gradient is approximately 0.001.

4.0 DESCRIPTION OF EXISTING GROUND WATER MONITORING SYSTEM

This section contains a summary of the information collected under the detection monitoring system including the present monitoring well configuration and chemistry data.

4.1 MONITORING WELL NETWORK

The present detection level monitoring well network for the A-29 Ditch consists of one upgradient well (299-E25-32P) and four downgradient wells (299-E25-26, 299-E25-28, 299-E25-34, and 299-E25-35). Locations of the wells are shown in Figure 4-1. Wells 299-E25-26 and 299-E25-28 are also used as Grout Treatment Facility site characterization wells, and 299-E25-32P is also part of the Grout Treatment Facility RCRA ground water monitoring network. A summary of construction details for the five wells in the detection monitoring system is provided in Table 4-1.

4.2 GROUND WATER QUALITY

Chemistry data gathered during the detection monitoring program indicate that specific conductance was elevated in well 299-E25-35 in relation to the other wells. Major ion concentrations (e.g., sulfate, sodium, nitrate, chloride, magnesium, etc.) were also elevated in this well and were likely the cause of the elevated specific conductance values. Ground water in the uppermost aquifer near the A-29 Ditch is characterized as calcium bicarbonate or calcium/magnesium bicarbonate type. Ground water chemistry is affected by artificial recharge from the B Pond System, which in turn reflects the chemistry of Columbia River water. A preliminary evaluation of water chemistry data indicates that tritium is the major contaminant of concern beneath the A-29 Ditch and the nearby B Pond System. Tritium is not a waste regulated by RCRA.

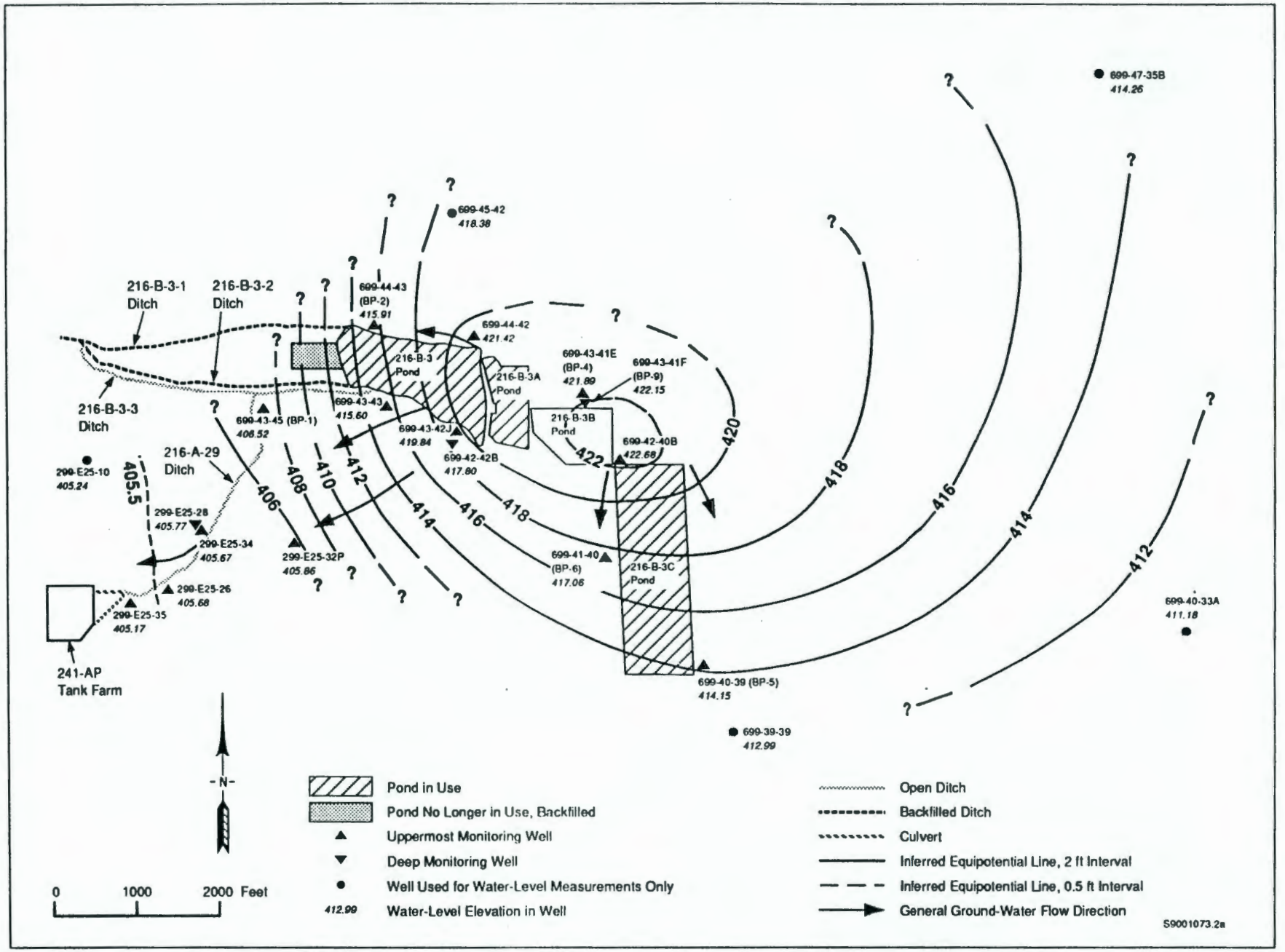


Figure 3-3. Water Level Elevations in Wells at 216-A-29 Ditch and 216-B-3 Pond; Water Table map Indicates General Direction of Ground Water Flow, November 16, 1989.

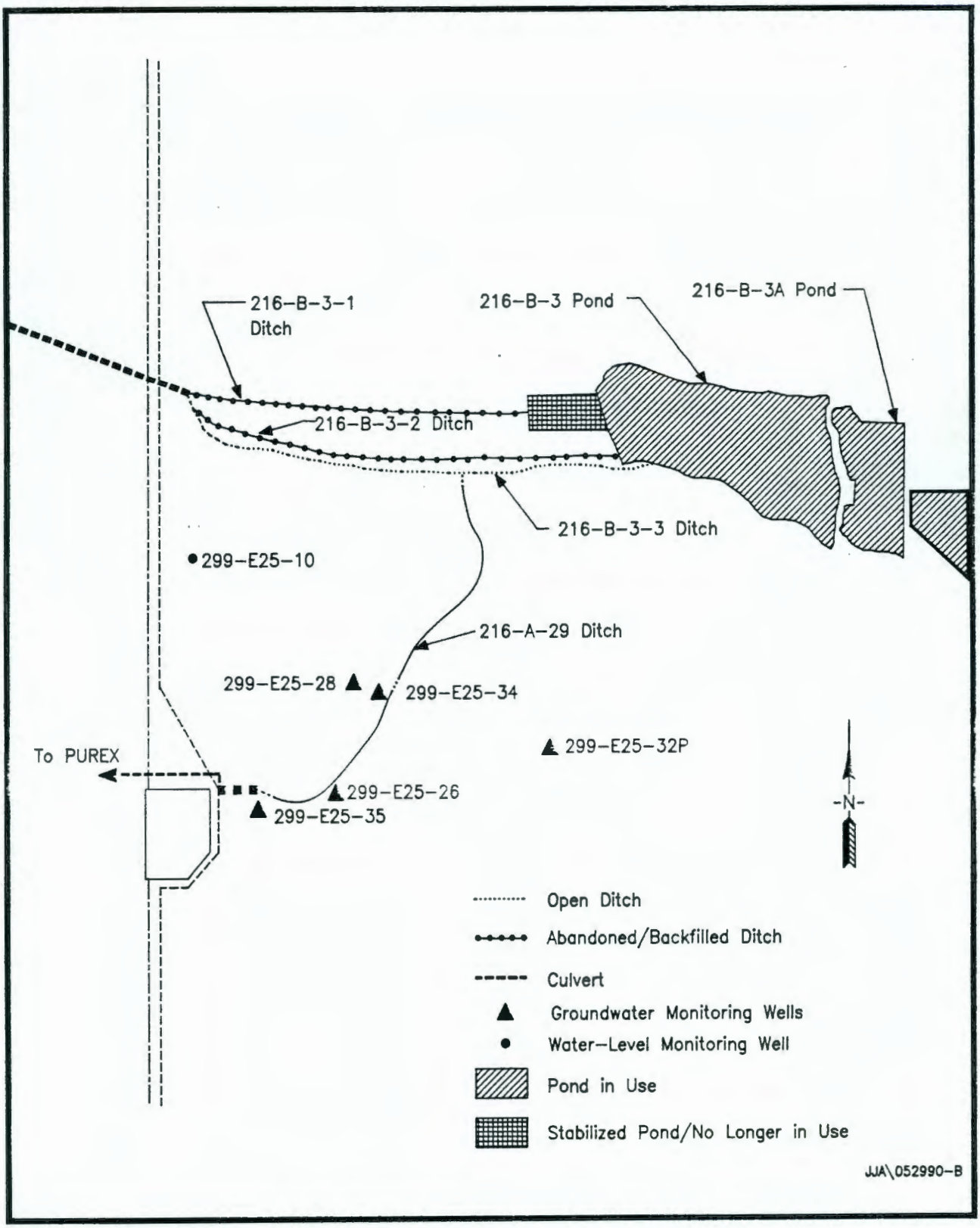


Figure 4-1. Monitoring Well Locations for 216-A-29 Ditch.

Table 4-1. Construction Summary for Wells in the A-29 Ground Water Detection Level Monitoring Network

Item	Well 299-E25-32P	299-E25-26	299-E25-28	299-E25-34	299-E25-35
Hanford coordinates	N41199 W44326	N40773 W45884	N41424 W45541	N41386 W45517	N40617 W46539
Primary purpose	GWM	GWM	GWM	GWM	GWM
Casing elevation (ft above MSL)	670.04	668.55	662.44	662.87	674.39
Total depth (ft)	354	290	340	276	285
Depth to water (ft)	264.12	262.81	256.80	257.16	269.19
Date measured	10/31/89	11/1/89	10/27/89	10/31/89	10/30/89
Depth screened (ft)	260-280	270-290	320-340	252-272	260-281
Completion date	5/88	4/85	4/86	9/88	9/88
Drill method	Cable tool	Cable tool	Cable tool	Cable tool	Cable tool

GWM = ground water monitoring.

4.3 GROUND WATER SAMPLING AND ANALYSIS STATUS

The ground water beneath the A-29 Ditch has been monitored by a RCRA interim-status well network since November 1988. The monitoring wells have been sampled quarterly for 1 yr for indicator parameters, ground water quality parameters, and drinking water quality parameters required by 40 CFR 265.92. The background stage of monitoring was completed on August 1989. After the first year, all monitoring wells are sampled on an annual schedule to establish ground water quality and on a semiannual schedule for indicator parameters. In addition, all wells are sampled for site-specific parameters each sampling event and at least once for Appendix IX constituents (EPA 1980). Results of the ground water sampling and analysis have been reported in quarterly reports (Fruland et al. 1989, Smith et al. 1989a, 1989b, and 1990).

4.4 STATISTICAL EVALUATION OF GROUND WATER DATA

Contamination-indicator parameter data have been collected and analyzed for the upgradient well (299-E25-32P) for at least four quarters to establish background values of these parameters. Because this well is also sampled for the Grout Treatment Facility there was an additional set of data collected in January 1989 which was included in establishing background. Background data at the A-29 Ditch consist of quadruplicate analyses of pH, specific conductance, total organic carbon (TOC), and total organic halogens (TOX) low detection limit (TOXLDL). Table 4-2 contains the reported data for all contamination-indicator parameters analyzed during the period (11/21/88 to 8/29/89) to establish background values.

Table 4-2. Background Contamination Indicator Parameter Data for the 216-A-29 Ditch

Well Name	Collection Date	Duplicate Sample Number	Conductivity (mhos/cm) 1/700[a]	pH Field 0.01/8.5[b]	TOC (p/b) 2,000[c]	TOXLDL (p/b) 10[c]
299-E25-32P	11/21/88		183	8.40	600	6
		1	183	8.40	700	5
		2	182	8.40	600	2
		3	182	8.40	600	5
299-E25-32P	1/04/89		151	8.30	500	4
		1	150	8.30	700	2
		2	150	8.30	700	1
		3	150	8.30	800	3
299-E25-32P	2/29/89		100	8.70	600	2
		1	100	8.80	600	3
		2	100	8.70	600	5
		3	100	8.70	600	6
299-E25-32P	7/13/89		174	6.92	989	5
		1	173	6.96	1,140	8
		2	172	7.01	767	9
		3	173	7.00	928	5
299-E25-32P	8/29/89		142	8.22	800	3
		1	136	8.21	800	6
		2	139	8.22	1,500	6
		3	134	8.22	900	4

NOTE: Column headers consist of constituent name, analytical units contractual detection limit/drinking water standard.

[a]Based on additional secondary maximum contaminant levels given in WAC 248-54, Public Water System Rules and Regulations.

[b]Based on secondary maximum contaminant levels in 40 CFR Part 143, National Secondary Drinking Water Regulations.

[c]Measured value is less than contractual detection limit; measured value reported.

The background statistics and critical means of the indicator parameters for the A-29 Ditch are presented in Table 4-3. The table lists the average background and standard deviation calculated from the first year of data from well 299-E25-32P. The critical mean is the value above which (or below which in the case of pH) a compared value is determined to be statistically different from background. Note that in Table 4-3 the background threshold criteria were determined to be the limit of quantitation (LOQ) for TOC and TOXLDL, respectively. Values used to calculate the LOQs are provided in Table 4-4. This is deemed appropriate because all the background values (blank corrected) for TOC and TOXLDL are

less than the contractually established detection limits for these parameters. The use of LOQ, in a situation like this, is consistent with the recommended techniques in the "RCRA Groundwater Monitoring Technical Enforcement Guidance Document (TEGD)" (EPA 1986a). However, this approach is an interim measure until method detection limit (MDL) can be established from laboratory spiked samples obtained in the future.

Table 4-3. Background Ground Water Constituent Values From Well 299-E25-32P for the 216-A-29 Ditch

Constituent	Average Background	Standard Deviation	Critical Mean
Specific conductance, mhos/cm	148.7	32.50	455.31
pH	8.12	0.671	(0.5, 15.7)
pH[a]	8.41	0.224	(4.3, 12.5)
TOC, p/b	NA	NA	829[b]
TOXLDL, p/b	NA	NA	15.8[b]

[a]This set of data was calculated without the July 1989 data for well 299-E25-32P since its validity was in doubt.

[b]The background mean and standard deviation were not available (NA) since all the background values were below the contractual required detection limit. The background threshold criteria were the blank corrected limit of quantitation (LOQ) values for TOC and TOXLDL, respectively.

The limit of quantitation (LOQ) is the lower limit for precise quantitative measurement. It is based on statistical evaluation of analytical data for blanks and is normally defined as the mean analytical signal for blank samples plus 10 standard deviations (EPA 1987a). The blank corrected LOQ is 10 standard deviations.

The limit of detection (LOD) is the lowest concentration level that can be determined to be statistically different from a blank. It is based on the statistical evaluation of analytical data for blanks and is normally defined as the mean analytical signal for blank samples plus 3 standard deviations (EPA 1987a). The blank corrected LOD is 3 standard deviations.

Table 4-4. Summary of U.S. Testing Company, Inc. Reagent Blank Data (Water Samples) for TOC and TOXLDL

Date	TOC (p/b)			TOXLDL (p/b)		
	Number of Samples	Mean	Standard Deviation	Number of Samples	Mean	Standard Deviation
Oct to Dec 88	26	199	69.2	485	5.82	1.49
Jan to Mar 89	36	206	78.9	800	6.30	1.45
Apr to Jun 89	29	200	59.8	515	5.59	1.54
Jul to Sep 89	35	256	89.3	774	5.90	1.67
Oct to Dec 89	25	252	96.3	471	6.53	1.58
Combined	151	223[a]	82.9[a]	3,045	6.04[a]	1.58[a]

[a]Values are calculated mean concentrations and pooled standard deviations for TOC and TOXLDL (p/b) using U.S. Testing Company, Inc. blank concentration data for period 10/1/88 to 12/31/89.

Table 4-5 gives the contamination-indicator parameter data collected from the A-29 Ditch in January 1990, and Table 4-6 gives the replicate averages. Comparisons of the replicate averages in Table 4-6 to the critical mean in Table 4-3 indicate that the field specific conductance values in well 299-E25-35, a downgradient well for the A-29 Ditch, are statistically greater than the background levels. Well 299-E25-35 was resampled for specific conductance on March 16, 1990. In addition, although it is not required by the regulations, upgradient well 299-E25-32P was resampled for TOXLDL on February 20, 1990 since the replicate average, 175 p/b, exceeded the LOQ (blank corrected) of 15.8 p/b. The followup March resampling results have verified that specific conductance in well 299-E25-35 exceeds the background threshold level. The resampling results are presented in Table 4-7 and replicate averages for verification samples are presented in Table 4-8.

It has not been determined if the high specific conductance found in well 299-E25-35 is due to contamination from the A-29 Ditch. Influence from other sources could exist (e.g., B Pond System, 216-A-37-1, 216-A-37-2, 216-A-30, 216-A-10, 216-A-36B cribs, etc.). The ground water assessment program addresses the possible causes for elevated specific conductance in downgradient well 299-E25-35 and that for elevated TOXLDL in upgradient well 299-E25-32P.

Table 4-5. January 29, 1990 Contamination Indicator Parameter Evaluation Data for 216-A-29 Ditch

Well Name	Duplicate Sample Number	Conductivity (mhos/cm) 1/700[a]	pH Field 0.01/8.5[b]	TOC (p/b) 2,000[c]	TOXLDL (p/b) 10[c]
299-E25-26		205	8.29	500	6
	1	205	8.29	500	7
	2	203	8.29	500	10
	3	203	8.29	400	3
299-E25-28 (deep)		147	8.14	600	3
	1	145	8.15	600	5
	2	144	8.14	500	6
	3	144	8.13	500	1
299-E25-32P		193	8.18	700	166
	1	193	8.18	600	182
	2	191	8.18	600	153
	3	192	8.18	700	199
299-E25-34		186	8.32	500	3
	1	187	8.32	500	5
	2	186	8.31	500	3
	3	185	8.31	500	3
299-E25-35		777	8.10	400	2
	1	785	8.09	400	6
	2	782	8.05	600	4
	3	783	8.03	400	2

NOTE: Column headers consist of constituent name, analytical units contractual detection limit/drinking water standard.

[a]Based on additional secondary maximum contaminant levels given in WAC 248-54, Public Water System Rules and Regulations.

[b]Based on secondary maximum contaminant levels in 40 CFR Part 143, National Secondary Drinking Water Regulations.

[c]Measured value is less than contractual detection limit; measured value reported.

Table 4-6. January 29, 1990 Contamination Indicator Parameter Replicate Averages for the 216-A-29 Ditch

Constituent (Units)	Well Number	Reps	Replicate Average	Std Dev.	Min.	Max.	CV (%)
Conductivity (mhos/cm)	299-E25-26	4	204	1.15	203	205	0.6
	299-E25-28	4	145	1.41	144	147	1.0
	299-E25-32P	4	192	0.96	191	193	0.5
	299-E25-34	4	186	0.82	185	187	0.4
	299-E25-35	4	782	3.40	777	785	0.4
Field pH	299-E25-26	4	8.29	0.000	8.29	8.29	0.0
	299-E25-28	4	8.14	0.008	8.13	8.15	0.1
	299-E25-32P	4	8.18	0.000	8.18	8.18	0.0
	299-E25-34	4	8.32	0.006	8.31	8.32	0.1
	299-E25-35	4	8.07	0.033	8.03	8.10	0.4
TOC (p/b)	299-E25-26	4	475	50.0	400	500	10.5
	299-E25-28	4	550	57.7	500	600	10.5
	299-E25-32P	4	650	57.7	600	700	8.9
	299-E25-34	4	500	0.0	500	500	0.0
	299-E25-35	4	450	100.0	400	600	22.2
TOXLDL (p/b)	299-E25-26	4	6.5	2.89	3	10	44.4
	299-E25-28	4	3.8	2.22	1	6	59.1
	299-E25-32P	4	175	19.90	153	199	11.4
	299-E25-34	4	3.5	1.00	3	5	28.6
	299-E25-35	4	3.5	1.91	2	6	54.7

CV = coefficient of variation.

Table 4-7. Contamination Verification Samples for the 216-A-29 Ditch

Collection Date	Well Number	Replicate	TOXLDL UST	TOXLDL PNL	Conductivity RPT	Conductivity PNL
2/20/90	299-E25-32P		297	171		
		2	278	55		
		3	329	162		
		4	182	76		
3/16/90	299-E25-35				673	660
		2			664	670
		3			677	666
		4			667	672

Table 4-8. Average Replicate Statistics for Verification Samples for the 216-A-26 Ditch

Well Number	Verification Sample	Replicate			
		N	Average	Std. Dev.	CV (%)
299-E25-35	Specific conductance (RPT)	4	670	5.85	0.8
	Specific conductance (PNL)	4	667	5.29	0.8
299-E25-32P	Total organic halogens (UST)	4	272	63.30	23.3
	Total organic halogens (PNL)	4	116	59.20	51.0

CV = coefficient of variation.

5.0 GROUND WATER QUALITY ASSESSMENT PROGRAM

The intent of this ground water quality assessment program is to determine whether dangerous waste from the A-29 Ditch entered the ground water and, if so, determine the rate, extent, and concentration of the dangerous waste or waste constituents in the ground water. The approach of the initial phase (Phase I) of the ground water quality assessment program is to first determine whether the source of the high specific conductance is from a waste site other than the A-29 Ditch. If it is determined that waste constituents are from the A-29 Ditch, the Phase II ground water assessment plan will be prepared to address further data needs in the next phases of the program. The performance of work in this program will meet the requirements of The Environmental Compliance Manual (WHC 1988).

5.1 INVESTIGATORY APPROACH

The ground water quality assessment program will progress in phases concurrently with the B Pond System assessment program. The objective of Phase I of the program is to determine if the elevated values of specific conductance in well 299-E25-35 are indicative of contamination in the ground water from the A-29 Ditch. The first phase of the program will address whether the statistical increase in specific conductance at well 299-E25-35 was caused by contaminants from another source (e.g., aforementioned nearby ponds and cribs). The investigatory approach to assess such a "false positive" involves 1) evaluation of existing and future water-level data from the A-29 Ditch monitoring wells and other nearby wells to assess the groundwater flow directions; 2) evaluation of existing and future water-quality data from the A-29 Ditch and other nearby wells to identify the constituents causing the high specific conductance and define the potential source of the waste constituents; 3) evaluation of the potential effects of other facilities that may result in trends in background water quality; and 4) evaluation of laboratory quality control on data already collected and data from analyses to be performed to ensure valid analytical results are being obtained.

This document describes the Phase I assessment program. If the results of this study indicate that the A-29 Ditch did not impact the ground water quality, then the detection level monitoring program will be reinstated on concurrence with Ecology. If the Phase I evaluation confirms that the A-29 Ditch is impacting the ground water, then a Phase II investigation plan will be prepared. Information collection strategies in Phase II may include, but are not limited to additional monitoring well installations and field testing, expansion of the chemical parameter list for sampling in existing and new well installations, ground water flow and contaminant transport modeling, and statistical evaluation of chemical analyses.

5.2 GROUND WATER QUALITY ASSESSMENT MONITORING NETWORK

As this first phase of the assessment monitoring program is designed primarily to confirm the elevated specific conductance values and provide a time profile of concentration changes, no new wells will be installed. If additional assessment is warranted after this preliminary investigation, the number and locations of any new wells that might be needed to fully assess the impact of the A-29 Ditch on the ground water will be evaluated. These additional wells would be included in the four ground water monitoring wells to be constructed at A-29 in CY 1991 as part of the Tri-Party Agreement milestone.

5.3 WATER TABLE MEASUREMENT SCHEDULE

Water level monitoring network will be expanded by including more monitoring wells for Phase I. Expanded network and schedule are shown in Table 5-1. Locations of these wells are presented in Figure 5-1. Measurement frequencies for wells in the monitoring network have been increased to monthly for Phase I of assessment monitoring. Wells not in the monitoring network but used for supplemental water table elevations will be measured quarterly. These additional wells will provide more information on ground water flow direction. Well construction summary diagrams for the wells listed in Table 5-1 can be found in Appendix A. Historical and current PUREX chemical sewer line analytical data and discharge volumes will be examined to determine the correlation, if any, between the sewer discharges and changes recognized in the monitoring wells. Additionally, water level measurements obtained as part of the B Pond ground water quality assessment program will be used for the A-29 Ditch quality assessment program.

5.4 GROUND WATER QUALITY ASSESSMENT SAMPLING SCHEDULE

The existing monitoring network of one upgradient and four downgradient wells will be sampled quarterly for the contamination-indicator, ground water quality, and drinking water parameters. Additional analyses of ion concentrations (metals analyzed by inductively coupled plasma ICP method and anions) have been added to the well (299-E25-35) where the elevated specific conductance values were observed and also to wells (299-E25-18, 299-E25-19, 299-E25-20, 299-E25-21, 299-E25-11, 299-E17-14, 299-E17-15, and 299-E25-36) located adjacent to the nearby cribs. The additional analyses are targeted at revealing the presence of any ion concentrations which may be the cause

of the elevated specific conductance values. Analyses targeted at revealing the presence of any halogenated compounds have been added to the upgradient well (299-E25-32P) where elevated TOXLDL values were observed. These analyses consist of herbicides, pesticides, polychlorinated biphenyls (PCBs), enhanced volatiles, and acid/base/neutrals. Any of these ion concentrations or halogenated compounds which are detected in the first sample round will be added to the site-specific list of constituents and analyzed for all wells during the remainder of Phase I of the assessment program. Table 5-2 contains the sample schedule and constituent list for Phase I of the assessment monitoring.

5.5 SCHEDULE OF IMPLEMENTATION

Phase I of the assessment monitoring program will be implemented with the next scheduled monitoring event and will end March, 1991 (Table 5-2).

Table 5-1. Water Table Level Measurement Schedule for the 216-A-29 Ditch

Well	Measurement Frequency
299-E25-32P	Monthly
299-E25-26	Monthly
299-E25-28	Monthly
299-E25-34	Monthly
299-E25-35	Monthly
299-E25-06	Quarterly
299-E25-09	Quarterly
299-E25-10	Quarterly
299-E25-11	Quarterly
299-E25-18	Quarterly
299-E25-19	Quarterly
299-E25-20	Quarterly
299-E25-31	Quarterly
299-E25-36	Quarterly
299-E26-02	Quarterly

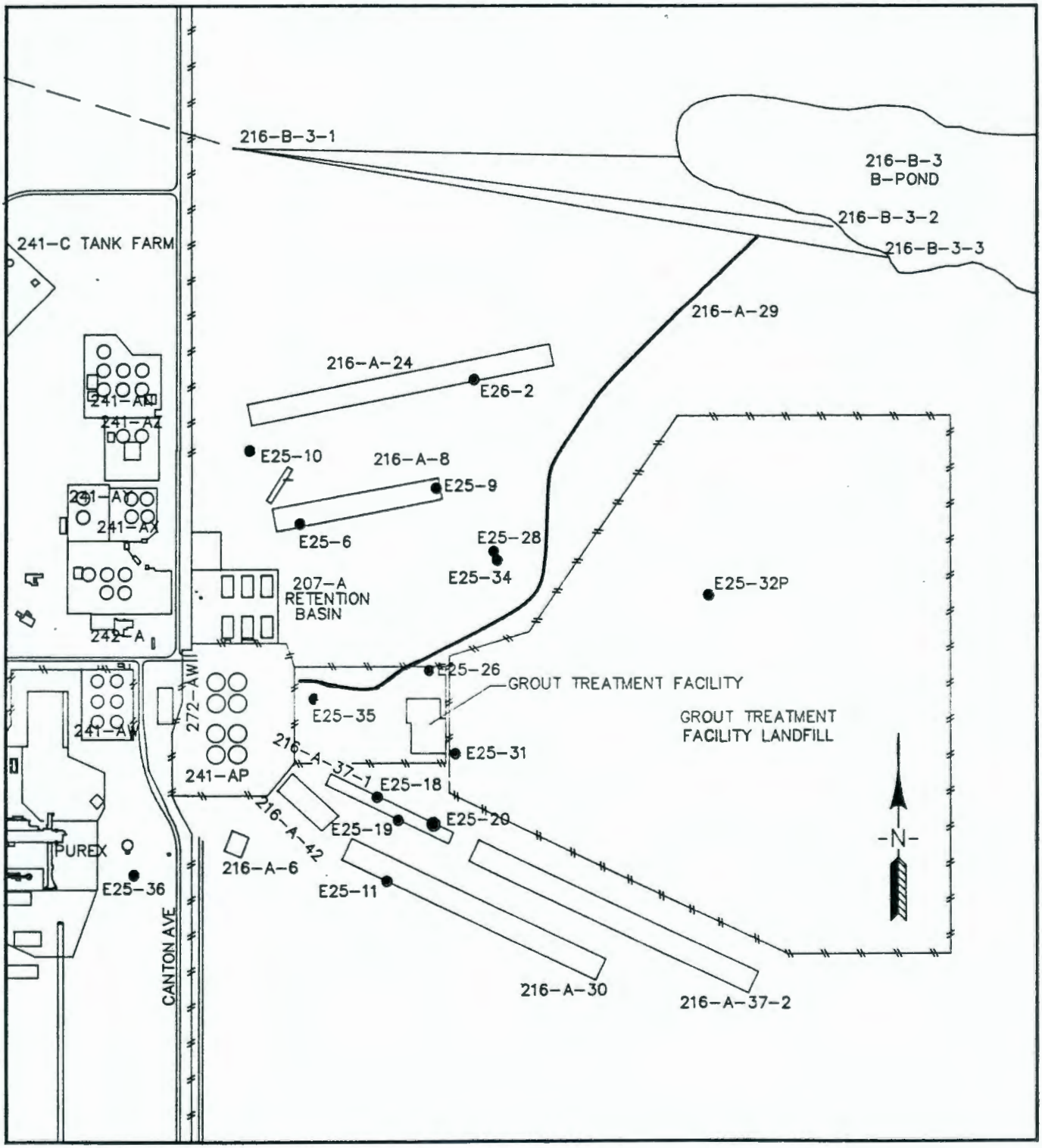


Figure 5-1. Expanded Monitoring Well Locations for 216-A-29 Ditch.

Table 5-2. 1990-1991 Phase I Ground Water Assessment Sampling Schedule for the 216-A-29 Ditch

Well	3rd Quarter, 90 (Jul, Aug, Sept)	4th Quarter, 90 (Oct, Nov, Dec)	1st Quarter, 91 (Jan, Feb, Mar)
299-E25-32P	CIP,GWQ,DW,SS,A1	CIP,GWQ,DW,SS,A1,A2	CIP,GWQ,DW,SS,A1
299-E25-26	CIP,GWQ,DW,SS	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS
299-E25-28	CIP,GWQ,DW,SS	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS
299-E25-34	CIP,GWQ,DW,SS	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS
299-E25-35	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2
299-E25-18	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2
299-E25-19	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2
299-E25-20	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2
299-E25-21	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2
299-E25-11	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2
299-E25-36	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2
299-E17-20	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2
299-E17-15	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2	CIP,GWQ,DW,SS,A2

CIP = contamination-indicator parameters per 40 CFR 265.92 (EPA 1980):

pH	total organic carbon (TOC)
specific conductance	total organic halogen (TOX)

GWQ = ground water quality parameters per 40 CFR 265.92 (EPA 1980):

chloride	phenols	manganese
iron	sodium	sulfate

DW = drinking water parameters per 40 CFR 265.92 (EPA 1980):

arsenic	nitrate	2,4-D
barium	selenium	2,4,5-TP silvex
cadmium	silver	radium
chromium	endrin	gross alpha
fluoride	lindane	gross beta
lead	methoxychlor	turbidity
mercury	toxaphene	coliform bacteria

SS = site-specific parameters for the A-29 Ditch:

hydrazine	tritium	ammonium

A1 = assessment monitoring parameters for the A-29 Ditch:

herbicides	enhanced volatiles
pesticides	acid/base/neutrals
PCBs	

A2 = assessment monitoring parameters for the A-29 Ditch:

ICP metals	anions

5.6 SAMPLING AND ANALYSIS METHOD

The procedure for ground water sample collection, water level measurements, and field measurements are contained in Procedure for Groundwater Investigations (PNL 1989a). The following list contains specific applicable procedures:

FA-1, "Temperature Measurement Procedure"
FA-2, "Calibration of Conductivity Meter and Measurement of Field Conductivity"
FA-3, "Calibration of pH Meter and Measurement of Field pH"
GC-1, "Groundwater Sample Collection Procedure"
GC-2, "In-Line Sample Filtration Procedure"
GC-3, "Disposal of Purge Water From Monitoring Wells"
WL-1, "Water Level Measurement Procedure"
WL-2, "Procedure of Standardizing Steel Tapes."

Chain-of-custody procedures are contained in procedure AD-2, "Groundwater Sample Chain-of-Custody Procedure" (PNL 1989a). The history of the custody of each sample is documented according to this procedure.

Preservation techniques, analytical methods used, and current detection levels of the constituents sampled for at the A-29 Ditch can be found in Test Methods for Evaluating Solid Wastes, SW-846 (EPA 1986b).

6.0 QUALITY ASSURANCE PROGRAM

Overall quality assurance (QA) program requirements are defined in Westinghouse Hanford Company Quality Assurance Manual (WHC 1989) and Article 30 of the Hanford Federal Facility Agreement and Consent Order (Ecology et al 1989). The RCRA sampling and analysis program is being performed by Pacific Northwest Laboratory (PNL), in support of waste management activities conducted by Westinghouse Hanford Company for the Department of Energy. Sample collection and analysis activities under RCRA Ground-Water Monitoring Projects Quality Assurance Project Plan (PNL 1989b) and Quality Assurance Manual (PNL 1989c). The laboratory analysis of RCRA samples is currently conducted by subcontractors to PNL. The quality control (QC) and QA programs at these subcontractors are documented in QC manuals, QA manuals, and specific laboratory procedures as in Testing Methods for Evaluating Solid Wastes, SW-846, (EPA 1986b). These programs are designed to meet requirements of Interim Guidelines and Specifications for Preparation of Quality Assurance Project Plans (EPA 1983).

6.1 INTERNAL QUALITY CONTROL OF PARTICIPANT CONTRACTOR OR SUBCONTRACTOR LABORATORY

Internal QC at the participant contractor, or subcontractor laboratories include general practices applicable to a wide range of analyses, as well as specific procedures stipulated for particular analyses. Each laboratory generating data has the responsibility to implement minimum

procedures which assure that precision, accuracy, completeness, and representativeness of its data are known and documented (EPA 1983). All laboratories shall have a written plan covering their analytical methods and internal QA/QC project manuals, including blanks, spiked samples, surrogate samples, calibration standards and devices, and reagent checks. The services of alternate analytical chemistry laboratories may be procured for split sample analyses.

6.2 EXTERNAL QUALITY CONTROL

The external QC will use both interlaboratory comparisons and blind, replicated, and blank samples, etc., to evaluate the accuracy or results from the participant contractor, or subcontractor laboratory. A summary of this evaluation is provided in the normal RCRA quarterly reports.

7.0 RECORDKEEPING AND REPORTING REQUIREMENTS

Phase I of the ground water quality assessment program will be compiled during CY 1990 and early 1991. The results of this phase will be presented in a report due to Ecology by June 1, 1991. The report will contain a discussion of the Phase I results of the assessment program and provide a recommendation to either reinstate ground water monitoring under detection requirements or proceed with the second phase of the ground water quality assessment program. If warranted, the second phase of the assessment plan will be prepared and submitted to Ecology to meet requirements for assessment monitoring. Recordkeeping requirements of 40 CFR 265.94 will be followed (EPA 1980).

8.0 REFERENCES

DOE, 1986, U.S. Environmental Protection Agency Information Request - Liquid Waste Land Disposal Units, October, 1986, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE, 1987, 216-A-29 Ditch Preliminary Closure/Post Closure Plan, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE, 1988, Hanford Site Dangerous Waste Part A Permit Application, DOE/RL 88-21, U.S. Department of Energy, Richland Office Operations Office, Richland, Washington.

DOE, 1989, 216-B-3 Pond System Closure/Postclosure Plan, DOE/RL 89-28, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Ecology, 1989, Dangerous Waste Regulations, Washington Administrative Code, 173-303, Washington Department of Ecology, Olympia, Washington.

Ecology, EPA, and DOE, 1989, Hanford Federal Facility Agreement and Consent Order, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy.

EPA, 1980, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Title 40, Code of Federal Regulations, Part 265, as amended, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1983, Interim Guidelines and Specifications for Preparation of Quality Assurance Project Plans, QAMS-005/80, U.S. Environmental Protection Agency/Office of Exploratory Research, Washington, D.C.

EPA, 1986a, Resource Conservation and Recovery Act (RCRA) Groundwater Monitoring Technical Enforcement Guidance Document, OSWER9950.1, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1986b, Test Methods for Evaluating Solid Wastes, SW-846, Third Edition, U.S. Environmental Protection Agency/Office of Solid Waste and Emergency Response, Washington, Washington, D.C.

Fruland, R. M., D. J. Bates, and R. E. Lundgren, 1989, RCRA Groundwater Projects for the Hanford Facilities: Progress Report for the Period October 1 to December 31, 1988, PNL-6844, Vol. 1, Pacific Northwest Laboratory, Richland, Washington.

Graham, M. J., G. V. Last, and K. R. Fecht, 1984, An Assessment of Aquifer Intercommunication in the B-Pond-Gable Mountain Pond Area of the Hanford Site. RHO-RE-ST-12P, Rockwell Hanford Operations, Richland, Washington.

PNL, 1989a, Procedures for Groundwater Investigations, PNL-6894, Pacific Northwest Laboratory, Richland, Washington.

PNL, 1989b, RCRA Ground-Water Monitoring Projects Quality Assurance Project Plan, PNL-7225, Pacific Northwest Laboratory, Richland, Washington.

PNL, 1989c, Quality Assurance Manual, PNL-7000, Pacific Northwest Laboratory, Richland, Washington.

Smith, R. M., D. J. Bates, and R. E. Lundgren, 1989a, Resource Conservation and Recovery Act Groundwater Monitoring Projects for Hanford Facilities: Progress Report for the Period January 1 to March 31, 1989, PNL-6957, Pacific Northwest Laboratory, Richland, Washington.

Smith, R. M., D. J. Bates, and R. E. Lundgren, 1989b, Resource Conservation and Recovery Act Groundwater Monitoring Projects for Hanford Facilities: Progress Report for the Period April 1 to June 30, 1989, PNL-7134, Pacific Northwest Laboratory, Richland, Washington.

Smith, R. M., D. J. Bates, and R. E. Lundgren, 1990, Resource Conservation and Recovery Act Groundwater Monitoring Projects for Hanford Facilities: Progress Report for the Period October 1 to December 31, 1989, PNL-7306, Pacific Northwest Laboratory, Richland, Washington.

Swanson, D. A., J. L. Anderson, R. D. Bentley, V. E. Camp, J. N. Gardner, and T. L. Wright, 1979, Reconnaissance Geologic Map of the Columbia River Basalt Group in Eastern Washington and Northern Idaho, Open File Report 70-1363, U.S. Geological Survey, Washington, D.C.

Swanson, L. C., D. C. Weekes, S. P. Luttrell, R. M. Mitchell, D. S. Landeen, A. R. Johnson, and R. C. Roos, 1988, Grout Treatment Facility Environmental Baseline and Site Characterization Report, WHC-EP-0150, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988, Environmental Compliance Manual, WHC-CM-7-5, Westinghouse Hanford Company, Richland, Washington.

WHC, 1989, Westinghouse Hanford Company Quality Assurance Manual, WHC-CM-4-2, Westinghouse Hanford Company, Richland, Washington.

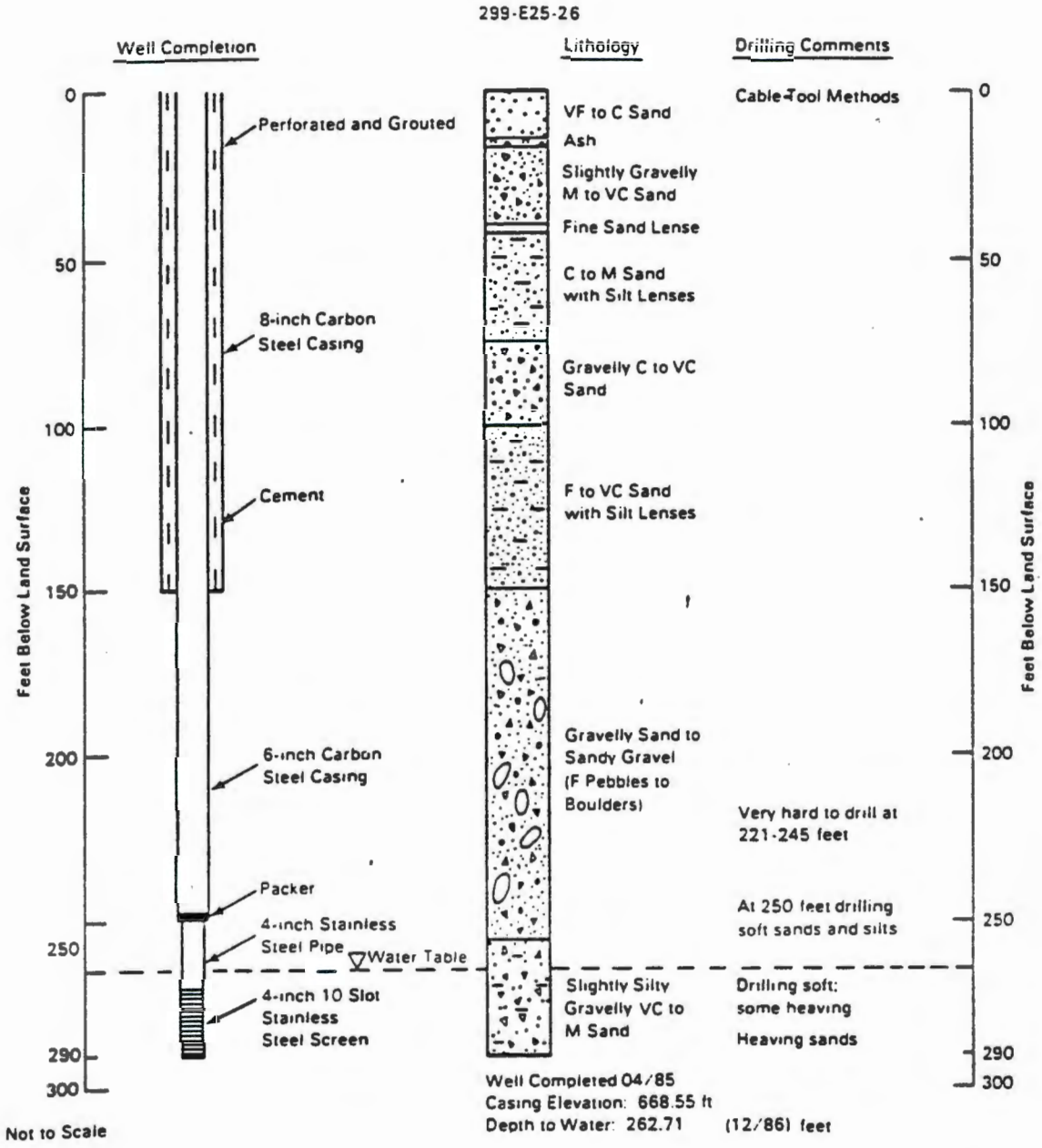
APPENDIX

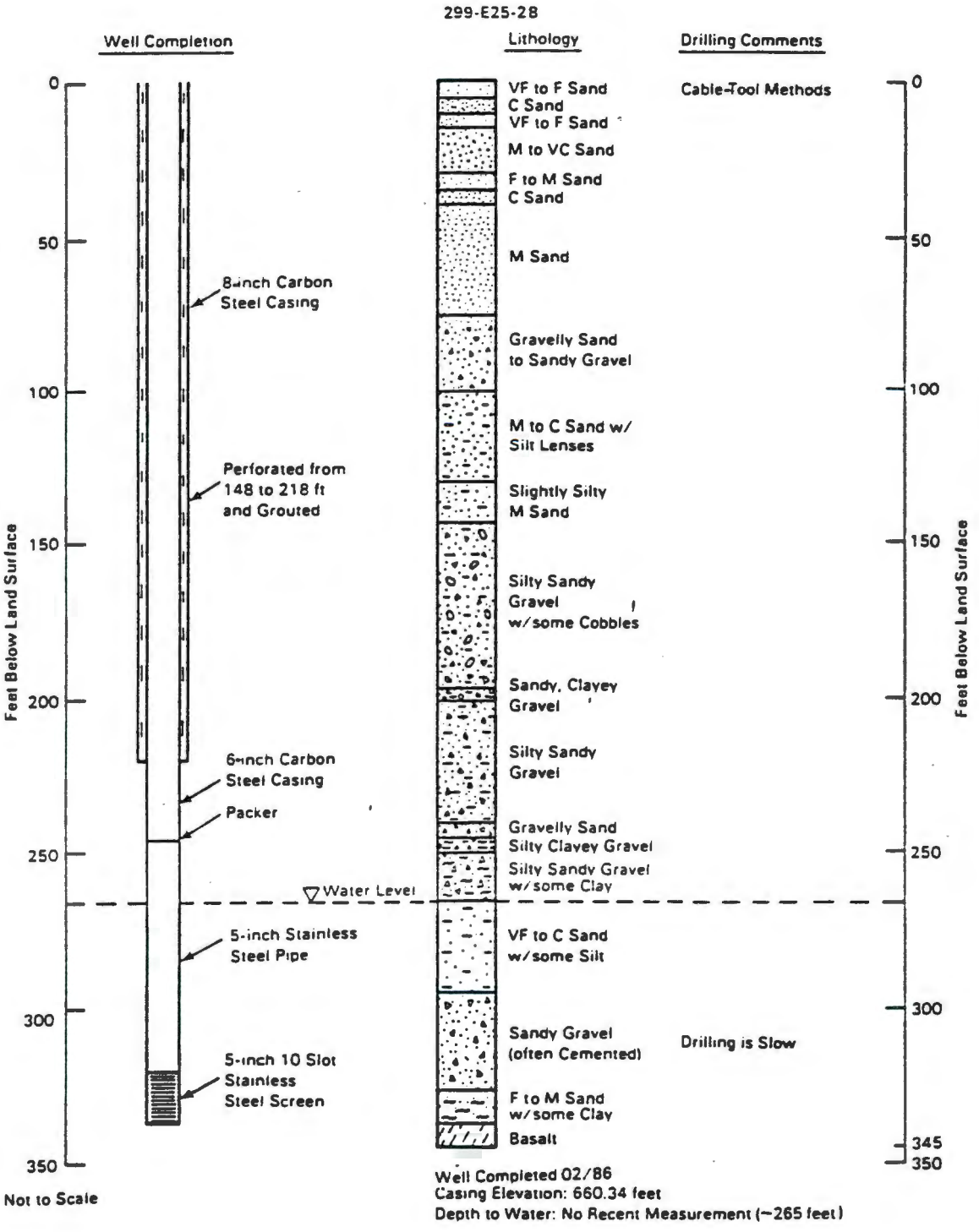
DRILLING AND WELL CONSTRUCTION LOGS

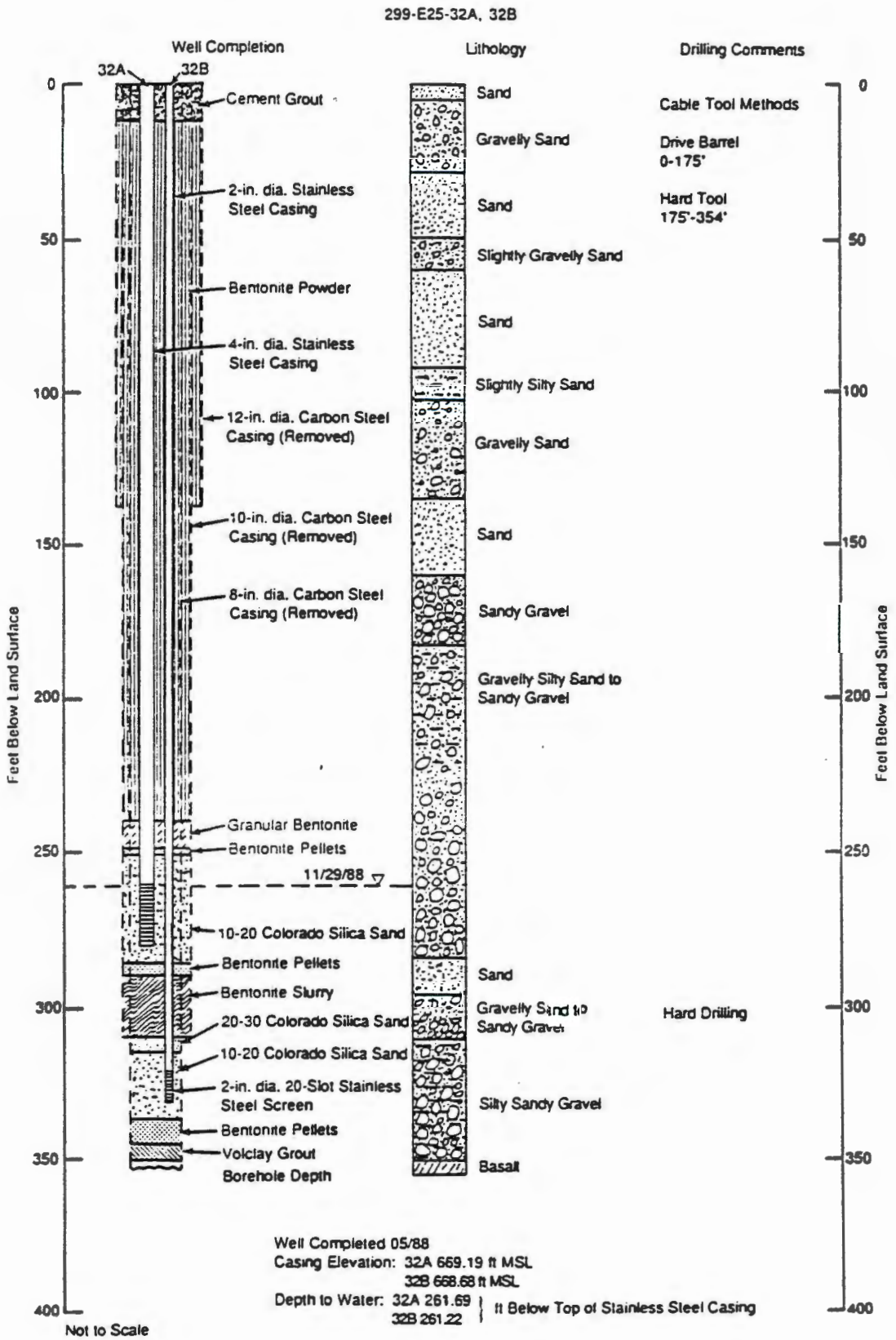
Drilling logs for the wells listed in Table 5-1, Water Table Level Measurement Schedule for the 216-A-29 Ditch, are included here. The following logs are provided:

216-A-29 Monitoring Network
- 299-E25-26
- 299-E25-28
- 299-E25-32
- 299-E25-34
- 299-E25-35

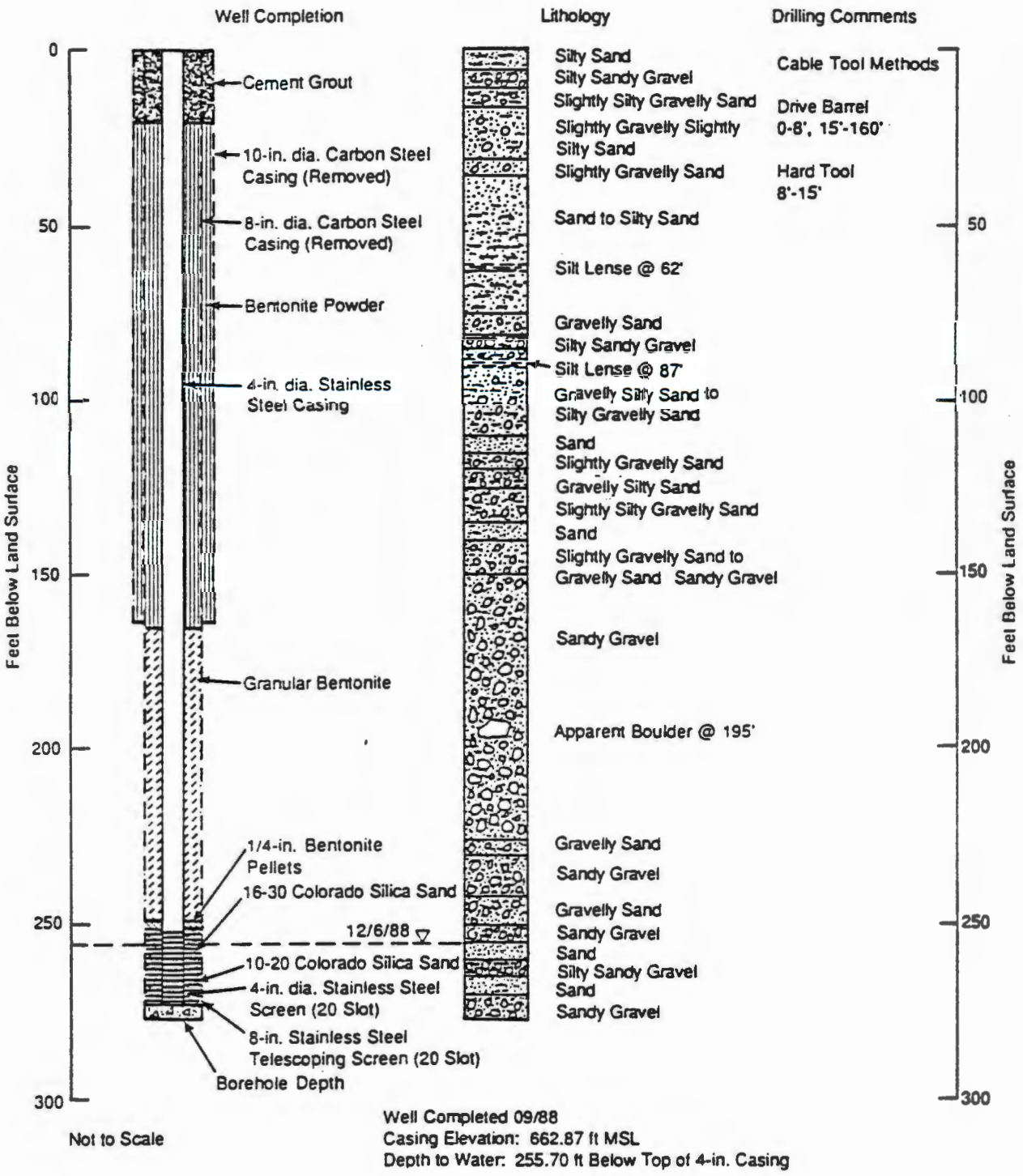
Supplementary Wells for Assessment Program
- 299-E25-06
- 299-E25-09
- 299-E25-10
- 299-E25-11
- 299-E25-18
- 299-E25-19
- 299-E25-20
- 299-E25-31
- 299-E25-36
- 299-E26-02


299-E25-26
Well Completion
Lithology
Drilling Comments
Cable-Tool Methods
Perforated and Grouted
8-inch Carbon Steel Casing
Cement
6-inch Carbon Steel Casing
Packer
4-inch Stainless Steel Pipe
Water Table
4-inch 10 Slot Stainless Steel Screen
VF to C Sand
Ash
Slightly Gravelly M to VC Sand
Fine Sand Lense
C to M Sand with Silt Lenses
Gravelly C to VC Sand
F to VC Sand with Silt Lenses
Gravelly Sand to Sandy Gravel (F Pebbles to Boulders)
Slightly Silty Gravelly VC to M Sand
Very hard to drill at 221-245 feet
At 250 feet drilling soft sands and silts
Drilling soft: some heaving
Heaving sands
0
50
100
150
200
250
290
300
Feet Below Land Surface
Well Completed 04/85
Casing Elevation: 668.55 ft
Depth to Water: 262.71 (12/86) feet
Not to Scale


299-E25-28
Well Completion
Lithology
Drilling Comments
Feet Below Land Surface
0
50
100
150
200
250
300
350
8-inch Carbon Steel Casing
Perforated from 148 to 218 ft and Grouted
6-inch Carbon Steel Casing
Packer
Water Level
5-inch Stainless Steel Pipe
5-inch 10 Slot Stainless Steel Screen
VF to F Sand
C Sand
VF to F Sand
M to VC Sand
F to M Sand
C Sand
M Sand
Gravelly Sand to Sandy Gravel
M to C Sand w/ Silt Lenses
Slightly Silty M Sand
Silty Sandy Gravel w/some Cobbles
Sandy, Clayey Gravel
Silty Sandy Gravel
Gravelly Sand
Silty Clayey Gravel
Silty Sandy Gravel w/some Clay
VF to C Sand w/some Silt
Sandy Gravel (often Cemented)
F to M Sand w/some Clay
Basalt
Cable-Tool Methods
Drilling is Slow
345
Not to Scale
Well Completed 02/86
Casing Elevation: 660.34 feet
Depth to Water: No Recent Measurement (~265 feet)


299-E25-32A, 32B
Well Completion
Lithology
Drilling Comments
32A
32B
Cement Grout
2-in. dia. Stainless Steel Casing
Bentonite Powder
4-in. dia. Stainless Steel Casing
12-in. dia. Carbon Steel Casing (Removed)
10-in. dia. Carbon Steel Casing (Removed)
8-in. dia. Carbon Steel Casing (Removed)
Granular Bentonite
Bentonite Pellets
11/29/88
10-20 Colorado Silica Sand
Bentonite Pellets
Bentonite Slurry
20-30 Colorado Silica Sand
10-20 Colorado Silica Sand
2-in. dia. 20-Slot Stainless Steel Screen
Bentonite Pellets
Volclay Grout
Borehole Depth
Sand
Gravelly Sand
Sand
Slightly Gravelly Sand
Sand
Slightly Silty Sand
Gravelly Sand
Sand
Sandy Gravel
Gravelly Silty Sand to Sandy Gravel
Sand
Gravelly Sand to Sandy Gravel
Silty Sandy Gravel
Basalt
Cable Tool Methods
Drive Barrel 0-175'
Hard Tool 175'-354'
Hard Drilling
Feet Below Land Surface
0
50
100
150
200
250
300
350
400
Well Completed 05/88
Casing Elevation: 32A 669.19 ft MSL
32B 668.68 ft MSL
Depth to Water: 32A 261.69
32B 261.22
ft Below Top of Stainless Steel Casing
Not to Scale

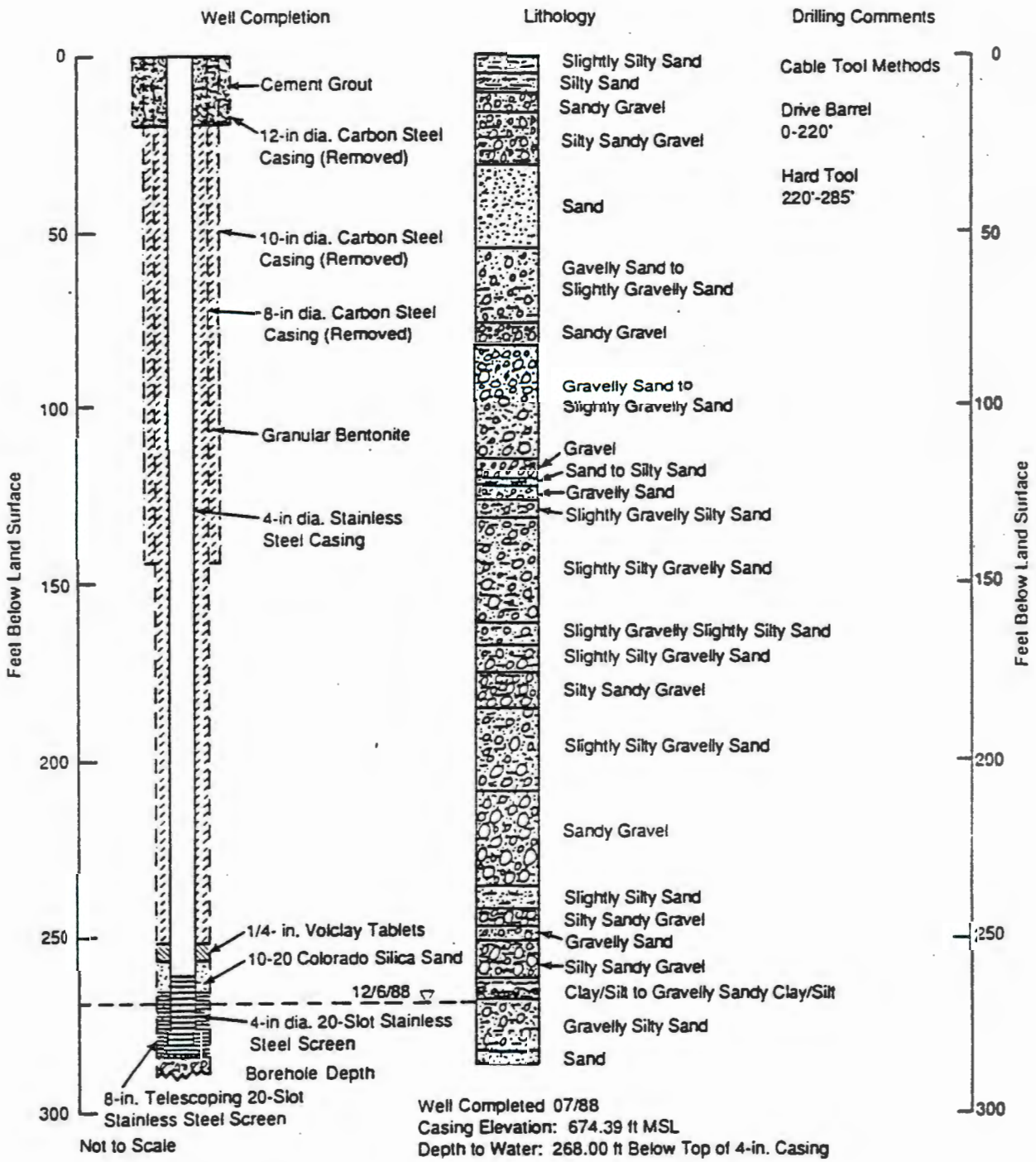
299-E25-34



Not to Scale

Well Completed 09/88
Casing Elevation: 662.87 ft MSL
Depth to Water: 255.70 ft Below Top of 4-in. Casing

299-E25-35


Well Completion
Lithology
Drilling Comments
Feet Below Land Surface
0
50
100
150
200
250
300
Cement Grout
12-in dia. Carbon Steel Casing (Removed)
10-in dia. Carbon Steel Casing (Removed)
8-in dia. Carbon Steel Casing (Removed)
Granular Bentonite
4-in dia. Stainless Steel Casing
1/4- in. Volclay Tablets
10-20 Colorado Silica Sand
12/6/88
4-in dia. 20-Slot Stainless Steel Screen
Borehole Depth
8-in. Telescoping 20-Slot Stainless Steel Screen
Not to Scale
Slightly Silty Sand
Silty Sand
Sandy Gravel
Silty Sandy Gravel
Sand
Gavelly Sand to Slightly Gravelly Sand
Sandy Gravel
Gravelly Sand to Slightly Gravelly Sand
Gravel
Sand to Silty Sand
Gravelly Sand
Slightly Gravelly Silty Sand
Slightly Silty Gravelly Sand
Slightly Gravelly Slightly Silty Sand
Slightly Silty Gravelly Sand
Silty Sandy Gravel
Slightly Silty Gravelly Sand
Sandy Gravel
Slightly Silty Sand
Silty Sandy Gravel
Gravelly Sand
Silty Sandy Gravel
Clay/Silt to Gravelly Sandy Clay/Silt
Gravelly Silty Sand
Sand
Cable Tool Methods
Drive Barrel 0-220'
Hard Tool 220'-285'
Well Completed 07/88
Casing Elevation: 674.39 ft MSL
Depth to Water: 268.00 ft Below Top of 4-in. Casing

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: P. Rydman
Drilling Company: Not documented
Date Started: 18Apr56
Date Complete: 01May56

Sample Method: Hard tool (nom)
Additives Used: Bentonite
WA State Lic Nr: Not documented
Company Location: Not documented

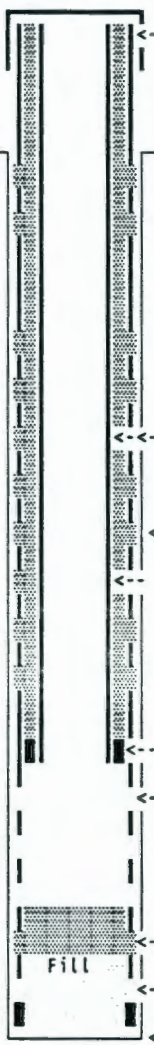
WELL NUMBER: 299-E25-6
TEMPORARY WELL NO: 216-A-8-3
Hanford Coordinates: N/S N 41,598 E/W W 46,619
State Coordinates: N 446,780 E 2,248,599
Start Card #: Not documented T___ R___ S___
Elevation Ground surface (ft): Not documented

Depth to water: 260 ft May56
(Ground surface)

GENERALIZED STRATIGRAPHY — Driller's Log

0-9: SAND
9-14: SAND and GRAVEL
14-19: SAND
19-78: SAND, some GRAVEL
78-83: SAND, some SILT
83-97: SAND
97-104: SAND, some GRAVEL
104-109: SAND
109-158: SAND, some GRAVEL
158-169: SAND, some SILT
169-176: SAND and GRAVEL
176-189: SAND, GRAVEL and BOULDERS
189-202: SAND, some GRAVEL
202-229: BOULDER, GRAVEL, SAND
229-233: SAND
233-258: GRAVEL
258-264: SAND and GRAVEL
264-271: SAND, some SILT
271-276: SAND, some GRAVEL
276-280: SAND, GRAVEL
280-290: SAND, GRAVEL, some BOULDERS

REMEDIATION:
Jun75, by Quinn;
Backfill 287-278 ft, installed cement plug 278-274 ft.
Apr81 by Evans;
Perforated 8-in casing 0-5 ft and 20-224 ft, 2 cuts/rd.
Installed packer at 229 ft.
Grouted between 6 and 8-in casing 0-229 ft. 168 gals cement used.



Elevation of reference point (top of casing): [658.72 ft]
Height of reference point above ground surface: [ND]
Depth of surface seal: [5.0 ft]
Type of surface seal: Cement grout
Perforated 0-5 ft, 2 cuts/rd
I.D. of surface casing (If present): [ND]
I.D. of riser pipe: [6 & 8-in]
Type of riser pipe: Carbon steel
Diameter of borehole: [9-in nom]
Type of filler: Cement grout between 6 & 8 in casing
Perforated 20-224 ft, 2 cuts/rd
Packer set at 229 ft
Top of perforations: [234 ft]
Description of perforations:
234-258 ft, 6 holes/ft
258-260 ft, 1 hole/ft
280-288 ft, 6 holes/ft
Cement plug 274-278 ft
Bottom of perforations: [288 ft]
Depth bottom of borehole: [290 ft]

Drawing By: RKL/2#E25#06.ASB Date: 22May90

Reference: Golder 8831752\2E2506

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: P. Rydman
Drilling Company: Not documented
Date Started: 14May56
Date Complete: 24May56

Sample Method: Hard tool (nom)
Additives Used: Bentonite
WA State Lic Nr: Not documented
Company Location: Not documented

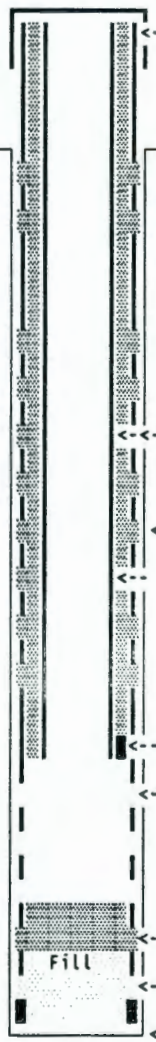
WELL NUMBER: 299-E25-9
TEMPORARY WELL NO: 216-A-8-6
Hanford Coordinates: N/S N 41,779 E/W W 45,860
State Coordinates: N 446,963 E 2,249,358
Start Card #: Not documented T___ R___ S___
Elevation Ground surface (ft): Not documented

Depth to water: 258 ft May56
(Top of casing)--> 251.8 ft Dec89

GENERALIZED STRATIGRAPHY — Driller's Log

0-7: SAND
7-10: SAND and GRAVEL
10-46: SAND, some GRAVEL
46-52: SAND, some SILT
52-58: SAND, and GRAVEL
58-94: SAND
94-126: SAND, GRAVEL
126-141: SAND
141-163: GRAVEL and BOULDERS
163-172: SAND, GRAVEL, some BOULDERS
172-177: GRAVEL and SAND
177-223: GRAVEL & BOULDERS, some SAND
223-227: SAND and GRAVEL
227-236: GRAVEL & BOULDERS, some SAND
236-258: GRAVEL with SAND
258-265: SAND with GRAVEL
265-289: SAND

REMEDIATION:
Jun75, by Quinn;
Backfill 287-276 ft, installed cement plug 276-271 ft.
Apr81 by Garcia;
Perforated 8-in casing 0-5 ft and 20-223 ft, 2 cuts/rd.
Installed packer at 228 ft.
Grouted between 6 and 8-in casing 0-228 ft. 168 gals cement used.



Elevation of reference point (top of casing): [655.15 ft]
Height of reference point above ground surface: [ND]
Depth of surface seal: [5.0 ft]
Type of surface seal: Cement grout
Perforated 0-5 ft, 2 cuts/rd
I.D. of surface casing (If present): [ND]
I.D. of riser pipe: [6 & 8-in]
Type of riser pipe: Carbon steel
Diameter of borehole: [9-in nom]
Type of filler: Cement grout between 6 & 8 in casing
Perforated 20-223 ft, 2 cuts/rd
Packer set at 228 ft
Top of perforations: [233 ft]
Description of perforations:
233-258 ft, 5 holes/ft
258-288 ft, 1 hole/ft
Cement plug 271-276 ft
Bottom of perforations: [288 ft]
Depth bottom of borehole: [289 ft]

Drawing By: RKL/2#E25#09.ASB Date: 22May90

Reference: Golder 8831752\2E2509

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Stone
Drilling Company: Not documented
Date Started: 10Jun58
Date Complete: 03Jul58

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

WELL NUMBER: 299-E25-10
TEMPORARY WELL NO: Not documented
Hanford Coordinates: N/S N 42,000 E/W W 46,900
State Coordinates: N 447,181 E 2,248,317
Start Card #: Not documented T___ R___ S___
Elevation Ground surface (ft): Not documented

Depth to water: 256 ft Jul58
(Top of casing)-->251.1 ft Mar90

GENERALIZED STRATIGRAPHY — Driller's Log

5-10; SAND
10-20: SAND and GRAVEL
20-25: SAND
25-35: SAND and GRAVEL
35-50: SAND
50-80: GRAVEL
80-85: CEMENT and GRAVEL
85-90: CEMENT, GRAVEL and SAND
90-105: CEMENT and GRAVEL
105-110: CEMENT, GRAVEL and SAND
110-130: CEMENT and GRAVEL
130-150: SAND and GRAVEL
150-155: GRAVEL
155-185: SAND and GRAVEL
185-190: GRAVEL and COBBLE
190-195: SAND
195-200: GRAVEL
200-210: SAND and GRAVEL
210-215: GRAVEL
215-230: GRAVEL and COBBLE
230-235: GRAVEL
235-245: CEMENT, GRAVEL and CLAY
245-250: GRAVEL
250-260: GRAVEL and CLAY
260-265: CLAY
265-270: GRAVEL
270-275: SAND and GRAVEL
275-285: GRAVEL
285-290: SAND and GRAVEL
290-293: GRAVEL
293- : SAND

Elevation of reference point (top of casing): [655.84 ft]
Height of reference point above ground surface: [ND]
Depth of surface seal: [ND]
Type of surface seal: None documented
2 ft round concrete collar, depth ND
I.D. of surface casing (If present): [ND]
I.D. of riser pipe: [8-in]
Type of riser pipe: Carbon steel
Diameter of borehole: [9-in nom]
Type of filler: Not documented
Elevation/depth top of seal
Type of seal: Not documented
Depth top of perforations: [226 ft]
Description of perforations: 226-291 ft-6 cuts/ft/rd
Depth bottom of perforations: [291 ft]
Depth bottom of casing: [293 ft]
Depth bottom of borehole: [293 ft]

Drawing By: RKL/2#E25#10.ASB Date: 22May90

Reference: Golder 8831752\14889

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: McDonald
Drilling Company: Hatch
Date Started: 05Nov60
Date Complete: 18Nov56

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

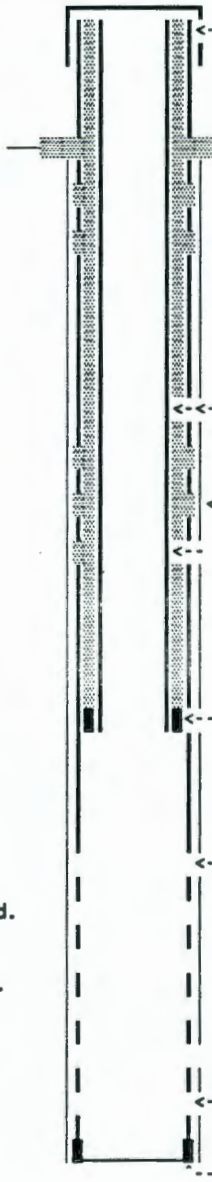
WELL NUMBER: 299-E25-11
TEMPORARY WELL NO: ND
Hanford Coordinates: N/S N 39,611 E/W W 46,125
State Coordinates: N 444,794 E 2,249,098
Start Card #: Not documented T___ R___ S___
Elevation Ground surface (ft): Not documented

Depth to water: 280 ft Nov60
(Top of casing)-->276.4 ft Jun89

GENERALIZED STRATIGRAPHY / Driller's Log

0-11: SAND and SILT
11-15: SAND and GRAVEL
15-20: SAND, GRAVEL and COBBLES
20-30: SAND
30-45: SAND some SILT
45-100: SAND, some SILT & GRAVEL
100-105: SAND, some GRAVEL
105-120: SAND, some SILT
120-160: SAND, some SILT & GRAVEL
160-165: SAND and GRAVEL
165-175: GRAVEL
175-197: SAND and SILT
197-205: SAND, SILT and GRAVEL
205-210: GRAVEL, some SILT
210-215: GRAVEL & SAND with SILT
215-225: SAND and GRAVEL
225-235: SAND, SILT and GRAVEL
235-260: GRAVEL, some SAND
260-270: GRAVEL with SAND & SILT
270-275: Sandy CLAY
275-295: SAND and SILT, GRAVEL
295-302: SAND
302-317: SAND and GRAVEL
317-327: SAND
327-335: SAND and CLAY
335-336: SAND & CLAY, some GRAVEL
336-340: SAND with GRAVEL

REMEDIATION:
Jun83 By Garcia;
Perforated 8-in casing
0-20 and 80-125 ft, 2 cuts/rd.
Set 6-in casing 0-178 ft,
packer assumed at 178 ft.
Grouted with 286 gals cement.



Elevation of reference point (top of casing): [681.28 ft]
Height of reference point above ground surface: [ND]
Depth of surface seal: [20.0 ft]
Type of surface seal: Cement grout
Perforated 0-20 ft, 2 cuts/rd
2 ft round pad,
depth indeterminate
I.D. of riser pipe: [6 & 8-in]
Type of riser pipe:
Carbon steel
Diameter of borehole: [9-in nom]
Type of filler:
Cement grout between 6 & 8 in casing
Perforated 0-20 & 80-125 ft
2 cuts/rd
Packer setting not documented
6-in casing to 178 ft
Top of perforations: [265 ft]
Description of perforations:
265-290 ft, 4 cuts/ft
290-335 ft, 2 cuts/ft
Bottom of perforations: [335 ft]
Depth bottom of borehole: [340 ft]

Drawing By: RKL/2#E25#11.ASB Date: 22May90

Reference:
Golder 8831752\2E2511

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Not documented
Driller's Name: Egan/Baker
Drilling Company: Not documented
Date Started: 24May76

Sample Method: Drive barrel
Additives Used: Bentonite
WA State Lic Nr: Not documented
Company Location: Pasco, WA
Date Complete: 06Aug76

WELL NUMBER: 299-E25-18
TEMPORARY WELL NO: ND
Hanford Coordinates: N/S N 40,070 E/W W 46,187
State Coordinates: N 445,253 E 2,249,035
Start Card #: Not documented T___ R___ S___
Elevation Ground surface (ft): Not documented

Depth to water: 274 ft Aug76
(Top of casing)--->274.4 ft Dec 89

GENERALIZED STRATIGRAPHY / Driller's Log

0-25: GRAVEL-SAND
25-30: SAND
30-50: Gravelly SAND
50-55: SAND
55-65: Gravelly SAND
65-75: SAND
75-100: Gravelly SAND
100-120: Sandy GRAVEL
120-132: Gravelly SAND
132-133: SILT, fine SAND
133-155: Gravelly SAND
155-160: SAND
160-175: SAND w/10% PEBBLES
175-190: SAND
190-210: SAND w/10% PEBBLES
210-215: SAND
215-220: Gravelly SAND
220-225: SAND
225-240: Gravelly SAND
240-245: 50% GRAVEL, 50% SAND
245-300: Gravelly SAND

Elevation of reference point (top of casing): [679.05 ft]
Height of reference point above ground surface: [ND]
Depth of surface seal: [20.0 ft]
Type of surface seal: 10-in casing 0-20 ft, pulled back, and cement grouted, 2 ft pad, depth indeterminate
I.D. of riser pipe: [6 & 8-in]
Type of riser pipe: Carbon steel
Diameter of borehole: [9-in nom]
Type of filler: Bentonite grout between 6 & 8 in casing
Perforated 94-127 ft, 4 cuts/rd/ft
128-149 ft, 2 cuts/rds/ft
Grouted w/bentonite drilling mud, 50#/150 gal water to 149 ft, cement 1 bag/5.5 gal water, total 220 gals.
8-in casing to 150 ft
Top of perforations: [269 ft]
Description of perforations: Not documented
Bottom of perforations: [294 ft]
Depth bottom of borehole: [300 ft]

Drawing By: RKL/2#E25#18.ASB Date: 22May90

Reference: Golder 8831752\7782

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Baker
Drilling Company: Not documented
Date Started: 22Jul76
Date Complete: 03Sep76

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

WELL NUMBER: 299-E25-19
TEMPORARY WELL NO: ND
Hanford Coordinates: N/S N 39,935 E/W W 46,060
State Coordinates: N 445,119 E 2,249,163
Start Card #: Not documented T___ R___ S___
Elevation Ground surface (ft): Not documented

Depth to water: 272 ft Sep76
(Top of casing)--->272.7 ft Dec89

GENERALIZED STRATIGRAPHY / Driller's Log

0-40: GRAVEL and SAND
40-65: SAND with GRAVEL
65-95: GRAVEL and SAND
95-125: SAND and GRAVEL, some COBBLES
125-130: SAND
130-145: SAND with GRAVEL
145-215: SAND and GRAVEL
215-220: SAND
220-255: SAND, GRAVEL and COBBLES
255-260: SAND
260-300: GRAVEL and SAND

Elevation of reference point (top of casing): [677.20 ft]
Height of reference point above ground surface: [ND]
Depth of surface seal: [20.0 ft]
Type of surface seal: 10-in casing 0-20 ft, left in hole and cement grouted. 2 ft pad, depth indeterminate
I.D. of riser pipe: [6 & 8-in]
Type of riser pipe: Carbon steel
Diameter of borehole: [9-in nom]
Type of filler: Bentonite grout between 6 & 8 in casing Perforated 20-150 ft, 4 cuts/rd/ft Grouted with bentonite. Bentonite bailed and grouted w/cement. Bailed cement and set 6-in casing. Grouted between 6 & 8-in; 8 & 10-in casings. Used 300 gals.
8-in casing to 150 ft
Top of perforations: [270 ft]
Description of perforations: 4 holes/ft
Bottom of perforations: [295 ft]
Depth bottom of borehole: [300 ft]

Drawing By: RKL/2#E25#19.ASB Date: 22May90

Reference: Golder 8831752\2E2519

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Egan
Drilling Company: Not documented
Date Started: 20May76
Date Complete: 06Aug76

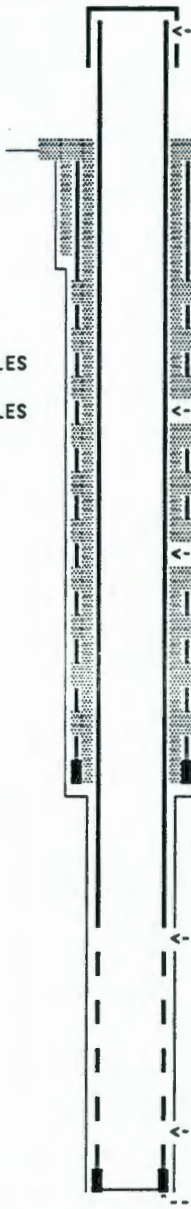
Sample Method: Hard tool (nom)
Additives Used: Bentonite
WA State Lic Nr: Not documented
Company Location: Pasco, WA

WELL NUMBER: 299-E25-20
TEMPORARY WELL NO: 4
Hanford Coordinates: N/S N 39,925 E/W W 45,875
State Coordinates: N 445,109 E 2,249,348
Start Card #: Not documented T___ R___ S___
Elevation Ground surface (ft): Not documented

Depth to water: 271 ft Aug76
(Top of casing)--->271.8 ft Dec89

GENERALIZED STRATIGRAPHY / Driller's Log

0-160: SAND
160-175: Pebbly SAND
175-190: SAND
190-200: Pebbly SAND
200-210: SAND and PEBBLES
210-215: SAND
215-220: Pebbly SAND
220-225: SAND
225-245: SAND & PEBBLES, some COBBLES
245-260: SAND and COBBLES
260-270: SAND & PEBBLES, some COBBLES
270-280: SAND & PEBBLES
280-300: SAND, PEBBLES & COBBLES



Elevation of reference point (top of casing): [676.30 ft]
Height of reference point above ground surface: [ND]
Depth of surface seal: [20.0 ft]
Type of surface seal: 10-in casing 0-20 ft, pulled back and cement grouted. 2 ft pad, depth indeterminate
I.D. of riser pipe: [6 & 8-in]
Type of riser pipe: Carbon steel
Diameter of borehole: [9-in nom]
Type of filler: Cement grout between 6 and 8-in casing. Perforated 21-149 ft, 4 cuts/rd/ft. Used 270 gals cement at 5.5 gals water/bag cement.
8-in casing to 150 ft
Top of perforations: [269 ft]
Description of perforations: 4 cuts/rd
Bottom of perforations: [294 ft]
Depth bottom of casing: [300 ft]
Depth bottom of borehole: [300 ft]

Drawing By: RKL/2#E25#20.ASB Date: 22May90

Reference: Golder 8831752\2E2520

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Air Rotary
Drilling Fluid Used: Air
Driller's Name: Nelson
Drilling Company: Nelson Well Drill
Date Started: 22Jun87

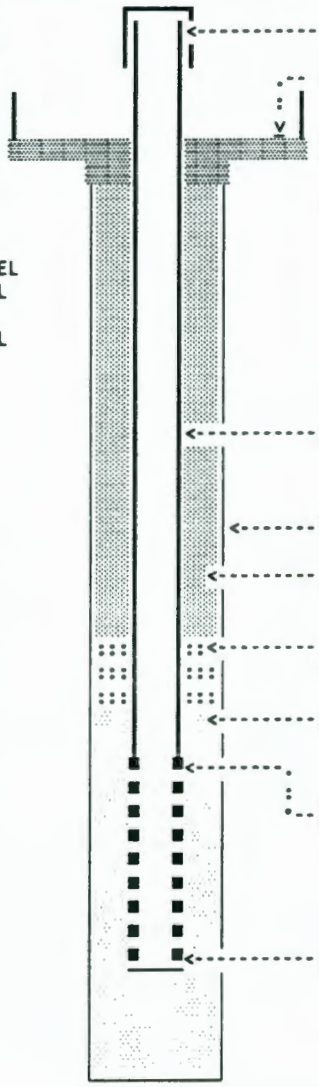
Sample Method: Air returns
Additives Used: Foam
WA State Lic Nr: Not documented
Company Location: Pasco, WA
Date Complete: 16Jul87

WELL NUMBER: 299-E25-31
TEMPORARY WELL NO: Not documented
Hanford Coordinates: N/S N 40,311 E/W W 45,752
State Coordinates: N 445,495 E 2,249,470
Start Card #: Not documented T___ R___ S___
Elevation Ground surface (ft): Not documented

Depth to water: 264 ft Jul87
(Top of casing)->267.4 ft Dec89

GENERALIZED Geologist's STRATIGRAPHY Log

0-27: No record
27-33: Black SAND
33-79: No record
79-99: Black, silty SAND
99-117: Black, sandy, silty GRAVEL
117-137: Coarse SAND, fine GRAVEL
137-177: No record
177-197: Coarse SAND, fine GRAVEL
197-217: Large GRAVEL, COBBLES
217-220: COBBLES, GRAVEL
220-225: No record
225-230: Very open, moist
230-237: No record
237-258: COBBLES, GRAVEL, SAND
258-271: No record
271-276: Medium SAND and GRAVEL
276-298: No record



Elevation of reference point (top of casing): [672.53 ft]
Height of reference point above ground surface: [ND]
Depth of surface seal: [0-3.0 ft]
Type of surface seal: Portland cement 4-ft x 4-ft x 4-in surface pad. 4 equidistant protective posts.
I.D. of surface casing (If present): [Removed]
I.D. of riser pipe: [4-in]
Type of riser pipe: Stainless steel, Type 304
Diameter of borehole: [9-in nom]
Type of filler: Volclay grout, 3-249 ft
Depth top of seal: [249.0 ft]
Type of seal: Bentonite pellets
Depth top of sand pack: [254.0 ft]
Silica sand
Mesh not documented
Depth top of screen: [259.0 ft]
4-in, stainless steel
slot not documented
Depth bottom of screen: [279.0 ft]
Depth to bottom: [298.0 ft]

Drawing By: RKL/2#E25#31.ASB Date: 22May90

Reference: Golder 8831752\14262

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Cordon
Drilling Company: Kaiser Engineers
Date Started: 09Jul88

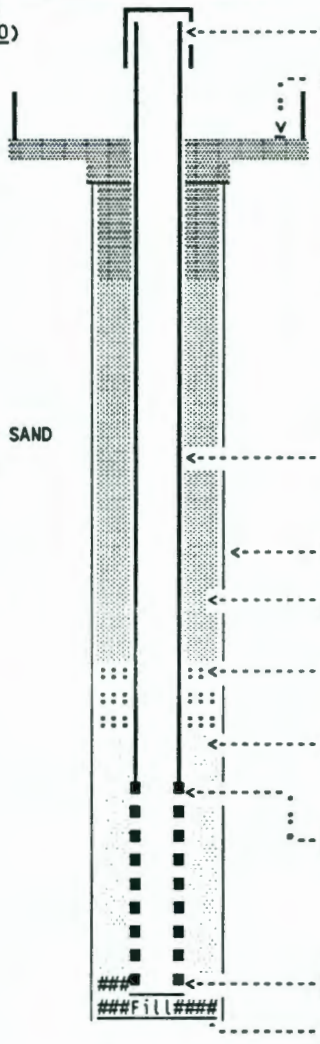
Sample Method: Not documented
Additives Used: Foam
WA State Lic Nr: 0079
Company Location: Hanford
Date Complete: 05Aug88

WELL NUMBER: 299-E25-36
TEMPORARY WELL NO: Not documented
Hanford Coordinates: N/S N 39,640 E/W W 47,541
State Coordinates: N 444,820 E 2,247,682
Start Card #: Not documented T___ R___ S___
Elevation Ground surface (ft): 704.36 (Brass cap)

Depth to water: 299.4 ft Aug88
(Top of casing)->(303.2 ft Mar90)

GENERALIZED Geologist's STRATIGRAPHY Log

0-10: SILT
10-30: SAND
30-35: Sandy GRAVEL
35-40: SAND
40-80: Sandy GRAVEL
80-110: SAND
110-115: Gravelly SAND
115-120: Sandy GRAVEL
120-135: SAND
135-140: Gravelly SAND
140-145: SAND
145-150: Slightly silty gravelly SAND
150-155: Slightly gravelly SAND
155-160: Gravelly SAND
160-170: SAND
170-180: Gravelly SAND
180-195: SAND
195-210: Gravelly SAND
210-230: Slightly gravelly SAND
230-275: SAND
275-300: Sandy GRAVEL
300-315: SAND
315-319: Sandy GRAVEL



Elevation of reference point (top of casing): [707.39 ft]
Height of reference point above ground surface: [3.0 ft]
Depth of surface seal: [0-17.8 ft]
Type of surface seal: Cement grout 4-ft x 4-ft x 4-in surface pad. 4 equidistant protective posts. Pad extends 3.1 ft into annulus. Cement grouted to 17. 8 ft.
I.D. of surface casing (If present): [Removed]
I.D. of riser pipe: [4-in]
Type of riser pipe: Stainless steel, Type 304
Diameter of borehole: [9-in nom]
Type of filler: Bentonite crumbles
Depth top of seal: [284.6 ft]
Type of seal: Bentonite pellets
Depth top of sand pack: [291.4 ft]
Silica sand 10-20 mesh
Depth top of screen: [296.7 ft]
4-in, stainless steel Johnson 20-slot
Depth bottom of screen: [317.6 ft]
Depth to bottom: [319.0 ft]

Drawing By: RKL/2#E25#36.ASB Date: 22May90

Reference: Golder 8831752\14102

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: Water
Driller's Name: Lueck
Drilling Company: Not documented
Date Started: 30Jun58
Date Complete: 16Jul58

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

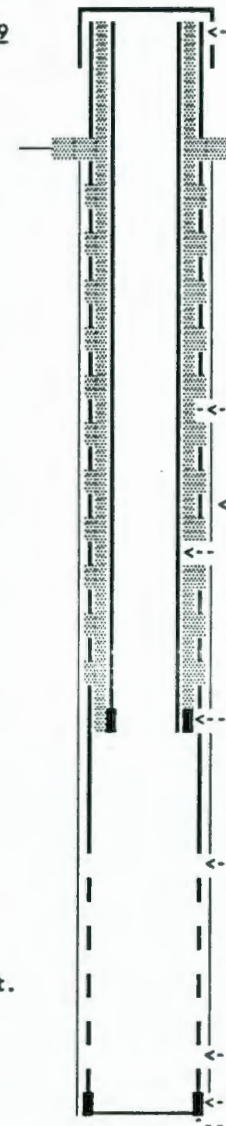
WELL NUMBER: 299-E26-2
TEMPORARY WELL NO: ND
Hanford Coordinates: N/S N 42,400 E/W W 45,664
State Coordinates: N 444,585 E 2,249,552
Start Card #: Not documented T___ R___ S___
Elevation Ground surface (ft): Not documented

Depth to water: 235 ft Jul58
(Top of casing)--->229.9 ft Dec89

GENERALIZED STRATIGRAPHY — Driller's Log

0-10: SAND
10-20: SAND and GRAVEL
20-25: SAND
25-40: SAND and GRAVEL
40-50: GRAVEL
50-55: SAND and GRAVEL
55-60: GRAVEL
60-85: SAND and GRAVEL
85-110: GRAVEL
110-115: SAND and GRAVEL
115-125: GRAVEL
125-130: CLAY and GRAVEL
130-145: SAND and GRAVEL
145-150: CLAY and SAND
150-155: Basalt ROCK and GRAVEL
155-170: Cemented GRAVEL
170-180: SAND, GRAVEL and CLAY
180-190: SAND
190-205: GRAVEL
205-240: Cemented GRAVEL
240-245: SAND and GRAVEL
245-250: SAND
250-261: SAND and GRAVEL
261-269: CLAY

REMEDIATION:
Feb82 By Garcia;
Perforated 8-in casing
0-195 ft, 2 cuts/rd.
Set 6-in casing 0-200 ft,
packer set at 200.5 ft.
Grouted with 186 gals cement.



Elevation of reference point (top of casing): [633.60 ft]
Height of reference point above ground surface: [ND]
Depth of surface seal: [0-200 ft]
Type of surface seal: Cement grout
Perforated 0-195 ft, 2 cuts/rd
Assumed 2 ft round pad,
depth indeterminate
I.D. of riser pipe: [6 & 8-in]
Type of riser pipe:
Carbon steel
Diameter of borehole: [9-in nom]
Type of filler:
Cement grout between 6 & 8 in casing
186 gals
Packer set at 200.5 ft
6-in casing to 200 ft
Top of perforations: [220 ft]
Description of perforations:
220-265 ft, 6 cuts/ft/rd
Depth bottom of perforations: [265 ft]
Depth bottom of casing: [267 ft]
Depth bottom of borehole: [267 ft]

Drawing By: RKL/2#E26#02.ASB Date: 22May90

Reference:
Golder 8831752\2E2602

DISTRIBUTION SHEET

To: DISTRIBUTION

From: GEOSCIENCES GROUP

Page 2 of 2

Date JUNE 6, 1990

Project Title/Work Order: INTERIM STATUS GROUNDWATER QUALITY ASSESSMENT PLAN FOR THE 216-A-29 DITCH

EDT No. 123603

ECN No. —

Name	MSIN	With Attach.	EDT/ECN & Comment	EDT/ECN Only
G. T. Berlin	S5-15	X		
C. J. Chou	H4-56	X		
D. B. Erb	R1-51	X		
S. F. Harris	H4-56	X		
R. L. Jackson	H4-56	X		
S. P. Luttrell	K4-97	X		
R. B. Mercer	H4-56	X		

A-6000-135 (12/87)

Date Request Received: 6/7/90

TECHNICAL INFORMATION RELEASE REQUEST

Reference: WHC-CM-3-4

Complete for all Types of Release

Purpose

- ☐ Speech or Presentation
  - ☐ Full Paper
  - ☐ Summary
  - ☐ Abstract
  - ☐ Visual Aid
- ☐ Speakers Bureau
- ☐ Poster Session
- ☐ Reference
- ☑ Technical Report
- ☐ Thesis or Dissertation
- ☐ Manual
- ☐ Brochure/Flier
- ☐ Software/Database
- ☐ Controlled Document
- ☐ Other: _____

Intended Audience

- ☑ Public
- ☐ Sponsor-limited
- ☐ Internal

New Document Number (Document Clearance Administration will assign):

Existing Identification Number: WHC-SD-EN-AP-031, Rev 0

If Previously Cleared, List Document No.:

Date Clearance Required: 6/7/90

Title: Interim-Status Ground Water Quality Assessment Plan

Lead Author Name	Impact Level	Phone	MSIN	Other Author(s) Name (s)
G.L. KASZA	2	6-0763	H4-56	C.J. CHOU, R.B. MERCER

Project or Program	Lead Org Code	Sponsor Agency
WASTE MANAGEMENT	81232	(DOE) DOT, NRC, USGS.

Editor Name	Phone	DOE/HQ Assistant Secretary For:
NA	NA	DP, EH, ER, (EM), RW, NE

New or novel (patentable) subject matter? ☑ No ☐ Yes
If "Yes", has disclosure been submitted by WHC or other company?
☐ No ☐ Yes Disclosure No(s).

Information received from others in confidence, such as proprietary data, trade secrets, and/or inventions?
☑ No ☐ Yes (Identify)

Copyrights? ☑ No ☐ Yes
If "Yes", has written permission been granted?
☐ No ☐ Yes (Attach Permission)

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☑ No ☐ Yes (Identify)

Complete for Speech or Presentation

Complete Title of Conference or Meeting	Group or Society Sponsoring
NA	NA

Dates of Conference or Meeting	City/State	Will a Proceedings be Published?	Will you hand out material at the meeting?
NA	NA	☐ Yes ☐ No	☐ Yes ☐ No

For a journal submission, provide complete title of journal: NA

Cognizant Line Management

Author: G.L. KASZA — Date: 6-6-90

~~QA MGR~~ Test Review: K.R. FECHT — Date: 6-6-90

~~LEVEL III Manager~~ Cognizant Manager: L.C. BROWN — Date: 6/6/90

Auth. Derivative Classifier: N/A — Date: 6/6/90

	Yes	No
Unclassified	☐	☐
Classified	☐	☐
UCNI	☐	☐

WHC Technical Program: L.C. Brown for R.R. Thompson per R.E. Lerch — Date: 6/7/90

	Yes	No	
Applied Technology	☐	☐	☐ Approve
Limited Disclosure	☐	☐	☐ Disapprove

Comments (Please initial)

INFORMATION

Document Clearance Administration

General Counsel — Date: 6/6/90

	Remove	Affix	
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Purpose and Use	☒	☐	☒ Approve
Patent Status	☒	☐	
Legal Disclaimer	☐	☒	☐ Disapprove
Proprietary Information	☐	☐	BDW for Stan Berglin 6/6/90
Computer Software Notice	☐	☐	

DOE Technical Program: R.M. Thompson — Date: 6/07/90
☑ Approve ☐ Disapprove

Communications: NA L.C. Brown 6/6/90 — Date
☐ Approve ☐ Disapprove

Publications Services: NA L.C. Brown 6/6/90 — Date
☐ Editorial Review Only ☐ Approve ☐ Disapprove

Other: NA N.S. — Date: 6/7/90
☐ Approve ☐ Disapprove

Document Clearance Administration Release Stamp

APPROVED FOR RELEASE OFFICIAL NS DOCUMENT Date 6/7/90

JUN 7 1990

Sta. 21

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1 EDT 123603

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No:
Distribution	Geosciences Group	NA
		7. Purchase Order No: NA
5. Proj./Prog/Dept/Div: 81230	6. Cog/Proj Engr: G. L. Kasza H4-56	9 Equip/Component No: NA
8. Originator Remarks:		10. System/Bldg/Facility: 216-A-29 Ditch
		12. Major Assm Dwg No: NA
11 Receiver Remarks:		13. Permit/Permit Application No. NA
		14. Required Response Date: June 4, 1990

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev No.	(E) Title or Description of Data Transmitted	(F) Impact Level	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-EN-AP-031		0	Interim-Status Groundwater Quality Assessment Plan for the 216-A-29 Ditch	2	1	1	6

16 KEY

Impact Level (F)	Reason for Transmittal (G)	Disposition (H) & (I)
1, 2, 3, or 4 see MRP 5.43 and EP-1.7	1. Approval 4. Review 2. Release 5. Post-Review 3. Information 6. Dist (Receipt Acknow. Required)	1. Approved 4 Reviewed no/comment 2. Approved w/comment 5. Reviewed w/comment 3. Disapproved w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION

(See Impact Level for required signatures)

(G) Reason	(H) Disp	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp
1	1	Cog./Proj. Eng	G. L. Kasza	6-1-90	H4-56	T. D. Blankenship	GK FOR T.D.B. PER TELECON	6-5-90	R1-62	4	1
1	1	Cog./Proj. Eng. Mgr.	K. R. Fecht	6/1/90	H4-56						
1	1	QA	D. H. Jones	6/1/90	H4-16						
1	1	Safety	H. N. Bowers	G FOR H.N.B 6-1-90 PER TELECON	R3-54						
1	1		R. J. Landon	6/1/90	B2-19						
1	1		G. D. Carpenter		H4-15						
1	1		F. A. Ruck		H4-57						

18. Signature of EDT Originator — 6-1-90 Date

19. Authorized Representative for Receiving Organization — Date

20. Cognizant/Project Engineer's Manager — 6-1-90 Date

21. DOE APPROVAL (if required) Ltr No. _____

- ☐ Approved
- ☐ Approved w/comments
- ☐ Disapproved w/comments

BD-7400-172 (2/89)