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1. Total Pages 561

2. Title: Interim Hydrogeologic Characterization Report for the 216-B-3 Pond

3. Number: WHC-SD- EN-EV-002

4. Rev. No.: 0

5. Key Words: 216-B-3 Pond, B Pond, Hydrogeologic characterization, Groundwater monitoring

6. Author

M. J. Hartman
Name (Type or Print)

Mary J Hartman
Signature

81230
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7. Abstract

The 216-B-3 Pond is a Resource Conservation and Recovery Act disposal unit on the Hanford Site. The uppermost aquifer comprises gravel, sand, and clay sediments of the Hanford and Ringold formations. The groundwater monitoring network is made up of 13 wells. This report presents potentiometric and groundwater chemistry data from early stages of characterization and monitoring. Geologic, geophysical, and sediment data are also included.

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I. WELL DEVELOPMENT DATA AND AQUIFER TEST RESULTS AND DATA FOR WELLS AT THE 216-B-3 POND I-1

1.0 INTRODUCTION

This report describes the current knowledge of the hydrogeology of the 216-B-3 Pond waste disposal site. The 216-B-3 Pond is located in the central portion of the Hanford Site in southeastern Washington State (Figure 1-1) and consists of a series of four unlined, interconnected ponds. These four ponds hereinafter will be collectively referred to as B Pond (Figure 1-2). Throughout the remainder of this document, the designation 216-B-3 Pond refers only to the westernmost pond. The other three ponds are designated 216-B-3A (3A), 216-B-3B (3B), and 216-B-3C (3C).

B Pond has received wastewater from various operations in the 200 East Area, including hazardous and radioactive wastes. Since 1984, physical and administrative controls have been modified to avoid inadvertent discharge of chemicals to the wastewater stream; the pond currently does not receive hazardous waste. B Pond is proposed for closure under the Resource Conservation and Recovery Act of 1976 (RCRA), although the 3A, 3B, and 3C ponds may continue to receive nondangerous wastewater.

B Pond is currently regulated under RCRA as an interim status facility. Interim status facilities are defined as being authorized to continue interim operations while engaged in the process of obtaining final status. The RCRA regulations and their amendments are promulgated by the U.S. Environmental Protection Agency (EPA) in 40 CFR 265, Subpart F (1980a) and by the Washington Department of Ecology (Ecology) in Washington Administrative Code (WAC) 173-303-400 (1987). These regulations require hydrogeologic characterization of the site. The following objectives of hydrogeologic characterization are described by the EPA (1986a, pp. 1 and 2):

- **Identify and characterize the uppermost aquifer.** This involves a study of the geology and hydrology beneath the site.

- **Identify ground water flow paths and flow rates.** This is accomplished through studies of 1) aquifer properties, 2) vertical and horizontal components of flow in the uppermost aquifer, and 3) pertinent physical and chemical properties of confining units relative to hazardous waste constituents.

- **Determine where to place ground water monitoring wells.** This determination is made based on the results of hydrogeologic characterization.

Hydrogeologic characterization of the B Pond site began with a review of previous studies of the hydrology and geology of the Hanford Site and the Separations Area. This information was presented in the ground water monitoring plan for B Pond (Luttrell et al. 1989, pp. 12 to 53) and was used to design and install a network of wells around B Pond to be used both for characterization and for ground water monitoring. The additional data obtained from the installation and monitoring of these wells will be used to fulfill the objectives listed above.

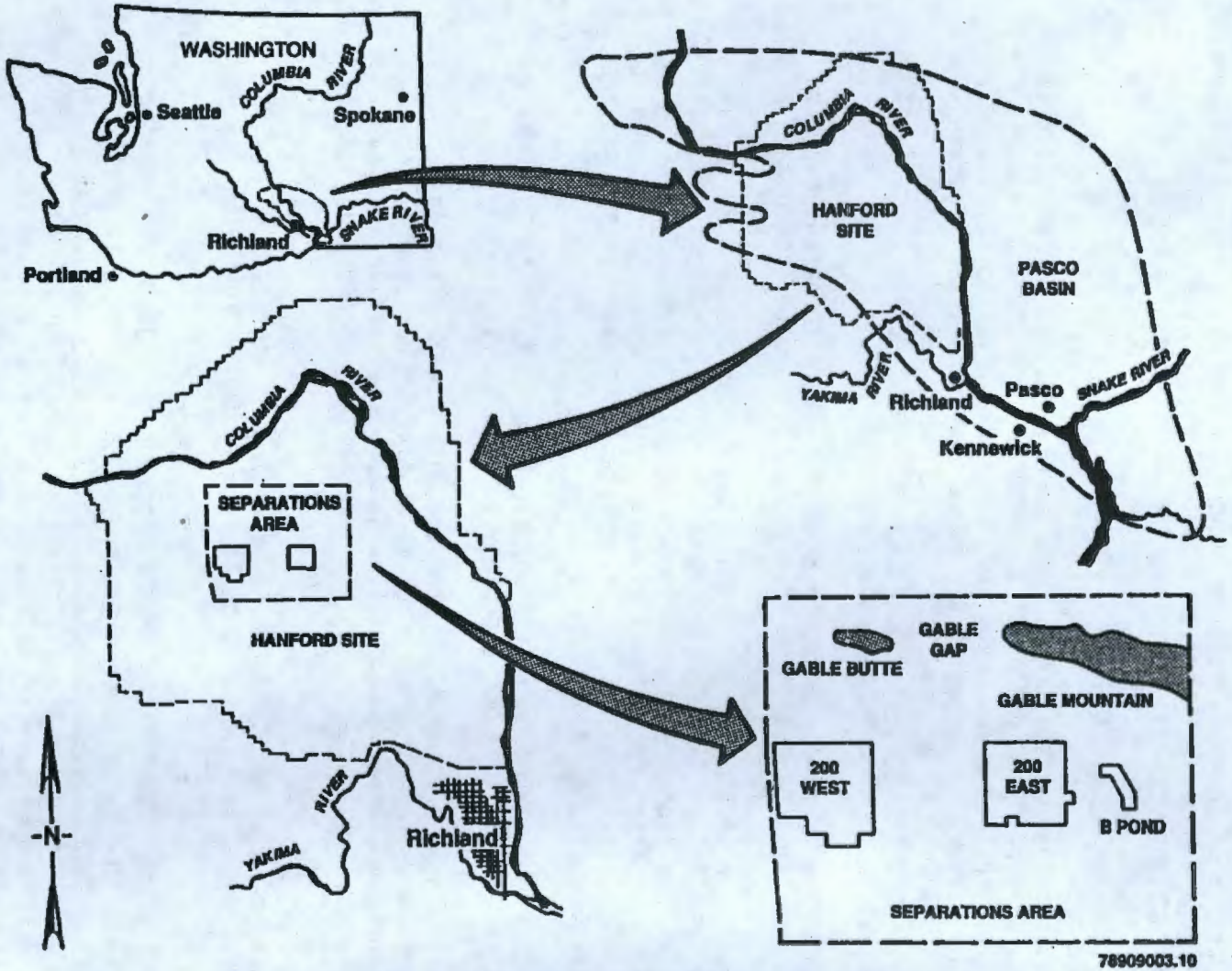


Figure 1-1. Location of the Hanford Site and 216-B-3 Pond.

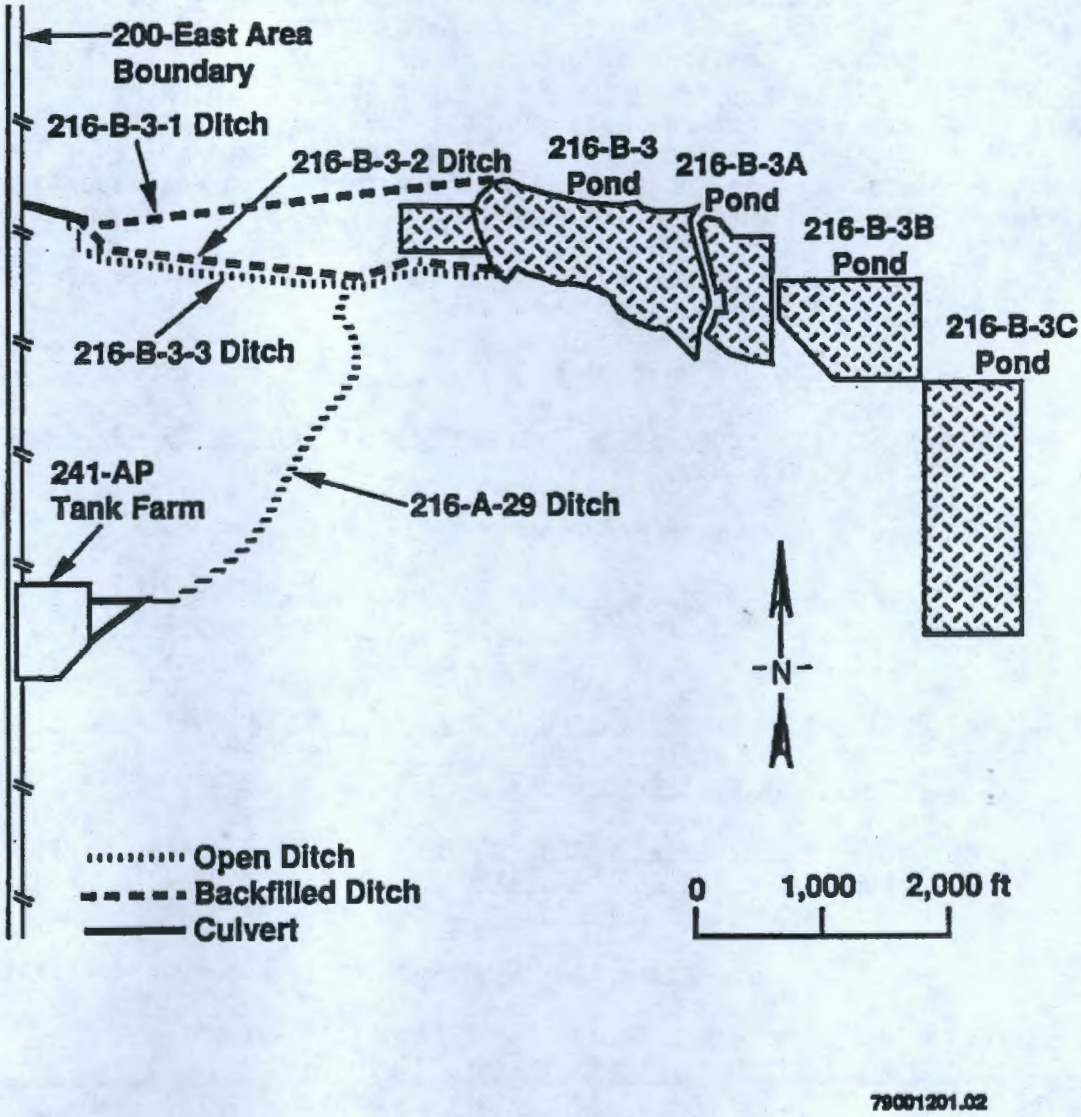


Figure 1-2. 216-B-3 Pond Site.

Hydrogeologic characterization is an ongoing process that includes compilation of data from past studies, well installation, aquifer tests, geophysics, and chemical analyses of ground water. This document, the Interim Hydrogeologic Characterization Report for the 216-B-3 Pond, reflects data collected before and during the summer of 1989. As more data are collected, hydrogeologic interpretations will be updated and revised. These data and interpretations will be described in quarterly progress reports and in revisions of this characterization report.

B Pond, its ground water monitoring program, and the hydrology of the site are described in the following documents:

- Preliminary Closure/Post-Closure Plan, 216-B-3 Pond (DOE 1987a)
- Interim-Status Ground-Water Monitoring Plan for the 216-B-3 Pond (Luttrell et al. 1989).
- RCRA ground water monitoring progress reports:
  - Resource Conservation and Recovery Act Ground-Water Monitoring Projects for Hanford Facilities: Progress Report for the Period October 1 to December 31, 1988 (Fruland et al. 1989)
  - Resource Conservation and Recovery Act Ground-Water Monitoring Projects for Hanford Facilities: Progress Report for the Period January 1 to March 31, 1989 (Smith et al. 1989a)
  - Resource Conservation and Recovery Act Ground-Water Monitoring Projects for Hanford Facilities: Progress Report for the Period April 1 to June 30, 1989 (Smith et al. 1989b)
  - Additional progress reports will be published quarterly.

A revised closure/postclosure plan for B Pond is in preparation. Chemical and hydrogeologic data for the Separations Area and vicinity (including B Pond) are available in annual environmental reports (e.g., Serkowski et al. 1988; Wilbur et al. 1983). Soil and near-surface sediments also are being characterized for the B Pond (Roos and Woodworth 1989).

2.0 DESCRIPTION OF THE B POND SITE

This section contains a description of the B Pond facility and general disposal practices. This section is intended to provide a basic understanding of the disposal facilities and the waste constituents of interest; it does not provide complete details of waste disposal practices. Additional information on facility operations and waste stream characteristics are contained in the B Pond closure plan (DOE 1987a, pp. 2-1 to 3-9) and in 216-B-3 Pond Characterization of the Hazardous Waste Inventory in the Near-Surface Soil and Sediments (Roos and Woodworth 1989, pp. 1 to 9).

2.1 LOCATION AND LAYOUT

B Pond is a series of unlined, interconnected wastewater disposal ponds that lie east of the 200 East Area (Figure 1-2). The following elements are considered part of the B Pond site:

1. 216-B-3 Pond
2. 216-B-3A, 3B, and 3C Ponds
3. 216-B-3-3 Ditch
4. Part of an inactive overflow area.

B Pond is located in a natural topographic depression and is diked on the eastern margin. It covers approximately 35 ac, with a maximum depth of about 20 ft. The three expansion ponds, 3A, 3B, and 3C, were placed into service in 1983, 1984, and 1985, respectively. The 3A and 3B Ponds are both about 11 acres in size, and the 3C Pond is approximately 41 acres. The 3B Pond is currently not in use.

Throughout its history, B Pond has received waste through various unlined, uncovered ditches (Figure 1-2). The 216-B-3-1 Ditch was put into service in 1945 and was backfilled with soil in 1964. The 216-B-3-2 Ditch was used from 1964 through 1970, when it too was backfilled. Both of these ditches carried dangerous wastes; however, they are not considered elements of the RCRA unit. The 216-A-29 Ditch also has carried RCRA-regulated waste and is considered a separate RCRA unit.

The 216-B-3-3 Ditch (B-3-3 Ditch) currently carries wastewater from the 200 East Area to B Pond. Under normal operation, this ditch does not carry dangerous waste; however, it is not impossible for dangerous wastes to be routed through the B-3-3 Ditch. Therefore, the entire B-3-3 Ditch is considered part of the B Pond site.

West of the 216-B-3 Pond is an overflow area which has been deactivated and backfilled. Part of the overflow area is believed to have received RCRA-regulated waste and is considered part of the B Pond site.

2.2 WASTE DISPOSAL PRACTICES

B Pond began receiving waste in 1945. The B Pond primarily receives wastewater from the Plutonium Uranium Extraction (PUREX) Plant and from

B Plant. Specifically, these streams are B Plant cooling water, PUREX Plant chemical sewer, and PUREX Plant steam condensate, which may be sent to B Pond only if the stream is diverted to the 216-A-42 Diversion Basin. The B Plant steam condensate and chemical sewer were discharged to the B Pond in the past. Additional sources of effluent to B Pond are the 242-A Evaporator, 244-AR Vault, 241-BY Tank Farm (inactive), 244-CR Vault (inactive), 241-A-702 Vessel Ventilation System, 283-E Water Treatment Facility, and the 284-E Powerhouse.

B Pond has occasionally received spilled material or off-specification chemicals, and also has received routine corrosive effluent from a demineralizer regeneration system. These releases were all transported via the 216-A-29 Ditch. The most frequent hazardous discharge was the demineralizer effluent. These discharges of sodium hydroxide and sulfuric acid solutions occurred on a daily basis until February 1986. Available information on discharge sources and the periods of discharge are summarized in Table 2-1. Analyses of quarterly samples of waste streams discharging to B Pond later in 1986 through 1987 indicate that these discharges are not regulated dangerous wastes under WAC 173-303 (Ecology 1987, Jungfleisch 1988, p. 25).

Radioactively contaminated water occasionally has been released to B Pond. The estimated radionuclide inventory for B Pond, corrected for radioactive decay through 1987, is listed in Table 2-2. Cesium-131, strontium-90, and tritium account for nearly all of the total activity (WHC 1989, p. 6). Recent annual volumes of wastewater discharged to B Pond are summarized in Table 2-3.

Table 2-1. Summary of Discharge Sources for the B Pond.

Wastewater Source	Transport Routes[a]				Active Date
	A	B	C	D	
B Plant					
Process cooling water	X	X	X		4/45 to present
Steam condensate	X	X			4/45 to 9/67
Chemical sewer	X	X			4/45 to 5/70
WESF[b]			X		1974 to 1978
284-E Powerhouse					
Liquid effluent[c]	X	X	X		4/45 to present
283-E Water Treatment Facility					
Filter backwash			X		4/45 to present
244-CR Vault					
Cooling water	X	X	X		3/52 to late 1983
PUREX Plant					
Chemical sewer				X	11/55 to present
Acid fractionator[d] condensate				X	2/58 to 9/86
Process cooling water	X	X	X		11/55 to present
241-BY Tank Farm					
ITS Unit 1 cooling water		X	X		1/65 to 7/73
ITS Unit 2 cooling water		X	X		2/68 to 7/73
244-AR Vault					
Liquid effluent[c]			X		1/69 to present
241-A Aging Waste Ventilation System Complex					
Cooling water			X		1/71 to present
242-A Evaporator					
Cooling water			X		3/77 to present
Steam condensate			X		3/77 to present

[a]Routes from diversion box: A = 216-B-3-1 Ditch (4/45 to 7/64)
B = 216-B-3-2 Ditch (7/64 to 9/70)
C = 216-B-3-3 Ditch (9/70 to present)
D = 216-A-29 Ditch (11/55 to present)

[b]Waste Encapsulation Storage Facility

[c]Consists primarily of cooling water

[d]Part of the chemical sewer discharge.

Table 2-2. B Pond Cumulative, Decayed Radionuclide Inventory as of December 31, 1988.

Radionuclides	Inventory (Ci)
Volume: 2.26×10^{11}	
Total alpha	$<1.60 \times 10^{1}$
Total beta	$<3.93 \times 10^{2}$
Tritium (^{3}H)	8.29×10^{2}
Strontium-90 (^{90}Sr)	$<1.03 \times 10^{2}$
Ruthenium-106 (^{106}Ru)	$<1.34 \times 10^{-4}$)
Cesium-137 (^{137}Cs)	$<9.49 \times 10^{1}$
Promethium-147 (^{147}Pm)	<1.03
Uranium (gross) (U)	<2.07
Plutonium-239 (^{239}Pu)	$<5.52 \times 10^{-1}$)
Americium-241 (^{241}Am)	<3.52

Table 2-3. Volume of Water Discharged to B Pond, 1985 through 1988.

Year	Volume of Discharge
1985	3.90×10^{9} gal (1.50×10^{10} L)[a]
1986	6.06×10^{9} gal (2.29×10^{10} L)[b]
1987	5.86×10^{9} gal (2.22×10^{10} L)[c]
1988	5.86×10^{9} gal (2.22×10^{10} L)[d]

[a]From Law and Schatz 1986.
[b]From Law et al. 1987.
[c]From Serkowski et al. 1988, p. 3-2.
[d]From WHC 1989, p. 3-3.

3.0 ENVIRONMENTAL SETTING

B Pond is located in the central portion of the U.S. Department of Energy's (DOE) Hanford Site in south-central Washington. This section describes the regional environmental setting of the Hanford Site, including its physiography, climate, geology (stratigraphy, tectonic framework, seismicity), and hydrology. A more detailed discussion of the Site is provided by DOE (1988, Chapters 1, 3 and 5).

3.1 PHYSIOGRAPHY

The Hanford Site lies within the Columbia Basin subprovince of the Columbia Intermontane Province (Figure 3-1). The Columbia Intermontane Province is the product of Miocene flood basalt volcanism and regional deformation that occurred over the past 16 million years. The Columbia Plateau is that portion of the Columbia Intermontane Province that is underlain by the Columbia River Basalt Group (Thornbury 1965, pp. 442 to 470).

The physiography of the Hanford Site is dominated by the low-relief plains of the Central Plains physiographic region and anticlinal ridges of the Yakima Folds physiographic region. The surface topography has been modified within the past several million years by several geomorphic processes: 1) Pleistocene cataclysmic flooding, 2) Holocene eolian activity, and 3) landsliding. Cataclysmic flooding occurred when ice dams in western Montana and northern Idaho were breached, allowing large volumes of water to spill across eastern and central Washington. The last major flood occurred about 13,000 yr ago, during the late Pleistocene Epoch. Anastomosing flood channels, giant current ripples, bergmounds, and giant flood bars are among the landforms created by the floods. The 200 areas waste management facilities are located on one prominent flood bar, the Cold Creek bar (Figure 3-2) (Bretz et al. 1956, pp. 1010 to 1014).

Since the end of the Pleistocene, winds have locally reworked the flood sediments, depositing dune sands in the lower elevations and loess (windblown silt) around the margins of the Pasco Basin. Many sand dunes have been stabilized by anchoring vegetation except where they have been reactivated where vegetation is disturbed.

Landslides occur along the north limbs of some Yakima Folds and along steep river embankments such as the White Bluffs (Figure 3-3). Landslides on the Yakima Folds occur along sedimentary units intercalated with the basalt whereas active landslides at the White Bluffs occur in suprabasalt sediments. The active landslides at the White Bluffs are principally the result of irrigation activity east of the Columbia River. No landsliding occurs in the the 200 areas.

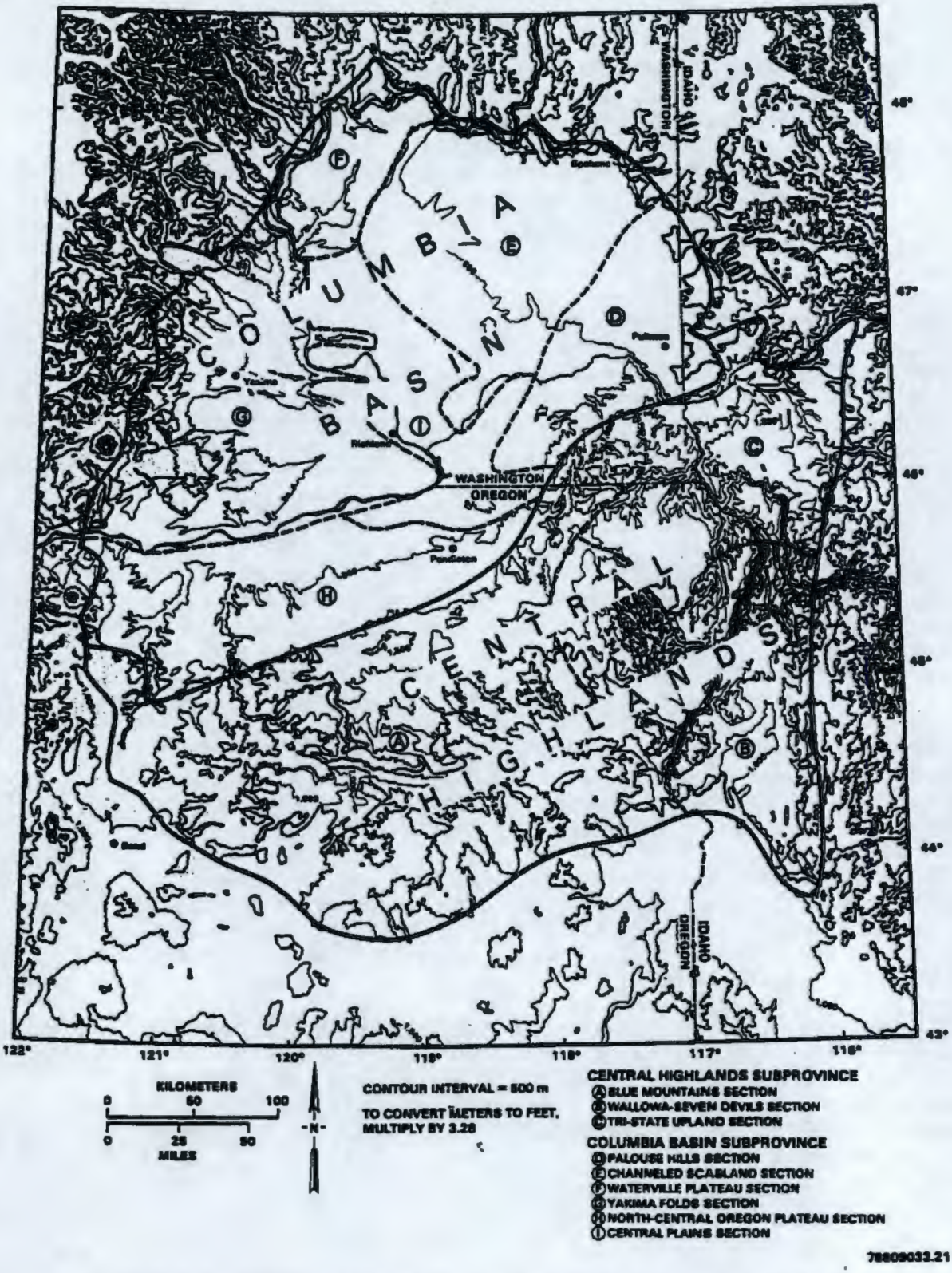


Figure 3-1. Geomorphic Units within the Central Highlands and Columbia Basin Subprovinces that Contain the Columbia River Basalt Group (after Thornbury 1965, p. 445).

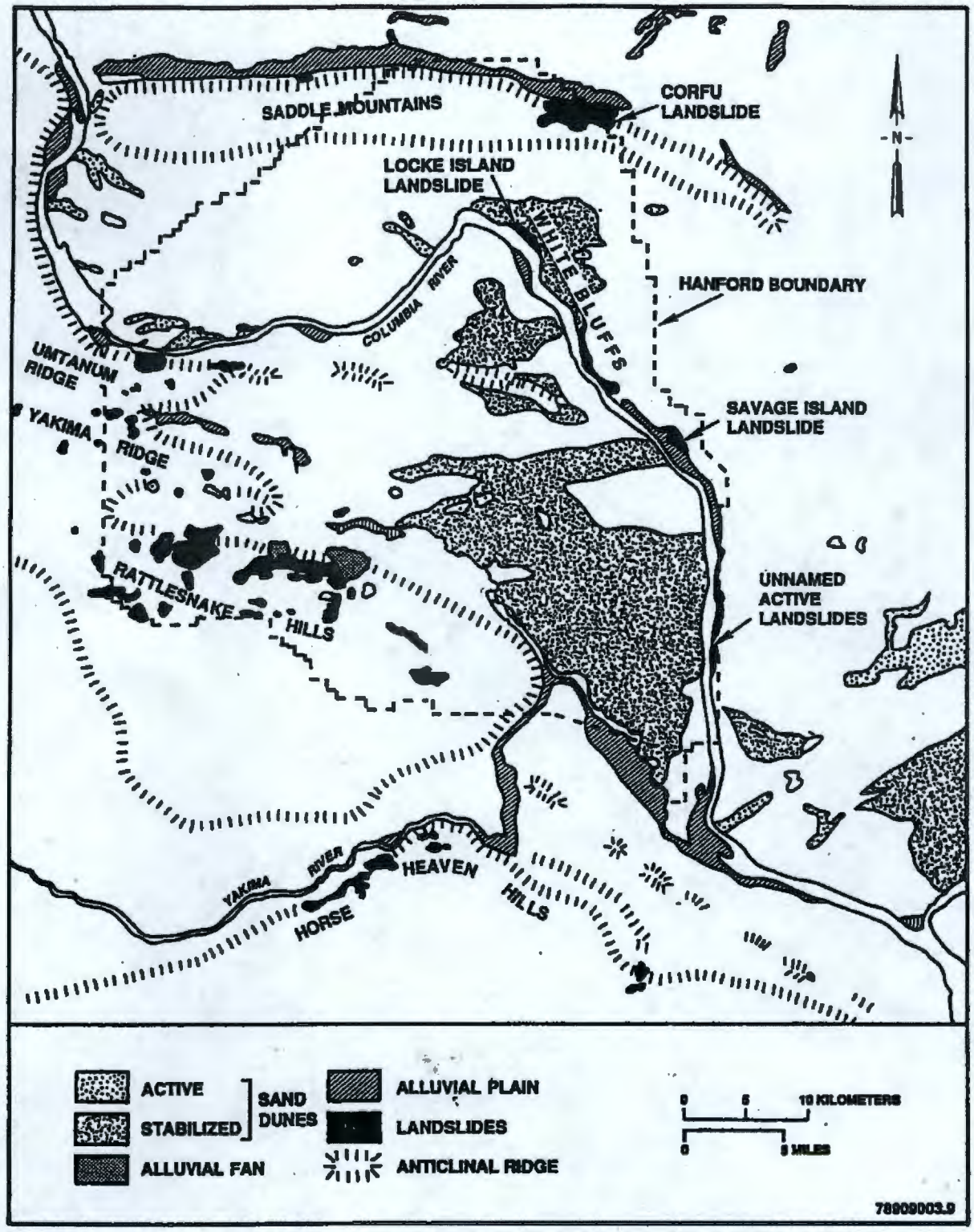
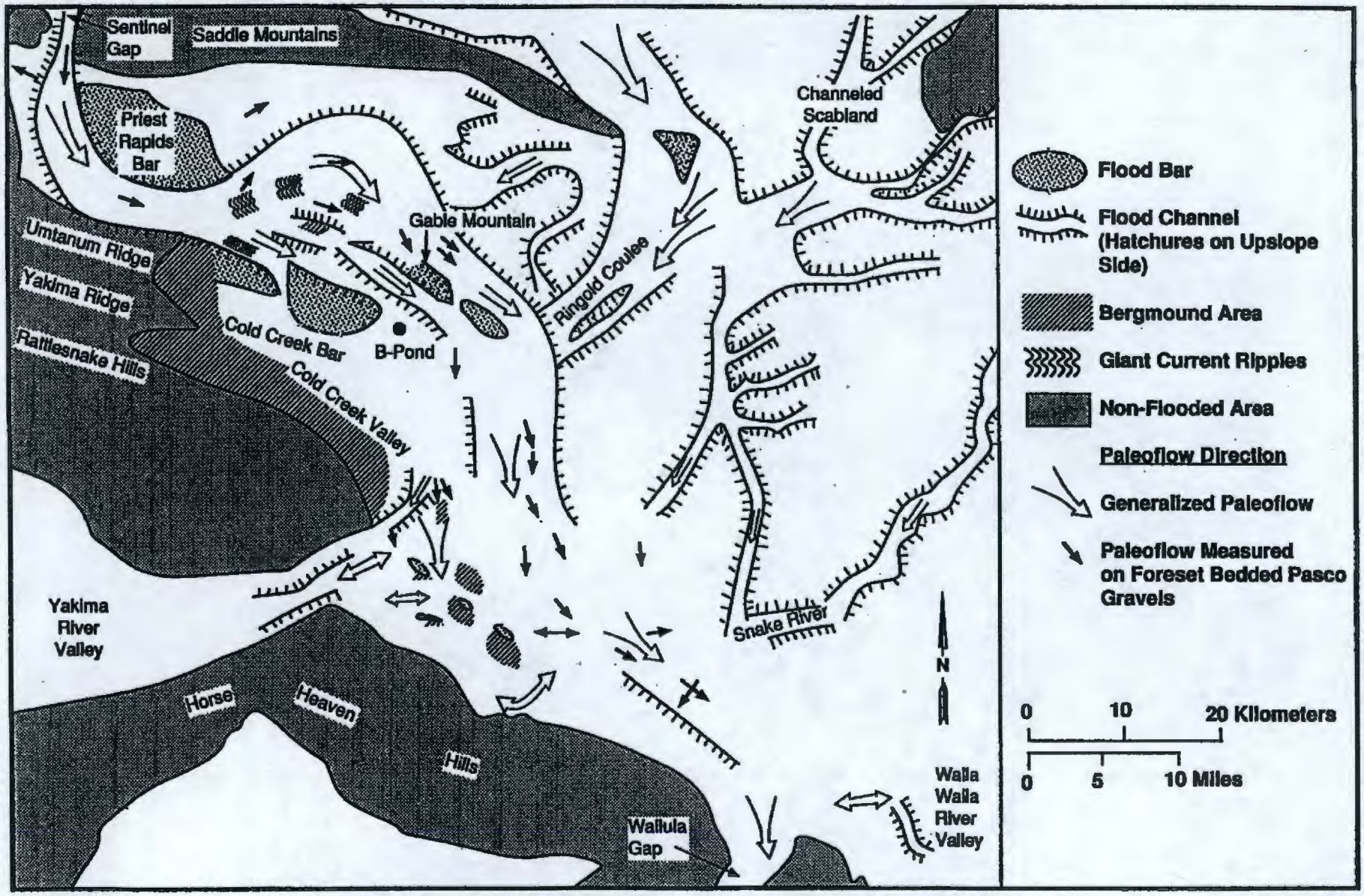


Figure 3-2. Paleoflow Directions and Landforms Associated with Proglacial Cataclysmic Flooding on the Central Columbia Plateau (DOE 1988, p. 1.1-15)



79001201.4

Figure 3-3. Late Quaternary Landforms Within and Adjacent to the Pasco Basin (after DOE 1988, p. 1.1-24).

3.2 CLIMATE AND METEOROLOGY

The climate of the Hanford Site is primarly controlled by the rain shadow effect of the Cascade Range. The Cascades also serve as a source of cold air drainage, which affects the wind regime at Hanford Site.

Climatological data have been collected at the Hanford Meteorological Station (HMS), located between the 200 East and West areas, since 1945. Temperature and precipitation data are also available from nearby locations for the period 1912 to 1943. A summary of these data through 1980 has been published by Stone et al. (1983). Data from the HMS are representative of the general climatic conditions for the region and describe the specific climate of the 200 Area Plateau.

3.2.1 Wind

Prevailing wind directions on the 200 Area Plateau are from the northwest in all months of the year (Figure 3-4). Secondary maxima occur for southwesterly winds.

Monthly average wind speeds are lowest during the winter months, averaging 6 to 7 mi/h, and highest during the summer, averaging 9 to 10 mi/h. Wind speeds that are well above average are usually associated with southwesterly winds. However, the summertime drainage winds are generally northwesterly and frequently reach 31 mi/h (DOE 1988, pp. 5.1-4 to 5.1-8).

Tornadoes are infrequent and generally small in the northwest portion of the United States. The HMS climatological summary (Stone et al. 1983, pp. IX-6 to IX-7) and the National Severe Storms Forecast Center data base list 22 separate tornado occurrences within 100 mi of the Hanford Site from 1916 through August 1982. Two additional tornadoes have been reported since August 1982.

3.2.2 Temperature and Humidity

The DOE (1988, pp. 5.1-10 and 5.1-11) lists averages and extremes of temperatures measured at the HMS from 1912 to 1980. The average daily maximum temperature ranges from 36.9°F in January to 91.9°F in July. Average daily minima range from 22.1°F in January to 61.1°F in July. The record high temperature is 114°F (July 27, 1939) and the record low is -27°F (December 12, 1919).

The annual average relative humidity at the HMS is 54%. It is highest during the winter months, averaging about 75%, and lowest during the summer, averaging about 35%.

3.2.3 Precipitation

Precipitation measurements have been made at the HMS since 1945. Average annual precipitation at the HMS is 6.3 in. (DOE 1988, p. 5.1-16).

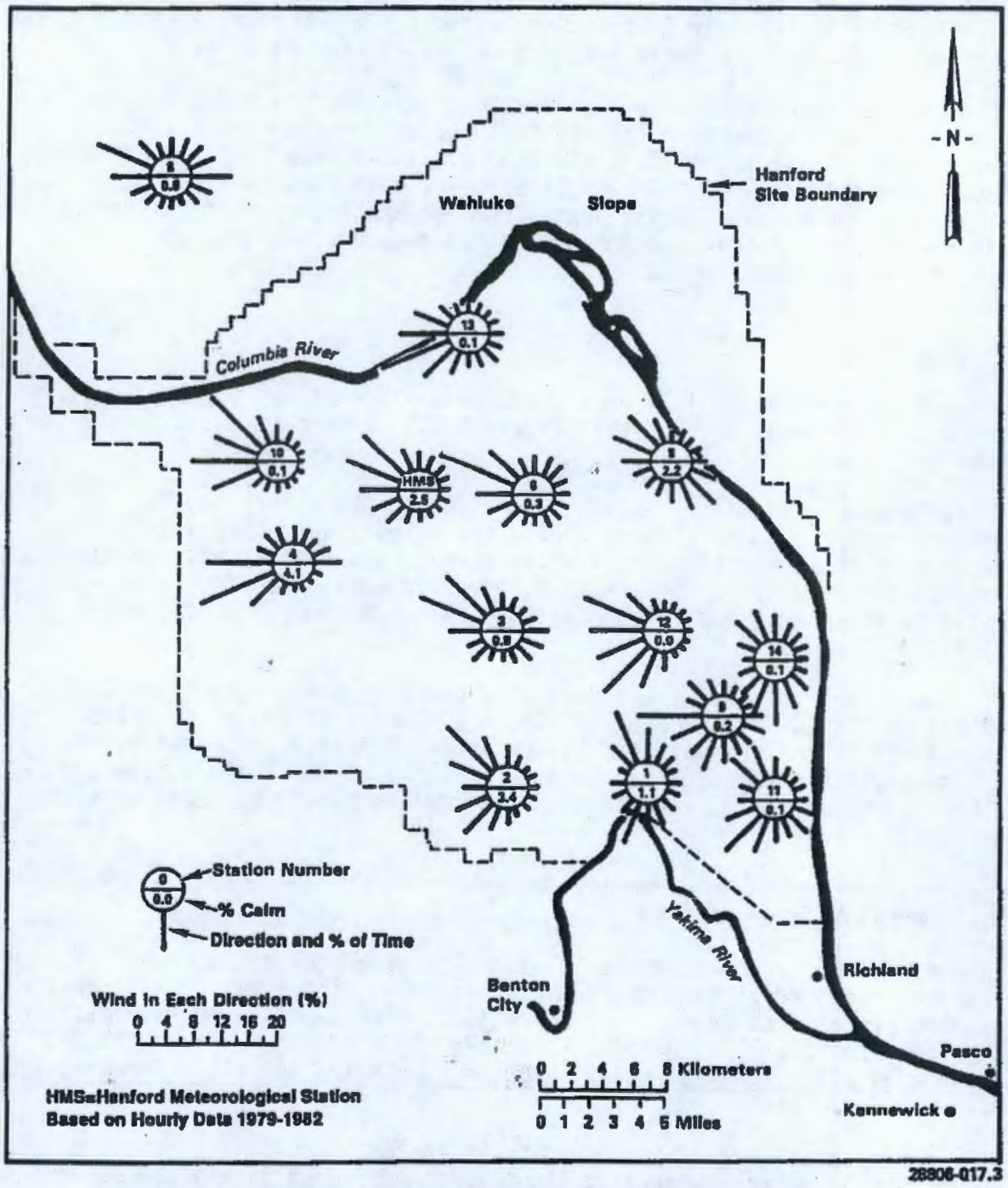


Figure 3-4. Wind Rose Patterns for the Hanford Site (after DOE 1988, p. 5.1-6).

Most of the precipitation occurs during the winter with nearly half of the annual amount occurring in the months of November through February. Days with >0.5 in. precipitation occur <1% of the year. Rainfall intensities of 0.5 in/h persisting for 1 h are expected once every 10 yr. Rainfall intensities of 1 in/h for 1 h are expected only once every 500 yr. The record snowfall of 24.4 in. occurred in February 1916. Snowfall accounts for about 38% of all precipitation during the months of December through February.

3.3 STRATIGRAPHY

The stratigraphy of the Hanford Site consists of Miocene age and younger rocks and sediments. Older Cenozoic sedimentary and volcaniclastic rock underly the Miocene and younger rocks but are not exposed at the surface. The Hanford Site stratigraphy is summarized in Figure 3-5 and described below. A more detailed discussion of the Hanford Site stratigraphy is provided by DOE (1988, pp. 1.2-1 to 1.2-134).

3.3.1 Columbia River Basalt Group

The Columbia River Basalt Group (Figure 3-5) comprises an assemblage of tholeiitic, continental flood basalts of Miocene age. These flows cover an area of more than 63,000 mi^2 in Washington, Oregon, and Idaho and have an estimated volume of about 170,000 km^3 (DOE 1988, p. 1.2-3). Isotopic age determinations suggest flows of the Columbia River Basalt Group were erupted during a period from approximately 17 to 6 million years ago (Ma), with more than 98% by volume being erupted in a 2.5-million-year period (17 to 14.5 Ma).

Columbia River basalt flows were erupted from north-northwest-trending fissures or linear vent systems in north-central and northeastern Oregon, eastern Washington, and western Idaho (Swanson et al. 1979, pp. 877 to 907). The Columbia River Basalt Group is formally divided into five formations, from oldest to youngest: Imnaha Basalt, Picture Gorge Basalt, Grande Ronde Basalt, Wanapum Basalt, and Saddle Mountains Basalt. Of these, only the Grande Ronde, Wanapum, and Saddle Mountains Basalts are known to be present in the Pasco Basin. The Saddle Mountains Basalt forms the uppermost basalt unit in the Pasco Basin except along some of the bounding ridges where Wanapum and Grande Ronde Basalt flows are exposed.

The flow top of a typical Columbia River basalt flow is the chilled, glassy upper crust of the flow. It may consist of vesicular to scoriaceious basalt or it may be rubbly to brecciated. The flow bottom is predominantly a thin, glassy, chilled zone a few inches thick, which may be vesicular. Intraflow structures within the interior of a Columbia River basalt flow are dominantly cooling joints. These are commonly referred to as colonnade and entablature (Tomkeieff 1940, p. 96).

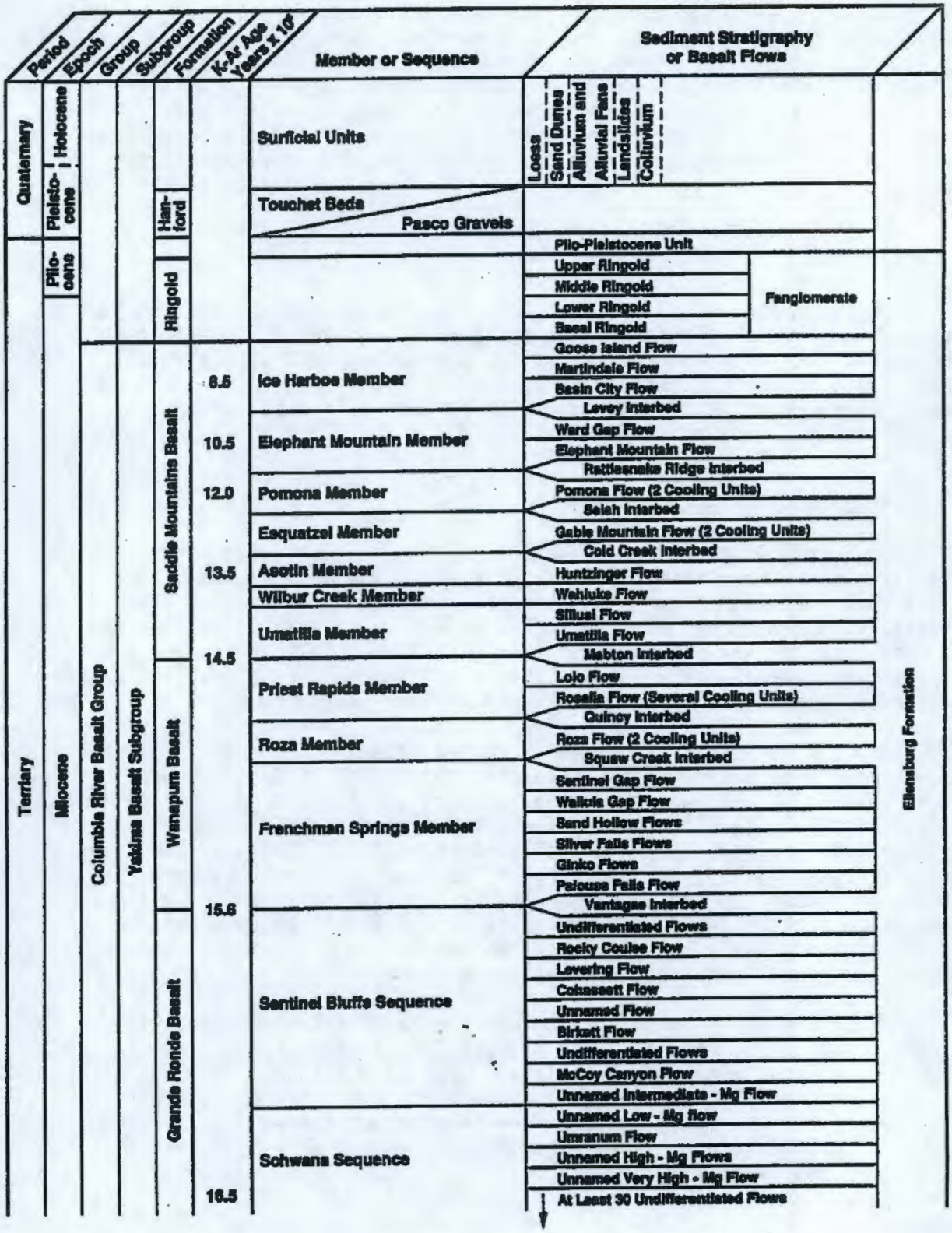


Figure 3-5. Stratigraphic Nomenclature of Units Penetrated Within the Pasco Basin.

3.3.2 Ellensburg Formation

The Ellensburg Formation (Figure 3-5) includes epiclastic and volcaniclastic sedimentary rocks that are interbedded with the Columbia River Basalt Group in the central and western part of the Columbia Plateau (Schmincke 1964, pp. 375 and 376; Swanson et al. 1979, p. G25). The age of the Ellensburg Formation is principally Miocene, although locally it may be equivalent to early Pliocene. The thickest accumulations of the Ellensburg Formation lie along the western margin of the Columbia Plateau where Cascade Range volcanic and volcaniclastic materials interfinger with the Columbia River Basalt Group. Within the Pasco Basin, individual interbeds have been named (i.e., Mabton, Selah, Cold Creek) and these deposits are found primarily in the Wanapum and Saddle Mountains basalts. The lateral extent and thickness of interbedded sediments generally increase upward in the section (Reidel and Fecht 1981, p. 3-30). Two major facies, volcaniclastic and subarkosic, are present on the Hanford Site, either as distinct or mixed deposits (DOE 1988, pp. 1.2-114 and 1.2-115; Myers et al. 1979, pp. II-61 to II-64 and Plate II-8). The uppermost interbed beneath the central Hanford Site is the Rattlesnake Ridge.

3.3.3 Suprabasalt Sediments

Suprabasalt sediments in and adjacent to the Hanford Site (Figure 3-5) were deposited in a variety of sedimentary environments. The fluvial-lacustrine Ringold Formation and glaciofluvial Hanford formation dominate the preserved stratigraphic record while lesser amounts of alluvial and eolian sediments also are present (DOE 1988, pp. 1.2-63 to 1.2-72).

3.3.3.1 Late Neogene Deposits. Late Neogene (i.e., late Miocene to Pliocene) deposits of the Ringold Formation unconformably overlie the Columbia River Basalt Group in the Pasco and Quincy basins of the central Columbia Plateau (Grolier and Bingham 1978, pp. 38 to 50; Newcomb et al. 1972, pp. 10 to 16; Rigby and Othberg 1979, pp. 15 to 17). The Ringold Formation was deposited in structural basins by the ancestral Columbia and Salmon/Clearwater River systems. While exposures of the Ringold Formation are limited to the White Bluffs within the central Pasco Basin, coulees northeast of the White Bluffs, the Smyrna and Taunton Benches north of the Pasco Basin, and local outcrops adjacent to anticlinal ridges, extensive data on the Ringold Formation are available from boreholes.

The Ringold Formation is divided into three facies associations or stratigraphic section types that represent variations in the paleogeography during Ringold time (Tallman et al. 1981, pp. 25 to 37). Section Type I, confined to the central portion of the Pasco Basin, is composed of gravel and associated sand and silt and represents migrating channel deposits of the major, thoroughgoing ancestral Columbia and Salmon/Clearwater River systems. Section Type II is composed of sand, silt, and clay deposited in overbank/lacustrine environments beyond the influence of the main channel systems. Section Type III occurs locally around the margins of the Pasco and Quincy basins adjacent to anticlinal basalt ridges and is composed of dominantly angular basaltic alluvium shed off the ridges.

Two approaches have been used to subdivide Ringold Section Type I strata in the central Pasco Basin. The first method, originally proposed by Newcomb (1958, pp. 328 to 337), divides these strata into three stratigraphic units: a coarse-grained middle unit bounded above and below by the fine-grained upper and lower units. Tallman et al. (1979, pp. 18 and 19) describes a fourth stratigraphic unit, the coarse-grained basal Ringold unit, which underlies the fine-grained lower Ringold unit in the west-central Pasco Basin. The basal Ringold unit is further subdivided into coarse- and fine-grained subunits within the central Cold Creek syncline (Bjornstad 1984, pp. 1 to 25). The second approach is that used by Puget Sound Power and Light Co. (PSPL 1981, pp. 2R-15 to 2R-19) south and east of Gable Mountain where they divided the subsurface Ringold Formation into four fining-upwards cycles (Units I through IV).

3.3.3.2 Plio-Pleistocene Incision and Deposition. The late Pliocene to early Pleistocene generally is characterized as a period of regional incision on the Columbia Plateau. Within the Pasco Basin, this is reflected by pre-glaciofluvial erosion of the top of the Ringold Formation (Brown 1960, pp. 4 to 6; Bjornstad 1985, p. 524; Newcomb et al. 1972, pp. 15 and 16). Incision is bracketed between 0.9 Ma and 3.4 Ma, the age of the basalt from Haystack Butte (Bela 1982) and the youngest age reported from the Ringold Formation, respectively. Haystack Butte lava lies near river level within the Columbia River Gorge, approximately 90 mi southwest of the Pasco Basin, indicating that incision (as much as 492 ft in the Pasco Basin) had ceased by this time. Following incision, a well-developed soil (represented by calcrete) formed and eolian and alluvial sediments were deposited atop the eroded surface.

Pedogenic calcrete and alluvial deposits unconformably overlying the Ringold Formation are assigned to the Plio-Pleistocene unit (DOE 1988, p. 1.2-129). The alluvial deposits were derived from Cold Creek and its tributaries and are characterized by relatively thick zones of unweathered basalt clasts along with pedogenically altered loess or colluvium. The calcrete consists of pedogenically altered loess and colluvium.

The Plio-Pleistocene unit is unconformably overlain by the early "Palouse" soil in the central Cold Creek syncline area. The early Palouse soil consists of fine-grained sand and silt derived from the reworking of the older Plio-Pleistocene unit or upper Ringold Formation and interpreted to be mainly of eolian origin. The early Palouse soil is differentiated from overlying slackwater flood deposits of the Hanford formation by a greater calcium-carbonate content, massive structure in core samples, and a high natural-gamma response in geophysical logs.

3.3.3.3 Quaternary Deposits. Quaternary sediments are associated with a variety of depositional processes, including volcanism, glaciation, mass wasting, and fluvial, lacustrine, and eolian activity. In the central Columbia Plateau, the Quaternary record is dominated by proglacial cataclysmic flood deposits. Lesser amounts of fluvial and eolian deposits underlie, are intercalacted with, and overlie the flood deposits. Unflooded areas on the Columbia Plateau often are mantled by alluvium, colluvium, and loess.

Proglacial flood deposits blanket low-lying areas over most of the central Columbia Plateau. Most preserved cataclysmic flood deposits are late Pleistocene-aged; the last major flood sequence is dated about 13,000 yr ago by the presence of interbedded Mount St. Helens "S" tephra (Mullineaux et al. 1978, p. 178). The largest and most frequent floods came from glacial Lake Missoula in northwestern Montana; however, smaller floods may have escaped downvalley from glacial Lakes Clark and Columbia along the northern margin of the Columbia Plateau (Waitt 1980, pp. 668 to 671). Floodwaters from Lake Bonneville in Utah also may have come down the Snake River (Malde 1968, p. 1) although Lake Bonneville flood deposits have not been positively identified in the Pasco Basin. This may be because of erosion and (or) burial by younger flood deposits from Lake Missoula. The last Lake Bonneville flood occurred about 14,000 to 15,000 yr ago (Scott et al. 1982, pp. 582 to 586). The formation of a hydraulic dam at Wallula Gap led to the impondment of cataclysmic flood waters in the Pasco Basin. Floodwaters ponded up to 1,250 ft in elevation, which equates to a lake 550 ft deep over the 200 areas. A proposed model for each flood cycle in the Pasco Basin consists of three phases: 1) large-scale erosion, 2) deposition associated with lake filling behind a hydraulic dam at Wallula Gap, and 3) deposition and erosion associated with lake draining (Bjornstad et al. 1987, p. 1; DOE 1988, p. 1.9 19). It is estimated that each flood cycle lasted only a few weeks or less (Craig and Hanson 1985, p. 103). As the lakes drained for the last time, flood deposits were incised and the present network of anastomosing channels seen in the central Pasco Basin formed.

Two end-member types of flood deposits are normally observed: a coarse-grained, main-channel facies and a finer-grained, slack-water facies. Within the Pasco Basin, these are referred to as the Pasco Gravels and Touchet Beds of the Hanford formation, respectively (Myers et al. 1979, pp. III-66 to III-68). Falling texturally and often spatially between these two end members are deposits consisting mostly of plane-laminated sands (Bjornstad et al. 1987, p.1).

Deciphering the history of cataclysmic flooding in the Pasco Basin is complicated by the fact that floods originated from multiple sources and that flood pathways changed in response to the advance and retreat of the Cordilleran ice sheet (Baker and Bunker 1985, pp. 32 to 34). Cataclysmic floods inundated the central Columbia Plateau several times during the Pleistocene. At least three major flooding episodes (early, middle, and late Pleistocene) are recognized in the Pasco Basin, although many more minor flood events probably occurred during each of these major episodes. The evidence for the different ages of flooding include changes in magnetic polarity, truncated clastic dikes, and soil development atop flood sequences (Bjornstad et al. 1987, p. 1).

Clastic dikes are commonly associated with, but not restricted to, cataclysmic flood deposits on the Columbia Plateau. While there is general agreement that clastic dikes formed during cataclysmic flooding, a primary mechanism to satisfactorily explain the formation of all dikes has not been identified (WPPSS 1981, pp. 2.5-58 to 2.5-64). Among the more probable explanations are fracturing initiated by hydrostatic loading and dewatering associated with pressure release as floodwaters receded. Seismicity may also have a role in their formation, although there is no evidence available at the present to establish a connection.

Other Quaternary deposits on the Site consist of alluvium, colluvium, loess, and landslide deposits are also present in the Pasco Basin (Figure 3-5). Quaternary alluvium occurs as surficial deposits along major river and stream courses (Figure 3-3) and in the subsurface underlying and interbedded with proglacial flood deposits. Two types of alluvium are recognized in the Pasco Basin: quartzitic mainstream and basalt-rich sidestream alluvium. Holocene-aged colluvium (talus and slopewash) is common in moderate-to-high relief areas in the region. Varying thicknesses of loess or sand also mantle much of the Columbia Plateau. Active and stabilized sand dunes are widespread over the Pasco Basin (DOE 1988, pp. 1.1-22 and 1.1-23). Landslide deposits in the Pasco Basin are of variable age and genesis. Most are associated with north limbs of Yakima folds, such as on the north side of Rattlesnake Mountain, or along steep river embankments such as the White Bluffs in the Pasco Basin (DOE 1988, p. 1.2-23).

3.4 TECTONIC FRAMEWORK AND STRUCTURAL GEOLOGY OF THE REGION

The Columbia Plateau is a part of the North American continental plate and lies east of the Cascade Range. It is bounded on the north by the Okanogan Highlands, on the east by the Northern Rocky Mountains and Idaho Batholith, and on the south by the High Lava Plains and Snake River Plain. This section describes the tectonic setting of the Hanford Site. A more detailed discussion is presented by DOE (1988, pp. 1.3-1 to 1.3-176).

The Columbia Plateau can be divided into three informal structural subprovinces: Blue Mountains, Palouse, and Yakima Fold Belt (Figure 3-6). These structural subprovinces are defined on the basis of their structural fabric, unlike the physiographic provinces, which are defined on the basis of landforms (DOE 1988, p. 1.3-14). The Hanford Site is located near the junction of the Yakima Fold Belt and the Palouse subprovinces and north of the Blue Mountains subprovince.

3.4.1 Blue Mountains Subprovince

The Blue Mountains subprovince is a structurally diverse region dominated by the complexly faulted Blue Mountains anticlinorium in its northern portion and a series of structural basins in its central and southern portions. The structural basins are generally of two types: 1) fault-bounded basins (e.g., the La Grande, Baker, and Unity Basins) and 2) fold-bounded basins (e.g., the John Day Basin). In the northern and central portions of the Blue Mountains proper, two important fault systems have been recognized: the Hite Fault System and the La Grande Fault System (DOE 1988, p. 1.3-20).

3.4.2 Palouse Subprovince

The Palouse subprovince is primarily a regional paleoslope that dips gently toward the central Columbia Plateau and exhibits only relatively mild structural deformation. The paleoslope and its present-day expression were formed by the gradual rise of highlands to the east and north, and the subsidence of the Columbia Basin to the west. The Palouse Slope is underlain by a wedge of Columbia River basalt that thins gradually toward the east and north and laps onto the adjacent highlands (DOE 1988, p. 1.3-14).

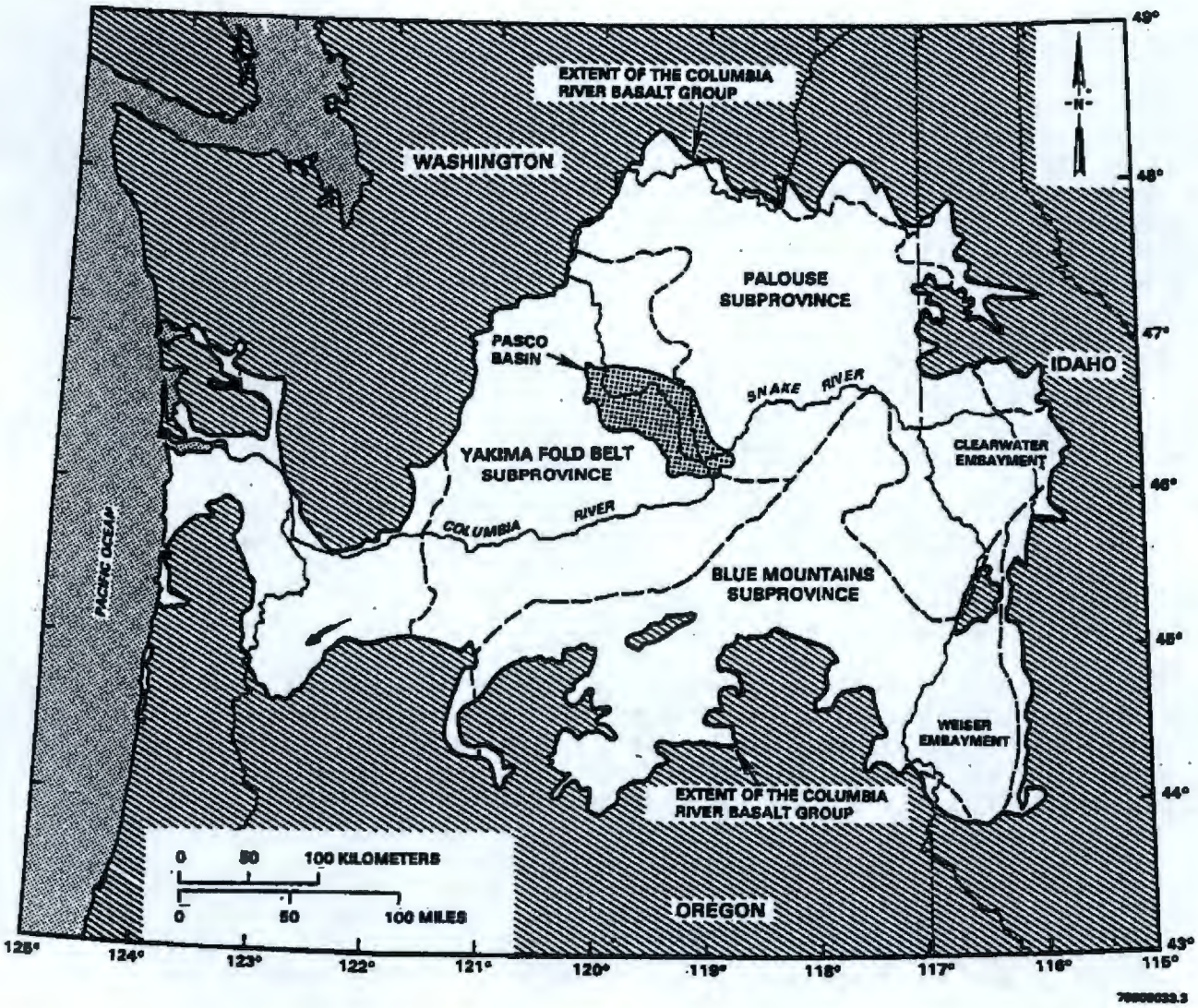


Figure 3-6. Structural Subprovinces of the Columbia Plateau (DOE 1988, p. 1.3-15).

3.4.3 Yakima Fold Belt Subprovince

The principal characteristics of the Yakima Fold Belt subprovince are a series of segmented, narrow, asymmetric anticlines that have wavelengths between 3 and 19 mi and amplitudes commonly <0.6 mi. These anticlinal ridges are separated by broad synclines or basins that, in many cases, contain thick accumulations of Neogene- to Quaternary-age sediments (DOE 1988, p. 1.3-30). Major features on the Hanford Site include the Umtanum Ridge-Gable Mountain structural trend, the Yakima Ridge Uplift, and the Cold Creek Syncline.

Thrust or high-angle reverse faults with fault planes that strike parallel or subparallel to the axial trends are principally found along the limbs of the anticlines (DOE 1988, pp. 1.2-32 and 1.2-33). The amount of vertical stratigraphic offset associated with these faults varies but commonly exceeds hundreds of meters.

The deformation of the Yakima Folds occurred under N-S compression and was probably contemporaneous with the eruption of the basalt flows (DOE 1988, pp. 1.2-32 and 1.2-33). The fold belt was growing during the eruption of the Columbia River Basalt Group and continued to grow through the Pliocene, into the Pleistocene and perhaps to the present.

3.4.3.1 Umtanum Ridge-Gable Mountain Structural Trend. The Umtanum Ridge-Gable Mountain structural trend is a segmented anticlinal ridge extending for a length of 85 mi in an east-west direction and passing north of the 200 areas (Figures 3-7 and 3-8). This structure consists of two major segments in the Pasco Basin: the Umtanum Ridge anticline and the Gable Mountain-Gable Butte fold. Umtanum Ridge is an asymmetrical, north-vergent-to-locally overturned anticline with a major thrust to high-angle reverse fault on the north side (Goff 1981, pp. 41 to 46; PSPL 1982, p. 2N 12-14) that dies out eastward toward Gable Mountain. Gable Mountain and Gable Butte are two topographically isolated, anticlinal ridges that are composed of a series of northwest trending, doubly plunging, en echelon anticlines, synclines, and associated faults. Capable faulting has been identified on Gable Mountain (NRC 1982, pp. 2-27 to 2-29; PSPL 1982, p. 20-5). From the west, Umtanum Ridge plunges toward the basin and joins the Gable Mountain-Gable Butte segment near the western boundary of the Hanford Site.

3.4.3.2 Yakima Ridge. The Yakima Ridge uplift extends from west of Yakima, Washington to the center of the Pasco Basin, where it forms the southern boundary of the Cold Creek syncline (Figures 3-7 and 3-8). The easternmost surface expression of the Yakima Ridge uplift is represented by an anticline that plunges eastward into the Pasco Basin (Myers et al. 1979, Plate III). The eastern extension of Yakima Ridge is mostly buried but is assumed to be similar to the exposed parts.

3.4.3.3 Cold Creek Syncline. The Cold Creek syncline (Figures 3-7 and 3-8) lies between the Umtanum Ridge-Gable Mountain uplift and the Yakima Ridge uplift, and is the principal structural unit that contains the 200 areas. There are no surface exposures of this fold, but a relatively high density of boreholes in the area provides greater confidence in interpretation. The Cold Creek syncline is an asymmetric and relatively flat-bottomed structure. Its amplitude is higher and wavelength is shorter west of the Hanford Site.

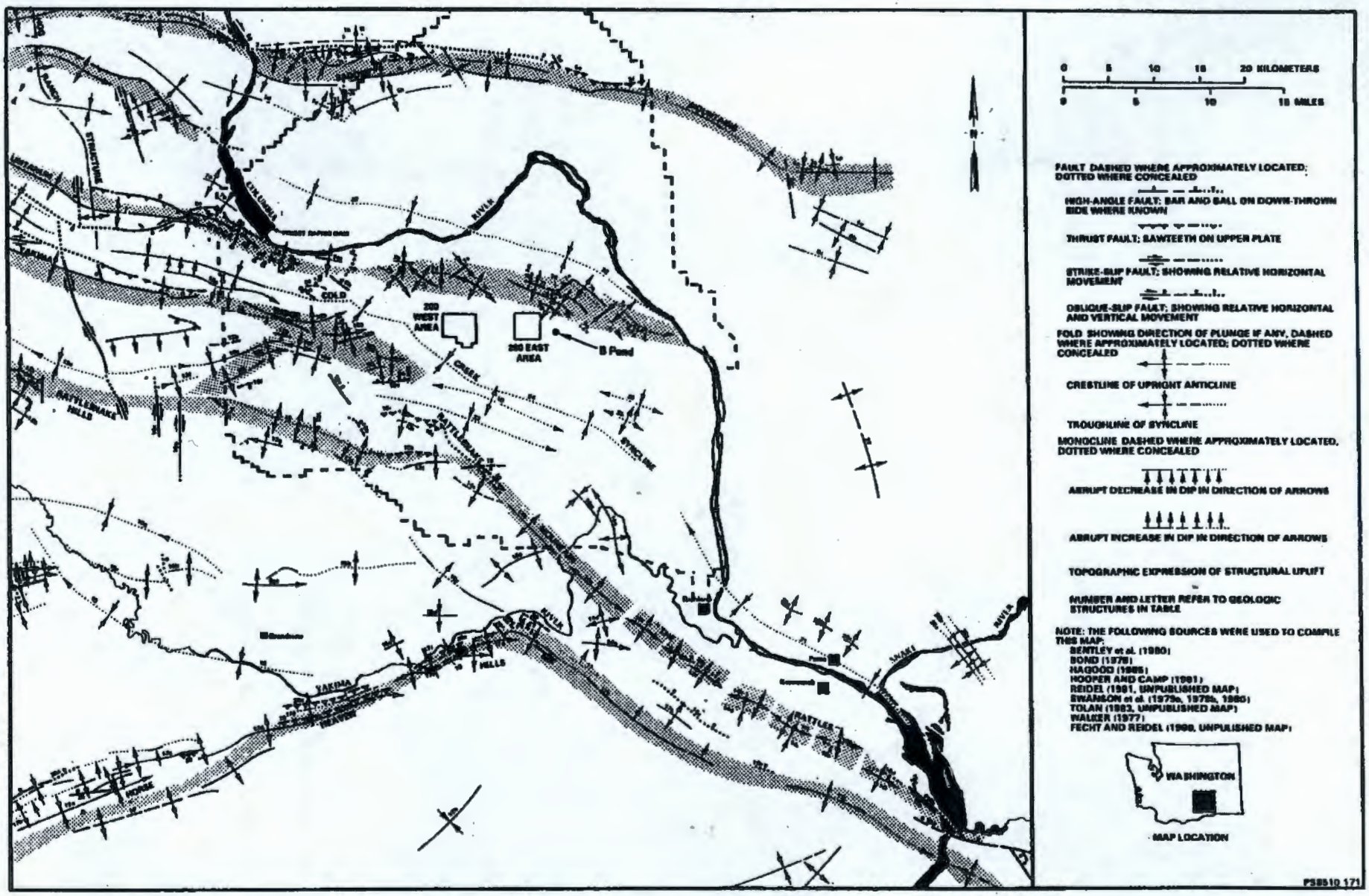


Figure 3-7. Structure Map of the Pasco Basin and Surrounding Area (after Tolan 1986, pp. 87 to 97).

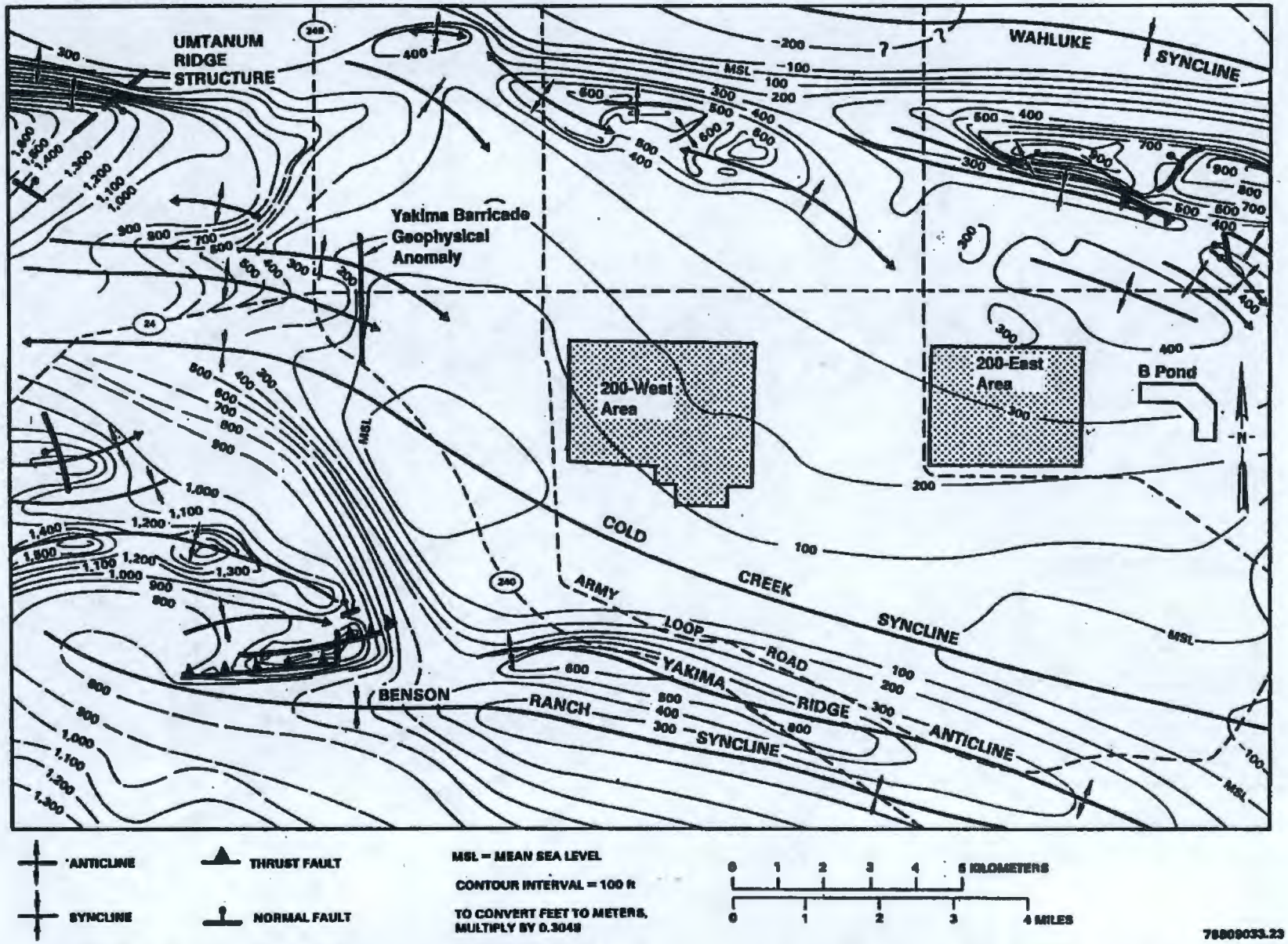


Figure 3-8. Tectonic Structures Adjacent to the 200 Areas; Top of Basalt (after DOE 1988, p. 1.3-62).

A gravity anomaly suggestive of structural control is present on the northern limb of the Cold Creek syncline. The data suggest that this feature, known as the Yakima Barricade geophysical anomaly (Figure 3-8), is either a steeply dipping fold or a high-angle fault that formed during the late Miocene to early Pliocene; movement ended by late Pliocene (DOE 1988, p. 1.3-63). The anomaly coincides with a west-to-east change in hydraulic conductivity.

3.5 SEISMICITY

The Pasco Basin and surrounding Columbia Plateau is an area of relatively low seismicity. Earthquake records for the pacific northwest extend back to about 1850; most records before about 1900 are from newspaper accounts. Earthquakes occurring before 1969 were documented from reports of tremors that were felt. Earthquakes since 1969 have been instrumentally recorded. A more complete discussion the seismicity of the region is presented by DOE (1988, pp. 1.4-1 to 1.4-63).

Earthquake activity on the Hanford Site is confined to the crust and is characterized primarily by shallow swarms of microearthquakes that occur predominantly in the basalts. Focal mechanisms for basalt and sub-basalt events indicate north-south compression and reverse faulting along nearly east-west planes (DOE 1988, p. 1.4-51).

3.5.1 Regional Earthquakes

The seismic record of eastern Washington is characterized by low seismicity. The historic record of events with epicentral intensities of modified Mercalli (MM) intensity IV or greater and the seismographic record of events of magnitude 3 or greater are remarkably similar, and indicate that the major seismicity of the Columbia Plateau is broadly scattered.

Described below are earthquakes that have historically been considered in seismic evaluations. A complete listing of known earthquakes is given by DOE (1988, pp. 1.4-11 to 1.4-20).

- On December 4, 1872 a major earthquake occurred somewhere in the vicinity of north-central Washington State. Because of the sparse population and lack of recording instruments at that time, the location and size of this earthquake are uncertain.

- On March 5, 1893, an earthquake occurred near Umatilla, Oregon (about 44 mi south of the Hanford Site). This was estimated to have an MM intensity of VI (WPPSS 1981, p. 123).

- An earthquake occurred in the vicinity of the Saddle Mountains and Frenchman Hills on November 1, 1918, which was followed by several, smaller events over subsequent weeks. A surface-wave magnitude of 4.4 is estimated on the basis of the recorded waveform and an empirical moment-magnitude relationship (WPPSS 1981, p. 2.5J-36).

- The largest earthquake known to have occurred within the Columbia Plateau was the July 16, 1936, Milton-Freewater, Oregon, earthquake. The maximum epicentral intensity was estimated to be MM VII (Gutenberg and Richter 1965, p. 164). An evaluation of Gutenberg's original seismographic data suggested that the Richter magnitude could be as high as 6.1 (WCC 1980, p. 12). A reevaluation using station corrections yielded a surface wave magnitude of 5.7 to 5.8 (NRC 1982, p. G-17).

- A coda-length magnitude 4.1 earthquake occurred near College Place, Washington, on April 8, 1979. This was a shallow event with a focal depth of between 2 and 4 mi).

3.5.2 Seismisity of the Central Columbia Plateau and Hanford Site

Based on the seismographic record, approximately 90% of the seismicity on the Columbia Plateau occurs at depths less than 5 mi, and most of this shallow seismicity (70 to 80%) occurs in the uppermost 2.5 mi (WPPSS 1981, pp. 2.5J-15 to 2.5J-17). No seismicity has been observed below the local Moho depth of 48 mi. Most of the currently observed seismicity of the central Columbia Plateau is concentrated between the Saddle Mountains and Frenchman Hills, and between the Saddle Mountains and the Gable Mountain-Gable Butte area.

The densest groups of epicenters in the central Columbia Plateau are earthquake swarms. An earthquake swarm is defined as a cluster of events of comparable magnitude that first wax and then wane in number with no one outstanding (large) event. An outstanding event is considered a mainshock, and any earthquakes that precede or follow it are considered foreshock or aftershock activity. However, because of the low seismicity rates and generally small magnitudes of events that have been observed in the central plateau region, the distinction between swarm and nonswarm activity is not always clear.

Since 1969, when the collection of local Columbia Plateau seismographic data began, most swarm events have had coda-length magnitudes of about 1.5 or less. The largest swarm event has been the 4.4 coda-length magnitude 1973 Royal Slope shock, which in some ways exhibited main shock characteristics. Only about 10% of the seismicity at depths >5 mi exceed coda-length magnitude 2.0.

Three swarm areas occur on the Hanford Site: Coyote Rapids, Cold Creek, and Wooded Island. The Coyote Rapids swarm area is located in the northern part of the Hanford Site. It has been the site of several swarms since 1969, when instrumental monitoring of this area began. A total of 91 events occurred in the Coyote Rapids swarm area during the period from 1969 to 1986, the bulk of which appeared to congregate into two roughly east-west lineations at either end of the west leg of the Columbia River horn. Most of the Coyote Rapids events (approximately 85%) had magnitudes (coda-length) of 1.5 or less. The two largest events in this area occurred during swarms on October 25, 1971 (3.8 coda-length magnitude) and on October 20, 1983 (3.4 coda-length magnitude).

The Cold Creek swarm area is located 3 to 5 mi south of 200 West Area. Three periods of activity have occurred in this area: July to November 1979, August 1981, and November 1985 to April 1986. A total of 35 events occurred in this area, all >3 mi deep. The largest event had a 2.4 coda-length magnitude.

Hundreds of seismic events have occurred at the Wooded Island swarm area, which is located east and west of the Columbia River and Wooded Island, approximately 9 mi southeast of the 200 areas. Swarm activity has been recorded since the installization of the local area net in 1969. The majority of the events were coda-length magnitude 1.5 or less. The largest event recorded in the Wooded Island swarm was a 2.4 coda-length magnitude. The latest swarm activity at Wooded Island was in the fall of 1988 through the early part of 1989.

Below about 5 mi depth, the seismicity in the central Columbia Plateau displays characteristics that are quite distinct from shallower seismicity (DOE 1988, p. 1.4-35). Clusters of events occur at the eastern end of the Saddle Mountains where the Scootney Reservoir and Connell swarm area extend to 6.2 and 7.5 mi, respectively, at a single area between the Frenchman Hills and the Saddle Mountains near Corfu, and south of the Horse Heaven Hills near Prosser. In general, the pattern and distribution of earthquakes deeper than about 5 mi do not exhibit an obvious relationship to known folds or faults having surface expression. This seismicity generally occurs in a diffuse pattern and does not coincide with areas of intense shallow swarm activity.

3.6 REGIONAL HYDROLOGY

The following sections summarize the surface and ground water hydrology of the Hanford Site and immediate vicinity. A more detailed discussion of the Site hydrology is provided by DOE (1988, Chapter 3).

3.6.1 Surface Water

Primary surface-water features associated with the Pasco Basin are the Columbia and Yakima rivers, and their major tributaries: the Snake and Walla Walla rivers. With the exception of the Columbia River, there are no perennial streams within the Hanford Site. West Lake, about 10 acres in size and <3 ft deep, is the only natural lake within the Hanford Site. Ephemeral streams and major surface ponds are depicted in Figure 3-9. Wastewater cribs and ditches are also present on the site, associated with nuclear fuel reprocessing and waste disposal activities. A network of dams and multipurpose water resource projects is located along the course of the Columbia River (Figure 3-10).

The Columbia River is considered to be free-flowing along approximately two-thirds of the Hanford Site. This area, referred to as the Hanford Reach, extends from Priest Rapids Dam to the headwaters of Lake Wallula (the reservoir behind McNary Dam). The flow has been inventoried and is described by DOE (1988, pp. 3.1-4 to 3.1-14). Flow along this reach is controlled by Priest Rapids Dam. Several drains and intakes are also present along this reach, including irrigation outfalls from the Columbia Basin Irrigation Project, the Washington Public Power Supply System (WPPSS) Nuclear Project 2, and Hanford Site intakes for onsite water use.

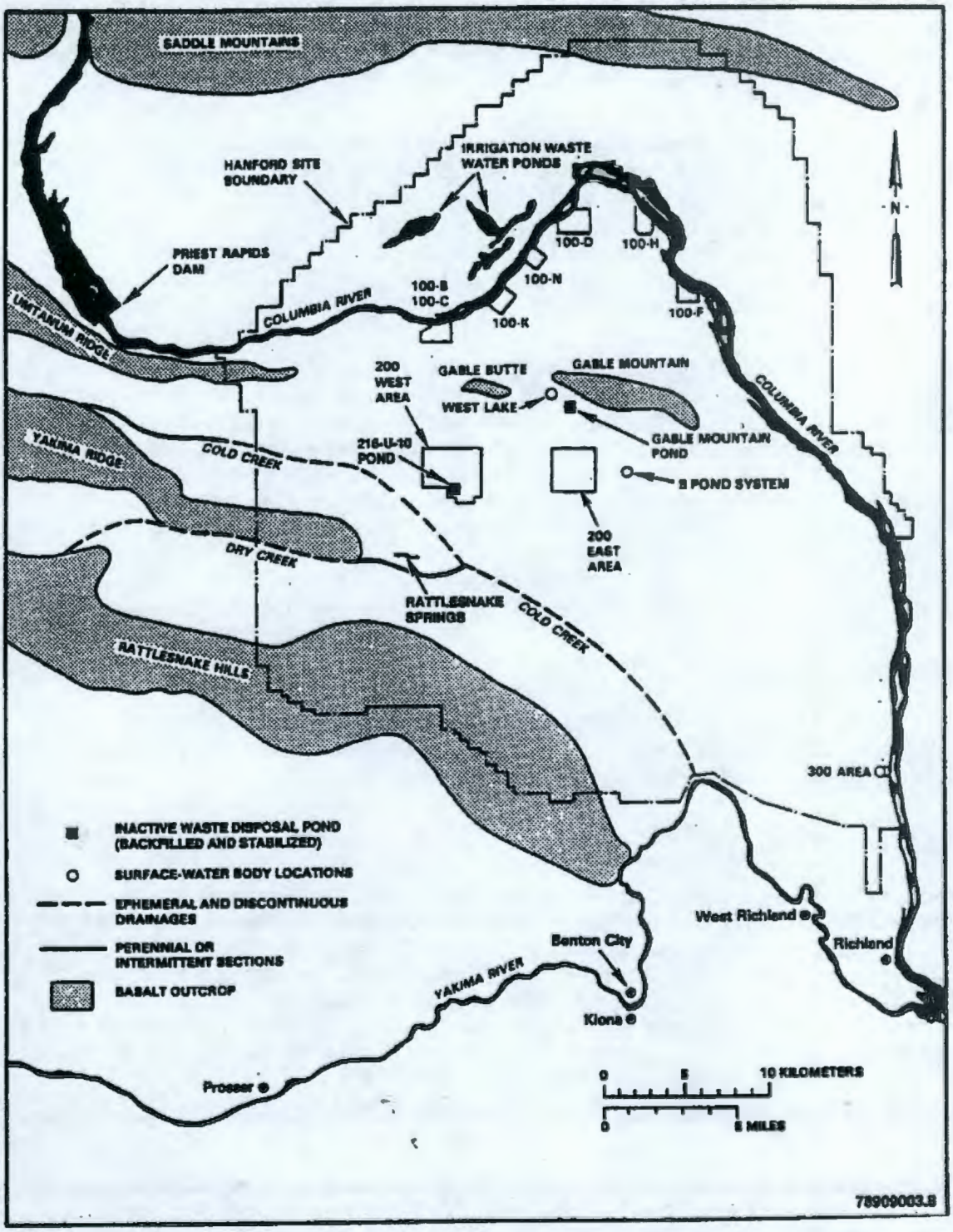


Figure 3-9. Locations of Surface Water Bodies on the Hanford Site (after DOE 1988, p. 3.1-4).

Figure 3-10. Locations of Principal Dams Within the Columbia Plateau (after DOE 1988, p. 3.1-5).

Cold Creek and its tributary, Dry Creek, are ephermeral streams within the Yakima River drainage system. Both streams drain areas along the western part of the Hanford Site and cross the southwestern part of the Site toward the Yakima River. Surface flow, which may occur during spring runoff or after heavier than normal precipitation, infiltrates into the surface sediments. Rattlesnake Springs, located on the western part of the Site, forms a small surface stream that flows for about 1.8 mi before disappearing into the ground.

Approximately one-third of the Hanford Site is drained by the Yakima River system. The average annual discharge of the Yakima River to the Columbia River (for 57 yr of record) is approximately 3,600 ft^3/s (DOE-RL 1988, p. 3.1-14). Extremes include a maximum discharge of 67,000 ft^3/s on December 23, 1933 and a minimum discharge of 105 ft^3/s on September 11, 1906 (USGS 1985, p. 322).

Flow in the Columbia River at the Priest Rapids Dam (i.e., above the Hanford Site) averages 120,000 ft^3/s. Maximum flow for the 66-yr period of record was 690,000 ft^3/s on June 12, 1948; minimum flow was 4,120 ft^3/s on February 10, 1932 (DOE 1988, p. 3.1-13). Normal river elevations within the Hanford Site range from 394 ft above mean sea level (MSL) where the river enters the Site to 341 ft where it leaves the Site.

Large Columbia River floods have occurred in the past, but the likelihood of recurrence of large-scale flooding has been reduced by the construction of several dams upstream of the Hanford Site. The probable maximum flood (PMF) calculated for the Columbia River below Priest Rapids Dam is 1,440,000 ft^3/s (Gephart et al. 1979, p. III-49). The PMF would inundate portions of the 100 areas, but would not reach the Separations Area or B Pond (Gephart et al. 1979, p. III-51).

Routine water-quality monitoring of the Columbia River is conducted by DOE for both radiological and nonradiological parameters. Reports on the monitoring have been published annually by Pacific Northwest Laboratory since 1973 (e.g., Jaquish and Mitchell 1988). Ecology has issued a Class A (excellent) quality designation for Columbia River water along the reach from Grand Coulee Dam, through the Pasco Basin, to McNary Dam. This designation requires that all industrial uses of this water be compatible with other uses, including drinking, wildlife habitat, and recreation. In general, Columbia River water can be characterized by a very low suspended load, a low nutrient content, and an absence of microbial contaminants (DOE 1988, p. 3.4-13).

Radionuclides in the Columbia River below the Hanford Site have decreased significantly since the plutonium production reactors were shut down in 1971 and improved effluent control systems were installed at the N Reactor. Low levels of radionuclides, however, continue to be measured downstream of the Hanford Site. Increases in the concentrations of some constituents have been observed in recent years. These increases are attributed, in part, to the movement of contaminant plumes in the ground water, and their discharge to the Columbia River (DOE 1988, pp. 3.4-14 and 3.4-19).

3.6.2 Ground Water

Ground water occurs within a suprabasalt aquifer system, consisting of fluvial and lacustrine sediments, and within a system of deeper confined-to-semiconfined aquifers in the basalt flow tops, flow bottom zones, and sedimentary interbeds (DOE 1988, p. 3.6-1). These deeper aquifers are intercalated with aquitards consisting of basalt flow interiors. Vertical flow across the aquitards is inferred from water level or potentiometric surface data, but the amount of leakage is not quantified and direct measurements are not available (DOE 1988, p. 3.6-17). The multiaquifer system within the Pasco Basin has been conceptualized as consisting of four primary geohydrologic units: 1) suprabasalt Hanford and Ringold formations sediments, 2) Saddle Mountain Basalt, 3) Wanapum Basalt, and 4) Grande Ronde Basalt. The discussion in the following sections focuses on the suprabasalt aquifer and the uppermost aquifer within the Saddle Mountains Basalt, the Rattlesnake Ridge aquifer.

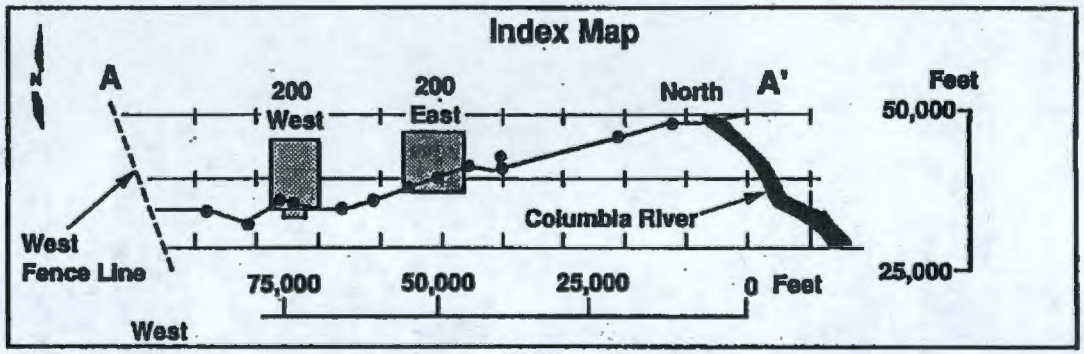
3.6.2.1 Suprabasalt Aquifer System. The suprabasalt aquifer is the uppermost regionally extensive aquifer beneath the Hanford Site. The water table ranges in depth from 0 ft at West Lake and the Columbia and Yakima rivers, to >350 ft near the center of the Site. Ground water within the suprabasalt aquifer system is contained within the glaciofluvial sands and gravels of the Hanford formation and the fluvial/lacustrine sediments of the Ringold Formation. The position of the water table beneath the western portion of the Hanford Site is generally within the middle Ringold unit. In the northern and eastern portions of the Site, the water table is generally within the Hanford formation.

The suprabasalt aquifer system is approximately 500 ft thick near the center of the basin. Laterally, the aquifer system is bounded by anticlinal basalt ridges, which extend above the water table. A generalized east-west geologic cross section showing the position of the water table and major stratigraphic units beneath the Hanford Site is presented in Figure 3-11.

The base of the uppermost aquifer is conceptualized as the basalt surface. On a local scale, the silts and clays of the lower Ringold Formation and the fine-grained facies of the basal Ringold form a confining layer. Ground water is unconfined above this layer and semiconfined below it, in the coarse facies of the basal Ringold member.

Sources of natural recharge to the suprabasalt aquifer are rainfall and runoff from the higher bordering elevations, water infiltrating from small ephemeral streams, and river water along influent reaches of the Yakima and Columbia rivers. Ground water also enters the suprabasalt aquifer from underlying aquifers in areas of upward hydraulic gradient.

The movement of precipitation through the unsaturated (vadose) zone has been studied at several locations on the Hanford Site. Conclusions from these studies vary, depending on the location studied. Some investigators conclude that no downward percolation of precipitation occurs on the 200 Area Plateau where the sediments are layered and vary in texture and that all moisture penetrating the soil is removed by evapotranspiration (Gephart et al. 1979, pp. III-56 and III-57). Others have suggested downward water movement below the root zone from tests conducted near the 300 Area, where soils are coarse-textured and bare (Gee 1987, p. 5.3).



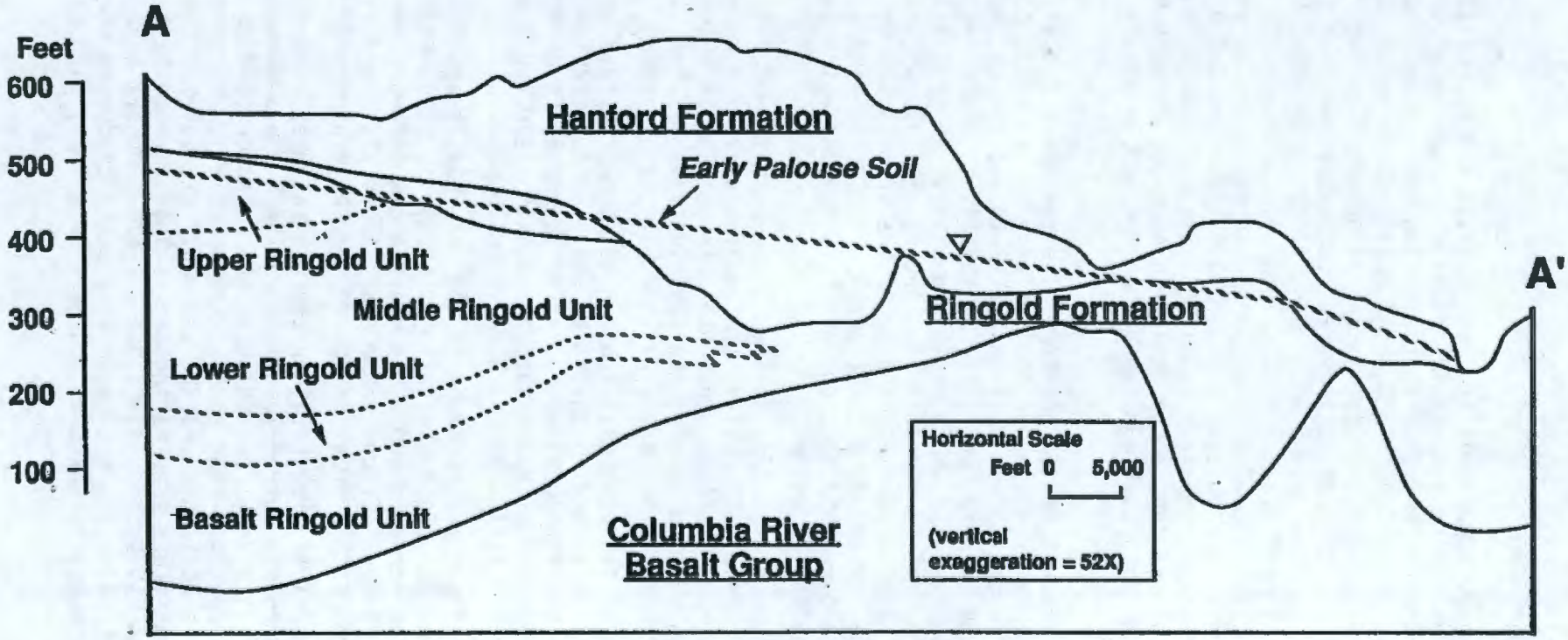


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Figure 3-11. Generalized Geologic Cross Section Through the Hanford Site (after Tallman et al. 1979, p. 20).

Water levels in the suprabasalt aquifer have risen because of artificial recharge mechanisms such as excessive application of imported irrigation water or impoundment of streams. Wastewater ponds on the Hanford Site have artificially recharged the suprabasalt aquifer below the 200 East and 200 West areas. Recharge from the 200 area wastewater disposal facilities is estimated to be approximately 10 times the natural recharge on the Hanford Site (Graham et al. 1981, p. 3-16). This artificial recharge has caused the water table to rise. The increase in water table elevations was most rapid from 1950 to 1960 and apparently had nearly reached equilibrium between 1970 and 1980, when only small increases in water table elevations occurred. Wastewater discharges from the 200 West Area were significantly reduced in 1984 (Serkowski et al. 1988, p. 1-4), and the water levels there are now slowly declining.

Ground water flows from the natural recharge areas west of the Hanford Site to discharge areas, primarily along the Columbia River. The general west-to-east flow pattern is interrupted locally by the ground water mounds in the 200 areas. From the 200 areas, there is also a component of ground water flow to the north, between Gable Mountain and Gable Butte. Figure 3-12 illustrates the water table conditions beneath the Hanford Site.

Hydraulic conductivities for the Hanford formation (2,000 to 10,000 ft/d) are much greater than those of the middle member of the Ringold Formation (9 to 230 ft/d) (Graham et al. 1981, p. 3-12). The main body of the suprabasalt aquifer occurs within the middle member of the Ringold Formation.

Wastewater discharged on the Hanford Site has affected ground water quality in the suprabasalt aquifer. The primary constituents that have reached the aquifer are tritium, iodine-129, ruthenium-106, technetium-99, uranium, nitrate, and chromium (DOE 1987b, p. 4.22). The ground water is routinely and extensively monitored to trace the movement of contaminants and to determine any impact from the Site to the public. Ground water monitoring reports are produced annually (e.g., Jaquish and Mitchell 1988 for site-wide environmental monitoring; Serkowski et al., 1988 for ground water monitoring in the 200 areas).

3.6.2.2 Basalt Confined Aquifer System. Confined aquifers are present in the sedimentary interbeds and/or interflow zones that occur between dense basalt flows of the Saddle Mountains Basalt, Wanapum Basalt, and Grande Ronde Basalt. The main water-bearing portions of the interflow zones are networks of interconnecting vesicles and cooling fractures of the flow tops and flow bottoms.

Recharge to the Saddle Mountains Basalt apparently occurs along the southwestern and western boundaries of the Pasco Basin. Some recharge may also occur in the eastern Saddle Mountains along the northern boundary of the Pasco Basin (DOE 1988, p. 3.7-14). Ground water also flows from the suprabasalt aquifer into the Rattlesnake Ridge interbed in the western half of the Hanford Site (DOE 1988, p. 3.9-116).

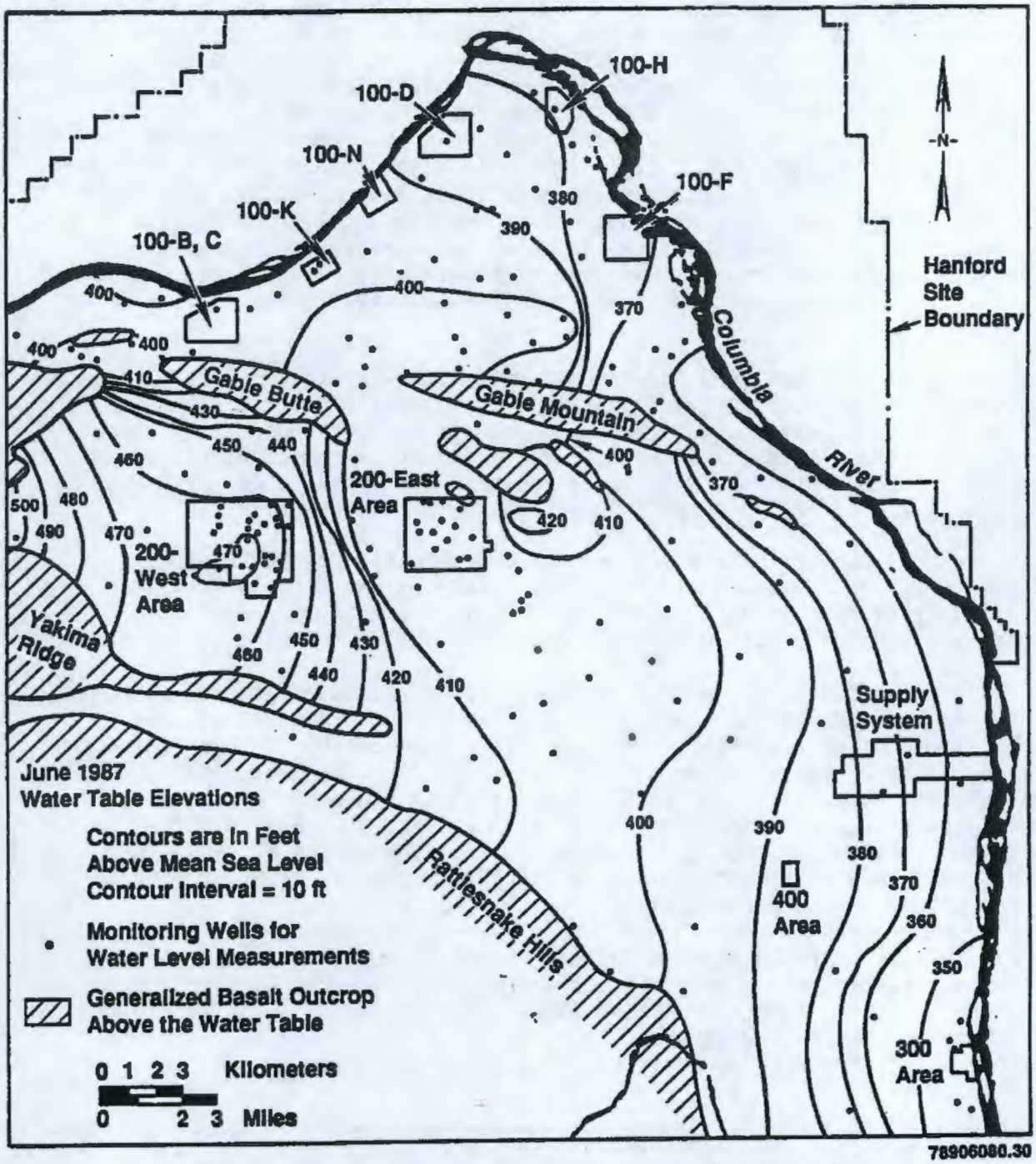

Figure 3-12. Water Table Map for the Suprabasalt Aquifer Within the Hanford Site, June 1987 (Schatz et al. 1987, Plate 1).

The poteniometric surface and cation concentrations of the Saddle Mountains Basalt imply that the Saddle Mountains Basalt discharges into the Columbia River (DOE 1988, pp. 3.7-14 and 3.7-15). This discharge occurs between the Columbia River's confluence with the Yakima and Snake rivers and the eastern portion of the Hanford Site. The Saddle Mountains Basalt may also discharge into the lower Snake and Walla Walla rivers in the Pasco Basin. In the eastern half of the Hanford Site, the Rattlesnake Ridge aquifer has a higher potential than the suprabasalt sediments (DOE 1988, p. 3.9-116), and ground water may flow upward through the confining units into the Ringold Formation.

Ground water flow in the Wanapum Basalt in the Pasco Basin is inferred to be toward the Columbia River from the north, west, and east. Ground water movement in the Grande Ronde Basalt in the Pasco Basin is believed to be to the south and west from the east side of the Columbia River, and to the east from the west side of the river (DOE 1988, p. 3.7-23).

Erosional "windows" through the dense basalt flow interiors provide the potential for direct interconnections between the suprabasalt aquifer and the uppermost confined aquifer (Rattlesnake Ridge) in the basalt system. Graham et al. (1984, pp. 70 to 87) indicated that some contamination was present in the Rattlesnake Ridge aquifer south and east of Gable Mountain Pond. Graham et al. (1984, pp. 67 to 68) evaluated the hydrologic relationships between the Rattlesnake Ridge aquifer and the suprabasalt aquifer in this area and delineated a potential area of intercommunication beneath the northeast portion of the 200 East Area.

4.0 HYDROGEOLOGIC CHARACTERIZATION

As stated in Section 1.0, the objectives of hydrogeologic characterization are: 1) identify and characterize the uppermost aquifer, 2) identify ground water flow paths and flow rates, and 3) determine where to place ground water monitoring wells. To fulfill these objectives for the B Pond site, the following parameters were investigated:

- stratigraphy beneath the site
- distribution of hydraulic head in the aquifers
- hydraulic properties of hydrogeologic units beneath the site
- physical and geochemical parameters controlling contaminant movement.

This section discusses the investigative approach used in hydrogeologic characterization at the B Pond site. It also includes a summary of the available data base and a description of the well installation program for B Pond. Details of the investigative methods are described in Appendix A.

4.1 INVESTIGATIVE APPROACH

The general investigative approach to characterize the hydrogeology of the B Pond site is to compile data from previous investigations and records of operation at B Pond, and to install additional boreholes in strategic areas or where information is lacking. Characterization efforts are focused on the uppermost aquifer.

Characterization activities associated with B Pond have occurred in several stages. The first stage was to compile data on the few boreholes that existed before the RCRA ground water monitoring wells were installed. A number of wells existed near B Pond prior to the initiation of RCRA monitoring. These include a well cluster (699-42-40A, B, C), a deep combination cable-tool/corehole [699-42-42A (DB-8)], and wells 699-43-42 (DH-9A), 299-E25-9, 299-E25-25, 299-E25-32A, 699-39-39, and 699-45-42 (Figure 4-1).

The next stage of characterization involved the installation and testing of four RCRA ground water monitoring wells [699-42-42B (designated BP-10 prior to completion), 699-43-42J (BP-7), 699-43-43 (BP-8), and 699-44-42 (BP-3)] completed in the last quarter of 1988. Two other RCRA wells, 299-E18-1 and 299-E32-4, are being used as background ground water monitoring wells; these are located 2 to 3 mi west of B Pond (Figure 4-2). Information from all these wells is included in Luttrell et al. (1989, pp. 85 to 100) and in Appendices B and C. Well 699-43-42K is a multiport monitoring well that was completed in early 1989. This well is not included in the RCRA monitoring system.

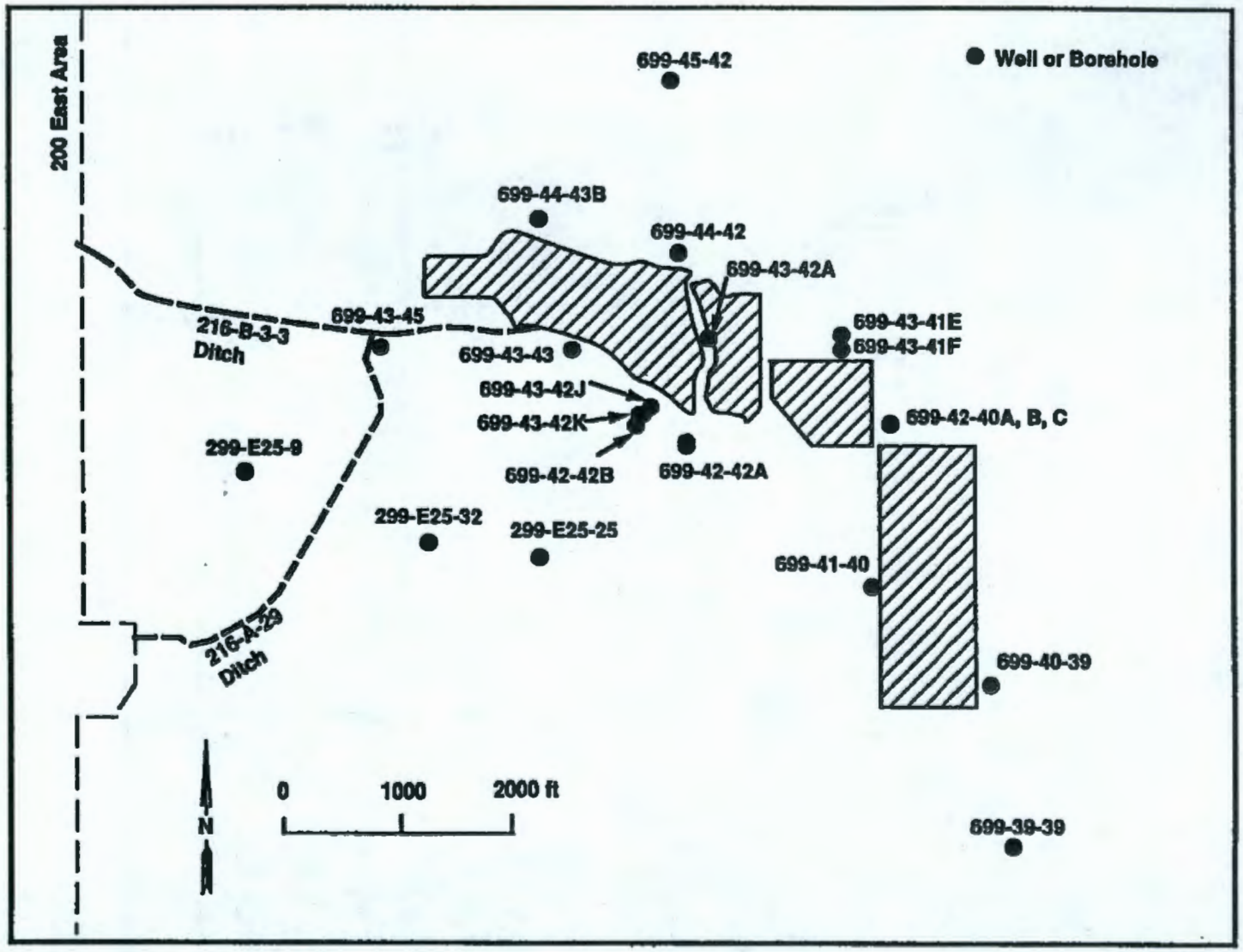

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Figure 4-1. Borehole Location Map for the 216-B-3 Pond Area.

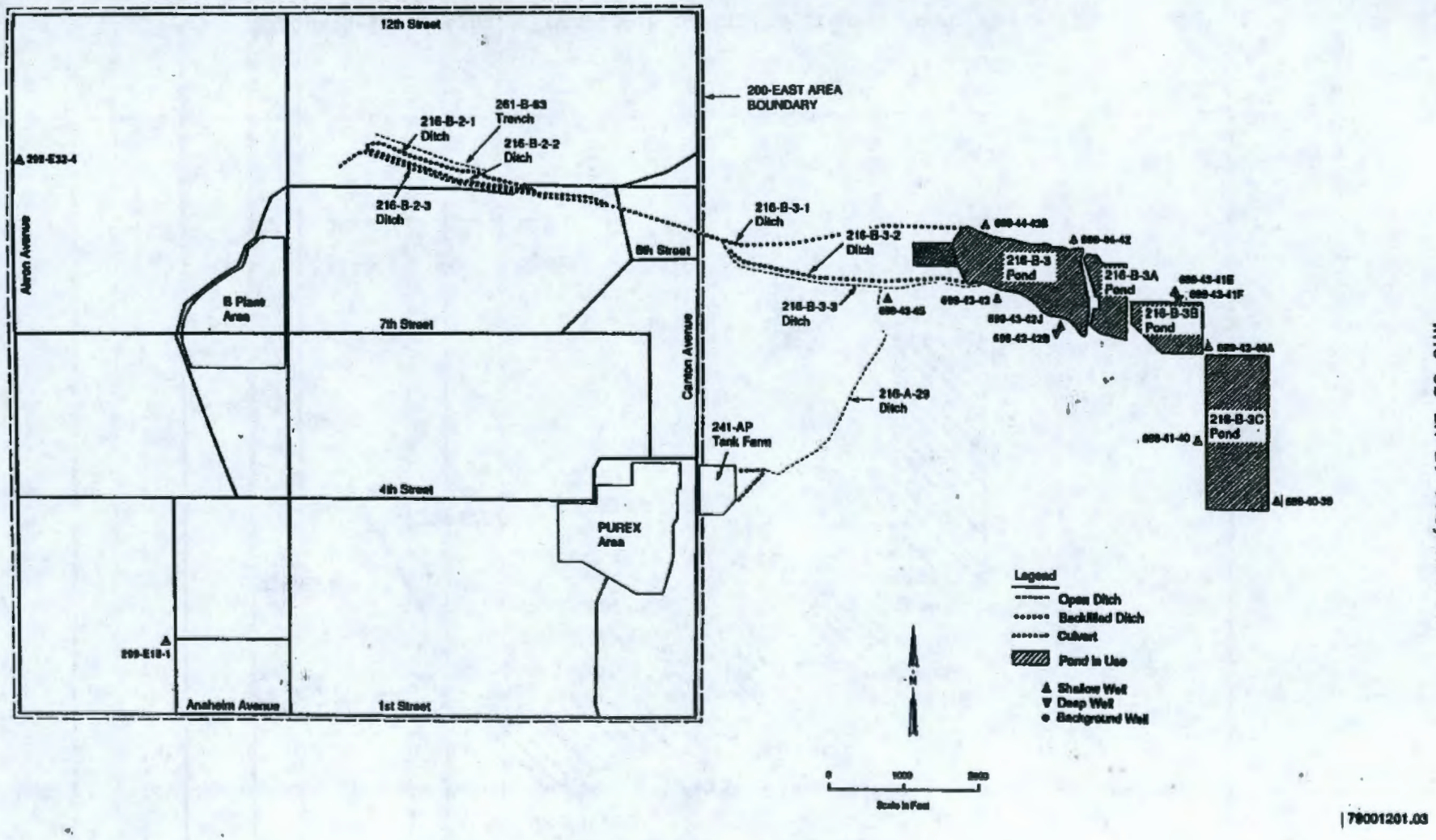


Figure 4-2. Wells in the B Pond Ground Water Monitoring Network.

The most recent stage of characterization involves the installation and testing of six new RCRA ground water monitoring wells shown in Figure 4-2: 699-40-39 (BP-5), 699-41-40 (BP-6), 699-43-41E (BP-4), 699-43-41F (BP-9), 699-43-45 (BP-1), and 699-44-43B (BP-2). The RCRA ground water monitoring wells are multipurpose wells that provide site-specific data on the hydrogeology in addition to monitoring ground water levels and providing ground water chemistry data. Additional monitoring wells may be necessary at a later time, depending on the results of analyses from the present monitoring system.

The locations of the B Pond RCRA ground water monitoring wells (as described in the ground water monitoring plan [Luttrell et al. 1989, pp. 53 to 58]) were chosen to define the hydrogeology beneath the site and to comply with the requirements for ground water monitoring systems (40 CFR 265 [EPA 1980a] and WAC 173-303 [Ecology 1987]). The ground water monitoring system contains a total of 11 downgradient wells. Two of these wells, 699-43-41F and 699-42-42B, are designed to monitor the base of the uppermost aquifer, while the remaining nine monitor the top of the aquifer. Well completion and geologic data available from these wells are presented in Appendices B and C.

4.2 AVAILABLE DATA

Numerous regional geologic and hydrologic studies are available for the Columbia Plateau, Pasco Basin, and Hanford Site. These studies were previously discussed in Section 3.0. Section 4.2 describes those published studies and the available data bases that pertain to the hydrogeologic environment of B Pond.

4.2.1 Previous Studies

Few studies deal specifically with the area near B Pond. These include an evaluation of aquifer intercommunication (Graham et al. 1984; Jensen 1987), a preliminary closure/postclosure plan (DOE 1987a), and a ground water monitoring plan (Luttrell et al. 1989). Most of the data available on B Pond have been obtained only recently as a result of the ongoing installation of RCRA ground water monitoring networks at B Pond, the 216-A-29 Ditch, and the Grout Treatment Facility. The 216-A-29 Ditch and the Grout Treatment Facility are located between B Pond and the 200 East Area. Wherever appropriate, data from these facilities are included in this report. Peripheral studies include those from the Separations Area to the west (e.g., Last et al. 1989) and those a few miles east of the B Pond site associated with the proposed Skagit-Hanford Nuclear Project (PSPL 1982).

4.2.2 Data Bases

Table 4-1 lists construction information for the wells that make up the B Pond ground water monitoring system. Table 4-2 contains similar information for other nearby wells. Well locations are illustrated in Figures 4-1 and 4-2.

Table 4-1. Construction and Data Summary for Wells in the B Pond Ground Water Monitoring Network.

Item / Well	299-E18-1	299-E32-4	699-40-39	699-41-40	699-42-40A	699-42-42B	699-43-41E	699-43-41F	699-43-42J	699-43-43	699-43-45	699-44-42	699-44-43B
Hanford coordinates	N38458 W54458	N44985 W56713	N39878 W39224	N41030 W40285	N42420 W40205	N42473 W42301	N42995 W40723	N42945 W40721	N42532 W42274	N42942 W43184	N42977 W44644	N43783 W41965	N43998 W43363
Primary purpose	gwm[a]	gwm[a]	gwm[a]	gwm[a]	gwm[a], geologic invest.	gwm[a]	gwm[a]	gwm[a]	gwm[a]	gwm[a]	gwm[a]	gwm[a]	gwm[a]
Casing Elevation (ft above MSL[b])	720.24	685.88	541.84	545.94	545.53	583.23	550.86	551.01	581.68	579.37	597.68	579.22	580.12
Total depth (ft)	332	310	212	176	176	250	149	176	180	180	204	173	176
Depth to water (ft)	315	281	125	127	122	166	126	127	162	164	188	158	161
Date measured	05/89	06/89	05/89	06/89	06/89	06/85	05/89	05/89	06/89	06/89	05/89	06/89	05/89
Depth screened (ft)	309-327	278-298	201-211	164-174	139-171	183-203	135-146	165-176	157-177	158-178	183-203	152-172	156-176
Completion date	08/88	09/87	07/89	06/89	07/81	10/88	05/89	06/89	09/88	09/88	06/89	09/88	05/89
Drill method	cable tool	cable tool	cable tool	cable tool	cable tool	cable tool	cable tool	cable tool	cable tool	cable tool	cable tool	cable tool	cable tool
Geologist's log	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	yes
Gamma log	yes	5-310 ft	yes	yes	no	3-249 ft	yes	yes	3-179 ft	2-180 ft	yes	3-172 ft	yes
Sieve data	5-330 ft	5-310 ft	no[c]	no[c]	no	5-250 ft	no[c]	no[c]	5-170 ft	0-180 ft	no[c]	0-173 ft	no[c]
$CaCO_3$ data	yes	no	no[c]	no[c]	no	105-250 ft	no[c]	no[c]	5-170 ft	5-180 ft	no[c]	5-173 ft	no[c]
Thickness/Hanford (ft)	ND[d]	ND[d]	130	118	ND[d]	158	122	128	158	172	180[c]	160	169[c]
Thickness/Ringold (ft)	ND[d]	ND[d]	152[e]	150[e]	ND[d]	95[e]	64[e]	58[e]	95[e]	70[e]	70[e]	60[e]	58[e]
Elevation/Top of Ringold (ft above MSL)	ND[d]	ND[d]	409	425	ND[d]	425	426	420	407	419	415	414	408

[a]ground water monitoring.
[b]mean sea level.
[c]sediment samples were collected for future analyses.
[d]not determined.
[e]estimated thickness based on projected top of basalt.

Table 4-2. Construction and Data Summary for Wells Near B Pond.

Item / Well	299-E25-9	299-E25-25	299-E25-32A	699-39-39	699-42-40B	699-42-40C	699-42-42A	699-43-42	699-43-42K	699-45-42
Hanford coordinates	N41779 W45860	N41002 W43684	N41199 W44326	N39044 W38851	N42400 W40200	N42414 W40181	N41994 W42063	N43409 W41716	N42509 W42304	N45274 W42099
Primary purpose	gwm[a]	gwm[a]	gwm[a]	gwm[a]	gwm[a]; geologic invest.	gwm[a]; geologic test	gwm[a]; geologic test	gwm[a]; geologic test	Westbay system test	gwm[a]
Casing Elevation (ft above MSL[b])	654.86	669.42	669.19	536.65	546.46	546.16	602.88	566.36	581.38	577.33
Total depth (ft)	289	288	354	200	150	390	1092	223	263	195
Depth to water (ft)	248.94	262.84	261.69	131.00	124.48	c	c	145.06	d	159.32
Date measured	12/86	12/86	11/88	12/70	12/86	--	--	12/86	--	12/86
Depth TOB[e]	f	f	350	f	f	220	304	207	243	190
Open Interval (ft)	233-288	269-288	260-280	110-180	130-150	306-390	174-301	154-223	d	150-180
Completion date	05/56	04/85	05/88	12/70	09/81	04/82	08/56	02/66	01/89	06/48
Drill method	cable tool	cable tool	cable tool	cable tool	cable tool	cable tool/air rotary	cable tool/ diamond core	cable tool/ diamond core	cable tool	cable tool
Geologist's log	no	yes	yes	no	no	no	no	154-223 ft	yes	no
Gamma log	2-258 ft	3-288 ft	0-351 ft	5-180 ft	no	yes	5-802 ft	0-220 ft	1-263 ft	3-186 ft
Sieve data	5-285 ft	5-285 ft	no	no	no	no	5-315 ft	no	no	no
$CaCO_3$ data	yes	no	no	no	no	no	yes	no	no	no
Thickness/Hanford (ft)	260[g]	275[g]	280[g]	112	ND[h]	122	195	152	159	156
Thickness/Ringold (ft)	60[g,c]	95[g,c]	68[g]	188[c]	ND[h]	98	110	50	95	35
Elevation/Top of Ringold (ft above MSL)	395[g]	394[g]	389[g]	425	ND[h]	424	408	i	422	421
Comments				cement plug at 180 ft		monitors Rattlesnake Ridge interbed				

[a]ground water monitoring.
[b]mean sea level.
[c]well does not measure water level in unconfined aquifer.
[d]monitors eight intervals between 161 and 255 ft.
[e]top of basalt.
[f]well does not reach basalt.
[g]indefinite boundary between Hanford and Ringold formations.
[h]not determined.
[i]surface elevation unsurveyed.

Borehole logs are produced by the geologist and driller during drilling and well completion activities. Well completion information for Hanford Site boreholes completed before 1989 is documented by McGhan (1989) while stratigraphic information from the 600 Area boreholes completed before 1982 is presented by Fecht and Lillie (1982). Well completion and lithologic information is summarized for each of the 21 wells near B Pond in Appendices B and C. Gross gamma logs for the most recently installed wells may be found in 216-B-3 Pond RCRA Wells Gamma-Ray Logs (WHC 1990).

Borehole samples have routinely been recovered from each borehole at 5-ft increments since before 1960. These samples are archived in the Hanford Geotechnical Sample Library maintained by Westinghouse Hanford Company (Westinghouse Hanford). Particle-size distribution and calcium carbonate analyses of many of these are in the computerized ROCSAN Data Base System maintained by Boeing Computer Services Richland, Inc. Particle-size distribution and calcium carbonate data available on samples from the wells drilled in 1988 are presented in Appendix D.

Gross gamma-ray logs were run in most of the boreholes or wells around B Pond. However, the logs run before 1989 were run through multiple steel casings and the equipment was not calibrated. These older logs do not show a formation response except in the lowermost part of the wells where only a single casing attenuated the natural gamma radiation. For wells drilled in 1989, the logging equipment was calibrated (Brodeur and Koizumi 1989) and multiple logs were run in each well during construction with only one casing within the logged zone (WHC 1990).

Water-level and ground water chemistry data from wells near B Pond are in the computerized Hanford Ground Water Data Base. Water-level data have also been documented in previous reports and in semiannual water-table maps (e.g., Schatz and Ammerman 1988). Water-level measurements and hydrographs are presented in Appendix E.

Ground water chemistry data have been published in annual environmental reports (e.g., Serkowski et al. 1988, pp. B-1 to B-22). Ground water chemistry analyses from nearby wells are presented in Appendix F.

4.3 WELL INSTALLATION PROGRAM

Ten new wells were installed around B Pond for hydrogeologic characterization and ground water monitoring. These wells are to: 1) provide ground water quality information from the upper and lower parts of the uppermost aquifer beneath B Pond, 2) evaluate the hydraulic properties of the aquifer, 3) provide data to interpret the subsurface stratigraphy beneath B Pond, 4) provide sediment samples to determine the moisture conditions of the unsaturated zone, and 5) provide hydraulic head data to determine the vertical hydraulic gradient beneath B Pond (at paired-well locations). During drilling, borehole cuttings were described, and samples were collected for future physical laboratory analysis. Water levels were measured during drilling. Gross gamma-ray logs were run in some of the wells, as discussed in Section 4.2.2. Aquifer tests were conducted

(slug and constant discharge), and, after completion, the wells were developed. The construction and development of each well were documented. After completion, each new well was surveyed to obtain its location coordinates and the elevation of the top of casing and well pad. Survey reports are included in Appendix B.

Laboratory analyses were performed on soil samples collected from four RCRA wells completed in 1988 (699-44-42, 699-43-44J, 699-43-43, and 699-42-42B). Borehole cuttings, collected at 5-ft intervals, were analyzed for particle-size distribution (using hydrometer and/or dry-sieve methods) and calcium carbonate content. Dry-sieve, calcium carbonate, and water content data for samples analyzed through June 30, 1989, are presented in Appendix D. Results of hydrometer analyses are presented in Appendix G. Permeameter tests were performed on two undisturbed samples from a fine-grained sequence collected from 699-42-42B; these data are presented in Appendix H. Information on particle-size distribution in combination with driller's logs, geologist's logs, and gamma logs were used to construct the cross sections and fence diagram presented in Section 5.0 of this report.

Following installation, the monitoring wells were developed, and, in most cases, aquifer tests were conducted. Well development and aquifer testing methods are described in Appendix A. Well development data and aquifer test results are included in Appendix I.

The new monitoring wells installed in fiscal year (FY) 1988 and FY 1989 were constructed according to Westinghouse Hanford specifications. During hydrogeologic characterization, procedures were implemented to control these activities. During FY 1988 activities, however, procedures were in place only for the collection and documentation of drilling data (i.e., well construction and geologic information), for geophysical logging, and for making water-level measurements. Currently, procedures are in place for virtually all hydrogeologic characterization activities during FY 1989 (PNL 1989).

The locations of the 10 downgradient wells and 2 background wells (as described in the ground water monitoring plan [Luttrell et al. 1989, pp. 53 to 58]) were chosen to define the hydrogeology beneath the site and to comply with the requirements for ground water monitoring systems (40 CFR 265 [EPA 1980a] and WAC 173-303 [Ecology 1987]). The ground water monitoring program requires, at a minimum, monitoring wells that are:

1. installed hydraulically upgradient from the limit of the B Pond facility. (Their number, location, and depths must be sufficient to yield ground water samples that are representative of background ground water quality in the uppermost aquifer near the facility and not affected by the facility.)

2. installed hydraulically downgradient at the limit of the B Pond facility. (Their number, location, and depth must ensure that they yield samples that immediately detect any statistically significant amounts of hazardous waste or hazardous waste constituents that migrate from B Pond to the uppermost aquifer.)

3. cased in a manner that maintains the integrity of the monitoring well borehole. (This casing must be screened and packed with gravel or sand, where necessary, to enable sample collection at depths representative of the most likely aquifer flow zones containing hazardous waste or hazardous waste constituents. The annular space above the sampling depth must be sealed with suitable material to prevent contamination of samples and the ground water.).

In addition, the location and construction details for these initial-phase monitoring wells are required to support a plausible final compliance monitoring system. The design life of the wells should include the active life of B Pond plus the postclosure period.

4.3.1 Monitoring Well Installation

Four wells were installed around B Pond in 1988 and six wells were installed in 1989. Of the four wells drilled in 1988, three (699-43-42J, 699-43-43, and 699-44-42) were drilled approximately 20 ft into the uppermost aquifer. These wells were completed with 20 ft of stainless steel screen extending approximately 18 ft into the aquifer. The other well (699-42-42B) was drilled adjacent to well 699-43-42J to monitor the lower part of the aquifer. It was drilled 90 ft into the aquifer, backfilled, and then completed with 10 ft of stainless steel screen in a permeable zone between 32 and 42 ft below the top of the aquifer. Well 699-42-42B was overdrilled to obtain hydrogeologic characterization information used to determine screen placement.

Of the six 1989 wells, five (699-40-39, 699-41-40, 699-43-41E, 699-43-45, and 699-44-43B) are completed in the upper part of the aquifer, and one (699-43-41F) drilled adjacent to well 699-43-41E is completed in the lower part of the aquifer. Information obtained during drilling indicates that the uppermost aquifer is confined in the vicinity of wells 699-40-39, 599-41-40, 699-43-41E and 699-43-41F). Specifically, low-permeability silts and clays overlie the uppermost saturated interval at these locations. Wells 699-43-45 and 699-44-43B are completed with 20 ft of stainless steel screen extending approximately 15 ft into the top of the aquifer. Wells 699-40-39, 699-41-40, 699-43-41E, and 699-43-41F are completed with 10 ft of stainless steel screen.

Details of well installation are described in Appendix B.

4.3.2 Justification of Well Locations

The wells that monitor the upper part of the aquifer are located around the perimeter of the B Pond lobes at distances ranging from 50 to 200 ft from the edge of the lobes. These locations were chosen:

1. because potential contaminant migration is expected to extend laterally in the vadose zone before reaching the water table. Contaminants may bypass monitoring wells located very close to the ponds.

2. to preclude drilling in zoned radiation areas adjacent to the ponds.

3. to reduce the likelihood of encountering perched water-table conditions, which may inadvertently provide a mechanism for allowing perched water to move down to the water table via the borehole annulus.

More wells are concentrated around the 216-B-3 Pond than the other expansion ponds. The potential for contamination is greater there because all the waste water passes through it (Figure 4-1), and because it has been in service much longer than the expansion ponds. Well 699-43-45 monitors the overflow area and the lower segment of the 216-B-3-3 Ditch, which are known to have received hazardous wastes. It is not known whether the upper portion of the B-3-3 Ditch received hazardous waste.

The locations of the two deep wells (699-43-41F and 699-42-42B) were chosen to monitor the lower part of the aquifer in the central B Pond area; each well is located near a well that monitors the upper part of the aquifer. The potential for contaminants to be driven downward to the lower part of the aquifer is expected to be greatest in the central B Pond area because the vertical gradients are expected to be greatest near the center of the ground water mound.

In the wells completed in the upper part of the aquifer, the final well screens (10- to 20-ft length of 4-in-ID, 304 stainless steel continuous-slot) straddle the current water table. This interval was chosen to accommodate water table fluctuations caused by variations in discharges to B Pond. These wells will allow sampling of the upper part of the aquifer and detection of any immiscible constituents floating on the water table. This will also allow water-level monitoring of the water-table surface.

The final screens for wells 699-43-41F and 699-42-42B (4-in-ID, 304 stainless steel continuous-slot) were chosen to be placed in the lowermost 10 ft of the uppermost aquifer above the top of the confining unit. This will allow detection of contaminants near the bottom of the aquifer. The shorter screen length of 10 ft will minimize excessive dilution of the samples. The bottoms of the 10-ft screen in wells 699-43-41F and 699-42-42B are immediately above a fine-grained unit.

There is no upgradient location in the vicinity of B Pond because of the ground water mound beneath the facility. Every location within at least 1,000 ft of B Pond is hydrologically "downgradient." Regional upgradient locations were selected for background monitoring wells. Background well locations 299-E18-1 and 299-E32-4 were chosen because the wells are:

1. completed in the uppermost part of the unconfined aquifer.

2. recently constructed to meet RCRA design criteria (i.e., stainless steel screen and casing with filter pack and annular seal to the surface).

3. located along flow paths that ground water presumably would have followed through to the northern and southern sections of the 200 East Area had the ground water mound beneath B Pond been absent.

4. located as close to B Pond as possible without being influenced by the B Pond ground water mound, as indicated by contaminant plume maps (Law et al. 1987, pp. 75 to 86) and the December 1987 Separations Area water-table map (Serkowski, et al. 1988, p. 1-5/6).

The well construction diagrams and geologic summaries for these background monitoring wells are presented in Appendix C.

An existing well, 699-42-40A, is constructed with carbon steel casing and stainless steel screen. The well construction diagram and geologic summary for well 699-42-40A are presented in Appendix C.

5.0 SITE GEOLOGY

5.1 INTRODUCTION

This section discusses the geology of the B Pond area. The following discussion is based on a recent ground water monitoring plan written for B Pond (Luttrell et al. 1989) as well as other nearby investigations (Graham et al. 1984; Last et al. 1989; Tallman et al. 1979; Webster and Crosby 1981).

5.2 GEOMORPHOLOGY

B Pond lies in an area of relatively low relief near an elevation of approximately 550 ft. The topographic surface in the vicinity of B Pond is primarily the result of two geomorphic processes: 1) Pleistocene cataclysmic flooding and 2) Holocene eolian (wind) activity. Proglacial cataclysmic flooding created a series of anastomosing channels and bars; these represent the dominant landforms within the central Hanford Site. Since the end of flooding approximately 13,000 yr ago, eolian dunes and sand sheets derived from local reworking of flood deposits have formed.

5.2.1 Landforms as a Result of Cataclysmic Flooding

The B Pond area is situated on the south side of two major flood channels, Susie and Gable Gap, that converge in the area of B Pond (Figure 5-1). A west-east topographic profile across the central Pasco Basin (Figure 5-2) shows the relationship between these channels and the present Columbia River channel. Susie channel is topographically the highest of the two, with the bottom of the channel lying at 540 ft. The bottom of Gable Gap channel is at 420 ft. The Susie and Gable Gap paleoflood channels currently are situated above the water table (Figure 5-2). B Pond also is situated at the east end of Cold Creek bar, a topographic high that extends back to the west and consists of sand and gravel deposited by cataclysmic floods.

5.2.2 Eolian Landforms

Eolian landforms in the B Pond area consist of dune fields and sheet sands. A well-developed dune field is situated immediately south of B Pond (Figure 5-1) 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. Winds in the B Pond area come dominantly from the southwest and northwest.

5.3 STRATIGRAPHY

The subsurface geology of the B Pond area is interpreted from field description and laboratory analysis of borehole cuttings and core from 11 recently installed RCRA ground water monitoring wells. In addition, data from 10 other nearby boreholes have been analyzed (Figure 4-1).

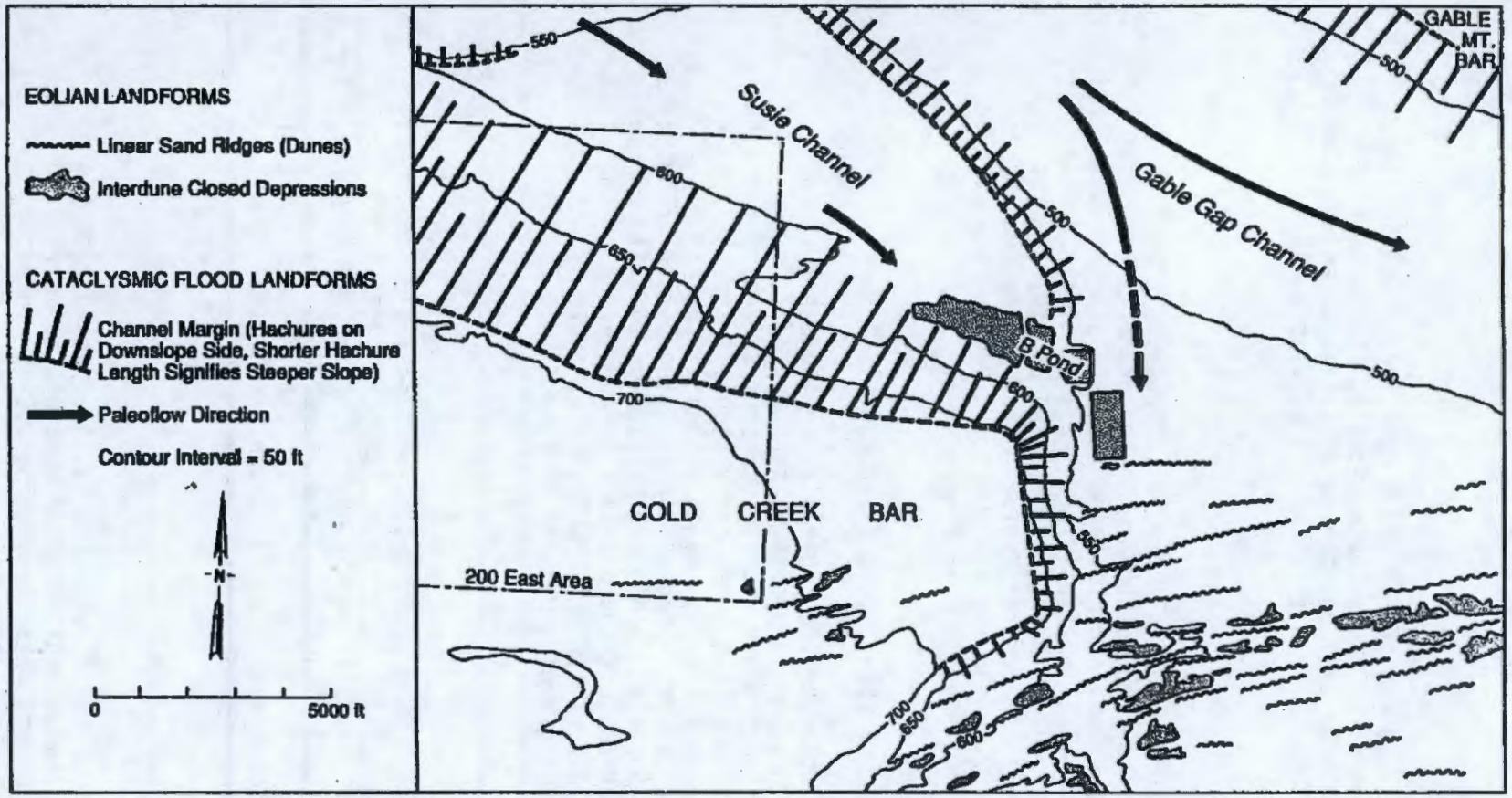


Figure 5-1. Geomorphic Features Near the 216-B-3 Pond.

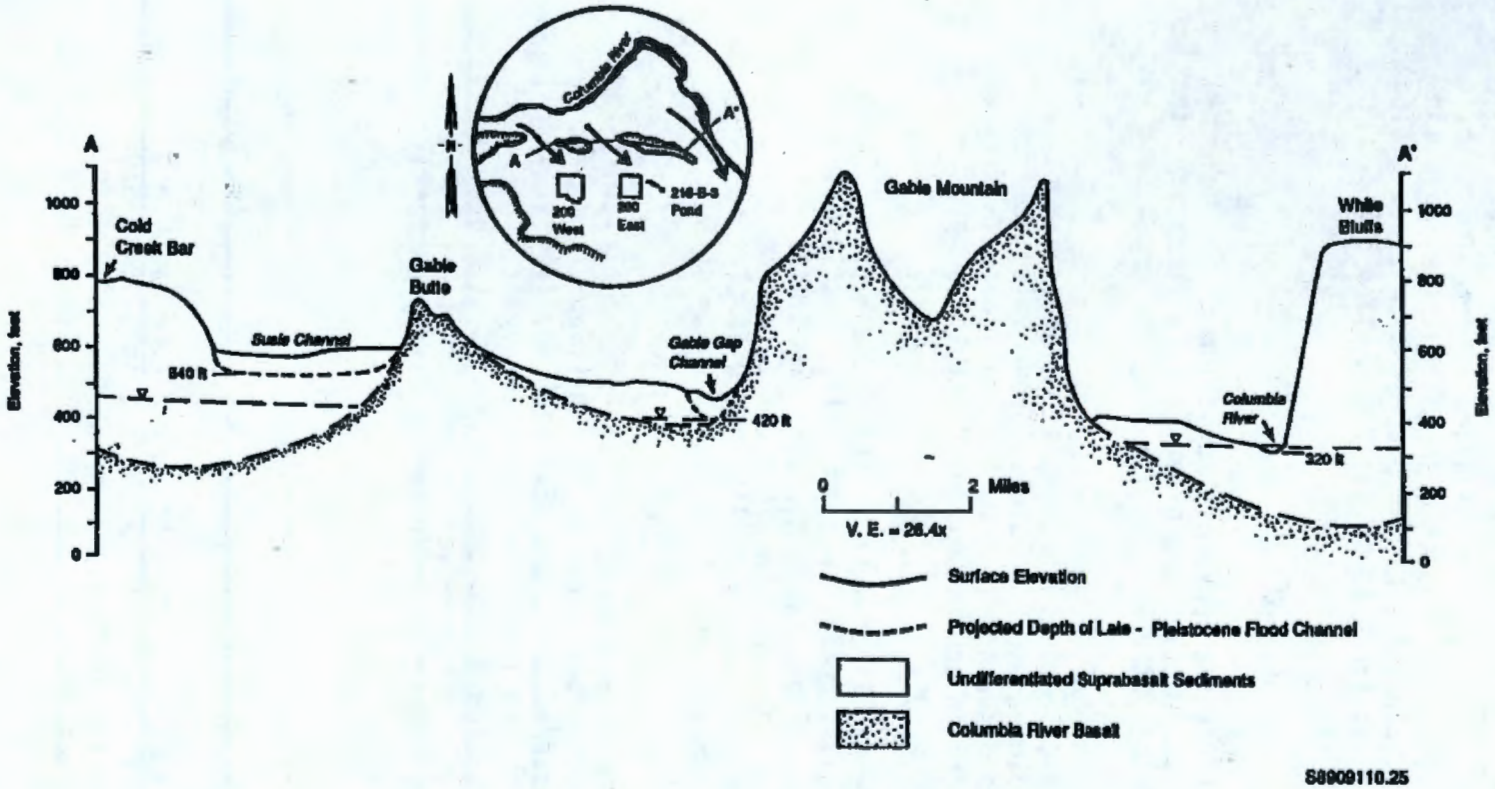


Figure 5-2. Topographic Profile Across the Central Pasco Basin.

This document focuses on the four uppermost stratigraphic units present at B Pond. These are, in ascending order, the Saddle Mountains Basalt, Ringold Formation, Hanford formation, and recent eolian sands (Figure 5-3). Stratigraphic units were identified using a combination of granulometric/ calcium carbonate data, lithologic data presented in geologist's logs, and gross gamma logs. Stratigraphic correlations are presented on three geologic cross-sections (Figures 5-4 to 5-6) and a fence diagram (Figure 5-7).

5.3.1 Saddle Mountains Basalt and Interbeds

The Saddle Mountains Basalt is the uppermost formation of the Columbia River Basalt Group. The units of principal interest in this study are, in ascending order: the Pomona Member, the Rattlesnake Ridge interbed, and the Elephant Mountain Member.

The Pomona Member of the Saddle Mountains Basalt includes four major intraflow structures: basal colonnade, entablature, upper colonnade, and flow top. These structures are described in greater detail by Graham et al. (1984, p. 44). The Pomona Member is approximately 180 ft thick at well 699-42-40C (Graham et al. 1984, p. 45).

The Rattlesnake Ridge interbed lies over the Pomona Member, and forms the uppermost regionally extensive aquifer in the basalt. Its litholgies include, in descending order, a tuffite, volcanic ash, flood deposits, and a clay matrix-supported basaltic conglomerate. Grain size of the flood deposits range from sandy gravel to sands and silts. The Rattlesnake Ridge interbed ranges in thickness from 50 to 65 ft in the vicinity of B Pond (Graham et al. 1984, p. 44 to 47).

The uppermost member of the Saddle Mountains Basalt in the vicinity of B Pond is the Elephant Mountain Member, dated at 10.5 million years. The Elephant Mountain Member consists of two flows (Elephant Mountain II overlying Elephant Mountain I) separated by an interflow zone. The upper flow has been eroded away beneath part of the B Pond area (Graham et al. 1984, p. 48). An interflow zone of 10 ft of silt was observed in well 299-E16-1 (Graham et al. 1984, p. 49). The entire Elephant Mountain Member is approximately 100 ft thick at well 699-42-40C.

5.3.2 Ringold Formation

5.3.2.1 Description. The Elephant Mountain Member is disconformably overlain by the Ringold Formation (Myers et al. 1979, Plate III-1). The Ringold Formation is approximately 50 to 150 ft thick beneath B Pond (Figure 5-8). To the north and west, Ringold strata pinch out against structural highs in the underlying basalt, while to the south and east, Ringold strata thicken into structural lows. Ringold sediments in the area of B Pond generally are moderately to strongly consolidated, either because of cementation or compaction.

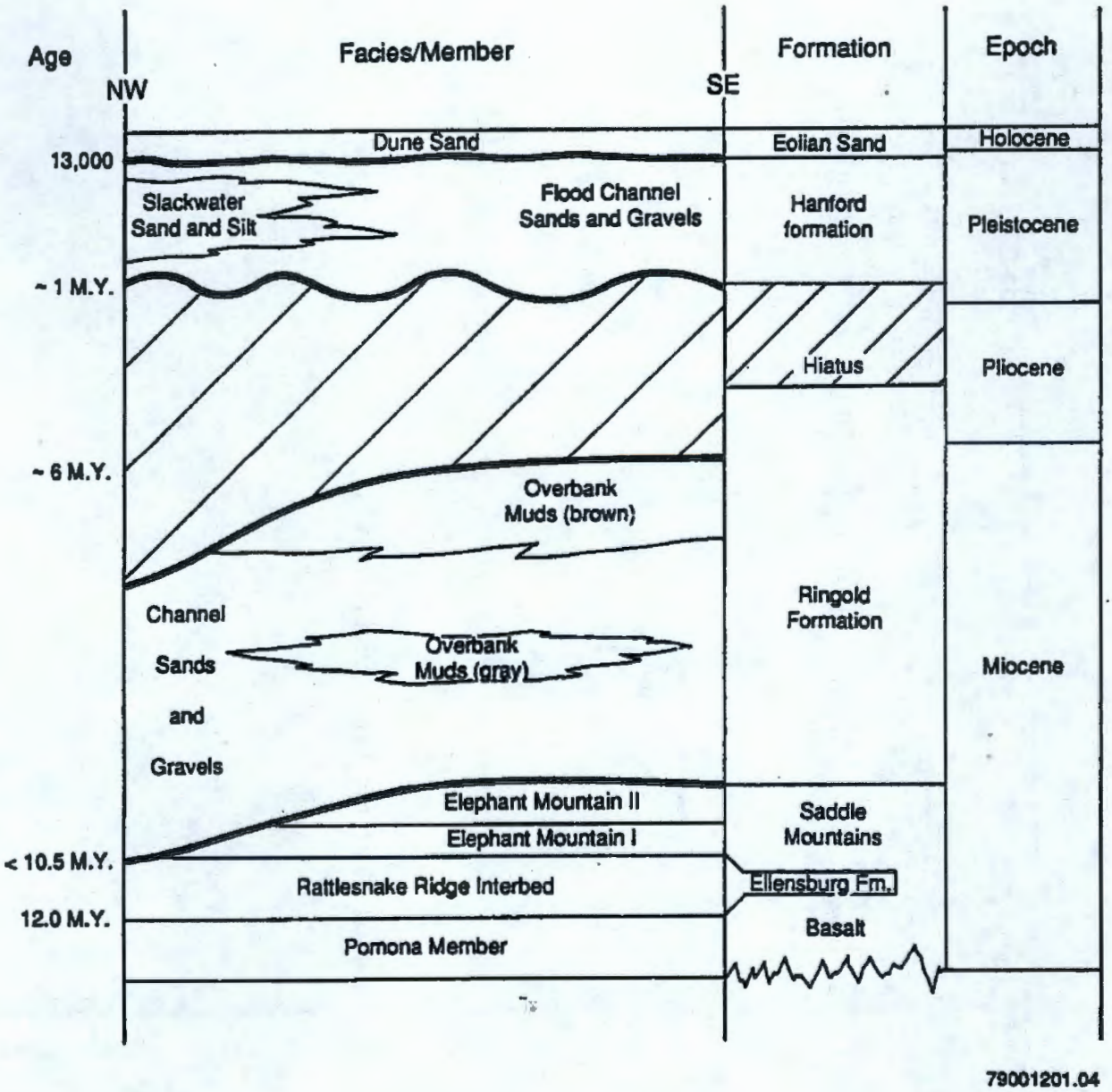


Figure 5-3. Generalized Stratigraphy of the B Pond Area.

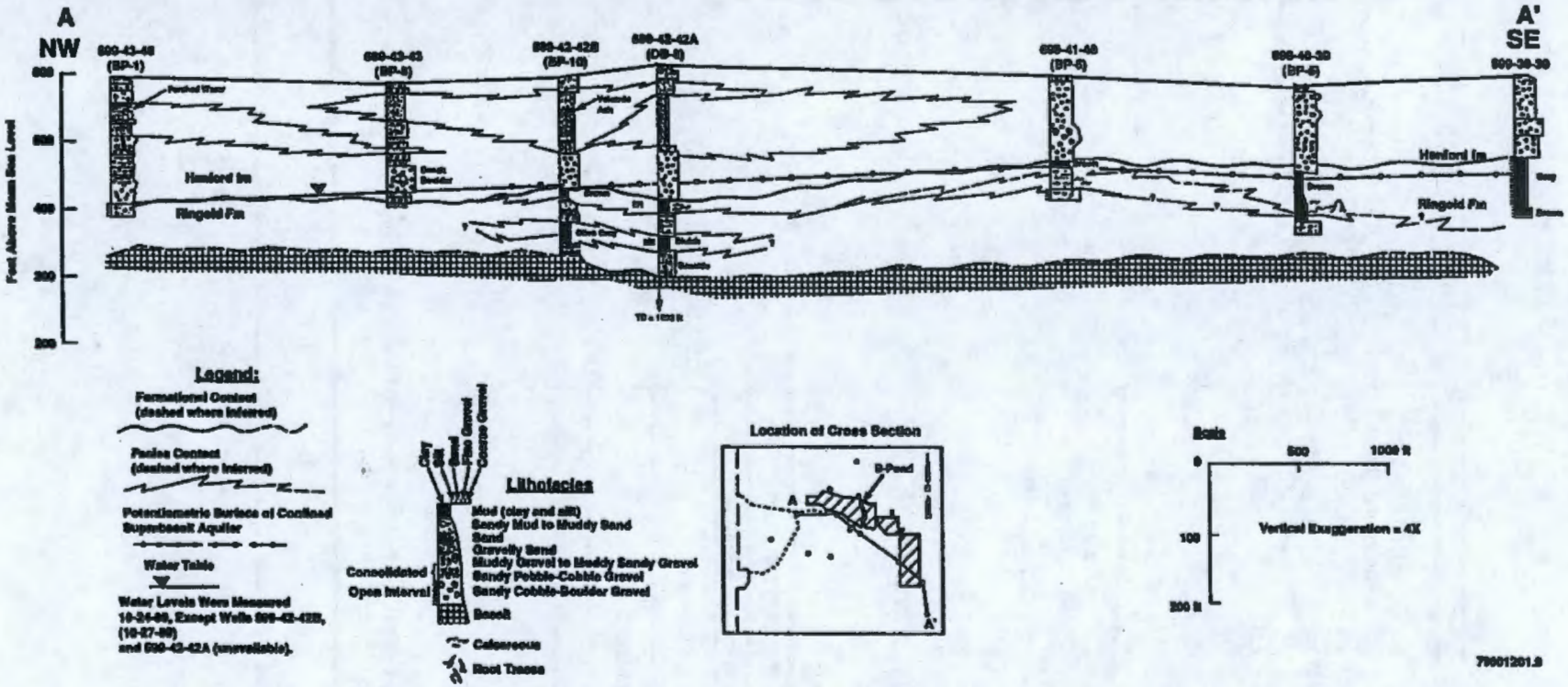


Figure 5-4. Geologic Cross Section A-A'.

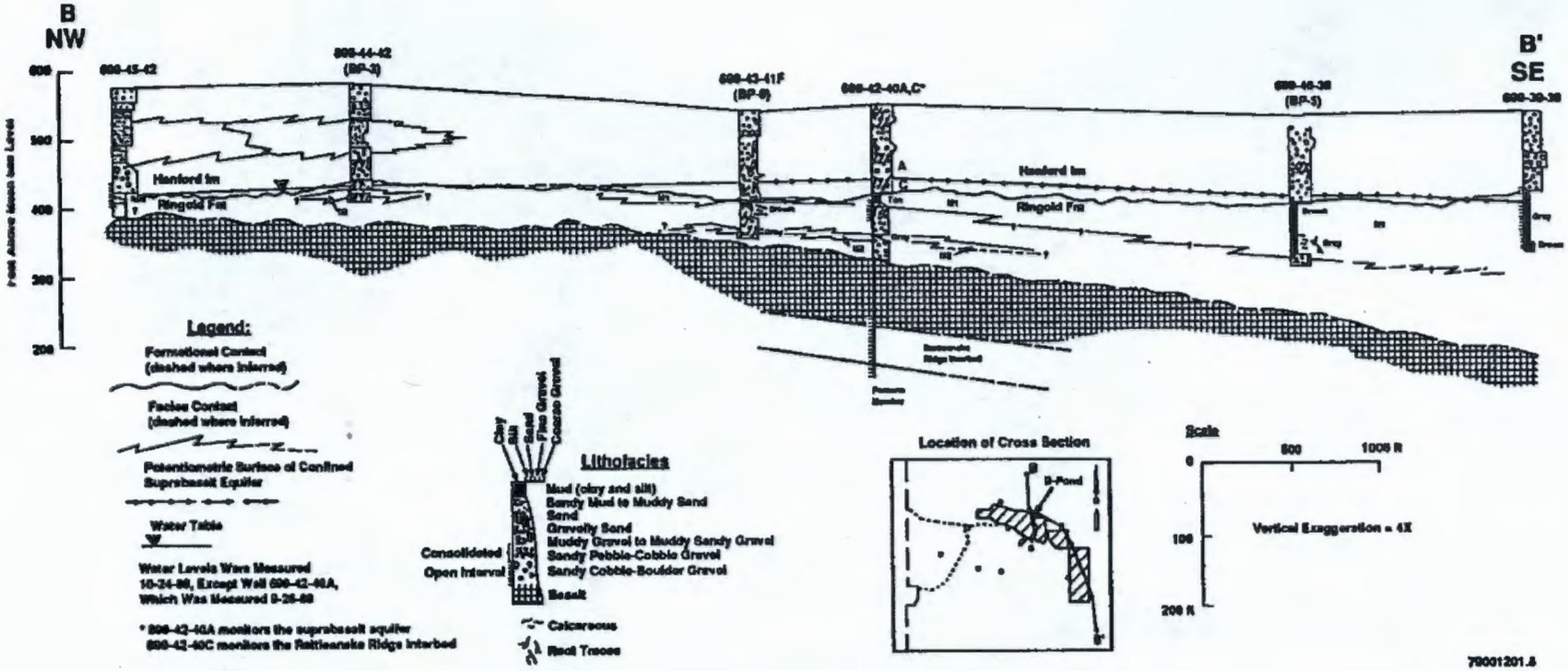


Figure 5-5. Geologic Cross Section B-B'.

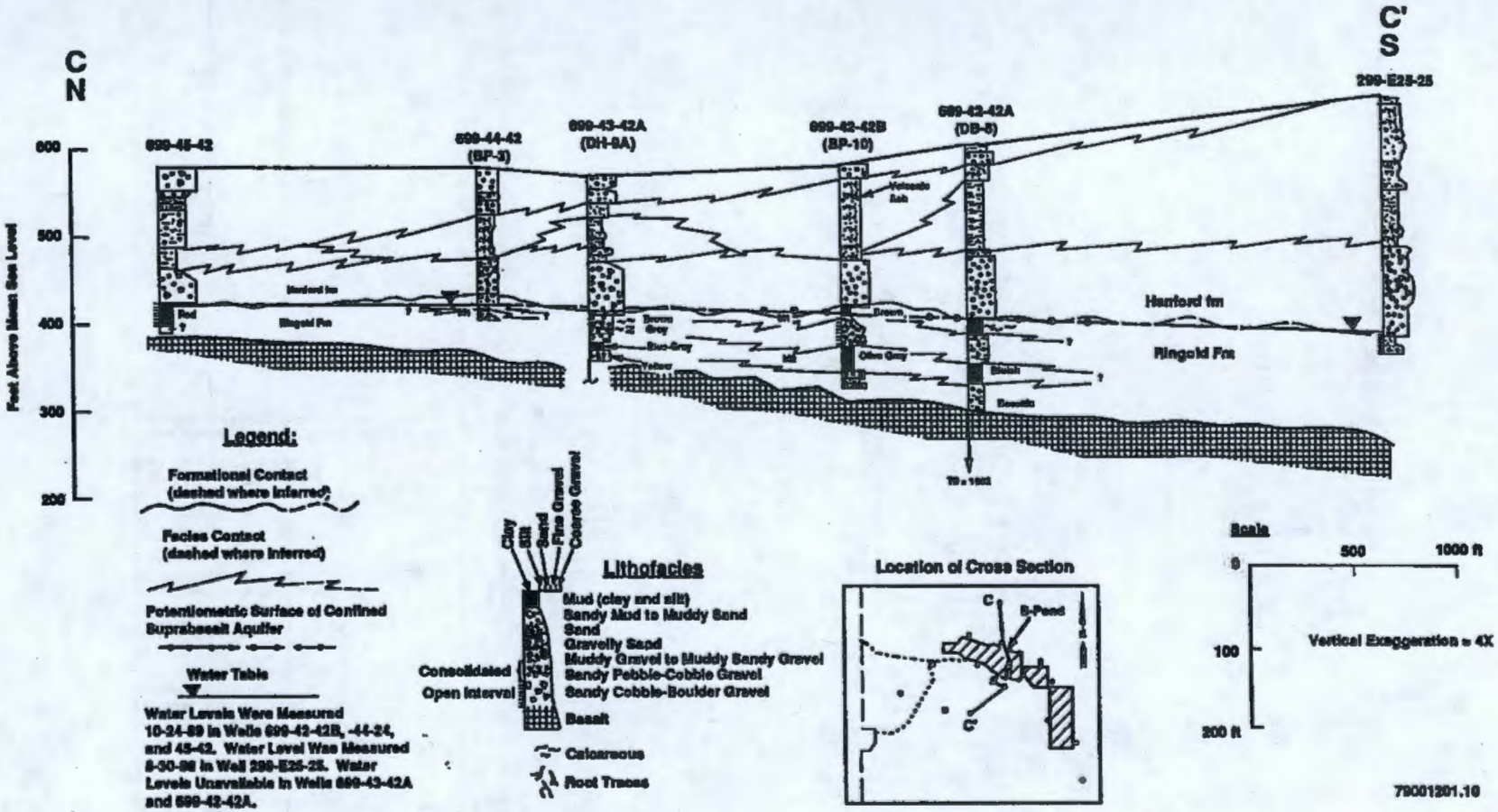


Figure 5-6. Geologic Cross Section C-C'.

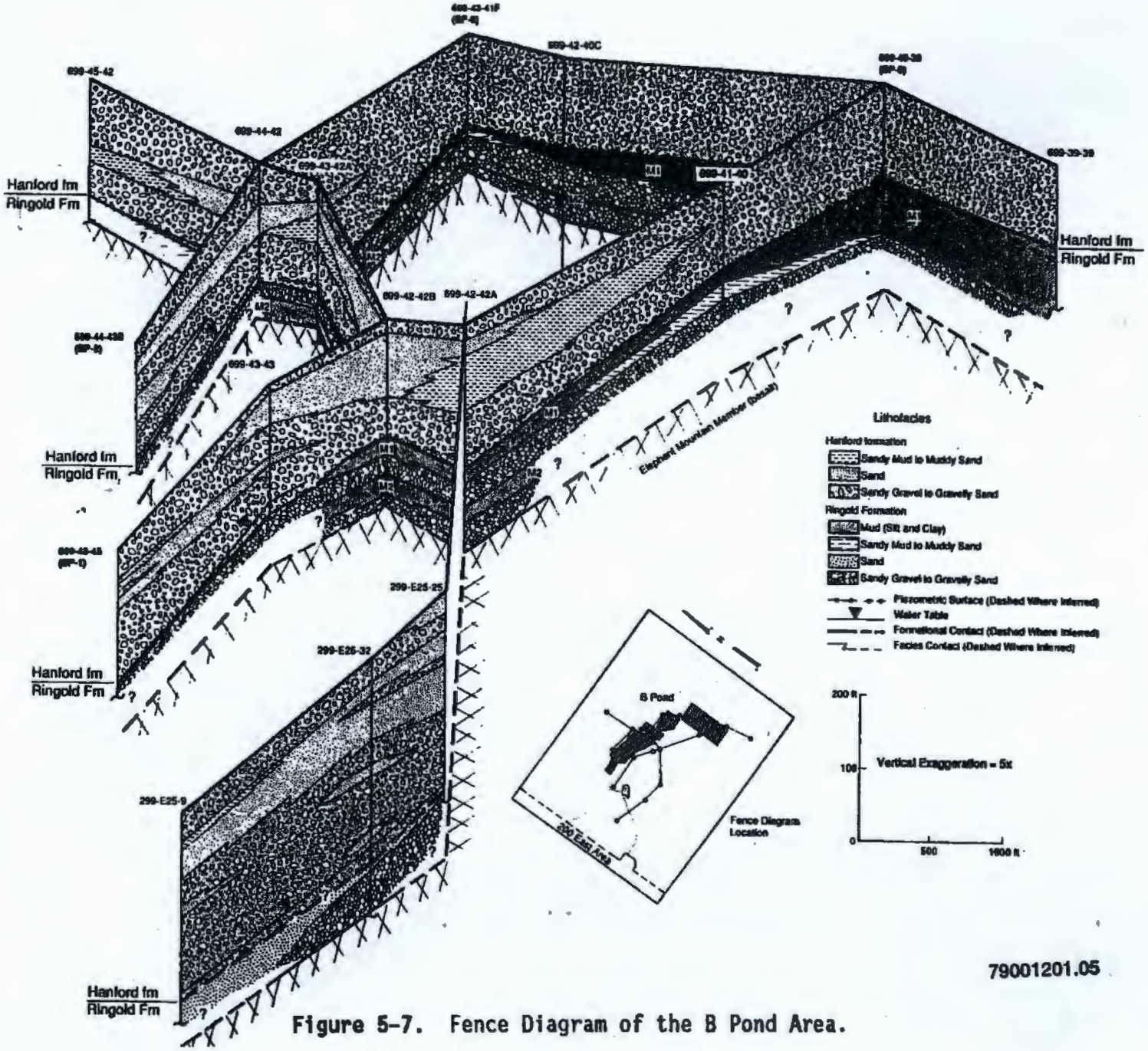
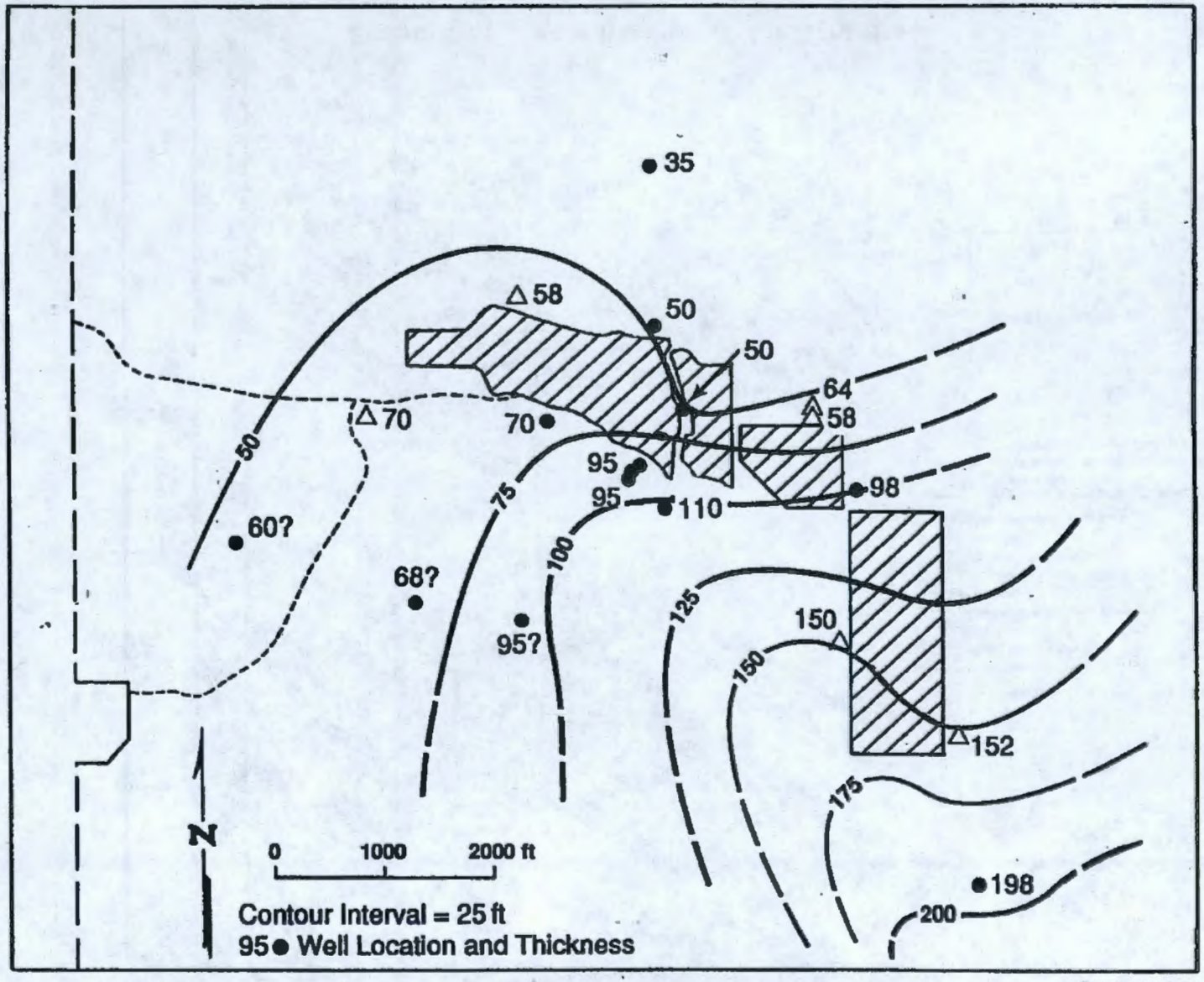


Figure 5-7. Fence Diagram of the B Pond Area.



S8909110.19

Figure 5-8. Ringold Formation Isopach Map for the B Pond Area.

The Ringold Formation in the vicinity of B Pond contains a wide variety of sediment types or lithofacies ranging from coarse sandy gravel to mud. In this report, the Ringold Formation is subdivided into facies rather than the more traditional basal, middle, and upper Ringold units (Myers et al. 1979, p. III-8). The use of facies is a more appropriate method to describe Ringold sediments because they better represent the lithologic heterogeneity typically seen in the Ringold Formation (Lindsey et al. 1989). Furthermore, the Ringold units are not easily correlated across the central Pasco Basin. Three facies are defined in the B Pond area: 1) gravel, 2) sand, and 3) mud.

Gravels usually are moderately to well-sorted and have a sand matrix. Clasts consist of up to 50% basalt in addition to quartzite, granitics, and porphyritic volcanics. Gravels occasionally are calcareous, but in general, the gravels are less calcareous than those in the overlying Hanford formation. Gravel facies dominate the Ringold Formation in the western part of the B Pond area.

The sand facies generally consists of fine- to coarse-grained sand that is composed dominantly of quartz and feldspar with lesser amounts of basalt and mica. This facies generally forms transitional intervals separating gravel and mud facies.

Mud facies consist dominantly of pedogenically altered silt and clay. Subordinate amounts of sand are present locally in the facies. Two distinct sequences dominated by mud facies are present beneath B Pond, an upper brown and a lower gray sequence. The upper brown sequence is over 80 ft thick at well 699-39-39 and pinches out to the northwest (Figure 5-5). In general, the brown mud sequence fines upwards from a muddy sand to a mud. The lower gray mud sequence is as much as 30 ft thick near well 699-42-42B (BP-10) and thins or pinches out to the north and west. These two mud-dominated sequences may interfinger with mud-dominated strata described by Webster and Crosby (1981, pp. 11 to 15) in the Ringold Formation east of the B Pond area. The extent of the mud-dominated interval to the south is not known because of the absence of wells into the Ringold Formation in that area. Undisturbed sediment cores from the upper brown sequence were collected from well 699-42-42B (BP-10) for laboratory analysis; five for hydrometer analysis and two for permeameter testing. Results of these tests are presented in Appendices D, G, and H. The samples were classified as silt to silty sand.

5.3.2.2 Interpretation. The three Ringold facies were deposited in different sedimentary environments. Gravel facies are interpreted as high energy river-channel deposits. Sand facies are interpreted as moderate energy river-channel deposits and as overbank flood deposits. Mud facies are interpreted as pedogenically altered overbank clays and silts that formed on floodplains adjacent to channels. The distribution of facies in the Ringold Formation in the B Pond area suggests overbank areas were more abundant to the east and southeast during deposition of the Ringold. The absence of the Ringold Formation less than 1 mi northwest of B Pond is attributed to erosion by cataclysmic flooding (Last et al. 1989, p. 5.29).

5.3.3 Hanford Formation

5.3.3.1 Description. 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 area and ranges in thickness from 100 ft in the northeast, where the Susie channel is located, to over 200 ft Cold Creek bar southwest of B Pond (Figure 5-9). Muddy sandy gravels, sandy gravels, and gravelly sands dominate Hanford sediments in the B Pond area. Subordinate amounts of sand and sandy silt are intercalated in the gravelly sediments, especially in the middle of the Hanford formation (Figure 5-7). South of B Pond, fine sediments are absent and the Hanford formation consists almost entirely of coarse-grained sand and gravel. Boulders as large as 20 ft in diameter occur locally in the Hanford formation.

Where mud facies are not present in the Ringold Formation (e.g., west of B Pond), it may be difficult to distinguish gravelly Hanford and Ringold deposits. Generally Hanford gravels: 1) are less consolidated, 2) display less alteration, 3) are more poorly sorted, 4) are more reactive to dilute hydrochloric acid, and 5) contain a higher percentage of angular basalt clasts than Ringold gravels.

5.3.3.2 Interpretation. The gravels and coarse sands of the Hanford formation are interpreted as having been deposited in main floodways, while the fine sands and muds are interpreted as slack water deposits. The size of some of the boulders incorporated into the Hanford formation is an indication of the power of the cataclysmic floods. These boulders are thought to have been derived from basalts scoured by floods just to the northwest of B Pond. North and west of B Pond, slack water deposits are interspersed with flood deposits.

5.3.4 Eolian Deposits

A thin veneer of eolian sand to silty sand locally overlies the Hanford formation, particularly in the area south and west of B Pond where sand dunes are well-developed (Figure 5-1). However, eolian sand generally is lacking in areas where the surface has been disturbed by man. The contact between eolian deposits and the Hanford formation is well defined.

5.4 PALEOCHANNELS

Channelization has been an important process in the B Pond area since the beginning of Ringold deposition. As discussed in Section 5.2.1, the Susie and Gable Gap paleochannels are currently expressed as landforms. Buried paleochannels also exist near B Pond. Structure contour maps of the top of the basalt (Figure 5-10) indicate the presence of a channel cut into the basalt below both the Ringold Formation and Hanford formation. This paleochannel trends southeast from the Gable Gap area and is located southwest of B Pond. The presence of Ringold sediments within this channel indicate that it has been active since at least Ringold time. The course of the river that cut the channel may have been controlled by two anticlinal structures located on either side of the channel (Figure 5-9).

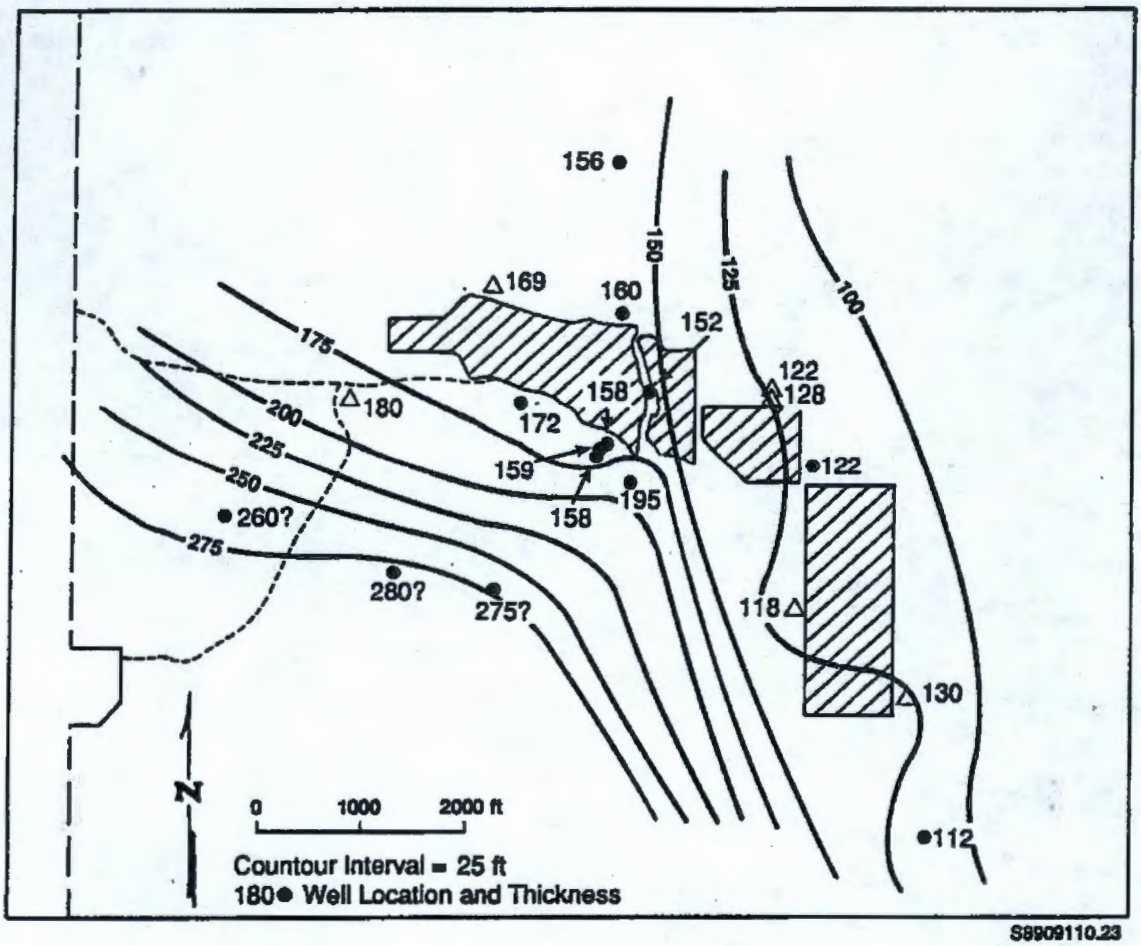


Figure 5-9. Hanford Formation Isopach Map for the B Pond Area.

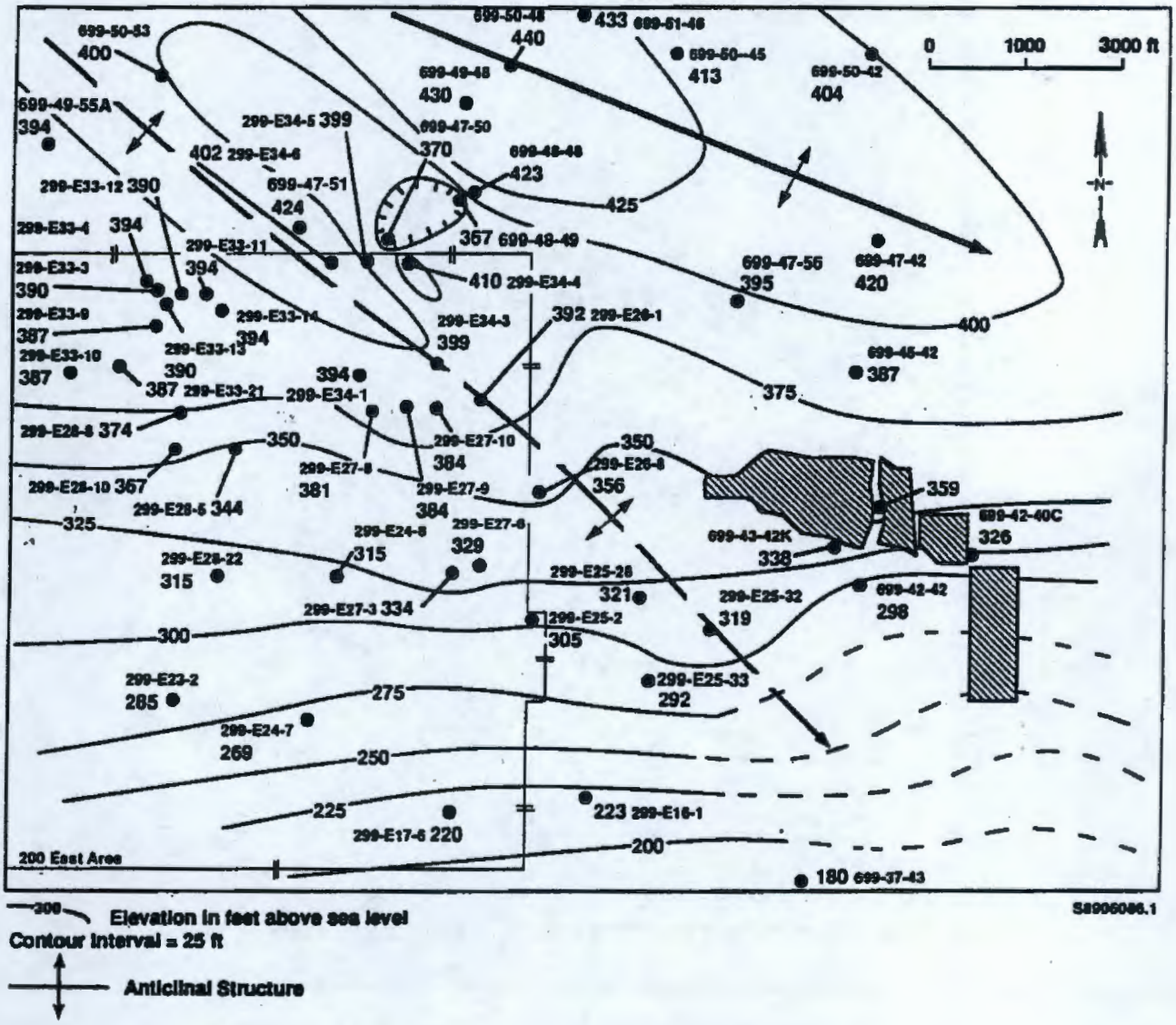


Figure 5-10. Top of Basalt Map for B Pond and Adjacent Areas.

Channelization into the basalt occasionally has resulted in the complete removal of the Elephant Mountain Member and erosion into the underlying Rattlesnake Ridge Member of the Ellensburg Formation (Graham et al. 1984, pp. 67 and 68). Such an erosional "window" is shown by the closed depression seen on Figure 5-10. At this locality, sediments comprising the confined aquifer are in direct contact with suprabasalt sediments of the unconfined aquifer. Many of the windows through basalt probably were created by flood erosion.

Pleistocene-aged paleochannels cut by cataclysmic floods are present throughout the area. For example, northwest of B Pond floods, stripped away the Ringold Formation, scoured into basalt, and then backfilled the channel. To the southeast, where the Ringold Formation is present, evidence of channelization is less well defined. In fact, there is a sharp rise on the top of the Ringold Formation in the vicinity of well 699-42-42B (BP-10) near where the suspected paleochannel is inferred to be. The absence of this buried paleochannel may have been the result of progradation of Cold Creek bar into the channel, filling it or forcing its displacement.

6.0 HYDROLOGY

This section synthesizes data from previous studies and the site characterization investigation and interprets them to form a description of the physical hydrology of the B Pond area.

Figure 6-1 illustrates the current conceptual model of the hydrogeology of the B Pond site. The major hydrologic units include surface water, the unsaturated zone, the suprabasalt aquifer system, and the basalt and interbed aquifer system. These elements are discussed briefly below to provide a framework for the description of B Pond site hydrology.

- Surface water: Surface water features of the B Pond site include two active wastewater ditches, and the 216-B-3, 3A, and 3C Ponds. The 3B Pond is currently inactive. Water from these ponds infiltrates into the ground and provides recharge to the suprabasalt aquifer.

- Unsaturated zone: The unsaturated zone beneath B Pond is made up mainly of sand and gravel, with some lenses of finer-grained material. The unsaturated zone receives infiltration from B Pond and appears to include zones of perched water.

- 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. The fine-grained sediments locally form a confining unit.

- Basalt and interbed aquifer system: The basalt surface is conceived to be the base of the uppermost aquifer. Confined aquifers exist within the basalt. In the B Pond area, the shallowest aquifers in the basalt system are the Elephant Mountain interflow zone and the Rattlesnake Ridge interbed.

6.1 SURFACE WATER

There are no natural surface water features on the B Pond Site. Artificial surface water bodies include the 216-A-29 Ditch, the 216-B-3-3 Ditch, both of which contain water continuously (Figure 1-2). B Pond itself is the largest surface water body on the site. The 216-B-3, 3A, and 3C ponds are all currently used; the 3B Pond has not been used since May 1985.

The 216-B-3 Pond is located in a natural topographic low and currently covers approximately 35 acres. Most of the pond is between 2 and 8 ft deep, and the maximum depth is approximately 20 ft near the eastern dike. The surface elevation is approximately 574 ft above MSL. The observed percolation rate is approximately 1.5 million gal/d.

The 3A Pond was constructed using a cut and fill method and covers about 11 acres. Water elevation is approximately 559 ft above MSL. The percolation rate of the -3A Pond is approximately 1.5 million gal/d.

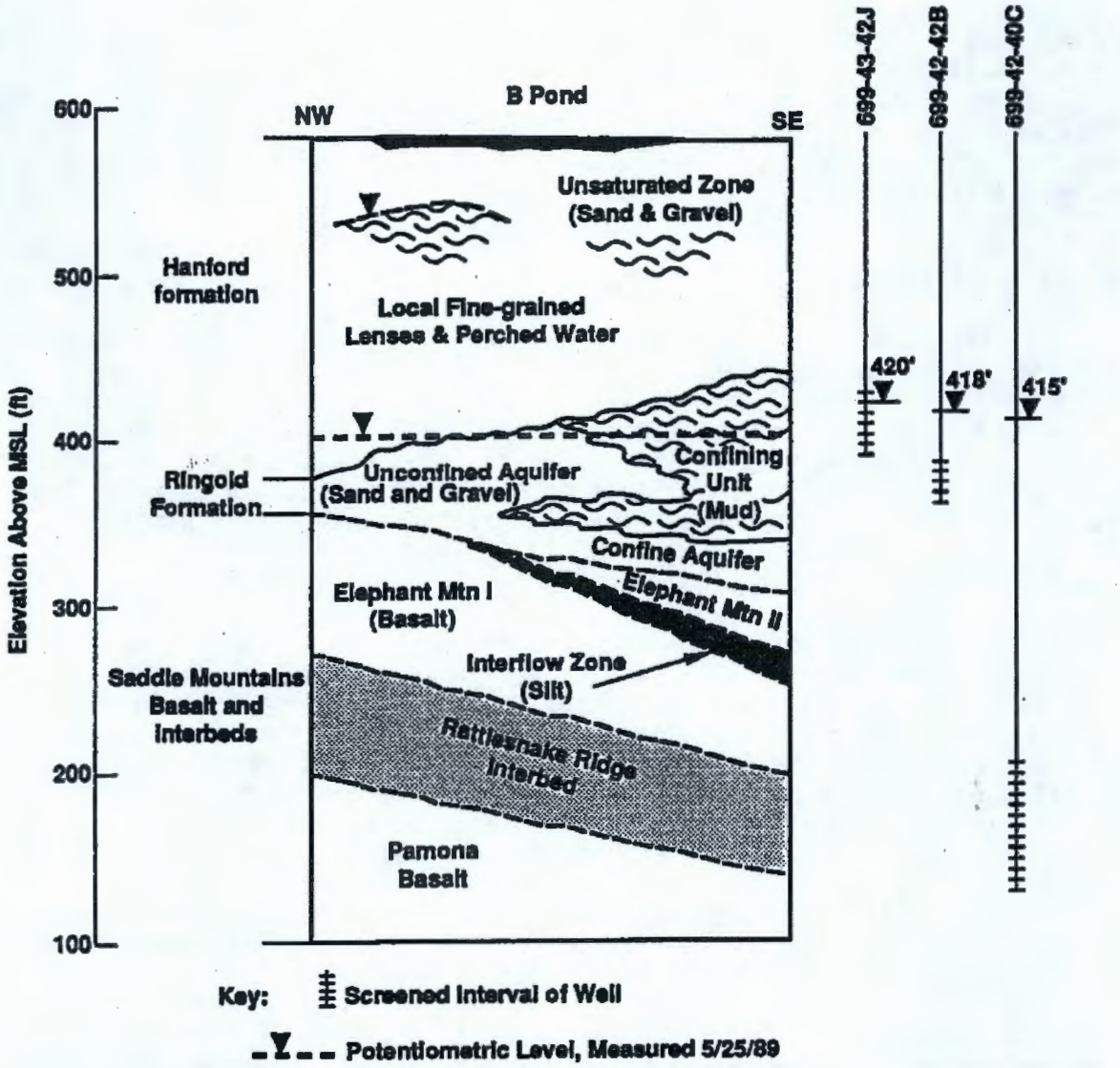


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Figure 6-1. Conceptual Drawing of B Pond Hydrogeology.

The 3C Pond was constructed by excavating 6 ft of soil over a 41-acre surface area. Eight parallel, north-south trenches, approximately 8 to 14 ft wide and 4 ft deep, were excavated in the pond bottom to increase infiltration. These trenches are connected by an east-west trench. To date, the main bottom of the 3C Pond has never been wetted, and all of the waste has percolated through the trenches. The bottom elevation of the 3C Pond is approximately 533 ft above MSL; the bottoms of the trenches are at about 529 ft.

6.2 UNSATURATED ZONE

The unsaturated zone beneath B Pond ranges in thickness from 124 ft at wells 699-42-40A and 699-42-40B to between 150 and 160 ft at wells 699-42-42B, 699-43-42J, 699-43-43, 699-44-42, and 699-45-42. It is composed of primarily Hanford formation sediments (Figures 5-4, 5-5, and 5-6), mostly sands and gravels, with minor amounts of silt and clay. In some areas the Hanford formation is overlain by a thin layer of eolian sand (Section 5.3.4). The unsaturated zone includes the top few feet of the fine-grained Ringold sediments near wells 699-40-39 and 699-41-40, where the water table is below the Hanford-Ringold contact.

Moisture content analyses were performed on sediment samples taken while drilling the RCRA wells. Samples were not collected at regular intervals in all wells; water was occasionally added during drilling, which precluded sampling for natural moisture content. Results of the moisture analyses are presented in Appendix D. Most values ranged from 3 to 7%. Zones of significantly higher moisture content were observed in wells 699-44-42 (at 80 to 90 ft of depth), 699-43-43 (35 to 40 and 85 ft), 699-42-42B (35, 50 to 60, 70 to 80, and 90 ft), 699-43-45 (14, 43 to 55 ft), and 699-41-40 (126 to 149 ft, which is below the potentiometric surface). These zones of relatively high moisture content appear to be associated with sand lenses, but because sampling was discontinuous, it is not possible to trace the extent of the high moisture zones.

A thin layer of perched water was encountered in muddy sand at approximately 44 ft below land surface while drilling well 699-43-45. This perched water zone does not appear to be areally continuous; no perched water was noted in the other wells.

No perched water was observed beneath the 3C Pond, although the fine-grained layer at the top of the saturated zone is thickest in this region, and percolation rates from 3C are higher than from the other ponds (Section 6.1). It is possible that the clay layer is not areally continuous beneath the 3C Pond or that water drains off the surface of the clay relatively rapidly. Another possibility is that there <u>is</u> perched water in this area, and that it simply was not observed during drilling. Soil samples from just above the clay zone in 699-41-40 did not have high moisture contents, however.

6.3 SUPRABASALT AQUIFER SYSTEM

This section describes the suprabasalt aquifer system at the B Pond site. Hydraulic properties of the subunits, potentiometric levels, and direction and rate of ground water flow are discussed.

6.3.1 Description

The suprabasalt aquifer beneath B Pond predominantly comprises the sediments of the Ringold Formation. The overlying Hanford formation extends to below the water table in the western portion of B Pond. Water-level data indicate that the water table or potentiometric surface beneath B Pond ranges from 125 to 160 ft in depth below the ground surface. The thickness of the saturated zone within the suprabasalt sediments beneath B Pond ranges from 75 to 100 ft.

The uppermost aquifer beneath B Pond has characteristically been referred to as unconfined. However, hydrogeologic data from some of the 1988 and 1989 wells indicate that 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. The uppermost aquifer is considered to be confined at those locations where the hydrostatic head within the water-bearing unit rises above the top of the unit. The suprabasalt aquifer is unconfined to the west and north of the 216-B-3 Pond and is confined in the southeast part of the site, beneath the 3C Pond. The presumed lateral extent of the fine-grained confining unit, estimated from geologic data (Section 5.3), is shown in Figure 6-2.

Aquifer tests and laboratory tests were conducted to estimate the hydraulic properties of the subunits within the suprabasalt aquifer. Results are described below for the Hanford formation and for three units within the Ringold Formation: the unconfined aquifer, the confining unit, and the confined aquifer. Aquifer test data and a description of analytical methods are presented in Appendix I and are summarized in Tables 6-1 and 6-2.

Results of slug tests should be interpreted with caution. Slug tests stress only a small portion of the aquifer, and therefore the results represent aquifer characteristics in the immediate vicinity of the well screen. Slug tests may also be affected by the presence of the sand packs around the well screen. In some cases, the test results may actually reflect the hydrologic properties of the sand pack, rather than the aquifer.

6.3.1.1 Hanford Formation. Constant-discharge tests in two wells (699-43-43 and 699-44-42) were conducted over an interval extending over both the Hanford and Ringold Formations in the upper part of the unconfined aquifer. Hydraulic properties determined from these tests are probably more representative of the Hanford formation than the Ringold Formation because the Hanford formation is generally more permeable than the Ringold Formation, therefore yielding more water per unit thickness. In addition, the portion of the screen length extending over the Hanford formation was greater than that over the Ringold Formation for each of the tests. Transmissivity values were estimated to be 37,000 ft^2/d and 76,000 ft^2/d from wells 699-43-43 and 699-44-42, respectively.

A semilogarithmic plot of the time-drawdown data (Appendix I) from well 699-44-42 indicates that the slope increases after 20 min and after 150 min of pumping. These changes in slope appear to reflect negative boundary effects, a result of decreasing transmissivity in one or more directions with increasing distances from the well.

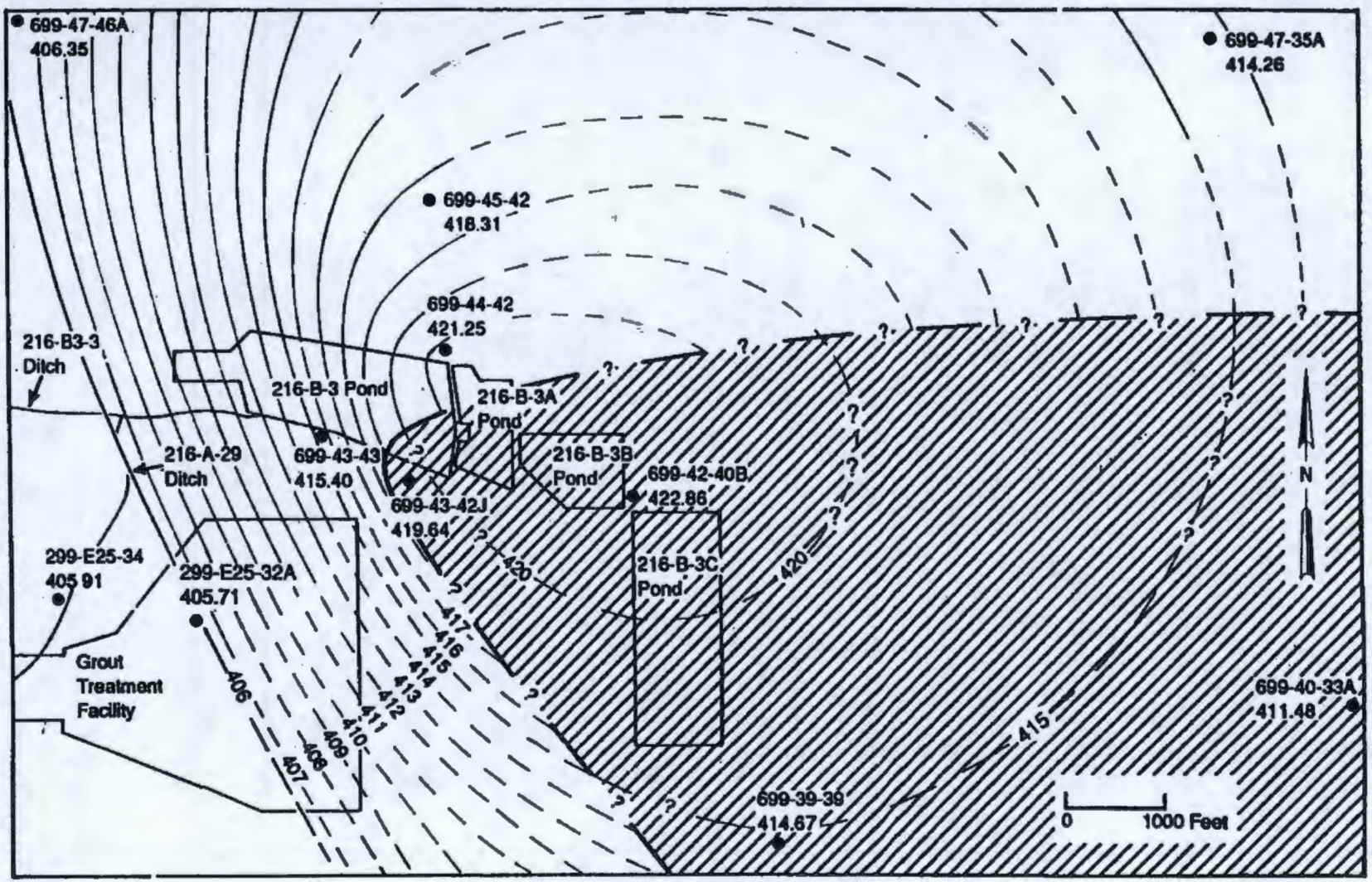

Figure 6-2. Water Table of Unconfined Aquifer and Potentiometric Surface of Suprabasalt Confined Aquifer Beneath B Pond. (Water levels were measured 5/24/89 in all wells except 699-47-46A, which was measured 6/9/89. Shaded area represents approximate extent of confining unit.)

Table 6-1. Summary of B Pond Aquifer Test Results

Well Number	Well Construction; Depth of Interval Tested (ft)	Formation	Type of Test	Analysis Method	Transmissitivy (ft^2/d)	Hydraulic Conductivity (ft/d)	Date Tested
699-44-42	temp. casing, screen; 155.3 to 173.6	Hanford/ Ringold	constant discharge	Cooper-Jacob (1946)	76,000	4,200	09/22/88
699-43-43	temp. casing, screen; 162 to 180	Hanford/ Ringold	constant discharge	Cooper-Jacob (1942)	37,000	2,100	09/09/88
699-44-43B	temp. casing, open hole; 173 to 176	Ringold (unconfined)	slug injection	Bouwer and Rice (1976)	0.3[a]	0.1	05/19/89
			slug withdrawal	Bouwer and Rice (1976)	0.8[a]	0.2	05/19/89
699-44-43B	final casing, screen; 161 to 176	Ringold (unconfined)	slug injection	Bouwer and Rice (1976)	71[a]	4.7	07/06/89
699-41-40	temp. casing, open hole; 147 to 158	Ringold (confining unit)	bail	Skibitzke (1958)	0.01	0.001[b]	05/26/89
699-42-42B	split-spoon sample; 178.42 to 178.65	Ringold (confining unit)	falling-head permeameter	Klute and Dirksen (1986)	---	0.07[c]	06/28/89
699-42-42B	split-spoon sample; 165.0 to 165.2	Ringold (confining unit)	const.-head permeameter	Klute and Dirksen (1986)	---	0.002[c]	06/29/89
699-42-42B[d]	final casing, screen; 192.9 to 203.2	Ringold (confined)	constant discharge	Cooper-Jacob (1942)	140	6[b]	10/18/88
699-43-41E	final casing, screen; 138 to 148	Ringold (confined)	slug injection	Cooper et al. (1967)	15 to 19	1.5 to 1.9[b]	06/29/89
699-43-41F	final casing, screen; 166 to 176	Ringold (confined)	slug injection	Cooper et al. (1967)	34 to 45	3.4 to 4.5[b]	05/30/89
699-41-40	final casing, screen; 164 to 174	Ringold (confined)	slug injection	Cooper et al. (1967)	2.0 to 3.4	.2 to .34[b]	07/07/89
699-40-39	final casing, screen; 202 to 212	Ringold (confined)	slug injection	Cooper et al. (1967)	4.5	0.45[b]	08/04/89

[a]Transmissivity was estimated from hydraulic conductivity, assuming saturated thickness equal to test interval thickness.
[b]Hydraulic conductivity was estimated from transmissivity, assuming saturated thickness equal to test interval thickness.
[c]Vertical hydraulic conductivity.
[d]Aquifer thickness, 22 ft.

Table 6-2. Summary of Aquifer Test Results for Wells 699-42-40A, B, and C (Graham et al. 1984, pp. C.10 to C.16).

Well Number	Depth of Interval Tested (ft)	Formation	Type of Test	Analysis Method	Transmissitivy (ft^2/d)	Hydraulic Conductivity (ft/d)	Storativity	Date Tested
699-42-40A[a] Observation Well	139 to 171	Ringold	constant discharge	Cooper-Jacob (1946)	310	4	1.7×10^{-2}	01/18/82
699-42-40B[a] Observation Well	130 to 150	Ringold	constant discharge	Cooper-Jacob (1946)	360	5	9.3×10^{-2}	01/18/82
699-42-40C	---	Elephant Mountain Interflow	constant discharge	Cooper-Jacob (1946)	8	---	---	04/15/82
699-42-40C[b]	93 to 119	Rattlesnake Ridge	constant discharge	Cooper-Jacob (1946)	300	12	---	05/19 to 05/21/82
699-42-40C[b]	93 to 119	Rattlesnake Ridge	recovery	Jacob (1963)	170	7	---	05/21 to 05/22/82
699-42-40C[b]	93 to 119	Rattlesnake Ridge	constant discharge	Cooper-Jacob (1946)	310	12	---	11/18 to 11/19/82
699-42-40C[b]	93 to 119	Rattlesnake Ridge	recovery	Jacob (1963)	260	10	---	11/19/82
699-42-40C[b]	93 to 119	Rattlesnake Ridge	slug injection	Cooper-Jacob (1946)	910	35	---	10/30/82
699-42-40C[b]	93 to 119	Rattlesnake Ridge	slug withdrawal	Cooper et al	130	5	---	10/30/82

[a]Aquifer thickness, 75 ft.
[b]Aquifer thickness, 26 ft.

Examination of the time-drawdown data and application of equations by Hargis (1979) and Schafer (1978) indicate that the effects of borehole storage during each of the aquifer pumping tests were negligible after 1 min of pumping.

6.3.1.2 Ringold (unconfined). Two slug tests were conducted in well 699-44-43B. The first was conducted in an open portion of the hole before completion (173 to 176.12 ft below the surface). The lithology at that depth is primarily muddy sand and gravel. Hydraulic conductivity calculated by the Bouwer and Rice (1967) method was 0.1 ft/d for slug injection and 0.2 ft/d for slug withdrawal. A second slug test was conducted in the completed well. The test interval was larger than for the first test (161 to 176 ft below land surface). The litholgy in the upper portion of the test interval is slightly coarser than in the lower part. Resulting estimate of hydraulic conductivity was 4.7 ft/d.

6.3.1.3 Ringold (confining unit). Transmissivity was estimated by the "bailer" method at well 699-41-40. This method involves measuring the rise in water level in the open hole and casing during drilling. The test interval was 11 ft of open hole below the temporary casing. The lithology at this interval is mud. Transmissivity was calculated by a method described by Skibitzke (1958). The result was 0.01 ft^2/d.

Falling-head and constant-head permeameter tests were conducted on sediment samples collected from well 699-42-42B to determine vertical hydraulic conductivity. These sediment samples represent fine-grained materials of the Ringold Formation in the upper portion of the aquifer, each representing a different interval from the sediment profile. Results of the falling-head test yielded a vertical saturated hydraulic conductivity of approximately 0.07 ft/d. Results of the constant-head test yielded a vertical saturated hydraulic conductivity of approximately 0.002 ft/d.

6.3.1.4 Ringold (confined aquifer). Slug tests were conducted in the confined aquifer of the Ringold Formation at wells 699-43-41E, 699-43-41F, 699-41-40, and 699-40-39. Transmissivity was estimated by the Cooper et al. (1967) method. Values ranged from 2 to 45 ft^2/d (equivalent hydraulic conductivity approximately 0.2 to 4.5 ft/d).

A multiple-well constant-discharge test was conducted at well 699-42-42B, and well 699-43-42J was used as an observation well. The tested interval in the pumping well represented the Ringold Formation in the lower part of the uppermost aquifer. The aquifer at this well is considered to be semiconfined or confined. Application of the Cooper-Jacob (1946) method yielded an estimate of hydraulic conductivity of 6 ft/d. Storativity and the ratio of horizontal to vertical hydraulic conductivity could not be determined because of the lack of response in the observation well.

An important assumption of the Cooper-Jacob analysis is that the well fully penetrates the aquifer. The screened portion of well 699-42-42B does not fully penetrate the aquifer. The effect of partial penetration on the analysis results is discussed in Appendix I. The analysis also assumes that well entrance losses are negligible. Well entrance losses occurred at the beginning of the test as indicated by 10.5 ft of drawdown after 1 min of pumping.

Another multiple-well constant-discharge aquifer test was conducted at well 699-42-40C in 1982 (Table 6-2; Graham et al. 1984, pp. C.10 and C.11). The observation wells used during the test were 699-42-40A and 699-42-40B. This test was conducted in the lowermost sediments of the Ringold Formation. Transmissivities determined from results of this test yielded values of 310 ft^2/d (well 699-42-40A) and 360 ft^2/d (well 699-42-40B). Estimates of storativity are 1.7×10^{-2} (observation well 699-42-40A) and 9.3×10^{-3} (observation well 699-42-40B).

6.3.2 Potentiometric Levels

The water table or potentiometric surface in the unconfined aquifer beneath B Pond ranges in elevation from approximately 410 to 422 ft above MSL. The depth to water is approximately 125 to 160 ft below land surface. The May 1989 water-table map (Figure 6-2) shows the presumed configuration of the water table beneath B Pond and adjacent areas. The elevations of wells used to construct this map are referenced to the 200 East or U.S. Geological Survey datum.

The potentiometric surface of the confined suprabasalt aquifer is similar to that of the unconfined aquifer. The approximate potentiometric surface is illustrated in Figure 6-2.

The ground water gradient is determined from head change along a presumed flow path. The horizontal gradient in the unconfined aquifer is steepest on the western flank of the ground water mound: about 0.007 near well 699-43-43 and 0.005 upgradient of well 299-E25-32A. There is a relatively abrupt change in gradient in the vicinity of well 299-E25-32A; the gradient to the west of that well is approximately 0.001. The approximate gradient near wells 699-45-42, 699-39-39, and 699-40-33A, which are north, south, and east of B Pond, is 0.002. The lower gradients may represent higher transmissivities and/or dissipation of the effect of artificial recharge from B Pond.

There is also a downward vertical hydraulic gradient within the suprabasalt aquifer beneath B Pond. This is evident from a comparison of potentiometric levels between wells 699-42-42B and 699-43-42J. Well 699-43-42J is completed in the upper portion of the uppermost aquifer (open interval of 156.9 to 177.4 ft below land surface), and well 699-42-42B is completed in the lower portion of the uppermost aquifer (open interval of 192.9 to 203.2 ft below land surface). The potentiometric levels measured in these wells on May 24, 1989, were 419.64 and 417.58 ft above MSL, respectively. This downward gradient of approximately 0.1 is caused by the mounding and recharge resulting from discharges to B Pond.

In January 1944, before discharges to B Pond began, the potentiometric surface in the unconfined aquifer was approximately 380 to 390 ft above MSL (ERDA 1975). Discharges to B Pond began in 1945. Well 699-45-42, completed in 1948 and open to the unconfined aquifer, shows a rise in water level of about 35 ft from 1956 to 1989 (Figure 6-3). Fluctuations in the discharge to B Pond continue to cause variations in the amount of artificial recharge, which results in fluctuations in the potentiometric surface. Natural seasonal variations in the ground water levels beneath B Pond are insignificant compared to these artificially induced fluctuations. Hydrographs and water elevations for wells near B Pond are listed in Appendix E.

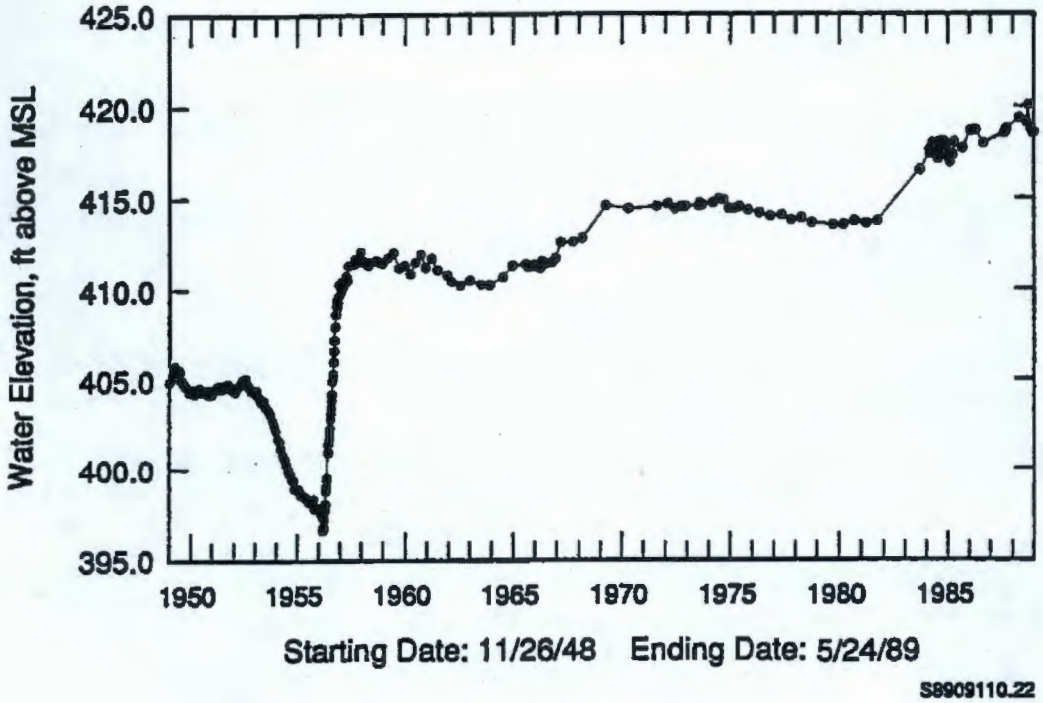

Figure 6-3. Water Levels in Well 699-45-42, 1949 to 1989.

6.3.3 Direction and Rate of Ground Water Flow

Ground water moves radially outward from a ground water high beneath B Pond. This ground water mound is evident in the water-table map (Figure 6-2). A downward hydraulic gradient also exists in the uppermost aquifer beneath B Pond.

An estimation of the average linear ground water velocity can be calculated from the following equation based on Darcy's law:

$$v=(KI)/n$$

where:

v = velocity, ft/d
K = hydraulic conductivity, ft/d
I = hydraulic gradient (dimensionless)
n = effective porosity (dimensionless).

The calculations of ground water velocity assume horizontal flow and a homogeneous aquifer. The following inputs were used to determine the velocity near well 699-43-43:

K = 2,100 ft/d (Table 6-1)
I = 0.007 (Section 6.3.2)
n = 0.10 to 0.30 (Graham et al. 1981, p. 3-12).

The given value of K is most likely representative of the Hanford formation (Section 6.3.1). The calculated v ranges from approximately 50 to 150 ft/d.

The approximate v of the Ringold Formation can be determined from the following inputs determined near well 699-42-40B:

K = 5 ft/d (Transmissivity = 360 ft^2/d [Graham et al. 1984, p. C.11], and aquifer thickness = 75 ft)
I = 0.002 (Section 6.3.2)
n = 0.10 to 0.30 (Graham et al. 1981, p. 3-12).

Using the above inputs, horizontal v ranges from approximately 0.03 to 0.1 ft/d for the Ringold Formation.

Other estimates of horizontal ground water v have been made for the 200 areas, based on the movement of the tritium plume (Wilbur et al. 1983, Plates 3 to 6). The configuration of the plume in 1964 indicates that ground water flowed at an average of 0.9 mi/yr since the PUREX Plant began operations. Data from 1972 indicate tritium migration of 11.4 mi in 16 yr, or an average of 0.7 mi/yr. These estimates correspond to a range from 10 to 13 ft/d. These estimates probably represent ground water flow in the Hanford formation and in the coarser-grained portions of the Ringold Formation.

As discussed above, the vertical I is estimated to be two orders of magnitude greater than the horizontal gradient, so the downward flow of ground water beneath B Pond is significant. This water may enter underlying aquifers in the basalt and interflow aquifer system (Section 6.3.3). There are insufficient data to estimate vertical ground water v in the suprabasalt aquifer.

6.4 BASALT AND INTERFLOW AQUIFER SYSTEM

This section describes the aquifer system contained in the Columbia River Basalts. Hydraulic properties, potentiometric levels, and direction and rate of ground water movement are discussed. Basalt stratigraphy is discussed in section 5.3.1.

6.4.1 Description

The two uppermost confined aquifers in the basalt beneath B Pond are the interbed-interflow zone between the Elephant Mountain I and Elephant Mountain II basalts and the Rattlesnake Ridge aquifer. The Elephant Mountain aquifer consists of interconnected vesicles, basalt rubble, and in some places sands and clays. This zone was encountered in well 699-42-40C and well 299-E16-1 (Graham et al. 1984, pp. 15 to 17). Well 299-E16-1 is located about 4,000 ft southeast of B Pond. The extent and thickness of this zone are unknown. The Rattlesnake Ridge aquifer is the uppermost regionally extensive aquifer within the basalts. It comprises the flow bottom of the Elephant Mountain Member, the flow top of the Pomona basalt, and the Rattlesnake Ridge interbed (Graham et al. 1984, p. 10).

The confining unit between the Rattlesnake Ridge aquifer and the unconfined aquifer is composed of the dense interiors of the Elephant Mountain Member. At well 699-42-40C, the thickness of the Elephant Mountain Member is about 100 ft (Graham et al. 1984, p. 48). The thickness of the Elephant Mountain Member to the southeast of B Pond is unknown because of a lack of wells penetrating the basalts.

Aquifer tests of the basalt aquifer system have been conducted in the past. Results of some of the tests conducted near B Pond are summarized below and listed in Table 6-2.

6.4.1.1 Elephant Mountain Member. A constant-discharge test at well 699-42-40C in 1982 (Graham et al. 1984, p. C.12) was conducted over an interval open to the Elephant Mountain Interflow Zone. Results of the test yielded a transmissivity of approximately 8 ft^2/d. The results of this aquifer test are summarized in Table 6-1.

6.4.1.2 Rattlesnake Ridge Aquifer. The two constant-discharge tests, two recovery tests, and two slug tests performed in well 699-42-40C in 1982 (Graham et al. 1984, pp. C.13 to C.16 and D.7 to D.8) were conducted in the sediments of the Rattlesnake Ridge confined aquifer. Results of the constant-discharge tests yielded transmissivity values of 300 ft^2/d and 310 ft^2/d, and the recovery tests yielded transmissivity values of 170 ft^2/d and 260 ft^2/d.

The slug test included both an injection and withdrawal test. The slug injection test results yielded a transmissivity value of 910 ft^2/d, and the slug withdrawal test results yielded a transmissivity value of 130 ft^2/d. The results of each aquifer test are summarized in Table 6-1.

6.4.1.3 Basalt Flow Interiors. Hydraulic conductivities of the Columbia River basalts flow interiors are extremely low, ranging from 3×10^{-6} to 3×10^{-8} ft/d (DOE 1988, p. 3.9-101).

6.4.2 Potentiometric Levels

Kasza and Schatz (1989, p.4) compared the potentiometric surface of the Rattlesnake Ridge aquifer with the water table in the suprabasalt aquifer. As a result they defined an area of downward hydraulic gradient associated with B Pond (Figure 6-4).

An example of this downward gradient is observed in well 699-42-40A, which is completed in the uppermost aquifer (open interval of 140 to 171 ft below land surface) and well 699-42-40C, which is completed in the Rattlesnake Ridge aquifer (open interval of 306 to 390 ft below land surface). The potentiometric level measured in well 699-42-40A on April 24, 1989, was 422.92 ft above MSL. The potentiometric level measured in well 699-42-40C on May 25, 1989, was 415.32 ft above MSL. These data indicate a downward hydraulic gradient between the uppermost aquifer and the Rattlesnake Ridge aquifer, providing the potential for downward movement across the Elephant Mountain Member.

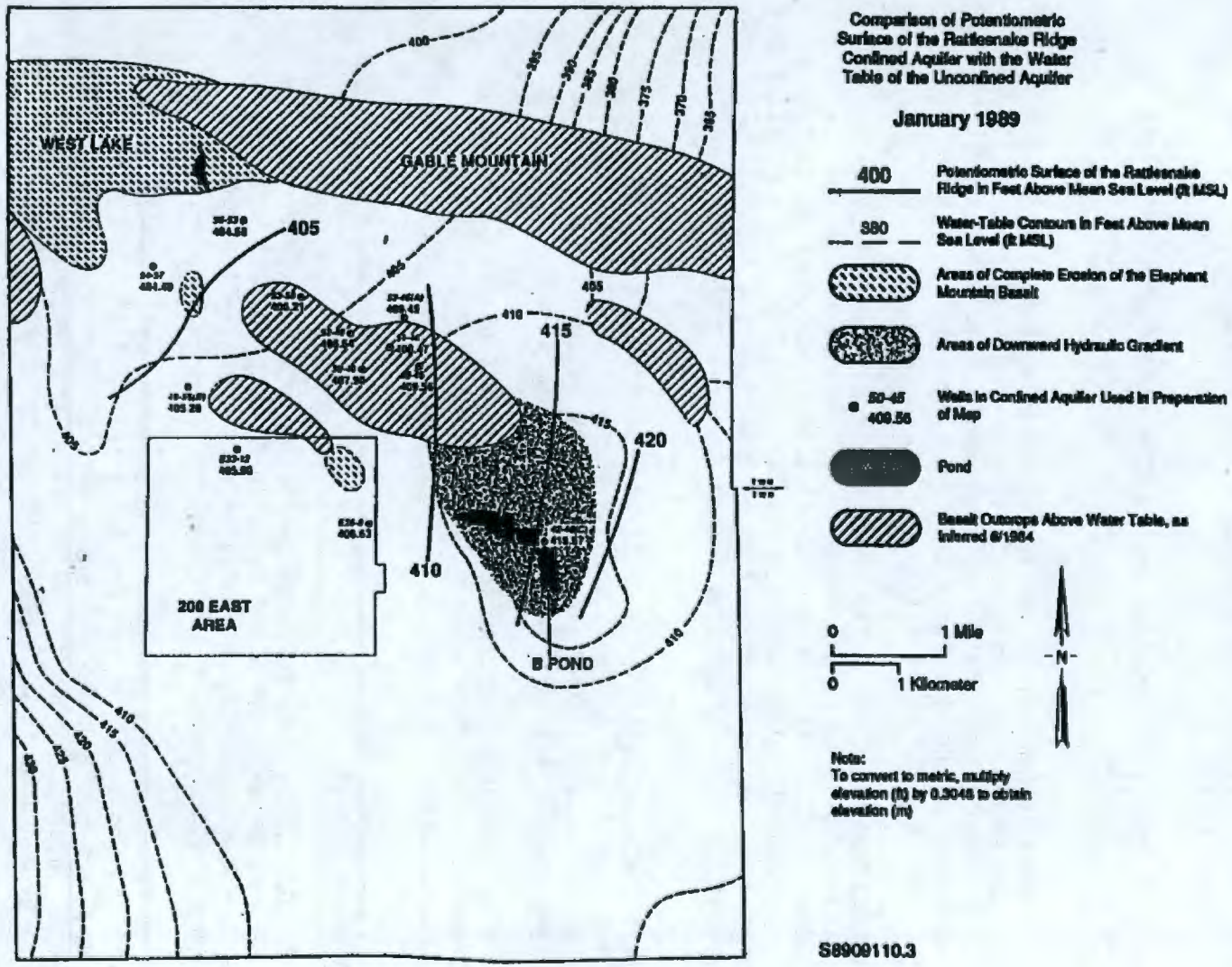

Figure 6-4. Comparison of Potentiometric Surface of the Rattlesnake Ridge Confined Aquifer with the Water Table of the Unconfined Aquifer (Kasza and Schatz 1989, p.4).

6.4.3 Direction and Rate of Ground Water Flow

Outside the area of B Pond, ground water tends to flow upward from the Rattlesnake Ridge confined aquifer to the overlying unconfined aquifer because hydraulic head in the confined aquifer is higher than in the unconfined aquifer. As discussed previously, the ground water mound beneath B Pond has reversed the natural vertical hydraulic gradient. The general horizontal direction of ground water flow in the Rattlesnake Ridge aquifer near B Pond is toward the west (Figure 6-4).

Leakage between the unconfined aquifer and the basalt aquifer system is discussed in Graham et al. (1984) and Jensen (1987). Aquifer intercommunication may occur in areas where the confining unit is eroded away or by leakage occurring through fractures in the Elephant Mountain Member. Areas of erosion are identified north and west of B Pond (Graham et al. 1984, p. 68). These areas of erosion do not coincide with the areas of downward hydraulic gradient (Figure 6-4).

Wells 699-42-40A, 699-42-40B, and 699-42-40C are located about 25 ft from each other near B Pond. Well 699-42-40A and 699-42-40B are screened in the upper part of the suprabasalt aquifer, and well 699-42-40C is screened in the Rattlesnake Ridge aquifer. Jensen (1987, pp. 11 and 12) reported similar water-level changes in these wells (Figure 6-5). The magnitude and timing of change is similar between wells 699-42-40A and 699-42-40B. Well 699-42-40C shows a dampened water-level response. This response may indicate that: 1) the Rattlesnake Ridge aquifer is hydraulically connected to the overlying suprabasalt aquifer(s) and/or 2) the potentiometric levels in the Rattlesnake Ridge aquifer reflect aquifer loading from the increased water levels in the overlying suprabasalt aquifer(s).

Ground water chemistry in the confined aquifer also provides information on whether there is ground water flow from the suprabasalt sediments into the Rattlesnake Ridge interbed (Graham et al. 1984, pp. 70 to 85). Tritium is present in the confined aquifer, with the highest concentrations associated with the 200 East Area. A well adjacent to B Pond, 699-42-40C, contained low concentrations of tritium in the Rattlesnake Ridge aquifer. However, this contamination appeared to be local and may have been introduced during drilling of the well. Tritium concentration decreased from 39 to 12.2 pCi/L during an aquifer test of this well. More recently, however, the tritium concentration in the well has increased continually since 1987 and was 2,970 pCi/L in February 1989. Any contamination in the Rattlesnake Ridge aquifer eventually will probably discharge back to the suprabasalt aquifer (Graham et al. 1984, p. 89).

If contamination from B Pond enters the Elephant Mountain or Rattlesnake Ridge aquifers, the rate of contaminant movement would probably be longer than in the suprabasalt aquifer, because: 1) the ground water gradient of the deeper aquifer are lower and 2) the hydraulic conductivity of the deeper aquifers are lower than the coarse-grained units of the suprabasalt aquifer.

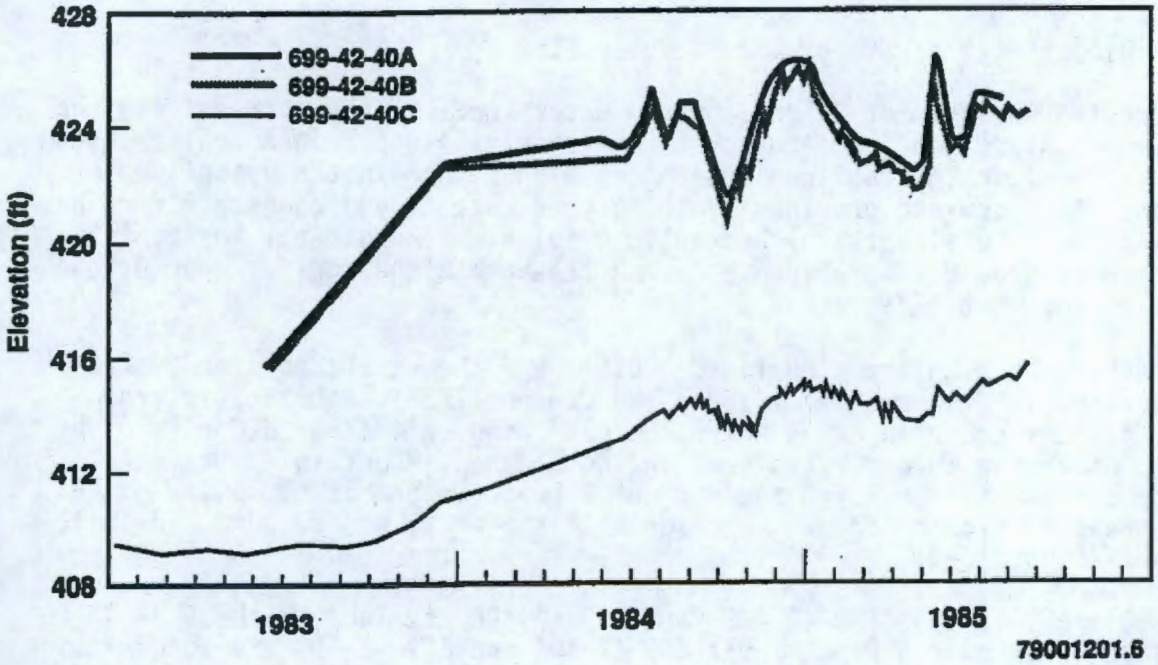

Figure 6-5. Hydrograph of Wells 699-42-40A, 699-42-40B, and 699-42-40C (Jensen 1987, p. 12).

7.0 GROUND WATER QUALITY

This section describes ground water quality in the B Pond area, including background and downgradient data. The occurrence of ground water contaminants in the vicinity of B Pond is discussed.

Ground water samples are analyzed for the parameters listed below as required by 40 CFR 265.92 (EPA 1980a), and for hydrazine, ammonia, and tritium. Some samples are analyzed for the "long list" of constituents (40 CFR 264, Appendix IX [EPA 1980b], and WAC 173-303-9905 [Ecology 1987]). Results of chemical analyses from RCRA monitoring wells are contained in Appendix F.

Interim Primary Drinking Water Standards[a]	Maximum Level[b]
arsenic	0.05
barium	1.0
cadmium	0.01
chromium	0.05
fluoride	1.4 to 2.4
lead	0.05
mercury	0.002
nitrate (as NO_3^-)	45
selenium	0.01
silver	0.05
endrin	0.0002
lindane	0.004
methoxychlor	0.1
toxaphene	0.005
2,4-D	0.1
2,4,5-TP silvex	0.01
radium	5 (pCi/L)
gross alpha	15 (pCi/L)
gross beta	4 (mrem/yr)
turbidity (surface water only)	1 (TU)
coliform bacteria	1/100 (mL)

Ground Water Quality Parameters[a]	Ground Water Contamination Indicator Parameters[a]
chloride	pH
iron	specific conductance
manganese	total organic carbon
phenols	total organic halogen
sodium	
sulfate	

[a]Regulatory requirements for sampling parameters are subject to change because of Federal regulations.
[b]Unless otherwise noted, concentrations are in mg/L.

7.1 BACKGROUND

As discussed in Section 4.0, there is no upgradient location in the vicinity of B Pond because of the ground water mound beneath the facility. Every location within at least 1,000 ft of B Pond is hydrologically "downgradient." Regional upgradient locations were selected for the background monitoring wells, 299-E18-1 and 299-E32-4. Ground water chemistry from wells 299-E18-1 and 299-E32-4 is expected to be unaffected by recharge to ground water beneath B Pond. Chemistry data from these wells are plotted on Figure 7-1. These data indicate a higher sulfate percent in these wells than in wells adjacent to B Pond. Wells 299-E18-1 and 299-E32-4 also have higher specific conductance than the wells near B Pond.

Background levels for indicator parameters will be determined after 1 yr of quarterly monitoring. The level of indicator parameters from samples from downgradient wells are compared to background levels semiannually in accordance with 40 CFR 265.93 (EPA 1980a). The data will be analyzed to evaluate whether ground water is affected by B Pond. The background wells 299-E32-4 and 299-E18-1 were completed in September 1987 and August 1988, respectively. Because not enough data have been collected from both background wells, background levels of indicator parameters have not yet been determined.

The background values of indicator parameters will be established by calculating summary statistics (mean, variance, and coefficient of variation). The actual method that will be used to calculate the summary statistics will depend on the distribution of the data and the presence of any data reported as less than the limit of detection.

Wells 299-E18-1 and 299-E32-4 are the upgradient wells for B Pond. Although a complete set of ground water chemistry data from wells 299-E18-1 and 299-E32-4 with which to calculate background statistics is not yet available, chemistry data for two quarters were used to calculate a preliminary mean and standard deviation for each indicator parameter specified in 40 CFR 265.92(b)(3) (EPA 1980a). These statistics are presented below.

Parameter	Mean	Std Dev
pH, field	7.97	0.58
specific conductance, field	490	112
total organic carbon	260	72
total organic halogen	4.6	1.45.

7.2 SUPRABASALT AQUIFERS BENEATH B POND

Ground water samples have recently been collected from several wells in the vicinity of B Pond. These include 699-42-42B, 699-43-42J, 699-43-43, 699-44-42, and 699-42-40A, immediately surrounding B Pond, and two wells in the vicinity of B Pond (299-E25-25 and 699-45-42).

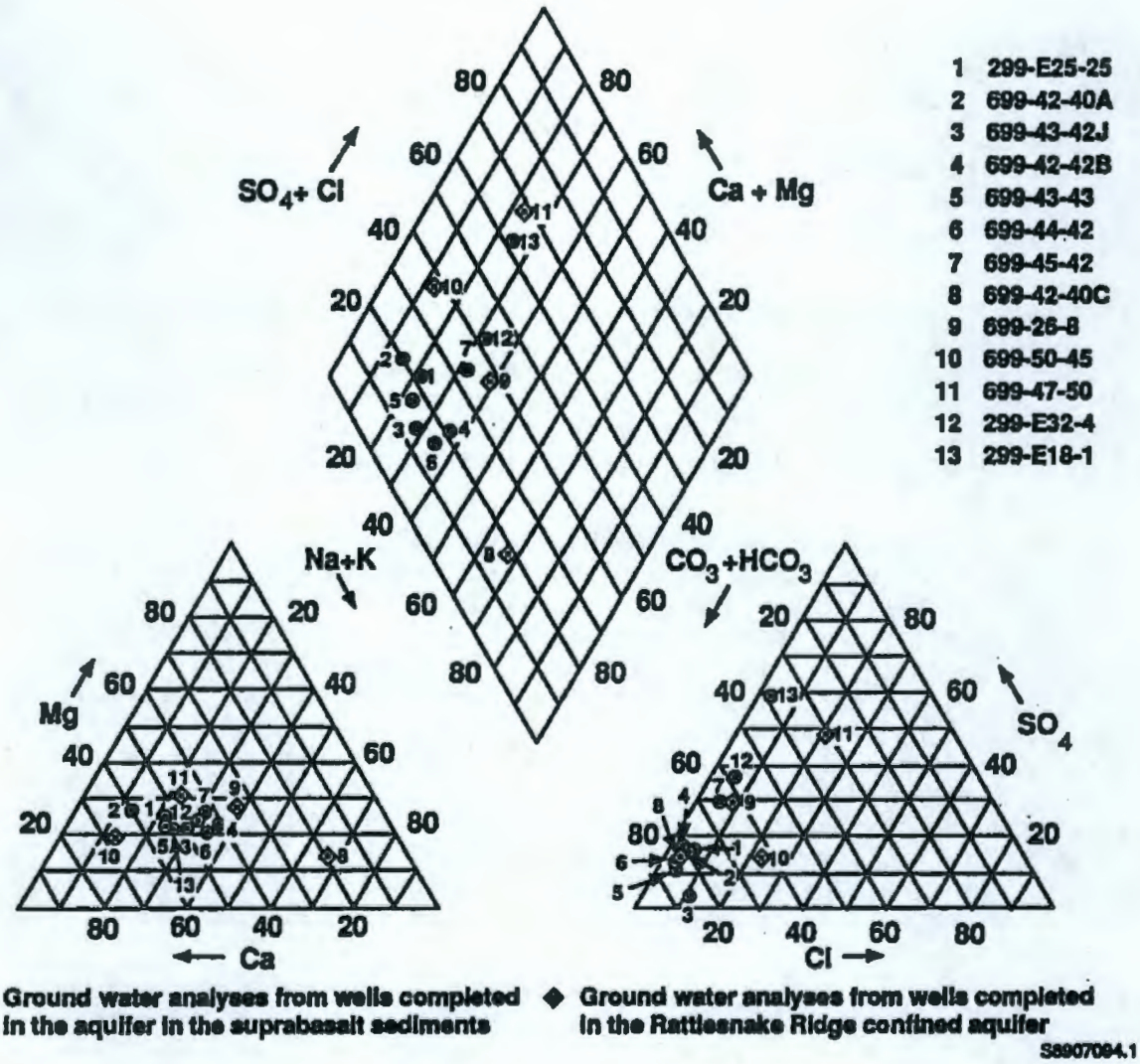

Figure 7-1. Trilinear Diagram Indicating Major Ion Ground Water Chemistry in Wells Near B Pond in the Suprabasalt Aquifer and Rattlesnake Ridge Aquifer.

Major cations and anions are plotted in percent milequivalents per liter on the trilinear diagram on Figure 7-1. Ground water in the uppermost aquifer near B Pond is primarily calcium bicarbonate or calcium/magnesium bicarbonate type. Constituents are grouped fairly close together on the trilinear diagram for analyses from the uppermost aquifer near B Pond, indicating generally similar water chemistry. Ground water chemistry is affected by artificial recharge from B Pond, which in turn reflects the chemistry of Columbia River water.

Differences in ground water chemistry in the vicinity of B Pond occur in the percentages of sodium/potassium versus calcium/magnesium, likely a result of rock/water interactions along the ground water flow paths. No attempt is made here to interpret these differences. Ground water in well 699-45-42 has similar chemistry except that the sulfate percentage is slightly higher than the sulfate percentage in the other wells in the uppermost aquifer.

Data from downgradient wells sampled semiannually will be evaluated after background concentrations have been established, per RCRA regulations. A minimum of four replicate measurements will be obtained from each downgradient well for the indicator parameters, and the arithmetic mean and variance will be calculated for each sample. The Student's t-test will be used to determine statistically significant changes in the concentrations of indicator parameters of downgradient wells as compared to initial background concentrations or values. This comparison will consider individually each of the wells in the monitoring system. For three of the indicator parameters (specific conductance, total organic carbon, and total organic halogen), a single-tailed Student's t-test will be used to test at the 0.01 level of significance for significant increases over background. The difference test for pH will be a two-tailed Student's t-test at the overall 0.01 level of significance.

Statistical comparisons between background summary statistics and downgradient data cannot be made at this time because four quarters of sampling data are not yet available. Results of indicator parameter analyses from the RCRA monitoring wells are presented in Appendix F.

A preliminary evaluation of water-chemistry data indicates that tritium is the major contaminant of concern beneath B Pond. A tritium plume map presented by Serkowski et al. (1988, p. 6-5/6) indicates tritium concentrations greater than 20,000 pCi/L in the vicinity of B Pond (Figure 7-2). This map does not include data from the new wells located adjacent to B Pond. Data from well 699-42-42B indicate tritium concentrations up to 77,800 pCi/L. This value exceeds the 40 CFR 141 (EPA 1986b) drinking water standard of 20,000 pCi/L. The next highest tritium concentration in wells located adjacent to B Pond is approximately 2,600 pCi/L in well 699-43-42J, located adjacent to well 699-42-42B. These results indicate that tritium contamination is higher at points deeper in the aquifer. This suggests the possibility that B Pond wastewater recharging the aquifer in the past contained a higher concentration of tritium than more recent wastewater, and the "older" water with higher tritium concentration has migrated vertically downward and has not been diluted at depth because of the low permeability of the materials. A downward vertical gradient exists in the vicinity of wells 699-42-42B and 699-43-42J, and the tritium concentration was, in the past, much higher than it is currently in surrounding wells, indicating the reduction of tritium concentration in the wastewater.

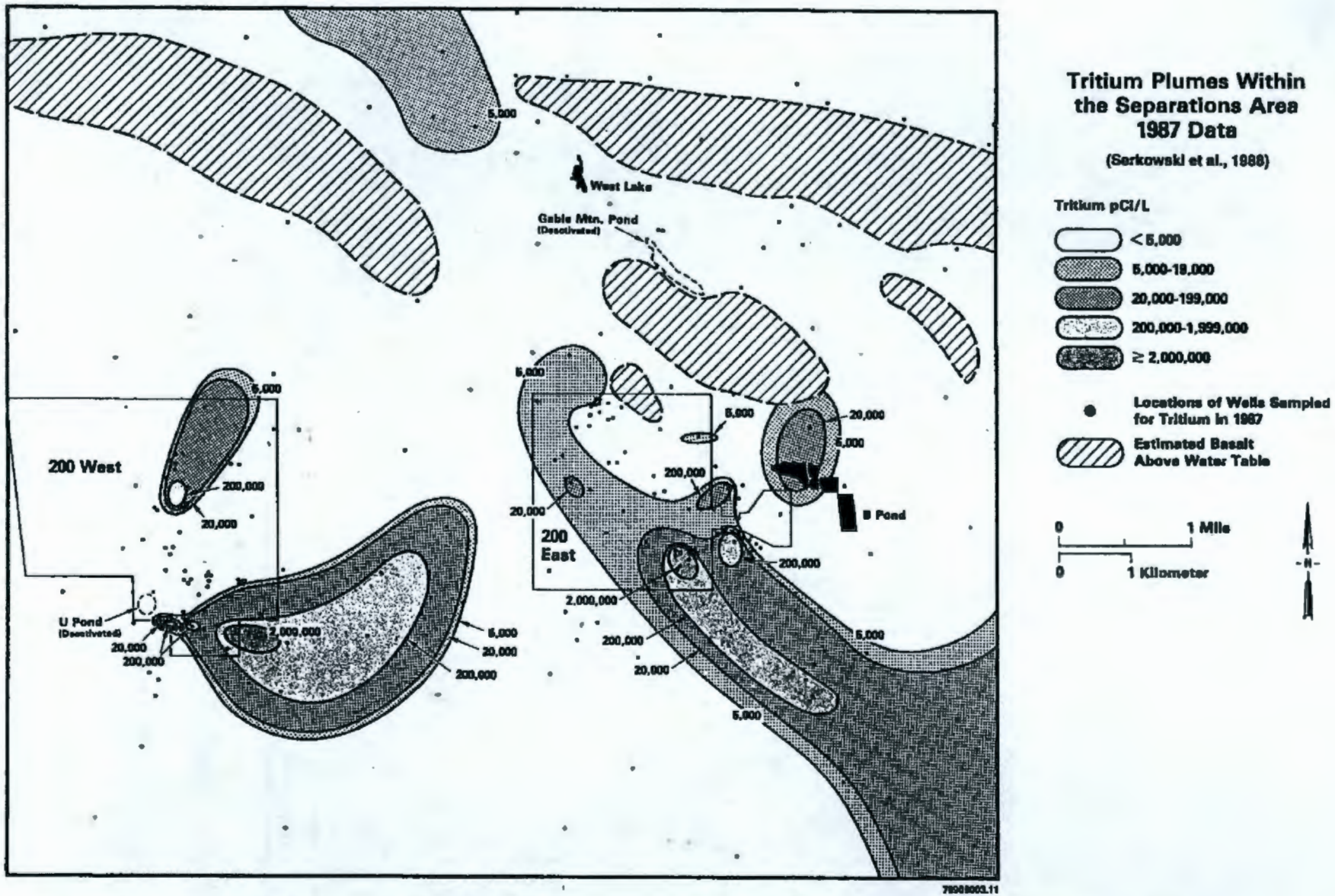

Figure 7-2. Tritium Plume Map for the Separations Area, 1987 (Serkowski et al. 1988, p. 6-5/6).

Tritium concentrations in ground water in the vicinity of B Pond were much higher in the 1960s and 1970s than they are currently. Tritium concentrations over time for several wells are plotted on Figures 7-3 and 7-4. These data are presented in Appendix F. The tritium concentration was over 2,500,000 pCi/L in well 699-42-42A in 1967, and was nearly 1,000,000 pCi/L in well 699-45-42 from 1969 through the early 1970s (Figure 7-3). After rapidly decreasing through the 1970s, it has gradually decreased the last several years (well 699-42-42A was open to the suprabasalt sediments before 1977 at which time it was deepened). Well 699-39-39, located south of B Pond, has had relatively low tritium concentrations during this time period (Figure 7-3). Tritium concentrations in wells 699-42-40A and 699-42-40B were over 200,000 pCi/L for a time after sampling began in early 1983, and then rapidly decreased to relatively low levels where they remain currently (Figure 7-4).

Ground water analyses from several new wells have indicated chromium (unfiltered) above detection limits. The concentration in November 1988 from well 699-43-43 was 57 ppb, which is above the 40 CFR 265, Appendix III (EPA 1980a), drinking water standard of 50 ppb. Elevated chromium levels have been reported for several wells constructed recently across the Hanford Site and appear to be residual from drilling or construction (Fruland et al. 1989, pp. 1.3 and 1.4).

Nitrate concentrations have been elevated (up to 6,400 ppb) in well 699-42-42B in relation to the other wells located adjacent to B Pond. The next highest concentration in a well located close to B Pond was 1,800 ppb in well 699-43-42J. The source of nitrate in these wells is possibly B Pond; the records of wastes discharged to B Pond indicate releases of nitric acid, calcium nitrate, sodium nitrate, cadmium nitrate, and sodium nitrite (Section 2.0). The nitrate concentration in well 699-45-42 has ranged between approximately 5,200 and 7,700 ppb in the last 2 yr, with no apparent upward or downward trend. The source of nitrate in ground water in the vicinity of the well is uncertain.

7.3 RATTLESNAKE RIDGE AQUIFER

One well near B Pond, 699-42-40C, is completed in the Rattlesnake Ridge Interbed aquifer. Other wells completed in this aquifer include 299-E26-8, located approximately 3,500 ft west of B Pond; 699-47-50, located approximately 6,500 ft northwest of B Pond; and 699-50-45, located approximately 6,500 ft north-northwest of B Pond. Results of analyses of ground water samples collected from these wells are presented in Appendix F. These data are taken from Graham et al. (1984, pp. I.1 to I.5) from samples collected in 1982; no recent analyses for major anions and cations have been conducted on samples from these wells. Major cations and anions are plotted in percent milequivalents per liter on the trilinear diagram on Figure 7-1. The results of the sample analyses from these wells indicate the water chemistry varies widely at these locations.

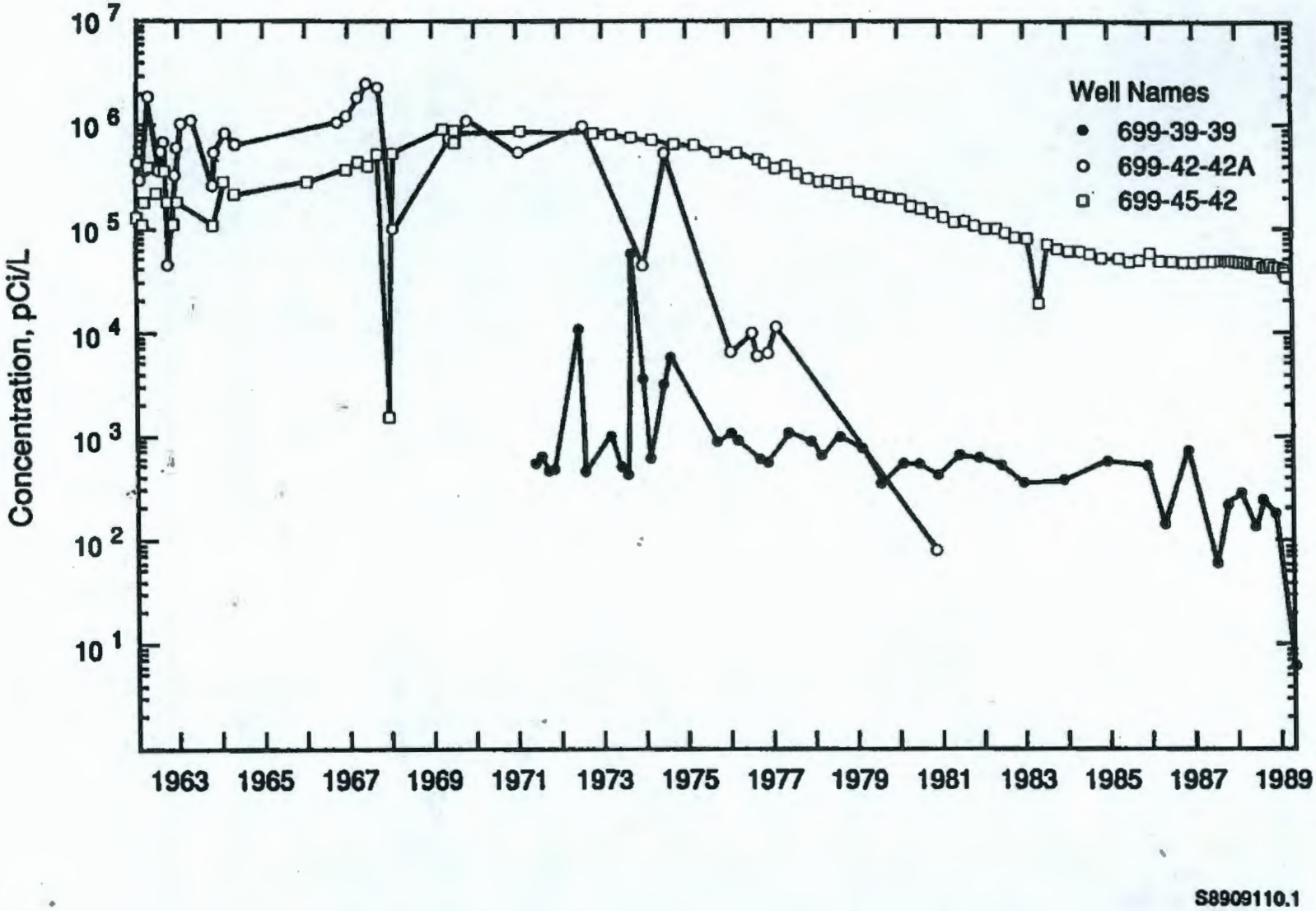

Figure 7-3. Tritium Concentrations for Wells 699-39-39, 699-42-42A, and 699-45-42, 1962 to 1989.

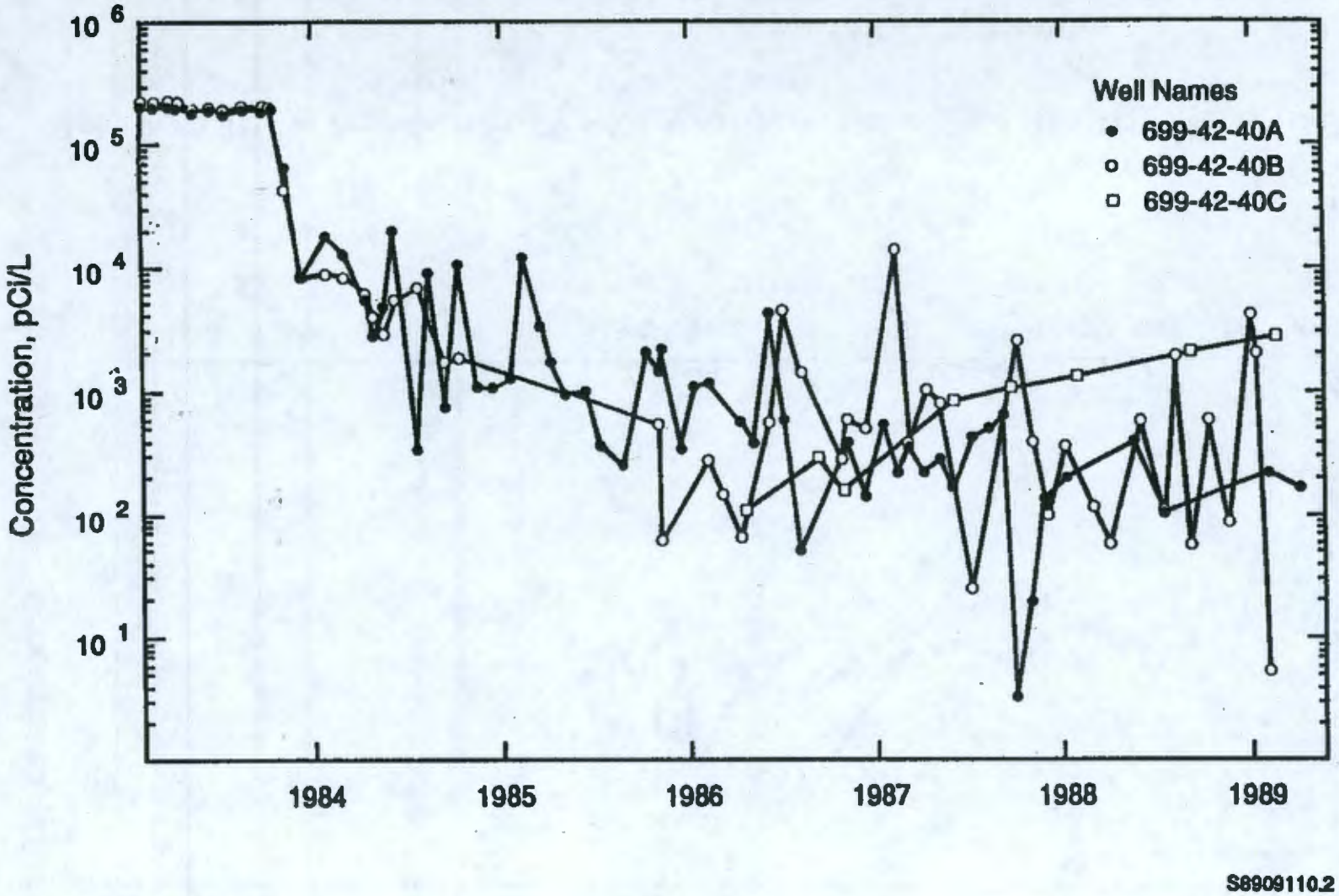

Figure 7-4. Tritium Concentrations for Wells 699-42-40A, 699-42-40B, and 699-42-40C.

The water chemistry in well 699-42-40C was a sodium bicarbonate type at the time of sampling in 1982. It is unknown whether this is representative of current conditions; however, there is no reason to expect the ground water chemistry has changed significantly since that time. Chemistry data reported by Strait and Moore (1982) indicate a similar range of major ions in Rattlesnake Ridge Interbed ground water.

Ground water chemistry in the confined aquifer has been evaluated to assess aquifer intercommunication between the uppermost aquifer in the suprabasalt sediments and the Rattlesnake Ridge Interbed aquifer (Graham et al. 1984; Jensen 1987; Strait and Moore 1982). These studies generally concluded that aquifer intercommunication does exist; however, they were inconclusive regarding aquifer intercommunication in the immediate vicinity of B Pond (Section 6.4.3).

Well 699-42-40C indicated low levels of tritium in the Rattlesnake Ridge Interbed aquifer shortly after well completion in 1982. Tritium concentrations have increased in this well in recent years (2,970 pCi/L in February 1989).

8.0 CONCLUSIONS AND DATA NEEDS

As stated in Section 1.0, the objectives of hydrogeologic characterization at B Pond are: 1) identify and characterize the uppermost aquifer, 2) identify ground water flow paths and flow rates, and 3) determine where to place ground water monitoring wells. Hydrogeologic characterization studies at B Pond have partially met these objectives, but some data gaps remain. This section summarizes the results of B Pond characterization to date and discusses what additional work is needed to meet the objectives completely.

8.1 UPPERMOST AQUIFER

The uppermost aquifer in the vicinity of B Pond comprises the sediments of the Ringold Formation and, in some areas, the lower part of the Hanford formation. The base of the aquifer is the basalt surface. In the western part of the site, the aquifer consists of primarily sand and gravel. In the eastern part of the site, the aquifer system includes layers of silt and clay, which form confining beds for the underlying, coarser sediments.

Hydraulic conductivity of the uppermost aquifer was estimated based on aquifer tests in the B Pond area, and on laboratory analyses. Estimates of hydraulic conductivity for the Hanford formation were 4,200 and 2,100 ft/d based on aquifer testing. Hydraulic conductivity of the unconfined aquifer in the Ringold Formation ranged from 0.1 to 4.7 ft/d (slug injection tests). Laboratory testing of fine-grained sediments from the Ringold Formation yielded values of vertical hydraulic conductivity of 0.002 ft/d (constant-head permeameter) and 0.07 ft/d (falling-head permeameter). Estimates of hydraulic conductivity of the confined aquifer within the Ringold Formation ranged from 0.1 to 6 ft/d (slug tests and constant discharge test, respectively). Estimates of storativity based on aquifer test data could not be made.

The stratigraphy of the uppermost aquifer is relatively complex. Additional data will be collected to refine the existing conceptual model. Sediment samples collected during drilling of the newest wells will be analyzed in the laboratory for grain size distribution, calcium carbonate content, and, in some cases, vertical hydraulic conductivity. Additional monitoring wells may be installed, providing more stratigraphic and hydrogeologic information (Section 8.3).

Ground water monitoring for potentiometric levels and ground water quality will continue at least until B Pond is closed and through the post-closure period. After water quality data are collected for a full year for the background wells, statistical analyses will be done to define representative values for background ground water quality. Chemistry of samples from downgradient wells will be compared to the background levels to determine if B Pond is adversely affecting ground water quality.

8.2 GROUND WATER FLOW DIRECTION AND RATE

The ground water system in the vicinity of B Pond is dominated by recharge from the pond itself. B Pond has created a large potentiometric mound in the uppermost aquifer, which causes ground water to flow radially outward. Horizontal ground water gradients near the pond range from 0.001 to 0.007 ft/ft.

Estimates of horizontal ground water velocity, calculated from aquifer properties and gradients, ranged from 0.03 to 0.1 ft/d for the Ringold Formation, and 50 to 150 ft/d for the more permeable Hanford formation.

Average horizontal flow rates of approximately 10 to 13 ft/d were estimated based on movement of the tritium plume through time. This estimate is based on ground water movement over an area that extends eastward down the regional gradient toward the Columbia River, and probably reflects flow in the Hanford formation.

The primary data gap with respect to flow direction and rate is vertical ground water movement. One estimate of vertical gradient between adjacent shallow and deep wells is approximately 0.1 ft/ft. This strong, downward hydraulic gradient and the presence of higher concentrations of tritium with depth in the uppermost aquifer indicate that more investigation is needed. This will likely involve installing additional wells completed at the base of the uppermost aquifer.

A related area that must be investigated further is the possibility of interconnection between the uppermost aquifer and the underlying basalt and interbed aquifer system. Chemical data from wells completed in the Rattlesnake Ridge aquifer should be collected and analyzed to determine the significance of aquifer intercommunication in the vicinity of B Pond.

8.3 ADEQUACY OF MONITORING NETWORK

Results of hydrogeologic characterization and ground water monitoring at B Pond to date indicate that several more monitoring wells should be added to the network. Areas that may be gaps in the existing network include the following:

1. Upper portion of the B-3-3 Ditch
2. Overflow area
3. Deep portion of the uppermost aquifer.

The sampling schedule and list of analyses run on ground water samples will also be assessed for adequacy after more data are collected.

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APPENDIX A

INVESTIGATIVE METHODS USED IN HYDROGEOLOGIC CHARACTERIZATION AND GROUND WATER MONITORING AT 216-B-3 POND

WELL INSTALLATION

Boreholes were drilled with cable-tool drill rigs using drive-barrel (when available and as drilling conditions permitted) or hard-tool methods. When using the drive-barrel method, a drive barrel (a short length of heavy-walled pipe) is driven into the soil column and withdrawn, and the sediment is removed from the drive barrel. This drilling method yields samples of geologic materials that are representative of the actual moisture content and grain-size distribution. However, this method is difficult to use when gravels are very large or when sediments are saturated or too dry. Hard-tool drilling consists of driving a solid metal bit into the sediments, breaking them up, and mixing them with added water to form a slurry, which is then bailed out of the borehole. The bailed slurry provides the samples for geologic characterization.

Figure A-1 illustrates the general design of 216-B-3 Pond, hereafter referred to as B Pond, ground water monitoring wells. As-built diagrams and well installation summaries are provided in Appendix B.

Completion of wells installed in 1988

Boreholes were drilled to depth using 12-in., 10-in., and 8-in. nominal diameter carbon steel casing to support the walls of the borehole. The casings were telescoped one inside the other to make it easier to pull the casing back out of the hole. A straightness test was performed by running a bailer the total length of the hole. The hole is considered straight if the bailer travels unimpeded over the entire length. However, this test does not provide information on whether the hole deviates from vertical.

A temporary screen was installed so the well could be developed and aquifer tests conducted. A 20-ft section of 8-in-telescoping (7 7/8-in-outside-diameter) stainless steel screen was placed in the well and the 8-in. casing pulled back approximately 20 ft to expose the screen. A temporary screen was not placed in well 699-43-42J because the formation sediments within the upper 20 ft of the aquifer were too fine.

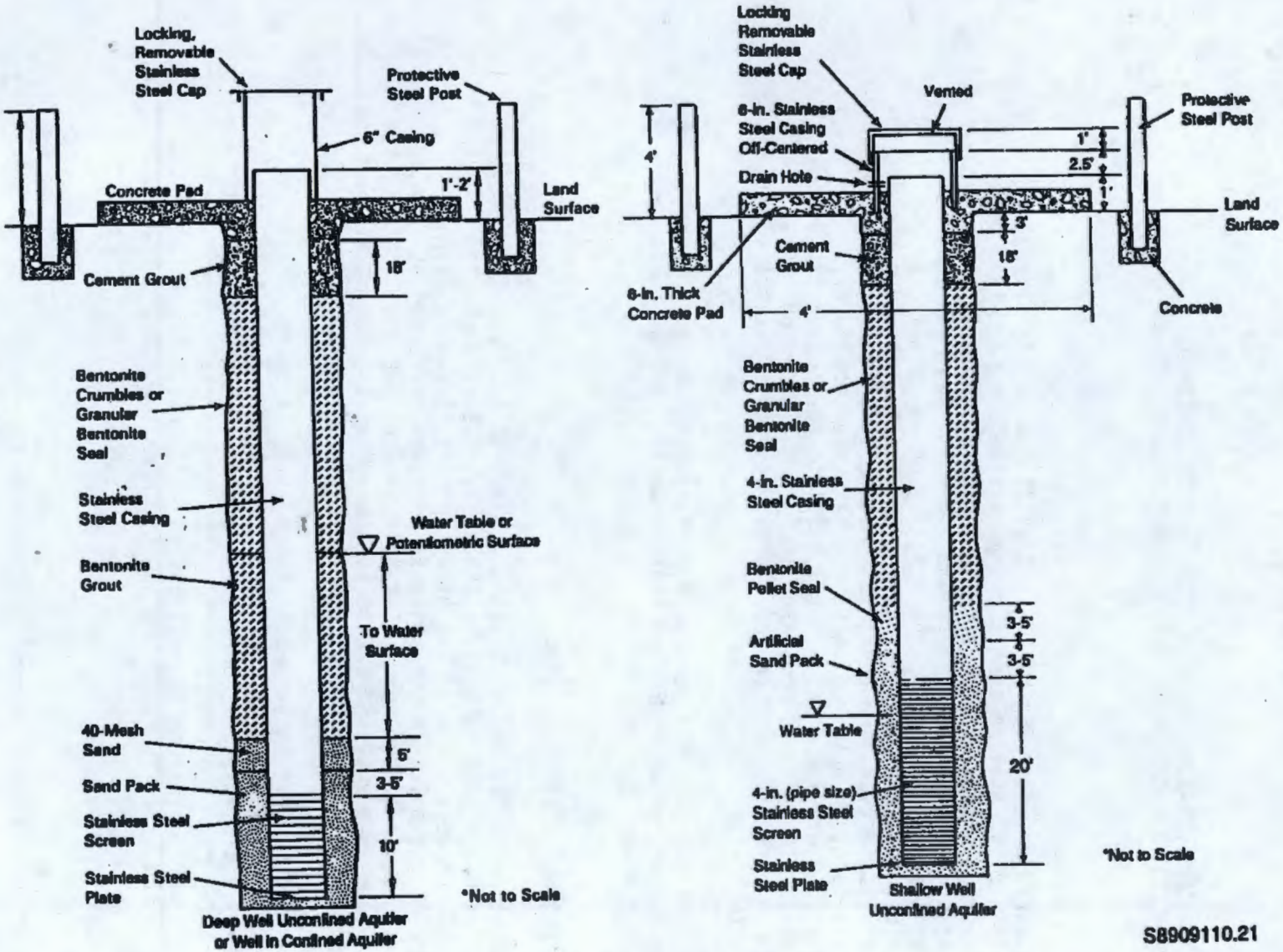


Figure A-1. Well Design.

After the aquifer tests, silica sand was used to backfill the borehole to the desired depth at which the permanent screen and casing would be set. A stainless steel permanent casing and screen were placed in the hole, and silica sand was used to fill the annulus between the 8-in. and 4-in. casing and screen to approximately 5 ft above the top of the permanent screen. Approximately 5 ft of bentonite pellets were then placed on top of the sand pack. Bentonite granules or bentonite slurry was placed as an annular sealant within the vadose zone from the top of the bentonite pellets to near the ground surface. The temporary casing was extracted as the sand pack and seals were installed.

The upper 15 to 20 ft of annulus was sealed with cement grout. A 4--ft by 4-ft concrete pad was placed around the well, and a brass marker was placed in the pad. Each brass marker was embossed with the well number. Protective guard posts were installed around each well. Borehole 699-43-43 was visually inspected from 0 to 160 ft using a downhole video camera. Refer to Luttrell et al. (1989, pp. 49 to 68) for details on the drilling methods and construction materials used.

Part of the completion of well 699-42-42B was an exception to that described above. At well 699-42-42B, the borehole was overdrilled, and the annulus was backfilled with a series of seals. The seals are composed of Volclay (trade name of American Colloid Company, Skokie, Illinois) bentonite-based grout, cement, bentonite pellets, and bentonite plug material. The bentonite plug material was topped with silica sand to the desired depth before the final screen and casing were set. Once the final 4-in. screen and casing, sand pack, and bentonite pellet seal were installed (as described above), the bentonite plug seal was placed above the bentonite pellets to approximately 5 ft above the water table to seal off the saturated zone above the screened interval. The remainder of the completion of well 699-42-42B was similar to that described above for the other monitoring wells.

Completion of wells installed in 1989

Well installation for the 1989 wells (699-40-39, 699-41-40, 699-43-41E, 699-43-41F, 699-43-45, and 699-44-43B) was similar to that described above, except for well development and aquifer testing. All of these wells were completed before development, and no pumping tests were performed. Well inspection/completion forms, as-built diagrams, geologic summaries, and geophysical logs for each well are presented in Appendix B.

GEOLOGIC SAMPLING

During drilling, two 1-pint sediment samples were collected every 5 ft and/or at changes in lithology in accordance with the procedure identified by Pacific Northwest Laboratory (PNL) (PNL 1989, procedure DO-1). Where possible, the sampled materials were recovered from the borehole using a drive-barrel or split-spoon sampler; otherwise, the wells were drilled with a hard tool and samples collected with a bailer. A third type of sample was collected above the water table from a drive-barrel or split-spoon sampler for moisture content analysis.

Additional samples were taken approximately every 20 ft during installation of the 1989 wells, for analysis of anions, total organic carbon, and gross beta; every 40 to 60 ft for X-ray fluorescence (XRF) analysis; and where contamination was suspected. Results of these analyses are presented in Appendix L. When basalt was encountered, hand-selected cuttings were collected for XRF identification of the basalt flow. No quality control samples were collected and these analyses are intended to provide only a reconnaissance-level study of whether sediment contamination is present beneath B Pond.

Some fine-grained Ringold silts and clays collected from well 699-42-42B (BP-10), which were collected with a split-spoon sampler, were analyzed in the laboratory for saturated hydraulic conductivity. Hydraulic conductivity results are presented in Appendix H.

Each sample was described in detail by the well site geologist and recorded on the drill logs. These descriptions included a textural name, estimated particle-size distribution, sorting, gross mineralogy, clast roundness, color, reaction to hydrochloric acid, consolidation, changes from previous sample, and any unusual findings. The collection and documentation of these samples were performed in accordance with the methods prescribed in Last and Liikala (1987). Summary logs for each borehole are presented in Appendix B.

BOREHOLE GROSS GAMMA-RAY LOGGING

Gross gamma-ray logs were run in most of the boreholes in the B Pond monitoring network. The logs from boreholes drilled prior to 1989 are of little value because they were not calibrated and they were run with multiple casings in the hole. A single casing attenuates the gamma photon flux by about 30% (Brodeur and Koizumi 1989) and increases the low energy noise. If two casings are present, the activity from the primary gamma photons from the formation is lost in the low energy noise, so no variations from lithology changes are evident. The logs from boreholes drilled prior to 1989 are maintained on file by PNL.

The boreholes drilled in 1989 (699-40-39, 699-41-40, 699-43-41E, 699-43-41F, 699-43-45, and 699-44-43B) were logged with the same gross gamma-ray logging system as the 1988 wells. However, in the newer wells, a log was run after placement of each of the telescoping casings. This was required to prevent the gamma-ray signal from being overly attenuated. These logs were run in accordance with PNL procedure GL-7A (PNL 1989), and the equipment was calibrated as described in Brodeur and Koizumi 1989. All the logs from a borehole were combined into a composite log. Copies of these logs may be found in 216-B-3 Pond RCRA Wells Gamma-Ray Logs (WHC 1990).

The gamma-ray logs from wells 699-40-39, 699-41-40, 699-43-41E, 699-43-41F, 699-43-45, and 699-44-43B were used to locate and define the spacial and depositional characteristics of clay layers within the Ringold Formation in each of the boreholes. For example, gamma activity shown on the logs can help determine whether the boundary of a clay stratum is erosional or gradational. The logs provide great detail on the relative clay content of the different strata and they were used to confirm the lithology picks from the geologist's logs. The gamma-ray logs were also used to confirm the geologic correlations between boreholes, and to define the location of the erosional contact between the Hanford and Ringold formations.

BOREHOLE DEVELOPMENT

Well development for wells installed in 1988 generally was conducted in two stages: initial development, which in some cases included aquifer testing, and final well development after the final well materials were installed. The purpose of borehole development is to remove drilling fluids from the well and fine-grained materials from around the well screens. Initial development can also provide information for determining the optimum pumping rates for subsequent aquifer tests. Boreholes 699-43-43 and 699-44-42 were developed before and after well completion activities. The other down-gradient RCRA wells were developed after well completion.

Initial Well Development

This section describes the procedure used in initial well development at the B Pond site. After the temporary, 8-in. carbon steel casing and 20-ft-long, 8-in. telescoping stainless steel screen were installed, wells 699-43-43 and 699-44-42 were initially developed by bailing until borehole fluids were cleared of most suspended sediment, as determined by the well site geologist. A submersible pump was then installed in the borehole to remove fine-grained material from the formation sediments.

Initial development of wells 699-43-43 and 699-44-42 was conducted by increasing the flow rate in successive steps, beginning at a low flow rate. Development of these wells was conducted for 1 to 2.5 h at pumping rates ranging between 62 and 220 gal/min. The initial development of well 699-42-42B with the temporary screen was unsuccessful because the slot size of the temporary screen allowed sediment to enter the well. The formation sediments around well 699-43-42J were also too fine to allow initial well development with the temporary screen. Initial development was not attempted on the wells drilled during 1989.

Final Well Development

Final development was conducted after the permanent screen and casing were installed. Final development of wells 699-42-42B and 699-43-42J was conducted by increasing the flow rate in steps and using a pumping and surging technique. Each well was developed until the water was virtually free of

suspended sediment (<5 nephelometric turbidity units), as measured in the field. These wells were pumped with a 1.5-hp submersible pump at a discharge rate ranging from 1 to 9 gal/min. After development, the submersible pump was removed and a HydroStar (trade name of Instrumentation Northwest, Inc., Redmond, Washington) sampling pump was installed in each well.

Final development of wells 699-43-43 and 699-44-42 began with bailing until the water was free of most sand and other fine-grained material, as determined by the well site geologist. Each well was then developed using a 1.5-hp submersible pump until the water was virtually free of suspended sediment (<5 nephelometric turbidity units), as measured in the field. The pumping rate ranged from 9 to 28 gal/min. A HydroStar sampling pump was then installed in each well.

Wells installed in 1989 were developed with submersible or HydroStar pumps. Development of these wells is summarized below in Table A-1. Specific information of each well's development is documented on the drill logs or on the aquifer test data sheets (Appendix I).

Table A-1. Summary of Well Development for B Pond Wells Installed in 1989.

Well Number	Pump(s) Used	Approximate Discharge Rate (gal/min)	Total Volume Pumped (gal)
699-40-39 (BP-5)	Submersible; HydroStar	1	443
699-41-40 (BP-6)	Submersible; HydroStar	<1	402
699-43-41E (BP-4)	Submersible	<1	107
699-43-41F (BP-9)	Submersible	1 to 3	3,718
699-43-45 (BP-1)	Submersible	7 to 10	2,049
699-44-43B	Submersible	4 to 5	6,850

AQUIFER TESTING

The purpose of hydrologic testing is to determine estimates of transmissivity, hydraulic conductivity, and, if possible, storativity of the uppermost aquifer beneath the B Pond. Estimates of transmissivity and

hydraulic conductivity were determined from data collected from constant-discharge tests, recovery tests, and slug injection and/or withdrawal tests. If possible, storativity was intended to be determined from data collected from constant-discharge or recovery multiple-well tests. Estimates of vertical saturated hydraulic conductivity were determined from laboratory permeameter tests. Some of the tests were subject to time constraints because of drilling schedules.

Aquifer pumping tests were conducted in wells 699-42-42B, 699-43-43, and 699-44-42. Single-well constant-discharge aquifer tests and subsequent recovery tests were performed in wells 699-43-43 and 699-44-42. A constant-discharge test and recovery test with one observation well (699-43-42J) was conducted in well 699-42-42B. Slug injection and/or withdrawal tests were performed in wells 699-40-39, 699-41-40, 699-43-41E, 699-43-41F, and 699-44-43B. Procedures for setting up and conducting aquifer tests are included in PNL (1989, procedures AT-1 through AT-6).

Constant Discharge Tests

The constant-discharge tests were designed to stress the aquifer as much as possible by pumping at a maximum constant rate without drawing the water level below the pump. The tested wells were drilled to total depth and cased with temporary, 8-in.-dia carbon steel casing and screened with a 20-ft section of 8-in. telescoping continuous-wound stainless steel screen. The screen was exposed by back-pulling the temporary casing. Wells were generally pumped at a constant rate for up to 7 h using a submersible pump.

The initial aquifer test conducted in well 699-42-42B was unsuccessful because the well was not adequately developed, allowing sediments to enter the screen. To minimize scheduling delays and to prevent sediment from entering the well, a second test was conducted after the well was completed.

Water pumped out of the wells was piped and disposed of to the B Pond. Discharge was measured using in-line flow meters with an analog dial and/or a totalizer. Totalizers used for wells 699-43-43 and 699-44-42 read to the nearest 1 gal, and the flow meter used for well 699-42-42B read to the nearest 0.1 gal. Timing the filling of a bucket of known volume was periodically used to check the performance of the small in-line flow meter used at well 699-42-42B. Discharge was maintained at a constant rate with variations of no more than ±10%.

Water-level responses were measured during both the drawdown period and during the recovery period (after pumping had been terminated). These measurements were made using an electric water-level indicator (E-tape) and/or a data logger and pressure transducer system. The E-tape measurements may be no more accurate than 0.5 ft relative to the top of the well casing; however, they are precise to within 0.05 ft relative to the static water level before the pump was started. The E-tape was placed in a stilling well whenever possible.

Pressure transducers, like the E-tapes, were used to measure the changes in the water level. These transducers are capable of measuring pressure ranges of 0 to 5 and 0 to 10 lb/in^2. The data loggers are capable of resolving 1 part in 1000 over the full range of the transducer.

The following methods were used to analyze the drawdown and recovery data obtained from the constant discharge and recovery tests. The Cooper-Jacob straight-line method was used to analyze the data obtained from the constant-discharge aquifer test (Cooper and Jacob 1946; Lohman 1972). The underlying assumptions in using these methods include the following:

- The aquifer is of infinite areal extent.
- The aquifer is homogeneous, isotropic, and of uniform thickness within the radius of influence of the pumped well.
- The pumped well penetrates and receives water from the full thickness of the aquifer by horizontal flow.
- The well is pumped at a constant discharge rate.
- The static level of the piezometric surface is horizontal within the radius of influence of the well.
- The well diameter is infinitesimal (storage in the well is neglected).
- The water removed from storage is discharged instantaneously with decline of head.

Wells that only partially penetrate the aquifer, as in the case of the B Pond monitoring wells, induce vertical flow gradients in the vicinity of the well screens during pumping. Vertical flow components cause drawdown to be greater than if the aquifer were fully screened. Analysis of the data affected by partial penetration using the Cooper-Jacob technique (1946) will thus underestimate transmissivity near the well. The assumptions that the aquifer is of infinite areal extent and is homogeneous, isotropic, and of uniform thickness are rarely, if ever, satisfied in nature; however, the results obtained using this analysis technique sufficiently approximate the aquifer hydraulic properties.

Effects of borehole storage were evaluated for some analyses. Casing storage effects were analyzed using the equation by Hargis (1979):

$$t_c = 360{,}000 \times r_c^2/T$$

where t_c = time of pumping after which casing storage effects dissipate, min

r_c = radius of the well casing over the interval of drawdown, ft

T = transmissivity of the aquifer, ft^2/d.

Casing storage effects were also analyzed using the equation by Schafer (1978):

$$t_c = 0.6\ (d_c^2 - d_p^2)/(Q/s)$$

where t_c = time when casing storage effect becomes negligible, min

d_c = inside diameter of well casing, in.

d_p = outside diameter of pump column pipe, in.

Q/s = specific capacity of the well, gal/min/ft of drawdown at time, t_c, where Q = discharge in gal/min and s = drawdown in ft

The aquifer test design, data, analytical results, and summaries are presented in Appendix I. Aquifer test results are also summarized in Section 6.3.3.

Slug Injection/Withdrawal Tests

Slug injection and/or withdrawal tests were performed in wells 699-40-39, 699-41-40, 699-43-41E, 699-43-41F, and 699-44-43B. Slug tests were performed before well completion in the open borehole for wells 699-40-39, 699-41-40, and 699-44-43B. Slug tests were performed in the completed well, before well development, in all five of the wells. A slug test was not conducted in well 699-43-45 because the screened interval is in a coarse material and the water level would equilibrate too quickly after slug injection/withdrawal to provide useful results.

Slug tests were performed by injecting or withdrawing a cylinder of known volume instantaneously into the well and observing the water-level recovery response with time. The response in water level was measured with an electric water-level indicator (E-tape) and/or data logger pressure transducer system.

Methods used to analyze the slug test data are those of Bouwer and Rice (1976) for unconfined aquifer conditions and those of Cooper et al. (1967) for confined aquifer conditions. Assumptions of the Bouwer and Rice method are drawdown of the water table around the well is negligible, flow above the water table can be ignored, well losses are negligible, the aquifer is homogeneous and isotropic, and the change in water level is instantaneous. Assumptions of the Cooper method are homogeneous isotropic aquifer, uniform thickness, fully penetrating screened wells, confined conditions, and an instantaneous change in water level. A limitation of the slug test is that it only reflects aquifer characteristics in the immediate vicinity of the well screen, which may not be representative of the whole aquifer. Also, application of slug tests is restricted to aquifers of relatively low transmissivity. Slug test data, analytical results, and summaries are presented in Appendix I. Slug test results are also summarized in Section 6.3.3.

LABORATORY TESTING

Borehole samples were analyzed for their physical and hydrologic characteristics in PNL's soil laboratory. Samples were analyzed for field moisture content, particle-size distribution, calcium carbonate content, and saturated hydraulic conductivity. A summary of these methods is presented in Table A-2.

Water Content (Field Moisture)

Samples were collected for moisture analyses from drive-barrel samples at approximately 5-ft intervals, at intervals where sediments were moist, and at intervals where a major change in lithology was evident. Samples were not collected for moisture analyses in intervals where drilling water had been added. The samples were placed in airtight containers, sealed with tape, and enclosed in plastic bags to prevent moisture loss. At the end of each day, the samples were placed in a refrigerator, where they remained until the next working day when the analysis was initiated. After the plastic bag was removed, the entire sample was weighed, oven dried at 105°C for 24 h, and reweighed in accordance with American Society for Testing and Materials procedure D 2216 (ASTM 1986). Water content results are presented in Appendix D.

Particle-Size Analyses

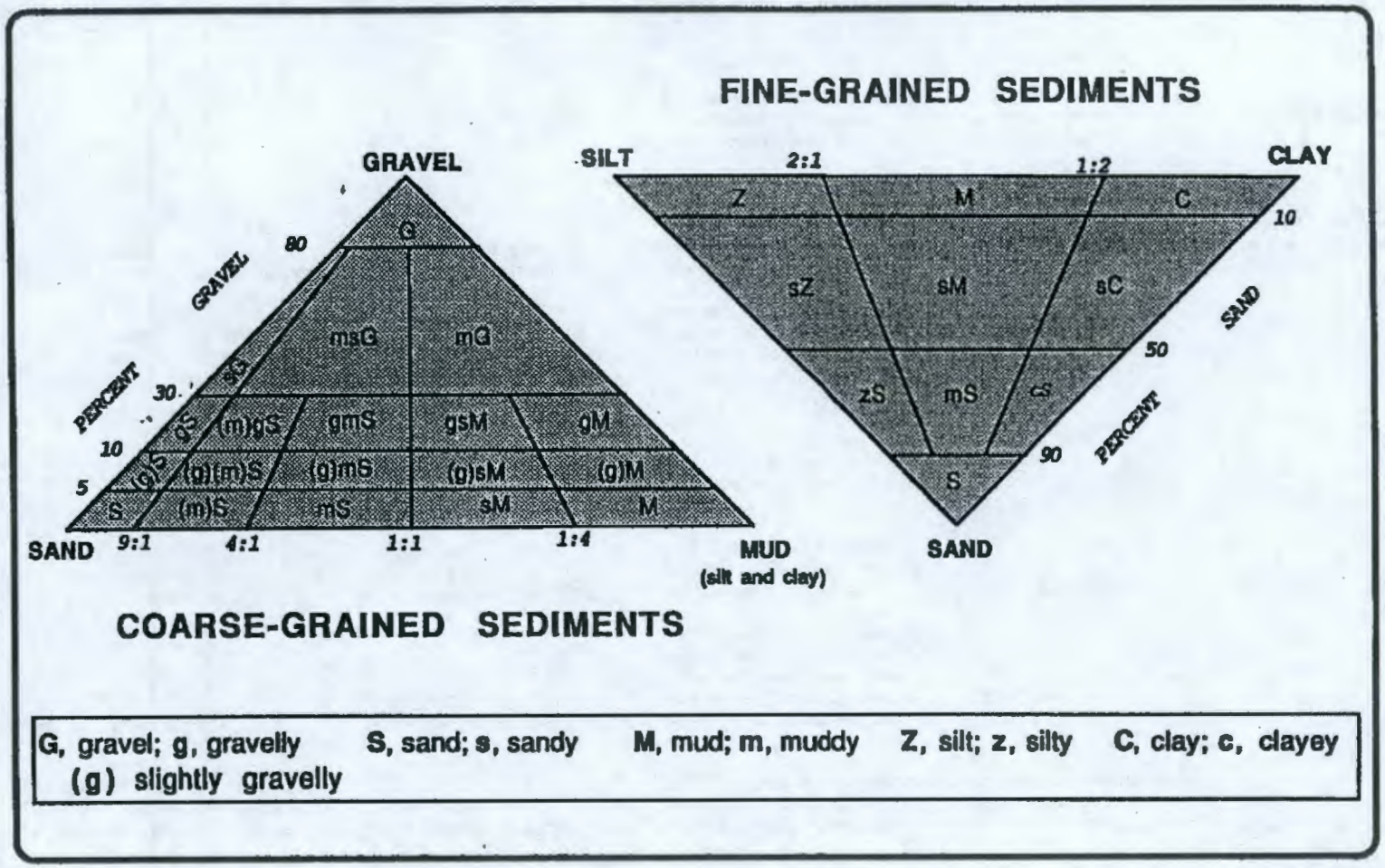
Particle-size analyses of the sand-to-gravels-sized particles using the dry-sieve method was conducted for seven out of 21 wells located near B Pond. Recent analyses of particle-size distribution have been expanded to include a hydrometer/wet sieve analysis on those samples containing >50% mud (as determined by the dry-sieve method) to determine the distribution of clay-to-silt-sized particles as well. The dry-sieve procedure is presented in PNL (1989, procedure SA-2); hydrometer/wet-sieve analyses were performed using the method described in Gee and Bauder (1986).

Dry-sieve analysis was performed on one of the two 1-pint-jar samples or moisture samples. Sediments were sieved using 2.00-, 1.00-, 0.50-, 0.25-0.125-, and 0.063-mm sieve openings. The weight of material retained on each sieve was determined and entered into the ROCSAN Data Base System. The ROCSAN program calculates the total weight percent and particle-size distribution of the sample, and classifies the sample according to one of the 19 sediment classes shown in Figure A-2. The ROCSAN output is presented in Appendix D. Hydrometer results are presented in Appendix G.

Table A-2. Laboratory Analyses Performed as Part of B Pond Characterization and Monitoring.

Laboratory Analysis	Parameter Measured	Sample Requirements Limitations	Potential Uses	Sample Frequency	Method of Sample Collection[a]
Dry Sieve	Particle-size distribution of sand to gravel-size particles	Hard-tool samples may be unrepresentative. Particles must be disaggregated and unbroken to yield accurate results.	Geologic interpretation; proxy for hydraulic parameters; ground-water modeling	Every 5 ft or change in lithology	H[b], D, S
Hydrometer/wet sieve	Particle-size distribution of mud-size particles (i.e., silt and clay)	Fine-grained sediments (>50% total)	Geologic interpretation; characterization of aquitards; ground-water modeling	All fine-grained intervals collected for particle-size analysis	H[b], D, S
Moisture content	Percent water	Representative vadose zone samples; no drill fluids	Geologic interpretation; determination of distribution of vadose zone water including perched water zones; vadose zone modeling	Every 5 ft or change in lithology	D, S
Permeameter	Saturated hydraulic conductivity	Undisturbed/intact sedimentary core	Small-scale estimate of aquifer properties; aquifer test check; ground-water modeling	Selected intervals	D[b], S
Volumetric calcimeter	Percent calcium carbonate content	<2 mm sediment-size fraction	Geologic interpretation; aquitard identification; stratigraphic marker horizons	All samples collected for particle-size analysis	H, D, S
X-ray flourescence	Major and trace element concentrations (except sodium and magnesium)	Bulk sediment sample	Geologic interpretation; indication of vadose zone contamination; geochemical characterization	Every 40 ft and at zones of suspected contamination	H, D, S
Hazardous chemical indicators	Concentrations of hazardous constituents in ground water and sediments	Nonturbid ground-water/bulk sediment samples	Ground-water contamination; indication of contamination	Sediment samples every 20 ft and at zones of suspected contamination; ground-water samples at regular intervals	H, D, S Ground-water samples pumped from well
Radionuclides	Concentrations of radionuclides in ground water and sediments	Nonturbid ground-water/bulk sediment samples	Ground-water contamination; indication of vadose zone contamination	Sediment samples every 20 ft and at zones of suspected contamination; ground-water samples at regular intervals	H, D, S Ground-water samples pumped from well

(a) H = hard tool. D = drive-barrel drill method. S = split-spoon drill method.
(b) May not be representative.



S8909110.100

Figure A-2. Sediment Classification of Coarse-Grained Versus Fine-Grained Sediments (modified after Folk 1968).

Particle-size distribution data are not an absolute measurement and must be used qualitatively in combination with geologist's log descriptions and the gamma log to arrive at an estimate of the in situ particle-size distribution. Samples collected with a bailer after hard-tool drilling are skewed toward finer grain sizes because of the crushing and pulverizing action of the hard-tool bit. Another problem with dry sieving has been noted in samples containing clay. The sieving procedure commonly used in the past does not adequately disaggregate the clays, so the results of the sieve analysis are often skewed toward larger grain sizes. A modified procedure will be used in future analyses to minimize this problem.

Calcium Carbonate Analyses

Calcium carbonate analyses are routinely conducted on the same samples analyzed for particle-size distribution. The calcium carbonate content was determined using a volumetric calcimeter method described by Allison and Moodie (1965). Calcium carbonate data are useful for identifying zones with concentrations of calcium carbonate, which are often associated with soil development, and can be used for stratigraphic identification and correlation purposes. These data, based on $\%CaCO_3$, were also entered into the ROCSAN Data Base and are included in the ROCSAN output in Appendix D.

Hydraulic Conductivity

Hydraulic conductivity measurements were performed on two split-spoon samples from well 699-42-42B (Appendix H) to determine the vertical hydraulic conductivity of the samples. These measurements were made using the constant-head method and the falling-head method described by Klute and Dirksen (1986). The constant-head method is conducted by imposing a hydraulic head difference on the sediment column of uniform cross-sectional area, and then measuring the resulting flux of water. The falling-head method is similar to the constant-head method, but instead, the change in hydraulic head is measured with time. These tests may not yield representative results if the sample is not completely saturated. Also, the sample may not be completely undisturbed. Results of the permeameter tests are presented in Appendix H and summarized in Section 6.3.3.

SURVEYING

Each well was surveyed by Kaiser Engineers Hanford following the completion of all these wells. The center of the well casing was surveyed for its horizontal position relative to the Hanford Plant Coordinate System. The accuracy of these measurements is estimated to be ±0.5 ft. The top edge of the casing and the top of the brass survey marker in the well pad were surveyed for their vertical elevation relative to the 200-East datum. An "X" was stamped at the survey location on top of the casing. The survey data reports are provided in Appendix B.

WATER-LEVEL MEASUREMENTS

Water-level measurements have been collected at least monthly since February 1989. Water-level maps of the B Pond area are presented in Section 6.3.1. Measurements in the down-gradient wells normally are made in a single day. A written PNL procedure is followed to measure water levels in wells (PNL 1989, procedure WL-1). A chalked, standardized steel tape is used to measure the depth to water and measurements are repeated to confirm the initial value. If the second measurement differs by more than 0.02 ft from the first, the measurement is repeated until two measurements within the proper tolerance are obtained. Measurements are compared to previous water levels, if available, as a check for gross errors. Water-level elevations for each well are determined by subtracting the depth to water from the surveyed measuring point elevation on the well casing. Each of the steel tapes is standardized against a calibrated steel tape. Only those standardized steel tapes within 0.10 ft of the calibrated steel tape are used to measure water levels. Water-level data and hydrographs are presented in Appendix E.

GROUND WATER CHEMICAL ANALYSES

Water samples are collected and analyzed quarterly from downgradient wells 699-42-40A, 699-42-42B, 699-43-42J, and 699-43-43; and background wells 299-E18-1 and 299-E32-4. Quarterly sampling of the wells installed in 1988 began the fourth quarter of calendar year 1988. After 1 yr of quarterly sampling, these wells will be sampled semiannually. The wells installed in 1989 will be sampled quarterly for one year.

Ground water samples are analyzed for parameters required by 40 CFR 265.92, and for volatile organic constituents, hydrazine, ammonia, and tritium. In addition, samples will be analyzed annually for constituents listed in 40 CFR 264, Appendix IX, and WAC 173-303-9905. Results of chemical analyses are presented in Appendix F and in quarterly progress reports.

All sampling activities are performed by PNL personnel. United States Testing Company, Incorporated currently conducts sample analyses for most constituents. The water chemistry samples are collected according to PNL procedures (PNL 1989, procedures GC-1 and GC-2). Chain-of-custody procedures (PNL 1989, procedure AD-2) are followed, providing a history of custody for each sample. Analytical methods used, preservation techniques, and a discussion of quality assurance/quality control are given in Appendix D of the ground water monitoring plan for the B Pond (Luttrell et al. 1989).

Chemical analyses were also run on ground water samples collected prior to well development. The purpose of predevelopment sampling was to determine how to dispose of purged water from the wells. The results are not included in this document because they are not representative of ground water conditions; the samples were extremely silty, due to drilling activities.

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APPENDIX B

216-B-3 POND RCRA WELL FIELD DATA

This appendix contains well completion/inspection reports, as-built diagrams, and analyses of gamma-ray logs for wells included in the Resource Conservation and Recovery Act of 1976 ground water monitoring system for the 216-B-3 Pond; some or all of this information is presented for each of the following wells:

- 699-40-39
- 699-41-40
- 699-42-42B
- 699-43-41E
- 699-42-41F
- 699-43-42J
- 699-43-43
- 699-43-45
- 699-44-42
- 699-44-43B.

The following list shows depth settings for HydroStar Pumps (trade name of Instrumentation Northwest, Inc., Redmond, Washington) in the 216-B-3 Pond wells:

Well Number	Screened Interval Depth (ft)	Depth of Pump Intake (ft)
699-40-39	201-211	209
699-41-40	164-174	172
699-42-42B	183-203	195
699-43-41E	135-146	144
699-42-41F	165-176	172
699-43-42J	157-177	166
699-43-43	158-178	166
699-43-45	183-203	200
699-44-42	152-172	161
699-44-43B	156-176	172.

This appendix also contains the results of the well location and elevation surveys conducted by Kaiser Engineers Hanford for wells installed around the 216-B-3 Pond site during 1988 and 1989.

WELL 699-40-39

Well Completion/Inspection Report

A well completion/inspection report for well 699-40-39 follows.

As-Built Diagram

An as-built diagram for well 699-40-39 follows.

Analysis of Gamma-Ray Log

Information regarding gamma-ray log analysis for well 699-40-39 follows. Copies of the original log may be found in WHC-MR-0126, 216-B-3 Pond RCRA Wells Gamma-Ray Logs (WHC 1990).

Two gamma-ray logs were run in well 699-40-39. In run #1, the well had a 10-inch surface casing to 19 feet and an 8-inch casing to 195 feet. In run #2, the 8-inch casing was extended to the total depth of 212 feet.

The Hanford formation consists of sandy silty gravel with no significant variation in gamma activity.

The Hanford/Ringold formation contact is evident in the gamma-ray log at 125 feet. Within the Ringold Formation, the gamma-ray log shows a fairly consistent activity from 125 feet to about 192 feet. This sediment can be described as sandy silty clay, with one zone (157 to 179 feet) containing a lower clay content. A gradational boundary to a higher clay content is observed at about 192 feet. This clay layer may isolate a coarser gravel underlying it, starting at about 210 feet. This gravel layer appears to be the most permeable zone at this location, based on the gamma-ray log.

Procedure DO-1 Rev. 0 MMC 4/12/89 Attachment 1 Page 1 of 1

WELL COMPLETION/INSPECTION REPORT

Specification No. WHC-S-014 Rev. No. 3
Project 216-B-3 POND
Location B-POND
Drilling Co. KAISER ENGINEERING HANFORD
Driller DAVE GARCIA, CRAIG WANGLEY
Other (companies) NONE
Geologist(s) CHAMNESS, AIRHART, GILMORE, JENSEN, GOODWIN

Well No. 699-40-39 Temp. Well No. BP-5
Coordinates N43 997.7 W 43 362.8
Casing Elev. 544.84 Ground Elev. 544.84 Beam Cap 544.95

DRILLING METHOD

Rotary-Air N/A Mud N/A
Cable Tool D 0'-80' H 210'-80'
Drilling Fluid 200E DRILL SUPPLY WATER
Other N/A CB: 210'-212'

GEOPHYSICAL LOGGING

Sondes	Interval	Date
NATURAL GAMMA	3' - 192'	4/25/89
NAT. GAMMA	100' - 212'	6/27/89

COMPLETION DATA

Drilled Depth ~~198.2'~~ 212.2'
Completed Depth 211.54'
Date Started 4/4/89
Date Completed 8-7-89
Static Water Level/Date 125.3' below land 4/26/89 Estimated

AQUIFER TESTING

Type SLUG TEST
Length of Test 4 hours
Volume Pumped N/A
Drawdown N/A
Date of Test 5-2-89

INSPECTION RESULTS

CLEANING

Inspection Method VISUAL
Acceptance Criteria AS PER SECTION 7.6

	Accept	Reject	Date
Drilling Tools/Rig	SPA		4/4/89
Temporary Materials	SPA		4/4/89
Permanent Materials	SWL		7/12/89

MATERIAL STORAGE/PACKING

Inspection Method VISUAL
Acceptance Criteria AS PER SECTION 7.3

	Accept	Reject	Date
Mtl. Handling/Storage	SPA		4/4/89
Material Packing	SPA		4/4/89

SCREEN

Type	Length	Slot Size
JOHNSON DIV. TYPE 304 4"	10.56'	10
CONTINUOUS WRAP CHANNEL BACK	—	—

Depth(s) 211.54' - 200.98'

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.3
Accept SWL Reject ____ Date 7/5/89

LUBRICANTS/ADDITIVES

Inspection Method VISUAL
Acceptance Criteria AS PER SECTION 7.2

	Identify	Accept	Reject	Date
Additives	200E AREA H_2O	SPA		4/26/89
Lubricants	FOOD GRADE OIL	SPA		4/4/89

STRAIGHTNESS TEST

Inspection Method VISUAL (BY CURTIS HOOVER (KEA))
Acceptance Criteria AS PER SECTION 8.5
Accept SPA Reject ____ Date 4-25-89

CASING (permanent)

Type	Size	Placement
JOHNSON DIV. TYPE 304 STAINLESS STEEL	4"	200.98' - +2.95'
	—	— - —

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.4
Accept SWL Reject ____ Date 7/5/89

WELL PROTECTION

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.9 - 4.2.10

	Accept	Reject	Date
Protective Posts	SWL		8/7/89
Locks	SWL		8/5/89

ANNULAR SEAL

Inspection Method MEASURED W/STEEL TAPE
Acceptance Criteria SECT. 4.2.6 - 4.2.9

Type	Interval	Volume	Accept	Reject	Date
8-12 MESH COLORADO SILICA SAND	212.2' - 198.05'	7.07 Ft^3	SWL		7/6/89
40-100 MESH COLORADO SILICA SAND	198.05' - 195.7'	2.54 Ft^3	SWL		7/6/89
VOLCLAY GROUT	195.7' - 122.1'	57.05 Ft^3	SWL		7/7/89
8-12 BENTONITE CHUNKS	122.1' - 18.1'	42.6 Ft^3	SWL		7/10/89

OTHER (initial if performed)

N/A Well Abandonment
N/A Well Development
N/A Downhole TV Inspection
SWL Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by D.L. McGlam 10-4-89

For all blanks mark N/A if not applicable.

WELL COMPLETION/INSPECTION REPORT(governing procedure DO-1, RO)

Specification No. WHC-S-014 Rev. No. 3
Project 216-B-3 POND
Location B-POND
Drilling Co. KAISER ENGINEERING / HANFORD
Driller DAVE GARCIA CRAIG WAMSLEY
Other (companies) NONE
Geologist(s) CHAMNESS, AIRHART, GILMORE, JENSEN, GOODWIN

Well No. 699-41-39 Temp. Well No. BP-5
Coordinates
Casing Elev. Ground Elev.

DRILLING METHOD
Rotary Air N/A Mud N/A
Cable Tool D 0-80' H 80'-210'
Drilling Fluid 200 E DAILY SUPPLY H_2O
Other SPLIT SPOON: 210'-212'

GEOPHYSICAL LOGGING

Sondes	Interval	Date
	-	
	-	
	-	
	-	
	-	

COMPLETION DATA
Drilled Depth
Completed Depth
Date Started
Date Completed
Static Water Level/Date

AQUIFER TESTING
Type
Length of Test
Volume Pumped
Drawdown
Date of Test

INSPECTION RESULTS

CLEANING
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Drilling Tools/Rig			
Temporary Materials			
Permanent Materials			

SCREEN

Type	Length	Slot Size

Depth(s) -
-
Inspection Method
Acceptance Criteria
Accept Reject Date

CASING (permanent)

Type	Size	Placement
		-
		-

Inspection Method
Acceptance Criteria
Accept Reject Date

MATERIAL STORAGE/PACKING
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Mtl. Handling/Storage			
Material Packing			

LUBRICANTS/ADDITIVES
Inspection Method
Acceptance Criteria

	Identify	Accept	Reject	Date
Additives				
Lubricants				

STRAIGHTNESS TEST
Inspection Method
Acceptance Criteria
Accept Reject Date

WELL PROTECTION
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Protective Posts			
Locks			

ANNULAR SEAL
Inspection Method MEASURED W/ STEEL TAPES
Acceptance Criteria SECT. 4.2.6 - 4.2.9

Type	Interval	Volume	Accept	Reject	Date
CEMENT GROUT	18.1' - 2.0'	7.93 ft^3	SW		7/10/89
CONCRETE PAD	2.0' - 0.5'	1.0 $YARD^3$	SW		8/9/89
	-				
	-				

OTHER (initial if performed)
N/A Well Abandonment
~~N/A~~ Well Development
N/A Downhole TV Inspection
SW Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by V.L. Mulkins 10-4-89

For all blanks mark N/A if not applicable.

Procedure DO-1 Rev. 0

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number BP-5 (699-40 v39) Geologist ~~[illegible]~~ AIRHART, GILMORE, GOODWIN, JENSEN Page 1 of 2

Reviewed by W. L. McGhee Date 10-4-89

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
		5		SLIGHTLY SILTY SAND
10" DIA. CARBON STEEL CASING (19.5')		10		SLIGHTLY SILTY, GRAVELLY SAND
		15		MUDDY SANDY GRAVEL
		20		" " "
8" DIA. CARBON STEEL CASING (213'9.4")		25		" " "
		30		" " "
		35		SANDY GRAVEL
		40		" "
		45		" "
		50		MUDDY SANDY GRAVEL
		55		" " "
		60		" " "
		65		" " "
		70		" " "
		75		" " "
		80		" " "
		85		SANDY GRAVEL
		90		" "
		95		" "
		100		" "
		105		" "
		110		" "
		115		MUDDY SANDY GRAVEL
		120		" " "
D/W = 125.3' E-log 3134 4-3-89		125		GRAVELLY MUDDY SAND
		130		SANDY MUD

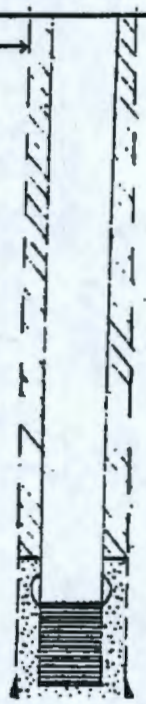
A-1800-188 (3/87)

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number BP-5 (699-40-39) Geologist AUGART, CHAMNESS, GILMORE, GOODWIN, JENSEN Page 2 of 2

Reviewed by D.T. McGehee Date 10-4-89

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
8" DIA CARBON STEEL CASING		135		SANDY MUD
(213' 9 1/4")		140		" "
		145		" "
		150		MUD
		155		"
		160		SANDY MUD
		165		MUD
		170		"
		175		"
		180		"
		185		SANDY MUD
		190		"
		195		"
		200		GRAVELLY SANDY MUD
		206		GRAVELLY MUDDY SAND
		210		MUDDY SANDY GRAVEL
COMPLETION SYMBOLS:				T.D. = 212.2'
CEMENT PAD				
CEMENT GROUT				
GRANULAR BENTONITE				
VOLCLAY GROUT				
SAND PACK				
CASING JOINT				
CASING CENTRALIZER				

A-1800-188 (3/87)

WESTINGHOUSE HANFORD COMPANY

WELL NUMBER BP-5 (699-40-39) AREA B-Pond, East Side

DATE 4-25-89

LOG RUN #1 LOG TYPE Nat Gamma/Analog

SURVEY COORDINATES N 39878 W 39224

ELEVATION DATUM Top of Casing ELEVATION 541.84

Apparent Surface = -2.1'

LOG MEASURED FROM GROUND SURFACE

LOCATION DESCRIPTION East Side of 216-B3-C Pond

GROUND SURFACE ELEVATION 538.95

SURFACE TEMPERATURE WEATHER Cool, Raining

BOREHOLE INFORMATION

DRILLER	KEH		
DRILL RIG TYPE	CABLE-TOOL	BIT TYPE/DIAMETER	Drilling Shoe, Open
BOREHOLE DIAMETER(S)/DEPTH			
DEPTH DRILLER	-194.65'	DEPTH LOGGER	-192'
LIQUID LEVEL	-128.6'	LIQUID APPEARANCE	Clear
TEMPERATURE			

CASING RECORD

TYPE	8"-Sch 40	INTERVAL	Surface to -195'
TYPE	10"-Sch 40	INTERVAL	Surface to -20'
TYPE		INTERVAL	
TYPE		INTERVAL	
WELL SCREEN INTERVAL:			

COMMENTS: Gravel to Clay interface at ~125' per Driller

Error-Depth Return, + 0.5" high

EQUIPMENT DATA

LOGGING COMPANY	PNL		
OPERATOR(S)	~~VH McGann~~ V.L. McGhan		
EQUIPMENT BRAND	MLS (GOI)	EQUIPMENT TYPE	Gamma / Analog
TOOL TYPE	NaI Gamma	BASE CALIBRATION DATE	12-88
SERIAL NO.	CG 27A97	CALIBRATION REFERENCE	WHC-EP-0246
CALIBRATION / PROBE FACTOR	8.53×10^{-2} eU (PPM / cps)		Ratemeter S/N 182
DEAD TIME	7.4 μSec	WARM UP TIME	20 min

LOGGING INFORMATION

LOG INTERVAL FROM	-198'	TO	-3'
RERUN(S)	1: -150' to -120'		
PRE SURVEY CALIBRATION:	POSITION 1 298 eU P/m	POSITION 2 58 eU P/m	BACKGROUND 60 c/s
LOGGING SPEED	5 FPM		
START TIME	8:30AM	COMPLETION TIME	9:35AM
CHART SPEED(S), FT/IN.	10'/in		
CHART RECORDER HORIZONTAL SCALE, CPS/IN.	50 cps/in, (500 cps F.S.)		
RERUN SCALES, CPS/IN.	50 cps/in		
TIME CONSTANT(S)	1 Sec		
POST SURVEY CALIBRATION:	POSITION 1 293 eU P/m	POSITION 2 66 eU P/m	BACKGROUND 60 c/s
PERCENT CHANGE:	POSITION 1 1.7 %	POSITION 2 13.8 %	

COMMENTS: Probe Sidewalled in Casing
Surface Casing Noted at ~19' on log

WITNESSED AND VERIFIED BY: J.I. Gould [signature] 4/25/89

WESTINGHOUSE HANFORD COMPANY

WELL NUMBER BP-5 (699-40-39) AREA 216-B-3C Pond (East Side)

DATE 6-27-89

LOG RUN 2nd LOG TYPE Nat. Gamma

SURVEY COORDINATES N 39,878 W 39,224

ELEVATION DATUM Top of Inner Casing (8") ELEVATION 541.84

LOG MEASURED FROM Surface

LOCATION DESCRIPTION East Side of Pond Perimeter Road, in Berrow

GROUND SURFACE ELEVATION 538.95

SURFACE TEMPERATURE 18.5°C WEATHER Fair, Slight Breeze

BOREHOLE INFORMATION

DRILLER	KEH		
DRILL RIG TYPE	Cable Tool	BIT TYPE/DIAMETER	8"
BOREHOLE DIAMETER(S)/DEPTH	8" @ 211.5'		
DEPTH DRILLER	212	DEPTH LOGGER	211.5'
LIQUID LEVEL	159.23' from top of 8" Casing	LIQUID APPEARANCE	Clear
TEMPERATURE	16.8°C		

CASING RECORD

TYPE	10" Sch. 40, Steel	INTERVAL	Surface to 19'
TYPE	8" Sch 40 Steel	INTERVAL	Surface to 212.4
TYPE	Open	INTERVAL	-211.5 to
TYPE		INTERVAL	

WELL SCREEN INTERVAL: -NA-

COMMENTS: Hit Obstruction ~198', forced logging Probe through.

EQUIPMENT DATA

LOGGING COMPANY: PNL

OPERATOR(S): VL McGhan

EQUIPMENT BRAND: MLS — EQUIPMENT TYPE: Gross Gamma (Analog)

TOOL TYPE: Gross Gamma — BASE CALIBRATION DATE: 12-88

SERIAL NO.: CG 27A97 — CALIBRATION REFERENCE: WHC-EP-0246

CALIBRATION / PROBE FACTOR: 8.53×10^{-2} (≈21 PPM/CPS) — Ratemeter #1, S/N 182

DEAD TIME: 7.4 μSec (per WHC-EP-0246) — WARM UP TIME: > 15 min

LOGGING INFORMATION

LOG INTERVAL FROM: -211.5' TO: ~~173.4'~~ -100'

RERUN(S): #1 -210 TO -180'

PRE SURVEY CALIBRATION: POSITION 1: 289 gal/min 69% (FS=5000) POSITION 2: 59 gal/min 75% (FS=1000) BACKGROUND: 60 c/s 12% (FS=500)

LOGGING SPEED: 5 ft/min

START TIME: 8:40 AM — COMPLETION TIME: 9:20 AM

CHART SPEED(S), FT/IN.: 10 ft/in

CHART RECORDER HORIZONTAL SCALE, CPS/IN.: 50 cps/in (FS=500)

RERUN SCALES, CPS/IN.: 50 cps/in

TIME CONSTANT(S): 1 second

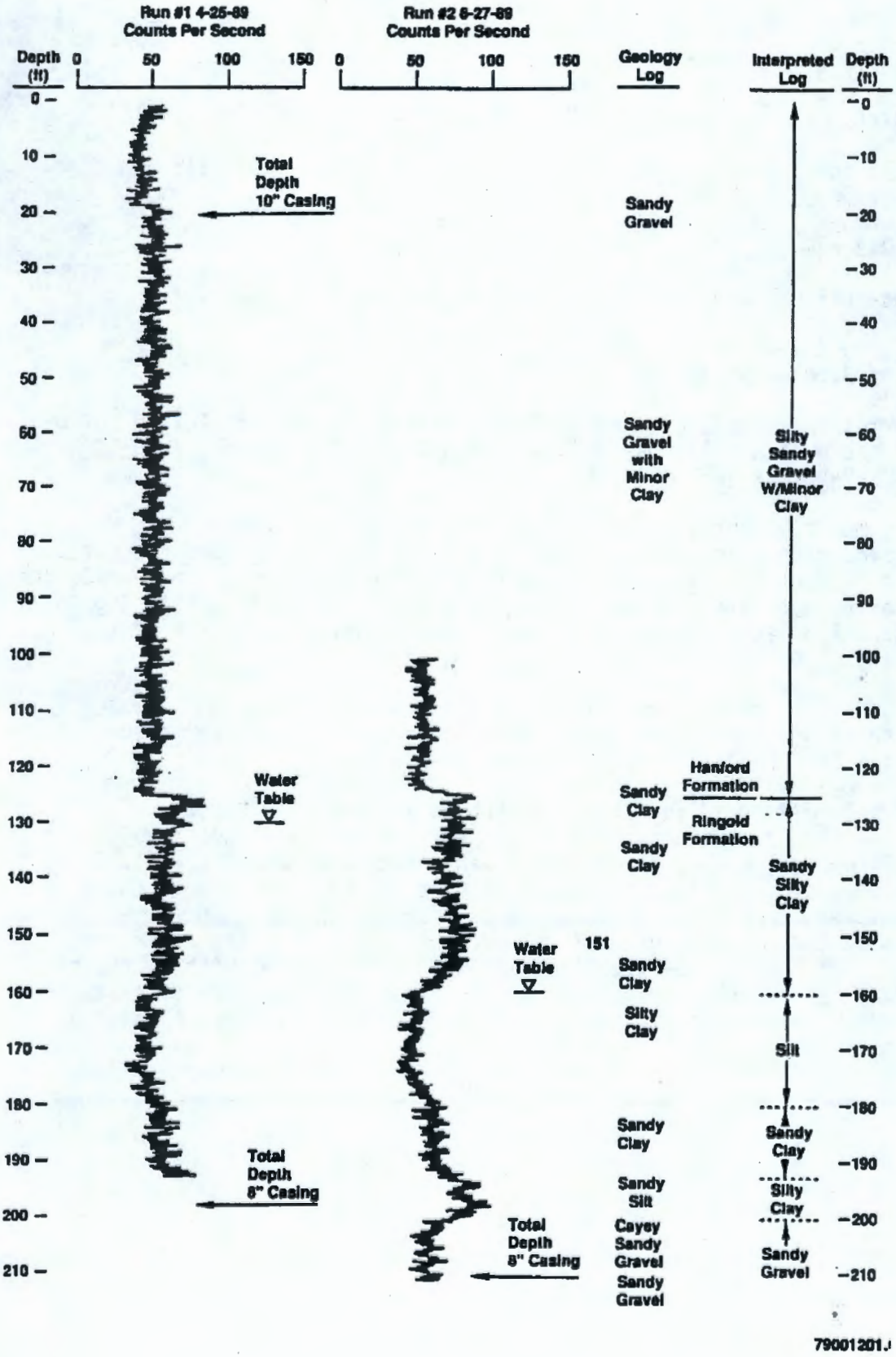
POST SURVEY CALIBRATION: POSITION 1: 70.5% FS 298 gal/min POSITION 2: 60 gal/min 76% FS BACKGROUND: 60 c/s 12% FS

PERCENT CHANGE: POSITION 1: ~2% 3% POSITION 2: ~1% 1.7%

COMMENTS: Probe sidewalled w/ Bowspring
Zero Return Error on Depth (< ½')
Pre/Post Survey Calcheck OK!

WITNESSED AND VERIFIED BY: J. [illegible] 6/22/87

Well 699-40-39



WELL 699-41-40

Well Completion/Inspection Report

A well completion/inspection report for well 699-41-40 follows.

As-Built Diagram

An as-built diagram for well 699-41-40 follows.

Analysis of Gamma-Ray Log

Information regarding gamma-ray log analysis for well 699-41-40 follows. Copies of the original log may be found in WHC-MR-0126, 216-B-3 Pond RCRA Wells Gamma-Ray Logs (WHC 1990).

Two gamma-ray logs were run in well 699-41-40. For run #1, the well had a surface casing to about 20 feet, and a 10-inch casing from the surface to 121 feet. From 121 to about 150 feet, the hole was open. For run #2, the 10-inch casing was extended to 151 feet, and there was an 8-inch casing to total depth, 176 feet. This second log is useful from the bottom of the 10-inch casing to total depth.

The first 120 feet of run #1 was in the Hanford formation. The log reflects the continuous sandy gravel that is typical of this formation. A 2-foot thick caliche layer may be present at 102 feet.

The Hanford/Ringold formation contact is evident at 120 feet. The upper layer in the Ringold consists of a 6-foot thick silty clay underlain by a uniform 15-foot thick clay layer. This very hard, continuous clay is evidently very impermeable. The upper contact of the clay layer appears to be an erosional surface, as seen by the very abrupt change in gamma activity. The bottom contact is more gradual, blending into a silt. The underlying silt (about 144 feet to 164 feet) increases in sand content with depth, as indicated by the geology log as well as the gamma-ray log. The silt layer makes a rather abrupt transition to a silty gravel in the lower portion of the borehole.

PROCEDURE — DO-1 REV. 0 MAC 4/18/89 ~~Attachment 1~~ ~~Page 1 of 1~~

WELL COMPLETION/INSPECTION REPORT

1 of 2

Specification No. WHC-S-014 Rev. No. 3
Project 216-B-3 Pond
Location B-Pond
Drilling Co. Kaiser Engineers Hanford
Driller Craig Wamsley
Other (companies) None
Geologist(s) T. Gilmore, E. Jensen, M.A. Chambers, S. Teal, S. Airhart, S. Goodwin

Well No. 699-41-40 Temp. Well No. B7-6
Coordinates N 41,029.5 W 40,294.9
Casing Elev. 545.94 Ground Elev. 543.00 Brass Cap

DRILLING METHOD

Rotary - Air NA Mud NA
Cable Tool D 0-10' H 10'-175'
Drilling Fluid 200 East Area Drill Supply Water
Other Split Spoon Samples at ~5' intervals from 143'-175.4'

GEOPHYSICAL LOGGING

Sondes	Interval	Date
NAT. GAMMA	1.5'-150.5'	5-23-89
X-Y CALIPER	135'-156'	5-31-89
RESISTIVITY	140'-155'	5-31-89
NAT. GAMMA	14'-179'	6-8-89

COMPLETION DATA

Drilled Depth 176.14' 6-7-89
Completed Depth 174.3'
Date Started 4/4/89
Date Completed 8/4/89
Static Water Level/Date 127.08' 6-15-89

AQUIFER TESTING

Type Slug Injection & Withdrawal
Length of Test N/A
Volume Pumped N/A
Drawdown N/A
Date of Test 5-26-89 AND 9/7/89

INSPECTION RESULTS

CLEANING

Inspection Method Visual
Acceptance Criteria as per 7.6 of spec.

	Accept	Reject	Date
Drilling Tools/Rig	[illegible]		4-4-89
Temporary Materials	[illegible]		6-7-89
Permanent Materials	SPA		

SCREEN

" DIA. Type	Length	Slot Size
Johnson Div. Type 304 Stainless Steel Channel Pack	10' 4 3/8	10
	—	—

Depth(s) 174.3' - 163.94'
— —

Inspection Method Visual
Acceptance Criteria Sect. 4.2.3 of Specs.
Accept SPA Reject ____ Date 6-15-89

CASING (permanent)

Type	Size	Placement
Johnson Div. Type 304 Stainless Steel	4"	163.94'-+2.94
	—	— - —

Inspection Method Visual
Acceptance Criteria Sect. 4.2.4 of Specs.
Accept SPA Reject ____ Date 6-15-89

MATERIAL STORAGE/PACKING

Inspection Method Visual
Acceptance Criteria as per 7.3 of spec

	Accept	Reject	Date
Mtl. Handling/Storage	SPA		6-15-89
Material Packing	SPA		6-15-89

LUBRICANTS/ADDITIVES

Inspection Method Visual
Acceptance Criteria as per 7.2 of spec

	Identify	Accept	Reject	Date
Additives	None	SPA		4/4/89
Lubricants	Food grade oil (Crisco)	SPA		4/4/89

STRAIGHTNESS TEST

Inspection Method Using 20' of 6" S.S. Casing
Acceptance Criteria as per 8.3 in specs.
Accept SPA Reject ____ Date 6-2-89

WELL PROTECTION

Inspection Method Visual
Acceptance Criteria as per 4.2.1c of spec.

	Accept	Reject	Date
Protective Posts	SW		8-4-89
Locks	SW		8-8-89

ANNULAR SEAL

Inspection Method Measured w/ Steel Tape Acceptance Criteria Sect. 4.2.6 - 4.2.9

Type	Interval	Volume	Accept	Reject	Date
20-30 Mesh Silica Sand Pack	175.5'-158.35'	6.6 FT³	SPA		6-19-89
40-100 Mesh Silica Sand Pack	158.35'-158'	0.29 FT³	SPA		6-19-89
Volclay Grout	158'-136.25'	21 FT³	SW		6-20-89
8-20 Mesh Bentonite Chunks	119'-20.25'	68.16 FT³	SW		6-22-89

OTHER (initial if performed)

N/A Well Abandonment
SW Well Development
N/A Downhole TV Inspection
SW Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by V.L. McGhan

For all blanks mark N/A if not applicable.

WELL COMPLETION/INSPECTION REPORT

2 of 2

Specification No. WHC-S-014 Rev. No. 3
Project 216-B-3 POND
Location B-POND
Drilling Co. KAISER ENGINEERING / HANFORD
Driller CRAIG WRAMSLEY
Other (companies) NONE
Geologist(s) GILMORE, BENSEN, CHAMNESS, TEEL, AINHART, GODDWIN

Well No. 699-41-40 Temp. Well No. BP-6
Coordinates
Casing Elev. Ground Elev.

DRILLING METHOD
Rotary-Air N/A Mud N/A
Cable Tool D 0'-10' H 10'-175'
Drilling Fluid TOP & DRILL SUPPLY WATER
Other SEE OTHER SHEET

GEOPHYSICAL LOGGING

Sondes	Interval	Date

COMPLETION DATA
Drilled Depth
Completed Depth
Date Started
Date Completed
Static Water Level/Date

AQUIFER TESTING
Type
Length of Test
Volume Pumped
Drawdown
Date of Test

INSPECTION RESULTS

CLEANING
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Drilling Tools/Rig			
Temporary Materials			
Permanent Materials			

MATERIAL STORAGE/PACKING
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Mtl. Handling/Storage			
Material Packing			

SCREEN

Type	Length	Slot Size

Depth(s)
Inspection Method
Acceptance Criteria
Accept Reject Date

LUBRICANTS/ADDITIVES
Inspection Method
Acceptance Criteria

	Identify	Accept	Reject	Date
Additives				
Lubricants				

STRAIGHTNESS TEST
Inspection Method
Acceptance Criteria
Accept Reject Date

CASING (permanent)

Type	Size	Placement

Inspection Method
Acceptance Criteria
Accept Reject Date

WELL PROTECTION
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Protective Posts			
Locks			

ANNULAR SEAL
Inspection Method MEASURED W/STEEL TAPE Acceptance Criteria SECT. 4.2.6 - 4.2.9

Type	Interval	Volume	Accept	Reject	Date
CEMENT GROUT	20.25' - 2.2'	8.99 ft³	SMG		6-21-89
CONCRETE PAD	2.2' - +.5'	1.0 YARD³	SMG		8-4-89
1/4" BENTONITE PELLETS	136.25' - 119'	8.69 ft³	SDA		6-21-89

OTHER (initial if performed)
N/A Well Abandonment
SMG Well Development
N/A Downhole TV Inspection
____ Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by V.L. McGlam

For all blanks mark N/A if not applicable.

Procedure DO-1 Rev 0

Battelle Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number PP-6 (699-41-40) Geologist T. Gilmore, M.A. Chamness, S. Airhart, Goodwin Page 1 of 2

Reviewed by D.L. McGhan Date 10-4-89

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
		5		SLIGHTLY GRAVELLY SAND
		10		SANDY GRAVEL
		15		MUDDY SANDY GRAVEL
10" CARBON STEEL CASING W/		20		" " "
DRIVE SHOE (129' 1 1/2")		25		" " "
		30		" " "
		35		" " "
		40		SANDY GRAVEL
8" CARBON STEEL CASING (176')		45		MUDDY SANDY GRAVEL
		50		" " "
		55		" " "
		60		" " "
		65		" " "
		70		NO SAMPLE (Presumed SANDY GRAVEL) (75'-75') Boulder encountered
4" STAINLESS STEEL CASING		75		SANDY GRAVEL
(168' 9/16")		80		" "
		85		MUDDY SANDY GRAVEL
		90		SANDY GRAVEL
		95		" "
		100		" "
		105		NO SAMPLE (ASSUME SG)
		110		" "
		115		" "
		120		" " (CONTACT AT 122')
		125		GRAVELLY SANDY MUD
		130		MUD (CONTACT AT 126') STATIC H_2O @ 127.05' 6-15-89

A-1800-186 (3/87)

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number BP-6 (699-41-40) Geologist AIRHART, GOODWIN Page 2 of 2

Reviewed by D.L. McGhan Date 10-4-89

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
8" CARBON STEEL CASING		135		MUD
W/ DRIVE SHOE (176")		140		"
		145		"
4" STAINLESS STEEL CASING		150		"
(168' 9/16")		155		"
		160		"
10' 4 3/8" OF 10 SLOT		165		MUDDY SANDY GRAVEL
STAINLESS STEEL CHANNEL		170		" " "
PACK SCREEN (5' DIA.)		175		" " "
				T.D. = 176.14'
COMPLETION SYMBOLS				
CEMENT PAD				
CEMENT GROUT				
GRANULAR BENTONITE				
BENTONITE PELLETS				
SAND PACK				
VOLCLAY GROUT				
CASING JOINT				
CASING CENTRALIZER				

A-1800-186 (3/87)

WESTINGHOUSE HANFORD COMPANY

WELL NUMBER BP-6 (699-41-40) AREA 216-B-3C POND

DATE 5-23-89

LOG RUN First LOG TYPE GAMMA - ANALOG

SURVEY COORDINATES N 41030 W 40285

ELEVATION DATUM Top of Casing ELEVATION 545.94

LOG MEASURED FROM -1.5' below surface

LOCATION DESCRIPTION 600 AREA, WEST SIDE OF POND

GROUND SURFACE ELEVATION 543.00

SURFACE TEMPERATURE ~50°F WEATHER COOL, RAIN AT NIGHT

BOREHOLE INFORMATION

DRILLER KEH	
DRILL RIG TYPE CABLE TOOL	BIT TYPE/DIAMETER 10"
BOREHOLE DIAMETER(S)/DEPTH	
DEPTH DRILLER 152'	DEPTH LOGGER 150.5'
LIQUID LEVEL -NA-	LIQUID APPEARANCE -NA-
TEMPERATURE -NA-	

CASING RECORD

TYPE 10" SCH. 40 STEEL	INTERVAL Surface to -122' (STEEL)
TYPE OPEN HOLE	INTERVAL -122' to -152'
TYPE	INTERVAL
TYPE	INTERVAL
WELL SCREEN INTERVAL: -NA-	

COMMENTS: Site Geologist, Measured Total Depth w/ Steel Tape (147')
Bore Hole is dry, except for water added by driller
Log shows "two" stage clay layer between -127' & 143'
Log shows apparent bottom of casing at -122'
Hole was originally drilled w/ 8", then redrilled & 10" Casing set

EQUIPMENT DATA

LOGGING COMPANY	PNL
OPERATOR(S)	V.K. McGHAN
EQUIPMENT BRAND	MIS (Gearhart)
EQUIPMENT TYPE	Analog
TOOL TYPE	NaI (Natural Gamma)
BASE CALIBRATION DATE	12-88
SERIAL NO.	CG 27A97
CALIBRATION REFERENCE	WHC-EP-0246
CALIBRATION / PROBE FACTOR	8.53×10^{-2} all (ppm/cps)
DEAD TIME	7.4 μ-Sec (from WHC-EP-0246)
WARM UP TIME	>15 min (using Ratemeter #1, S/N-182)

LOGGING INFORMATION

LOG INTERVAL FROM	-150.5' TO -1.5'
RERUN(S)	#1 (-149.6' To -115')
PRE SURVEY CALIBRATION: POSITION 1	~70% (FS=1000) (289 all ppm)
POSITION 2	~80% (FS=800) (63 all ppm)
BACKGROUND	~13% (FS=500) 65 cps
LOGGING SPEED	5 Ft/Min
START TIME	8 00 AM
COMPLETION TIME	9 00 AM
CHART SPEED(S), FT/IN.	10 ft/in
CHART RECORDER HORIZONTAL SCALE, CPS/IN.	50 cps/in
RERUN SCALES, CPS/IN.	50 cps/in
TIME CONSTANT(S)	1 second
POST SURVEY CALIBRATION: POSITION 1	~80% FS (293 all ppm)
POSITION 2	~77% (FS=500)
BACKGROUND	~12% (FS=500) 60 cps
PERCENT CHANGE: POSITION 1	~~NA~~ -1.4% OK
POSITION 2	~3% OK.
	3.3%

COMMENTS: Non-linearity in Attenuator on Span check w/ 5000 cps pulser

Depth Return Error -2" (low)

Pos #2 Post-check, used settled value, after 5 minutes stabilization. {Drift Noted. Could be Thermal} JJ

WITNESSED AND VERIFIED BY: J.L. Ebold 5-23-89

WESTINGHOUSE HANFORD COMPANY

WELL NUMBER BP-6 (699-41-4D) AREA 216-B-3C Pond

DATE 6-8-89

LOG RUN 2ND (Gamma) LOG TYPE Analog - Nat. Gamma

SURVEY COORDINATES N 41030 W 40285

ELEVATION DATUM Top of 8" Casing ELEVATION 545.94

LOG MEASURED FROM (APPARENT) Ground Surface

LOCATION DESCRIPTION West of Road, Middle of 216-B-3C Pond

GROUND SURFACE ELEVATION 543.00

SURFACE TEMPERATURE 28°C WEATHER Fair, Warm

BOREHOLE INFORMATION

DRILLER	KEH Craig Wamsley		
DRILL RIG TYPE	Cable-Tool	BIT TYPE/DIAMETER	Drilling Shoe
BOREHOLE DIAMETER(S)/DEPTH	8" from 149 to 174.4		
DEPTH DRILLER	175'	DEPTH LOGGER	174.4'
LIQUID LEVEL	131.19'	LIQUID APPEARANCE	clear
TEMPERATURE	17.2°C		

CASING RECORD

TYPE	10" Sch 40, Steel	INTERVAL	Surface to 149'
TYPE	8" Sch. 40 Steel	INTERVAL	Surface to 175'
TYPE		INTERVAL	
TYPE		INTERVAL	

WELL SCREEN INTERVAL: -NA-

COMMENTS: First Run, (Gamma) was with 10" Casing to ~ 122' (5/23/89)
Tool Sidewalled w/ bowspring.
Depth return error ≤ ±1"

EQUIPMENT DATA

LOGGING COMPANY: PNL

OPERATOR(S): VL McGHAN

EQUIPMENT BRAND: M.L.S. — EQUIPMENT TYPE: ANALOG - NAT. GAMMA

TOOL TYPE: NaI (GAMMA) — BASE CALIBRATION DATE: 12-88

SERIAL NO.: CG 27A97 — CALIBRATION REFERENCE: 12-88 / WHC-EP-0246

CALIBRATION / PROBE FACTOR: 8.53×10^{-2} eU(PPM/cps) w/ Ratemeter #1, S/N 182

DEAD TIME: 7.4 μSec (from WHP-EP-0246 — WARM UP TIME: ≥ 15 Min

LOGGING INFORMATION

LOG INTERVAL FROM: -174.4' TO: -1.4'

RERUN(S): #1 -173' TO -135'

PRE SURVEY CALIBRATION: POSITION 1 ~68% (FS=5000 cps) (285 eU P/m) POSITION 2 ~73% (FS=1000 cps) (59 eU P/m) BACKGROUND ~12% (FS=500) 60 c/s

LOGGING SPEED: 5 FT/MIN

START TIME: 10:15 AM — COMPLETION TIME: 11:05 AM

CHART SPEED(S), FT/IN.: 10 FT/IN

CHART RECORDER HORIZONTAL SCALE, CPS/IN.: 50 cps/in (FS=500)

RERUN SCALES, CPS/IN.: 50 cps/in (FS=500)

TIME CONSTANT(S): 1 SECOND

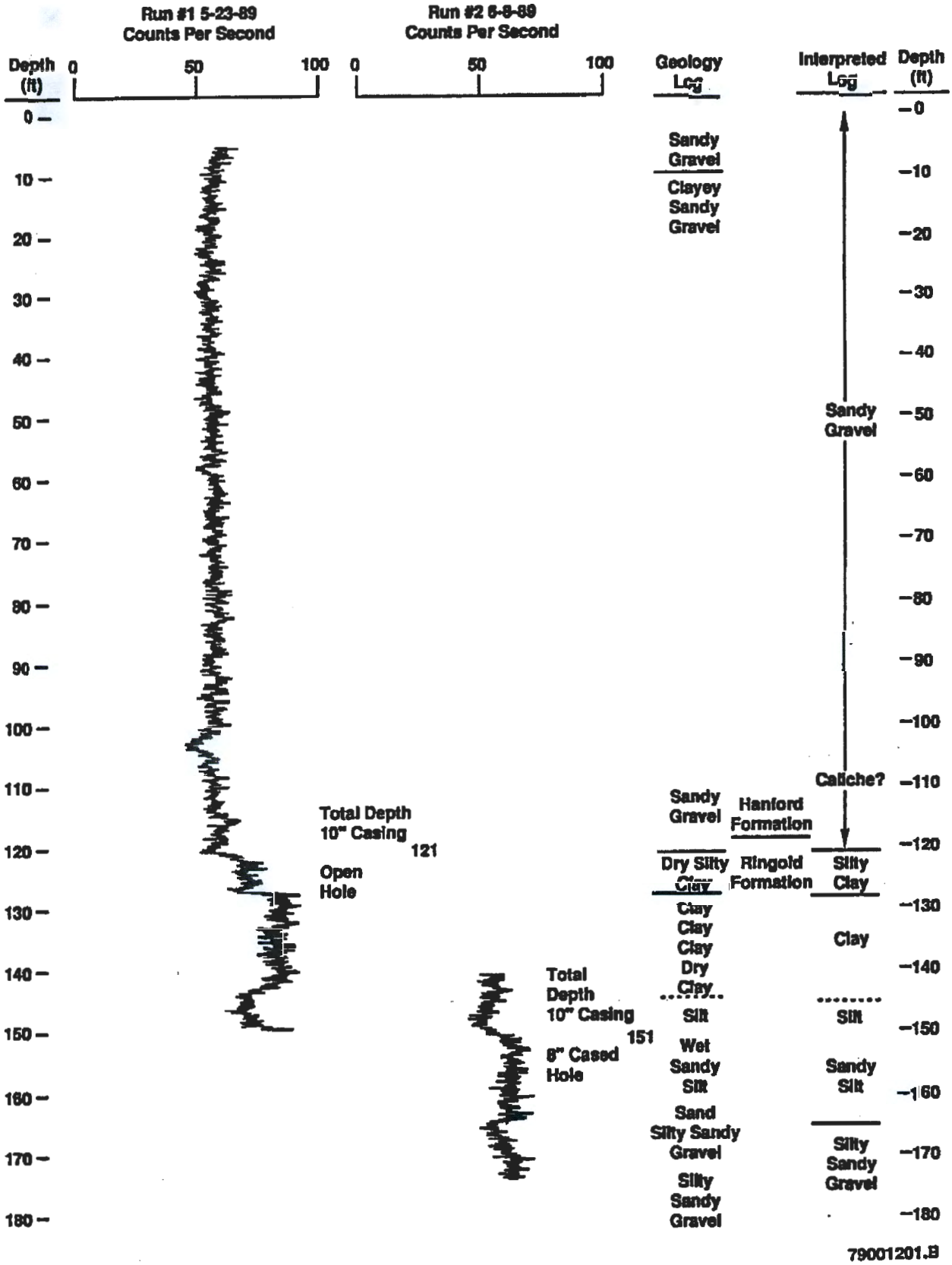
POST SURVEY CALIBRATION: POSITION 1 ~69% (FS=5000) (289 eU P/m) POSITION 2 ~75% (FS=1000) (59 eU P/m) BACKGROUND ~12% 60 c/s

PERCENT CHANGE: POSITION 1 ~ +1% (1.4%) (OK!) POSITION 2 ~ +2% OK! (3.5%)

COMMENTS: IRREGULARITIES MAY BE ATTRIBUTED TO HOLE SIZE, BELOW WATER LEVEL.
REGULARITY OF TRACE ABOVE 100', DUE TO DOUBLE CASING & DRY CONDITIONS

WITNESSED AND VERIFIED BY: J.S. Gorell 6/8/89

Well 699-41-40



WELL 699-42-42B

Well Completion/Inspection Report

A well completion/inspection report for well 699-42-42B follows.

As-Built Diagram

An as-built diagram for well 699-42-42B follows.

WELL COMPLETION/INSPECTION REPORT

Page 1 of 3

Specification No. V-C2-0480-21 Rev. No. 001
Project 13730
Location 3-Pond: East of 200 East Area
Drilling Co. Cruseco Drilling Co.
Dr Russell Young
Other (companies) N/A
Geologist(s) Karen R. Oster
Steve P. Airhart
Steve S. Teel

Well No. 199-H2-4GB Temp. Well No. EP-10
Coordinates N 42,473.9 W 42,301.3
Casing Elev. 583.23 Ground Elev. 579.65

DRILLING METHOD
Rotary · Air N/A Mud N/A
Cable Tool D 0'-109' H 109'-160'; 180.75'-250'
Drilling Fluid 200 East Area Supply Water
Other Split Spoon: 160'-180.75'

GEOPHYSICAL LOGGING

Sondes	Interval	Date
Natural Gamma	249'-3'	9/14/88
Neutron	249'-4'	9/14/88
Density	244'-1'	9/14/88
	-	
	-	

COMPLETION DATA
Drilled Depth 250' b.l.s.
Completed Depth 203.15' b.l.s.
Date Started 8/15/88
Date Completed 10/5/88
Static Water Level/Date 160.85' b.l.s. 10/7/88

AQUIFER TESTING
Type Development, Constant Discharge, and Recovery
Length of Test 390 min.
Volume Pumped 3745 gals
Drawdown 11.67
Date of Test 10/14/88

INSPECTION RESULTS

CLEANING
Inspection Method visual
Acceptance Criteria Spec. Sec. 3.5

	Accept	Reject	Date
Drilling Tools/Rig	KRO		10/5/88
Temporary Materials	KRO		10/5/88
Permanent Materials	KRO		10/5/88

SCREEN

Type	Length	Slot Size
8" Glass Steel 304 (Telescoping)	20'	20
4" Stainless Steel 304	10'3"	10

Depth(s) 203.5' - 183.5'
203.15' - 192.9'
Inspection Method verify using steel tape.
Acceptance Criteria Spec. Sec. 3.2
Accept KRO Reject ____ Date 9/27/88

CASING (permanent)

Type	Size	Placement
Stainless Steel 304	4"	192.9'-+3.5
		-

Inspection Method verify using steel tape.
Acceptance Criteria Spec. Sec. 3.2
Accept KRO Reject ____ Date 9/27/88

MATERIAL STORAGE/PACKING
Inspection Method visual
Acceptance Criteria Spec Sec 3.5

	Accept	Reject	Date
Mtl. Handling/Storage	KRO		10/5/88
Material Packing	KRO		10/5/88

LUBRICANTS/ADDITIVES
Inspection Method visual
Acceptance Criteria Spec Sec 3.5

	Identify	Accept	Reject	Date
Additives	Drilling Water	KRO		10/5/88
Lubricants	Crisco	KRO		10/5/88

STRAIGHTNESS TEST
Inspection Method visual
Acceptance Criteria Spec. Sec. 3.6
Accept KRO Reject ____ Date 9/27/88

WELL PROTECTION
Inspection Method visual
Acceptance Criteria Spec. Sec. 3.2

	Accept	Reject	Date
Protective Posts	KRO		10/5/88
Locks	KRO		10/5/88

ANNULAR SEAL
Inspection Method verify using steel tape
Acceptance Criteria Spec. Sec. 3.2

Type	Interval	Volume	Accept	Reject	Date
Volclay Grout Seal	250' - ≈ 222'	95 gallons	KRO		9/23/88
Cement Grout Seal	≈ 222' - 219.25'	19 gallons	KRO		9/23/88
Bentonite Plug Seal (Hydrous)	219.25' - 212'	3 bags (50 lbs each)	KRO		9/23/88
Bentonite Pellet Seal (1/4")	212' - 207.25'	5 buckets (50 lbs each)	KRO		9/23/88

Continued on Page 2.

OTHER (initial if performed)
N/A Well Abandonment
KRO Well Development
N/A Downhole TV Inspection
KRO Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed: J.R. Raymond 11/14/88

For all blanks mark N/A if not applicable.

WELL COMPLETION/INSPECTION REPORT

Page 3 of 3

Specification No. Y-CP-2490-C1 Rev. No. 001
Project 13730
Location B-Pond: East of 200 East Area
Drilling Co. Oregon Drilling Co.
Driller Russel Vance
Other (companies) N/A
Geologist(s) Karen R Oster
Steve P. Airhart
Steve S Teel

Well No. 699-48-43B Temp. Well No. BP-10
Coordinates N 42,432.9 W 42,301.3
Casing Elev. 593.23' Ground Elev. 579.23'

DRILLING METHOD
Rotary · Air ____ Mud ____
Cable Tool D ____ H ____
Drilling Fluid ____
Other ____

GEOPHYSICAL LOGGING

Sondes	Interval	Date

COMPLETION DATA
Drilled Depth ____
Completed Depth ____
Date Started ____
Date Completed ____
Static Water Level/Date ____

AQUIFER TESTING
Type ____
Length of Test ____
Volume Pumped ____
Drawdown ____
Date of Test ____

INSPECTION RESULTS

CLEANING
Inspection Method ____
Acceptance Criteria ____

	Accept	Reject	Date
Drilling Tools/Rig			
Temporary Materials			
Permanent Materials			

MATERIAL STORAGE/PACKING
Inspection Method ____
Acceptance Criteria ____

	Accept	Reject	Date
Mtl. Handling/Storage			
Material Packing			

SCREEN

Type	Length	Slot Size

Depth(s) ____
Inspection Method ____
Acceptance Criteria ____
Accept ____ Reject ____ Date ____

LUBRICANTS/ADDITIVES
Inspection Method ____
Acceptance Criteria ____

	Identify	Accept	Reject	Date
Additives				
Lubricants				

STRAIGHTNESS TEST
Inspection Method ____
Acceptance Criteria ____
Accept ____ Reject ____ Date ____

CASING (permanent)

Type	Size	Placement

Inspection Method ____
Acceptance Criteria ____
Accept ____ Reject ____ Date ____

WELL PROTECTION
Inspection Method ____
Acceptance Criteria ____

	Accept	Reject	Date
Protective Posts			
Locks			

ANNULAR SEAL
Inspection Method verify using steel tape
Acceptance Criteria Spec. Sec. 3.2

Type	Interval	Volume	Accept	Reject	Date
Colorado Silica Sand (10-20 mesh)	207.25' - 202.75'	2½ bags (100 lbs ea)	KRO		9/23/88
Colorado Silica Sand (20-40 mesh)	202.75' - 194.9'	3 bags (100 lbs ea)	KRO		9/27/88
Bentonite Pellet Seal (¼")	194.9' - 191.75'	1 bucket (50 lbs ea)	KRO		9/22/88
Bentonite Pellet Seal (½")	191.75' - 177.5'	1 bucket (50 lbs ea)	KRO		9/22/88

~~Continued on Page 2~~

OTHER (initial if performed)
____ Well Abandonment
____ Well Development
____ ~~Downhole TV Inspection~~
____ Complete As-Built Diagram, ~~Driller's/Geologist's Logs~~

Reviewed: J. L. Raymond 11/14/88

For all blanks mark N/A if not applicable.

WELL COMPLETION/INSPECTION REPORT

Page 3 of 3

Specification No. V-CR-0490-CL Rev. No. 001
Project 13730
Location B-Pond; East of 200 East Area
Drilling Co. Onsite Drilling Co.
Driller Russel Van's
Other (companies) N/A
Geologist(s) Karen J Oster
Steve J. Aichart
Steve S Teel

Well No. 699-42-42B Temp. Well No. BP-10
Coordinates N 42,432.9 W 42,301.3
Casing Elev. 593.23' Ground Elev. 579.83'

DRILLING METHOD
Rotary · Air ____ Mud ____
Cable Tool D ____ H ____
Drilling Fluid ____
Other ____

GEOPHYSICAL LOGGING

Sondes	Interval	Date

COMPLETION DATA
Drilled Depth ____
Completed Depth ____
Date Started ____
Date Completed ____
Static Water Level/Date ____

AQUIFER TESTING
Type ____
Length of Test ____
Volume Pumped ____
Drawdown ____
Date of Test ____

INSPECTION RESULTS

CLEANING
Inspection Method ____
Acceptance Criteria ____

	Accept	Reject	Date
Drilling Tools/Rig			
Temporary Materials			
Permanent Materials			

MATERIAL STORAGE/PACKING
Inspection Method ____
Acceptance Criteria ____

	Accept	Reject	Date
Mtl. Handling/Storage			
Material Packing			

SCREEN

Type	Length	Slot Size

Depth(s) ____
Inspection Method ____
Acceptance Criteria ____
Accept ____ Reject ____ Date ____

LUBRICANTS/ADDITIVES
Inspection Method ____
Acceptance Criteria ____

	Identify	Accept	Reject	Date
Additives				
Lubricants				

STRAIGHTNESS TEST
Inspection Method ____
Acceptance Criteria ____
Accept ____ Reject ____ Date ____

CASING (permanent)

Type	Size	Placement

Inspection Method ____
Acceptance Criteria ____
Accept ____ Reject ____ Date ____

WELL PROTECTION
Inspection Method ____
Acceptance Criteria ____

	Accept	Reject	Date
Protective Posts			
Locks			

ANNULAR SEAL
Inspection Method verify using steel tape
Acceptance Criteria Spec. Sec. 3.2

Type	Interval	Volume	Accept	Reject	Date
Bentonite Plug Seal (Sodium)	173.5' - 150.5'	13 bags (50 lbs ea)	KRO		9/28/93
Granular Bentonite Seal	150.5' - 18.2'	5 bags (100 lbs ea)	KRO		10/1/93
Cement Grout Seal	18.2' - 2'	133 gallons	KRO		10/3/93
Concrete Pad	2' - +4"	—	KRO		10/3/93

OTHER (initial if performed)
____ Well Abandonment
____ Well Development
____ Downhole TV Inspection
____ Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed: J.F. Raymond 11/14/88

For all blanks mark N/A if not applicable.

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number (22-10) 699-42-42B Geologist Karen R. Lister Page 1 of 2

Reviewed by J.R. Raymond Date 11/14/83

Construction Data: Description	Construction Data: Diagram	Depth in Feet	Geologic/Hydrologic Data: Diagram Litho.	Geologic/Hydrologic Data: Lithologic Description	Drill rate FT/:
20' of 12" Carbon Steel		5'		SAND (COARSE)	30
Surface Pipe (Removed)		10'			15
110' of 10" Carbon Steel		15'		SLIGHTLY GRAVELLY SAND	4.6
Casing (Removed)		20'			20
208' 1" of 8" Carbon Steel		25'		SAND (FINE)	3.2
Casing (Removed)		30'			12
195' 1" of 4" Stainless Steel		35'		SAND (MEDIUM-FINE)	12
(304) Casing		40'		SAND (FINE) Ash @ 39'	5
		45'			4
		50'		SAND (MEDIUM-FINE)	8.6
Factory Welded Centralizers		55'			6
		60'			10
		65'		SAND (MEDIUM)	4.6
		70'		SAND (FINE)	15
		75'			3.3
		80'			10
		85'		SAND (MEDIUM)	5.5
		90'		SAND (FINE)	15
		95'		SAND (COARSE-MEDIUM) 2" SILT @ 95'	7.5
		100'			8.6
		105'		SAND (MEDIUM)	3.2
Drive Shoe		110'		SILTY SANDY GRAVEL SAG @ 109'	1.7
		115'			1.9
		120'			5
		125'			1.3

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Battelle Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number (BP-10) 699-42-42B Geologist Karen R. Oster Page 2 of 2

Reviewed by J.R. Raymond Date 11/14/88

Construction Data: Description	Construction Data: Diagram	Depth in Feet	Geologic/Hydrologic Data: Diagram Litho.	Geologic/Hydrologic Data: Lithologic Description	Drill rate FT/HR
208'1" of 8" Carbon Steel		130'		SILTY SANDY GRAVEL	1.6
Casing (Removed)		135'			7.5
195'1" of 4" Stainless		140'			4.3
Steel (304) Casing		145'			2.3
		150'			1.4
		155'			3.5
		160'		G A C @ 159' GRAVELLY SILTY CLAYEY SAND	1.93
		165'		Static H_2O level = 160.85' b.i.s. 10/7/88 160'-180.75 SPLITSPOON SAMPLES	
		170'	?	TAKEN - NO FIELD DESCRIPTION - SEE	
		175'		LOGS FOR BP-2 FOR SIMILAR	
		180'		LITHOLOGIES	
		185'		C A G @ 184' SILTY SANDY GRAVEL	3.1
20' of 8" Telescoping Stainless		190'		GRAVELLY SAND	2.1
Steel (304) 20 slot Screen		195'		SANDY GRAVEL	2.9
10'3" of 4" Stainless Steel		200'			1.3
(304) 10 slot Screen		205'		G A C @ 204' SLIGHTLY GRAVELLY SILTY CLAYEY SAND	2.1
Drive Shoe		210'		SLIGHTLY GRAVELLY SANDY SILTY CLAY	4.3
Completion Depth = 203.15' b.i.s.		215'		SANDY SILTY CLAY	6.7
		220'		SILTY CLAY	15
Borehole Wall		225'		SLIGHTLY GRAVELLY SILTY CLAY	10
		230'		SILTY CLAY	15
Completion Symbols:		235'		GRAVELLY SANDY SILTY CLAY	7.5
+ Concrete Pad		240'		C A G @ 235' SILTY CLAYEY SANDY GRAVEL	3.5
// Granular Bentonite Seal		245'		G A S @ 243' SLIGHTLY GRAVELLY SILTY CLAYEY SAND	8.6
· Artificial Sand Pack		250'		S A G @ 248' SILTY CLAYEY SANDY GRAVEL	8.6
xx Bentonite Pellet Seal					
|||| Bentonite Plug Seal					
Cement Grout Seal					
Volclay Grout Seal					

Lithologic Symbols:

~ Clay
– Silt
· Sand
O Gravel
▫ Caliche

A-1800-188 (3/87)

WELL 699-43-41E

Well Completion/Inspection Report

A well completion/inspection report for well 699-43-41E follows.

As-Built Diagram

An as-built diagram for well 699-43-41E follows.

Analysis of Gamma-Ray Log

Information regarding gamma-ray log analysis for well 699-43-41E follows. Copies of the original log may be found in WHC-MR-0126, 216-B-3 Pond RCRA Wells Gamma-Ray Logs (WHC 1990).

One gamma-ray log was run in well 699-43-41E. It was run through a single 10-inch casing to 138 feet.

No lithology changes are evident from the gamma-ray log within the Hanford formation. The Hanford/Ringold formation contact is evident at about 120 feet.

The small section of the Ringold intersected by this log confirms the lithology noted on the geologist's log. A small section of silty clay is observed from 120 feet to about 137 feet. Below this clay layer is a poorly-sorted gravelly sandy silt.

1 of 2

WELL COMPLETION/INSPECTION REPORT(governing procedure DO-1, RO)

Specification No. WHC-S-014 Rev. No. 3
Project 216-B-3 POND
Location B-POND
Drilling Co. KAISER ENGINEERING / HANFORD
Driller FELIX MURPHY
Other (companies) N/A
Geologist(s) S.M. GOODWIN
M.A. CHARNESS
T.J. GILMORE

Well No. 699-43-46E Temp. Well No. BP-4
Coordinates N42 994.9 W40 723.0
Casing Elev. 550.26' ~~Ground~~ DRILL PAD Elev. 547.87'

DRILLING METHOD

Rotary Air N/A Mud N/A
Cable Tool D 0'-5' H 5'-150'
Drilling Fluid 200 E DRILL SUPPLY WATER
Other N/A

GEOPHYSICAL LOGGING

Sondes	Interval	Date
NAT. GAMMA	2' - 139'	4/19/89
	-	
	-	
	-	
	-	

COMPLETION DATA

Drilled Depth 150.02' (4/19/89)
Completed Depth 145.84'
Date Started 4/4/89
Date Completed 8/4/89
Static Water Level/Date 125.95 5/9/89

AQUIFER TESTING

Type N/A
Length of Test
Volume Pumped
Drawdown
Date of Test

INSPECTION RESULTS

CLEANING

Inspection Method VISUAL
Acceptance Criteria AS PER SECT. 7.6

	Accept	Reject	Date
Drilling Tools/Rig	SWL		4/4/89
Temporary Materials	SWL		4/4/89
Permanent Materials	SWL		5/24/89

MATERIAL STORAGE/PACKING

Inspection Method VISUAL
Acceptance Criteria SECT. 7.3

	Accept	Reject	Date
Mtl. Handling/Storage	SWL		5/24/89
Material Packing	SWL		5/24/89

SCREEN

Type	Length	Slot Size
JOHNSON DIA. TYPE 304 CHANNEL	10'7 3/4"	10
PACK STAINLESS STEEL (4" DIA.)	—	—

Depth(s) 145.84' - 135.19'
— -

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.3
Accept SWL Reject Date 5/22/89

LUBRICANTS/ADDITIVES

Inspection Method VISUAL
Acceptance Criteria SECT. 7.2

	Identify	Accept	Reject	Date
Additives	NONE	SWL		5/24/89
Lubricants	FOOD GRADE OIL	SWL		5/24/89

STRAIGHTNESS TEST

Inspection Method 26' OF 8" CASING DOWN HOLE
Acceptance Criteria SECT. 8.3
Accept SWL Reject Date 4/19/89

CASING (permanent)

Type	Size	Placement
JOHNSON DIA. TYPE 304	4"	135.19' - +1.0'
STAINLESS STEEL	-	-

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.4
Accept SWL Reject Date 5/22/89

WELL PROTECTION

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.9 - 4.2.10

	Accept	Reject	Date
Protective Posts	SWL		8/4/89
Locks	SWL		8/8/89

ANNULAR SEAL

Inspection Method MEASURED W/ STEEL TAPES
Acceptance Criteria SECT. 4.2.6 - 4.2.9

Type	Interval	Volume	Accept	Reject	Date
20-40 MESH COLORADO SILICA SAND	150' - 133.5'	9.9 FT³	SWL		5/23/89
40-100 MESH COLORADO SILICA SAND	133.5' - 132'	0.86 FT³	SWL		5/23/89
VOLCLAY GROUT	132' - 124.92'	7.0 FT³	SWL		5/24/89
8-20 MESH BENTONITE CRUMBLES	124.92' - 18.6'	58.93 FT³	SWL		5/24/89

OTHER (initial if performed)

N/A Well Abandonment
SWL Well Development
N/A Downhole TV Inspection
SWL Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by V.L. McGhan 10-3-89

For all blanks mark N/A if not applicable.

2 of 2

WELL COMPLETION/INSPECTION REPORT (governing procedure DO-1, RO)

Specification No. WHC-S-014 Rev. No. 3
Project 216-B-3 POND
Location B-POND
Drilling Co. KAISER ENGINEERING MANFORD
Driller FELIX LUNDRY
Other (companies) NONE
Geologist(s) S.M. GOODWIN
M.A. CHAMNESS
T.J. GILMORE

Well No. 699-43-41B Temp. Well No. BP-4
Coordinates
Casing Elev. Ground Elev.

DRILLING METHOD
Rotary Air N/A Mud N/A
Cable Tool D 0'-5' H 5'-130'
Drilling Fluid 200 GAL DRILL SUPPLY WATER
Other N/A

GEOPHYSICAL LOGGING

Sondes	Interval	Date
	-	
	-	
	-	
	-	
	-	

COMPLETION DATA
Drilled Depth
Completed Depth
Date Started
Date Completed
Static Water Level/Date

AQUIFER TESTING
Type SLUG INJECTION + WITHDRAWAL
Length of Test N/A
Volume Pumped N/A
Drawdown N/A
Date of Test 6/24/89

INSPECTION RESULTS

CLEANING
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Drilling Tools/Rig			
Temporary Materials			
Permanent Materials			

MATERIAL STORAGE/PACKING
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Mtl. Handling/Storage			
Material Packing			

SCREEN

Type	Length	Slot Size

Depth(s) -
-
Inspection Method
Acceptance Criteria
Accept Reject Date

LUBRICANTS/ADDITIVES
Inspection Method
Acceptance Criteria

	Identify	Accept	Reject	Date
Additives				
Lubricants				

STRAIGHTNESS TEST
Inspection Method
Acceptance Criteria
Accept Reject Date

CASING (permanent)

Type	Size	Placement
		-
		-

Inspection Method
Acceptance Criteria
Accept Reject Date

WELL PROTECTION
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Protective Posts			
Locks			

ANNULAR SEAL
Inspection Method MEASURED W/ STEEL TAPE Acceptance Criteria SECT. 4.2.6 - 4.2.9

Type	Interval	Volume	Accept	Reject	Date
CEMENT GROUT	18.6' - 2.4'	7.92 FT³	SWL		5/24/89
CONCRETE PAD	2.4' - +.5'	1.0 YD³	SWL		8/4/89
	-				
	-				

OTHER (initial if performed)
N/A Well Abandonment
SWL Well Development
N/A Downhole TV Inspection
SWL Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by V.L. McKlem 10-3-89

For all blanks mark N/A if not applicable.

Procedure DD-1, Rev. 0

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number BP-4 (699-43-41E) Geologist S. M. Goodwin / CHAMNESS Page 1 of 2

Reviewed by [illegible] Date 10-3-89

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
		5		MUDDY SANDY GRAVEL
136' 2⅜" OF 4" DIA. TYPE		10		" " "
304 STAINLESS STEEL		15		" " "
CASING		20		" " "
		25		" " "
		30		" " "
		35		" " "
		40		" " "
		45		" " "
		50		" " "
150' 2⅛" OF 10"		55		" " "
CARBON STEEL CASING		60		" " "
w/ DRIVE SHOE		65		" " "
(REMOVED)		70		" " "
		75		" " "
		80		" " "
		85		" " "
		90		" " "
FACTORY WELDED CASING		95		" " "
CENTRALIZERS		100		" " "
		105		" " "
		110		" " "
		115		" " "
		120		
		122'		
		125		GRAVELLY SAND. MUD
				STATIC H2O @ 125.45' (SEPT. 87)
		130		SLIGHTLY GRAVELLY SAND MUD

A-1800-188 (3/87)

PROCEDURE DO-1, REV. 0

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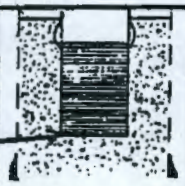
AS-BUILT DIAGRAM

Well Number BP-4 (699-43-41-E) Geologist GOODWIN / CHARNESS Page 2 of 2

Reviewed by [illegible] Date 10-3-89

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
150' 2 1/8" OF 10" CARBON		135		SL. GRAVELLY SANDY MUD
STEEL CASING W/		140		" " " "
DRIVE SHOE		145		MUDDY SANDY GRAVEL
10' 7 3/4" OF 4" DIA.		150		" " "
10 SLOT TYPE 304				T.D. = 150.02'
CHANNEL PACK SCREEN				
(STAINLESS STEEL)				
COMPLETION SYMBOLS:				
CEMENT PAD				
CEMENT GROUT.				
GRANULAR BENTONITE				
VOLCLAY GROUT				
SAND PACK				
CASING JOINT				
CASING CENTRALIZER				

A-1800-188 (3/87)

WESTINGHOUSE HANFORD COMPANY

WELL NUMBER BP-4 Site #4 (699-43-41E) AREA 216-B-3 Pond, Area C

DATE 4-18-89

LOG RUN Run #1 WIT Program LOG TYPE Nat. Gamma

SURVEY COORDINATES N 42995 W 40723

ELEVATION DATUM Ground Surface ELEVATION 550.86

LOG MEASURED FROM -2' Below Surface TO 138'

LOCATION DESCRIPTION North side of 216-B-3 Pond.

GROUND SURFACE ELEVATION 547.89

SURFACE TEMPERATURE 50°F WEATHER Cool/P. Cloudy

BOREHOLE INFORMATION

DRILLER	KEH		Sam Tourney - Safety
DRILL RIG TYPE	Cable-Tool	BIT TYPE/DIAMETER	Regular Pattern 8" Open Shoe
BOREHOLE DIAMETER(S)/DEPTH	~11"/138'		
DEPTH DRILLER	138.2'	DEPTH LOGGER	137.9'
LIQUID LEVEL		LIQUID APPEARANCE	Cloudy
TEMPERATURE	16°C		

CASING RECORD

TYPE	10" Sch.-40 Carbon Steel	INTERVAL	Surface to 138.2'
TYPE		INTERVAL	
TYPE		INTERVAL	
TYPE		INTERVAL	

WELL SCREEN INTERVAL: -NL-

COMMENTS: Driller will go another ~5' before quitting

Driller Log - shows Clay layer @ 121'

Depth Return to Zero, 3" (0.25') High Possible Initial Cable Slack

EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) ~~V.L. McGehan~~ V.L. McGhan

EQUIPMENT BRAND MIS (GOI) EQUIPMENT TYPE Pulse

TOOL TYPE Natural Gamma (NaI) BASE CALIBRATION DATE 12-88

SERIAL NO. CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR 8.53×10^{-2} cll p/m

DEAD TIME 7.4 μ Sec. WARM UP TIME 7 15 min.

LOGGING INFORMATION

LOG INTERVAL FROM ~~138.0'~~ 137.9' TO (Surface) -2'

RERUN(S) 139'-105'

PRE SURVEY CALIBRATION: POSITION 1 289 cll p/m POSITION 2 68 cll p/m BACKGROUND 65 c/s

LOGGING SPEED 5'/min.

START TIME ~ 8:00 AM COMPLETION TIME ~ 9:15 AM

CHART SPEED(S), FT/IN. 10 ft/in

CHART RECORDER HORIZONTAL SCALE, CPS/IN. (500 cps FS) 50 cps/in

RERUN SCALES, CPS/IN. 50 cps/in #1, 10 cps/in #2

TIME CONSTANT(S) 1 Sec

POST SURVEY CALIBRATION: POSITION 1 280 cll p/m POSITION 2 58 cll p/m BACKGROUND 65 c/s

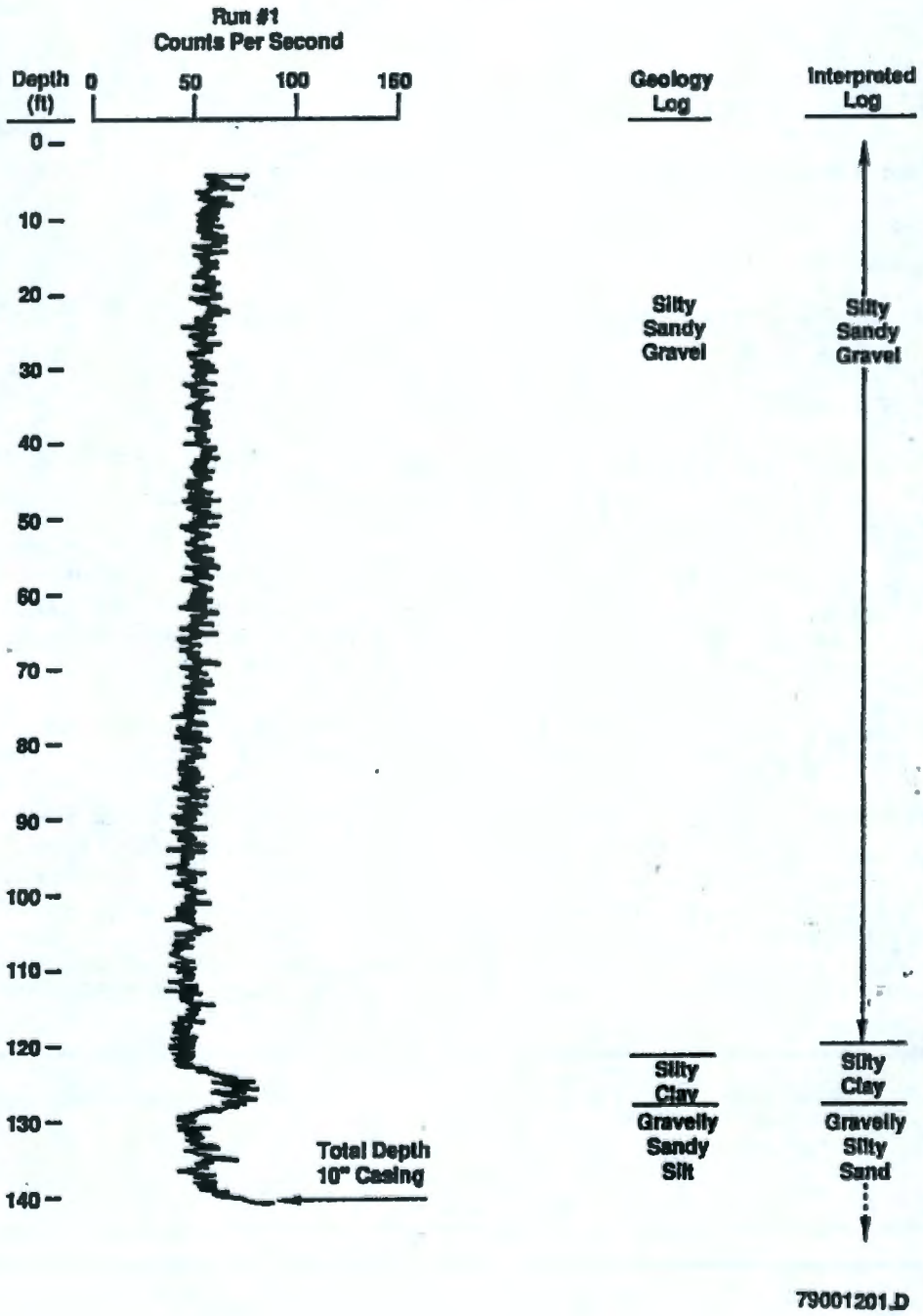
PERCENT CHANGE: POSITION 1 3.2 % POSITION 2 17.2 %

COMMENTS:

Decentralizer added by VMNG

WITNESSED AND VERIFIED BY: J. I. Gould 4/18/89
JI Gould

Well 699-43-41E



WELL 699-43-41F

Well Completion/Inspection Report

A well completion/inspection report for well 699-43-41F follows.

As-Built Diagram

An as-built diagram for well 699-43-41F follows.

Analysis of Gamma-Ray Log

Information regarding gamma-ray log analysis for well 699-40-39 follows. Copies of the original log may be found in WHC-MR-0126, 216-B-3 Pond RCRA Wells Gamma-Ray Logs (WHC 1990).

The gamma ray log from run #1 at well 699-43-41F was run through a single 10-inch steel casing. In run #2, the 10-inch casing was left in place and an 8-inch casing was installed. The log from run #2 is useful from the bottom of the 10-inch casing (126 feet) to total depth.

The Hanford formation appears to be made up of a consistent silty sandy gravel. No clay layers are evident from the gamma-ray log.

The Hanford/Ringold formation contact is found at about 123 feet. The uppermost layer of the Ringold Formation is a silty sandy clay that grades downward into a silty clay with a higher clay and $CaCO_3$ cement content. A distinctive break between the cemented clay and an underlying gravelly, silty sand is found at 141 feet. The gravelly silty sand extends down to total depth and it appears to be the most permeable section of the Ringold Formation at this location, based on the gamma ray log.

1 of 2

WELL COMPLETION/INSPECTION REPORT(governing procedure DO-1, RO)

Specification No. WHC-S-014 Rev. No. 3
Project 216-B-3 POND
:ation B-POND
urilling Co. KAISER ENGINEERING / HANFORD
Driller LOUIS WATKINS
Other (companies) N/A
Geologist(s) S.M. GOODWIN
M.A. CHAMNESS

Well No. 699-43-41F Temp. Well No. BP-4
Coordinates N42 944.5 W40 720.9
Casing Elev. 541.01' Ground Elev. 545.06 BRASS CAP

DRILLING METHOD

Rotary Air N/A Mud N/A
Cable Tool D 0'-15' H 15'-175'
Drilling Fluid 200 E. DRILL SUPPLY WATER
Other SPLIT SPOON: 135'-137.5', 175.3-177.5'

GEOPHYSICAL LOGGING

Sondes	Interval	Date
NAT. GAMMA	0'-123'	4/13/89
NAT. GAMMA	60'-176'	4/29/89

COMPLETION DATA

Drilled Depth 177.5'
Completed Depth 175.65'
Date Started 4/4/89
Date Completed 8-7-89
Static Water Level/Date 126.36' 5/16/89

AQUIFER TESTING

Type SLUG INJECTION
Length of Test 20 HR
Volume Pumped N/A
Drawdown N/A
Date of Test 5/30/89

INSPECTION RESULTS

CLEANING

Inspection Method VISUAL
Acceptance Criteria SECT. 7.6

	Accept	Reject	Date
Drilling Tools/Rig	SWL		4/4/89
Temporary Materials	SWL		4/4/89
Permanent Materials	SWL		5/19/89

MATERIAL STORAGE/PACKING

Inspection Method VISUAL
Acceptance Criteria SECT. 7.3

	Accept	Reject	Date
Mtl. Handling/Storage	SWL		5/19/89
Material Packing	SWL		5/19/89

SCREEN

Type	Length	Slot Size
JOHNSON DIV. TYPE 304 CHANNEL	10'7 1/4"	10
PACK STAINLESS STEEL (4" DIA)	—	—

Depth(s) 175.65' - 165.03'
Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.3
Accept SWL Reject ____ Date 5/16/89

LUBRICANTS/ADDITIVES

Inspection Method VISUAL
Acceptance Criteria SECT. 7.2

	Identify	Accept	Reject	Date
Additives	NONE	SWL		4/27/89
Lubricants	FOOD GRADE OIL	SWL		4/27/89

STRAIGHTNESS TEST

Inspection Method VISUAL SWL 5/10/89
Acceptance Criteria SECT. ~~4.2.3~~ ~~4.2.10~~ 8.3
Accept SWL Reject ____ Date 4/27/89

CASING (permanent)

Type	Size	Placement
JOHNSON DIV. TYPE 304	4"	165.03' - 0'1.02'
STAINLESS STEEL	—	— - —

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.4
Accept SWL Reject ____ Date 5/16/89

WELL PROTECTION

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.9 - 4.2.10

	Accept	Reject	Date
Protective Posts	SWL		8/7/89
Locks	SWL		8-8-89

ANNULAR SEAL

Inspection Method MEASURED w/ STEEL TAPE
Acceptance Criteria SECT. 4.2.6 - 4.2.9

Type	Interval	Volume	Accept	Reject	Date
20-40 MESH SILICA SAND PACK	176.17' - 161.49'	6.16 Ft³	SWL		5/17/89
40-100 MESH SILICA SAND PACK	161.49' - 160.69'	1.15 Ft³	SWL		5/17/89
VOLCLAY GROUT	160.69' - 126.85'	26.25 Ft³	SWL		5/19/89
8-20 MESH BENTONITE CHIPS	126.85' - 19.05'	76.68 Ft³	SWL		5/19/89

OTHER (initial if performed)

N/A Well Abandonment
SWL Well Development
N/A Downhole TV Inspection
SWL Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by D.K. McKelvey 10-5-89

For all blanks mark N/A if not applicable.

WELL COMPLETION/INSPECTION REPORT(governing procedure DO-1, RO)

Specification No. WHC-S-014 Rev. No. 3
Project 216-B-3 POND
Location B-POND
Drilling Co. ICAHAN ENGINEERING / HANFORD
Driller LOUIS WATKINS
Other (companies) N/A
Geologist(s) S.M. GOODWIN
M.A. CLAMMESS

Well No. 699A3-41F Temp. Well No. BP-9
Coordinates
Casing Elev. Ground Elev.

DRILLING METHOD
Rotary Air N/A Mud N/A
Cable Tool D 0'-15' H 15'-175'
Drilling Fluid 700 E DRILL SUPPLY WATER
Other SPLIT SPOON: 135'-137.5', 175.5-177.5'

GEOPHYSICAL LOGGING

Sondes	Interval	Date
	-	
	-	
	-	
	-	

COMPLETION DATA
Drilled Depth
Completed Depth
Date Started
Date Completed
Static Water Level/Date

AQUIFER TESTING
Type
Length of Test
Volume Pumped
Drawdown
Date of Test

INSPECTION RESULTS

CLEANING
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Drilling Tools/Rig			
Temporary Materials			
Permanent Materials			

MATERIAL STORAGE/PACKING
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Mtl. Handling/Storage			
Material Packing			

SCREEN

Type	Length	Slot Size

Depth(s) -
-
Inspection Method
Acceptance Criteria
Accept Reject Date

LUBRICANTS/ADDITIVES
Inspection Method
Acceptance Criteria

	Identify	Accept	Reject	Date
Additives				
Lubricants				

STRAIGHTNESS TEST
Inspection Method
Acceptance Criteria
Accept Reject Date

CASING (permanent)

Type	Size	Placement
		-
		-

Inspection Method
Acceptance Criteria
Accept Reject Date

WELL PROTECTION
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Protective Posts			
Locks			

ANNULAR SEAL
Inspection Method MEASURED W/ SIGNAL TAPE Acceptance Criteria SECT. 4.2.6 - 4.2.9

Type	Interval	Volume	Accept	Reject	Date
CEMENT GROUT	19.06' - 2.1'	8.58 ft³	SW		5/19/89
CONCRETE PAD	2.1' - +.5'	1.0 YARD³	SW		6/7/89
	-				
	-				

OTHER (initial if performed)
N/A Well Abandonment
SW Well Development
N/A Downhole TV Inspection
SW Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by V.L. Mitchem 10-5-89

For all blanks mark N/A if not applicable.

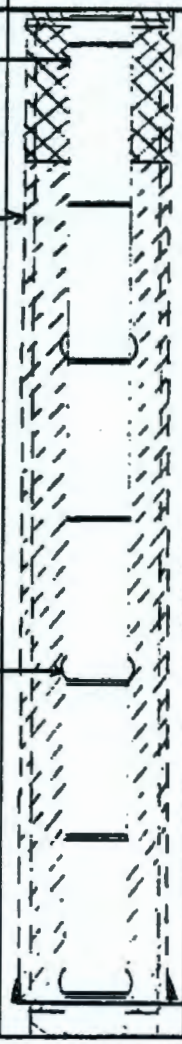
Procedure # DO-1 Rev. 0

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number BP-9 (699-43-41F) Geologist S. M. Goodwin, M.A. Chainess Page 1 of 2

Reviewed by V.L. McGhan Date 10-5-89

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
166' 5/8" OF 4" STAINLESS STEEL TYPE 304 CASING		5		MUDDY SANDY GRAVEL
		10		" " "
		15		" " "
		20		" " "
126' 7" OF 10" CARBON STEEL CASING W/ DRIVE SHOE		25		GRAVELLY SAND
		30		MUDDY SANDY GRAVEL
		35		" " "
		40		" " "
		45		" " "
		50		" " "
		55		" " "
177' OF 8" CARBON STEEL CASING W/ DRIVE SHOE		60		" " "
		65		" " "
		70		" " "
		75		" " "
		80		" " "
FACTORY WELDED CASING CENTRALIZERS		85		" " "
		90		" " "
		95		" " "
		100		" " "
		105		" " "
		110		" " "
		115		" " "
		120		
		125		SL. GRAVELLY MUDDY SAND
		130		SANDY MUD

T/W @ 126.36 3/16/89

A-1800-198 (3/87)

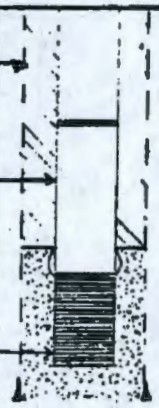
PROCEDURE # DO-1 REV. 0

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number BP-9 (699-43-41F) Geologist GOODWIN/CHAMNESS Page 2 of 2

Reviewed by D.L. McGhan Date 10-5-89

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
177' of 8" CARBON STEEL		135		SANDY MUD
CASING w/ DRIVE CHOE		140		SL GRAVELLY SANDY MUD
		145		GRAVELLY MUDDY SAND
166'5/8" OF 4" STAINLESS		150		MUDDY SANDY GRAVEL
STEEL FINAL CASING		155		" " "
		160		" " "
		165		GRAVELLY MUDDY SAND
		170		MUDDY SANDY GRAVEL
10' 7 3/4" OF 10 SLOT		175		GRAVELLY MUDDY SAND
CHANNEL PACK STAINLESS		176 177		SL GRAVELLY MUD MUD (GRAY CLAY)
STEEL TYPE 304 SCREEN				
				T.D. = 176.17' (8")
				SPLIT SPOON w/ 4" DIA.
				TO 177.5'
COMPLETION SYMBOLS:				
CEMENT PAD				
CEMENT GROUT				
GRANULAR BENTONITE				
VOLCLAY GROUT				
SAND PACK				
CASING JOINT				
CASING CENTRALIZER				

A-1800-186 (3/87)

WESTINGHOUSE HANFORD COMPANY

WELL NUMBER BP-9 DRILL SITE #9 (699-43-41F) AREA 216-B-3 POND, ARM C

DATE 4-18-89

LOG RUN #1 LOG TYPE NATURAL GAMMA

SURVEY COORDINATES N 42945 W 40721

ELEVATION DATUM SURFACE (2.7' ON CASING) ELEVATION 551.01

LOG MEASURED FROM SURFACE to 123'

LOCATION DESCRIPTION 548.06

GROUND SURFACE ELEVATION

SURFACE TEMPERATURE 62°F WEATHER CLEAR

BOREHOLE INFORMATION

DRILLER	KEH		
DRILL RIG TYPE	CABLE-TOOL	BIT TYPE/DIAMETER	OPEN SHOE
BOREHOLE DIAMETER(S)/DEPTH			
DEPTH DRILLER	121'	DEPTH LOGGER	123.6'
LIQUID LEVEL		LIQUID APPEARANCE	cloudy
TEMPERATURE	16°C (in sample)		

CASING RECORD

TYPE	10" SCH-40	INTERVAL	123.6' to SURFACE
TYPE		INTERVAL	
TYPE		INTERVAL	
TYPE		INTERVAL	

WELL SCREEN INTERVAL:

COMMENTS:

SOUTH ONE OF 2, ON NORTH SIDE OF POND.

DRILLER WILL DECREASE TO 8" USING 8" SD DRIVEPIPE

EQUIPMENT DATA

LOGGING COMPANY	PNL		
OPERATOR(S)	~~V.L. McGann~~ V.L. McGhan		
EQUIPMENT BRAND	MLS (GOI)	EQUIPMENT TYPE	Gross Gamma, Analog
TOOL TYPE	Natural Gamma	BASE CALIBRATION DATE	12-88
SERIAL NO.	CG2797	CALIBRATION REFERENCE	WHC-EP-0246
CALIBRATION / PROBE FACTOR	8.53×10^{-2} cll cpm/cps		
DEAD TIME	7.4 μ-Sec	WARM UP TIME	> 1 hr (Not Shut Off Since 1st Hole)

LOGGING INFORMATION

LOG INTERVAL FROM	123.6'	TO	Surface		
RERUN(S)	100'-70'				
PRE SURVEY CALIBRATION:	POSITION 1	281 cll c/m	POSITION 2	56 cll c/m	BACKGROUND 60 c/s
LOGGING SPEED	5'/MIN				
START TIME	9:50 AM		COMPLETION TIME		
CHART SPEED(S), FT/IN.					
CHART RECORDER HORIZONTAL SCALE, CPS/IN.	(500 cps/FS)	50 cps/IN			
RERUN SCALES, CPS/IN.	50 CPS/IN				
TIME CONSTANT(S)	1 Sec				
POST SURVEY CALIBRATION:	POSITION 1	298 cll c/m	POSITION 2	63 cll c/m	BACKGROUND 60 c/s
PERCENT CHANGE:	POSITION 1	6%	POSITION 2	12.5%	

COMMENTS: 2ND Hole of Pair, Noted Some Temp. Drift, Earlier Decentralizer, Single Body; Temp. Drift, Opposite Sense This Run

WITNESSED AND VERIFIED BY: J.I. Fowler [signature] 4-18-89

WESTINGHOUSE HANFORD COMPANY

WELL NUMBER BP-9 (699-43-41F) AREA 216-B-3B

DATE 4-28-89

LOG RUN Run #2 LOG TYPE Nat. Gamma

SURVEY COORDINATES N 42945 W 40721

ELEVATION DATUM Top of Inner (8") Casing ELEVATION 551.01

LOG MEASURED FROM -3' Below Surface

LOCATION DESCRIPTION South Hole of Pair, N. Side of 216-B-3B Pond (Dry)

GROUND SURFACE ELEVATION 548.06

SURFACE TEMPERATURE _____ WEATHER CLEAR

BOREHOLE INFORMATION

DRILLER	KEH		
DRILL RIG TYPE	CABLE-TOOL	BIT TYPE/DIAMETER	8" Nom. OPEN SHOE
BOREHOLE DIAMETER(S)/DEPTH			
DEPTH DRILLER	176.07'	DEPTH LOGGER	175.8'
LIQUID LEVEL	126.8'	LIQUID APPEARANCE	CLEAR
TEMPERATURE	-NA-		

CASING RECORD

TYPE 8" Sch.-40 to 176'	INTERVAL -176' to Surface
TYPE 10" Sch-40 to 125.47"	INTERVAL -125.58' to Surface
TYPE	INTERVAL
TYPE	INTERVAL

WELL SCREEN INTERVAL: -NA-

COMMENTS: Driller Installed 8" Casing After Former Logging Run
8" Casing extends to 2' above Nom. Surface
10" Casing Extends to 1'-1" above Nom. Surface
Depth Return Error = 2" (high)

EQUIPMENT DATA

LOGGING COMPANY	PNL		
OPERATOR(S)	V.K. McGHAN		
EQUIPMENT BRAND	MLS (GOI)	EQUIPMENT TYPE	ANALOG
TOOL TYPE	NAT. GAMMA	BASE CALIBRATION DATE	12-88
SERIAL NO.	CG27A97	CALIBRATION REFERENCE	WHC-EP-0246
CALIBRATION / PROBE FACTOR	8.53×10^{-2} eU (ppm/cps)		
DEAD TIME	7.48 μSec	WARM UP TIME	>15 Minutes

LOGGING INFORMATION

LOG INTERVAL FROM - 176' (175.8) TO ~~-2'~~ -60' (JK 9-28-89, REDUCED TO EXPEDITE AVAIL. TIME)

RERUN(S) #1, -150' TO ~~-120'~~ -116' ACROSS CLAY ZONE, & START OF DEL. CASING

PRE SURVEY CALIBRATION: POSITION 1 ~~3450~~ 289 eU P/m ~3500 cps POSITION 2 ~710 cps 56 eU P/m BACKGROUND ~60 cps

LOGGING SPEED	5 Ft/Min		
START TIME	11:52 AM	COMPLETION TIME	
CHART SPEED(S), FT/IN.	10 Ft/IN		
CHART RECORDER HORIZONTAL SCALE, CPS/IN.		500 CPS (FS)	50 CPS/IN
RERUN SCALES, CPS/IN.		500 cps (FS)	50 CPS/IN
TIME CONSTANT(S)	1 Sec		

POST SURVEY CALIBRATION: POSITION 1 289 eU P/m ~3500 cps POSITION 2 (REPEAT RUN) ~720 cps 56 eU P/m BACKGROUND ~65 cps

PERCENT CHANGE: POSITION 1 ~1.4% 0% POSITION 2 ~1.4% 0%

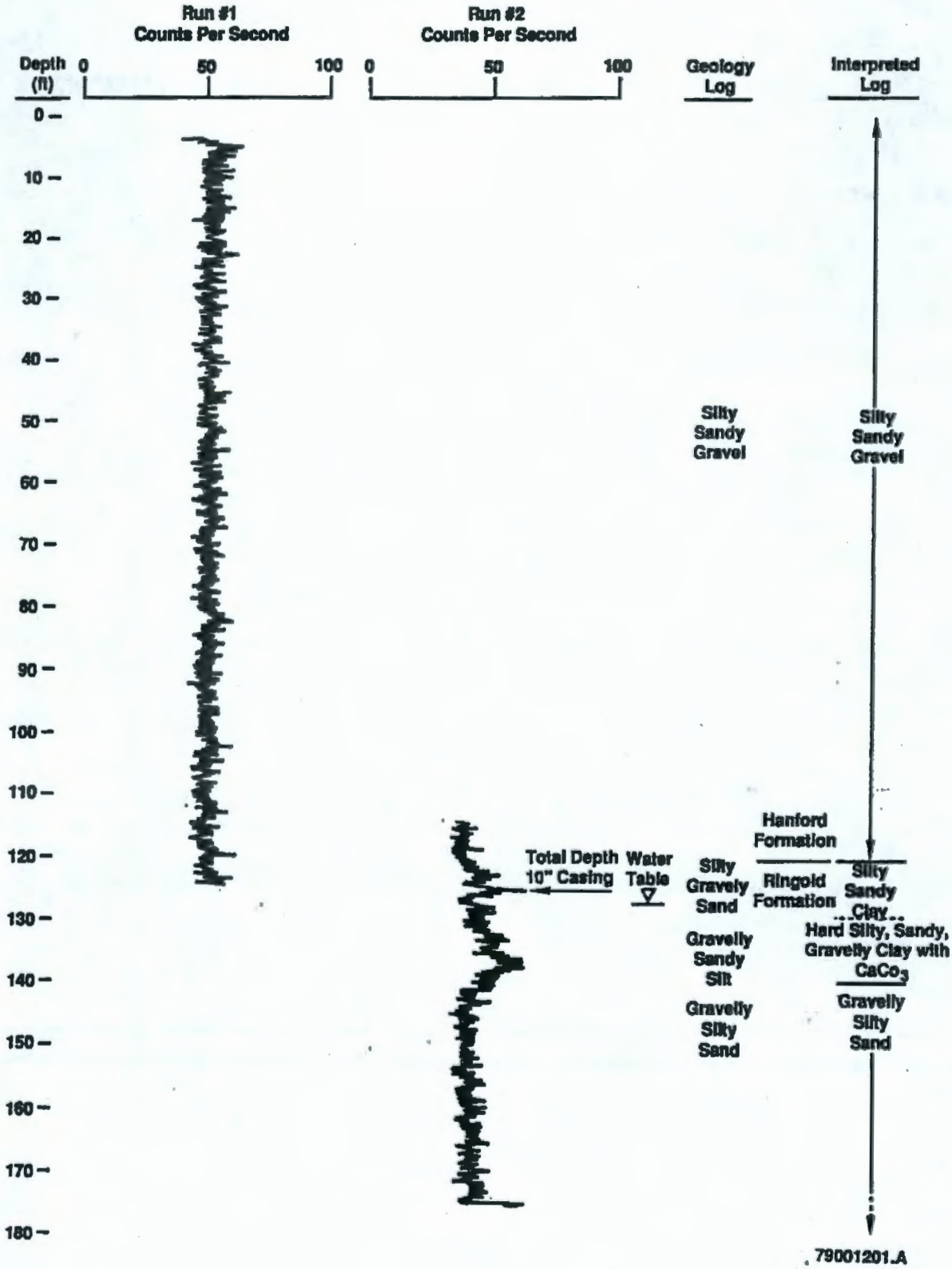
COMMENTS: PRE-CAL SPAN, ERRATIC ± 2%, SETTLED OK at start of LOG RUN

RATEMETER #1, S/N 182 PROBE IS SIDEWALLED W/ BOWSPRING

POS-SURVEY CAL REPEATED IN POS. 2

WITNESSED AND VERIFIED BY: J. T. GOULD 9/28/89

Well 699-42-41F



WELL 699-43-42J

The majority of the following data for well 699-43-42J was mismarked in the field as "699-43-42F."

Well Completion/Inspection Report

A well completion/inspection report for well 699-43-42J follows.

As-Built Diagram

An as-built diagram for well 699-43-42J follows.

9/1/E

WELL COMPLETION/INSPECTION REPORT

Page 1 of 2

Specification No. V-CR-0420-01 Rev. No. 001
Project 13730
Location 3-Tank; East of 200 East Area
Drilling Co. Omega Drilling Co.
Driller Russell Vargas
Other (companies) N/A
Geologist(s) Karen R. Oster
Terry L. Likkola Steve C. Tool
Eric O. Oersen

Well No. 299-W3-42F Temp. Well No. 3P-7
Coordinates N 42,531.9 W 42,274.4
Casing Elev. 501.[illegible] Ground Elev. 518.23'

DRILLING METHOD
Rotary · Air N/A Mud N/A
Cable Tool 0'-6'; 90'-110' H 6'-90'; 110'-180'
Drilling Fluid 200 East Area Sump Water
Other

GEOPHYSICAL LOGGING

Sondes	Interval	Date
Natural Gamma	179'-3'	8/10/88
Neutron	179'-3'	8/10/88
Density	178'-1'	8/10/88
	-	
	-	

COMPLETION DATA
Drilled Depth 180' b.l.s.
Completed Depth 177.35' b.l.s.
Date Started 7/20/88
Date Completed 9/2/88
Static Water Level/Date 157.16 b.l.s. 10/7/88

AQUIFER TESTING
Type Development
Length of Test 4.25 Hours
Volume Pumped ≈ 288 gals.
Drawdown 13.75'
Date of Test 10/14/88

INSPECTION RESULTS

CLEANING
Inspection Method visual
Acceptance Criteria Spec. Sec. 3.5

	Accept	Reject	Date
Drilling Tools/Rig	KRO		9/2/88
Temporary Materials	KRO		9/2/88
Permanent Materials	KRO		9/2/88

SCREEN

Type	Length	Slot Size
4" Stainless Steel 304	20.5'	5

Depth(s) 177.35' - 156.9'
Inspection Method verify using steel tape
Acceptance Criteria Spec. Sec. 3.2
Accept KRO Reject Date 8/24/88

CASING (permanent)

Type	Size	Placement
Stainless Steel 304	4"	156.9' - +3.5'
		-

Inspection Method verify using steel tape.
Acceptance Criteria Spec. Sec. 3.2
Accept KRO Reject Date 8/24/88

MATERIAL STORAGE/PACKING
Inspection Method visual
Acceptance Criteria Spec. Sec. 3.5

	Accept	Reject	Date
Mtl. Handling/Storage	KRO		9/2/88
Material Packing	KRO		9/2/88

LUBRICANTS/ADDITIVES
Inspection Method visual
Acceptance Criteria Spec. Sec. 3.5

	Identify	Accept	Reject	Date
Additives	Drilling Water	KRO		9/2/88
Lubricants	Grease	KRO		9/2/88

STRAIGHTNESS TEST
Inspection Method visual
Acceptance Criteria Spec. Sec. 3.6
Accept KRO Reject Date 8/24/88

WELL PROTECTION
Inspection Method visual
Acceptance Criteria Spec. Sec. 3.2

	Accept	Reject	Date
Protective Posts	KRO		9/2/88
Locks	KRO		9/2/88

ANNULAR SEAL
Inspection Method verify using steel tape
Acceptance Criteria Spec. Sec. 3.7

Type	Interval	Volume	Accept	Reject	Date
Colorado Silica Sand (70 mesh)	180' - 152'	14 bags (100 lbs/bag)	KRO		8/26/88
Colorado Silica Sand (30 mesh)	152' - 150.5'	1 bag (100 lbs/bag)	KRO		8/26/88
Bentonite Pellet Seal (1/4")	150.5' - 146.75'	2 buckets (50 lbs/bag)	KRO		8/26/88
Granular Bentonite Seal	146.75' - 99.4'	13 bags (50 lbs/bag)	KRO		9/29/88

Confirmed by tape

OTHER (initial if performed)
N/A Well Abandonment
KRO Well Development
N/A Downhole TV Inspection
KRO Complete As-Built Diagram, Driller's/Geologist's Logs

REVIEWED: J. A. Raymond 11/15/88

For all blanks mark N/A if not applicable.

WELL COMPLETION/INSPECTION REPORT

Page 2 of 2

Specification No. V-CR-0480-C1 Rev. No. 001
Project 13730
Location B-Pond: East of 200 East Area
Drilling Co. Dawson Drilling Co
Driller Russell Vance
Other (companies) N/A
Geologist(s) Karen E. Deeter
Terry L. Liikala Steve S. Teel
Eric Q. Jensen

Well No. 699-43-42E Temp. Well No. 3D-2
Coordinates N 42,531.9 W 42,274.2
Casing Elev. 521.62' Ground Elev. 522.05'

DRILLING METHOD

Rotary Air ____ Mud ____
Cable Tool D ____ H ____
Drilling Fluid ____
Other ____

GEOPHYSICAL LOGGING

Sondes	Interval	Date

COMPLETION DATA

Drilled Depth ____
Completed Depth ____
Date Started ____
Date Completed ____
Static Water Level/Date ____

AQUIFER TESTING

Type ____
Length of Test ____
Volume Pumped ____
Drawdown ____
Date of Test ____

INSPECTION RESULTS

CLEANING

Inspection Method ____
Acceptance Criteria ____

	Accept	Reject	Date
Drilling Tools/Rig			
Temporary Materials			
Permanent Materials			

MATERIAL STORAGE/PACKING

Inspection Method ____
Acceptance Criteria ____

	Accept	Reject	Date
Mtl. Handling/Storage			
Material Packing			

SCREEN

Type	Length	Slot Size

Depth(s) ____
Inspection Method ____
Acceptance Criteria ____
Accept ____ Reject ____ Date ____

LUBRICANTS/ADDITIVES

Inspection Method ____
Acceptance Criteria ____

	Identify	Accept	Reject	Date
Additives				
Lubricants				

STRAIGHTNESS TEST

Inspection Method ____
Acceptance Criteria ____
Accept ____ Reject ____ Date ____

CASING (permanent)

Type	Size	Placement

Inspection Method ____
Acceptance Criteria ____
Accept ____ Reject ____ Date ____

WELL PROTECTION

Inspection Method ____
Acceptance Criteria ____

	Accept	Reject	Date
Protective Posts			
Locks			

ANNULAR SEAL

Inspection Method verify using steel tape
Acceptance Criteria Spec. Sec. 3.2

Type	Interval	Volume	Accept	Reject	Date
Bentonite Slurry Seal	98.4' - 20.25'	600 gallons	KRD		9/30/83
Granular Bentonite Seal	20.25' - 19.5'	1 bag/100 lb seal	KRD		9/30/83
Cement Grout Seal	19.5' - 2'	102 gallons	KRD		9/30/83
Concrete Pad	2' - +4"	45 gallons	KRD		9/2/83

OTHER (initial if performed)

____ Well Abandonment
____ Well Development
____ Downhole TV Inspection
Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed: J.R. Raymond 11/15/88

For all blanks mark N/A if not applicable.

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number (BP-7) 699-43-42A Geologist Loren R. Oster Page 1 of 2

Reviewed by J.R. Raymond Date 11/15/88

Construction Data: Description	Construction Data: Diagram	Depth in Feet	Geologic/Hydrologic Data: Diagram Litho.	Geologic/Hydrologic Data: Lithologic Description	Drill Rate FT/
19' of 12" Carbon Steel		5		SLIGHTLY GRAVELLY SANDY SILT	2C
Surface Pipe (Removed)		10		SLIGHTLY GRAVELLY SAND	1.6
105' 1" of 10" Carbon Steel		15		SANDY GRAVEL SAG @ 14'	1
Casing (Removed)		20		GRAVELLY SAND) SAS @ 20'	2.5
179' 10" of 8" Carbon Steel		25		SILTY SAND	10
Casing (Removed)		30			10
158' of 4" Stainless Steel		35			10
(304) Casing		40			5
		45			7.5
		50			10
		55			10
Factory Welded Centralizers		60			7.5
		65			4
		70			4.6
		75		SLIGHTLY SILTY SAND	3.7
		80		SILTY SAND	7.5
		85		SLIGHTLY SILTY SAND	9.[illegible]
		90		SAND (MEDIUM)	7.5
		95		8" SILT LENS @ 93'	7.5
		100		SLIGHTLY GRAVELLY SAND	7.5
Drive Shoe		105		SAND (MEDIUM)	6
		110		SAG @ 110'	1C
		115		SILTY SANDY GRAVEL	.6
		120		SANDY GRAVEL	1.[illegible]
		125		SILTY SANDY GRAVEL	3.9

A-1800-186 (3/87)

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number (BP-7) 699-43-42F Geologist Karen R. Oster Page 2 of 2

Reviewed by J. R. Raymond Date 11/15/88

Construction Data: Description	Construction Data: Diagram	Depth in Feet	Geologic/Hydrologic Data: Diagram Litho.	Geologic/Hydrologic Data: Lithologic Description	Drill Rate FT/
179'10" of 8" Carbon Steel		130'		SILTY SANDY GRAVEL	2
Casing (Removed)		135'		SANDY GRAVEL	3.0
158' of 4" Stainless Steel		140'			1.4
(304) Casing		145'			7
		150'			1.3
		155'		Static H_2O Level @157.1' b.l.s. 10/7/88	1.8
		160'		GAC @ 158' GRAVELLY SANDY SILTY CLAY	3.8
20'5" of 4" Stainless Steel		165'			10
(304) 5 slot Screen		170'		GRAVELLY SANDY CLAYEY SILT	10
Drive Shoe		175'			8.1
Completion Depth = 177.35' b.l.s.		180'		GRAVELLY SILTY CLAYEY SAND	7.5
				Drilled Depth = 180' b.l.s.	

Completion Symbols
+ Concrete Pad
Cement Grout Seal
Bentonite Slurry Seal
/ Granular Bentonite Seal
X Bentonite Pellet Seal
• Artificial Sand Pack

Lithologic Symbols
~ Clay
— Silt
' Sand
o Gravel
Caliche

A-1800-186 (3/87)

WELL 699-43-43

Well Completion/Inspection Report

A well completion/inspection report for well 699-43-43 follows.

As-Built Diagram

An as-built diagram for well 699-43-43 follows.

WELL COMPLETION/INSPECTION REPORT

ecification No. V-CR-0480-01 Rev. No. 001
oject 13730
cation B-Pond: East of 200 East Area
illing Co. Ontario Drilling Co.
ill Darrel Luttke / Russell Vance,
he mpanies) N/A
ologist(s) Karen R Oster

Well No. 699-43-43 Temp. Well No. EP-9
Coordinates N 42,942.4 W 43,154.4
Casing Elev. 579.37' Ground Elev. 576.00'

DRILLING METHOD
Rotary Air N/A Mud N/A
Cable Tool 0'-105' H 105'-180'
Drilling Fluid 200 East Area Supply Water
Other N/A

GEOPHYSICAL LOGGING

Sondes	Interval	Date
atural Gamma	180'-2'	9/1/88
Neutron	180'-2'	9/1/88
Density	180'-1'	9/1/88
ownhole T.V.	160'-0'	9/1/88

COMPLETION DATA
Drilled Depth 180' b.l.s.
Completed Depth 177.45' b.l.s.
Date Started 8/2/88
Date Completed 9/30/88
Static Water Level/Date 159.3 b.l.s. 10/7/88

AQUIFER TESTING
Type Development, Constant-Discharge and Recovery
Length of Test 290 min.
Volume Pumped 81,475 gals.
Drawdown 0.45'
Date of Test 9/9/88

INSPECTION RESULTS

CLEANING
nspection Method visual
cceptance Criteria Spec. Sec. 3.5

	Accept	Reject	Date
rilling Tools/Rig	KRO		9/30/88
emporary Materials	KRO		9/30/88
ermanent Materials	KRO		9/30/88

SCREEN

	Type	Length	Slot Size
8"	Stainless Steel 304	80'	20
4"	Stainless Steel 304	77.8'	10

Depth(s) 179.5' - 159.5'
177.45' - 156.8'
Inspection Method verify using steel tape
Acceptance Criteria Spec Sec 3.2
Accept KRO Reject ____ Date 9/13/88

CASING (permanent)

Type	Size	Placement
Stainless Steel 304	4"	156.5' - +3.4'

Inspection Method verify using steel tape
Acceptance Criteria Spec Sec 3.2
Accept KRO Reject ____ Date 9/13/88

MATERIAL STORAGE/PACKING
Inspection Method visual
Acceptance Criteria Spec Sec. 3.5

	Accept	Reject	Date
Mtl. Handling/Storage	KRO		9/30/88
Material Packing	KRO		9/30/88

LUBRICANTS/ADDITIVES
Inspection Method visual
Acceptance Criteria Spec. Sec. 3.5

	Identify	Accept	Reject	Date
Additives	Drilling water	KRO		9/30/88
Lubricants	Crisco	KRO		9/30/88

STRAIGHTNESS TEST
Inspection Method visual
Acceptance Criteria Spec Sec. 3.6
Accept KRO Reject ____ Date 9/30/88

WELL PROTECTION
Inspection Method visual
Acceptance Criteria Spec Sec. 3.6

	Accept	Reject	Date
Protective Posts	KRO		9/30/88
Locks	KRO		9/30/88

ANNULAR SEAL
Inspection Method verify using steel tape Acceptance Criteria Spec Sec. 3.2

Type	Interval	Volume	Accept	Reject	Date
Colorado Silica Sand (30-40 mesh)	180' - 152'	12 bags (100 lbs each)	KRO		9/14/88
Bentonite Pellet Seal (1/4")	152' - 147.5'	2 buckets (50 lbs each)	KRO		9/14/88
Granular Bentonite Seal	147.5' - 18'	3 bags (100 lbs each) / 2 bags (50 lbs)	KRO		9/20/88
Cement Grout Seal	18' - 2'	6 gallons	KRO		9/22/88
Concrete Pad	2' - 0'		KRO		9/28/88

OTHER (initial if performed)
Well Abandonment ____ Downhole TV Inspection KRO Complete As-Built Diagram, Driller's/Geologist's Logs
Well Development

Reviewed: J.A. Raymond 11/18/88

For all blanks mark N/A if not applicable.

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number (BP-8) 699-43-43 Geologist Karen R. Oster Page 1 of 2

Reviewed by J. R. Raymond Date 11/18/88

Construction Data: Description	Depth in Feet	Geologic/Hydrologic Data: Lithologic Description	Drill rate FT/HR
15' 1/2" of 12" Carbon Steel	5'	SLIGHTLY SILTY GRAVELLY SAND	20
Surface Pipe (Removed)	10'	SILTY SANDY GRAVEL	15
126' 2 3/4" of 10" Carbon Steel	15'	SAND (MEDIUM)	6.7
Casing (Removed)	20'		20
183' 9" of 8" Carbon Steel	25'		30
Casing (Removed)	30'		30
160' of 4" Stainless Steel	35'	SAND (MEDIUM TO FINE)	6.7
(304) Casing	40'	SAND (FINE)	9.1
	45'	SAND (MEDIUM)	15
	50'		30
	55'		15
Factory Welded Centralizers	60'	GRAVELLY SAND	30
	65'		7.5
	70'		8.6
	75'		6.7
	80'		20
	85'	SAND (FINE)	15
	90'	SLIGHTLY GRAVELLY SLIGHTLY SILTY SAND	20
	95'	SLIGHTLY GRAVELLY SAND	15
	100'	SAND (MEDIUM)	4.3
	105'	SAG ICE	15
	110'	SANDY GRAVEL	2.4
	115'		5.4
	120'	GRAVELLY SAND	2.6
Drive Shoe	125'	SANDY GRAVEL	1.7
		BASALT BOULDER: 124'-139.5'	

A-1800-186 (3/87)

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AS-BUILT DIAGRAM

Well Number (BP-8) 699-43-43 Geologist Karen R. Oster Page 2 of 2

Reviewed by J.R. Raymond Date 11/18/88

Construction Data: Description	Construction Data: Diagram	Depth in Feet	Geologic/Hydrologic Data: Diagram Litho.	Geologic/Hydrologic Data: Lithologic Description	Drill rate FT/HR
183'9" of 8" Carbon Steel		130'		SAND (MEDIUM)	.44
Casing (Removed)		135'		SLIGHTLY GRAVELLY SAND	1
160' of 4" Stainless Steel		140'		GRAVELLY SAND	2.7
(304) Casing		145'		SANDY GRAVEL	1.1
		150'			.73
		155'			1.7
	156.2	160'		Static H_2O Level = 159.3' b.s. 10/7/88	6.5
20' of 8" Telescoping Stainless		165'		GRAVELLY SAND	3.8
Steel (304) 20 slot Screen		170'		SILTY SANDY GRAVEL SAGE 120.5	5
20' 8" of 4" Stainless Steel		175'		SANDY GRAVEL Z:NGOLDS 173'	1.9
(304) 10 slot Screen	177.45	180'		SLIGHTLY GRAVELLY SAND	.87
Drive Shoe				Drilled Depth = 180' b.l.s.	
Completion Depth = 177.45' b.l.s.					

Completion Symbols:
+ Concrete Pad
Cement Grout Seal
// Granular Bentonite Seal
XX Bentonite Pellet Seal
• Artificial Sand Pack

Lithologic Symbols:
~ Clay
– Silt
• Sand
○ Gravel
Calcite
Basalt Rock

A-1800-188 (3/87)

WELL 699-43-45

Well Completion/Inspection Report

A well completion/inspection report for well 699-43-45 follows.

As-Built Diagram

An as-built diagram for well 699-43-45 follows.

Analysis of Gamma-Ray Log

Information regarding gamma-ray log analysis for well 699-43-45 follows. Copies of the original log may be found in WHC-MR-0126, 216-B-3 Pond RCRA Wells Gamma-Ray Logs (WHC 1990).

One gamma-ray log was run in well 699-43-45. This log was run through a single 8-inch casing.

No significant variations in the gamma-ray log are observed within the Hanform formation.

The Hanford/Ringold formation contact is distinguished by a 5-foot thick clay layer at 145 feet. This clay is the only sedimentary layer that is distinguishable by the gamma-ray log. The Ringold Formation below the clay layer is a uniform silty or sandy gravel.

Procedure P-0 DO-1 REV. 0 Attachment 1 Page 1 of 1

WELL COMPLETION/INSPECTION REPORT

1 of 2

Specification No. WHC-S-014 Rev. No. 3
Project 216-B-3 POND
Location B-POND
Drilling Co. LANGER ENGINEERING MANFRED
Driller LOUIS WATKINS
Other (companies) —
Geologist(s) AIGHART CHAMNESS GOODWIN, TEEL

Well No. 699-43-45 Temp. Well No. BP-1
Coordinates N 42,977.4 W 44 643.6
Casing Elev. 597.68 Ground Elev. 594.70 BRASS CAP

DRILLING METHOD

Rotary-Air N/A Mud N/A
Cable Tool D 0'-95' H 95'-203.55'
Drilling Fluid 200 E DRILL SUPPLY WATER
Other NONE

GEOPHYSICAL LOGGING

Sondes	Interval	Date
~~NAT. GAMMA~~	~~15'-100.5'~~	~~5-23-89~~ SPA
NAT. GAMMA	3'-203'	6-6-89

COMPLETION DATA

Drilled Depth 203.55' 6-2-89
Completed Depth 203.3'
Date Started 5-2-89
Date Completed 6-4-89
Static Water Level/Date 187.7' 6-8-89

AQUIFER TESTING

Type N/A
Length of Test
Volume Pumped
Drawdown
Date of Test

INSPECTION RESULTS

CLEANING

STEAM CLEANING WITNESSED BY CURTIS HOOVER, IEM

Inspection Method VISUAL
Acceptance Criteria AS PER SECTION 7.6

	Accept	Reject	Date
Drilling Tools/Rig	SPA		5-2-89
Temporary Materials	SPA		5-2-89
Permanent Materials	SPA		6-14-89

MATERIAL STORAGE/PACKING

Inspection Method VISUAL
Acceptance Criteria AS PER SECTION 7.3

	Accept	Reject	Date
Mtl. Handling/Storage	SPA		5-2-89
Material Packing	SPA		6-14-89

SCREEN

Type	Length	Slot Size
JOHNSON DIV. TYPE 304 CONT.	20' 4 1/4"	20
JOHNS WRAP STAINLESS STEEL (4")	—	—

Depth(s) 203.3' - 182.95'

Inspection Method VISUAL
Acceptance Criteria AS PER SECT. 4.2.3
Accept SPA Reject Date 6-9-89

LUBRICANTS/ADDITIVES

Inspection Method VISUAL
Acceptance Criteria AS PER SECTION 7.2

	Identify	Accept	Reject	Date
Additives	NONE	SPA		5-2-89
Lubricants	FOOD GRADE OIL (LUBIGON)	SPA		5-2-89

STRAIGHTNESS TEST

Inspection Method 20' OF 6" S.S. DOWN HOLE
Acceptance Criteria AS PER SECT. 8.3
Accept SPA Reject Date 6-2-89

CASING (permanent)

Type	Size	Placement
JOHNSON DIV. TYPE 304	4"	182.95' - +2.05'
STAINLESS STEEL	—	— - —

Inspection Method VISUAL
Acceptance Criteria AS PER SECT. 4.2.4
Accept SPA Reject Date 6-8-89

WELL PROTECTION

Inspection Method VISUAL
Acceptance Criteria AS PER SECT. 4.2.9 - 4.2.10

	Accept	Reject	Date
Protective Posts	SNG		8/4/89
Locks	SNG		8/8/89

ANNULAR SEAL

Inspection Method MEASURED W/ STEEL TAPE
Acceptance Criteria AS PER SECT. 4.2.6 - 4.2.9

Type	Interval	Volume	Accept	Reject	Date
20-30 MESH COLORADO SILICA SAND	203.3' - 179.2'	19.25 Ft³	SPA		6-12-89
1/4" VOLCLAY BENTONITE PELLETS	179.2' - 173.4'	1.86 Ft³	SPA		6-12-89
8-20 MESH GRANULAR BENTONITE	173.4' - 18.5'	85.91 Ft³	SPA		6-14-89
CEMENT GROUT	18.5' - 3.4'	7.44 Ft³	SPA		6-14-89

OTHER (initial if performed)

N/A Well Abandonment
SNG Well Development
N/A Downhole TV Inspection
SNG Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by J.L. McSlam 10-3-89

For all blanks mark N/A if not applicable.

2 of 2

WELL COMPLETION/INSPECTION REPORT(governing procedure DO-1, RO)

Specification No. WHC-S-014 Rev. No. 3
Project 216-B-3 POND
Location B-POND
Drilling Co. KAISER ENGINEERING HANFORD
Driller LOUIS WATKINS
Other (companies) N/A
Geologist(s) AIRHART, CHAMANISS, GOODWIN, TEGL

Well No. 699-43-45 Temp. Well No. BP-1
Coordinates
Casing Elev. Ground Elev.

DRILLING METHOD
Rotary Air N/A Mud N/A
Cable Tool D 0-45' H 95'-203.55'
Drilling Fluid 200 E DRILL SUPPLY WATER
Other

GEOPHYSICAL LOGGING

Sondes	Interval	Date
	-	
	-	
	-	
	-	

COMPLETION DATA
Drilled Depth
Completed Depth
Date Started
Date Completed
Static Water Level/Date

AQUIFER TESTING
Type
Length of Test
Volume Pumped
Drawdown
Date of Test

INSPECTION RESULTS

CLEANING
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Drilling Tools/Rig			
Temporary Materials			
Permanent Materials			

SCREEN

Type	Length	Slot Size

Depth(s) -
-
Inspection Method
Acceptance Criteria
Accept Reject Date

CASING (permanent)

Type	Size	Placement
		-
		-

Inspection Method
Acceptance Criteria
Accept Reject Date

MATERIAL STORAGE/PACKING
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Mtl. Handling/Storage			
Material Packing			

LUBRICANTS/ADDITIVES
Inspection Method
Acceptance Criteria

	Identify	Accept	Reject	Date
Additives				
Lubricants				

STRAIGHTNESS TEST
Inspection Method
Acceptance Criteria
Accept Reject Date

WELL PROTECTION
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Protective Posts			
Locks			

ANNULAR SEAL
Inspection Method MEASURED W/ STEEL TAPE
Acceptance Criteria AS PER SECT. 4.2.6 - 4.2.9

Type	Interval	Volume	Accept	Reject	Date
CONCRETE PAD	3.4' - 4.5'	1.0 YRD^3	SW		8/4/89
	-				
	-				
	-				

OTHER (initial if performed)
N/A Well Abandonment
SW Well Development
N/A Downhole TV Inspection
SW Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by W.L. McBlain 10-5-89

For all blanks mark N/A if not applicable.

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AS-BUILT DIAGRAM

Well Number BP-1 699-42-45 Geologist AIRHART, CHAMNESS, Page 1 of 2

Reviewed by [illegible] Date 10-3-89

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
		5		MUDDY SAND
		10		GRAVELLY SAND
10" DIA. CARBON STEEL CASING (0'-47')		15		6" SILT LATER @ 14' (MOIST) SAND
		20		SLIGHTLY GRAVELLY SAND
		25		GRAVELLY SAND
		30		" "
		35		" "
		40		SAND
		45	STAINED HIG-	45' SLIGHTLY MUDDY SAND (VERY MOIST) MUDDY SAND 48' contact MUDDY SAND - SAND
8" DIA. CARBON STEEL CASING (0'-203.4')		50		SAND
		55		"
		60		SLIGHTLY GRAVELLY SAND
		65		" " "
		70		SAND
185' of 4" DIA STAINLESS		75		cobbles @ 72'-75' SAND
STEEL FINAL CASING		80		"
		85		SANDY GRAVEL
		90		" "
		95		" "
		100		" "
FACTORY WELDED CASING		105		" "
CENTRALIZER		110		" "
		115		MUDDY SANDY GRAVEL
		120		" " "
		125		" " "
		130		" " "

A-1600-188 (3/87)

Battelle
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AS-BUILT DIAGRAM

Well Number BP-1 (699-43-45) Geologist AIRHART Page 2 of 2

Reviewed by D.L. McGhan Date 10-3-89

Construction Data: Description	Construction Data: Diagram	Depth in Feet	Geologic/Hydrologic Data: Diagram Litho.	Geologic/Hydrologic Data: Lithologic Description
		135		SLIGHTLY SANDY GRAVEL
8" DIA. CARBON STEEL CASING (0'-207.4')		140		" " "
		145		MUDDY GRAVEL
185' OF 4" DIA STAINLESS		150		SANDY GRAVEL Bailer @ 151'
STEEL FINAL CASING		155		MUDDY SANDY GRAVEL
		160		" " "
		165		" " "
		170		" " "
		175		" " "
		180		" " "
4" DIA. CONTINUOUS WRAP		185		" " "
TYPE 304 STAINLESS STEEL		190		STATIC H_2O @ 187.7' 6-8-89 " " "
SCREEN (20'4 1/4" OF 20		195		SL. MUDDY GRAVELLY SAND
SLOT SCREEN)		200		GRAVELLY SAND
COMPLETION SYMBOLS				T.D. = 203.55'
CONCRETE PAD				COMPLETION DEPTH = 203.3'
CEMENT GROUT				
GRANULAR BENTONITE				
BENTONITE PELLETS				
SAND PACK				
CASING JOINT				
CASING CENTRALIZER				

A-1800-186 (3/87)

WESTINGHOUSE HANFORD COMPANY

WELL NUMBER BP-1 (699-43-45) AREA 216-B Pond South of Distribution Ditch

DATE 6/6/89

LOG RUN First LOG TYPE Analog - Gamma

SURVEY COORDINATES N 42977 W 44644

ELEVATION DATUM GROUND SURFACE ELEVATION 597.68

LOG MEASURED FROM Apparent Surface, Ground site is Sloped.

LOCATION DESCRIPTION 50 yds South of B-Pond Distributor Ditch

GROUND SURFACE ELEVATION 548.06

SURFACE TEMPERATURE ~50°F (27.5°C) WEATHER Cool/Fair
Start Final

BOREHOLE INFORMATION

DRILLER	KEH		
DRILL RIG TYPE	CABLE TOOL	BIT TYPE/DIAMETER	9 & 10"
BOREHOLE DIAMETER(S)/DEPTH			
DEPTH DRILLER	203'	DEPTH LOGGER	202.9'
LIQUID LEVEL	189.68'	LIQUID APPEARANCE	clear
TEMPERATURE	19.7°C (~68°F)		

CASING RECORD

TYPE	10" Sch 40, Steel	INTERVAL	Surface - 20'
TYPE	8" Sch 40, Steel	INTERVAL	Surface - 2[illegible]
TYPE		INTERVAL	
TYPE		INTERVAL	

WELL SCREEN INTERVAL: /.

COMMENTS: Exact Casing Depths not available
Sloped site; Nominal Surface referenced to bottom of 10" Support Tang.

EQUIPMENT DATA

LOGGING COMPANY	PNL		
OPERATOR(S)	V.H. McGHAN		
EQUIPMENT BRAND	MLS	EQUIPMENT TYPE	ANALOG - NATURAL GAMMA
TOOL TYPE	NaI - Natural Gamma	BASE CALIBRATION DATE	12-88
SERIAL NO.	CG 27A97	CALIBRATION REFERENCE	WHC-EP-0246
CALIBRATION / PROBE FACTOR	8.53×10^{-2} cell (PPM/CPS)		
DEAD TIME	7.4 μ-Sec (from WHC-EP-0246)	WARM UP TIME	≈30 min

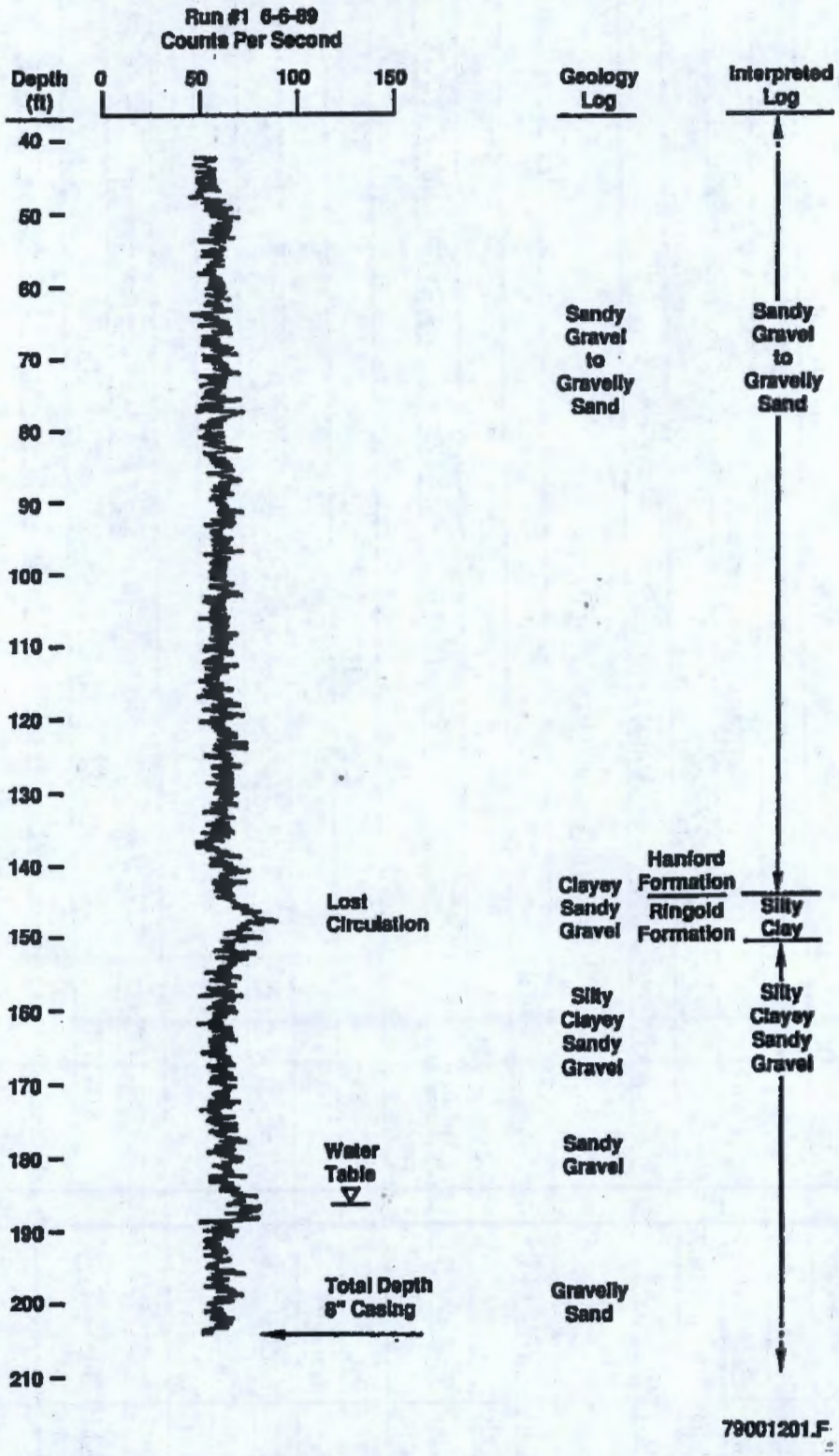
LOGGING INFORMATION

LOG INTERVAL FROM	-202.9 TO -3'		
RERUN(S)	#1 203'-165'		
PRE SURVEY CALIBRATION: POSITION 1	(284 cell P/min) ~676 FS	POSITION 2 (86 cell P/min) ~822 FS	BACKGROUND ~65 c/s ~122 FS
LOGGING SPEED	5'/min		
START TIME	~8:00 AM	COMPLETION TIME	
CHART SPEED(S), FT/IN.	10'/in		
CHART RECORDER HORIZONTAL SCALE, CPS/IN.	50 cps/in (500=F.S.)		
RERUN SCALES, CPS/IN.	#1 50 cps/in		
TIME CONSTANT(S)	1 Second		
POST SURVEY CALIBRATION: POSITION 1	(272 cell P/min) ~664 FS	POSITION 2 (86 cell P/min) ~736 FS	BACKGROUND ~65 c/s ~132 FS
PERCENT CHANGE:	POSITION 1 ~12 (4.4%)	POSITION 2 ≈ 10% (0%)	

COMMENTS: Log shows some minor drift possible due to variation in #2 calibration position. But since #1 position nearly unchanged; log is acceptable.
Depth Return Error = -4" (low)

WITNESSED AND VERIFIED BY: J.J. Kroll 6/6/89

Well 699-43-45



WELL 699-44-42

Well Completion/Inspection Report

A well completion/inspection report for well 699-44-42 follows.

As-Built Diagram

An as-built diagram for well 699-44-42 follows.

7/1/88

WELL COMPLETION/INSPECTION REPORT

Specification No. WCP-DQAP-01 Rev. No. 001
Project 13730
Location B-Pond: East of 200 East Area
Drilling Co. Quinn Drilling Co.
Driller Darrel Ludtke, Lenny Ruiteno
Other (companies) N/A
Geologist(s) Karen R. Oster
Steve P. Eichart

Well No. 699-44-48 Temp. Well No. BP-3
Coordinates N 43,222.4 W 41,818.5
Casing Elev. 579.33 Ground Elev. 576.14

DRILLING METHOD
Rotary · Air N/A Mud N/A
Cable Tool D 0'-113' H 113'-173'
Drilling Fluid 200 East Area Sanitary Water
Other

GEOPHYSICAL LOGGING

Sondes	Interval	Date
Natural Gamma	172'-3'	9/19/88

COMPLETION DATA
Drilled Depth 173' b.l.s.
Completed Depth 171.65' b.l.s.
Date Started 9/16/88
Date Completed 9/30/88
Static Water Level/Date 153.4' b.l.s. 10/7/88

AQUIFER TESTING
Type Development Surge & Discharge w/ Pressure
Length of Test 480 min
Volume Pumped 109.085 gals
Drawdown 192'
Date of Test 9/22/88

INSPECTION RESULTS

CLEANING
Inspection Method Visual
Acceptance Criteria Spec. Sec. 3.5

	Accept	Reject	Date
Drilling Tools/Rig	KRO		9/30/88
Temporary Materials	KRO		9/30/88
Permanent Materials	KRO		9/30/88

MATERIAL STORAGE/PACKING
Inspection Method Visual
Acceptance Criteria Spec. Sec. 3.5

	Accept	Reject	Date
Mtl. Handling/Storage	KRO		9/30/88
Material Packing	KRO		9/30/88

SCREEN

Type	Length	Slot Size
8" Stainless Steel 304 w/ housing	20'2¼"	20
4" Stainless Steel 304	20'8"	10

Depth(s) 172.5' - 152.3'
171.65' - 151'
Inspection Method verify using steel tape
Acceptance Criteria Spec. Sec. 3.2
Accept KRO Reject Date 9/23/88

LUBRICANTS/ADDITIVES
Inspection Method Visual
Acceptance Criteria Spec. Sec. 3.5

	Identify	Accept	Reject	Date
Additives	Drilling Water	KRO		9/30/88
Lubricants	None	KRO		9/30/88

STRAIGHTNESS TEST
Inspection Method Visual
Acceptance Criteria Spec. Sec. 3.6
Accept KRO Reject Date 9/16/88

CASING (permanent)

Type	Size	Placement
Stainless Steel 304	4"	151' - +3.2'

Inspection Method verify using steel tape
Acceptance Criteria Spec. Sec. 3.2
Accept KRO Reject Date 9/29/88

WELL PROTECTION
Inspection Method Visual
Acceptance Criteria Spec. Sec. 3.2

	Accept	Reject	Date
Protective Posts	KRO		9/30/88
Locks	KRO		9/30/88

ANNULAR SEAL
Inspection Method verify using steel tape
Acceptance Criteria Spec. Sec. 3.2

Type	Interval	Volume	Accept	Reject	Date
Colorado Silica Sand (20-40 mesh)	172.5' - 146.4'	6 3/4 bags (100 lbs/bag)	KRO		9/26/88
Bentonite Pellet Seal (1/4")	146.4' - 143.1'	1 1/2 buckets (50 lbs/bag)	KRO		9/26/88
Granular Bentonite Seal	143.1' - 16.66'	98 gals (100 lbs/bag)	KRO		9/27/88
Cement Grout Seal	16.66' - 2'	5 gals	KRO		9/27/88
Concrete Pad	2' - +0.17'		KRO		9/30/88

OTHER (initial if performed)
N/A Well Abandonment
KRO Well Development
N/A Downhole TV Inspection
KRO Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed: JR Raymond 11/18/88

For all blanks mark N/A if not applicable.

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number (BP-3) 699-44-42 Geologist K.R. Oster Page 1 of 2

Reviewed by J.R. Raymond Date 11/18/88

Construction Data: Description	Construction Data: Diagram	Depth in Feet	Geologic/Hydrologic Data: Diagram Litho.	Geologic/Hydrologic Data: Lithologic Description	Drill rate FT/HR
18'10" of 12" Carbon Steel		5		SILTY SANDY GRAVEL	20
Surface Pipe (Removed)		10			4.3
108'10" of 10" Carbon Steel		15			5.5
Casing (Removed)		20		SANDY GRAVEL	7.5
175' of 8" Carbon Steel		25		SILTY SANDY GRAVEL	1.9
Casing (Removed)		30		SANDY GRAVEL	10
153' of 4" Stainless Steel		35		SLIGHTLY GRAVELLY SAND	2.9
(304) Casing		40		GRAVELLY SAND	15
		45		SANDY GRAVEL	10
		50			4
Factory Welded Centralizers		55		SAND (MEDIUM) -GAS @ 53'	10
		60			6.7
		65			7.5
		70			6.7
		75			10
		80		SAND (FINE)	20
		85			5
		90			20
		95		SAND (MEDIUM)	6.7
10" Drive Shoe		100			10
		105		GRAVELLY SAND	10
		110		SLIGHTLY GRAVELLY SAND	2.7
		115		SANDY GRAVEL SAG @ 1:2'	2
		120			7.5
		125		GRAVELLY SAND	1.8

A-1800-188 (3/87)

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number (RP-2) 699-44-42 Geologist K.R. Oster Page 2 of 2

Reviewed by J.R. Raymond Date 11/18/88

Construction Data: Description	Construction Data: Diagram	Depth in Feet	Geologic/Hydrologic Data: Diagram Litho.	Geologic/Hydrologic Data: Lithologic Description	Drill rate FT/HR
175' of 8" Carbon Steel		130		SANDY GRAVEL	6.7
Casing (Removed)		135			2.5
153' of 4" Stainless Steel		140			3.3
(304) Casing		145		SILTY SANDY GRAVEL	7.5
		150		GRAVELLY SAND	3.2
20'2¼" of 8" Stainless Steel		155		Static H2O Level = 153.4' 10/17/88 SLIGHTLY SILTY GRAVELLY SAND	5
(304) Telescoping 20 slot Screen		160		SLIGHTLY SILTY SAND	5.5
20'8" of 4" Stainless Steel		165		TOP OF BINGOLOW 163' GRAVELLY SILTY SAND	1.5
(304) 10 slot Screen		170		SLIGHTLY SILTY SAND	2.3
Completion Depth = 171.65' b.l.s.		175		SLIGHTLY SILTY GRAVELLY SAND	2.5
				Drilled Depth = 173' b.l.s.	

Completion Symbols
+ Concrete Pad
XXX Cement Grout Seal
/ Granular Bentonite Seal
X Bentonite Pellet Seal
· Artificial Sand Pack

Lithologic Symbols:
~ Clay
— Silt
· Sand
o Gravel
□ Caliche

A-1800-188 (3/87)

WELL 699-44-43B

Well Completion/Inspection Report

A well completion/inspection report for well 699-44-43B follows.

As-Built Diagram

An as-built diagram for well 699-44-43B follows.

Analysis of Gamma-Ray Log

Information regarding gamma-ray log analysis for well 699-44-43B follows. Copies of the original log may be found in WHC-MR-0126, 216-B-3 Pond RCRA Wells Gamma-Ray Logs (WHC 1990).

Well 699-44-43B was logged once, through a single 8-inch casing to 170 feet.

The geologist's log from this well shows the Hanford formation varying between sand and silty gravel. This is not reflected in the gamma-ray log.

The gamma-ray log is not useful in picking out the Hanford/Ringold formation contact in well 699-44-43B. No stratigraphic changes are evident in the lower portion of the borehole.

1 of 2

WELL COMPLETION/INSPECTION REPORT (governing procedure DO-1, RO)

Specification No. WHC-S-014 Rev. No. 3
Project 216-B-3 POND
Location B-POND
Drilling Co. KAISER ENGINEERING / HANFORD
Driller FELIX MURPHY / DAVE GARCIA
Other (companies) N/A
Geologist(s) S. M. GOODWIN
B. N. BJORNSTAD

Well No. 699-44-43B Temp. Well No. BP-2
Coordinates
Casing Elev. Ground Elev.

DRILLING METHOD
Rotary Air N/A Mud N/A
Cable Tool D 0'-15', 35'-50' H 15'-35', 90'-100'
Drilling Fluid 20 L DRILL SUPPLY WATER
Other D: 100'-125' H: 125'-175'

GEOPHYSICAL LOGGING

Sondes	Interval	Date
NAT. GAMMA	3'-175'	5/18/89

COMPLETION DATA 4/17/89
Drilled Depth 176.12' 4/21/89
Completed Depth 176.2'
Date Started 4/21/89
Date Completed 8/7/89
Static Water Level/Date 160.83' 4/26/89

AQUIFER TESTING
Type SLUG INJECTION + WITHDRAWAL
Length of Test 78.5 HR
Volume Pumped N/A
Drawdown N/A
Date of Test 5/19/89

INSPECTION RESULTS

CLEANING
Inspection Method VISUAL
Acceptance Criteria SECT. 7.6

	Accept	Reject	Date
Drilling Tools/Rig	SNL		4/20/89
Temporary Materials	SNL		4/20/89
Permanent Materials	SNL		5/26/89

MATERIAL STORAGE/PACKING
Inspection Method VISUAL
Acceptance Criteria SECT. 7.3

	Accept	Reject	Date
Mtl. Handling/Storage	SNL		5/30/89
Material Packing	SNL		5/30/89

SCREEN

Type	Length	Slot Size
JOHNSON DIV. TYPE 304 STAINLESS STEEL (4" DIA.)	20'4 5/16" + 3 3/8"	20 PLUG

Depth(s) 176.2' - 155.56'
Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.3
Accept SNL Reject Date 5/23/89

LUBRICANTS/ADDITIVES
Inspection Method VISUAL
Acceptance Criteria SECT. 7.2

	Identify	Accept	Reject	Date
Additives	NONE	SNL		5/30/89
Lubricants	FOOD GRADE OIL	SNL		5/30/89

STRAIGHTNESS TEST
Inspection Method 70' OF 6" STRAIGHTNESS CASING DROP TEST
Acceptance Criteria SECT. 8.3
Accept SNL Reject Date 5/17/89

CASING (permanent)

Type	Size	Placement
JOHNSON DIV. TYPE 304 STAINLESS STEEL	4"	155.56' - +2.46'

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.4
Accept SNL Reject Date 5/25/89

WELL PROTECTION
Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.9 - 4.2.10

	Accept	Reject	Date
Protective Posts	SNL		8/7/89
Locks	SNL		8/9/89

ANNULAR SEAL
Inspection Method MEASURED W/ STEEL TAPE
Acceptance Criteria SECT. 4.2.6 - 4.2.9

Type	Interval	Volume	Accept	Reject	Date
20-30 MESH COATED SILICA SAND	176.2' - 149.9'	11.0 FT³	SNL		5/26/89
1/4" ENVIROGEL BENTONITE PELLETS	149.9' - 147'	1.24 FT³	SNL		5/26/89
8-20 MESH BENTONITE CHIPS	147' - 20.1'	56.09 FT³	SNL		5/30/89
CEMENT GROUT	20.1' - 4.0'	7.92 FT³	SNL		5/30/89

OTHER (initial if performed)
N/A Well Abandonment
SNL Well Development
N/A Downhole TV Inspection
SNL Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by T.L. McElhaney 10-5-89

For all blanks mark N/A if not applicable.

2 of 2

WELL COMPLETION/INSPECTION REPORT(governing procedure DO-1, RO)

Specification No. WHC-S-014 Rev. No. 3
Project 216-B-3 POND
Location B-POND
Drilling Co. KAISER ENGINEERING / HANFORD
Driller FELIX MURPHY / DAVE GARCIA
Other (companies) N/A
Geologist(s) S.M. GOODWIN
B.N. BJORNSTAD

Well No. 699-44-43B Temp. Well No. BP-2
Coordinates
Casing Elev. Ground Elev.

DRILLING METHOD
Rotary Air N/A Mud N/A
Cable Tool D 0'-15', 35'-80' H 15'-35', 80'-100'
Drilling Fluid 200 E DRILL SUPPLY WATER
Other D: 100'-125' H: 125'-175'

GEOPHYSICAL LOGGING

Sondes	Interval	Date
	-	
	-	
	-	
	-	
	-	

COMPLETION DATA
Drilled Depth
Completed Depth
Date Started
Date Completed
Static Water Level/Date

AQUIFER TESTING
Type
Length of Test
Volume Pumped
Drawdown
Date of Test

INSPECTION RESULTS

CLEANING
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Drilling Tools/Rig			
Temporary Materials			
Permanent Materials			

MATERIAL STORAGE/PACKING
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Mtl. Handling/Storage			
Material Packing			

SCREEN

Type	Length	Slot Size

Depth(s) -
-
Inspection Method
Acceptance Criteria
Accept Reject Date

LUBRICANTS/ADDITIVES
Inspection Method
Acceptance Criteria

	Identify	Accept	Reject	Date
Additives				
Lubricants				

STRAIGHTNESS TEST
Inspection Method
Acceptance Criteria
Accept Reject Date

CASING (permanent)

Type	Size	Placement
		-
		-

Inspection Method
Acceptance Criteria
Accept Reject Date

WELL PROTECTION
Inspection Method
Acceptance Criteria

	Accept	Reject	Date
Protective Posts			
Locks			

ANNULAR SEAL
Inspection Method MEASURED W/ STEEL TAPE Acceptance Criteria SECT. 4.2.6 - 4.2.9

Type	Interval	Volume	Accept	Reject	Date
CONCRETE PAD	4.0' - +.5'	1.0 YARD³	SMW		8/9/89
	-				
	-				
	-				

OTHER (initial if performed)
N/A Well Abandonment
SMW Well Development
N/A Downhole TV Inspection
SMW Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by JL McKee 10-3-89

For all blanks mark N/A if not applicable.

PROCEDURE DO-1, REV. 0

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number BP-2 (699-44-43-B) Geologist GOODWIN Page 1 of 2

Reviewed by J.L. McElhan Date 11-3-89

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
19' 9 1/2" OF 10" CARBON STEEL CASING W/ DRIVE SHOE		5		SL. MUDDY GRAVELLY SAND
		10		MUDDY SANDY GRAVEL
		15		SANDY GRAVEL
		20		SL. MUDDY GRAVELLY SAND
174' OF 8" CARBON STEEL CASING W/ DRIVE SHOE		25		MUDDY SANDY GRAVEL
		30		GRAVELLY SAND
		35		SL. GRAVELLY SL. MUDDY SAND
		40		SAND
		45		SL. MUDDY GRAVELLY SAND
158' 1/4" OF 4" STAINLESS STEEL FINAL CASING		50		GRAVELLY SAND
		55		" "
		60		" "
		65		" "
		70		" "
		75		SAND
		80		"
		85		SL. GRAVELLY SL. MUDDY SAND
		90		SLIGHTLY MUDDY SAND
		95		" " "
		100		" " "
		105		" " "
		110		SAND
FACTORY WELDED CASING CENTRALIZERS		115		SLIGHTLY MUDDY SAND
		120		MUDDY SANDY GRAVEL
		125		" " "
		130		" " "

A-1800-188 (3/87)

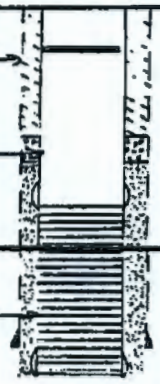
PROCEDURE DO-1, REV. 0

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number BP-2 (699-44-43B) Geologist GOODWIN Page 2 of 2

Reviewed by D.L. McGhan Date 10-3-89

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
174' OF 8" CARBON STEEL CASING W/ DRIVE SHOE		135		SL. MUDDY GRAVELLY SAND
		140		MUDDY SANDY GRAVEL (NO 145' SAMPLE)
150' 1/4" OF 4" STAINLESS STEEL CASING		150		SAND
		155		SL. MUDDY GRAVELLY SAND
		160		MUDDY SANDY GRAVEL STATIC H2O @ 160.03' (5-25-89)
		165		
20.4' 20-SLOT, CONTINUOUS WIRE WRAP, STAINLESS STEEL SCREEN + .34' STAINLESS STEEL CAP		170		GRAVELLY MUDDY SAND
		175		" " "
				T.D. = 176.12'
COMPLETION SYMBOLS:				
CEMENT PAD				
CEMENT GROUT				
GRANULAR BENTONITE				
BENTONITE PELLETS				
SAND PACK				
CASING JOINT				
CASING CENTRALIZER				

A-1800-188 (3/87)

WESTINGHOUSE HANFORD COMPANY

WELL NUMBER BP-2 Well (699-44-438) AREA 600
DATE 5-18-89
LOG RUN First LOG TYPE GAMMA RAY
SURVEY COORDINATES N 43998 W 43363 E
ELEVATION DATUM GROUND SURFACE ELEVATION 580.12
LOG MEASURED FROM Top of inner Casing
LOCATION DESCRIPTION North Edge of 216-B3 Pond
GROUND SURFACE ELEVATION 577.22
SURFACE TEMPERATURE WEATHER Cloudy, Cool

BOREHOLE INFORMATION

DRILLER	KEH		
DRILL RIG TYPE	Percussive	BIT TYPE/DIAMETER	9-inch
BOREHOLE DIAMETER(S)/DEPTH	8" Cased to -173'		
DEPTH DRILLER	173'	DEPTH LOGGER	-175.5'
LIQUID LEVEL	-160' *	LIQUID APPEARANCE	Cloudy **
TEMPERATURE	N/A		

CASING RECORD

TYPE	19'-8.5" 10" Sch-40	INTERVAL	- to +4.75"
TYPE	173' [illegible]	INTERVAL	
TYPE		INTERVAL	
TYPE		INTERVAL	

WELL SCREEN INTERVAL: -NA-

COMMENTS: Driller had left site

* Liquid level prior to Sampling activity per D. Glover, Sampler

** View 1/2 liter Sample, taken by D. Glover

EQUIPMENT DATA

LOGGING COMPANY	PNL		
OPERATOR(S)	V.K.L. McGHAN		
EQUIPMENT BRAND	M.L.S.	EQUIPMENT TYPE	Gross-Gamma (Analog)
TOOL TYPE	NaI (Gamma-Ray)	BASE CALIBRATION DATE	12-88
SERIAL NO.	CG27A97	CALIBRATION REFERENCE	WHC-EP-0246
CALIBRATION / PROBE FACTOR		RATEMETER #1, SN 182	
DEAD TIME	7.4 μ-Sec (per WHC-EP-0246)	WARM UP TIME	>15 Min

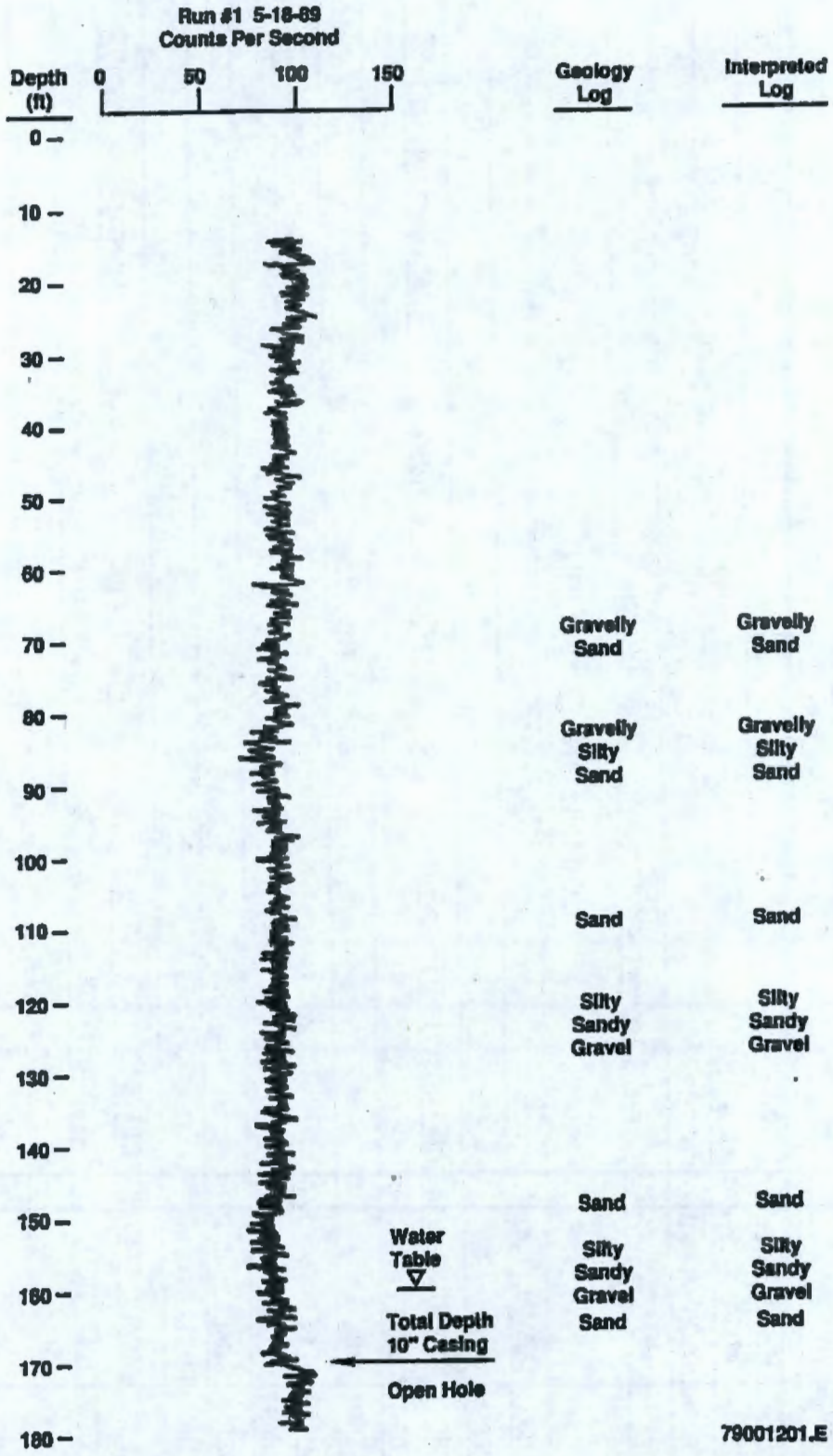
LOGGING INFORMATION

LOG INTERVAL FROM	-3.3'	TO	-175.5'		
RERUN(S)	#1 -175' to -140'				
PRE SURVEY CALIBRATION:	POSITION 1	302 all P/m	POSITION 2	57 all P/m	BACKGROUND 60 c/s
LOGGING SPEED	5'/MIN				
START TIME	11:00 AM		COMPLETION TIME		
CHART SPEED(S), FT/IN.	10'/IN				
CHART RECORDER HORIZONTAL SCALE, CPS/IN.	50 CPS/IN (500 CPS-F.S.)				
RERUN SCALES, CPS/IN.	50 cps/IN (500 cps-FS)				
TIME CONSTANT(S)	= 1 second				
POST SURVEY CALIBRATION:	POSITION 1	289 all P/m	POSITION 2	66 all P/m	BACKGROUND 60 c/s
PERCENT CHANGE:	POSITION 1	4.5%	POSITION 2	15.8%	

COMMENTS: Sidewalled probe, w/ Bowspring.
Depth return error = +1" (higher)
No significant Difference between Barren casing zone (-160 to -140') & Pre run Bkgd.

WITNESSED AND VERIFIED BY: J. L. Gall 5-18-89

Well 699-44-43B



SURVEY REPORTS

Survey reports for wells installed around the 216-B-3 Pond site during 1988 and 1989 follow.

KAISER ENGINEERS HANFORD	SURVEY DATA REPORT	Request No. —8 8 4—3 3 3
Project/W.O. No. B80914	Title 216-B-3 POND WELL LOCATIONS	File No. WELL—113
KEH Job No. B80914-11	Prepared By Gary Wagner / Date 10/28/88	Reviewer D.F. Bryant 11

DESCRIPTION OF WORK	ACCEPTABILITY (Within Plan Tolerance)	DISTRIBUTION	
Horizontal and vertical locations of wells around the B-3 Pond, east of 200 east area.	Yes N/A ☐	Survey File	1
	No ☐	Field Project File	
	NA ☐	S.Luttrell	1
	TBD by Requestor ☐		

SURVEY RESULTS AND COMMENTS

216-B3 POND WELL LOCATIONS
WELL CASING SURVEY DATA

WELL NUMBER	NORTHING	WESTING	ELEVATION	COMMENTS
BP-3 699-44-42	43,783.4	41,965.4	579.22 575.94	TOP OF CASING TOP OF BRASS PLATE
BP-7 -43-42J	42,531.9	42,274.4	581.68 578.23	TOP OF CASING TOP OF BRASS PLUG
BP-8 -43-43	42,942.4	43,184.4	579.37 576.00	TOP OF CASING TOP OF BRASS PLATE
BP-10 -42-42B	42,472.9	42,301.3	583.23 579.83	TOP OF CASING TOP OF BRASS PLATE

NOTE: ALL COORDINATES ARE TO CENTERLINE OF CASING. ALL ELEVATIONS (except where noted) ARE TO TOP OF STAINLESS STEEL CASING COVER PLATE WHICH IS 0.01 THICK.

200E DATUM

KEH-159.1 (6-84)

KAISER ENGINEERS HANFORD

SURVEY DATA REPORT

Request No. -|8|9|3|-|1|9|6

Project W.O. No. W - 017

Title 216 - B - 3 POND WELL LOCATIONS

File No. W|E|L|L|-|1|1|9

KEH Job No. ER8340-11

Prepared By Steve Wray

Date 9/28/89

Reviewer

DESCRIPTION OF WORK

Locate 6 wells for horizontal and vertical position. Wells No. BP-1, BP-2, BP-4, BP-5, BP-6 and BP-9.

ACCEPTABILITY (Within Plan Tolerance)

Yes ☐
No ☐
NA ☒
TBD by Requestor ☐

DISTRIBUTION

Survey File	1
Field Project File	OR
D. Weekes	1
J. Keller	1

SURVEY RESULTS AND COMMENTS

Well No.	Plant	Coordinates NAD'27	NAD'83	Brass Cap	Elevations Top of Casing	Top of 4" Casing
BP-1 69-43-45	N 42,977.4 W 44,643.6	N 448,167.3 E 2,250,568.1	N 136,585.7 E 576,284.2	594.70	597.68 X on W Edge	595.20 N. Edge
BP-2 44-43B	N 43,997.7 W 43,362.8	N 449,191.2 E 2,251,845.8	N 136,897.7 E 576,673.7	577.22	580.12 X on N Edge	577.67 N. Edge
BP-4 43-41E	N 42,994.9 W 40,723.0	N 448,196.1 E 2,254,488.2	N 136,594.4 E 577,479.1	547.89	550.86 X on N Edge	548.38 N. Edge
BP-5 40-39	N 39,877.9 W 39,224.3	N 445,083.7 E 2,255,995.6	N 135,645.7 E 577,938.5	538.95	541.84 X on N Edge	*
BP-6 41-40	N 41,029.8 W 40,284.9	N 446,232.4 E 2,254,931.8	N 135,995.9 E 577,614.3	543.00	545.94 X on N Edge	543.48 N. Edge
BP-9 43-41F	N 42,944.5 W 40,720.9	N 448,145.7 E 2,254,490.4	N 136,579.0 E 577,479.7	548.06	551.01 X on S Edge	548.52 N. Edge

* Could not obtain data on Well BP-5 (4" Casing) due to test equipment installed on casing.

KEH-159.1 (6-84)

REFERENCE

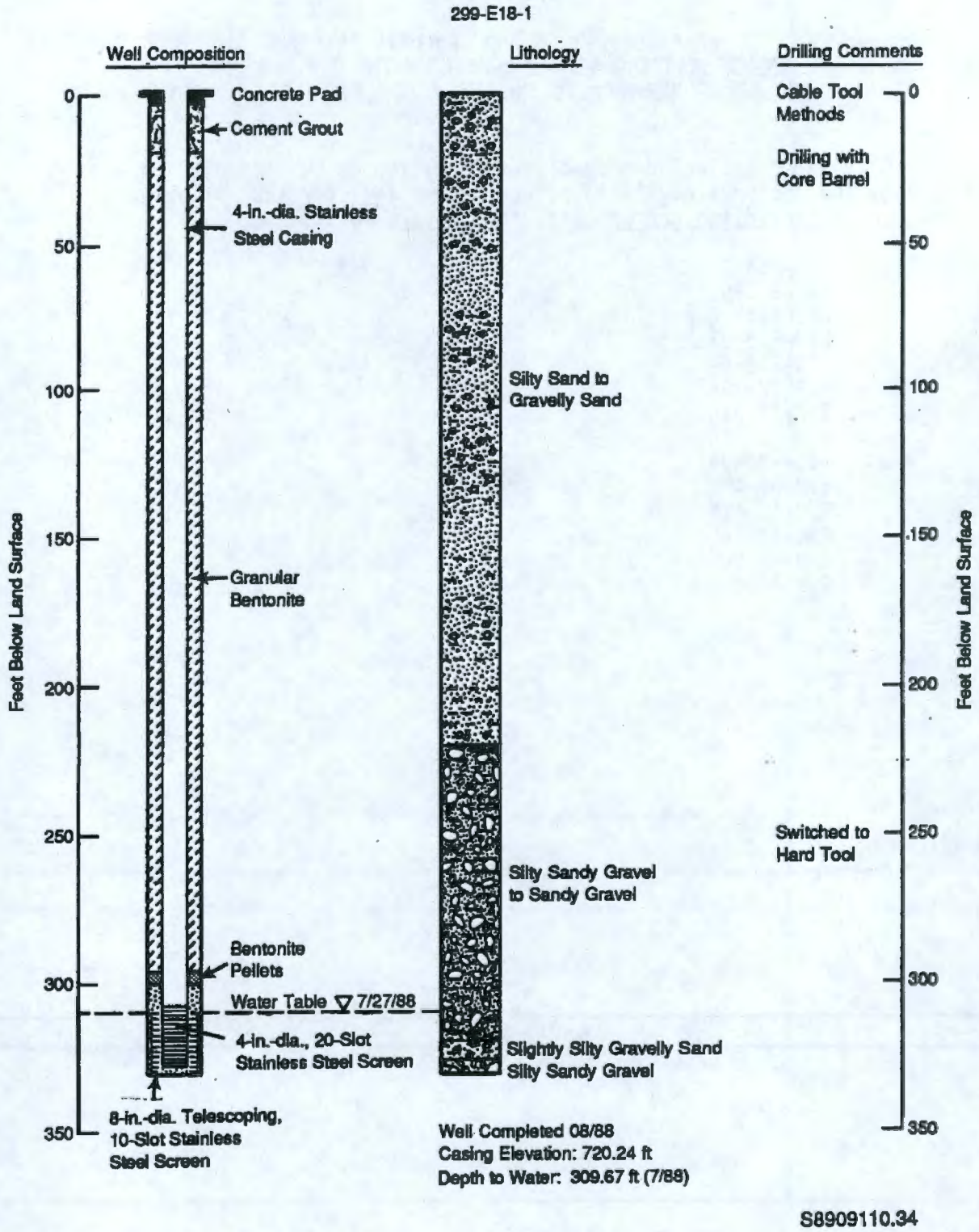
WHC, 1990, 216-B-3 Pond RCRA Wells Gamma-Ray Logs, WHC-MR-0126, Westinghouse Hanford Company, Richland, Washington.

APPENDIX C

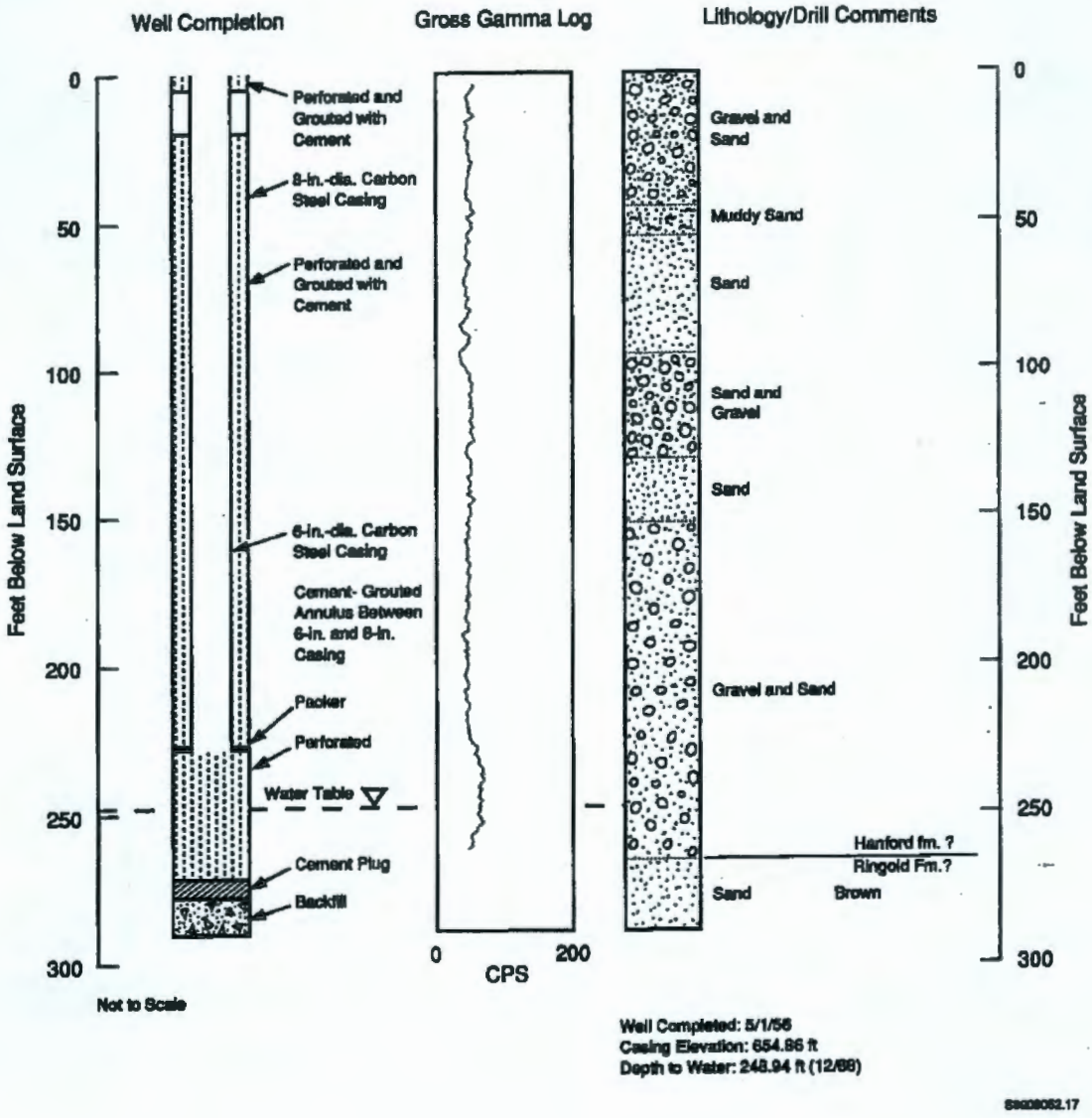
WELL COMPLETION AND GEOLOGIC DATA FOR WELLS EXISTING BEFORE 1987 NEAR THE 216-B-3 POND AND BACKGROUND MONITORING WELLS FOR THE 216-B-3 POND

This appendix includes summary information on well completion and geology and includes digitized natural gamma logs for the following non-Resource Conservation and Recovery Act of 1976 wells.

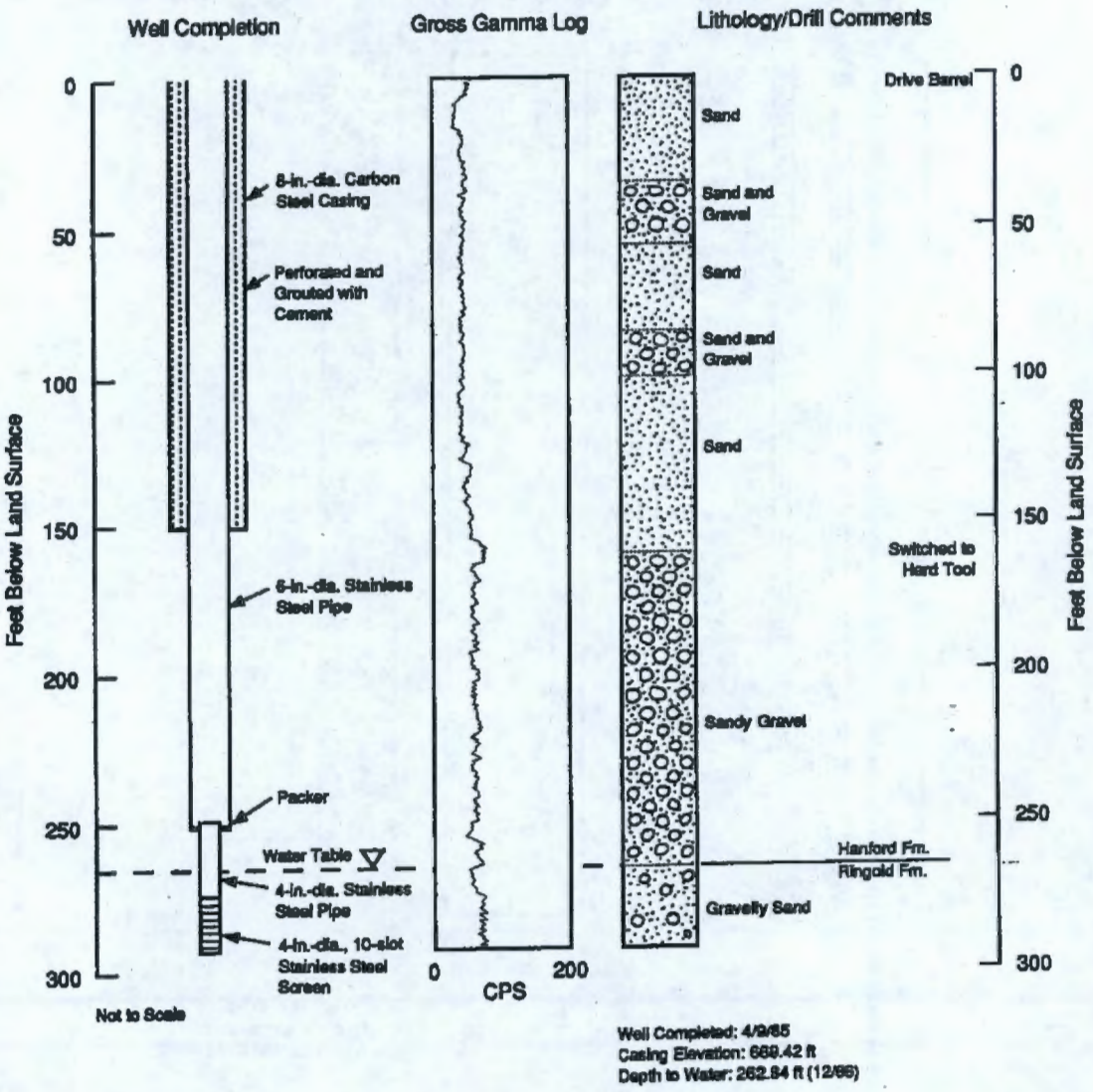
- 299-E18-1
- 299-E25-9
- 299-E25-25
- 299-E25-32
- 299-E32-4
- 699-39-39
- 699-40-33A
- 699-42-40A
- 699-42-40B
- 699-42-40C
- 699-42-42A
- 699-43-42A
- 699-43-42K
- 699-45-42.


299-E18-1
Well Composition
Lithology
Drilling Comments
Concrete Pad
Cement Grout
4-in.-dia. Stainless Steel Casing
Granular Bentonite
Bentonite Pellets
Water Table ▽ 7/27/88
4-in.-dia., 20-Slot Stainless Steel Screen
8-in.-dia. Telescoping, 10-Slot Stainless Steel Screen
Silty Sand to Gravelly Sand
Silty Sandy Gravel to Sandy Gravel
Slightly Silty Gravelly Sand
Silty Sandy Gravel
Cable Tool Methods
Drilling with Core Barrel
Switched to Hard Tool
Feet Below Land Surface
0
50
100
150
200
250
300
350
Well Completed 08/88
Casing Elevation: 720.24 ft
Depth to Water: 309.67 ft (7/88)
S8909110.34

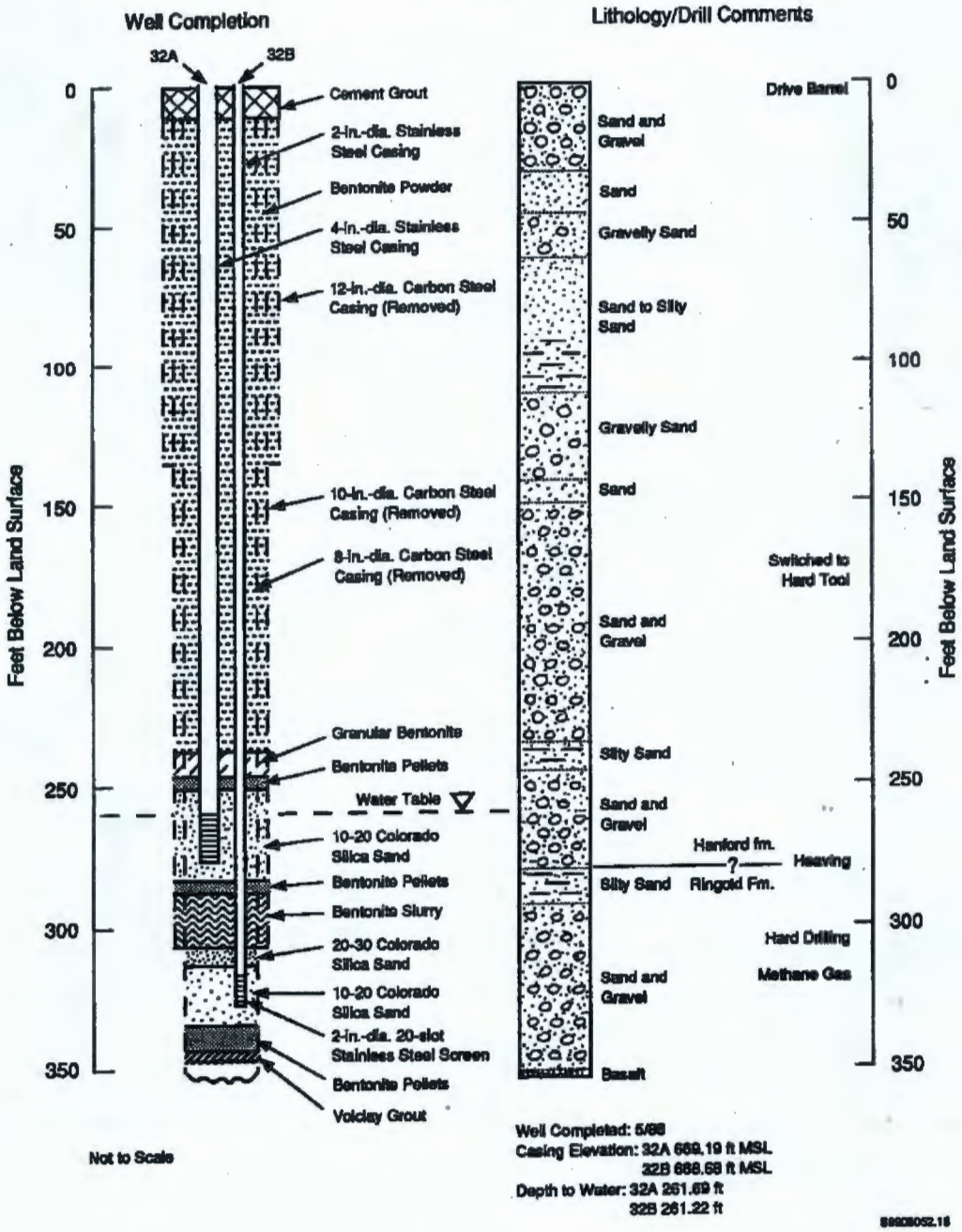
299-E25-9


Well Completion
Gross Gamma Log
Lithology/Drill Comments
Feet Below Land Surface
0
50
100
150
200
250
300
Perforated and Grouted with Cement
8-in.-dia. Carbon Steel Casing
Perforated and Grouted with Cement
6-in.-dia. Carbon Steel Casing
Cement- Grouted Annulus Between 6-in. and 8-in. Casing
Packer
Perforated
Water Table
Cement Plug
Backfill
Not to Scale
0
200
CPS
Gravel and Sand
Muddy Sand
Sand
Sand and Gravel
Sand
Gravel and Sand
Hanford fm. ?
Ringold Fm.?
Sand
Brown
Well Completed: 5/1/56
Casing Elevation: 654.86 ft
Depth to Water: 248.94 ft (12/88)

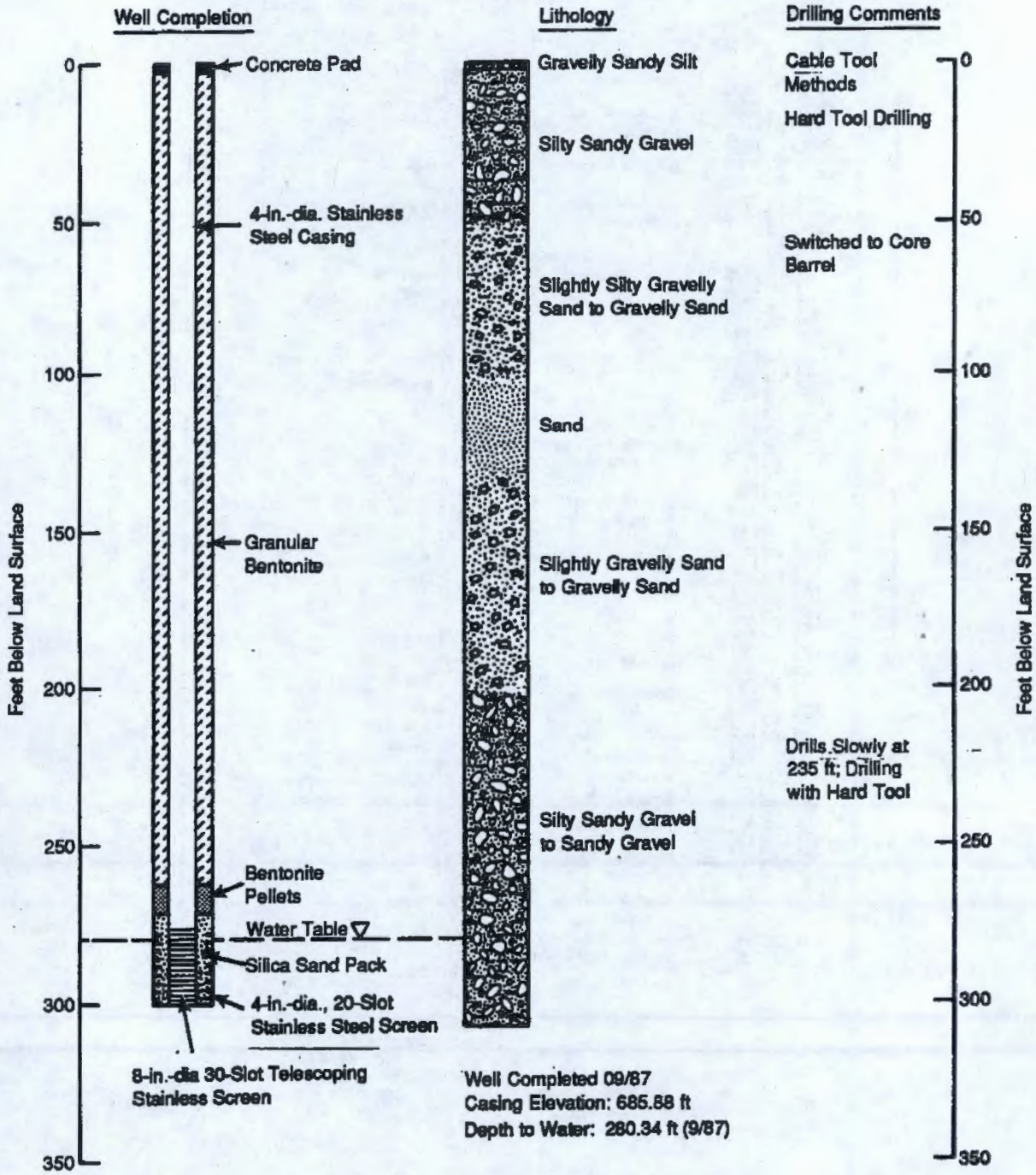
299-E25-25


Well Completion
Gross Gamma Log
Lithology/Drill Comments
Feet Below Land Surface
0
50
100
150
200
250
300
8-in.-dia. Carbon Steel Casing
Perforated and Grouted with Cement
6-in.-dia. Stainless Steel Pipe
Packer
Water Table
4-in.-dia. Stainless Steel Pipe
4-in.-dia., 10-slot Stainless Steel Screen
Not to Scale
0
200
CPS
Sand
Sand and Gravel
Sand
Sand and Gravel
Sand
Sandy Gravel
Gravelly Sand
Hanford Fm.
Ringold Fm.
Drive Barrel
Switched to Hard Tool
Well Completed: 4/9/65
Casing Elevation: 669.42 ft
Depth to Water: 262.84 ft (12/95)

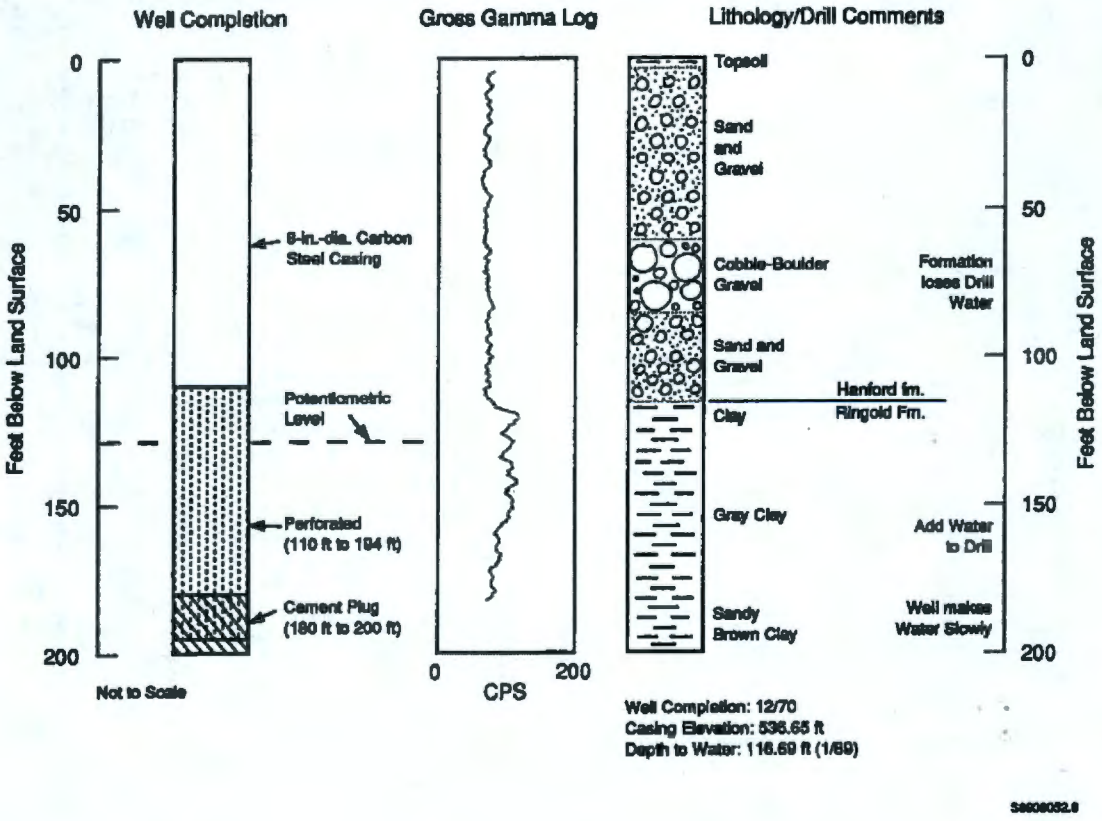
299-E25-32

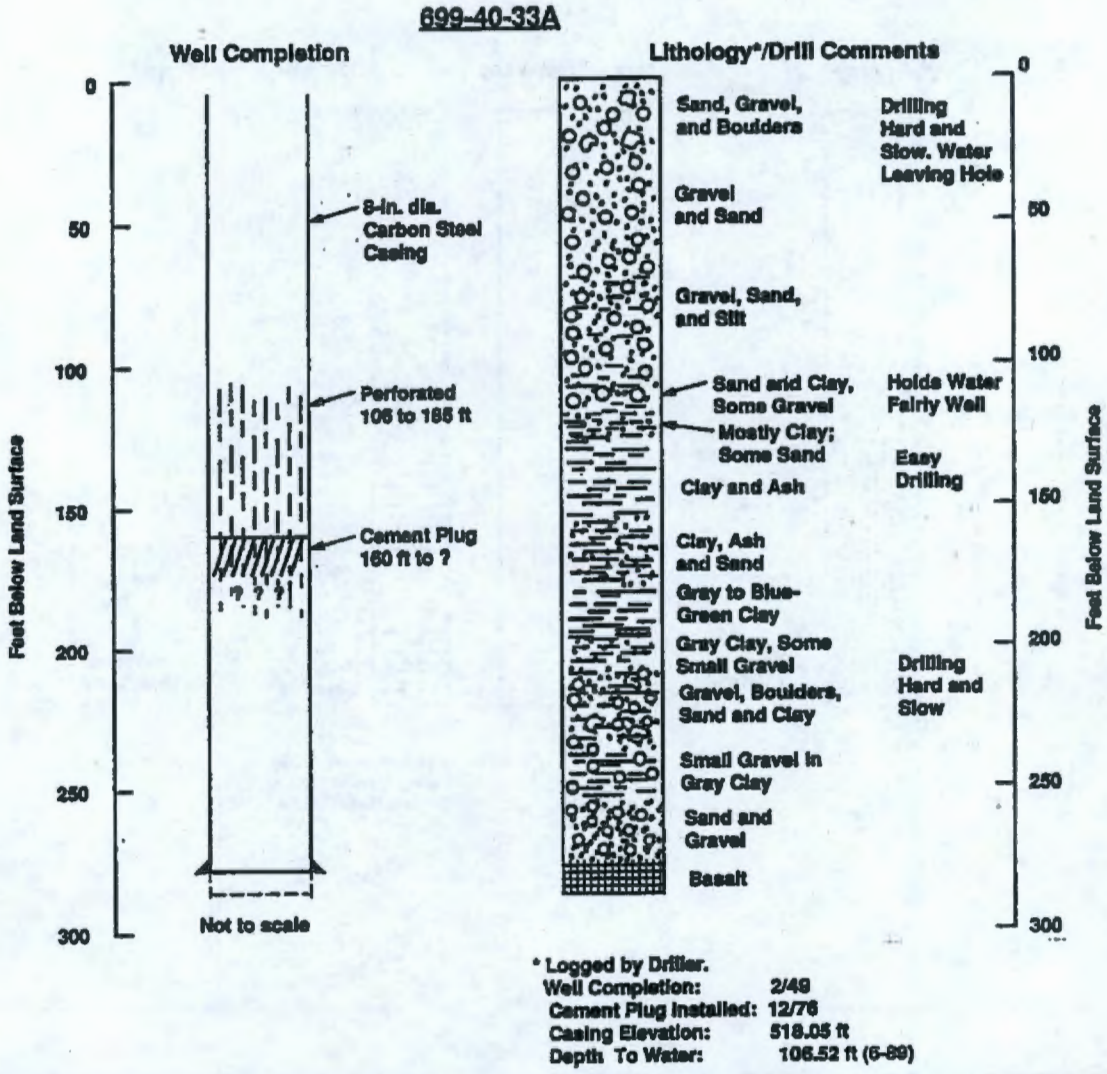

Well Completion
Lithology/Drill Comments
32A
32B
Feet Below Land Surface
0
50
100
150
200
250
300
350
Cement Grout
2-in.-dia. Stainless Steel Casing
Bentonite Powder
4-in.-dia. Stainless Steel Casing
12-in.-dia. Carbon Steel Casing (Removed)
10-in.-dia. Carbon Steel Casing (Removed)
8-in.-dia. Carbon Steel Casing (Removed)
Granular Bentonite
Bentonite Pellets
Water Table
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
Not to Scale
Sand and Gravel
Sand
Gravelly Sand
Sand to Silty Sand
Gravelly Sand
Sand
Sand and Gravel
Silty Sand
Sand and Gravel
Silty Sand
Sand and Gravel
Basalt
Drive Barrel
Switched to Hard Tool
Hanford fm.
?
Ringold Fm.
Heaving
Hard Drilling
Methane Gas
Well Completed: 5/88
Casing Elevation: 32A 669.19 ft MSL
32B 668.58 ft MSL
Depth to Water: 32A 261.69 ft
32B 261.22 ft

299-E32-4

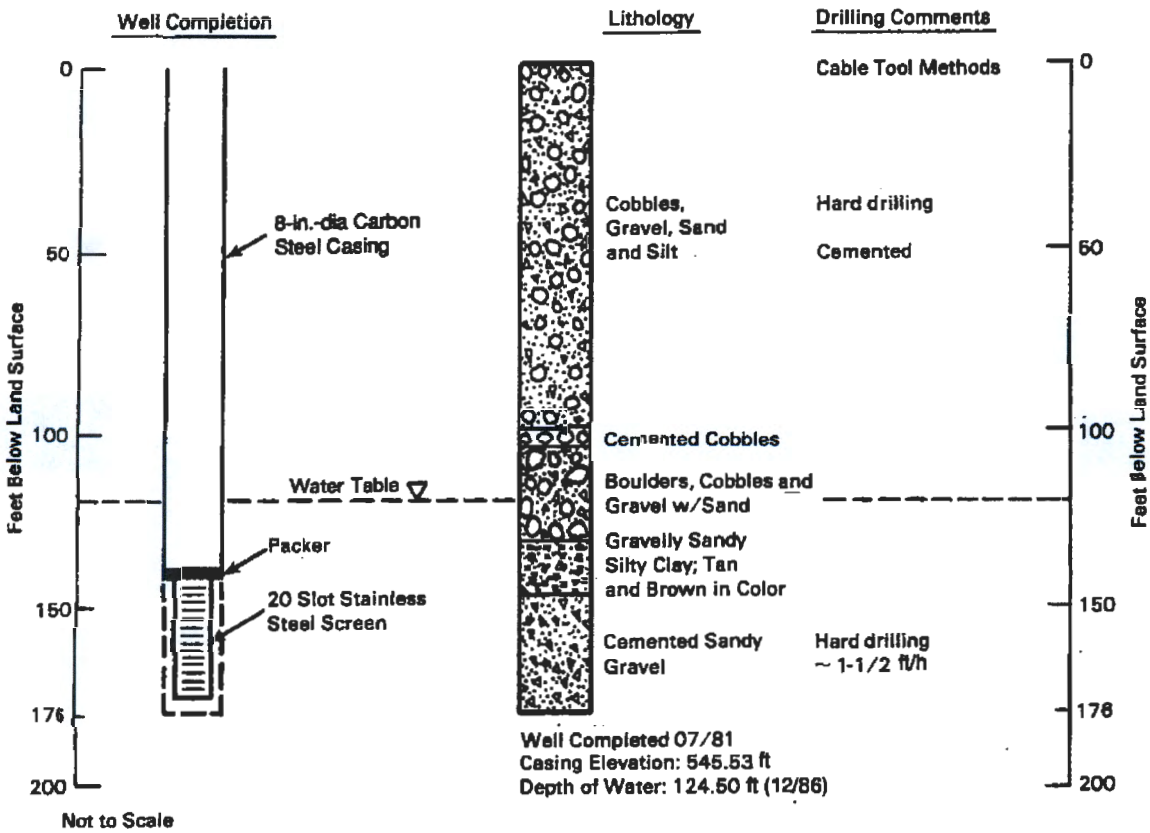

Well Completion
Lithology
Drilling Comments
Concrete Pad
4-in.-dia. Stainless Steel Casing
Granular Bentonite
Bentonite Pellets
Water Table
Silica Sand Pack
4-in.-dia., 20-Slot Stainless Steel Screen
8-in.-dia 30-Slot Telescoping Stainless Screen
Gravelly Sandy Silt
Silty Sandy Gravel
Slightly Silty Gravelly Sand to Gravelly Sand
Sand
Slightly Gravelly Sand to Gravelly Sand
Silty Sandy Gravel to Sandy Gravel
Cable Tool Methods
Hard Tool Drilling
Switched to Core Barrel
Drills Slowly at 235 ft; Drilling with Hard Tool
Feet Below Land Surface
0
50
100
150
200
250
300
350
Well Completed 09/87
Casing Elevation: 685.88 ft
Depth to Water: 280.34 ft (9/87)
S8909110.33

699-39-39

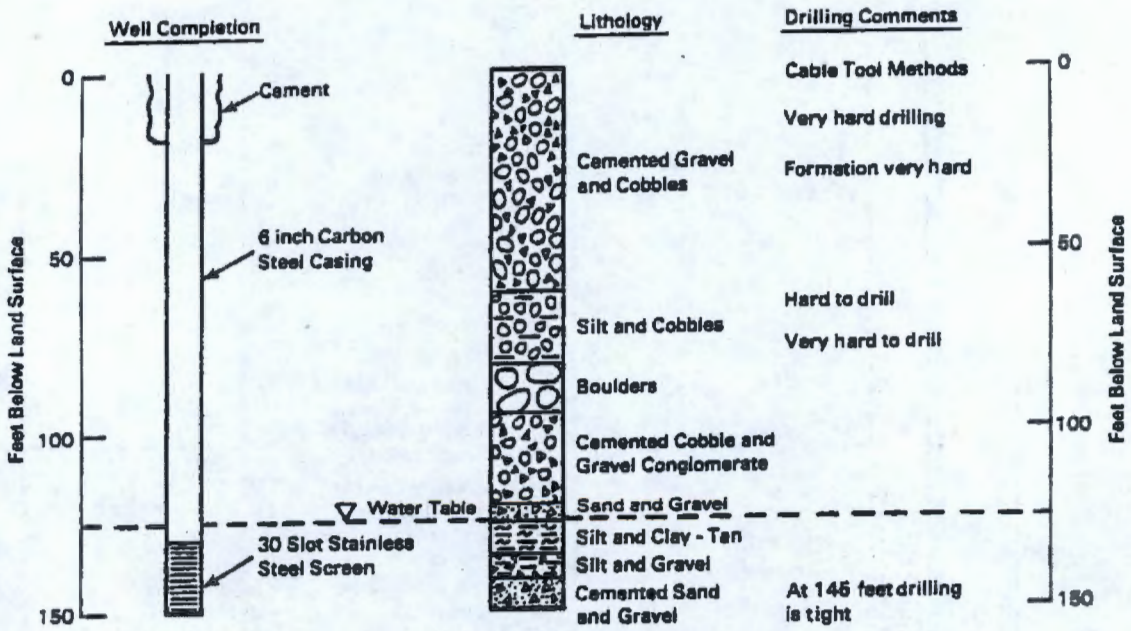

Well Completion
Gross Gamma Log
Lithology/Drill Comments
Feet Below Land Surface
0
50
100
150
200
8-in.-dia. Carbon Steel Casing
Potentiometric Level
Perforated (110 ft to 194 ft)
Cement Plug (180 ft to 200 ft)
Not to Scale
0
200
CPS
Topsoil
Sand and Gravel
Cobble-Boulder Gravel
Sand and Gravel
Clay
Gray Clay
Sandy Brown Clay
Hanford fm.
Ringold Fm.
Formation loses Drill Water
Add Water to Drill
Well makes Water Slowly
Well Completion: 12/70
Casing Elevation: 536.65 ft
Depth to Water: 116.69 ft (1/89)


699-40-33A
Well Completion
Lithology*/Drill Comments
Feet Below Land Surface
0
50
100
150
200
250
300
8-in. dia. Carbon Steel Casing
Perforated 106 to 165 ft
Cement Plug 160 ft to ?
Not to scale
Sand, Gravel, and Boulders
Gravel and Sand
Gravel, Sand, and Silt
Sand and Clay, Some Gravel
Mostly Clay; Some Sand
Clay and Ash
Clay, Ash and Sand
Gray to Blue-Green Clay
Gray Clay, Some Small Gravel
Gravel, Boulders, Sand and Clay
Small Gravel in Gray Clay
Sand and Gravel
Basalt
Drilling Hard and Slow. Water Leaving Hole
Holds Water Fairly Well
Easy Drilling
Drilling Hard and Slow
* Logged by Driller.
Well Completion: 2/49
Cement Plug Installed: 12/76
Casing Elevation: 518.05 ft
Depth To Water: 106.52 ft (6-89)
79001201.7

699-42-40A


Well Completion
Lithology
Drilling Comments
0
50
100
150
176
200
Feet Below Land Surface
8-in.-dia Carbon Steel Casing
Water Table
Packer
20 Slot Stainless Steel Screen
Cobbles, Gravel, Sand and Silt
Cemented Cobbles
Boulders, Cobbles and Gravel w/Sand
Gravelly Sandy Silty Clay; Tan and Brown in Color
Cemented Sandy Gravel
Cable Tool Methods
Hard drilling
Cemented
Hard drilling ~ 1-1/2 ft/h
Well Completed 07/81
Casing Elevation: 545.53 ft
Depth of Water: 124.50 ft (12/86)
Not to Scale
S8909110.32

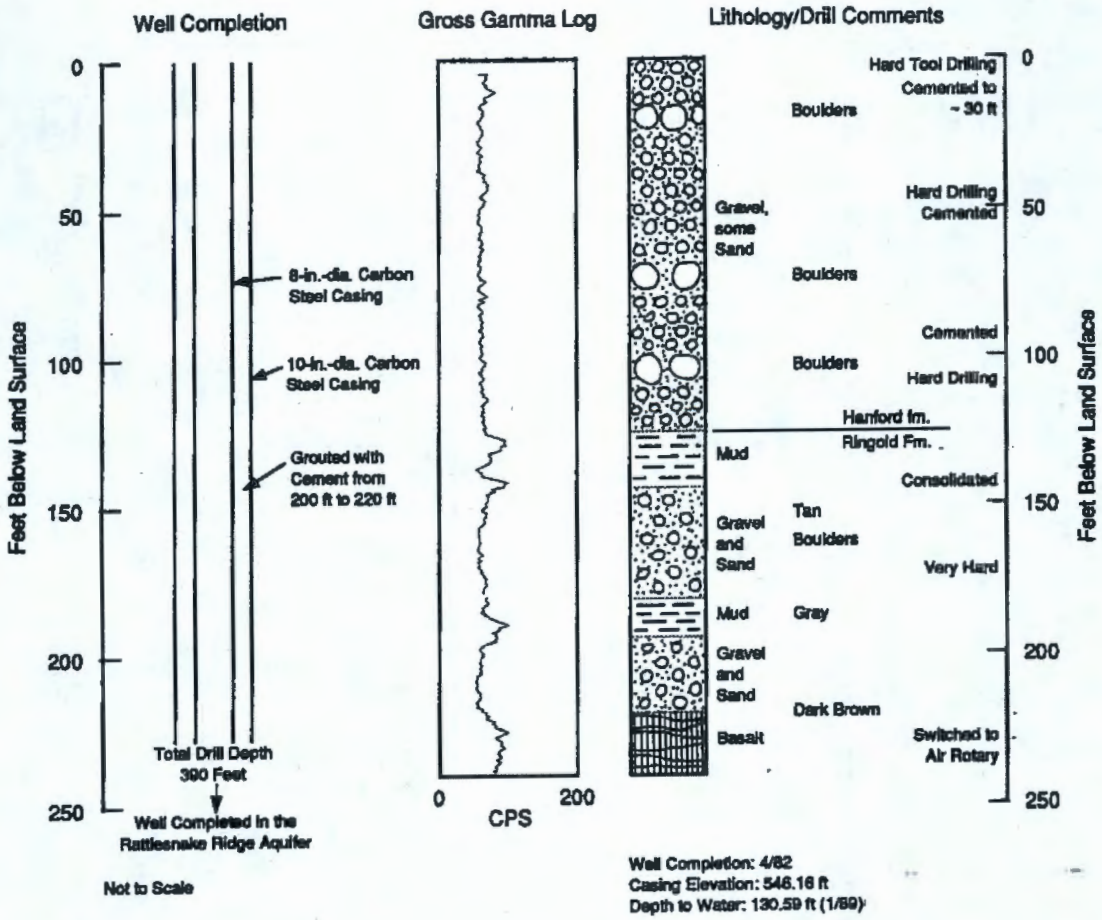
699-42-40B



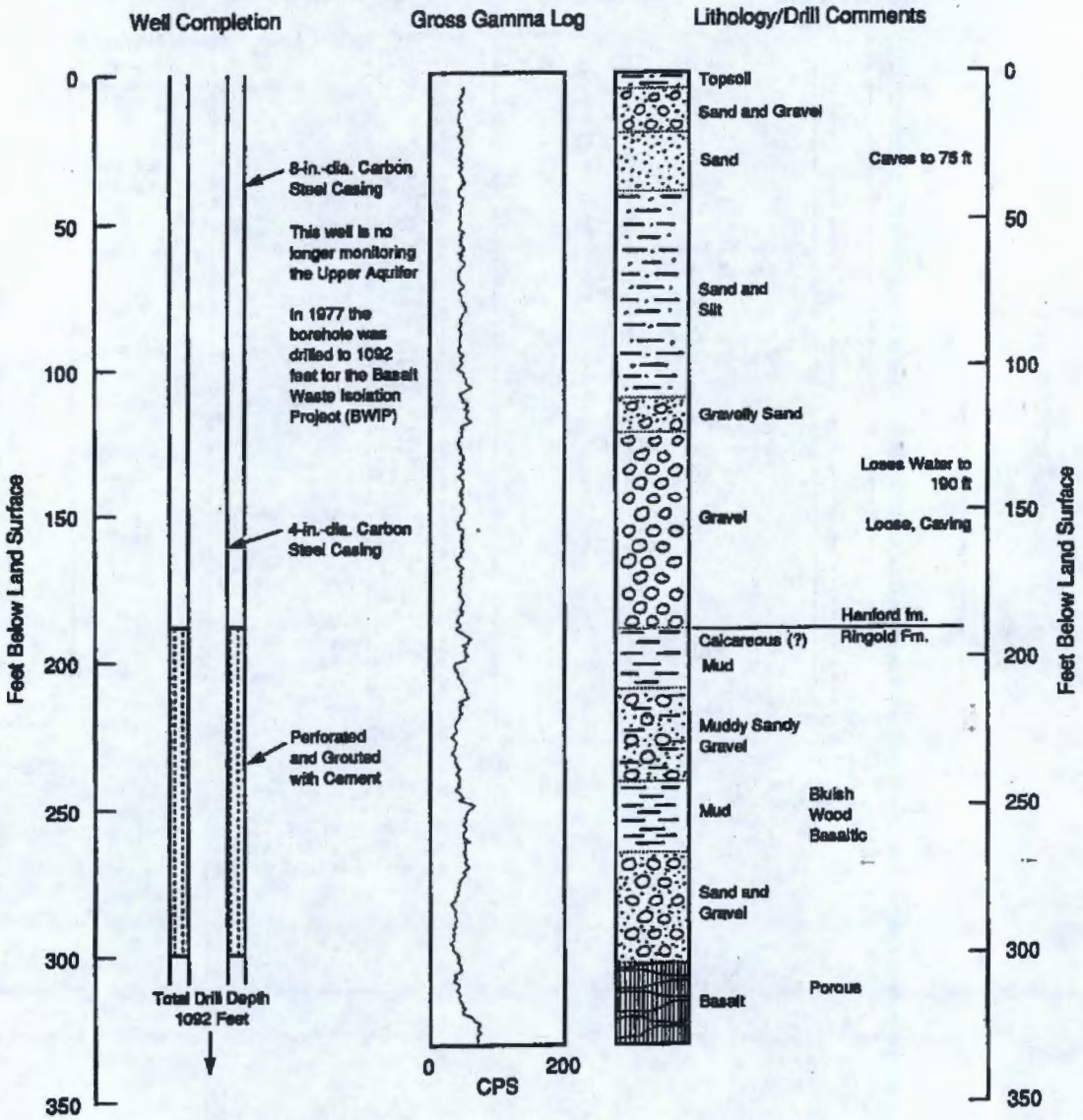
Not to Scale

Well Completed 09/81
Casing Elevation: 546.46 feet
Depth to Water: 124.48 feet (12/86)

699-42-40C


Well Completion
Gross Gamma Log
Lithology/Drill Comments
Feet Below Land Surface
0
50
100
150
200
250
8-in.-dia. Carbon Steel Casing
10-in.-dia. Carbon Steel Casing
Grouted with Cement from 200 ft to 220 ft
Total Drill Depth 390 Feet
Well Completed in the Rattlesnake Ridge Aquifer
Not to Scale
0
200
CPS
Gravel, some Sand
Mud
Gravel and Sand
Mud
Gravel and Sand
Basalt
Boulders
Boulders
Boulders
Tan Boulders
Gray
Dark Brown
Hard Tool Drilling Cemented to ~ 30 ft
Hard Drilling Cemented
Cemented
Hard Drilling
Hanford fm.
Ringold Fm.
Consolidated
Very Hard
Switched to Air Rotary
Well Completion: 4/82
Casing Elevation: 546.16 ft
Depth to Water: 130.59 ft (1/89)
S9208092.11

699-42-42A (DB-8)

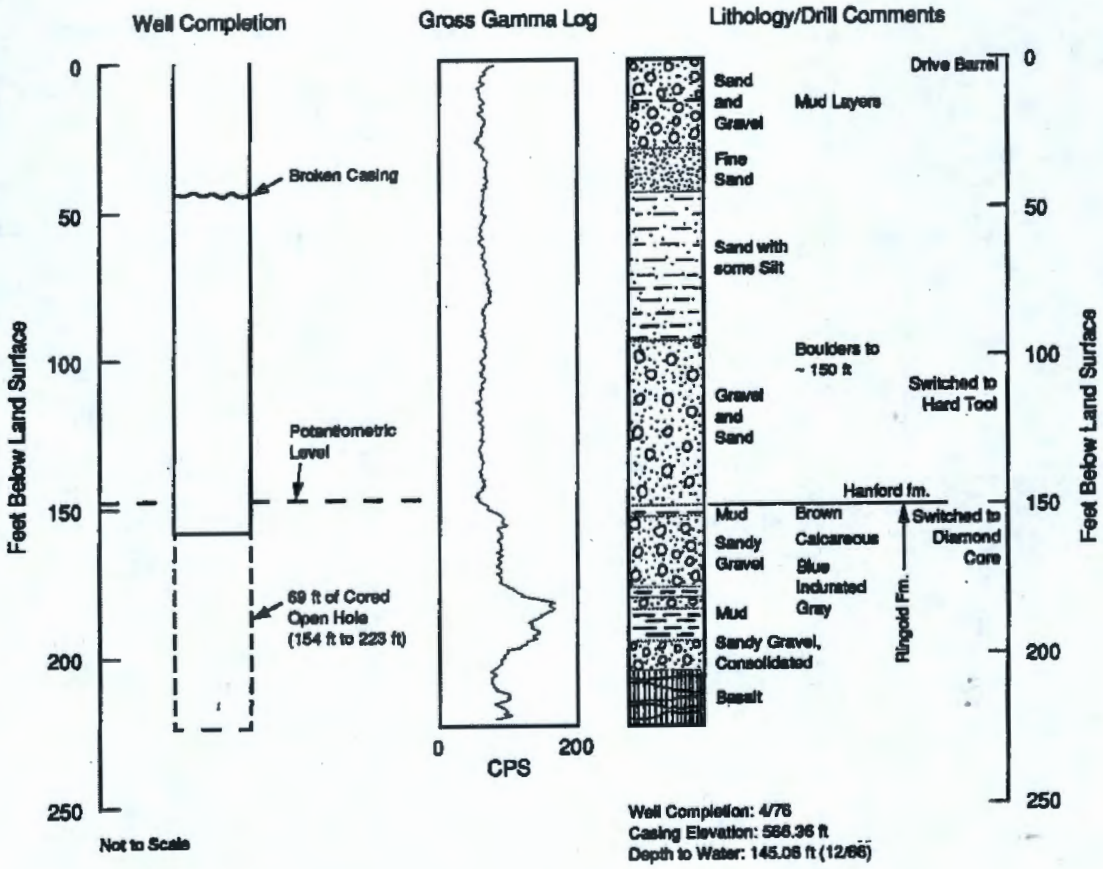


Not to Scale

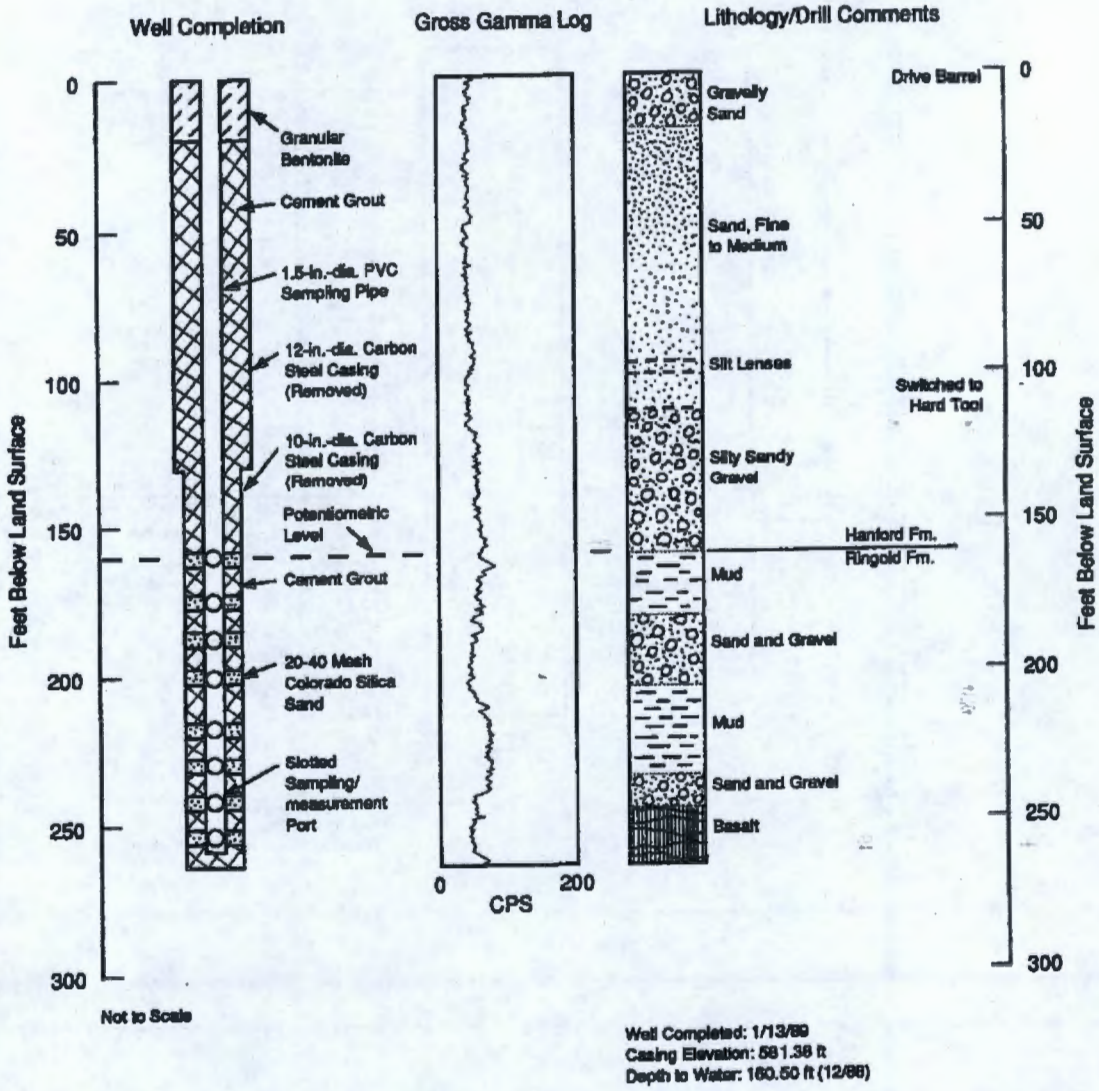
Well Completed: 9/56
Casing Elevation: 602.88 ft
Depth to Water: No Recent Measurement

S9308052.19

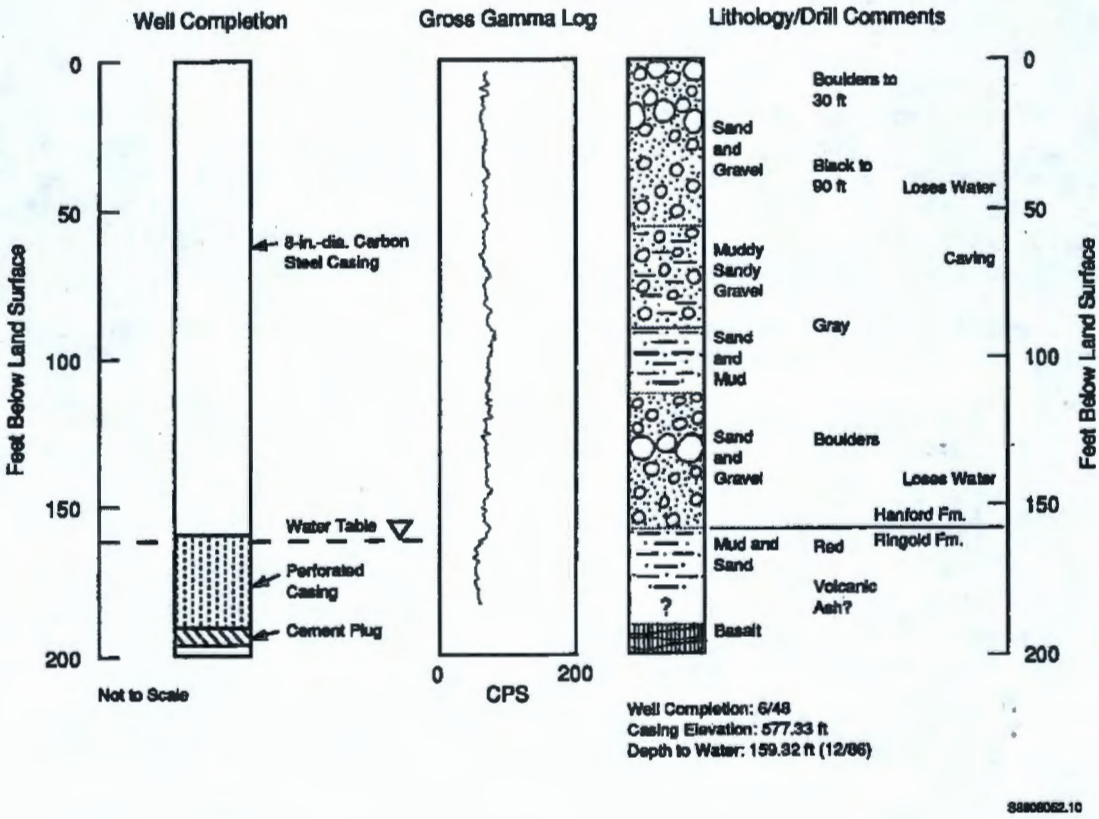
699-43-42A (DH-9A)



699-43-42K (WB-1)



699-45-42


Well Completion
Gross Gamma Log
Lithology/Drill Comments
Feet Below Land Surface
0
50
100
150
200
8-in.-dia. Carbon Steel Casing
Water Table
Perforated Casing
Cement Plug
Not to Scale
0
200
CPS
Sand and Gravel
Muddy Sandy Gravel
Sand and Mud
Sand and Gravel
Mud and Sand
?
Basalt
Boulders to 30 ft
Black to 90 ft
Loses Water
Caving
Gray
Boulders
Loses Water
Hanford Fm.
Ringold Fm.
Red
Volcanic Ash?
Well Completion: 6/48
Casing Elevation: 577.33 ft
Depth to Water: 159.32 ft (12/86)
S9808062.10

APPENDIX D

PARTICLE-SIZE DISTRIBUTION, CALCIUM CARBONATE, MOISTURE CONTENT, AND SEDIMENT CHEMISTRY DATA FOR WELLS NEAR THE 216-B-3 POND

This appendix contains particle-size distribution (Tables D-1 to D-9), calcium carbonate (Tables D-1 to D-9), moisture content (Table D-10), and sediment chemistry data (Tables D-11 to D-16 and Figures D-1 to D-6) for several wells in the vicinity of the 216-B-3 Pond. Analyses completed through June 30, 1989 for the wells installed in 1988 are included. Some moisture content analyses are included for wells installed in 1989.

Particicle-size distribution and calcium carbonate data are included (Tables D-1 to D-9) for the following wells:

- 299-E18-1
- 299-E25-9
- 299-E25-25
- 299-E32-4
- 699-42-42A
- 699-42-42B
- 699-43-42J
- 699-43-43
- 699-44-42.

Moisture content data are included (Table D-10) for the following wells:

- 699-42-42B
- 699-43-42J
- 699-43-43
- 699-44-42
- 699-43-45 (BP-1)
- 699-44-43B (BP-2)
- 699-43-41E (BP-4)
- 699-40-39 (BP-5)
- 699-41-40 (BP-6)
- 699-43-41F (BP-9).

Sediment chemistry data are included (Tables D-11 to D-16 and Figures D-1 to D-6) for soil samples collected from the following wells:

- 699-40-39
- 699-41-40
- 699-43-41E
- 699-43-41F
- 699-43-45
- 699-44-43B.

Key for Tables D-1 through D-9:

Column header	Explanation
Depth	Depth of sample collection
%CaCO3	Percent of sample volume that is calcium carbonate
DM	Drilling Method C = core barrel H = hard tool
%mud	Weight % of sample that is "silt" and "pan"
%sand	Weight % of sample that is very coarse, coarse, medium, fine, and very fine sand.
%gravel	Weight % of sample larger than sand.
Class	M = mud; m = muddy S = sand; s = sandy G = gravel; g = gravelly parentheses = "slightly"

Abbreviations

peb	pebbles
wt	weight
cum wt %	cumulative weight percent
vfine	very fine.

Key for Tables D-11 to D-16:

Abbreviations

TOC	total organic carbon
IC	ion chromatography
XRF	X-ray fluorescence.

TABLE D.1

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E18-001 ****

08/07/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
5	3.9	C	40.2	55.8	3.9	mS	WT	9.2	14.8	21.4	34.8	39.1	110.0	125.9	63.4	174.7
SORT= 1.72		MEDIAN=	4.00	MODE=	5.00	MEAN= 3.27	WT %	1.6	2.4	3.6	5.8	6.6	18.6	21.3	10.7	29.5
SPLIT WT= 588.1							CUM WT %	1.6	3.9	7.5	13.3	19.9	38.5	59.8	70.5	100.0
10	1.6	C	5.6	88.1	6.3	(g)S	WT	12.5	30.3	140.4	219.6	146.3	61.9	31.4	11.8	26.8
SORT= 1.45		MEDIAN=	1.00	MODE=	1.00	MEAN= 0.85	WT %	1.8	4.5	20.6	32.3	21.5	9.1	4.6	1.7	3.9
SPLIT WT= 680.7							CUM WT %	1.8	6.3	26.9	59.2	80.7	89.8	94.4	96.1	100.0
15	1.4	C	4.2	91.9	3.9	S	WT	1.5	22.7	127.2	268.4	119.6	40.7	19.8	6.3	20.3
SORT= 1.14		MEDIAN=	1.00	MODE=	1.00	MEAN= 0.70	WT %	0.2	3.6	20.3	42.8	19.1	6.5	3.2	1.0	3.2
SPLIT WT= 624.4							CUM WT %	0.2	3.9	24.2	67.0	86.1	92.6	95.8	96.8	100.0
20	1.9	C	4.5	92.6	2.9	S	WT	2.2	19.1	163.5	293.4	101.4	55.6	27.1	8.0	24.6
SORT= 1.04		MEDIAN=	1.00	MODE=	1.00	MEAN= 0.91	WT %	0.3	2.6	14.3	40.5	26.4	7.7	3.7	1.1	3.4
SPLIT WT= 726.1							CUM WT %	0.3	2.9	17.2	57.7	84.1	91.8	95.5	96.6	100.0
25	1.9	C	6.1	93.3	1.6	S	WT	0.4	7.6	38.0	132.6	198.1	63.6	26.2	7.1	17.6
SORT= 1.13		MEDIAN=	2.00	MODE=	2.00	MEAN= 1.34	WT %	0.1	1.0	8.0	27.3	40.8	13.1	4.2	1.5	3.6
SPLIT WT= 486.1							CUM WT %	0.1	1.6	9.6	36.9	77.7	90.8	94.9	96.4	100.0
30	1.8	C	4.1	94.5	1.4	S	WT	0.6	7.9	49.3	193.9	211.5	80.9	24.5	7.1	17.3
SORT= 1.12		MEDIAN=	2.00	MODE=	2.00	MEAN= 1.28	WT %	0.1	1.3	6.3	32.7	35.7	13.6	4.1	1.2	2.9
SPLIT WT= 590.6							CUM WT %	0.1	1.4	9.7	42.4	78.1	91.8	95.9	97.1	100.0
35	2.2	C	5.2	94.4	0.4	S	WT	0.1	1.8	9.9	76.4	189.8	164.7	45.1	9.3	17.0
SORT= 0.97		MEDIAN=	2.00	MODE=	2.00	MEAN= 1.95	WT %	0.0	0.4	2.0	13.9	37.4	32.4	8.9	1.8	3.4
SPLIT WT= 507.0							CUM WT %	0.0	0.4	2.3	16.2	53.6	85.9	94.8	96.7	100.0
40	1.6	C	7.3	91.1	1.6	S	WT	1.5	7.8	80.8	257.1	125.8	41.1	28.1	9.3	33.7
SORT= 1.22		MEDIAN=	1.00	MODE=	1.00	MEAN= 1.08	WT %	0.3	1.3	13.8	43.9	21.5	7.0	4.8	1.6	5.8
SPLIT WT= 582.7							CUM WT %	0.3	1.6	15.4	59.3	80.8	87.9	92.7	94.2	100.0
45	1.8	C	7.4	91.0	1.6	S	WT	5.9	2.5	30.9	277.8	123.3	39.5	24.8	8.8	31.7
SORT= 1.13		MEDIAN=	1.00	MODE=	1.00	MEAN= 1.15	WT %	1.1	0.5	5.7	51.9	22.6	7.3	4.6	1.6	5.8
SPLIT WT= 541.5							CUM WT %	1.1	1.5	7.2	58.2	80.8	88.0	92.6	94.2	100.0
50.	1.9	C	2.5	93.9	3.6	S	WT	4.4	15.4	115.8	286.5	82.5	20.6	11.0	3.7	9.8
SORT= 0.95		MEDIAN=	1.00	MODE=	1.00	MEAN= 0.52	WT %	0.8	2.8	21.3	51.6	15.2	3.8	2.0	0.7	1.8
SPLIT WT= 540.9							CUM WT %	0.8	3.6	24.9	76.5	91.7	95.5	97.5	98.2	100.0
55	1.6	C	3.6	93.0	3.4	S	WT	3.0	18.1	117.6	319.4	120.1	30.8	14.5	6.0	17.6
SORT= 1.00		MEDIAN=	1.00	MODE=	1.00	MEAN= 0.66	WT %	0.6	2.8	18.2	49.3	18.5	4.8	2.2	0.9	2.7
SPLIT WT= 645.9							CUM WT %	0.6	3.4	21.5	70.8	89.4	94.1	96.4	97.3	100.0

TABLE D.1 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E18-001 ****

08/07/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
60	1.7	C	1.9	97.5	0.6	S	WT	0.3	3.2	42.0	232.0	194.0	47.1	11.3	3.4	6.8
SORT= 0.87 MEDIAN= 1.00 MODE= 1.00 MEAN= 1.02							WT %	0.1	0.6	7.9	42.9	35.9	8.7	2.1	0.6	1.3
SPLIT WT= 537.0							CUM WT %	0.1	0.7	8.5	51.4	87.3	96.0	98.1	98.8	100.0
65	1.8	C	2.0	97.4	0.7	S	WT	0.1	3.6	43.9	247.8	204.1	35.6	11.0	3.5	7.5
SORT= 0.84 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.98							WT %	0.0	0.7	7.9	44.5	36.6	6.4	2.0	0.6	1.4
SPLIT WT= 554.5							CUM WT %	0.0	0.7	8.6	53.0	89.7	96.1	98.0	98.7	100.0
70	1.8	C	6.5	91.2	2.4	S	WT	1.0	11.1	56.1	218.6	164.1	39.7	21.8	8.0	27.3
SORT= 1.07 MEDIAN= 1.00 MODE= 1.00 MEAN= 1.09							WT %	0.3	2.0	10.3	39.6	30.0	7.3	4.0	1.5	5.0
SPLIT WT= 542.5							CUM WT %	0.3	2.4	12.6	52.3	82.3	89.6	93.5	95.0	100.0
75	1.2	C	1.4	96.3	2.3	S	WT	1.7	9.0	58.0	248.5	144.3	22.2	6.1	2.6	4.3
SORT= 0.83 MEDIAN= 1.00 MODE= 1.50 MEAN= 0.82							WT %	0.3	2.0	11.0	49.7	28.8	4.4	1.6	0.5	0.9
SPLIT WT= 499.0							CUM WT %	0.3	2.3	14.1	63.7	92.6	97.0	98.6	99.1	100.0
80	1.9	C	0.6	98.9	0.6	S	WT	0.3	2.9	24.1	135.1	207.9	99.0	36.2	13.1	34.4
SORT= 1.25 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.65							WT %	0.1	0.5	4.4	24.4	37.6	17.9	6.6	2.4	6.2
SPLIT WT= 549.4							CUM WT %	0.1	0.6	4.9	29.4	67.6	84.9	91.4	93.8	100.0
85	2.0	C	2.0	93.0	4.2	S	WT	0.6	16.9	44.1	113.6	77.0	14.0	6.6	2.1	5.7
SORT= 1.03 MEDIAN= 1.50 MODE= 1.50 MEAN= 0.75							WT %	0.2	4.0	16.1	41.4	28.0	5.1	2.4	0.8	2.1
SPLIT WT= 270.7							CUM WT %	0.2	4.2	20.3	61.6	89.7	94.8	97.2	97.9	100.0
90	1.9	C	5.3	92.6	2.1	S	WT	1.2	16.4	45.6	196.4	183.5	57.3	21.0	7.8	21.1
SORT= 1.18 MEDIAN= 2.00 MODE= 1.00 MEAN= 1.20							WT %	0.2	1.9	8.4	36.1	33.7	10.5	3.9	1.4	3.9
SPLIT WT= 541.0							CUM WT %	0.2	2.1	10.5	46.6	80.3	90.8	94.7	96.1	100.0
95	1.6	C	5.6	93.6	1.3	S	WT	0.3	3.5	17.1	49.7	98.7	78.2	20.8	4.9	9.3
SORT= 1.19 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.69							WT %	0.1	1.2	6.1	17.6	34.9	27.7	7.4	1.7	3.3
SPLIT WT= 279.6							CUM WT %	0.1	1.4	7.4	25.0	59.9	87.6	95.0	96.7	100.0
100	1.9	C	3.8	94.2	2.0	S	WT	0.9	8.4	49.0	159.3	164.9	51.4	16.7	5.1	12.8
SORT= 1.06 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.14							WT %	0.2	1.8	10.5	34.0	35.2	11.0	3.6	1.1	2.7
SPLIT WT= 464.4							CUM WT %	0.2	2.0	12.4	46.4	81.6	92.6	96.2	97.3	100.0
105	1.9	C	3.0	94.1	2.1	S	WT	0.2	5.0	10.9	35.1	82.5	84.8	16.4	3.4	5.9
SORT= 1.09 MEDIAN= 2.00 MODE= 3.00 MEAN= 1.78							WT %	0.1	2.1	4.5	14.4	33.8	34.7	6.7	1.4	2.4
SPLIT WT= 241.1							CUM WT %	0.1	2.1	6.6	21.0	54.7	89.5	96.2	97.6	100.0
110	1.3	C	7.0	92.3	0.7	S	WT	0.3	1.3	7.1	23.1	61.1	94.8	30.1	6.2	10.3
SORT= 1.16 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.22							WT %	0.1	0.6	3.0	9.9	26.1	40.5	12.9	2.7	4.4
SPLIT WT= 231.1							CUM WT %	0.1	0.7	3.7	13.6	39.7	80.1	93.0	95.6	100.0

TABLE D.1 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E18-001 ****

00/07/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
115	1.3	C	7.1	91.7	1.1	S	WT	0.4	2.4	15.9	67.6	90.8	34.6	18.4	5.3	12.4
SORT= 1.29	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.54	WT %	0.2	1.0	6.4	27.3	36.6	14.0	7.4	2.1	5.0
SPLIT WT= 243.8							CUM WT %	0.2	1.1	7.6	34.8	71.5	85.4	92.9	95.0	100.0
120	1.2	C	9.4	88.2	2.4	S	WT	0.2	7.5	35.0	110.9	70.6	41.6	19.7	7.4	22.1
SORT= 1.46	MEDIAN=		2.00	MODE=	1.00	MEAN= 1.37	WT %	0.1	2.4	11.1	35.2	22.4	13.2	6.3	2.4	7.0
SPLIT WT= 312.1							CUM WT %	0.1	2.4	13.6	48.8	71.2	84.4	90.6	93.0	100.0
125	1.4	C	2.9	94.5	2.6	S	WT	1.0	6.5	29.2	95.6	103.8	31.4	10.7	3.1	5.1
SORT= 1.02	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.11	WT %	0.4	2.3	10.2	33.4	36.2	11.0	3.7	1.1	1.8
SPLIT WT= 281.8							CUM WT %	0.4	2.6	12.8	46.2	82.4	93.4	97.1	98.2	100.0
130	1.5	C	5.6	93.2	1.2	S	WT	0.1	3.4	17.9	63.4	111.1	63.3	18.7	5.2	11.3
SORT= 1.20	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.59	WT %	0.0	1.2	6.1	21.5	37.7	21.5	6.4	1.8	3.8
SPLIT WT= 291.5							CUM WT %	0.0	1.2	7.3	28.8	66.5	88.0	94.4	96.2	100.0
135	1.0	C	6.0	88.0	6.0	(g)S	WT	2.7	13.9	37.8	79.6	78.0	35.1	12.1	4.5	11.9
SORT= 1.41	MEDIAN=		2.00	MODE=	1.00	MEAN= 1.11	WT %	1.0	5.0	13.7	28.9	28.3	12.7	4.4	1.6	4.3
SPLIT WT= 272.7							CUM WT %	1.0	6.0	19.7	48.6	76.9	89.7	94.1	95.7	100.0
140	1.3	C	6.4	92.7	0.9	S	WT	0.1	2.4	12.2	89.4	123.6	36.2	14.0	4.6	13.3
SORT= 1.12	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.51	WT %	0.0	0.9	4.4	25.0	44.5	13.0	5.0	1.7	4.8
SPLIT WT= 273.1							CUM WT %	0.0	0.9	5.3	30.3	74.8	88.5	93.5	95.2	100.0
145	1.1	C	7.0	92.8	0.1	S	WT	0.1	0.5	1.0	27.0	258.5	107.4	35.9	10.4	22.8
SORT= 0.88	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.94	WT %	0.0	0.1	0.2	5.9	57.2	22.9	8.0	2.2	4.8
SPLIT WT= 467.1							CUM WT %	0.0	0.1	0.3	6.3	63.5	86.4	93.0	95.2	100.0
150	1.4	C	4.0	95.0	0.2	S	WT	0.0	1.1	1.7	2.3	139.7	407.5	50.1	9.0	16.0
SORT= 0.63	MEDIAN=		3.00	MODE=	3.00	MEAN= 2.34	WT %	0.0	0.2	0.3	0.4	22.3	65.0	8.0	1.4	2.6
SPLIT WT= 622.9							CUM WT %	0.0	0.2	0.5	0.8	23.1	88.0	96.0	97.5	100.0
155	1.0	C	7.0	92.1	0.3	S	WT	0.1	1.2	5.6	29.0	65.4	298.9	72.7	14.3	24.7
SORT= 0.85	MEDIAN=		3.00	MODE=	3.00	MEAN= 2.54	WT %	0.0	0.2	1.1	5.7	12.8	58.4	14.2	2.8	4.8
SPLIT WT= 508.6							CUM WT %	0.0	0.3	1.3	7.0	19.8	78.2	92.4	95.2	100.0
160.	1.7	C	5.4	94.3	0.4	S	WT	0.3	1.8	20.6	119.4	241.0	134.0	36.6	10.2	21.1
SORT= 1.11	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.67	WT %	0.1	0.3	3.5	20.4	41.2	22.9	6.3	1.7	3.6
SPLIT WT= 582.3							CUM WT %	0.1	0.4	3.9	24.3	65.5	88.4	94.7	96.4	100.0
165	1.3	C	2.4	97.3	0.3	S	WT	0.0	1.5	10.0	117.2	259.2	125.7	22.6	4.8	8.5
SORT= 0.96	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.60	WT %	0.0	0.3	1.8	21.3	47.2	22.9	4.1	0.8	1.6
SPLIT WT= 545.6							CUM WT %	0.0	0.3	2.1	23.4	70.6	93.5	97.6	98.5	100.0

TABLE D.1 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E18-001 ****

08/07/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
170	1.5	C	3.8	94.1	2.2	S	WT	0.3	11.6	49.1	140.8	226.6	63.0	18.6	5.4	13.7
SORT= 1.04	MEDIAN=	2.00	MODE=	2.00	MEAN=	1.23	WT %	0.1	2.2	9.3	26.6	42.8	11.9	3.5	1.0	2.6
SPLIT WT= 524.8							CUM WT %	0.1	2.3	11.5	38.1	81.0	92.9	96.4	97.4	100.0
175	1.5	C	4.7	93.9	1.4	S	WT	0.1	3.4	16.8	70.4	102.3	35.1	10.6	3.7	8.0
SORT= 1.10	MEDIAN=	2.00	MODE=	2.00	MEAN=	1.37	WT %	0.0	1.4	6.7	28.1	40.9	14.0	4.2	1.5	3.2
SPLIT WT= 247.4							CUM WT %	0.0	1.4	8.1	36.2	77.1	91.1	95.3	96.8	100.0
180	1.3	C	4.1	95.2	0.7	S	WT	0.5	1.7	7.8	54.7	146.1	62.7	14.3	3.8	8.5
SORT= 0.98	MEDIAN=	2.00	MODE=	2.00	MEAN=	1.64	WT %	0.2	0.6	2.6	18.2	48.7	20.9	4.8	1.3	2.8
SPLIT WT= 295.7							CUM WT %	0.2	0.7	3.3	21.6	70.3	91.1	95.9	97.2	100.0
187	1.3	C	9.1	90.6	0.4	S	WT	0.0	1.4	21.0	174.7	78.8	28.5	37.3	19.0	15.1
SORT= 1.54	MEDIAN=	1.00	MODE=	1.00	MEAN=	1.49	WT %	0.0	0.4	5.6	46.5	21.0	7.6	9.9	5.1	4.0
SPLIT WT= 371.1							CUM WT %	0.0	0.4	6.0	52.5	73.4	81.0	90.9	96.0	100.0
190	1.4	C	6.1	93.7	0.3	S	WT	0.1	0.8	13.9	120.5	113.3	33.6	16.8	7.7	11.8
SORT= 1.18	MEDIAN=	2.00	MODE=	1.00	MEAN=	1.36	WT %	0.0	0.3	4.4	37.9	35.6	10.6	5.3	2.4	3.6
SPLIT WT= 315.1							CUM WT %	0.0	0.3	4.7	42.5	78.1	88.7	94.0	96.4	100.0
195	1.4	C	7.1	92.2	0.8	S	WT	0.2	2.2	11.1	96.6	112.5	45.3	16.7	6.3	15.3
SORT= 1.19	MEDIAN=	2.00	MODE=	2.00	MEAN=	1.50	WT %	0.1	0.7	3.6	31.6	36.7	14.8	5.5	2.1	5.0
SPLIT WT= 302.6							CUM WT %	0.1	0.8	4.4	36.0	72.7	87.5	93.0	95.0	100.0
200	1.5	C	15.3	84.0	0.7	(m)S	WT	0.1	2.1	7.9	34.6	83.9	66.2	65.8	14.1	32.9
SORT= 1.46	MEDIAN=	3.00	MODE=	2.00	MEAN=	2.47	WT %	0.0	0.7	2.6	11.3	27.3	21.5	21.4	4.8	10.7
SPLIT WT= 302.6							CUM WT %	0.0	0.7	3.3	14.5	41.8	63.3	84.7	89.3	100.0
205	1.3	C	9.4	90.4	0.1	S	WT	0.1	0.7	4.5	77.5	290.2	87.2	39.2	16.5	35.6
SORT= 1.03	MEDIAN=	2.00	MODE=	2.00	MEAN=	1.92	WT %	0.0	0.1	0.8	14.1	52.6	15.8	7.1	3.0	6.5
SPLIT WT= 548.4							CUM WT %	0.0	0.2	1.0	15.0	67.6	83.5	90.6	93.6	100.0
210	1.3	C	7.9	90.9	1.2	S	WT	1.4	5.5	29.0	193.6	198.0	71.3	29.8	12.1	33.4
SORT= 1.24	MEDIAN=	2.00	MODE=	2.00	MEAN=	1.45	WT %	0.2	1.0	5.1	33.7	34.5	12.4	5.2	2.1	5.8
SPLIT WT= 570.3							CUM WT %	0.2	1.2	6.3	40.0	74.5	86.9	92.1	94.2	100.0
215	1.6	C	8.2	83.7	8.1	(g)S	WT	14.2	25.9	63.7	153.4	115.9	51.4	29.8	9.7	31.1
SORT= 1.61	MEDIAN=	1.00	MODE=	1.00	MEAN=	1.13	WT %	2.9	5.2	12.9	31.0	23.4	10.4	6.0	2.0	6.3
SPLIT WT= 495.7							CUM WT %	2.9	8.1	21.0	52.0	75.4	85.7	91.8	93.7	100.0
220	6.8	C	4.9	72.5	22.6	gS	WT	63.1	83.1	127.6	193.9	86.5	39.4	21.3	6.5	22.9
SORT= 1.69	MEDIAN=	1.00	MODE=	1.00	MEAN=	0.20	WT %	9.8	12.9	19.8	30.0	13.4	6.1	3.3	1.3	3.5
SPLIT WT= 646.5							CUM WT %	9.8	22.8	42.4	72.4	85.8	91.9	95.1	96.4	100.0

TABLE D.1 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E18-001 ****

08/07/89

DEPTH	%CACO3	DW	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
225	0.8	C	11.4	48.4	40.2	msG	WT	186.1	91.3	77.2	70.8	72.8	62.3	50.8	25.8	53.1
SORT= N/A MEDIAN= 0.00 MODE= -2.00 MEAN= N/A							WT %	27.0	13.2	11.2	10.2	10.6	9.0	7.4	3.7	7.7
SPLIT WT= 690.1							CUM WT %	27.0	40.2	51.4	61.6	72.2	81.2	88.6	92.3	100.0
230	0.7	C	9.5	51.3	39.2	msG	WT	201.3	99.7	78.9	97.0	92.7	83.8	41.2	21.4	51.8
SORT= N/A MEDIAN= 1.00 MODE= -2.00 MEAN= N/A							WT %	26.2	13.0	10.3	12.7	12.1	10.9	5.4	2.8	6.7
SPLIT WT= 767.8							CUM WT %	26.2	39.2	49.4	62.2	74.2	85.1	90.5	93.3	100.0
235	0.5	H	11.0	52.8	36.2	msG	WT	169.3	98.4	74.0	112.5	83.6	64.5	55.1	22.5	58.8
SORT= N/A MEDIAN= 1.00 MODE= -2.00 MEAN= N/A							WT %	22.9	13.3	10.0	15.2	11.3	8.7	7.5	3.1	8.0
SPLIT WT= 737.5							CUM WT %	22.9	36.2	46.3	61.5	72.8	81.5	89.0	92.1	100.0
240	0.5	H	12.1	43.0	44.9	msG	WT	167.5	72.5	57.7	45.7	40.7	46.4	39.3	19.9	44.5
SORT= N/A MEDIAN= 0.00 MODE= -2.00 MEAN= N/A							WT %	31.4	13.6	10.8	8.6	7.6	8.7	7.4	3.7	8.3
SPLIT WT= 534.0							CUM WT %	31.4	44.9	55.7	64.3	71.9	80.6	88.0	91.7	100.0
245	0.5	H	9.5	41.8	48.7	msG	WT	236.2	112.7	75.3	65.0	64.2	50.2	44.6	13.9	54.3
SORT= N/A MEDIAN= 0.00 MODE= -2.00 MEAN= N/A							WT %	33.0	15.7	10.5	9.1	9.0	7.0	6.3	1.9	7.6
SPLIT WT= 714.7							CUM WT %	33.0	48.7	59.2	68.3	77.2	84.2	90.5	92.4	100.0
250	0.6	H	8.9	37.1	56.1	msG	WT	281.2	102.3	61.4	57.8	52.2	55.9	26.2	12.1	34.8
SORT= N/A MEDIAN= -1.00 MODE= -2.00 MEAN= N/A							WT %	41.1	15.0	9.0	8.5	7.6	8.2	3.8	1.8	5.1
SPLIT WT= 681.8							CUM WT %	41.1	56.1	65.1	73.5	81.1	89.3	93.1	94.9	100.0
255	0.4	H	11.4	52.6	36.1	msG	WT	167.6	103.8	91.7	76.0	88.1	79.5	60.6	29.5	56.1
SORT= N/A MEDIAN= 1.00 MODE= -2.00 MEAN= N/A							WT %	22.3	13.8	12.2	10.1	11.7	10.6	8.1	3.9	7.5
SPLIT WT= 752.1							CUM WT %	22.3	36.1	48.2	58.3	70.0	80.6	88.6	92.6	100.0
260	0.5	H	9.5	51.6	38.9	msG	WT	150.2	104.0	83.0	68.3	78.7	71.8	36.3	15.0	47.2
SORT= N/A MEDIAN= 0.00 MODE= -2.00 MEAN= N/A							WT %	23.0	15.9	12.7	10.5	12.0	10.9	5.6	2.3	7.2
SPLIT WT= 651.9							CUM WT %	23.0	38.9	51.6	62.0	74.1	84.9	90.5	92.8	100.0
265	1.6	H	11.8	52.1	36.1	msG	WT	152.4	110.3	87.5	88.5	80.4	68.3	57.5	27.7	60.4
SORT= N/A MEDIAN= 1.00 MODE= -2.00 MEAN= N/A							WT %	20.5	15.6	11.7	11.9	11.6	9.2	7.7	3.7	8.1
SPLIT WT= 743.6							CUM WT %	20.5	36.1	47.8	59.7	71.3	80.5	88.2	91.9	100.0
270	0.3	H	10.3	57.1	32.6	msG	WT	110.1	88.9	78.1	71.3	88.7	75.9	34.8	25.0	37.7
SORT= N/A MEDIAN= 1.00 MODE= -2.00 MEAN= N/A							WT %	18.0	14.6	12.8	11.7	14.5	12.4	5.7	4.1	6.2
SPLIT WT= 608.8							CUM WT %	18.0	32.6	45.4	57.1	71.6	84.0	89.7	93.8	100.0
275	0.3	H	11.2	45.8	43.0	msG	WT	210.4	106.1	79.8	64.1	76.2	62.2	55.2	21.0	61.2
SORT= N/A MEDIAN= 0.00 MODE= -2.00 MEAN= N/A							WT %	28.6	14.4	10.8	8.7	10.4	8.5	7.5	2.9	8.3
SPLIT WT= 734.4							CUM WT %	28.6	43.0	53.8	62.5	72.9	81.3	88.8	91.7	100.0

TABLE D.1 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E18-001 ****

08/07/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
280	0.3	H	7.8	60.5	31.6	msG	WT	122.0	108.7	84.5	141.8	101.5	78.7	34.7	15.4	41.7
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	16.7	14.9	11.6	19.5	13.9	10.8	4.8	2.1	5.7
SPLIT WT= 726.1							CUM WT %	16.7	31.7	43.2	62.7	76.6	87.4	92.2	94.3	100.0
285	0.4	H	8.9	63.2	28.0	(m)gS	WT	114.8	79.5	76.8	147.6	106.1	62.0	45.9	21.8	39.2
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	16.6	11.5	11.1	21.3	15.3	8.9	6.6	3.1	5.7
SPLIT WT= 691.6							CUM WT %	16.6	28.0	39.1	60.4	75.7	84.6	91.2	94.4	100.0
290	0.3	H	9.5	49.8	40.7	msG	WT	205.0	110.3	81.8	77.8	93.9	85.3	46.4	26.3	47.6
SORT=	N/A	MEDIAN=	0.00	MODE=	-2.00	MEAN= N/A	WT %	26.5	14.3	10.6	10.1	12.1	11.0	6.0	3.4	6.1
SPLIT WT= 772.3							CUM WT %	26.5	40.7	51.3	61.4	73.5	84.5	90.5	93.9	100.0
295	0.3	H	8.2	40.1	51.7	msG	WT	204.5	168.6	102.1	69.1	42.2	42.4	33.2	14.1	44.8
SORT=	N/A	MEDIAN=	-1.00	MODE=	-2.00	MEAN= N/A	WT %	28.4	23.4	14.2	9.6	5.9	5.9	4.6	2.0	6.2
SPLIT WT= 718.2							CUM WT %	28.4	51.7	65.9	75.5	81.3	87.2	91.8	93.8	100.0
300	0.4	H	8.8	42.8	48.4	msG	WT	226.6	101.3	69.4	49.7	53.9	82.9	34.5	21.8	37.8
SORT=	N/A	MEDIAN=	0.00	MODE=	-2.00	MEAN= N/A	WT %	33.4	14.9	10.2	7.3	8.0	12.2	5.1	3.2	5.6
SPLIT WT= 675.9							CUM WT %	33.4	48.4	58.6	65.9	73.9	86.1	91.2	94.4	100.0
305	0.5	H	11.9	52.7	35.4	msG	WT	147.4	108.8	80.2	58.3	65.2	114.2	64.2	19.4	66.7
SORT=	N/A	MEDIAN=	1.00	MODE=	-2.00	MEAN= N/A	WT %	20.4	15.0	11.1	8.1	9.0	15.8	8.9	2.7	9.2
SPLIT WT= 722.4							CUM WT %	20.4	35.4	46.4	54.5	63.5	79.3	88.1	90.8	100.0
310	0.4	H	11.6	57.8	31.1	msG	WT	117.8	113.5	79.6	81.7	113.1	86.7	72.3	38.1	48.4
SORT=	2.77	MEDIAN=	1.00	MODE=	-2.00	MEAN= 0.77	WT %	15.8	15.2	10.6	11.0	15.2	10.8	9.7	5.1	6.5
SPLIT WT= 743.1							CUM WT %	15.8	31.1	41.7	52.6	67.8	78.7	88.4	93.5	100.0
315	0.2	H	8.4	64.4	27.2	(m)gS	WT	108.3	76.0	52.9	61.2	178.7	88.0	37.1	15.4	39.4
SORT=	2.41	MEDIAN=	2.00	MODE=	2.00	MEAN= 0.70	WT %	15.5	11.7	8.2	9.4	27.5	13.6	5.7	2.4	6.1
SPLIT WT= 645.4							CUM WT %	15.5	27.2	35.3	44.7	72.3	85.8	91.6	93.9	100.0
320	0.1	H	9.7	66.4	23.9	(m)gS	WT	106.5	64.6	38.5	33.2	119.6	227.5	55.8	24.6	44.6
SORT=	2.53	MEDIAN=	2.00	MODE=	3.00	MEAN= 1.09	WT %	14.9	9.0	5.4	4.6	16.7	31.8	7.8	3.4	6.2
SPLIT WT= 713.6							CUM WT %	14.9	23.9	29.3	34.0	50.7	82.5	90.3	93.8	100.0
325	0.2	H	7.2	58.5	34.3	msG	WT	164.9	76.6	51.3	38.7	164.8	106.4	49.4	12.2	38.3
SORT=	N/A	MEDIAN=	2.00	MODE=	-2.00	MEAN= N/A	WT %	23.5	10.8	7.3	5.5	23.5	15.2	7.0	1.7	5.5
SPLIT WT= 699.0							CUM WT %	23.5	34.3	41.6	47.1	70.6	85.8	92.8	94.6	100.0
330	0.2	H	6.3	44.5	49.2	msG	WT	236.7	117.5	59.9	36.8	73.5	103.5	41.5	13.0	31.4
SORT=	N/A	MEDIAN=	0.00	MODE=	-2.00	MEAN= N/A	WT %	32.8	16.8	8.5	5.2	10.4	14.6	5.9	1.8	4.4
SPLIT WT= 705.0							CUM WT %	32.8	49.2	57.7	62.9	73.2	87.9	93.7	95.5	100.0

TABLE D.2

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E25-009 ****

08/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
5	0.8	C	21.4	67.4	11.2	gmS	WT	12.9	4.3	9.0	10.6	14.1	25.6	44.5	24.1	8.9
SORT= 2.21	MEDIAN=		4.00	MODE=	4.00	MEAN= 2.37	WT %	8.4	2.8	5.8	6.9	9.2	16.6	28.9	15.7	5.8
SPLIT WT= 154.3							CUM WT %	8.4	11.2	17.0	23.9	33.1	49.7	78.6	94.2	100.0
10	0.8	C	2.3	69.1	38.5	sG	WT	35.0	21.2	36.1	31.9	11.0	4.5	2.7	1.8	1.6
SORT= N/A	MEDIAN=		0.00	MODE=	0.00	MEAN= N/A	WT %	24.0	14.5	24.8	21.9	7.5	3.1	1.9	1.2	1.1
SPLIT WT= 145.6							CUM WT %	24.0	38.6	63.3	85.2	92.7	95.8	97.7	98.9	100.0
15	0.6	C	1.0	92.8	6.2	(g)S	WT	4.0	5.7	20.8	77.4	43.3	3.9	1.3	0.9	0.7
SORT= 0.90	MEDIAN=		1.00	MODE=	1.00	MEAN= 0.66	WT %	2.5	3.8	12.7	49.2	27.5	2.5	0.8	0.6	0.5
SPLIT WT= 157.1							CUM WT %	2.5	6.2	18.9	68.1	95.7	98.2	99.0	99.6	100.0
20	1.3	C	3.2	89.5	7.3	(g)S	WT	3.4	7.4	22.8	58.7	34.1	11.4	5.1	2.5	2.2
SORT= 1.18	MEDIAN=		1.00	MODE=	1.00	MEAN= 0.72	WT %	2.3	5.0	15.5	39.8	23.1	7.7	3.5	1.7	1.5
SPLIT WT= 147.7							CUM WT %	2.3	7.3	22.8	62.5	85.6	93.4	96.8	98.5	100.0
25	1.3	C	3.3	88.0	8.7	(g)S	WT	4.9	6.6	20.5	52.4	31.0	10.3	4.7	2.4	2.1
SORT= 1.22	MEDIAN=		1.00	MODE=	1.00	MEAN= 0.69	WT %	3.6	5.0	15.2	38.8	23.0	7.6	3.5	1.8	1.6
SPLIT WT= 135.6							CUM WT %	3.6	8.7	23.8	62.5	85.6	93.2	96.7	98.5	100.0
30	1.4	C	5.1	90.5	4.4	S	WT	2.9	3.5	16.0	53.0	45.7	11.2	5.0	3.0	3.8
SORT= 1.01	MEDIAN=		1.00	MODE=	1.00	MEAN= 1.00	WT %	2.0	2.4	11.1	36.6	31.6	7.7	3.5	2.5	2.6
SPLIT WT= 145.0							CUM WT %	2.0	4.4	15.5	52.1	83.7	91.4	94.9	97.4	100.0
35	0.9	C	6.0	92.0	1.9	S	WT	1.0	1.0	9.7	53.0	43.6	13.6	5.0	3.7	4.5
SORT= 1.09	MEDIAN=		2.00	MODE=	1.00	MEAN= 1.20	WT %	0.7	1.2	7.2	39.1	32.1	10.0	3.7	2.7	3.3
SPLIT WT= 136.5							CUM WT %	0.7	1.9	9.1	48.1	80.3	90.3	94.0	96.7	100.0
40	0.8	C	5.3	91.9	2.8	S	WT	1.7	2.8	11.0	49.4	65.1	17.6	5.9	3.9	4.7
SORT= 1.06	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.26	WT %	1.1	1.7	6.8	30.6	40.3	10.5	3.7	2.4	2.9
SPLIT WT= 161.6							CUM WT %	1.1	2.8	9.6	40.2	80.5	91.0	94.7	97.1	100.0
45	1.4	C	11.5	88.1	0.4	(m)S	WT	0.0	0.6	3.3	24.8	55.9	27.2	10.1	7.3	8.5
SORT= 1.32	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.94	WT %	0.0	0.4	2.4	18.0	40.6	19.8	7.3	5.3	6.2
SPLIT WT= 138.3							CUM WT %	0.0	0.4	2.8	20.9	61.5	81.2	88.5	93.8	100.0
50	1.1	C	7.7	91.0	0.5	S	WT	0.0	0.7	9.5	31.6	48.9	22.2	7.8	5.1	4.9
SORT= 1.26	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.56	WT %	0.0	0.5	7.3	24.2	37.4	17.0	6.0	3.9	3.8
SPLIT WT= 131.0							CUM WT %	0.0	0.5	7.8	32.0	69.4	86.4	92.4	96.3	100.0
55	1.1	C	1.5	65.8	32.6	sG	WT	15.6	38.2	50.9	20.7	20.3	6.2	2.4	1.4	1.1
SORT= 1.48	MEDIAN=		0.00	MODE=	0.00	MEAN= -0.30	WT %	9.5	23.2	30.9	17.4	12.3	3.8	1.5	0.9	0.7
SPLIT WT= 165.2							CUM WT %	9.5	32.7	63.5	81.0	93.3	97.0	98.5	99.4	100.0

TABLE D.2 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E25-009 ****

06/23/89

DEPTH	%CACO3	DW	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
60	0.7	C	0.3	71.8	27.9	gS	WT	9.2	34.2	66.7	36.2	6.9	1.5	0.4	0.2	0.2
SORT= 1.05	MEDIAN=		0.00	MODE=	0.00	MEAN= -0.48	WT %	5.9	22.0	42.9	23.3	4.4	1.0	0.3	0.1	0.1
SPLIT WT= 155.4							CUM WT %	5.9	27.9	70.8	94.1	98.5	99.5	99.7	99.9	100.0
65	1.0	C	1.8	83.3	14.9	gS	WT	4.4	20.2	62.3	49.0	17.7	6.1	2.6	1.7	1.3
SORT= 1.07	MEDIAN=		0.00	MODE=	0.00	MEAN= 0.04	WT %	2.7	12.2	37.7	29.6	10.7	3.7	1.6	1.0	0.8
SPLIT WT= 165.8							CUM WT %	2.7	14.9	52.6	82.2	92.9	96.6	98.2	99.2	100.0
70	0.8	C	0.3	86.4	13.2	gS	WT	1.0	16.0	74.6	42.0	9.6	2.4	0.7	0.3	0.2
SORT= 0.84	MEDIAN=		0.00	MODE=	0.00	MEAN= -0.15	WT %	1.2	12.0	49.9	28.1	6.4	1.6	0.5	0.2	0.1
SPLIT WT= 149.8							CUM WT %	1.2	13.2	63.1	91.2	97.6	99.2	99.7	99.9	100.0
75	1.1	C	0.6	97.6	1.8	S	WT	0.1	2.6	26.5	88.0	36.1	4.0	1.1	0.6	0.4
SORT= 0.77	MEDIAN=		1.00	MODE=	1.00	MEAN= 0.58	WT %	0.1	1.7	17.2	57.6	19.5	2.6	0.7	0.4	0.3
SPLIT WT= 155.0							CUM WT %	0.1	1.8	18.9	76.5	96.1	98.6	99.4	99.7	100.0
80	0.9	C	2.0	90.6	7.3	(g)S	WT	1.3	10.9	35.4	62.7	42.6	7.9	2.9	2.3	1.1
SORT= 1.14	MEDIAN=		1.00	MODE=	1.00	MEAN= 0.56	WT %	0.8	6.6	21.3	37.7	25.2	4.7	1.7	1.4	0.7
SPLIT WT= 166.4							CUM WT %	0.8	7.3	28.6	66.3	91.5	96.2	98.0	99.3	100.0
85	1.0	C	1.6	90.1	8.3	(g)S	WT	1.5	10.2	73.7	38.7	10.0	2.7	1.3	1.2	1.0
SORT= 0.84	MEDIAN=		0.00	MODE=	0.00	MEAN= -0.07	WT %	1.1	7.3	52.5	27.6	7.1	1.9	0.9	0.9	0.7
SPLIT WT= 140.1							CUM WT %	1.1	8.3	60.9	88.5	95.6	97.5	98.4	99.3	100.0
90	1.0	C	0.3	83.6	15.9	gS	WT	6.7	14.7	57.0	43.6	9.7	2.1	0.6	0.3	0.1
SORT= 0.90	MEDIAN=		0.00	MODE=	0.00	MEAN= -0.13	WT %	5.0	10.9	42.3	32.3	7.2	1.6	0.5	0.2	0.1
SPLIT WT= 135.4							CUM WT %	5.0	15.9	58.2	90.5	97.7	99.3	99.7	99.9	100.0
95	0.9	C	0.2	72.9	26.9	gS	WT	16.6	23.3	65.1	35.5	5.5	1.6	0.5	0.2	0.1
SORT= 1.12	MEDIAN=		0.00	MODE=	0.00	MEAN= -0.54	WT %	11.2	15.7	43.9	23.9	3.7	1.1	0.3	0.1	0.1
SPLIT WT= 147.8							CUM WT %	11.2	26.9	70.8	94.7	98.4	99.5	99.8	99.9	100.0
100	1.2	C	0.2	76.0	23.8	gS	WT	10.8	22.9	65.2	33.9	6.2	1.6	0.5	0.2	0.1
SORT= 1.03	MEDIAN=		0.00	MODE=	0.00	MEAN= -0.44	WT %	7.6	16.2	46.1	24.0	4.4	1.1	0.4	0.1	0.1
SPLIT WT= 141.5							CUM WT %	7.6	23.8	70.0	93.9	96.3	99.4	99.8	99.9	100.0
105	1.0	C	0.3	66.6	33.7	sG	WT	12.9	38.1	70.9	25.1	2.8	0.8	0.5	0.3	0.2
SORT= 0.95	MEDIAN=		0.00	MODE=	0.00	MEAN= -0.71	WT %	8.5	25.2	46.8	16.6	1.9	0.5	0.2	0.2	0.1
SPLIT WT= 151.5							CUM WT %	8.5	33.7	80.5	97.1	99.0	99.5	99.7	99.9	100.0
110	1.1	C	0.3	59.1	40.6	sG	WT	19.2	49.0	70.2	24.2	3.7	0.9	0.4	0.3	0.2
SORT= 0.98	MEDIAN=		0.00	MODE=	0.00	MEAN= -0.83	WT %	11.4	29.2	41.8	14.4	2.2	0.5	0.2	0.2	0.1
SPLIT WT= 168.0							CUM WT %	11.4	40.6	82.3	96.7	98.9	99.5	99.7	99.9	100.0

TABLE D.2 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E25-009 ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
115	0.8	C	0.2	74.1	25.7	gS	WT	0.0	30.3	63.7	33.0	6.2	1.4	0.4	0.2	0.1
SORT= 1.01 MEDIAN= 0.00 MODE= 0.00 MEAN= -0.45							WT %	4.3	21.4	45.1	23.4	4.4	1.0	0.3	0.1	0.1
SPLIT WT= 141.2							CUM WT %	4.3	25.7	70.8	94.1	98.5	99.5	99.8	99.9	100.0
120	1.0	C	0.4	79.3	20.3	gS	WT	4.7	25.7	66.9	36.5	9.7	2.5	2.0	0.4	0.2
SORT= 1.01 MEDIAN= 0.00 MODE= 0.00 MEAN= -0.27							WT %	3.2	17.2	44.8	24.4	6.5	1.7	1.9	0.3	0.1
SPLIT WT= 151.0							CUM WT %	3.2	20.4	65.1	89.6	96.1	97.7	99.6	99.9	100.0
125	1.0	C	0.5	92.0	7.5	(g)S	WT	1.6	0.5	46.4	46.3	25.6	5.3	1.0	0.5	0.2
SORT= 1.09 MEDIAN= 1.00 MODE= 0.00 MEAN= 0.31							WT %	1.2	6.3	34.3	34.2	18.9	3.9	0.7	0.4	0.2
SPLIT WT= 135.9							CUM WT %	1.2	7.5	41.7	75.9	94.8	98.7	99.5	99.9	100.0
130	1.0	C	0.6	99.0	0.4	S	WT	0.0	0.6	15.1	75.3	40.6	6.7	1.2	0.5	0.4
SORT= 0.79 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.06							WT %	0.0	0.4	10.2	50.7	32.0	4.5	0.8	0.3	0.3
SPLIT WT= 140.5							CUM WT %	0.0	0.4	10.6	61.3	94.1	98.6	99.4	99.7	100.0
135	1.0	C	0.7	97.3	2.0	S	WT	0.6	2.6	19.3	69.6	60.9	6.2	1.1	0.6	0.5
SORT= 0.83 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.07							WT %	0.4	1.6	12.0	43.1	37.7	3.8	0.7	0.4	0.3
SPLIT WT= 161.9							CUM WT %	0.4	2.0	13.9	57.1	94.8	98.6	99.3	99.7	100.0
140	1.1	C	0.8	94.9	4.3	S	WT	0.2	0.4	30.7	49.5	54.5	10.1	1.0	0.8	0.5
SORT= 1.10 MEDIAN= 1.00 MODE= 2.00 MEAN= 0.73							WT %	0.1	4.2	19.9	32.1	35.3	6.6	1.0	0.5	0.3
SPLIT WT= 154.5							CUM WT %	0.1	4.3	24.2	56.3	91.6	98.1	99.2	99.7	100.0
145	0.4	C	0.6	16.0	83.3	G	WT	99.3	17.2	12.3	5.4	2.8	1.3	0.6	0.4	0.5
SORT= N/A MEDIAN= -2.00 MODE= -2.00 MEAN= N/A							WT %	71.0	12.3	8.8	3.9	2.0	0.9	0.4	0.3	0.4
SPLIT WT= 139.9							CUM WT %	71.0	83.3	92.1	96.0	98.0	98.9	99.4	99.8	100.0
150	0.6	C	0.1	24.2	75.7	sG	WT	80.7	36.7	28.3	7.9	1.1	0.2	0.0	0.0	0.1
SORT= N/A MEDIAN= -2.00 MODE= -2.00 MEAN= N/A							WT %	52.1	23.7	18.3	5.1	0.7	0.1	0.0	0.0	0.1
SPLIT WT= 156.4							CUM WT %	52.1	75.7	94.0	99.1	99.8	99.9	99.9	99.9	100.0
155	0.6	C	0.1	17.2	82.7	G	WT	81.4	30.0	17.4	4.7	0.8	0.2	0.1	0.0	0.1
SORT= N/A MEDIAN= -2.00 MODE= -2.00 MEAN= N/A							WT %	60.4	22.3	12.9	3.5	0.6	0.2	0.1	0.0	0.1
SPLIT WT= 134.6							CUM WT %	60.4	82.7	95.6	99.1	99.7	99.9	99.9	99.9	100.0
160	0.4	C	2.8	18.6	78.7	msG	WT	90.5	20.1	11.4	6.6	4.0	2.4	1.7	1.6	2.3
SORT= N/A MEDIAN= -2.00 MODE= -2.00 MEAN= N/A							WT %	64.4	14.3	8.1	4.7	2.8	1.7	1.2	1.1	1.6
SPLIT WT= 141.1							CUM WT %	64.4	78.7	86.8	91.5	94.3	96.0	97.2	98.4	100.0
165	0.9	C	0.9	51.0	48.0	sG	WT	27.0	45.2	49.9	19.0	5.2	1.5	0.5	0.3	1.1
SORT= N/A MEDIAN= 0.00 MODE= 0.00 MEAN= N/A							WT %	18.0	30.1	33.2	13.0	3.5	1.0	0.3	0.2	0.7
SPLIT WT= 150.3							CUM WT %	18.0	48.0	81.2	94.3	97.7	98.7	99.1	99.3	100.0

TABLE D.2 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E25-009 ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
170	0.8	C	0.8	38.9	60.3	sG	WT	83.2	14.4	38.3	21.3	4.3	0.8	0.3	0.2	1.1
SORT= N/A	MEDIAN= -2.00		MODE= -2.00		MEAN=	N/A	WT %	51.4	8.9	22.4	13.2	2.7	0.5	0.2	0.1	0.7
SPLIT WT= 160.9							CUM WT %	51.4	60.3	82.7	95.9	98.6	99.0	99.2	99.3	100.0
175	0.8	C	0.1	44.2	55.7	sG	WT	69.2	12.8	34.3	24.4	5.2	1.0	0.2	0.1	0.0
SORT= N/A	MEDIAN= -1.00		MODE= -2.00		MEAN=	N/A	WT %	47.0	8.7	23.3	16.6	3.5	0.7	0.1	0.1	0.0
SPLIT WT= 147.1							CUM WT %	47.0	55.7	79.0	95.6	99.1	99.8	99.9	100.0	100.0
180	0.2	C	0.1	11.9	88.0	G	WT	99.1	41.9	18.8	5.8	1.7	0.5	0.2	0.1	0.1
SORT= N/A	MEDIAN= -2.00		MODE= -2.00		MEAN=	N/A	WT %	61.9	26.2	6.7	3.6	1.1	0.3	0.1	0.1	0.1
SPLIT WT= 160.6							CUM WT %	61.9	88.0	94.8	98.4	99.4	99.7	99.9	99.9	100.0
185	0.7	C	0.1	24.6	75.3	sG	WT	87.3	17.2	22.6	8.9	1.9	0.5	0.2	0.1	0.0
SORT= N/A	MEDIAN= -2.00		MODE= -2.00		MEAN=	N/A	WT %	62.9	12.4	16.3	6.4	1.4	0.4	0.1	0.1	0.0
SPLIT WT= 138.9							CUM WT %	62.9	75.3	91.6	98.1	99.4	99.8	99.9	100.0	100.0
190	0.7	C	0.1	15.6	84.3	G	WT	99.8	26.4	12.1	7.6	2.5	0.8	0.3	0.1	0.1
SORT= N/A	MEDIAN= -2.00		MODE= -2.00		MEAN=	N/A	WT %	66.7	17.6	8.1	5.1	1.7	0.5	0.2	0.1	0.1
SPLIT WT= 150.1							CUM WT %	66.7	84.3	92.4	97.5	99.1	99.7	99.9	99.9	100.0
195	0.4	C	0.0	5.3	94.7	G	WT	92.0	4.6	3.8	1.3	0.2	0.1	0.0	0.0	0.0
SORT= N/A	MEDIAN= -2.00		MODE= -2.00		MEAN=	N/A	WT %	90.2	4.5	3.7	1.3	0.2	0.1	0.0	0.0	0.0
SPLIT WT= 102.2							CUM WT %	90.2	94.7	98.4	99.7	99.9	100.0	100.0	100.0	100.0
200	0.2	C	1.2	22.4	76.4	sG	WT	77.5	23.3	14.1	7.2	4.5	2.6	1.2	1.1	0.5
SORT= N/A	MEDIAN= -2.00		MODE= -2.00		MEAN=	N/A	WT %	58.7	17.7	10.7	5.5	3.4	2.0	0.9	0.8	0.4
SPLIT WT= 132.5							CUM WT %	58.7	76.4	87.0	92.5	95.9	97.9	98.8	99.6	100.0
205	0.3	C	0.1	10.5	89.4	G	WT	95.6	21.0	7.3	4.1	1.7	0.4	0.2	0.1	0.0
SORT= N/A	MEDIAN= -2.00		MODE= -2.00		MEAN=	N/A	WT %	73.3	16.1	5.6	3.1	1.3	0.3	0.2	0.1	0.0
SPLIT WT= 130.3							CUM WT %	73.3	89.4	95.0	98.2	99.5	99.8	99.9	100.0	100.0
210	0.5	C	0.2	12.3	87.6	G	WT	97.4	6.2	6.4	4.7	2.4	0.8	0.2	0.1	0.1
SORT= N/A	MEDIAN= -2.00		MODE= -2.00		MEAN=	N/A	WT %	82.3	5.2	5.4	4.0	2.0	0.7	0.2	0.1	0.1
SPLIT WT= 118.0							CUM WT %	82.3	87.6	93.0	97.0	99.0	99.7	99.8	99.9	100.0
215	0.6	C	0.1	19.8	80.1	G	WT	92.0	28.3	17.9	8.8	2.4	0.4	0.2	0.1	0.0
SORT= N/A	MEDIAN= -2.00		MODE= -2.00		MEAN=	N/A	WT %	61.3	18.9	11.9	5.9	1.6	0.3	0.1	0.1	0.0
SPLIT WT= 150.4							CUM WT %	61.3	80.1	92.1	97.9	99.5	99.8	99.9	100.0	100.0
220	0.3	C	2.2	39.0	58.7	sG	WT	44.0	32.4	23.0	16.0	7.5	2.9	1.4	1.2	1.7
SORT= N/A	MEDIAN= -1.00		MODE= -2.00		MEAN=	N/A	WT %	33.8	24.9	17.7	12.3	5.8	2.2	1.1	0.9	1.3
SPLIT WT= 129.9							CUM WT %	33.8	58.7	76.4	88.7	94.5	96.7	97.8	98.7	100.0

TABLE D.2 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E25-009 ****

08/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
225	0.6	C	0.2	68.9	46.9	sG	WT	38.3	28.9	39.2	34.0	10.3	1.5	0.4	0.2	0.1
SORT= N/A	MEDIAN= 0.00		MODE= 0.00		MEAN= N/A		WT %	20.9	19.9	27.1	23.5	7.1	1.0	0.3	0.1	0.1
SPLIT WT= 145.2							CUM WT %	20.9	40.9	67.9	91.4	98.5	99.5	99.8	99.9	100.0
230	0.5	C	2.8	26.2	71.0	sG	WT	77.4	39.0	22.1	11.8	5.3	2.5	1.5	1.7	2.9
SORT= N/A	MEDIAN= -1.00		MODE= -2.00		MEAN= N/A		WT %	46.9	24.1	13.4	7.2	3.2	1.5	0.9	1.0	1.8
SPLIT WT= 165.4							CUM WT %	46.9	71.0	84.4	91.6	94.8	96.3	97.2	98.2	100.0
235	0.6	C	0.2	14.4	85.5	G	WT	97.1	16.0	6.6	4.4	4.4	2.1	0.5	0.2	0.0
SORT= N/A	MEDIAN= -2.00		MODE= -2.00		MEAN= N/A		WT %	77.6	8.0	5.3	3.5	3.5	1.7	0.4	0.2	0.0
SPLIT WT= 125.4							CUM WT %	77.6	85.6	90.7	94.3	97.8	99.4	99.8	100.0	100.0
240	0.0	C	N/A	N/A	N/A	N/A	WT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SORT= N/A	MEDIAN= N/A		MODE= N/A		MEAN= N/A		WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SPLIT WT= 0.0							CUM WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
245	0.0	C	N/A	N/A	N/A	N/A	WT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SORT= N/A	MEDIAN= N/A		MODE= N/A		MEAN= N/A		WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SPLIT WT= 0.0							CUM WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
250	0.6	C	0.5	19.8	79.7	sG	WT	92.9	5.5	5.4	5.2	8.2	4.9	0.8	0.4	0.2
SORT= N/A	MEDIAN= -2.00		MODE= -2.00		MEAN= N/A		WT %	75.2	4.5	4.4	4.2	6.6	4.0	0.7	0.3	0.2
SPLIT WT= 124.2							CUM WT %	75.2	79.7	84.0	88.3	94.9	98.9	99.5	99.8	100.0
255	0.6	C	0.5	20.3	79.2	sG	WT	78.3	33.1	16.5	4.6	2.1	3.9	1.5	0.5	0.2
SORT= N/A	MEDIAN= -2.00		MODE= -2.00		MEAN= N/A		WT %	55.7	23.5	11.7	3.3	1.5	2.8	1.1	0.4	0.1
SPLIT WT= 141.1							CUM WT %	55.7	79.2	90.9	94.2	95.7	98.4	99.5	99.9	100.0
260	0.7	C	0.6	86.1	13.3	gS	WT	14.7	3.9	25.2	62.6	28.5	3.6	0.9	0.5	0.4
SORT= 1.13	MEDIAN= 1.00		MODE= 1.00		MEAN= 0.32		WT %	10.5	2.8	18.0	44.6	20.3	2.6	0.6	0.4	0.3
SPLIT WT= 140.1							CUM WT %	10.5	13.3	31.2	75.8	96.2	98.7	99.4	99.7	100.0
265	0.6	C	0.5	96.9	2.6	S	WT	0.0	4.3	35.6	88.6	31.2	3.4	0.8	0.4	0.4
SORT= 0.84	MEDIAN= 1.00		MODE= 1.00		MEAN= 0.48		WT %	0.0	2.6	21.3	54.0	19.0	2.1	0.5	0.2	0.2
SPLIT WT= 164.7							CUM WT %	0.0	2.6	24.0	77.9	97.0	99.0	99.5	99.8	100.0
270	0.7	C	0.5	96.3	3.2	S	WT	0.6	4.7	26.3	84.8	44.9	4.3	0.9	0.6	0.3
SORT= 0.86	MEDIAN= 1.00		MODE= 1.00		MEAN= 0.66		WT %	0.4	2.8	16.7	50.7	26.8	2.6	0.5	0.4	0.2
SPLIT WT= 168.7							CUM WT %	0.4	3.2	18.9	69.5	96.4	98.9	99.5	99.8	100.0
275	0.6	C	0.8	97.7	1.5	S	WT	0.8	1.5	20.1	81.6	44.3	4.9	1.1	0.8	0.4
SORT= 0.78	MEDIAN= 1.00		MODE= 1.00		MEAN= 0.77		WT %	0.5	1.0	12.9	52.5	28.5	3.2	0.7	0.5	0.3
SPLIT WT= 155.8							CUM WT %	0.5	1.5	14.4	66.9	95.4	98.6	99.2	99.7	100.0

TABLE D.2 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E26-009 ****

08/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
280	0.6	C	0.5	96.5	3.0	S	WT	0.1	4.4	26.6	77.4	36.9	3.4	0.8	0.4	0.3
SORT= 0.86	MEDIAN=		1.00	MODE=	1.00	MEAN= 0.60	WT %	0.1	3.0	17.3	52.2	24.2	2.3	0.5	0.3	0.2
SPLIT WT= 148.6							CUM WT %	0.1	3.0	20.3	72.5	96.7	99.0	99.5	99.8	100.0
285	0.6	C	1.0	96.3	2.7	S	WT	0.0	4.4	30.2	81.2	38.4	5.2	1.4	0.9	0.7
SORT= 0.91	MEDIAN=		1.00	MODE=	1.00	MEAN= 0.61	WT %	0.0	2.7	18.6	50.0	23.7	3.2	0.9	0.6	0.4
SPLIT WT= 162.2							CUM WT %	0.0	2.7	21.3	71.3	95.0	98.2	99.0	99.6	100.0

TABLE D.3

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E25-025 ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
5	N/A	C	66.6	33.5	0.0	sM	WT	0.0	0.0	0.2	2.1	1.5	3.1	40.2	58.7	42.7
SORT= 0.74 MEDIAN= 4.75 MODE= 4.75 MEAN= 4.20							WT %	0.0	0.0	0.1	1.5	1.1	2.2	28.6	36.1	30.4
SPLIT WT= 140.9							CUM WT %	0.0	0.0	0.1	1.6	2.7	4.9	33.5	69.6	100.0
10	N/A	C	19.1	80.8	0.1	(m)S	WT	0.0	0.1	0.7	6.0	16.0	46.7	61.2	14.2	15.2
SORT= 1.05 MEDIAN= 4.00 MODE= 4.00 MEAN= 3.21							WT %	0.0	0.1	0.5	4.4	6.5	29.7	39.8	9.2	9.9
SPLIT WT= 154.3							CUM WT %	0.0	0.1	0.5	4.9	11.4	41.1	80.9	90.1	100.0
15	N/A	C	8.5	87.0	3.7	S	WT	2.0	3.5	25.3	69.0	17.6	12.2	7.2	2.7	10.0
SORT= 1.47 MEDIAN= 1.00 MODE= 1.00 MEAN= 1.01							WT %	1.3	2.3	16.9	46.2	11.8	8.2	4.8	1.8	6.7
SPLIT WT= 149.0							CUM WT %	1.3	3.7	20.6	66.8	78.5	86.7	91.5	93.3	100.0
20	N/A	C	2.0	96.1	1.3	S	WT	0.0	2.0	12.4	74.6	49.0	6.1	2.5	1.0	2.9
SORT= 0.81 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.90							WT %	0.0	1.3	8.2	49.6	32.6	4.1	1.7	0.7	1.9
SPLIT WT= 150.8							CUM WT %	0.0	1.3	9.6	59.1	91.7	95.8	97.4	98.1	100.0
25	N/A	C	3.5	95.0	1.5	S	WT	0.3	2.0	32.5	85.0	15.0	5.4	3.2	1.3	3.9
SORT= 0.83 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.48							WT %	0.2	1.4	21.9	57.2	10.1	3.6	2.2	0.9	2.6
SPLIT WT= 148.5							CUM WT %	0.2	1.6	23.4	80.6	90.7	94.3	96.5	97.4	100.0
30	N/A	C	4.5	94.8	0.7	S	WT	0.2	0.9	19.7	94.2	18.2	6.5	4.0	1.7	5.0
SORT= 0.79 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.74							WT %	0.1	0.6	13.1	62.6	12.1	4.3	2.7	1.1	3.3
SPLIT WT= 151.3							CUM WT %	0.1	0.7	13.8	76.5	88.6	92.9	95.5	96.7	100.0
35	N/A	C	7.5	91.0	1.5	S	WT	1.2	1.0	9.5	59.2	47.2	10.2	7.2	3.0	8.0
SORT= 1.14 MEDIAN= 2.00 MODE= 1.00 MEAN= 1.25							WT %	0.8	0.7	6.5	40.4	32.2	7.0	4.9	2.1	5.5
SPLIT WT= 146.5							CUM WT %	0.8	1.5	8.0	48.4	80.6	87.6	92.5	94.5	100.0
40	N/A	C	4.2	88.1	7.7	(g)S	WT	8.7	3.0	7.5	55.0	59.3	8.4	4.2	1.7	4.7
SORT= 0.91 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.01							WT %	5.7	2.0	4.9	36.1	38.9	5.5	2.8	1.1	3.1
SPLIT WT= 152.2							CUM WT %	5.7	7.7	12.6	48.7	87.6	93.1	95.8	96.9	100.0
45	N/A	C	4.8	94.5	0.7	S	WT	0.8	0.3	2.0	46.5	81.1	11.7	5.2	1.9	5.6
SORT= 0.76 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.26							WT %	0.5	0.2	1.7	29.9	52.1	7.5	3.3	1.2	3.6
SPLIT WT= 155.7							CUM WT %	0.5	0.7	2.4	32.2	84.3	91.8	95.2	96.4	100.0
50	N/A	C	5.9	93.9	0.2	S	WT	0.0	0.3	4.3	50.9	65.6	16.4	6.3	2.4	6.6
SORT= 1.02 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.38							WT %	0.0	0.2	2.8	33.3	42.9	10.7	4.1	1.6	4.3
SPLIT WT= 153.1							CUM WT %	0.0	0.2	3.0	36.3	79.3	90.0	94.1	95.7	100.0
55	N/A	C	5.1	92.3	2.6	S	WT	1.0	2.9	14.4	58.0	48.6	13.4	6.0	2.2	5.6
SORT= 1.06 MEDIAN= 1.00 MODE= 1.00 MEAN= 1.16							WT %	0.7	1.9	9.5	38.3	31.7	8.8	4.0	1.5	3.7
SPLIT WT= 153.1							CUM WT %	0.7	2.6	12.1	50.4	82.0	90.9	94.8	96.3	100.0

TABLE D.3. (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E25-026 ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
60	N/A	C	2.1	96.6	1.1	S	WT	0.1	1.6	10.6	68.8	46.9	11.0	3.8	1.1	2.1
SORT= 0.89 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.93							WT %	0.1	1.1	10.9	45.3	30.9	7.2	2.5	0.7	1.4
SPLIT WT= 151.5							CUM WT %	0.1	1.1	12.0	57.3	88.2	95.4	97.9	98.6	100.0
65	N/A	C	4.0	93.8	1.5	S	WT	0.5	1.7	21.3	64.5	37.7	11.6	6.0	2.0	5.2
SORT= 1.02 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.96							WT %	0.3	1.1	14.2	42.9	25.1	7.7	4.0	1.3	3.5
SPLIT WT= 150.0							CUM WT %	0.3	1.5	15.6	58.5	83.5	91.2	95.2	96.6	100.0
70	N/A	C	7.2	92.8	0.1	S	WT	0.0	0.1	2.1	30.6	76.7	21.2	8.9	3.3	7.5
SORT= 1.04 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.68							WT %	0.0	0.1	1.4	20.4	51.0	14.1	5.9	2.2	5.0
SPLIT WT= 151.1							CUM WT %	0.0	0.1	1.5	21.8	72.8	86.9	92.8	95.0	100.0
75	N/A	C	10.4	89.5	0.1	(m)S	WT	0.0	0.1	0.1	7.6	57.0	51.1	18.1	4.5	11.1
SORT= 1.13 MEDIAN= 3.00 MODE= 2.00 MEAN= 2.34							WT %	0.0	0.1	0.1	5.1	38.1	34.2	12.1	3.0	7.4
SPLIT WT= 150.3							CUM WT %	0.0	0.1	0.1	5.2	43.3	77.5	89.6	92.6	100.0
80	N/A	C	6.5	92.9	0.5	S	WT	0.0	0.0	0.1	37.1	67.5	21.9	8.0	3.0	6.9
SORT= 1.12 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.55							WT %	0.0	0.5	4.0	24.5	44.6	14.5	5.3	2.0	4.6
SPLIT WT= 150.7							CUM WT %	0.0	0.5	4.6	29.1	73.7	88.2	93.5	95.4	100.0
85	N/A	C	7.0	92.6	0.4	S	WT	0.0	0.6	4.6	29.6	61.4	23.7	8.8	2.9	6.7
SORT= 1.13 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.66							WT %	0.0	0.4	3.3	21.4	44.5	17.2	6.2	2.1	4.9
SPLIT WT= 138.0							CUM WT %	0.0	0.4	3.8	25.2	69.7	86.8	93.0	95.1	100.0
90	N/A	C	12.0	87.0	0.2	(m)S	WT	0.0	0.3	0.8	5.6	36.0	61.1	25.1	8.0	12.0
SORT= 1.14 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.63							WT %	0.0	0.2	0.6	4.0	21.3	43.4	17.8	4.3	8.5
SPLIT WT= 140.9							CUM WT %	0.0	0.2	0.8	4.8	26.0	69.4	87.2	91.5	100.0
95	N/A	C	10.4	88.5	1.1	(m)S	WT	1.0	0.6	3.2	8.5	46.2	56.5	19.5	5.0	10.0
SORT= 1.16 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.37							WT %	0.7	0.4	2.1	5.6	30.5	37.3	12.9	3.3	7.1
SPLIT WT= 151.5							CUM WT %	0.7	1.1	3.2	8.8	39.3	76.7	89.6	92.9	100.0
100	N/A	C	9.7	83.7	6.6	(gm)S	WT	0.7	0.6	3.9	18.3	48.0	34.5	12.7	4.5	9.1
SORT= 1.39 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.87							WT %	0.2	0.4	2.8	13.0	34.2	24.6	9.1	3.2	6.5
SPLIT WT= 140.5							CUM WT %	0.2	0.6	9.4	22.5	56.7	81.3	90.3	93.5	100.0
105	N/A	C	7.2	92.5	0.3	S	WT	0.0	0.5	5.0	27.7	67.3	31.1	11.8	3.7	7.4
SORT= 1.13 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.76							WT %	0.0	0.3	3.2	17.9	43.6	20.1	7.6	2.4	4.8
SPLIT WT= 164.7							CUM WT %	0.0	0.3	3.6	21.5	65.1	85.2	92.8	95.2	100.0
110	N/A	C	10.1	89.4	0.5	(m)S	WT	0.0	0.7	5.4	31.6	64.0	21.4	10.6	4.3	10.8
SORT= 1.31 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.77							WT %	0.0	0.5	3.6	21.2	43.0	14.4	7.1	2.9	7.3
SPLIT WT= 148.9							CUM WT %	0.0	0.5	4.1	25.3	68.4	82.7	89.9	92.7	100.0

TABLE D.3 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E25-025 ****

08/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
115	N/A	C	3.9	95.7	0.3	S	WT	0.0	0.5	4.3	32.0	83.5	20.4	6.1	1.0	4.2
SORT= 0.89 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.49							WT %	0.0	0.3	2.8	20.9	54.7	13.4	4.0	1.2	2.8
SPLIT WT= 154.4							CUM WT %	0.0	0.3	3.1	24.1	78.7	92.1	96.1	97.3	100.0
120	N/A	C	10.3	89.2	0.5	(m)S	WT	0.1	0.6	2.6	13.0	45.9	51.1	18.2	5.1	10.0
SORT= 1.19 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.31							WT %	0.1	0.4	1.8	8.9	31.3	34.9	12.4	3.5	6.8
SPLIT WT= 147.7							CUM WT %	0.1	0.5	2.3	11.1	42.4	77.3	89.7	93.2	100.0
125	N/A	C	10.2	89.5	0.3	(m)S	WT	0.0	0.4	1.5	11.0	54.2	50.0	16.8	4.5	10.8
SORT= 1.14 MEDIAN= 3.00 MODE= 2.00 MEAN= 2.27							WT %	0.0	0.3	1.0	7.7	36.2	33.4	11.2	3.0	7.2
SPLIT WT= 151.1							CUM WT %	0.0	0.3	1.3	9.0	45.2	78.6	89.8	92.8	100.0
130	N/A	C	10.4	88.7	0.9	(m)S	WT	0.0	1.3	7.5	16.5	44.4	41.4	19.3	5.0	9.3
SORT= 1.35 MEDIAN= 3.00 MODE= 2.00 MEAN= 2.10							WT %	0.0	0.9	5.2	11.3	30.5	28.5	13.3	4.0	6.4
SPLIT WT= 148.1							CUM WT %	0.0	0.9	6.0	17.4	47.9	76.4	89.6	93.6	100.0
135	N/A	C	6.1	92.5	1.4	S	WT	1.0	1.0	3.4	18.3	64.7	36.1	11.4	2.0	6.1
SORT= 0.97 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.88							WT %	0.7	0.7	2.4	12.6	44.7	24.9	7.9	1.9	4.2
SPLIT WT= 145.7							CUM WT %	0.7	1.4	3.7	16.4	61.1	86.0	93.9	95.8	100.0
140	N/A	C	6.1	93.2	0.7	S	WT	0.0	1.0	5.0	26.0	59.2	31.7	10.6	2.0	6.0
SORT= 1.13 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.72							WT %	0.0	0.7	3.5	18.7	41.4	22.2	7.4	2.0	4.2
SPLIT WT= 143.7							CUM WT %	0.0	0.7	4.2	22.9	64.3	86.4	93.9	95.8	100.0
145	N/A	C	6.8	90.4	2.8	S	WT	0.2	4.2	15.5	48.4	49.0	19.5	9.4	2.0	7.9
SORT= 1.31 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.35							WT %	0.1	2.7	9.9	30.9	31.2	12.4	6.0	1.3	5.0
SPLIT WT= 157.6							CUM WT %	0.1	2.8	12.7	43.5	74.8	87.2	93.2	95.0	100.0
150	N/A	H	4.4	80.6	15.0	gS	WT	7.0	15.5	47.2	45.0	16.6	7.7	4.7	1.8	4.0
SORT= 1.33 MEDIAN= 1.00 MODE= 0.00 MEAN= 0.28							WT %	4.7	10.3	31.4	29.9	11.0	5.1	3.1	1.2	3.2
SPLIT WT= 151.7							CUM WT %	4.7	15.0	46.4	76.3	87.4	92.5	95.6	96.8	100.0
155	N/A	H	12.9	82.5	4.6	(m)S	WT	1.0	6.0	23.0	38.6	31.4	19.3	13.5	4.4	15.3
SORT= 1.94 MEDIAN= 2.00 MODE= 1.00 MEAN= 1.55							WT %	0.7	3.9	15.1	25.4	20.6	12.6	8.8	2.9	10.0
SPLIT WT= 154.4							CUM WT %	0.7	4.6	19.6	45.1	65.6	78.3	87.1	90.0	100.0
160	N/A	C	13.1	86.6	0.3	(m)S	WT	0.1	0.4	4.7	26.0	53.5	29.7	14.6	5.2	14.2
SORT= 1.49 MEDIAN= 2.00 MODE= 2.00 MEAN= 2.07							WT %	0.1	0.3	3.2	17.5	36.1	20.0	9.9	3.5	9.6
SPLIT WT= 150.2							CUM WT %	0.1	0.3	3.5	21.0	57.1	77.1	86.9	90.4	100.0
165	N/A	C	8.0	85.8	6.3	(g)S	WT	2.4	7.4	19.1	46.0	40.5	17.7	11.0	3.3	9.2
SORT= 1.55 MEDIAN= 2.00 MODE= 1.00 MEAN= 1.26							WT %	1.5	4.7	12.2	29.4	25.9	11.3	7.0	2.1	5.9
SPLIT WT= 155.1							CUM WT %	1.5	6.3	18.5	47.9	73.7	85.0	92.0	94.1	100.0

TABLE D.3 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E25-025 ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
169	N/A	H	18.6	76.2	5.3	(gm)S	WT	1.7	6.2	15.1	34.3	25.1	16.9	23.2	16.4	17.5
SORT= 2.13 MEDIAN= 2.00 MODE= 1.00 MEAN= 2.01							WT %	1.1	4.1	10.0	22.8	16.7	11.2	15.4	8.9	11.6
SPLIT WT= 151.1							CUM WT %	1.1	5.3	15.3	38.1	54.8	66.0	81.5	90.4	100.0
175	N/A	H	18.6	60.6	20.9	gmS	WT	11.2	19.0	20.4	20.4	17.8	16.8	13.3	5.5	21.4
SORT= 2.94 MEDIAN= 2.00 MODE= 5.00 MEAN= 1.41							WT %	7.7	13.1	14.1	14.1	12.2	11.1	9.2	3.8	14.8
SPLIT WT= 145.2							CUM WT %	7.7	20.9	34.9	49.0	61.2	72.2	81.4	85.2	100.0
180	N/A	H	19.3	57.3	23.4	gmS	WT	13.7	22.8	22.7	19.3	16.0	16.0	13.2	7.0	23.6
SORT= 3.02 MEDIAN= 1.00 MODE= 5.00 MEAN= 1.33							WT %	8.8	14.6	14.6	12.4	11.6	10.3	8.5	4.5	14.8
SPLIT WT= 156.2							CUM WT %	8.8	23.4	38.0	50.4	62.0	72.3	80.7	85.2	100.0
185	N/A	H	15.9	76.0	7.2	(gm)S	WT	8.9	10.3	23.6	35.9	27.1	17.9	13.7	5.6	19.0
SORT= 2.20 MEDIAN= 2.00 MODE= 1.00 MEAN= 1.59							WT %	6.6	6.7	15.2	23.8	17.5	11.6	8.8	3.6	12.3
SPLIT WT= 156.1							CUM WT %	6.6	7.2	22.5	46.3	63.8	75.3	84.1	87.8	100.0
190	N/A	H	9.4	62.8	27.9	(m)gS	WT	18.6	24.7	24.4	32.4	20.3	11.7	6.5	3.5	11.0
SORT= 2.30 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.47							WT %	11.9	15.9	15.7	20.9	13.1	7.6	5.5	2.3	7.1
SPLIT WT= 155.2							CUM WT %	11.9	27.9	43.6	64.5	77.6	85.2	90.7	92.9	100.0
195	N/A	H	17.8	51.4	30.8	msG	WT	13.8	32.2	22.2	16.4	15.7	12.4	10.2	4.7	21.9
SORT= 3.06 MEDIAN= 1.00 MODE= -1.00 MEAN= 1.65							WT %	9.2	21.5	14.9	11.0	10.5	8.3	6.8	3.1	14.7
SPLIT WT= 151.4							CUM WT %	9.2	30.8	45.6	56.6	67.1	75.4	82.2	85.3	100.0
200	N/A	H	22.9	68.3	8.8	(g)mS	WT	1.3	11.9	21.8	22.8	23.9	18.6	15.6	7.6	26.8
SORT= 2.64 MEDIAN= 2.00 MODE= 5.00 MEAN= 2.00							WT %	0.9	7.9	14.5	15.2	15.9	12.4	10.4	5.1	17.8
SPLIT WT= 151.4							CUM WT %	0.9	8.8	23.3	38.5	54.4	66.7	77.1	82.2	100.0
205	N/A	H	15.8	46.9	37.4	msG	WT	25.7	30.0	21.8	15.1	10.8	12.0	10.2	4.7	18.8
SORT= N/A MEDIAN= 0.50 MODE= -1.00 MEAN= N/A							WT %	17.2	20.1	14.8	10.1	7.2	8.1	6.8	3.2	12.6
SPLIT WT= 150.1							CUM WT %	17.2	37.4	52.0	62.1	69.4	77.4	84.2	87.4	100.0
210	N/A	H	15.9	52.9	31.2	msG	WT	20.1	27.3	21.6	17.6	17.0	13.5	11.1	5.5	18.6
SORT= 2.91 MEDIAN= 1.00 MODE= -1.00 MEAN= 0.84							WT %	13.3	18.0	14.2	11.2	11.2	8.9	7.3	3.6	12.3
SPLIT WT= 152.4							CUM WT %	13.3	31.3	45.5	56.7	67.9	76.8	84.1	87.8	100.0
215	N/A	H	15.0	72.0	13.1	(m)gS	WT	5.1	14.7	27.7	32.1	23.9	14.7	10.0	4.2	18.5
SORT= 2.35 MEDIAN= 1.00 MODE= 1.00 MEAN= 1.30							WT %	3.4	9.7	18.3	21.2	15.8	9.7	7.1	2.8	12.2
SPLIT WT= 153.5							CUM WT %	3.4	13.1	31.3	52.5	68.2	77.9	85.0	87.8	100.0
220	N/A	H	13.8	54.1	32.1	msG	WT	18.1	29.3	22.8	18.0	15.6	13.0	10.5	4.3	16.1
SORT= 2.75 MEDIAN= 1.00 MODE= -1.00 MEAN= 0.69							WT %	12.3	19.8	15.4	12.2	10.6	8.9	7.1	2.9	10.9
SPLIT WT= 148.2							CUM WT %	12.3	32.1	47.5	59.7	70.3	79.1	86.2	89.1	100.0

TABLE D.3 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E25-025 ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
225	N/A	H	32.4	64.8	2.8	mS	WT	0.7	3.6	11.4	19.2	22.4	25.1	21.6	9.5	40.4
SORT= 2.19 MEDIAN= 3.00 MODE= 5.00 MEAN= 2.78							WT %	0.5	2.3	7.4	12.5	14.6	16.3	14.0	6.2	26.3
SPLIT WT= 155.7							CUM WT %	0.5	2.8	10.2	22.7	37.2	53.5	67.6	73.8	100.0
230	N/A	H	16.2	63.8	20.0	gmS	WT	8.6	22.1	22.3	24.5	21.5	16.5	13.4	5.0	19.1
SORT= 2.66 MEDIAN= 1.00 MODE= 1.00 MEAN= 1.25							WT %	5.6	14.4	14.5	15.9	14.0	10.7	8.7	3.8	12.4
SPLIT WT= 154.5							CUM WT %	5.6	20.0	34.5	50.4	64.4	75.1	83.8	87.6	100.0
235	N/A	H	17.9	56.6	26.5	gmS	WT	15.1	24.8	21.9	18.3	15.4	15.4	12.7	4.8	22.2
SORT= 3.04 MEDIAN= 1.00 MODE= -1.00 MEAN= 1.18							WT %	10.0	16.5	14.5	12.2	10.2	10.2	8.4	3.2	14.7
SPLIT WT= 152.1							CUM WT %	10.0	26.5	41.0	53.2	63.4	73.7	82.1	85.3	100.0
240	N/A	H	15.1	54.9	30.1	msG	WT	15.5	30.0	23.3	14.9	18.9	14.1	11.9	5.2	17.6
SORT= 2.79 MEDIAN= 1.00 MODE= -1.00 MEAN= 0.88							WT %	10.2	19.8	15.4	9.8	12.5	9.3	7.9	3.4	11.6
SPLIT WT= 152.3							CUM WT %	10.2	30.1	45.5	55.3	67.8	77.1	84.9	88.4	100.0
245	N/A	H	16.1	58.8	25.1	gmS	WT	16.5	29.0	27.2	19.0	19.0	15.0	12.2	6.1	19.2
SORT= 2.75 MEDIAN= 1.00 MODE= -1.00 MEAN= 1.05							WT %	8.7	18.5	17.3	12.1	12.1	9.5	7.8	3.9	12.2
SPLIT WT= 158.2							CUM WT %	8.7	25.1	42.4	54.5	66.5	76.2	83.9	87.8	100.0
250	N/A	H	16.4	50.6	33.0	msG	WT	20.6	20.4	21.2	15.8	15.6	12.5	10.7	5.5	18.9
SORT= 2.99 MEDIAN= 1.00 MODE= -1.00 MEAN= 0.82							WT %	13.9	19.1	14.3	10.6	10.1	8.4	7.2	3.7	12.7
SPLIT WT= 149.1							CUM WT %	13.9	33.0	47.2	57.9	68.0	76.4	83.6	87.3	100.0
255	N/A	H	17.6	52.5	29.9	gmS	WT	15.7	30.5	22.5	16.3	15.3	14.5	12.5	6.0	21.2
SORT= 3.00 MEDIAN= 1.00 MODE= -1.00 MEAN= 1.05							WT %	10.2	19.7	14.6	10.6	9.9	9.4	8.1	3.9	13.7
SPLIT WT= 155.4							CUM WT %	10.2	29.9	44.5	55.0	64.9	74.3	82.4	86.3	100.0
260	N/A	H	16.9	51.8	31.3	msG	WT	9.7	37.5	24.9	16.2	11.9	13.7	11.5	6.3	19.2
SORT= 2.98 MEDIAN= 1.00 MODE= -1.00 MEAN= 0.92							WT %	6.4	24.9	16.5	10.7	7.9	9.1	7.6	4.2	12.7
SPLIT WT= 152.2							CUM WT %	6.4	31.3	47.8	58.5	66.4	75.5	83.1	87.3	100.0
265	N/A	H	24.4	72.9	2.7	mS	WT	0.3	3.7	21.8	27.3	21.9	20.4	17.5	8.9	27.6
SORT= 2.43 MEDIAN= 2.00 MODE= 5.00 MEAN= 2.23							WT %	0.2	2.5	14.6	18.3	14.7	13.7	11.7	6.0	18.5
SPLIT WT= 151.1							CUM WT %	0.2	2.7	17.3	35.5	50.2	63.9	75.6	81.5	100.0
270	N/A	H	15.6	59.0	25.4	gmS	WT	7.0	31.0	29.2	18.1	14.6	14.1	12.5	5.2	18.2
SORT= 2.70 MEDIAN= 1.00 MODE= -1.00 MEAN= 0.98							WT %	4.7	20.7	19.5	12.1	9.7	9.4	8.3	3.5	12.1
SPLIT WT= 150.9							CUM WT %	4.7	25.4	44.8	56.9	66.6	76.1	84.4	87.9	100.0
275	N/A	H	16.9	81.0	2.1	(m)S	WT	0.4	2.7	15.0	29.8	37.5	22.5	15.7	6.6	18.8
SORT= 1.98 MEDIAN= 2.00 MODE= 2.00 MEAN= 2.02							WT %	0.3	1.8	10.1	20.0	25.2	15.1	10.6	4.4	12.5
SPLIT WT= 149.2							CUM WT %	0.3	2.1	12.2	32.2	57.4	72.5	83.1	87.5	100.0

TABLE D.3 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E25-026 ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
280	N/A	H	11.5	86.9	1.6	(m)S	WT	0.3	2.1	11.5	39.6	49.0	19.4	11.5	4.3	13.0
SORT= 1.67 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.71							WT %	0.2	1.4	7.6	26.3	32.5	12.9	7.6	2.9	8.6
SPLIT WT= 151.0							CUM WT %	0.2	1.6	9.2	35.5	68.0	80.9	88.5	91.4	100.0
285	N/A	H	13.7	86.0	0.3	(m)S	WT	0.0	0.5	6.2	34.5	51.1	26.6	14.1	5.1	16.0
SORT= 1.61 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.99							WT %	0.0	0.3	4.0	22.4	33.2	17.3	9.2	3.3	10.4
SPLIT WT= 154.0							CUM WT %	0.0	0.3	4.3	26.7	59.9	77.2	86.3	89.6	100.0
288	N/A	H	10.6	85.2	4.3	(m)S	WT	0.3	6.1	23.6	48.1	32.7	14.2	9.5	3.7	12.2
SORT= 1.69 MEDIAN= 1.00 MODE= 1.00 MEAN= 1.28							WT %	0.2	4.1	15.7	32.0	21.7	9.4	6.3	2.5	8.1
SPLIT WT= 150.5							CUM WT %	0.2	4.3	20.0	51.9	73.7	83.1	89.4	91.9	100.0

TABLE D.4

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E32-004 ****

06/23/89

DEPTH	%CACO3	DW	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
5	N/A	N/	16.0	58.5	25.5	gmS	WT	N/A	159.0	27.9	68.1	34.5	60.8	174.4	N/A	99.9
SORT= N/A	MEDIAN=		3.00	MODE=	4.00	MEAN= N/A	WT %	N/A	25.5	4.5	10.9	5.5	9.7	27.9	N/A	16.0
SPLIT WT= 627.0							CUM WT %	N/A	25.5	29.9	40.8	46.4	56.1	84.0	N/A	100.0
10	N/A	H	9.5	34.2	56.2	msG	WT	N/A	439.1	59.3	45.6	46.8	45.0	70.7	N/A	74.3
SORT= N/A	MEDIAN=		-1.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	56.2	7.6	5.8	6.0	5.8	9.1	N/A	9.5
SPLIT WT= 777.0							CUM WT %	N/A	56.2	63.8	69.7	75.7	81.4	90.5	N/A	100.0
15	N/A	H	16.4	48.3	35.3	msG	WT	N/A	284.2	99.6	89.3	62.3	76.0	61.4	N/A	132.1
SORT= N/A	MEDIAN=		1.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	35.3	12.4	11.1	7.7	9.4	7.6	N/A	16.4
SPLIT WT= 803.5							CUM WT %	N/A	35.3	47.7	58.8	66.5	76.0	83.6	N/A	100.0
20	N/A	H	11.9	46.8	41.3	msG	WT	N/A	345.5	89.1	83.8	99.6	58.8	60.0	N/A	99.1
SORT= N/A	MEDIAN=		0.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	41.3	10.7	10.0	11.9	7.0	7.2	N/A	11.9
SPLIT WT= 841.2							CUM WT %	N/A	41.3	52.0	62.0	73.9	81.0	88.2	N/A	100.0
25	N/A	H	12.1	46.6	41.3	msG	WT	N/A	357.9	100.3	75.7	95.8	67.2	65.1	N/A	165.1
SORT= N/A	MEDIAN=		0.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	41.3	11.6	8.7	11.1	7.8	7.5	N/A	12.1
SPLIT WT= 864.0							CUM WT %	N/A	41.3	52.9	61.6	72.6	80.4	87.9	N/A	100.0
30	N/A	H	7.5	41.6	50.8	msG	WT	N/A	486.0	90.2	96.5	107.8	71.9	37.3	N/A	72.1
SORT= N/A	MEDIAN=		-1.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	50.9	9.4	9.5	11.3	7.5	3.9	N/A	7.5
SPLIT WT= 952.0							CUM WT %	N/A	50.9	60.3	69.8	81.0	88.6	92.5	N/A	100.0
35	N/A	H	6.5	45.2	48.3	msG	WT	N/A	434.9	97.5	127.9	87.6	55.7	38.6	N/A	59.5
SORT= N/A	MEDIAN=		0.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	45.3	10.0	14.2	9.7	6.2	4.3	N/A	6.5
SPLIT WT= 895.3							CUM WT %	N/A	45.3	59.1	73.3	83.0	89.2	93.5	N/A	100.0
40	N/A	H	7.0	49.0	43.2	msG	WT	N/A	363.7	141.3	93.8	83.6	55.6	38.6	N/A	65.6
SORT= N/A	MEDIAN=		0.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	43.2	16.8	11.2	9.9	6.6	4.6	N/A	7.8
SPLIT WT= 838.6							CUM WT %	N/A	43.2	60.0	71.2	81.0	87.6	92.2	N/A	100.0
45	N/A	H	5.4	43.7	50.9	msG	WT	N/A	427.6	149.4	83.3	66.8	41.0	25.9	N/A	45.2
SORT= N/A	MEDIAN=		-1.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	50.9	17.8	9.9	8.0	4.9	3.2	N/A	5.4
SPLIT WT= 844.0							CUM WT %	N/A	50.9	68.7	78.6	86.5	91.4	94.6	N/A	100.0
50	N/A	H	6.5	64.3	29.2	gS	WT	N/A	241.5	215.1	135.3	99.1	51.3	30.2	N/A	53.9
SORT= N/A	MEDIAN=		0.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	29.2	26.0	16.4	12.0	6.2	3.7	N/A	6.5
SPLIT WT= 820.0							CUM WT %	N/A	29.2	55.3	71.6	83.6	89.8	93.5	N/A	100.0
55	N/A	H	5.9	72.9	21.2	gS	WT	N/A	181.1	247.3	203.6	90.2	49.3	33.1	N/A	50.9
SORT= N/A	MEDIAN=		0.00	MODE=	0.00	MEAN= N/A	WT %	N/A	21.2	29.9	23.8	10.5	5.8	3.9	N/A	6.0
SPLIT WT= 859.2							CUM WT %	N/A	21.2	50.1	73.9	84.4	90.2	94.1	N/A	100.0

TABLE D.4 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E32-004 ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
60	N/A	H	5.2	78.1	16.7	gS	WT	N/A	140.9	242.1	220.6	100.3	85.7	30.9	N/A	44.3
SORT= N/A	MEDIAN=		1.00	MODE=	0.00	MEAN= N/A	WT %	N/A	16.7	28.7	26.1	11.9	7.8	3.7	N/A	5.2
SPLIT WT= 846.1							CUM WT %	N/A	16.7	45.3	71.5	83.3	91.1	94.8	N/A	100.0
65	N/A	C	0.7	69.0	30.4	sG	WT	N/A	187.4	283.3	109.0	18.5	8.7	6.2	N/A	4.1
SORT= N/A	MEDIAN=		0.00	MODE=	0.00	MEAN= N/A	WT %	N/A	30.4	45.9	17.7	3.0	1.4	1.0	N/A	0.7
SPLIT WT= 620.1							CUM WT %	N/A	30.4	76.3	93.9	96.9	98.3	99.3	N/A	100.0
70	N/A	C	1.9	79.7	18.4	gS	WT	N/A	117.8	241.1	195.5	41.6	20.8	10.7	N/A	11.9
SORT= N/A	MEDIAN=		0.00	MODE=	0.00	MEAN= N/A	WT %	N/A	18.4	37.7	30.7	6.4	3.3	1.7	N/A	1.9
SPLIT WT= 644.6							CUM WT %	N/A	18.4	56.1	86.8	93.2	96.5	98.1	N/A	100.0
75	N/A	C	1.4	93.1	5.4	(g)S	WT	N/A	32.2	287.1	278.2	48.6	16.9	7.8	N/A	8.5
SORT= N/A	MEDIAN=		1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	5.5	35.0	45.7	8.2	2.9	1.3	N/A	1.4
SPLIT WT= 588.3							CUM WT %	N/A	5.5	40.5	86.2	94.4	97.3	98.6	N/A	100.0
80	N/A	C	3.6	95.5	0.9	S	WT	N/A	2.4	11.0	31.4	81.8	111.7	18.3	N/A	9.5
SORT= N/A	MEDIAN=		3.00	MODE=	3.00	MEAN= N/A	WT %	N/A	0.9	4.1	11.8	30.7	42.0	6.9	N/A	3.6
SPLIT WT= 263.5							CUM WT %	N/A	0.9	5.0	16.8	47.6	89.6	96.4	N/A	100.0
85	N/A	C	1.0	96.0	3.0	S	WT	N/A	16.3	171.1	393.0	38.9	10.4	4.1	N/A	5.5
SORT= N/A	MEDIAN=		1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	3.0	31.2	55.2	7.1	1.9	0.8	N/A	1.0
SPLIT WT= 548.6							CUM WT %	N/A	3.0	34.1	89.3	96.4	98.3	99.0	N/A	100.0
90	N/A	C	2.3	90.3	7.5	(g)S	WT	N/A	23.1	163.1	136.7	25.3	8.8	5.4	N/A	7.0
SORT= N/A	MEDIAN=		1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	7.5	33.3	44.2	8.2	2.8	1.8	N/A	2.3
SPLIT WT= 306.5							CUM WT %	N/A	7.5	40.8	85.0	93.2	96.0	97.7	N/A	100.0
95	N/A	C	2.5	93.7	3.8	S	WT	N/A	21.0	138.7	278.0	84.0	26.5	13.2	N/A	14.1
SORT= N/A	MEDIAN=		1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	3.8	24.4	47.5	14.9	4.7	2.3	N/A	2.5
SPLIT WT= 565.5							CUM WT %	N/A	3.8	28.2	75.7	90.6	95.2	97.5	N/A	100.0
100	N/A	C	1.9	90.6	7.5	(g)S	WT	N/A	42.7	170.1	245.6	57.6	28.6	17.2	N/A	11.0
SORT= N/A	MEDIAN=		1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	7.5	29.7	42.9	10.1	5.0	3.0	N/A	1.9
SPLIT WT= 579.4							CUM WT %	N/A	7.5	37.2	80.0	90.1	95.1	98.1	N/A	100.0
105	N/A	C	1.0	91.6	7.4	(g)S	WT	N/A	43.4	194.7	217.3	84.1	29.1	11.0	N/A	5.6
SORT= N/A	MEDIAN=		1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	7.4	33.3	37.1	14.4	5.0	1.9	N/A	1.0
SPLIT WT= 589.7							CUM WT %	N/A	7.4	40.7	77.8	92.2	97.2	99.0	N/A	100.0
110	N/A	C	1.8	97.3	0.8	S	WT	N/A	5.0	107.6	313.8	126.6	23.0	9.1	N/A	10.9
SORT= N/A	MEDIAN=		1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	0.9	18.2	53.2	20.4	3.9	1.5	N/A	1.9
SPLIT WT= 587.0							CUM WT %	N/A	0.9	19.1	72.3	92.7	96.6	98.2	N/A	100.0

TABLE D.4 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E32-004 ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
115	N/A	C	0.6	96.3	3.1	S	WT	N/A	16.9	166.5	251.2	81.8	20.1	7.9	N/A	3.2
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	3.1	29.6	46.4	15.1	3.7	1.5	N/A	0.6
SPLIT WT= 549.1							CUM WT %	N/A	3.1	32.8	79.1	94.2	97.9	99.4	N/A	100.0
120	N/A	C	2.1	96.5	1.4	S	WT	N/A	7.3	73.4	251.6	142.0	28.8	16.0	N/A	10.9
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	1.4	14.0	48.0	27.1	5.5	1.9	N/A	2.1
SPLIT WT= 520.5							CUM WT %	N/A	1.4	15.4	63.4	90.5	96.0	97.9	N/A	100.0
125	N/A	C	3.4	95.8	0.8	S	WT	N/A	4.0	1.4	1.4	135.7	279.2	42.6	N/A	16.1
SORT=	N/A	MEDIAN=	3.00	MODE=	3.00	MEAN= N/A	WT %	N/A	0.8	0.3	0.3	28.3	58.2	8.8	N/A	3.4
SPLIT WT= 473.6							CUM WT %	N/A	0.8	1.1	1.4	29.7	87.9	96.6	N/A	100.0
130	N/A	C	3.3	85.8	10.9	gS	WT	N/A	22.6	63.7	77.6	24.1	7.8	4.6	N/A	6.8
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	10.9	30.7	37.5	11.6	3.8	2.2	N/A	3.3
SPLIT WT= 206.2							CUM WT %	N/A	10.9	41.7	79.1	90.7	94.5	96.7	N/A	100.0
135	N/A	C	3.7	90.4	6.0	(g)S	WT	N/A	11.4	36.2	65.3	40.7	24.2	7.8	N/A	7.0
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	6.0	18.5	34.2	21.3	12.7	3.7	N/A	3.7
SPLIT WT= 189.6							CUM WT %	N/A	6.0	24.4	58.6	80.0	92.7	96.3	N/A	100.0
140	N/A	C	1.0	90.4	7.0	(g)S	WT	N/A	47.7	156.1	225.0	125.6	32.6	11.9	N/A	10.9
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	7.0	25.6	37.0	20.6	5.3	2.0	N/A	1.8
SPLIT WT= 606.2							CUM WT %	N/A	7.0	33.4	70.4	91.0	96.3	98.2	N/A	100.0
145	N/A	C	2.9	90.8	6.3	(g)S	WT	N/A	38.3	99.7	229.6	163.6	42.1	16.8	N/A	17.5
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	6.3	16.4	37.7	27.0	6.9	2.6	N/A	2.9
SPLIT WT= 607.1							CUM WT %	N/A	6.3	22.7	60.5	87.4	94.4	97.1	N/A	100.0
150	N/A	C	1.8	93.0	5.1	(g)S	WT	N/A	31.2	89.0	248.0	168.2	46.9	13.9	N/A	11.1
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	5.1	14.6	40.8	27.7	7.7	2.3	N/A	1.8
SPLIT WT= 602.7							CUM WT %	N/A	5.1	19.8	60.5	88.2	95.9	98.2	N/A	100.0
155	N/A	C	2.1	91.9	5.9	(g)S	WT	N/A	37.2	76.5	262.9	170.3	45.3	20.3	N/A	13.4
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	5.9	12.2	42.0	27.2	7.2	3.2	N/A	2.1
SPLIT WT= 632.1							CUM WT %	N/A	5.9	18.2	60.2	87.4	94.6	97.9	N/A	100.0
160	N/A	C	7.5	91.0	1.4	S	WT	N/A	3.9	5.6	16.7	82.1	105.8	37.5	N/A	20.5
SORT=	N/A	MEDIAN=	3.00	MODE=	3.00	MEAN= N/A	WT %	N/A	1.4	2.1	6.1	30.2	38.9	13.6	N/A	7.5
SPLIT WT= 271.6							CUM WT %	N/A	1.4	3.5	9.6	39.8	78.7	92.5	N/A	100.0
165	N/A	C	8.2	91.3	0.5	S	WT	N/A	1.8	10.8	38.4	106.6	107.9	37.1	N/A	26.9
SORT=	N/A	MEDIAN=	3.00	MODE=	3.00	MEAN= N/A	WT %	N/A	0.6	3.3	11.7	32.4	32.8	11.3	N/A	8.2
SPLIT WT= 334.4							CUM WT %	N/A	0.6	3.9	15.5	47.8	80.6	91.8	N/A	100.0

TABLE D.4 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E32-004 ****

06/23/89

DEPTH	%CAC03	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
170	N/A	C	3.1	96.3	0.6	S	WT	N/A	1.8	10.9	48.5	126.9	99.8	17.6	N/A	9.9
SORT=	N/A	MEDIAN=	2.00	MODE=	2.00	MEAN= N/A	WT %	N/A	0.6	3.5	15.4	40.3	31.5	5.6	N/A	3.2
SPLIT WT= 313.7							CUM WT %	N/A	0.6	4.0	19.5	59.8	91.3	96.9	N/A	100.0
175	N/A	C	3.9	84.0	12.0	gS	WT	N/A	75.9	95.0	155.6	153.0	93.7	32.5	N/A	24.9
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	12.0	15.1	24.7	24.3	14.9	5.2	N/A	4.0
SPLIT WT= 626.7							CUM WT %	N/A	12.0	27.1	51.8	76.0	90.9	96.1	N/A	100.0
180	N/A	C	2.7	85.5	11.8	gS	WT	N/A	76.9	131.1	201.1	125.7	76.4	24.5	N/A	17.5
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	11.8	20.1	30.8	19.2	11.7	3.8	N/A	2.7
SPLIT WT= 650.3							CUM WT %	N/A	11.8	31.8	62.6	81.9	93.6	97.3	N/A	100.0
185	N/A	C	15.9	79.4	4.8	(m)S	WT	N/A	27.0	128.0	193.6	57.4	36.5	46.7	N/A	92.8
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	4.6	22.0	33.3	9.9	6.3	8.0	N/A	16.0
SPLIT WT= 580.5							CUM WT %	N/A	4.6	26.6	59.9	69.8	76.0	84.0	N/A	100.0
190	N/A	C	3.6	82.9	13.5	gS	WT	N/A	69.1	153.1	198.4	93.6	67.7	34.6	N/A	23.7
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	13.5	23.2	30.1	14.2	10.3	5.2	N/A	3.6
SPLIT WT= 658.2							CUM WT %	N/A	13.5	36.7	66.7	80.9	91.2	96.4	N/A	100.0
195	N/A	C	3.5	84.0	12.5	gS	WT	N/A	88.6	215.0	245.6	75.1	37.8	22.3	N/A	25.2
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	12.5	30.4	34.6	10.6	5.3	3.1	N/A	3.6
SPLIT WT= 708.9							CUM WT %	N/A	12.5	42.9	77.4	88.0	93.3	96.5	N/A	100.0
200	N/A	C	3.3	50.1	46.7	sG	WT	N/A	345.3	156.4	127.7	44.1	26.7	15.6	N/A	24.3
SORT=	N/A	MEDIAN=	0.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	46.7	21.1	17.3	6.0	3.6	2.1	N/A	3.3
SPLIT WT= 737.4							CUM WT %	N/A	46.7	67.8	85.0	91.0	94.6	96.7	N/A	100.0
210	N/A	C	4.1	70.6	25.3	gS	WT	N/A	165.1	116.0	170.0	88.2	46.9	31.1	N/A	26.7
SORT=	N/A	MEDIAN=	1.00	MODE=	1.00	MEAN= N/A	WT %	N/A	25.3	17.8	27.4	13.5	7.2	4.8	N/A	4.1
SPLIT WT= 661.4							CUM WT %	N/A	25.3	43.1	70.5	84.0	91.1	95.9	N/A	100.0
215	N/A	C	5.6	63.1	31.3	sG	WT	N/A	114.2	94.6	73.0	32.6	17.8	11.9	N/A	20.4
SORT=	N/A	MEDIAN=	0.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	31.3	26.0	20.0	8.9	4.9	3.3	N/A	5.6
SPLIT WT= 362.2							CUM WT %	N/A	31.3	57.3	77.3	86.3	91.1	94.4	N/A	100.0
220.	N/A	C	3.8	52.4	43.8	sG	WT	N/A	165.5	79.7	70.6	26.3	13.4	8.1	N/A	14.3
SORT=	N/A	MEDIAN=	0.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	43.8	21.1	18.7	7.0	3.6	2.1	N/A	3.8
SPLIT WT= 378.3							CUM WT %	N/A	43.8	64.9	83.6	90.5	94.1	96.2	N/A	100.0
225	N/A	C	21.0	78.0	0.3	mS	WT	N/A	1.4	1.2	0.4	1.5	99.4	298.5	N/A	112.0
SORT=	N/A	MEDIAN=	4.00	MODE=	4.00	MEAN= N/A	WT %	N/A	0.3	0.2	0.1	0.4	19.3	58.0	N/A	21.8
SPLIT WT= 514.7							CUM WT %	N/A	0.3	0.5	0.6	0.9	20.2	78.2	N/A	100.0

TABLE D.4. (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E32-004 ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
230	N/A	C	14.5	79.4	6.1	(gm)S	WT	N/A	20.8	14.4	14.4	5.7	127.0	107.2	N/A	48.9
SORT= N/A MEDIAN= 3.00 MODE= 3.00 MEAN= N/A							WT %	N/A	6.2	4.3	4.3	1.7	37.5	31.7	N/A	14.5
SPLIT WT= 337.0							CUM WT %	N/A	6.2	10.4	14.7	16.4	53.9	85.6	N/A	100.0
235	N/A	H	9.4	50.2	40.4	msG	WT	N/A	371.0	113.9	97.9	89.1	81.0	79.8	N/A	86.3
SORT= N/A MEDIAN= 0.00 MODE= -1.00 MEAN= N/A							WT %	N/A	40.4	12.4	10.6	9.7	8.8	8.7	N/A	9.4
SPLIT WT= 926.6							CUM WT %	N/A	40.4	52.8	63.4	73.1	81.9	90.6	N/A	100.0
240	N/A	H	2.4	43.2	54.4	sG	WT	N/A	468.3	90.5	152.1	79.5	32.3	18.1	N/A	20.8
SORT= N/A MEDIAN= -1.00 MODE= -1.00 MEAN= N/A							WT %	N/A	54.4	10.5	17.7	9.2	3.8	2.1	N/A	2.4
SPLIT WT= 862.6							CUM WT %	N/A	54.4	64.9	82.6	91.7	95.5	97.6	N/A	100.0
245	N/A	H	10.2	49.5	40.2	msG	WT	N/A	345.1	100.7	133.8	76.4	62.7	51.3	N/A	87.8
SORT= N/A MEDIAN= 0.00 MODE= -1.00 MEAN= N/A							WT %	N/A	40.2	11.7	15.6	8.9	7.3	6.0	N/A	10.2
SPLIT WT= 855.7							CUM WT %	N/A	40.2	52.0	67.6	76.5	83.8	89.8	N/A	100.0
250	N/A	H	9.6	47.5	43.0	msG	WT	N/A	385.5	93.8	89.6	86.1	86.6	69.7	N/A	86.6
SORT= N/A MEDIAN= 0.00 MODE= -1.00 MEAN= N/A							WT %	N/A	43.6	10.5	10.0	9.6	9.7	7.8	N/A	9.6
SPLIT WT= 903.2							CUM WT %	N/A	43.0	53.4	63.4	73.0	82.7	90.4	N/A	100.0
255	N/A	H	10.3	53.4	36.2	msG	WT	N/A	306.6	107.4	116.7	89.4	77.3	61.0	N/A	87.5
SORT= N/A MEDIAN= 1.00 MODE= -1.00 MEAN= N/A							WT %	N/A	36.3	12.7	13.8	10.6	9.1	7.2	N/A	10.3
SPLIT WT= 851.3							CUM WT %	N/A	36.3	49.0	62.8	73.3	82.5	89.7	N/A	100.0
260	N/A	H	8.2	36.0	55.8	msG	WT	N/A	437.5	79.8	55.6	58.2	46.2	42.4	N/A	64.6
SORT= N/A MEDIAN= -1.50 MODE= -1.00 MEAN= N/A							WT %	N/A	55.8	10.2	7.1	7.4	5.9	5.4	N/A	8.2
SPLIT WT= 780.4							CUM WT %	N/A	55.8	66.0	73.0	80.5	86.4	91.8	N/A	100.0
265	N/A	H	6.4	74.1	19.5	gS	WT	N/A	135.8	106.1	112.8	123.3	115.8	58.9	N/A	44.6
SORT= N/A MEDIAN= 1.00 MODE= -1.50 MEAN= N/A							WT %	N/A	19.5	15.2	16.2	17.7	16.6	8.5	N/A	6.4
SPLIT WT= 692.4							CUM WT %	N/A	19.5	34.7	50.9	68.6	85.2	93.6	N/A	100.0
270	N/A	H	11.4	49.0	39.6	msG	WT	N/A	342.1	100.6	61.7	92.3	83.9	65.5	N/A	98.7
SORT= N/A MEDIAN= 0.00 MODE= -1.00 MEAN= N/A							WT %	N/A	39.6	11.6	9.5	10.7	9.7	7.6	N/A	11.4
SPLIT WT= 859.4							CUM WT %	N/A	39.6	51.2	60.6	71.3	81.0	88.6	N/A	100.0
275	N/A	H	12.7	45.4	42.0	msG	WT	N/A	285.7	65.3	58.9	75.6	54.9	54.2	N/A	86.2
SORT= N/A MEDIAN= 0.00 MODE= -1.00 MEAN= N/A							WT %	N/A	42.0	9.6	8.7	11.1	8.1	8.0	N/A	12.7
SPLIT WT= 682.2							CUM WT %	N/A	42.0	51.6	60.2	71.3	79.4	87.3	N/A	100.0
280	N/A	H	9.8	46.6	43.6	msG	WT	N/A	312.9	89.8	65.6	76.4	59.4	43.1	N/A	70.4
SORT= N/A MEDIAN= 0.00 MODE= -1.00 MEAN= N/A							WT %	N/A	43.6	12.5	9.2	10.6	8.3	6.0	N/A	9.8
SPLIT WT= 713.8							CUM WT %	N/A	43.6	56.1	65.3	75.9	84.2	90.2	N/A	100.0

TABLE D.4 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0299-E32-004 ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
285	N/A	H	7.6	79.7	12.7	gS	WT	N/A	85.6	84.1	104.4	124.5	143.3	82.3	N/A	51.6
SORT=	N/A	MEDIAN=	2.00	MODE=	3.00	MEAN= N/A	WT %	N/A	12.7	12.4	15.5	18.4	21.2	12.2	N/A	7.6
SPLIT WT= 672.3							CUM WT %	N/A	12.7	25.1	40.6	59.0	80.2	92.4	N/A	100.0
290	N/A	H	5.8	45.9	48.3	msG	WT	N/A	393.9	158.4	57.4	68.1	62.9	32.3	N/A	47.5
SORT=	N/A	MEDIAN=	0.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	48.3	19.4	7.0	7.7	7.7	4.0	N/A	5.8
SPLIT WT= 813.6							CUM WT %	N/A	48.3	67.7	74.8	82.5	90.2	94.2	N/A	100.0
295	N/A	H	8.2	53.7	38.0	msG	WT	N/A	361.7	107.5	77.6	116.5	120.8	68.1	N/A	78.4
SORT=	N/A	MEDIAN=	1.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	38.1	11.3	8.2	12.3	12.7	9.3	N/A	8.3
SPLIT WT= 950.6							CUM WT %	N/A	38.1	49.4	57.6	69.9	82.5	91.8	N/A	100.0
298	N/A	H	5.7	93.6	0.7	S	WT	N/A	3.8	7.7	46.8	189.0	264.8	47.3	N/A	36.0
SORT=	N/A	MEDIAN=	3.00	MODE=	3.00	MEAN= N/A	WT %	N/A	0.7	1.5	8.8	35.7	38.7	8.9	N/A	5.7
SPLIT WT= 525.7							CUM WT %	N/A	0.7	2.2	11.0	46.7	85.4	94.3	N/A	100.0
300	N/A	H	3.4	56.6	35.0	msG	WT	N/A	269.0	95.3	95.9	90.5	93.7	60.2	N/A	64.8
SORT=	N/A	MEDIAN=	1.00	MODE=	-1.00	MEAN= N/A	WT %	N/A	35.0	12.4	12.5	11.8	12.2	7.8	N/A	8.4
SPLIT WT= 774.8							CUM WT %	N/A	35.0	47.4	59.8	71.6	83.8	91.6	N/A	100.0
305	N/A	H	3.4	78.8	20.7	(m)gS	WT	N/A	148.5	57.7	68.7	173.7	139.3	75.8	N/A	60.5
SORT=	N/A	MEDIAN=	2.00	MODE=	2.00	MEAN= N/A	WT %	N/A	20.7	8.1	9.5	24.1	19.5	10.6	N/A	8.5
SPLIT WT= 717.8							CUM WT %	N/A	20.7	28.8	37.3	61.5	81.0	91.6	N/A	100.0
310	N/A	H	5.0	73.6	21.3	gS	WT	N/A	165.1	61.6	47.1	273.4	140.8	47.1	N/A	39.0
SORT=	N/A	MEDIAN=	2.00	MODE=	2.00	MEAN= N/A	WT %	N/A	21.3	8.0	6.1	35.3	18.2	6.1	N/A	5.0
SPLIT WT= 775.0							CUM WT %	N/A	21.3	29.3	35.4	70.7	88.9	95.0	N/A	100.0

TABLE D.5

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-042-042 A ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
5	0.1	C	38.7	61.2	0.1	mS	WT	0.0	0.2	2.2	5.6	5.3	20.1	70.4	48.1	17.3
SORT= 0.95 MEDIAN= 4.00 MODE= 4.00 MEAN= 3.67							WT %	0.0	0.1	1.3	3.3	3.1	11.9	41.6	28.4	10.2
SPLIT WT= 169.7							CUM WT %	0.0	0.1	1.4	4.7	7.9	19.7	61.4	89.8	100.0
10	0.9	C	0.1	86.5	5.4	(g)S	WT	3.3	5.2	25.3	61.3	26.2	14.3	0.8	5.0	7.0
SORT= 1.55 MEDIAN= 1.00 MODE= 1.00 MEAN= 1.04							WT %	2.1	3.3	16.2	39.3	16.2	9.2	5.6	3.8	4.5
SPLIT WT= 156.7							CUM WT %	2.1	5.5	21.7	61.0	77.1	86.3	91.9	95.5	100.0
15	1.3	C	9.1	83.9	7.0	(g)S	WT	3.9	7.0	19.9	42.3	37.5	21.4	10.3	6.1	8.2
SORT= 1.63 MEDIAN= 2.00 MODE= 1.00 MEAN= 1.28							WT %	2.5	4.5	12.7	27.0	24.0	13.7	6.6	3.9	5.2
SPLIT WT= 156.8							CUM WT %	2.5	7.0	19.7	46.7	70.6	84.3	90.9	94.8	100.0
20	0.9	C	13.2	85.6	1.2	(m)S	WT	0.8	1.0	5.9	58.8	40.1	22.7	12.7	8.4	12.0
SORT= 1.06 MEDIAN= 2.00 MODE= 1.00 MEAN= 1.82							WT %	0.5	0.7	3.8	32.9	26.0	14.7	8.2	5.4	7.8
SPLIT WT= 155.8							CUM WT %	0.5	1.2	5.0	37.9	63.9	78.6	86.8	92.2	100.0
25	0.8	C	7.6	91.8	1.4	S	WT	0.2	2.0	8.5	55.5	24.1	41.8	9.4	5.2	6.4
SORT= 1.13 MEDIAN= 2.00 MODE= 1.00 MEAN= 1.53							WT %	0.1	1.3	5.6	36.3	15.8	27.2	6.2	3.4	4.2
SPLIT WT= 153.1							CUM WT %	0.1	1.4	7.0	43.3	59.1	86.3	92.4	95.8	100.0
30	0.6	C	9.5	89.9	0.6	S	WT	0.1	0.0	8.6	40.1	47.7	31.1	11.9	6.5	8.2
SORT= 1.38 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.70							WT %	0.1	0.5	5.6	25.9	30.8	20.1	7.7	4.2	5.3
SPLIT WT= 155.6							CUM WT %	0.1	0.6	6.1	32.0	62.8	82.8	90.5	94.7	100.0
35	0.9	C	11.9	87.7	0.4	(m)S	WT	0.0	0.6	2.9	24.3	51.8	44.1	14.9	8.2	10.5
SORT= 1.34 MEDIAN= 2.00 MODE= 2.00 MEAN= 2.15							WT %	0.0	0.4	1.8	15.5	32.9	28.0	9.5	5.2	6.7
SPLIT WT= 157.4							CUM WT %	0.0	0.4	2.2	17.7	50.6	78.6	88.1	93.3	100.0
40	0.9	C	6.4	92.7	0.9	S	WT	0.1	1.3	11.8	44.6	53.9	32.1	8.6	4.5	6.0
SORT= 1.24 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.56							WT %	0.1	0.8	7.2	27.4	33.1	19.7	5.3	2.8	3.7
SPLIT WT= 162.8							CUM WT %	0.1	0.9	8.1	35.5	68.6	88.3	93.6	96.3	100.0
45	1.2	C	11.0	88.7	0.3	(m)S	WT	0.0	0.5	6.6	25.7	46.8	41.6	13.9	7.5	9.2
SORT= 1.39 MEDIAN= 2.00 MODE= 2.00 MEAN= 2.01							WT %	0.0	0.3	4.4	16.9	30.8	27.4	9.2	4.9	6.1
SPLIT WT= 151.9							CUM WT %	0.0	0.3	4.7	21.6	52.4	79.8	89.0	93.9	100.0
50	1.2	C	9.5	89.8	0.6	S	WT	0.0	1.0	7.9	28.6	46.5	42.0	13.7	6.9	7.8
SORT= 1.36 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.89							WT %	0.0	0.7	5.1	18.5	30.1	27.2	8.9	4.5	5.1
SPLIT WT= 154.2							CUM WT %	0.0	0.7	5.8	24.3	54.4	81.6	90.5	95.0	100.0
55	1.3	C	11.8	87.5	0.7	(m)S	WT	0.1	1.0	5.7	20.9	57.0	43.7	14.4	8.3	10.0
SORT= 1.31 MEDIAN= 2.00 MODE= 2.00 MEAN= 2.12							WT %	0.1	0.6	3.5	12.9	35.2	27.0	8.9	5.1	6.7
SPLIT WT= 161.8							CUM WT %	0.1	0.7	4.2	17.1	52.3	79.3	88.2	93.3	100.0

TABLE D.5 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-042-042A ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
60	1.4	C	11.4	87.5	1.1	(m)S	WT	0.4	1.8	5.7	19.1	54.6	43.0	14.0	7.7	10.0
SORT= 1.28 MEDIAN= 2.00 MODE= 2.00 MEAN= 2.11							WT %	0.3	0.8	3.7	12.3	35.0	27.6	9.0	4.9	6.4
SPLIT WT= 158.0							CUM WT %	0.3	1.1	4.8	17.0	52.1	79.7	88.6	93.6	100.0
65	1.7	C	15.2	84.2	0.5	(m)S	WT	0.4	0.5	2.2	13.6	46.6	49.7	22.7	11.4	12.9
SORT= 1.38 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.49							WT %	0.3	0.3	1.4	8.5	29.1	31.1	14.2	7.1	8.1
SPLIT WT= 160.1							CUM WT %	0.3	0.6	1.9	10.4	39.6	70.6	84.8	91.9	100.0
70	1.7	C	14.8	84.8	0.4	(m)S	WT	0.2	0.4	2.1	13.2	45.2	50.9	22.6	11.0	12.4
SORT= 1.35 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.49							WT %	0.1	0.3	1.3	8.4	28.6	32.2	14.3	7.0	7.9
SPLIT WT= 158.0							CUM WT %	0.1	0.4	1.7	10.1	38.7	70.9	85.2	92.2	100.0
75	1.4	C	12.6	87.2	0.1	(m)S	WT	0.0	0.2	4.2	25.1	38.9	50.6	22.1	9.8	10.6
SORT= 1.45 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.28							WT %	0.0	0.1	2.6	15.5	24.1	31.3	13.7	6.1	6.6
SPLIT WT= 161.0							CUM WT %	0.0	0.1	2.7	18.3	42.4	73.7	87.4	93.4	100.0
80	1.2	C	15.1	84.9	0.1	(m)S	WT	0.0	0.1	1.1	13.6	35.9	62.5	29.3	12.4	12.8
SORT= 1.30 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.61							WT %	0.0	0.1	0.7	7.8	21.5	37.4	17.5	7.4	7.7
SPLIT WT= 167.0							CUM WT %	0.0	0.1	0.7	8.5	30.0	67.4	84.9	92.3	100.0
85	1.3	C	17.7	82.0	0.4	(m)S	WT	0.2	0.4	1.7	9.0	38.4	59.1	27.8	13.2	16.1
SORT= 1.38 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.71							WT %	0.1	0.2	1.0	5.4	23.2	35.6	16.8	8.0	9.7
SPLIT WT= 165.4							CUM WT %	0.1	0.4	1.4	6.8	30.0	65.6	82.3	90.3	100.0
90	1.3	C	16.3	83.4	0.3	(m)S	WT	0.1	0.4	1.0	9.0	35.6	55.1	25.0	11.4	13.2
SORT= 1.32 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.65							WT %	0.1	0.3	0.7	6.0	23.6	36.5	16.6	7.6	8.8
SPLIT WT= 151.1							CUM WT %	0.1	0.3	1.0	7.0	30.6	67.1	83.7	91.3	100.0
95	1.5	C	13.8	85.6	0.5	(m)S	WT	0.0	0.8	5.0	23.4	46.5	38.6	18.4	9.7	11.6
SORT= 1.50 MEDIAN= 3.00 MODE= 2.00 MEAN= 2.22							WT %	0.0	0.5	3.3	15.2	30.2	25.1	12.0	6.3	7.5
SPLIT WT= 154.4							CUM WT %	0.0	0.5	3.8	19.0	49.2	74.2	86.2	92.5	100.0
100	1.6	C	16.6	83.4	0.0	(m)S	WT	0.0	0.0	0.2	7.1	39.8	51.0	29.3	12.4	13.2
SORT= 1.31 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.69							WT %	0.0	0.0	0.1	4.6	25.9	33.7	19.1	8.1	8.6
SPLIT WT= 154.4							CUM WT %	0.0	0.0	0.1	4.8	30.6	64.3	83.4	91.4	100.0
105	1.3	C	14.2	83.8	2.1	(m)S	WT	0.1	3.1	13.1	24.4	33.1	36.5	22.4	10.2	11.7
SORT= 1.76 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.11							WT %	0.1	2.0	8.5	15.8	21.4	23.6	14.5	6.6	7.6
SPLIT WT= 154.8							CUM WT %	0.1	2.1	10.5	26.3	47.7	71.3	85.8	92.4	100.0
110	1.5	C	14.8	84.3	0.9	(m)S	WT	0.0	1.4	11.1	24.8	33.8	35.7	22.6	10.2	12.1
SORT= 1.72 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.18							WT %	0.0	0.9	7.4	15.9	22.4	23.7	15.0	6.8	8.0
SPLIT WT= 150.4							CUM WT %	0.0	0.9	8.3	24.2	46.6	70.3	85.2	92.0	100.0

TABLE D.5 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-042-042A ****

08/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
115	1.6	C	18.6	81.1	0.9	(m)S	WT	0.2	1.3	5.3	10.8	35.0	41.0	29.1	14.2	14.5
SORT= 1.59 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.54							WT %	0.1	0.8	3.3	11.6	22.0	25.7	18.3	8.9	9.1
SPLIT WT= 159.6							CUM WT %	0.1	1.0	4.3	16.1	38.0	63.7	82.0	90.9	100.0
120	1.2	C	11.2	83.8	5.0	(gm)S	WT	2.2	5.7	20.7	42.1	32.7	23.4	13.0	7.4	10.2
SORT= 1.79 MEDIAN= 2.00 MODE= 1.00 MEAN= 1.50							WT %	1.4	3.8	13.2	26.8	20.8	14.9	8.3	4.7	6.5
SPLIT WT= 157.6							CUM WT %	1.4	5.0	18.2	44.9	65.7	80.6	88.8	93.5	100.0
125	1.2	C	9.3	84.9	5.7	(g)S	WT	6.2	9.2	35.3	45.2	5.1	41.6	12.1	6.4	8.9
SORT= 1.81 MEDIAN= 1.00 MODE= 1.00 MEAN= 1.14							WT %	6.1	5.6	21.5	27.6	3.1	25.4	7.4	3.9	5.4
SPLIT WT= 164.5							CUM WT %	6.1	5.7	27.3	54.8	57.9	83.3	90.7	94.6	100.0
130	0.9	C	6.3	47.6	46.1	msG	WT	46.2	26.9	20.4	17.9	20.0	11.4	5.0	3.6	6.4
SORT= N/A MEDIAN= 0.00 MODE= -2.00 MEAN= N/A							WT %	29.1	17.0	12.9	11.3	12.6	7.2	3.7	2.3	4.0
SPLIT WT= 159.0							CUM WT %	29.1	46.1	59.0	70.2	82.9	90.0	93.7	96.0	100.0
135	0.6	C	14.5	55.2	30.3	msG	WT	19.1	36.0	24.4	22.3	5.2	25.6	12.1	8.7	14.9
SORT= 2.79 MEDIAN= 1.00 MODE= -1.00 MEAN= 0.79							WT %	11.8	18.5	15.0	13.7	3.2	15.8	7.5	5.4	9.2
SPLIT WT= 162.8							CUM WT %	11.8	30.3	45.3	59.0	62.2	78.0	85.5	90.8	100.0
140	0.2	C	3.6	71.0	25.4	gS	WT	17.7	15.3	8.5	36.0	32.4	10.4	5.0	2.6	2.1
SORT= 1.89 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.28							WT %	13.6	11.6	6.5	27.7	24.9	8.0	3.9	2.0	1.6
SPLIT WT= 130.3							CUM WT %	13.6	25.4	31.9	59.6	84.5	92.5	96.4	98.4	100.0
145	0.1	C	0.1	22.4	77.6	sG	WT	82.5	46.6	25.1	10.0	2.0	0.1	0.0	0.0	0.1
SORT= N/A MEDIAN= -1.00 MODE= -2.00 MEAN= N/A							WT %	49.6	28.0	15.1	6.0	1.2	0.1	0.0	0.0	0.1
SPLIT WT= 166.6							CUM WT %	49.6	77.6	92.7	98.7	99.9	99.9	99.9	99.9	100.0
150	0.1	C	0.1	26.5	73.4	sG	WT	65.2	58.7	33.0	10.1	1.5	0.1	0.0	0.0	0.1
SORT= N/A MEDIAN= -1.00 MODE= -2.00 MEAN= N/A							WT %	38.7	34.8	19.6	6.0	0.9	0.1	0.0	0.0	0.1
SPLIT WT= 169.1							CUM WT %	38.7	73.5	93.0	99.0	99.9	100.0	100.0	100.0	100.0
155	0.1	C	0.1	23.9	76.0	sG	WT	78.2	47.8	27.9	9.7	1.8	0.2	0.0	0.0	0.2
SORT= N/A MEDIAN= -1.00 MODE= -2.00 MEAN= N/A							WT %	47.2	28.8	16.8	5.9	1.1	0.1	0.0	0.0	0.1
SPLIT WT= 165.8							CUM WT %	47.2	76.0	92.8	98.7	99.8	99.9	99.9	99.9	100.0
160	0.2	C	4.3	25.1	70.6	msG	WT	58.3	55.6	21.5	10.2	4.1	2.4	2.3	2.3	4.6
SORT= N/A MEDIAN= -1.00 MODE= -2.00 MEAN= N/A							WT %	36.1	34.5	13.3	6.3	2.5	1.5	1.4	1.4	2.9
SPLIT WT= 161.9							CUM WT %	36.1	70.6	83.9	90.3	92.8	94.3	95.7	97.2	100.0
165	0.1	C	3.6	23.1	73.1	msG	WT	64.8	44.8	18.4	7.8	3.7	2.5	2.3	1.9	3.8
SORT= N/A MEDIAN= -1.00 MODE= -2.00 MEAN= N/A							WT %	43.2	29.9	12.3	5.2	2.5	1.7	1.5	1.3	2.5
SPLIT WT= 150.3							CUM WT %	43.2	73.1	85.3	90.5	93.0	94.7	96.2	97.5	100.0

TABLE D.5 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 8699-042-042[A] ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
170	0.1	C	0.9	50.0	49.1	sG	WT	16.1	58.9	44.9	21.8	6.8	1.7	1.2	0.8	0.6
SORT= 1.13		MEDIAN=	0.00	MODE=	-1.00	MEAN= -0.81	WT %	10.5	38.6	29.4	14.3	4.5	1.1	0.8	0.5	0.4
SPLIT WT= 152.6							CUM WT %	10.5	49.1	78.5	92.7	97.2	98.3	99.1	99.6	100.0
175	0.1	C	0.3	25.3	74.4	sG	WT	78.0	46.0	26.7	12.5	2.4	0.4	0.1	0.2	0.3
SORT= N/A		MEDIAN=	-1.00	MODE=	-2.00	MEAN= N/A	WT %	46.8	27.6	16.0	7.5	1.4	0.2	0.1	0.1	0.2
SPLIT WT= 166.5							CUM WT %	46.8	74.4	90.5	98.0	99.4	99.6	99.7	99.8	100.0
180	0.1	C	0.2	37.1	62.7	sG	WT	43.5	53.1	35.7	17.9	3.3	0.3	0.0	0.0	0.3
SORT= N/A		MEDIAN=	-1.00	MODE=	-1.00	MEAN= N/A	WT %	28.2	34.5	23.2	11.6	2.1	0.2	0.0	0.0	0.2
SPLIT WT= 154.1							CUM WT %	28.2	62.7	85.9	97.5	99.6	99.8	99.8	99.8	100.0
185	0.1	C	0.2	44.9	54.9	sG	WT	41.9	50.2	37.2	27.5	8.2	1.7	0.7	0.1	0.3
SORT= N/A		MEDIAN=	-1.00	MODE=	-1.00	MEAN= N/A	WT %	25.0	29.9	22.2	16.4	4.9	1.0	0.4	0.1	0.2
SPLIT WT= 168.1							CUM WT %	25.0	54.9	77.1	93.5	98.3	99.4	99.8	99.8	100.0
190	3.9	C	27.7	55.4	16.9	gmS	WT	6.0	21.3	21.7	30.5	16.7	11.0	12.1	15.0	31.6
SORT= 2.93		MEDIAN=	2.00	MODE=	5.00	MEAN= 1.63	WT %	4.1	12.8	13.1	18.4	10.1	6.6	7.3	9.0	18.7
SPLIT WT= 166.3							CUM WT %	4.1	16.9	30.0	48.3	58.4	65.0	72.3	81.3	100.0
195	2.5	C	41.3	53.9	4.8	mS	WT	2.4	4.9	5.9	21.2	13.7	14.0	27.9	25.1	30.3
SORT= 2.15		MEDIAN=	4.00	MODE=	5.00	MEAN= 2.97	WT %	1.6	3.2	3.9	13.8	9.0	9.1	18.2	16.4	25.0
SPLIT WT= 153.8							CUM WT %	1.6	4.8	8.6	22.4	31.4	40.5	58.7	75.0	100.0
200	0.6	C	36.2	63.0	0.8	mS	WT	0.5	0.9	0.8	5.6	9.6	39.7	48.5	28.3	31.5
SORT= 1.28		MEDIAN=	4.00	MODE=	4.00	MEAN= 3.52	WT %	0.3	0.5	0.5	3.4	5.8	24.0	29.3	17.1	19.0
SPLIT WT= 165.8							CUM WT %	0.3	0.8	1.3	4.7	10.5	34.5	63.8	80.9	100.0
205	0.6	C	15.7	50.9	33.5	msG	WT	33.1	17.6	9.6	9.7	15.1	23.7	18.9	11.1	12.6
SORT= N/A		MEDIAN=	2.00	MODE=	-2.00	MEAN= N/A	WT %	21.9	11.6	6.3	6.4	10.0	15.7	12.5	7.3	8.3
SPLIT WT= 151.5							CUM WT %	21.9	33.5	39.8	46.2	56.2	71.9	84.3	91.7	100.0
210	0.5	C	14.8	84.2	20.9	(m)gS	WT	12.4	21.9	14.9	26.2	27.5	21.7	14.9	9.7	14.6
SORT= 2.62		MEDIAN=	2.00	MODE=	2.00	MEAN= 1.25	WT %	7.6	13.4	9.1	16.0	16.8	13.3	9.1	5.9	8.9
SPLIT WT= 163.7							CUM WT %	7.6	20.9	30.0	46.0	62.8	76.1	85.2	91.1	100.0
215	0.6	C	16.1	53.4	30.5	msG	WT	28.1	27.6	16.9	15.3	15.7	18.4	17.1	10.9	14.3
SORT= 2.91		MEDIAN=	1.00	MODE=	-1.00	MEAN= 1.03	WT %	12.9	17.7	10.8	9.6	10.0	11.8	10.9	7.0	9.2
SPLIT WT= 156.6							CUM WT %	12.9	30.5	41.3	51.1	61.2	72.9	83.9	90.8	100.0
220	0.4	C	8.8	66.0	25.3	(m)gS	WT	15.0	22.0	21.1	31.0	24.7	13.8	8.2	5.2	7.9
SORT= 2.22		MEDIAN=	1.00	MODE=	1.00	MEAN= 0.56	WT %	10.6	14.7	14.1	20.7	16.5	9.2	5.5	3.5	5.3
SPLIT WT= 149.8							CUM WT %	10.6	25.3	39.3	60.1	76.6	85.8	91.3	94.7	100.0

TABLE D.5 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-042-042A ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
225	0.7	C	23.1	54.5	22.4	gmS	WT	14.5	20.4	15.5	15.2	19.4	16.0	19.0	14.4	21.7
SORT= 3.03 MEDIAN= 2.00 MODE= 5.00 MEAN= 1.58							WT %	9.3	13.1	9.9	9.7	12.4	10.3	12.2	9.2	13.9
SPLIT WT= 156.6							CUM WT %	9.3	22.4	32.3	42.0	54.5	64.7	76.9	86.1	100.0
230	0.6	C	21.5	64.1	14.4	gmS	WT	9.1	12.7	8.8	22.8	24.2	19.6	21.8	14.7	17.8
SORT= 2.57 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.87							WT %	6.0	8.4	5.8	14.9	16.0	13.0	14.4	9.7	11.8
SPLIT WT= 151.5							CUM WT %	6.0	14.4	20.2	35.2	51.2	64.1	78.5	88.2	100.0
235	0.3	C	9.6	49.7	41.3	msG	WT	39.4	27.5	15.9	14.4	29.2	13.1	7.8	5.5	9.1
SORT= N/A MEDIAN= 0.00 MODE= -2.00 MEAN= N/A							WT %	24.3	17.0	9.8	8.9	18.0	8.1	4.8	3.4	5.6
SPLIT WT= 162.1							CUM WT %	24.3	41.3	51.2	60.0	78.1	86.2	91.0	94.4	100.0
240	0.1	C	12.3	55.5	32.2	msG	WT	29.6	21.4	13.6	17.9	29.3	15.3	11.7	7.8	11.7
SORT= N/A MEDIAN= 1.00 MODE= -2.00 MEAN= N/A							WT %	18.7	13.5	8.6	11.3	18.5	9.7	7.4	4.9	7.4
SPLIT WT= 158.8							CUM WT %	18.7	32.2	40.8	52.1	70.6	80.3	87.7	92.6	100.0
245	0.2	C	17.0	59.1	23.9	gmS	WT	16.6	25.3	19.3	24.6	21.6	14.0	10.0	7.2	18.3
SORT= 2.81 MEDIAN= 1.00 MODE= -1.00 MEAN= 1.17							WT %	7.1	16.8	12.8	16.0	14.4	9.3	6.7	4.8	12.2
SPLIT WT= 151.0							CUM WT %	7.1	23.9	36.7	52.7	67.1	76.4	83.0	87.8	100.0
250	0.2	C	9.7	53.1	37.2	msG	WT	26.7	19.1	14.8	21.8	14.9	8.6	5.3	3.7	8.2
SORT= N/A MEDIAN= 1.00 MODE= -2.00 MEAN= N/A							WT %	21.7	15.5	12.0	17.7	12.1	7.0	4.3	3.0	6.7
SPLIT WT= 124.5							CUM WT %	21.7	37.2	49.2	66.9	79.0	86.0	90.3	93.4	100.0
255	0.6	C	13.9	59.1	27.0	(m)gS	WT	19.5	17.1	14.0	23.8	20.8	13.1	8.5	5.6	13.3
SORT= 2.77 MEDIAN= 1.50 MODE= 1.00 MEAN= 0.84							WT %	14.4	12.8	10.3	17.5	15.3	9.7	6.3	4.1	9.8
SPLIT WT= 135.9							CUM WT %	14.4	27.0	37.3	54.8	70.2	79.8	86.1	90.2	100.0
260	0.4	C	18.2	56.6	25.2	gmS	WT	24.8	16.7	16.2	30.3	21.3	14.6	10.9	8.7	21.2
SORT= 3.11 MEDIAN= 1.00 MODE= 1.00 MEAN= 1.07							WT %	15.1	10.1	9.8	18.4	12.9	8.9	6.6	5.3	12.8
SPLIT WT= 165.1							CUM WT %	15.1	25.2	35.0	53.4	66.4	75.2	81.9	87.1	100.0
265	0.3	C	17.2	66.8	16.2	gmS	WT	11.1	15.1	20.4	36.1	23.2	15.6	10.6	7.6	20.2
SORT= 2.60 MEDIAN= 1.00 MODE= 1.00 MEAN= 1.36							WT %	6.9	9.3	12.6	23.5	14.3	9.6	6.5	4.7	12.5
SPLIT WT= 162.2							CUM WT %	6.9	16.2	28.8	52.3	66.7	76.3	82.8	87.5	100.0
270	0.3	C	16.4	63.7	19.9	gmS	WT	13.9	17.4	20.3	35.4	20.1	14.3	10.1	7.5	18.3
SORT= 2.70 MEDIAN= 1.00 MODE= 1.00 MEAN= 1.16							WT %	8.8	11.1	12.9	22.5	12.8	9.1	6.4	4.8	11.6
SPLIT WT= 157.9							CUM WT %	8.8	19.9	32.8	55.3	68.1	77.2	83.6	88.4	100.0
275	0.2	C	8.3	76.3	15.5	gS	WT	6.4	18.7	19.2	26.6	41.3	25.7	11.1	5.4	8.0
SORT= 1.94 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.88							WT %	3.9	11.5	11.8	16.4	25.4	15.8	6.8	3.3	4.9
SPLIT WT= 160.4							CUM WT %	3.9	15.5	27.3	43.7	69.1	84.9	91.7	95.1	100.0

TABLE D.5 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-042-042A ****

06/23/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
280	0.1	C	7.6	76.2	16.1	gS	WT	13.3	13.3	26.9	41.6	33.6	19.2	10.4	5.5	7.1
SORT= 1.92	MEDIAN=		1.00	MODE=	1.00	MEAN= 0.88	WT %	8.1	8.1	12.7	25.2	20.4	11.6	6.3	3.3	4.3
SPLIT WT= 164.7							CUM WT %	8.1	16.1	28.8	54.0	74.4	86.1	92.4	95.7	100.0
285	0.1	C	10.8	79.4	9.8	(gm)S	WT	3.1	11.7	18.0	30.5	34.5	22.5	13.8	7.6	8.6
SORT= 1.95	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.43	WT %	2.1	7.8	12.0	20.5	22.9	14.9	9.2	5.1	5.7
SPLIT WT= 149.4							CUM WT %	2.1	9.9	21.9	42.2	65.1	80.1	89.2	94.3	100.0
290	0.3	C	6.3	83.1	10.7	gS	WT	6.6	17.6	30.6	47.3	31.7	18.5	9.3	4.6	5.7
SORT= 1.67	MEDIAN=		1.00	MODE=	1.00	MEAN= 0.89	WT %	6.4	16.3	18.2	28.7	19.3	11.2	5.7	2.8	3.5
SPLIT WT= 163.3							CUM WT %	6.4	16.7	28.9	57.6	76.9	88.1	93.7	96.5	100.0
295	0.4	C	6.0	55.5	38.5	sG	WT	29.1	36.1	31.7	29.1	18.0	9.8	5.5	3.7	6.4
SORT= N/A	MEDIAN=		0.00	MODE=	-1.00	MEAN= N/A	WT %	17.2	21.3	18.7	17.2	10.6	5.8	3.3	2.2	3.8
SPLIT WT= 169.6							CUM WT %	17.2	38.5	57.2	74.4	85.0	90.8	94.1	96.2	100.0
300	0.8	C	9.4	77.1	13.5	(m)gS	WT	3.6	18.6	24.1	42.7	27.9	17.9	11.2	6.7	8.4
SORT= 1.94	MEDIAN=		1.00	MODE=	1.00	MEAN= 1.01	WT %	2.2	11.2	15.0	26.0	17.4	11.2	7.0	4.2	5.2
SPLIT WT= 160.3							CUM WT %	2.2	13.5	28.5	55.1	72.5	83.6	90.6	94.8	100.0
302	0.2	C	1.3	13.5	85.2	G	WT	60.3	3.4	3.4	3.1	1.9	1.1	0.6	0.4	0.6
SORT= N/A	MEDIAN=		-2.00	MODE=	-2.00	MEAN= N/A	WT %	80.6	4.6	4.6	4.1	2.5	1.5	0.8	0.5	0.8
SPLIT WT= 74.7							CUM WT %	80.6	85.2	89.7	93.8	96.4	97.9	98.7	99.2	100.0
310	0.1	C	2.2	90.0	7.8	(g)S	WT	9.2	13.0	58.3	54.9	27.7	8.7	2.4	1.2	2.5
SORT= 1.16	MEDIAN=		1.00	MODE=	0.00	MEAN= 0.35	WT %	9.1	7.7	34.5	32.5	16.4	5.2	1.4	0.7	1.5
SPLIT WT= 169.1							CUM WT %	9.1	7.8	42.3	74.8	91.2	96.4	97.8	98.5	100.0
315	0.1	C	6.7	93.2	0.1	S	WT	0.0	0.1	2.5	38.8	64.7	35.3	5.6	3.8	7.0
SORT= 1.08	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.03	WT %	0.0	0.1	1.6	24.6	41.1	22.4	3.6	2.3	4.4
SPLIT WT= 157.8							CUM WT %	0.0	0.1	1.7	26.3	67.3	89.7	93.3	95.6	100.0

TABLE D.6

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-042-42B ****

07/27/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
5	6.6	C	1.6	88.2	10.8	gS	WT	56.6	12.4	137.9	331.5	62.8	16.7	5.3	1.7	4.4
SORT= 0.86	MEDIAN=		1.66	MODE=	1.00	MEAN= 0.18	WT %	8.9	2.0	22.0	52.8	10.0	2.7	0.8	0.3	0.7
SPLIT WT= 628.1							CUM WT %	8.9	10.8	32.8	85.5	95.5	98.2	99.0	99.3	100.0
10	3.9	C	2.7	91.7	5.6	(g)S	WT	17.5	16.9	164.7	318.3	101.4	27.9	13.0	4.0	12.6
SORT= 0.99	MEDIAN=		1.00	MODE=	1.00	MEAN= 0.58	WT %	2.8	2.8	17.0	51.7	16.5	4.5	2.1	0.7	2.0
SPLIT WT= 615.7							CUM WT %	2.8	5.6	22.6	74.2	90.7	95.2	97.3	98.0	100.0
15	2.8	C	2.5	79.7	17.8	gS	WT	75.2	34.2	146.0	208.0	95.0	25.5	13.0	4.6	11.0
SORT= 1.42	MEDIAN=		1.60	MODE=	1.60	MEAN= 0.15	WT %	12.2	5.6	24.1	33.8	15.5	4.1	2.1	0.8	1.8
SPLIT WT= 614.3							CUM WT %	12.2	17.8	41.9	75.7	91.2	95.3	97.5	98.2	100.0
20	2.5	C	1.4	86.4	12.2	gS	WT	28.4	50.6	163.7	261.0	102.7	22.9	8.7	2.7	6.4
SORT= 1.12	MEDIAN=		1.00	MODE=	1.00	MEAN= 0.28	WT %	4.4	7.8	25.3	40.4	15.9	3.5	1.3	0.4	1.0
SPLIT WT= 647.8							CUM WT %	4.4	12.2	37.5	77.9	93.7	97.3	98.6	99.0	100.0
25	2.6	C	6.7	92.3	0.0	S	WT	0.0	0.0	0.4	7.4	79.0	230.9	114.0	11.8	19.3
SORT= 0.89	MEDIAN=		3.00	MODE=	3.00	MEAN= 2.70	WT %	0.0	0.0	0.1	1.6	17.1	49.9	24.6	2.6	4.2
SPLIT WT= 462.1							CUM WT %	0.0	0.0	0.1	1.7	18.7	68.7	93.3	95.8	100.0
30	2.4	C	11.3	88.6	0.0	(m)S	WT	0.0	0.2	1.7	50.3	205.4	147.5	66.5	22.0	38.3
SORT= 1.23	MEDIAN=		3.60	MODE=	2.00	MEAN= 2.28	WT %	0.0	0.0	0.3	9.5	38.6	27.7	12.5	4.1	7.2
SPLIT WT= 531.3							CUM WT %	0.0	0.0	0.4	9.8	48.4	76.2	88.7	92.8	100.0
35	3.1	C	5.9	93.7	0.3	S	WT	0.0	1.7	17.9	87.0	214.1	116.7	31.5	9.8	19.6
SORT= 1.07	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.73	WT %	0.0	0.3	3.6	17.5	43.0	23.4	6.3	2.0	3.9
SPLIT WT= 499.5							CUM WT %	0.0	0.3	3.9	21.4	64.4	87.8	94.1	96.1	100.0
40	2.8	C	7.1	92.8	0.2	S	WT	0.2	0.6	4.6	62.7	230.2	137.0	36.6	11.5	24.3
SORT= 0.94	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.94	WT %	0.0	0.1	0.9	12.3	45.3	27.0	7.2	2.3	4.8
SPLIT WT= 507.6							CUM WT %	0.0	0.2	1.1	13.4	58.7	85.7	92.9	95.2	100.0
45	1.3	C	4.9	95.1	0.0	S	WT	0.0	0.0	0.9	10.6	137.4	198.2	84.5	11.0	16.2
SORT= 0.98	MEDIAN=		3.00	MODE=	3.00	MEAN= 2.41	WT %	0.0	0.0	0.2	2.3	30.3	43.7	18.6	2.6	2.3
SPLIT WT= 452.8							CUM WT %	0.0	0.0	0.2	2.5	32.8	76.5	95.1	97.7	100.0
50	1.7	C	8.9	91.1	0.0	S	WT	0.0	0.1	1.4	28.5	105.1	151.2	48.7	10.4	22.4
SORT= 1.09	MEDIAN=		3.00	MODE=	3.00	MEAN= 2.36	WT %	0.0	0.0	0.4	7.8	28.6	41.1	13.3	2.8	6.1
SPLIT WT= 367.1							CUM WT %	0.0	0.0	0.4	8.1	36.7	77.8	91.1	93.9	100.0
55	2.0	C	4.4	93.4	2.2	S	WT	7.7	1.7	12.8	72.6	191.0	96.0	24.3	6.8	12.0
SORT= 1.05	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.66	WT %	1.8	0.4	3.0	17.1	45.0	22.6	5.7	1.6	2.8
SPLIT WT= 424.7							CUM WT %	1.8	2.2	5.2	22.3	67.3	89.9	95.6	97.2	100.0

TABLE D.6 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-042-42B ****

07/27/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
60	2.4	C	6.8	92.6	0.6	S	WT	0.7	1.9	14.0	66.5	193.3	100.2	50.8	13.0	17.6
SORT= 1.16	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.93	WT %	0.2	0.4	3.1	14.5	42.2	21.9	11.1	3.0	3.8
SPLIT WT= 458.2							CUM WT %	0.2	0.6	3.6	18.1	60.3	82.1	93.2	96.2	100.0
65	1.9	C	1.8	98.0	0.2	S	WT	0.0	0.9	8.5	105.4	266.1	67.0	10.8	2.6	5.7
SORT= 0.77	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.41	WT %	0.0	0.2	1.8	22.0	57.0	14.4	2.3	0.6	1.2
SPLIT WT= 468.0							CUM WT %	0.0	0.2	2.0	24.0	81.0	95.4	98.2	98.8	100.0
70	1.8	C	6.6	93.3	0.1	S	WT	0.0	0.4	2.6	18.3	127.9	255.2	75.6	13.8	20.3
SORT= 0.94	MEDIAN=		3.00	MODE=	3.00	MEAN= 2.42	WT %	0.0	0.1	0.5	3.6	24.9	49.6	14.7	2.7	4.0
SPLIT WT= 513.0							CUM WT %	0.0	0.1	0.6	4.1	29.0	78.6	93.3	96.0	100.0
75	1.4	C	9.2	90.8	0.0	S	WT	0.0	0.0	0.1	1.5	81.1	238.6	170.2	16.9	27.0
SORT= 0.80	MEDIAN=		3.00	MODE=	3.00	MEAN= 2.90	WT %	0.0	0.0	0.0	0.3	6.4	49.1	35.0	3.5	5.7
SPLIT WT= 485.0							CUM WT %	0.0	0.0	0.0	0.3	6.7	55.8	90.8	94.3	100.0
80	1.4	C	10.3	89.7	0.0	(m)S	WT	0.0	0.0	0.4	1.0	13.9	205.7	185.7	21.5	25.2
SORT= 0.79	MEDIAN=		4.00	MODE=	3.00	MEAN= 3.06	WT %	0.0	0.0	0.1	0.2	3.1	45.4	41.0	4.7	5.6
SPLIT WT= 453.3							CUM WT %	0.0	0.0	0.1	0.3	3.4	48.8	89.7	94.5	100.0
85	2.2	C	4.1	95.9	0.0	S	WT	0.0	0.1	0.3	26.2	226.0	201.2	42.0	8.4	12.9
SORT= 0.82	MEDIAN=		3.00	MODE=	2.00	MEAN= 2.66	WT %	0.0	0.0	0.1	5.1	43.7	38.9	8.1	1.6	2.5
SPLIT WT= 516.4							CUM WT %	0.0	0.0	0.1	5.1	48.8	87.8	95.9	97.5	100.0
90	2.0	C	13.5	86.5	0.0	(m)S	WT	0.0	0.0	0.1	0.5	16.5	225.9	209.1	30.7	40.0
SORT= 0.82	MEDIAN=		4.00	MODE=	3.00	MEAN= 3.11	WT %	0.0	0.0	0.0	0.1	3.2	43.2	40.0	5.9	7.7
SPLIT WT= 522.4							CUM WT %	0.0	0.0	0.0	0.1	3.3	46.5	86.5	92.3	100.0
95	2.0	C	1.5	94.9	3.6	S	WT	0.5	10.6	54.7	240.7	167.0	35.8	9.6	2.4	5.6
SORT= 0.88	MEDIAN=		1.00	MODE=	1.00	MEAN= 0.89	WT %	1.6	2.0	10.2	45.0	31.2	6.7	1.8	0.5	1.1
SPLIT WT= 535.3							CUM WT %	1.6	3.6	13.8	58.8	90.0	96.7	98.5	99.0	100.0
100	1.9	C	3.6	90.5	5.9	(g)S	WT	10.6	25.6	109.4	249.8	143.4	43.4	22.3	6.9	15.6
SORT= 1.18	MEDIAN=		1.00	MODE=	1.00	MEAN= 0.73	WT %	1.7	4.1	17.7	39.8	23.2	7.0	3.6	1.1	2.5
SPLIT WT= 617.8							CUM WT %	1.7	5.9	23.6	62.5	85.7	92.7	96.4	97.5	100.0
105	1.2	C	1.9	97.8	0.3	S	WT	0.0	1.4	23.8	96.0	211.9	131.6	19.3	2.9	8.4
SORT= 1.03	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.59	WT %	0.0	0.3	4.8	19.5	43.0	26.7	3.9	0.6	1.3
SPLIT WT= 493.6							CUM WT %	0.0	0.3	5.1	24.6	67.5	94.2	98.1	98.7	100.0
110	2.2	H	9.2	50.5	40.3	msG	WT	185.9	90.3	59.6	88.2	81.6	73.1	45.6	14.2	49.0
SORT= N/A	MEDIAN=		1.00	MODE=	-2.00	MEAN= N/A	WT %	27.1	13.2	8.7	12.6	11.9	10.7	6.7	2.1	7.2
SPLIT WT= 686.7							CUM WT %	27.1	40.3	49.0	61.6	73.5	84.1	90.8	92.9	100.0

TABLE D.6 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-042-42B ****

07/27/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
115	0.6	H	13.4	51.0	35.6	msG	WT	152.2	106.0	92.3	74.7	77.1	81.6	44.3	16.8	80.9
SORT= N/A	MEDIAN=	1.00	MODE=	-2.00	MEAN=	N/A	WT %	21.0	14.6	12.7	10.3	10.6	11.3	6.1	2.3	11.1
SPLIT WT= 726.3							CUM WT %	21.0	35.6	48.3	58.6	69.2	80.5	86.6	88.9	100.0
120	0.6	H	16.0	50.5	33.5	msG	WT	136.4	96.8	75.1	79.3	71.7	67.0	58.5	22.5	88.7
SORT= N/A	MEDIAN=	1.00	MODE=	-2.00	MEAN=	N/A	WT %	19.6	13.9	10.8	11.4	10.3	9.6	8.4	3.2	12.7
SPLIT WT= 699.3							CUM WT %	19.6	33.5	44.3	55.7	66.0	75.6	84.0	87.3	100.0
125	0.5	H	11.9	46.6	41.5	msG	WT	216.9	89.4	83.8	68.7	71.4	76.5	43.9	23.7	63.8
SORT= N/A	MEDIAN=	5.00	MODE=	-2.00	MEAN=	N/A	WT %	29.4	12.1	11.4	9.3	9.7	10.4	5.9	3.2	8.6
SPLIT WT= 746.6							CUM WT %	29.4	41.5	52.9	62.2	71.9	82.2	88.1	91.4	100.0
130	0.6	H	14.3	47.9	37.8	msG	WT	189.6	92.1	86.8	73.6	69.1	65.5	61.7	16.7	89.4
SORT= N/A	MEDIAN=	1.00	MODE=	-2.00	MEAN=	N/A	WT %	25.5	12.4	11.7	9.9	9.3	8.8	8.3	2.2	12.0
SPLIT WT= 738.5							CUM WT %	25.5	37.8	49.5	59.4	68.7	77.5	85.8	88.0	100.0
135	0.7	H	11.6	51.4	36.9	msG	WT	166.4	101.9	91.8	100.2	73.6	67.9	41.2	15.5	69.8
SORT= N/A	MEDIAN=	1.00	MODE=	-2.00	MEAN=	N/A	WT %	22.9	14.0	12.5	13.8	10.1	9.3	5.7	2.1	9.5
SPLIT WT= 727.5							CUM WT %	22.9	36.9	49.4	63.2	73.4	82.7	88.4	90.5	100.0
140	1.0	H	11.6	55.0	33.4	msG	WT	146.9	90.0	93.1	102.2	85.4	58.2	46.7	18.6	63.6
SORT= N/A	MEDIAN=	1.00	MODE=	-2.00	MEAN=	N/A	WT %	20.7	12.7	13.8	14.4	12.0	8.2	6.6	2.6	9.0
SPLIT WT= 710.5							CUM WT %	20.7	33.4	47.2	61.6	73.6	81.8	88.4	91.0	100.0
145	0.8	H	9.8	33.4	56.8	msG	WT	313.6	104.7	69.5	58.3	43.7	42.5	39.6	12.2	60.3
SORT= N/A	MEDIAN=	-1.00	MODE=	-2.00	MEAN=	N/A	WT %	42.6	14.2	9.4	8.0	5.9	5.8	5.4	1.7	8.2
SPLIT WT= 737.0							CUM WT %	42.6	56.8	66.3	73.1	79.0	84.8	90.2	91.8	100.0
150	0.6	H	16.0	52.6	31.4	msG	WT	115.7	98.6	79.0	81.5	73.7	64.0	60.0	27.4	81.2
SORT= N/A	MEDIAN=	1.00	MODE=	-2.00	MEAN=	N/A	WT %	17.0	14.4	11.6	12.0	10.8	9.4	8.8	4.0	11.9
SPLIT WT= 682.8							CUM WT %	17.0	31.4	43.0	55.0	65.8	75.2	84.1	88.1	100.0
155	0.4	H	13.5	51.8	34.7	msG	WT	154.4	99.8	87.2	75.3	80.0	96.5	46.3	33.0	85.1
SORT= N/A	MEDIAN=	1.00	MODE=	-2.00	MEAN=	N/A	WT %	21.1	13.6	11.9	10.3	10.9	12.4	6.3	4.6	6.9
SPLIT WT= 732.4							CUM WT %	21.1	34.7	46.6	56.9	67.8	80.2	86.5	91.1	100.0
160	1.0	H	17.8	67.8	14.6	gmS	WT	31.7	53.5	69.2	122.2	84.6	58.0	60.4	21.1	83.0
SORT= 2.63	MEDIAN=	2.00	MODE=	1.00	MEAN=	1.56	WT %	5.4	9.2	11.9	20.9	14.5	9.9	10.4	3.6	14.2
SPLIT WT= 586.1							CUM WT %	5.4	14.6	26.4	47.4	61.9	71.8	82.2	85.8	100.0
161	0.3	S	N/A	N/A	N/A	N/A	WT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SORT= N/A	MEDIAN=	N/A	MODE=	N/A	MEAN=	N/A	WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SPLIT WT= N/A							CUM WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

TABLE D.6 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-042-42B ****

07/27/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
164	0.9	S	N/A	N/A	N/A	N/A	WT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SORT= N/A	MEDIAN=		N/A	MODE=	N/A	MEAN= N/A	WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SPLIT WT= N/A							CUM WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
170	0.3	S	N/A	N/A	N/A	N/A	WT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SORT= N/A	MEDIAN=		N/A	MODE=	N/A	MEAN= N/A	WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SPLIT WT= N/A							CUM WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
176	0.3	S	N/A	N/A	N/A	N/A	WT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SORT= N/A	MEDIAN=		N/A	MODE=	N/A	MEAN= N/A	WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SPLIT WT= N/A							CUM WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
180	0.3	S	N/A	N/A	N/A	N/A	WT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SORT= N/A	MEDIAN=		N/A	MODE=	N/A	MEAN= N/A	WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SPLIT WT= N/A							CUM WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
185	1.2	H	13.2	74.6	12.1	(m)gS	WT	27.8	37.1	34.3	49.6	77.1	165.4	72.7	20.5	50.2
SORT= 2.10	MEDIAN=		3.00	MODE=	3.00	MEAN= 1.88	WT %	5.2	6.9	6.4	9.3	14.4	30.9	13.6	3.8	9.4
SPLIT WT= 535.5							CUM WT %	5.2	12.1	18.6	27.8	42.2	73.2	86.8	90.6	100.0
190	0.8	H	5.9	81.3	12.8	gS	WT	20.9	64.7	126.9	142.9	133.7	99.2	46.6	11.9	27.2
SORT= 1.78	MEDIAN=		1.00	MODE=	1.00	MEAN= 0.92	WT %	3.1	9.7	19.0	21.4	20.0	14.9	6.1	1.8	4.1
SPLIT WT= 667.8							CUM WT %	3.1	12.8	31.8	53.2	73.2	88.1	94.2	95.9	100.0
195	0.7	H	4.4	33.5	62.2	msG	WT	316.4	158.2	78.3	43.9	48.5	51.6	32.1	9.0	24.1
SORT= N/A	MEDIAN=		-1.00	MODE=	-2.00	MEAN= N/A	WT %	41.6	20.6	10.3	5.8	6.4	6.8	4.2	1.2	3.2
SPLIT WT= 760.4							CUM WT %	41.6	62.2	72.5	78.3	84.6	91.4	95.6	96.8	100.0
200	0.7	H	9.4	63.8	26.8	(m)gS	WT	49.4	86.3	86.8	73.8	67.8	59.6	40.6	14.1	33.5
SORT= 2.40	MEDIAN=		1.00	MODE=	-1.00	MEAN= 0.68	WT %	9.8	17.1	16.8	14.6	13.4	11.8	8.0	2.8	6.6
SPLIT WT= 507.5							CUM WT %	9.8	26.8	42.8	57.4	70.8	82.6	90.6	93.4	100.0
205	0.6	H	19.6	76.0	4.4	mS	WT	2.2	16.6	39.2	43.2	66.0	103.8	71.8	22.0	61.7
SORT= 2.14	MEDIAN=		3.00	MODE=	3.00	MEAN= 2.40	WT %	0.5	3.9	9.2	10.1	15.5	24.3	16.8	5.2	14.5
SPLIT WT= 428.5							CUM WT %	0.5	4.4	13.6	23.7	39.2	63.5	80.4	85.6	100.0
210	0.5	H	11.1	78.1	10.8	(m)gS	WT	9.8	20.1	56.4	62.9	41.0	35.2	19.7	6.8	23.7
SORT= 2.03	MEDIAN=		1.00	MODE=	1.00	MEAN= 1.13	WT %	3.6	7.3	20.5	22.8	14.9	12.8	7.2	2.5	8.6
SPLIT WT= 276.9							CUM WT %	3.6	10.9	31.3	54.1	69.0	81.8	89.0	91.4	100.0
215	1.2	H	19.6	76.2	4.2	mS	WT	1.7	6.3	46.7	31.8	26.6	24.7	19.8	8.1	28.8
SORT= 2.54	MEDIAN=		2.00	MODE=	0.00	MEAN= 1.89	WT %	0.9	3.3	21.6	16.9	14.1	13.1	10.5	4.3	15.3
SPLIT WT= 188.9							CUM WT %	0.9	4.2	25.8	42.7	56.8	69.9	80.4	84.7	100.0

TABLE D.6 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-042-42B ****

07/27/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
220	1.7	H	11.2	85.9	2.9	(m)S	WT	1.1	2.9	44.0	29.0	19.0	14.5	10.5	2.3	13.2
SORT= 1.97		MEDIAN=	1.00	MODE=	0.00	MEAN= 1.15	WT %	0.8	2.1	32.3	21.5	14.2	10.5	7.5	1.7	9.8
SPLIT WT= 140.0							CUM WT %	0.8	2.9	35.2	56.0	70.3	81.3	88.8	90.5	100.0
225	2.1	H	7.0	84.9	8.2	(g)S	WT	4.4	11.8	73.7	40.2	22.0	15.0	9.3	3.3	10.5
SORT= 1.00		MEDIAN=	1.00	MODE=	0.00	MEAN= 0.61	WT %	2.2	6.0	37.2	24.3	11.1	7.6	4.7	1.7	5.3
SPLIT WT= 201.7							CUM WT %	2.2	8.2	45.4	69.7	80.8	88.4	93.0	94.7	100.0
230	1.6	H	5.1	89.8	5.1	(g)S	WT	2.1	7.4	76.0	46.2	24.0	13.7	7.4	2.3	7.1
SORT= 1.39		MEDIAN=	1.00	MODE=	0.00	MEAN= 0.49	WT %	1.2	4.0	40.8	24.8	12.9	7.3	4.0	1.3	3.8
SPLIT WT= 180.5							CUM WT %	1.2	5.1	45.9	70.7	83.6	91.0	95.0	96.2	100.0
235	1.3	H	7.9	85.2	6.9	(g)S	WT	1.4	9.9	34.0	40.4	32.2	20.4	11.0	3.1	9.9
SORT= 1.74		MEDIAN=	1.00	MODE=	1.00	MEAN= 1.00	WT %	0.8	5.1	21.3	24.7	19.7	12.5	7.1	1.9	6.0
SPLIT WT= 165.5							CUM WT %	0.8	5.9	28.2	52.9	72.5	85.0	92.1	94.0	100.0
240	0.5	H	10.2	61.2	28.5	(m)gS	WT	57.7	76.3	64.6	71.9	61.7	53.5	36.1	11.5	36.7
SORT= 2.51		MEDIAN=	1.00	MODE=	-1.00	MEAN= 0.66	WT %	12.3	16.2	13.7	15.3	13.1	11.4	7.7	2.4	7.8
SPLIT WT= 472.2							CUM WT %	12.3	28.5	42.3	57.6	70.7	82.1	89.7	92.2	100.0
245	0.5	H	11.0	93.5	5.5	(gm)S	WT	2.1	11.7	29.1	56.9	60.8	39.8	23.1	7.6	19.9
SORT= 1.77		MEDIAN=	2.00	MODE=	2.00	MEAN= 1.59	WT %	0.8	4.7	11.6	22.7	24.2	15.9	9.2	3.0	7.9
SPLIT WT= 251.7							CUM WT %	0.8	5.5	17.1	39.8	64.0	79.8	89.0	92.1	100.0
250	0.5	H	6.5	65.4	29.1	gS	WT	58.2	31.9	36.2	57.8	50.6	32.5	17.3	4.4	12.8
SORT= N/A		MEDIAN=	1.00	MODE=	-2.00	MEAN= N/A	WT %	18.8	10.3	12.3	18.7	18.3	10.5	5.6	1.4	4.1
SPLIT WT= 311.2							CUM WT %	18.8	29.1	41.4	60.1	78.4	88.9	94.5	95.9	100.0

TABLE D.7

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-043-42J ****

07/27/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
5	0.7	C	10.9	84.0	5.1	(gm)S	WT	16.7	12.3	50.4	71.4	70.4	99.2	187.2	31.9	30.1
SORT= 1.84 MEDIAN= 3.00 MODE= 4.00 MEAN= 2.21							WT %	2.9	2.2	8.9	12.5	12.4	17.4	32.9	5.6	5.3
SPLIT WT= 570.0							CUM WT %	2.9	5.1	14.0	26.5	38.8	56.3	89.1	94.7	100.0
10	2.0	H	7.5	77.9	14.6	gS	WT	62.0	41.2	140.5	215.0	89.3	50.4	41.3	9.6	43.3
SORT= 1.00 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.74							WT %	8.8	5.8	21.0	30.4	12.6	8.0	5.8	1.4	6.1
SPLIT WT= 708.8							CUM WT %	8.8	14.6	35.6	66.1	78.7	86.7	92.5	93.9	100.0
15	2.0	H	9.2	71.5	19.3	(m)gS	WT	63.5	66.2	127.4	186.5	79.3	51.7	35.8	14.5	47.7
SORT= 2.07 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.64							WT %	9.4	9.8	18.9	27.7	11.8	7.7	5.3	2.2	7.1
SPLIT WT= 678.0							CUM WT %	9.4	19.3	38.2	65.9	77.7	85.4	90.7	92.9	100.0
20	1.7	H	6.6	80.8	12.5	gS	WT	46.1	37.3	76.8	165.4	171.1	83.3	42.6	11.6	32.6
SORT= 1.72 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.03							WT %	6.9	5.6	11.5	24.8	25.7	12.5	6.3	1.8	4.9
SPLIT WT= 667.2							CUM WT %	6.9	12.5	24.1	48.9	74.6	87.1	93.4	95.1	100.0
25	1.7	H	9.3	84.1	6.5	(g)S	WT	22.7	19.5	38.3	116.7	263.9	181.8	57.7	14.9	45.2
SORT= 1.52 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.70							WT %	3.5	3.0	5.9	17.2	31.6	20.4	8.8	2.3	7.0
SPLIT WT= 648.4							CUM WT %	3.5	6.6	12.5	29.7	61.3	81.7	90.7	93.0	100.0
30	2.0	H	9.3	88.9	1.9	S	WT	4.7	6.1	15.0	169.7	191.8	138.9	62.2	15.2	39.8
SORT= 1.38 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.93							WT %	0.8	1.0	2.6	18.8	32.9	23.9	10.7	2.6	6.7
SPLIT WT= 585.4							CUM WT %	0.8	1.9	4.4	23.3	56.2	80.0	90.7	93.3	100.0
35	2.4	H	9.4	89.4	1.2	S	WT	1.3	5.0	21.0	95.5	209.8	106.7	49.3	15.7	35.0
SORT= 1.33 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.86							WT %	0.2	0.9	4.0	17.7	38.9	19.8	9.1	2.9	6.5
SPLIT WT= 541.1							CUM WT %	0.2	1.2	5.2	22.9	61.7	81.5	90.6	93.5	100.0
40	2.1	H	9.6	89.9	0.4	S	WT	0.6	1.7	9.1	49.0	167.6	169.2	67.7	14.3	35.1
SORT= 1.19 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.27							WT %	0.1	0.3	1.8	9.5	32.6	32.9	13.2	2.8	6.8
SPLIT WT= 516.6							CUM WT %	0.1	0.4	2.2	11.7	44.3	77.2	90.4	93.2	100.0
45	1.5	H	9.1	90.8	0.1	S	WT	0.6	0.0	3.5	24.7	114.7	236.2	110.4	18.5	30.5
SORT= 1.08 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.56							WT %	0.1	0.0	0.7	4.8	21.3	43.8	20.5	3.4	5.7
SPLIT WT= 543.5							CUM WT %	0.1	0.1	0.8	5.4	26.6	70.4	90.9	94.3	100.0
50	1.7	H	12.4	87.6	0.0	(m)S	WT	0.0	0.0	3.9	17.0	103.7	238.0	102.5	22.4	43.8
SORT= 1.10 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.68							WT %	0.0	0.0	0.7	3.2	19.5	44.9	19.3	4.2	8.2
SPLIT WT= 532.6							CUM WT %	0.0	0.0	0.7	3.9	23.4	68.3	87.6	91.8	100.0
55	2.1	H	11.8	87.7	0.5	(m)S	WT	0.9	2.0	18.5	38.7	144.9	181.3	77.4	18.2	42.0
SORT= 1.25 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.42							WT %	0.2	0.4	2.6	7.5	28.1	35.1	15.0	3.5	8.2
SPLIT WT= 519.7							CUM WT %	0.2	0.5	2.6	10.1	38.1	73.3	88.2	91.8	100.0

TABLE D.7 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-043-42J ****

07/27/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
60	2.3	H	10.1	87.6	2.3	(m)S	WT	0.5	0.0	15.0	66.2	185.0	147.3	69.3	16.5	38.5
SORT= 1.29 MEDIAN= 2.00 MODE= 2.00 MEAN= 2.10							WT %	1.2	1.1	2.8	12.2	34.3	27.2	11.1	3.1	7.1
SPLIT WT= 544.9							CUM WT %	1.2	2.3	5.1	17.3	51.6	78.8	89.9	92.9	100.0
65	2.4	H	10.2	89.1	0.8	(m)S	WT	1.5	3.6	15.6	74.0	266.9	159.3	67.1	18.5	48.1
SORT= 1.19 MEDIAN= 2.00 MODE= 2.00 MEAN= 2.11							WT %	0.2	0.5	2.4	11.3	40.8	24.3	10.3	2.8	7.3
SPLIT WT= 656.7							CUM WT %	0.2	0.8	3.2	14.5	55.2	79.6	89.8	92.7	100.0
70	2.2	H	8.7	90.8	0.5	S	WT	0.5	3.0	11.2	63.8	288.6	177.2	61.4	18.4	39.1
SORT= 1.06 MEDIAN= 2.00 MODE= 2.00 MEAN= 2.06							WT %	0.1	0.5	1.7	9.7	43.3	26.8	9.3	2.8	5.9
SPLIT WT= 661.4							CUM WT %	0.1	0.5	2.2	11.9	55.2	82.0	91.3	94.1	100.0
75	1.8	H	11.0	88.8	0.2	(m)S	WT	0.1	1.0	3.7	23.2	104.2	244.7	108.3	21.0	39.2
SORT= 1.09 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.63							WT %	0.0	0.2	0.7	4.3	19.1	44.9	19.9	3.9	7.2
SPLIT WT= 551.0							CUM WT %	0.0	0.2	0.9	5.2	24.3	69.1	89.0	92.8	100.0
80	1.5	H	9.0	90.3	0.0	S	WT	0.0	0.2	2.8	20.2	129.3	262.5	102.0	15.7	39.4
SORT= 1.06 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.56							WT %	0.0	0.0	0.5	3.5	22.0	45.9	17.8	2.7	6.9
SPLIT WT= 573.3							CUM WT %	0.0	0.0	0.5	4.1	26.7	72.5	90.4	93.1	100.0
85	2.1	H	11.2	88.7	0.0	(m)S	WT	0.0	0.2	3.5	31.5	139.0	186.9	88.0	19.4	36.5
SORT= 1.19 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.47							WT %	0.0	0.1	0.7	6.3	28.0	37.6	16.1	3.9	7.3
SPLIT WT= 497.5							CUM WT %	0.0	0.1	0.8	7.1	35.1	72.7	88.8	92.7	100.0
90	2.3	H	10.6	88.0	0.5	(m)S	WT	1.2	2.1	6.9	65.6	142.9	212.6	95.3	22.1	46.5
SORT= 1.27 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.39							WT %	0.2	0.4	1.2	11.1	24.3	36.1	16.2	3.8	6.9
SPLIT WT= 590.4							CUM WT %	0.2	0.6	1.7	12.9	37.1	73.2	89.4	93.1	100.0
95	2.0	C	1.8	98.2	0.0	S	WT	0.0	0.1	0.5	152.5	225.5	45.2	9.1	2.0	5.9
SORT= 0.76 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.22							WT %	0.0	0.0	1.5	34.1	50.5	10.1	2.0	0.4	1.3
SPLIT WT= 451.3							CUM WT %	0.0	0.0	1.5	35.6	86.1	96.2	98.2	98.7	100.0
100	1.7	C	2.3	92.0	5.7	(g)S	WT	5.0	25.0	98.9	224.0	133.6	30.0	12.2	3.7	8.9
SORT= 1.69 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.65							WT %	0.9	4.8	18.2	41.4	24.6	5.6	2.3	0.7	1.6
SPLIT WT= 543.5							CUM WT %	0.9	5.7	23.9	65.2	89.8	95.4	97.7	98.4	100.0
105	1.8	C	2.0	96.4	0.6	S	WT	0.0	3.6	28.8	110.7	207.5	83.5	16.9	4.0	9.1
SORT= 1.04 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.43							WT %	0.0	0.8	6.2	23.9	44.7	18.0	3.7	0.9	2.0
SPLIT WT= 464.9							CUM WT %	0.0	0.8	7.0	30.8	75.6	93.6	97.2	98.1	100.0
110	1.3	C	1.9	98.1	0.0	S	WT	0.0	0.0	12.0	194.0	253.7	46.1	12.0	2.7	7.1
SORT= 0.78 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.17							WT %	0.0	0.0	2.4	36.3	48.0	8.7	2.3	0.5	1.4
SPLIT WT= 530.5							CUM WT %	0.0	0.0	2.4	39.2	87.2	95.9	98.2	98.7	100.0

TABLE D.7 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 8699-843-42J ****

07/27/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
115	0.6	H	12.4	45.4	42.3	msG	WT	226.4	91.5	71.7	64.7	79.4	64.2	61.1	16.2	76.8
SORT= N/A			MEDIAN= 0.00		MODE= -2.00	MEAN= N/A	WT %	30.1	12.2	9.5	8.6	10.6	8.5	8.1	2.2	10.2
SPLIT WT= 754.5							CUM WT %	30.1	42.3	51.8	60.4	71.0	79.5	87.6	89.8	100.0
120	0.4	H	12.7	48.1	39.2	msG	WT	192.7	110.7	95.1	78.8	74.0	61.3	43.4	30.4	68.3
SORT= N/A			MEDIAN= 0.00		MODE= -2.00	MEAN= N/A	WT %	24.9	14.3	12.3	10.2	9.6	10.5	5.6	3.9	8.8
SPLIT WT= 773.5							CUM WT %	24.9	39.2	51.4	61.6	71.2	81.7	87.3	91.2	100.0
125	0.6	H	13.6	44.7	41.6	msG	WT	224.2	94.5	79.4	84.2	62.9	59.7	56.1	20.7	83.5
SORT= N/A			MEDIAN= 0.00		MODE= -2.00	MEAN= N/A	WT %	29.3	12.4	10.4	11.0	8.2	7.8	7.3	2.7	10.9
SPLIT WT= 769.6							CUM WT %	29.3	41.7	52.0	63.0	71.3	79.1	86.4	89.1	100.0
130	0.8	H	9.7	53.3	37.0	msG	WT	188.2	92.5	97.0	110.0	86.1	71.0	43.1	15.0	58.0
SORT= N/A			MEDIAN= 1.00		MODE= -2.00	MEAN= N/A	WT %	24.7	12.3	12.9	14.7	10.6	9.4	5.7	2.0	7.7
SPLIT WT= 754.1							CUM WT %	24.7	37.0	49.9	64.6	75.2	84.6	90.3	92.3	100.0
135	0.8	H	11.3	43.3	45.5	msG	WT	265.7	74.3	71.1	75.5	74.8	55.1	47.0	22.5	61.7
SORT= N/A			MEDIAN= 0.00		MODE= -2.00	MEAN= N/A	WT %	35.5	9.9	9.5	10.1	10.0	7.4	6.3	3.0	8.3
SPLIT WT= 747.4							CUM WT %	35.5	45.5	55.0	65.1	75.1	82.5	88.7	91.7	100.0
140	0.7	H	10.6	58.8	30.6	msG	WT	180.8	107.2	86.8	103.4	73.2	74.1	41.0	19.1	59.7
SORT= N/A			MEDIAN= 0.00		MODE= -2.00	MEAN= N/A	WT %	24.3	14.4	11.7	13.9	9.8	9.9	5.5	2.6	8.0
SPLIT WT= 746.0							CUM WT %	24.3	38.8	50.3	64.2	74.0	83.9	89.4	92.0	100.0
145	0.7	H	11.5	40.5	47.9	msG	WT	266.4	90.6	75.1	62.7	63.2	50.2	50.5	15.7	70.2
SORT= N/A			MEDIAN= 0.00		MODE= -2.00	MEAN= N/A	WT %	35.8	12.2	10.1	8.4	8.5	6.7	6.8	2.1	9.4
SPLIT WT= 747.6							CUM WT %	35.8	47.9	58.0	66.5	74.9	81.7	88.5	90.6	100.0
150	0.6	H	11.1	52.0	37.0	msG	WT	172.4	104.6	97.8	96.6	75.7	76.8	42.9	30.2	52.7
SORT= N/A			MEDIAN= 0.00		MODE= -2.00	MEAN= N/A	WT %	23.0	14.0	13.0	12.9	10.1	10.3	5.7	4.0	7.0
SPLIT WT= 749.2							CUM WT %	23.0	37.0	50.0	62.9	73.0	83.2	89.0	93.0	100.0
155	0.5	H	13.9	48.3	37.8	msG	WT	157.2	104.0	80.5	81.5	66.1	62.8	62.7	43.6	52.7
SORT= N/A			MEDIAN= 1.00		MODE= -2.00	MEAN= N/A	WT %	22.8	15.1	11.7	8.9	9.6	9.1	9.1	6.3	7.6
SPLIT WT= 690.2							CUM WT %	22.8	37.9	49.5	58.4	67.9	77.0	86.1	92.4	100.0
160	1.2	H	13.6	71.8	14.6	(m)gS	WT	20.9	54.0	59.3	98.8	97.7	65.6	47.3	15.4	54.3
SORT= 2.31			MEDIAN= 2.00		MODE= 1.00	MEAN= 1.37	WT %	4.1	10.5	11.6	19.3	19.0	12.8	9.2	3.0	10.6
SPLIT WT= 515.3							CUM WT %	4.1	14.6	26.1	45.4	64.4	77.2	86.4	89.4	100.0
165	3.0	H	36.1	55.9	8.0	(g)mS	WT	10.6	19.8	15.1	16.9	25.6	53.9	99.2	41.2	94.8
SORT= 1.97			MEDIAN= 4.00		MODE= 4.00	MEAN= 3.07	WT %	2.8	5.2	4.0	4.5	6.8	14.3	26.3	10.9	25.2
SPLIT WT= 378.5							CUM WT %	2.8	8.0	12.0	16.5	23.3	37.6	63.9	74.9	100.0

TABLE D.7 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-043-42J ****

07/27/89

DEPTH	%CACO3	DW	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
170	3.2	N	46.0	50.2	3.8	mS	WT	2.7	10.7	14.7	16.6	61.0	32.3	71.6	57.0	82.6
SORT= 1.02		MEDIAN=	4.00	MODE=	5.00	MEAN= 3.17	WT %	0.8	3.1	4.2	4.8	17.5	9.3	20.5	16.3	23.7
SPLIT WT= 349.4							CUM WT %	0.8	3.8	8.0	12.8	30.3	39.5	60.0	76.3	100.0
175	0.0	N/	N/A	N/A	N/A	N/A	WT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SORT= N/A		MEDIAN=	N/A	MODE=	N/A	MEAN= N/A	WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SPLIT WT= N/A							CUM WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
180	2.7	N/	N/A	N/A	N/A	N/A	WT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SORT= N/A		MEDIAN=	N/A	MODE=	N/A	MEAN= N/A	WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SPLIT WT= N/A							CUM WT %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

TABLE D.8

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-043-043 ****

07/27/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
5	1.8	C	9.2	73.2	17.6	(m)gS	WT	74.4	57.6	142.0	115.6	107.8	89.9	94.5	25.8	42.9
SORT= 2.33 MEDIAN= 1.00 MODE= 0.00 MEAN= 1.04							WT %	9.9	7.7	18.9	15.4	14.3	12.0	12.6	3.5	5.7
SPLIT WT= 748.7							CUM WT %	9.9	17.6	36.5	52.0	66.2	78.2	90.8	94.3	100.0
10	3.7	C	4.7	59.0	36.2	sG	WT	175.3	89.3	184.4	134.7	60.6	30.8	20.4	7.1	27.6
SORT= N/A MEDIAN= 0.00 MODE= 0.00 MEAN= N/A							WT %	24.0	12.2	25.3	18.5	8.3	4.2	2.8	1.0	3.8
SPLIT WT= 730.1							CUM WT %	24.0	36.2	61.5	79.9	88.2	92.5	95.2	96.2	100.0
15	2.2	C	4.5	95.2	0.3	S	WT	6.6	1.6	18.8	134.7	249.3	69.7	23.4	7.2	15.8
SORT= 1.01 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.46							WT %	0.6	0.3	3.7	26.3	47.0	13.6	4.6	1.4	3.1
SPLIT WT= 511.7							CUM WT %	0.6	0.3	4.0	30.3	77.3	90.9	95.5	96.9	100.0
20	2.2	C	2.7	97.2	0.1	S	WT	0.6	0.4	10.9	97.1	259.2	58.5	15.0	4.2	8.2
SORT= 0.80 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.44							WT %	0.0	0.1	2.4	21.5	57.1	12.9	3.3	0.9	1.8
SPLIT WT= 452.6							CUM WT %	0.0	0.1	2.5	23.9	81.0	94.0	97.3	98.2	100.0
25	2.3	C	2.8	97.1	0.0	S	WT	0.0	0.2	5.6	71.3	230.4	97.2	17.5	4.9	7.4
SORT= 0.85 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.70							WT %	0.0	0.0	1.3	16.4	53.0	22.4	4.0	1.1	1.7
SPLIT WT= 435.0							CUM WT %	0.0	0.0	1.3	17.7	70.8	93.2	97.2	98.3	100.0
30	2.7	C	4.3	95.4	0.3	S	WT	0.0	1.3	7.2	77.6	214.2	120.7	32.6	7.0	13.2
SORT= 0.97 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.79							WT %	0.0	0.3	1.5	16.4	45.2	25.5	6.9	1.5	2.8
SPLIT WT= 472.8							CUM WT %	0.0	0.3	1.8	18.2	63.4	88.8	95.7	97.2	100.0
35	2.5	C	9.2	90.7	0.1	S	WT	0.0	0.3	8.1	33.3	110.6	170.4	113.3	24.8	20.3
SORT= 1.19 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.52							WT %	0.0	0.1	1.6	6.8	22.6	36.6	23.1	5.1	4.1
SPLIT WT= 490.4							CUM WT %	0.0	0.1	1.7	8.5	31.1	67.7	90.8	95.8	100.0
40	3.3	C	7.8	89.7	2.7	S	WT	13.4	0.1	2.6	43.8	134.8	211.6	58.9	14.2	24.1
SORT= 1.06 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.23							WT %	2.7	0.0	0.5	8.7	26.8	42.0	11.7	2.8	4.8
SPLIT WT= 504.1							CUM WT %	2.7	2.7	3.2	11.9	38.7	80.7	92.4	95.2	100.0
45	2.9	C	3.3	95.7	1.0	S	WT	1.0	4.7	18.9	126.2	299.5	87.2	22.6	5.5	13.9
SORT= 0.94 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.47							WT %	0.2	0.8	3.3	21.8	51.7	15.1	3.9	1.0	2.4
SPLIT WT= 579.7							CUM WT %	0.2	1.0	4.2	26.0	77.7	92.8	96.7	97.6	100.0
50	2.3	C	3.5	96.2	0.3	S	WT	0.2	1.2	9.8	77.4	217.8	105.6	34.3	7.2	8.8
SORT= 0.98 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.76							WT %	0.1	0.3	2.1	16.7	47.1	22.8	7.4	1.6	1.9
SPLIT WT= 462.5							CUM WT %	0.1	0.3	2.4	19.2	66.3	89.1	96.5	98.1	100.0
55	2.2	C	3.3	92.6	4.1	S	WT	7.1	14.0	52.0	220.5	163.1	42.4	17.4	5.2	12.4
SORT= 0.95 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.96							WT %	1.3	2.8	9.7	41.2	30.5	7.9	3.3	1.0	2.3
SPLIT WT= 536.1							CUM WT %	1.3	4.1	13.8	55.1	85.5	93.5	96.7	97.7	100.0

TABLE D.8 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-043-043 ****

07/27/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
60	1.0	C	1.3	76.9	21.8	gS	WT	26.9	88.9	213.0	137.3	38.3	13.8	6.4	1.8	5.4
SORT= 1.10		MEDIAN=	0.00	MODE=	0.00	MEAN= -0.26	WT %	5.1	16.7	40.1	25.8	7.2	2.6	1.2	0.3	1.0
SPLIT WT= 532.4							CUM WT %	5.1	21.8	61.8	87.7	94.9	97.5	98.7	99.0	100.0
65	2.0	C	2.7	85.3	11.9	gS	WT	16.9	52.8	196.8	184.3	70.4	29.9	16.8	4.5	11.5
SORT= 1.22		MEDIAN=	1.00	MODE=	0.00	MEAN= 0.27	WT %	2.9	9.0	33.7	31.6	12.1	5.1	2.9	0.8	2.0
SPLIT WT= 582.1							CUM WT %	2.9	11.9	45.6	77.2	89.3	94.4	97.3	98.0	100.0
70	1.0	C	3.3	85.9	10.8	gS	WT	15.1	47.9	164.8	175.7	99.0	41.2	19.8	6.1	13.1
SORT= 1.34		MEDIAN=	1.00	MODE=	1.00	MEAN= 0.47	WT %	2.6	8.2	28.3	30.2	17.0	7.1	3.4	1.1	2.3
SPLIT WT= 581.2							CUM WT %	2.6	10.8	39.1	69.3	86.3	93.3	96.7	97.8	100.0
75	2.0	C	4.8	88.3	8.8	(g)S	WT	10.3	39.6	137.3	206.9	81.3	39.3	22.8	8.0	19.3
SORT= 1.35		MEDIAN=	1.00	MODE=	1.00	MEAN= 0.58	WT %	1.8	7.0	24.3	36.6	14.4	7.0	4.0	1.4	3.4
SPLIT WT= 566.2							CUM WT %	1.8	8.8	33.2	69.8	84.2	91.1	95.2	96.6	100.0
80	2.0	C	2.6	88.1	9.9	(g)S	WT	15.2	37.8	98.8	193.9	134.2	32.2	12.2	3.1	7.6
SORT= 1.22		MEDIAN=	1.00	MODE=	1.00	MEAN= 0.57	WT %	2.8	7.1	18.5	36.2	25.1	6.0	2.3	0.6	1.4
SPLIT WT= 534.9							CUM WT %	2.8	9.9	28.4	64.6	89.7	95.7	98.0	98.6	100.0
85	2.0	C	10.1	88.6	1.2	(m)S	WT	2.2	5.1	11.0	67.6	201.6	146.2	94.0	25.4	34.1
SORT= 1.29		MEDIAN=	0.00	MODE=	2.00	MEAN= 2.24	WT %	0.4	0.9	2.0	11.5	34.3	24.9	16.0	4.3	5.8
SPLIT WT= 586.9							CUM WT %	0.4	1.2	3.2	14.7	49.0	73.9	89.9	94.2	100.0
90	2.0	C	2.9	91.2	5.9	(g)S	WT	8.0	26.8	108.1	245.2	126.9	48.6	20.8	5.9	11.9
SORT= 1.10		MEDIAN=	1.00	MODE=	1.00	MEAN= 0.71	WT %	1.4	4.5	17.9	40.7	21.1	8.1	3.5	1.0	2.0
SPLIT WT= 602.7							CUM WT %	1.4	5.9	23.8	64.5	85.6	93.6	97.1	98.1	100.0
95	2.0	C	2.7	94.0	3.3	S	WT	1.9	16.7	87.1	288.8	174.6	47.2	17.3	4.4	11.1
SORT= 1.05		MEDIAN=	1.00	MODE=	1.00	MEAN= 0.88	WT %	0.3	2.9	15.3	36.7	30.7	8.3	3.0	0.8	2.0
SPLIT WT= 568.5							CUM WT %	0.3	3.3	18.6	55.3	86.0	94.3	97.3	98.1	100.0
100	1.1	C	2.4	97.5	0.1	S	WT	0.0	0.3	22.4	172.7	209.5	63.1	17.8	4.6	7.4
SORT= 0.94		MEDIAN=	2.00	MODE=	2.00	MEAN= 1.27	WT %	0.0	0.1	4.5	34.7	42.1	12.7	3.6	0.9	1.5
SPLIT WT= 498.4							CUM WT %	0.0	0.1	4.6	39.3	81.4	94.0	97.6	98.5	100.0
105	2.0	C	0.8	91.2	0.0	S	WT	0.0	0.0	2.6	23.3	150.1	169.9	69.5	16.9	23.1
SORT= 1.11		MEDIAN=	3.00	MODE=	3.00	MEAN= 2.38	WT %	0.0	0.0	0.6	5.1	33.0	37.3	15.3	3.7	5.1
SPLIT WT= 455.8							CUM WT %	0.0	0.0	0.6	5.7	38.7	76.0	91.2	94.9	100.0
110	0.0	H	9.8	41.8	48.5	msG	WT	288.5	93.1	76.8	63.7	63.7	69.9	37.8	12.0	60.3
SORT= N/A		MEDIAN=	0.00	MODE=	-2.00	MEAN= N/A	WT %	38.6	12.5	10.3	8.5	8.5	9.4	5.1	1.6	8.2
SPLIT WT= 746.7							CUM WT %	38.6	48.5	58.8	67.3	75.8	85.2	90.3	91.9	100.0

TABLE D.8 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-043-043 ****

07/27/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
115	1.0	H	8.8	31.6	59.6	msG	WT	352.5	134.4	88.0	72.2	36.6	32.9	28.9	13.8	57.8
SORT= N/A	MEDIAN= -1.00		MODE= -2.00		MEAN= N/A		WT %	43.1	16.5	10.8	8.8	4.5	4.0	3.5	1.7	7.1
SPLIT WT= 819.7							CUM WT %	43.1	59.6	70.4	79.2	83.7	87.7	91.2	92.9	100.0
120	0.7	H	7.8	70.3	21.9	gS	WT	56.2	120.9	259.9	158.1	66.5	51.8	29.4	13.8	48.8
SORT= 1.04	MEDIAN= 0.00		MODE= 0.00		MEAN= 0.26		WT %	6.9	15.0	32.3	19.7	8.3	6.4	3.7	1.7	6.1
SPLIT WT= 804.8							CUM WT %	6.9	21.9	54.2	73.9	82.1	88.6	92.2	93.9	100.0
125	0.5	H	9.3	27.3	63.5	msG	WT	411.1	101.3	66.0	45.0	37.0	35.8	36.1	18.4	56.4
SORT= N/A	MEDIAN= -2.00		MODE= -2.00		MEAN= N/A		WT %	50.9	12.6	8.2	5.6	4.6	4.4	4.5	2.3	7.0
SPLIT WT= 807.6							CUM WT %	50.9	63.5	71.7	77.2	81.8	86.3	90.7	93.0	100.0
130	0.4	H	6.0	93.3	0.7	S	WT	1.1	4.1	86.3	285.1	180.3	74.4	36.2	10.2	31.2
SORT= 1.24	MEDIAN= 1.00		MODE= 1.00		MEAN= 1.19		WT %	0.2	0.6	12.5	38.5	26.2	10.8	5.3	1.5	4.5
SPLIT WT= 685.9							CUM WT %	0.2	0.8	13.3	51.8	77.9	88.7	94.0	95.5	100.0
135	0.3	H	7.8	87.4	4.7	S	WT	8.7	26.3	124.2	242.4	137.9	85.5	54.7	18.5	39.4
SORT= 1.63	MEDIAN= 1.00		MODE= 1.00		MEAN= 1.16		WT %	1.2	3.6	16.8	32.9	18.7	11.6	7.4	2.5	5.3
SPLIT WT= 739.1							CUM WT %	1.2	4.8	21.6	54.5	73.1	84.7	92.2	94.7	100.0
140	0.3	H	4.4	69.9	25.6	gS	WT	77.4	120.9	175.1	155.2	110.7	68.5	33.2	11.0	23.4
SORT= 1.88	MEDIAN= 1.00		MODE= 0.00		MEAN= 0.21		WT %	10.0	15.6	22.7	20.1	14.3	8.8	4.3	1.4	3.0
SPLIT WT= 772.6							CUM WT %	10.0	25.6	48.3	68.4	82.7	91.3	95.6	97.0	100.0
145	0.3	H	13.3	47.5	39.2	msG	WT	176.1	108.3	87.7	70.1	64.5	64.1	58.2	16.4	79.8
SORT= N/A	MEDIAN= 0.00		MODE= -2.00		MEAN= N/A		WT %	24.3	14.9	12.1	9.7	8.9	8.8	8.0	2.3	11.0
SPLIT WT= 726.4							CUM WT %	24.3	39.2	51.3	61.0	69.9	78.7	86.7	89.0	100.0
150	0.3	H	12.9	54.2	32.9	msG	WT	137.4	92.1	77.0	88.3	78.1	89.3	44.8	15.8	73.8
SORT= N/A	MEDIAN= 1.00		MODE= -2.00		MEAN= N/A		WT %	19.7	13.2	11.2	12.7	11.2	12.8	6.4	2.3	10.6
SPLIT WT= 698.4							CUM WT %	19.7	32.9	44.1	56.7	67.9	80.7	87.1	89.4	100.0
155	0.4	H	13.7	49.8	36.5	msG	WT	138.9	120.1	92.2	68.4	71.4	64.2	57.2	24.9	72.6
SORT= N/A	MEDIAN= 1.00		MODE= -2.00		MEAN= N/A		WT %	19.6	16.9	13.0	9.6	10.1	9.0	8.1	3.5	10.2
SPLIT WT= 709.6							CUM WT %	19.6	36.5	49.5	59.1	69.2	78.2	86.3	89.8	100.0
160	0.4	H	12.6	48.8	39.2	msG	WT	158.1	131.4	91.7	72.9	74.6	84.3	37.5	15.8	73.0
SORT= N/A	MEDIAN= 0.00		MODE= -2.00		MEAN= N/A		WT %	21.4	17.8	12.4	9.9	10.1	11.4	5.1	2.1	9.9
SPLIT WT= 739.1							CUM WT %	21.4	39.2	51.6	61.4	71.5	82.9	88.0	90.1	100.0
165	0.5	H	6.8	77.6	15.6	gS	WT	65.0	45.5	58.6	176.6	189.9	100.0	33.2	10.7	37.7
SORT= 1.82	MEDIAN= 2.00		MODE= 2.00		MEAN= 0.92		WT %	9.2	6.4	8.2	24.0	26.7	14.0	4.7	1.5	5.3
SPLIT WT= 713.3							CUM WT %	9.2	15.6	23.9	47.9	74.5	88.5	93.2	94.7	100.0

TABLE D.8 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-043-043 ****

07/27/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
170	0.5	H	7.4	38.4	54.2	msG	WT	281.5	116.2	81.6	67.7	51.5	43.9	33.2	13.4	39.9
SORT= N/A		MEDIAN=	-1.00	MODE=	-2.00	MEAN= N/A	WT %	39.0	15.2	11.3	9.4	7.1	6.1	4.6	1.9	5.5
SPLIT WT= 721.9							CUM WT %	39.0	54.2	65.5	74.8	82.8	88.0	92.6	94.5	100.0
175	1.1	H	4.1	76.6	19.3	gS	WT	48.2	94.0	118.5	168.1	172.8	77.3	27.0	6.8	23.2
SORT= 1.73		MEDIAN=	1.00	MODE=	2.00	MEAN= 0.53	WT %	6.6	12.8	16.1	22.8	23.5	10.5	3.7	0.9	3.2
SPLIT WT= 736.1							CUM WT %	6.6	19.3	35.4	58.3	81.8	92.3	96.0	96.9	100.0
180	0.6	H	6.6	88.5	4.9	S	WT	6.9	25.1	82.2	153.6	164.7	124.2	57.0	12.0	31.5
SORT= 1.53		MEDIAN=	2.00	MODE=	2.00	MEAN= 1.41	WT %	1.5	3.8	12.5	23.4	25.1	18.9	8.7	1.8	4.8
SPLIT WT= 657.5							CUM WT %	1.0	4.9	17.4	40.7	65.8	84.7	93.4	95.2	100.0

TABLE D.9

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-044-042 ****

07/27/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
5	0.2	C	3.9	42.3	53.8	sG	WT	309.2	72.7	98.4	75.9	70.1	34.5	21.7	8.3	19.2
SORT= N/A MEDIAN= -1.00 MODE= -2.00 MEAN= N/A							WT %	43.6	10.2	13.9	10.7	9.9	4.9	3.1	1.2	2.7
SPLIT WT= 709.7							CUM WT %	43.6	53.8	67.6	78.3	88.2	93.1	96.1	97.3	100.0
10	1.2	H	3.5	36.4	60.1	sG	WT	411.2	95.7	61.0	67.2	108.8	43.6	26.7	8.3	21.3
SORT= N/A MEDIAN= -1.00 MODE= -2.00 MEAN= N/A							WT %	48.7	11.3	7.2	8.0	12.9	5.2	3.2	1.0	2.5
SPLIT WT= 843.3							CUM WT %	48.7	60.1	67.3	75.3	88.2	93.3	96.5	97.5	100.0
15	1.4	H	4.1	34.7	61.3	msG	WT	417.3	72.5	51.2	64.6	94.7	44.1	22.4	9.0	23.4
SORT= N/A MEDIAN= -2.00 MODE= -2.00 MEAN= N/A							WT %	52.2	9.1	6.4	8.1	11.8	5.5	2.8	1.1	2.9
SPLIT WT= 797.9							CUM WT %	52.2	61.3	67.7	75.8	87.6	93.1	95.9	97.1	100.0
20	1.2	H	1.8	34.6	63.6	sG	WT	379.1	88.1	81.4	64.2	58.3	34.6	11.8	3.2	9.6
SORT= N/A MEDIAN= -2.00 MODE= -2.00 MEAN= N/A							WT %	52.5	11.1	11.3	8.9	8.1	4.7	1.6	0.4	1.3
SPLIT WT= 721.0							CUM WT %	52.5	63.6	74.9	83.8	91.9	96.6	98.2	98.7	100.0
25	1.0	C	3.2	46.8	50.0	sG	WT	278.2	93.7	89.8	90.3	90.4	52.7	26.2	8.4	15.6
SORT= N/A MEDIAN= 0.00 MODE= -2.00 MEAN= N/A							WT %	37.4	12.6	12.0	12.1	12.1	7.1	3.5	1.1	2.1
SPLIT WT= 743.1							CUM WT %	37.4	50.0	61.9	74.1	86.2	93.3	96.8	97.9	100.0
30	0.8	C	3.4	28.9	67.7	msG	WT	502.7	92.9	74.6	83.9	46.4	29.1	20.2	8.1	21.7
SORT= N/A MEDIAN= -2.00 MODE= -2.00 MEAN= N/A							WT %	57.2	10.6	8.5	9.5	5.3	3.3	2.3	0.9	2.5
SPLIT WT= 879.4							CUM WT %	57.2	67.7	76.2	85.7	91.0	94.3	96.6	97.5	100.0
35	1.2	C	0.6	80.4	13.0	gS	WT	81.7	3.2	5.3	105.1	265.3	107.4	42.4	12.1	31.0
SORT= 1.84 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.49							WT %	12.5	0.5	0.8	16.1	40.6	16.4	6.5	1.9	4.8
SPLIT WT= 652.0							CUM WT %	12.5	13.0	13.8	29.9	70.5	86.9	93.4	95.3	100.0
40	1.2	H	4.2	72.3	23.0	gS	WT	116.0	43.5	38.0	129.0	225.7	83.7	30.5	16.1	19.5
SORT= N/A MEDIAN= 2.00 MODE= 2.00 MEAN= N/A							WT %	16.8	6.2	5.5	18.5	32.4	12.0	4.4	1.5	2.8
SPLIT WT= 693.2							CUM WT %	16.8	23.0	28.5	47.0	79.4	91.4	95.8	97.2	100.0
45	1.6	C	3.1	46.3	50.6	sG	WT	338.5	56.9	34.0	107.4	151.3	51.1	18.2	6.3	17.9
SORT= N/A MEDIAN= -1.00 MODE= -2.00 MEAN= N/A							WT %	43.3	7.3	4.4	13.8	19.4	6.5	2.3	0.8	2.3
SPLIT WT= 780.7							CUM WT %	43.3	50.6	55.0	68.7	88.1	94.6	96.9	97.7	100.0
50	0.7	C	3.4	43.5	53.1	sG	WT	267.9	131.6	118.4	97.1	56.6	33.9	21.1	6.5	19.1
SORT= N/A MEDIAN= -1.00 MODE= -2.00 MEAN= N/A							WT %	35.6	17.5	15.7	12.9	7.5	4.5	2.8	0.9	2.5
SPLIT WT= 752.5							CUM WT %	35.6	53.1	68.8	81.8	89.3	93.8	96.6	97.5	100.0
55	1.4	C	4.8	94.9	0.3	S	WT	0.0	1.5	14.0	103.3	251.9	82.9	33.1	9.3	15.3
SORT= 1.03 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.63							WT %	0.0	0.3	2.7	20.2	49.3	16.2	6.5	1.8	3.0
SPLIT WT= 510.7							CUM WT %	0.0	0.3	3.0	23.2	72.5	88.7	95.2	97.0	100.0

TABLE D.9 (contd)

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DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
60	1.2	C	2.9	97.0	0.1	S	WT	0.0	0.0	10.4	128.0	303.3	89.3	24.4	7.0	9.7
SORT= 0.90 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.52							WT %	0.0	0.1	1.8	22.3	53.0	15.0	4.3	1.2	1.7
SPLIT WT= 572.3							CUM WT %	0.0	0.1	2.0	24.3	77.2	92.9	97.1	98.3	100.0
65	1.8	C	6.4	93.6	0.0	S	WT	0.0	0.2	1.0	9.5	141.5	269.1	54.9	10.5	21.8
SORT= 0.80 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.33							WT %	0.0	0.0	0.2	1.9	27.8	52.9	10.8	2.1	4.3
SPLIT WT= 507.6							CUM WT %	0.0	0.0	0.2	2.1	29.9	82.8	93.6	95.7	100.0
70	1.3	C	3.9	96.1	0.0	S	WT	0.0	0.3	2.0	81.0	266.1	157.3	35.5	7.7	14.1
SORT= 0.88 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.85							WT %	0.0	0.1	0.5	14.3	47.1	27.9	6.3	1.4	2.5
SPLIT WT= 562.1							CUM WT %	0.0	0.1	0.5	14.9	62.0	89.9	96.2	97.6	100.0
75	1.4	C	2.7	97.3	0.0	S	WT	0.0	0.0	0.0	158.9	233.0	87.3	23.2	5.2	8.9
SORT= 0.99 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.45							WT %	0.0	0.0	1.6	30.3	44.4	16.6	4.4	1.0	1.7
SPLIT WT= 523.7							CUM WT %	0.0	0.0	1.7	31.9	76.3	92.9	97.3	98.3	100.0
80	1.6	C	7.7	92.3	0.0	S	WT	0.0	0.0	0.3	3.9	52.6	245.8	132.9	15.2	21.2
SORT= 0.81 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.84							WT %	0.0	0.0	0.1	0.8	11.1	52.1	28.2	3.2	4.5
SPLIT WT= 469.8							CUM WT %	0.0	0.0	0.1	0.9	12.0	64.1	92.3	95.5	100.0
85	2.1	C	5.3	94.6	0.1	S	WT	0.1	0.5	2.1	31.1	191.3	176.9	61.0	12.6	13.4
SORT= 0.95 MEDIAN= 3.00 MODE= 2.00 MEAN= 2.16							WT %	0.0	0.1	0.4	6.4	39.1	36.2	12.5	2.6	2.7
SPLIT WT= 488.5							CUM WT %	0.0	0.1	0.5	6.9	46.0	82.2	94.7	97.3	100.0
90	2.6	C	9.2	90.8	0.0	S	WT	0.0	0.0	0.1	1.0	42.4	292.7	89.2	17.5	25.7
SORT= 0.76 MEDIAN= 3.00 MODE= 3.00 MEAN= 2.80							WT %	0.0	0.0	0.0	0.4	9.0	62.4	19.0	3.7	5.5
SPLIT WT= 472.7							CUM WT %	0.0	0.0	0.0	0.4	9.5	71.9	90.8	94.5	100.0
95	1.4	C	2.8	98.9	0.3	S	WT	0.1	1.5	0.6	101.1	252.0	47.0	14.8	4.2	10.4
SORT= 0.78 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.21							WT %	0.0	0.3	1.7	34.8	48.6	9.0	2.9	0.8	2.0
SPLIT WT= 521.5							CUM WT %	0.0	0.3	2.0	36.8	85.3	94.4	97.2	98.0	100.0
100	0.9	C	3.0	94.3	2.7	S	WT	1.0	13.2	104.5	259.1	109.2	28.6	13.2	4.6	11.8
SORT= 1.02 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.87							WT %	0.3	2.4	19.1	47.5	20.0	5.2	2.4	0.8	2.2
SPLIT WT= 546.6							CUM WT %	0.3	2.7	21.9	69.3	89.3	94.6	97.0	97.8	100.0
105	1.0	C	2.0	87.9	9.4	(g)S	WT	11.2	41.9	95.0	203.0	137.3	46.9	15.6	4.9	11.0
SORT= 1.26 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.65							WT %	2.0	7.4	16.9	35.8	24.2	8.3	2.8	0.9	1.9
SPLIT WT= 569.5							CUM WT %	2.0	9.4	26.2	62.0	86.2	94.5	97.2	98.1	100.0
110	0.9	C	1.9	93.0	5.0	(g)S	WT	5.4	21.3	113.0	218.8	120.9	29.2	9.7	2.6	7.7
SORT= 1.10 MEDIAN= 1.00 MODE= 1.00 MEAN= 0.60							WT %	1.0	4.0	21.4	41.4	22.9	5.5	1.8	0.5	1.5
SPLIT WT= 529.0							CUM WT %	1.0	5.0	26.4	67.8	90.7	96.2	98.0	98.5	100.0

TABLE D.9 (contd)

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DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
115	0.3	H	7.3	46.6	46.1	msG	WT	226.8	158.6	100.3	94.1	45.9	40.4	29.1	14.8	46.4
SORT= N/A	MEDIAN=		0.00	MODE=	-2.00	MEAN= N/A	WT %	27.1	19.0	21.6	11.3	5.5	4.8	3.5	1.8	5.6
SPLIT WT= 836.7							CUM WT %	27.1	46.1	67.6	78.9	84.4	89.2	92.7	94.5	100.0
120	0.5	H	12.3	41.7	45.9	msG	WT	211.0	142.5	92.3	75.5	47.0	54.1	52.2	18.7	76.1
SORT= N/A	MEDIAN=		0.00	MODE=	-2.00	MEAN= N/A	WT %	27.4	18.5	12.0	9.8	6.1	7.0	6.8	2.4	9.9
SPLIT WT= 772.4							CUM WT %	27.4	45.9	57.9	67.8	73.9	80.9	87.7	90.1	100.0
125	0.3	H	9.7	80.8	9.5	(gm)S	WT	27.6	41.7	107.5	209.2	158.7	86.6	34.0	14.0	57.1
SORT= 1.71	MEDIAN=		1.00	MODE=	1.00	MEAN= 1.08	WT %	3.8	5.7	14.7	27.8	21.7	11.9	4.7	1.9	7.8
SPLIT WT= 728.2							CUM WT %	3.8	9.5	24.2	52.0	73.8	85.6	90.3	92.2	100.0
130	0.4	H	10.4	30.2	59.4	msG	WT	403.5	64.8	59.5	49.1	43.7	44.1	42.0	17.8	64.3
SORT= N/A	MEDIAN=		-2.00	MODE=	-2.00	MEAN= N/A	WT %	51.2	8.2	7.6	6.2	5.5	5.6	5.3	2.3	8.2
SPLIT WT= 785.9							CUM WT %	51.2	59.4	66.9	73.2	78.7	84.3	89.6	91.8	100.0
135	0.3	H	16.3	39.2	44.5	msG	WT	254.2	54.6	49.5	58.7	52.9	71.4	39.1	28.7	84.4
SORT= N/A	MEDIAN=		0.00	MODE=	-2.00	MEAN= N/A	WT %	36.7	7.9	7.1	8.5	7.6	10.3	5.6	4.1	12.2
SPLIT WT= 691.6							CUM WT %	36.7	44.5	51.7	60.1	67.8	78.1	83.7	87.8	100.0
140	0.2	H	11.1	37.9	51.0	msG	WT	283.2	145.0	94.2	72.3	53.1	44.3	39.3	14.2	75.6
SORT= N/A	MEDIAN=		-1.00	MODE=	-2.00	MEAN= N/A	WT %	32.9	18.1	11.8	9.0	6.6	5.5	4.9	1.8	9.4
SPLIT WT= 798.7							CUM WT %	32.9	51.0	62.8	71.8	78.4	84.0	88.9	90.7	100.0
145	0.4	H	10.8	30.7	58.4	msG	WT	310.2	112.6	66.2	54.9	34.9	34.1	32.6	14.7	63.3
SORT= N/A	MEDIAN=		-1.00	MODE=	-2.00	MEAN= N/A	WT %	42.9	15.5	9.1	7.6	4.8	4.7	4.5	2.0	8.8
SPLIT WT= 722.7							CUM WT %	42.8	58.4	67.6	75.1	80.0	84.7	89.2	91.2	100.0
150	0.3	H	7.0	59.3	33.7	msG	WT	149.9	128.3	174.4	155.5	80.7	47.8	31.9	12.3	45.3
SORT= N/A	MEDIAN=		0.00	MODE=	0.00	MEAN= N/A	WT %	18.2	15.5	21.1	18.8	9.8	5.8	3.9	1.5	5.5
SPLIT WT= 823.2							CUM WT %	18.2	33.7	54.8	73.6	83.4	89.2	93.0	94.5	100.0
155	0.3	H	21.2	49.5	29.3	gmS	WT	115.3	75.6	49.7	54.4	71.7	102.5	43.8	20.3	117.7
SORT= N/A	MEDIAN=		2.00	MODE=	5.00	MEAN= N/A	WT %	17.7	11.6	7.6	8.4	11.0	15.7	6.7	3.1	18.1
SPLIT WT= 648.7							CUM WT %	17.7	29.3	37.0	45.3	56.3	72.1	78.8	81.9	100.0
160	0.4	H	11.4	88.2	0.4	(m)S	WT	0.1	2.9	51.8	200.1	185.5	133.6	54.3	16.8	63.8
SORT= 1.55	MEDIAN=		2.00	MODE=	1.00	MEAN= 1.74	WT %	0.0	0.4	7.3	28.2	26.1	18.8	7.7	2.4	9.0
SPLIT WT= 709.5							CUM WT %	0.0	0.4	7.7	35.9	62.1	80.9	88.6	91.0	100.0
165	0.5	H	15.4	70.5	14.1	(m)gS	WT	45.4	40.2	77.1	87.9	118.3	94.2	59.6	25.2	66.5
SORT= 2.39	MEDIAN=		2.00	MODE=	2.00	MEAN= 1.53	WT %	7.5	6.6	12.7	14.4	18.1	15.5	9.8	4.1	11.3
SPLIT WT= 605.2							CUM WT %	7.5	14.1	26.7	41.2	59.3	74.8	84.6	88.7	100.0

TABLE D.9 (contd)

WESTINGHOUSE HANFORD OPERATIONS SIEVE ANALYSIS
ROCKSAN REPORT

**** REPORT ON WELL 0699-044-042 ****

07/27/89

DEPTH	%CACO3	DM	%MUD	%SAND	%GRAVEL	CLASS		FINE PEB (<=-2)	VFINE PEB (-1)	VERY COARS (0)	COARS (1)	MED (2)	FINE (3)	VERY FINE (4)	SILT (4.75)	PAN (>4.75)
170	0.2	H	4.1	92.8	3.1	S	WT	6.1	21.2	116.8	186.2	240.0	85.2	20.3	6.6	22.5
SORT= 1.15 MEDIAN= 2.00 MODE= 2.00 MEAN= 0.97							WT %	0.6	3.1	17.0	27.1	36.1	9.5	3.0	0.9	3.3
SPLIT WT= 683.3							CUM WT %	0.6	3.1	20.1	47.3	83.4	92.9	96.9	96.7	100.0
173	0.3	H	15.3	85.4	19.2	(m)gS	WT	90.5	20.2	68.5	97.6	102.7	84.4	50.4	21.6	73.8
SORT= 2.95 MEDIAN= 2.00 MODE= 2.00 MEAN= 1.05							WT %	16.0	3.3	11.1	15.6	16.6	13.7	8.2	3.5	11.8
SPLIT WT= 616.3							CUM WT %	16.0	19.2	30.4	46.2	62.8	76.5	84.7	88.2	100.0

TABLE D.10 Moisture Content at 216-B-3 Pond Wells

Well 699-44-42		Well 699-43-42J	
Depth, ft	% Moisture, by weight	Depth, ft	% Moisture, by weight
5	3.45	5	3.08
10	2.55	95	3.66
15	3.07	100	4.78
20	3.09	105	8.65
25	3.27	110	5.51
30	3.28		
35	3.57		
40	2.54		
45	2.72		
50	3.23		
55	6.82		
60	7.48		
65	9.44		
70	7.53		
75	7.44		
80	16.83		
85	16.17		
90	16.31		
95	5.64		
100	5.13		
105	7.54		
110	5.76		

Well 699-43-43		Well 699-42-42B	
Depth, ft	% Moisture, by weight	Depth, ft	% Moisture, by weight
5	2.72	5	3.11
10	2.44	10	3.01
15	4.70	15	4.81
20	5.01	20	4.94
25	8.29	25	7.28
30	7.00	30	6.17
35	14.78	35	11.13
40	12.64	40	6.29
45	3.01	45	6.53
50	3.34	50	20.12
55	3.96	55	11.26
60	2.93	60	12.10
65	3.50	65	8.78
70	3.28	70	10.49
75	3.44	75	11.33

TABLE D.10 (contd)

Well 699-43-43 (contd)

Depth, ft	% Moisture, by weight
80	2.84
85	11.44
90	3.08
95	3.24
100	3.48
105	5.93

Well 699-42-42B (contd)

Depth, ft	% Moisture, by weight
80	9.94
85	7.19
90	12.97
95	3.63
100	3.55
105	5.12

BP-1

Depth, ft	% Moisture, by weight
5	3.38
10	2.38
14	12.52
15	4.62
20	3.00
25	3.33
30	3.06
35	3.55
40	4.66
43	21.57
45	21.73
50	10.28
55	12.93
60	6.93
65	6.87
70	9.45
75	9.19
80	8.80
85	5.22
90	5.68
95	4.68

BP-2

Depth, ft	% Moisture, by weight
5	4.73
10	3.92
40	3.90
45	5.81
50	4.36
55	4.62
60	4.73
65	4.61
70	4.74
75	4.74
80	5.47
110	8.25
115	8.74
120	5.29

BP-4

NO SAMPLES COLLECTED

BP-5

Depth, ft	% Moisture, by weight
5	2.83
10	2.84
15	2.39
30	2.83
40	3.69

TABLE D.10 (contd)

BP-6		BP-9	
Depth, ft	% Moisture, by weight	Depth, ft	% Moisture, by weight
5	2.78	5	6.97
126	24.63[a]	10	3.63
140	19.39[a]	15	3.90
147	20.79[a]		
149	36.47[a]		

(a) Water had been added during drilling at this interval. Sample was obtained from within a split-spoon sampler and was believed to be unaffected by the added water.

Table D-11. Summary of Samples and Analyses of B Pond Sediments. (The symbol "X" indicates that the results are included in this report. The symbol "--" indicates that the sample was not selected for analysis. The symbol "O" indicates that the sample will be submitted for XRF Analysis when the sample is returned to PNL from U.S. Testing.

WELL NUMBER	DEPTH (ft)	TOC MEASUREMENTS	IC MEASUREMENTS	GROSS BETA	GAMMA SCAN	XRF
BP-1	14	X	X	X	--	--
BP-1	20	X	X	X	--	--
BP-1	40	X	X	X	--	--
BP-1	43	X	X	X	--	--
BP-1	46-47	X	X	X	--	O
BP-1	60	X	X	X	--	--
BP-1	80	X	X	X	--	--
BP-1	105	X	X	X	--	O
BP-1	120	X	X	X	--	--
BP-1	146	X	X	X	--	O
BP-1	160	X	X	X	--	--
BP-1	181	X	X	X	--	O
BP-1	200	X	X	X	--	--
BP-2	20	X	X	X	--	--
BP-2	40	X	X	X	--	--
BP-2	60	X	X	X	--	X
BP-2	80	X	X	X	X	--
BP-2	100	X	X	X	--	--
BP-2	115	X	X	X	--	X
BP-2	120	X	X	X	--	--
BP-2	140	X	X	X	--	--
BP-2	160	X	X	X	--	--
BP-4	20	X	X	X	--	X
BP-4	40	X	X	X	--	--
BP-4	60	X	X	X	X	X
BP-4	80	X	X	X	--	--
BP-4	100	X	X	X	--	X
BP-4	120	X	X	X	X	--
BP-4	125	X	X	X	--	X
BP-4	140	X	X	X	--	--
BP-5	20	X	X	X	--	O
BP-5	40	X	X	X	--	--
BP-5	60	X	X	X	--	X
BP-5	80	X	X	X	X	--
BP-5	101	X	X	X	--	X
BP-5	120	X	X	X	--	--
BP-5	125	X	X	X	X	X

Table D-11. (continued)

WELL NUMBER	DEPTH (ft)	TOC MEASUREMENTS	IC MEASUREMENTS	GROSS BETA	GAMMA SCAN	XRF
BP-5	140	X	X	X	--	--
BP-5	160	X	X	X	X	--
BP-5	180	X	X	X	--	0
BP-5	206	(a)	(a)	X	--	--
BP-6	22	X	X	X	--	X
BP-6	40	X	X	X	--	--
BP-6	60	X	X	X	X	X
BP-6	80	X	X	X	--	--
BP-6	100	X	X	X	--	X
BP-6	120	X	X	X	X	--
BP-6	123-124	X	X	X	--	--
BP-6	129.5	X	X	X	--	X
BP-6	140	X	X	X	--	--
BP-9	20	X	X	X	--	X
BP-9	40	X	X	X	--	--
BP-9	60	X	X	X	--	X
BP-9	80	X	X	X	X	--
BP-9	100	X	X	X	X	X
BP-9	120	X	X	X	--	--
BP-9	125	X	X	X	--	--
BP-9	140	X	X	X	--	--
BP-9	145	X	X	X	--	X
BP-9	160	X	X	X	--	--
BP-9	177	X	X	X	--	X

(a) Analysis not received from U.S. Testing.

Table D-12. Results of Total Organic Carbon (TOC) Analyses of B Pond Sediment Samples Reported by U.S. Testing.

WELL NUMBER	DEPTH (ft)	TOC (µg/g)
BP-1	14	< 20
BP-1	20	< 20
BP-1	40	< 20
BP-1	43	< 20
BP-1	46-47	< 20
BP-1	60	< 20
BP-1	80	< 20
BP-1	105	< 20
BP-1	120	< 20
BP-1	146	< 20
BP-1	160	< 20
BP-1	181	< 20
BP-1	200	< 20
BP-2	20	< 20
BP-2	40	< 20
BP-2	60	< 20
BP-2	80	< 20
BP-2	100	25
BP-2	115	< 20
BP-2	120	< 20
BP-2	140	< 20
BP-2	160	< 20
BP-4	20	< 20
BP-4	40	< 20
BP-4	60	< 20
BP-4	80	< 20
BP-4	100	< 20
BP-4	120	< 20
BP-4	125	< 20
BP-4	140	< 20
BP-5	20	< 20
BP-5	40	< 20
BP-5	60	< 20
BP-5	80	< 20
BP-5	101	< 20
BP-5	120	< 20
BP-5	120	< 20
BP-5	125	< 20
BP-5	140	< 20
BP-5	160	< 20
BP-5	180	< 20
BP-5	206	< 20
BP-6	22	< 20
BP-6	40	< 20
BP-6	60	< 20
BP-6	80	< 20
BP-6	100	< 20
BP-6	120	< 20
BP-6	123-124	< 20
BP-6	129.5	< 20
BP-6	140	< 20
BP-9	20	< 20
BP-9	40	< 20
BP-9	60	< 20
BP-9	80	< 20
BP-9	100	< 20
BP-9	120	< 20
BP-9	125	< 20
BP-9	140	< 20
BP-9	145	< 20
BP-9	160	< 20
BP-9	177	27[a]

(a) This value was estimated because of matrix interference that would not allow signal to return to the baseline value within the timing cycle. As a result, this value may be too high.

Table D-13. Anion Concentration in B Pond Sediments
Concentrations in µg/g.

SAMPLE	NO_3^-	$SO_4^=$	F^-	CL^-	PO_4^{3-}	BR^-	NO_2^-
BP-1 14 FT	2.69	26.03	<1.0	7.30	<2.0	<1.0	<1.0
BP-1 20 FT	<1.0	7.99	<1.0	1.05	<2.0	<1.0	<1.0
BP-1 40 FT	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
BP-1 43 FT	<1.0	2.72	<1.0	<1.0	<2.0	<1.0	<1.0
BP-1 46 FT	<1.2	7.87	<1.2	1.70	<2.4	<1.2	<1.2
BP-1 60 FT	<1.1	1.27	<1.1	<1.1	<2.2	<1.1	<1.1
BP-1 80 FT	<1.1	1.29	<1.1	<1.1	<2.2	<1.1	<1.1
BP-1 105 FT	<1.2	11.99	<1.2	2.02	<2.4	<1.2	<1.2
BP-1 120 FT	<1.1	10.95	<1.1	1.37	<2.2	<1.1	<1.1
BP-1 146 FT	<1.5	33.50	<1.5	1.68	<3.0	<1.5	<1.5
BP-1 160 FT	<1.0	17.75	<1.0	1.77	<2.0	<1.0	<1.0
BP-1 181 FT	<1.1	16.00	<1.1	1.65	<2.2	<1.1	<1.1
BP-1 200 FT	<1.0	3.87	<1.0	1.02	<2.0	<1.0	<1.0
BP-2 20 FT	<1.3	18.63	1.52	1.75	<2.6	<1.3	<1.3
BP-2 40 FT	1.04	1.50	<1.0	<1.0	<2.0	<1.0	<1.0
BP-2 60 FT	<1.0	1.06	<1.0	<1.0	<2.0	<1.0	<1.0
BP-2 80 FT	<1.0	7.85	<1.0	<1.0	<2.0	<1.0	<1.0
BP-2 100 FT	<1.0	5.92	<1.0	1.67	<2.4	<1.0	<1.0
BP-2 115 FT	<1.0	1.10	<1.0	51.92	<2.0	<1.0	<1.0
BP-2 120 FT	<1.0	1.14	<1.0	<1.0	<2.0	<1.0	<1.0
BP-2 140 FT	<1.2	9.30	<1.2	<1.2	<2.4	<1.2	<1.2
BP-2 160 FT	<1.3	15.49	<1.3	1.97	<2.6	<1.3	<1.3
BP-4 20 FT	<1.3	23.40	<1.3	1.80	<2.6	<1.3	<1.3
BP-4 40 FT	<1.1	21.67	<1.1	1.72	<2.2	<1.1	<1.1
BP-4 60 FT	<1.1	29.49	<1.1	1.90	<2.2	<1.1	<1.1
BP-4 80 FT	<1.2	15.06	<1.2	<1.2	<2.4	<1.2	<1.2
BP-4 100 FT	<1.2	18.44	<1.2	1.83	<2.4	<1.2	<1.2
BP-4 120 FT	<1.2	17.19	<1.2	1.57	<2.4	<1.2	<1.2
BP-4 125 FT	<1.0	8.51	<1.0	<1.0	<2.0	<1.0	<1.0
BP-4 140 FT	<1.3	11.71	<1.3	2.14	<2.6	<1.3	<1.3
BP-5 20 FT	<1.0	11.11	<1.0	<1.0	<2.0	<1.0	<1.0
BP-5 40 FT	<1.0	8.80	<1.0	1.19	<2.0	<1.0	<1.0
BP-5 60 FT	<1.0	18.66	<1.0	1.96	<2.0	<1.0	<1.0
BP-5 80 FT	5.66	27.53	<1.0	4.20	<2.0	<1.0	<1.0
BP-5 101 FT	3.12	38.95	2.08	5.88	<3.2	<1.6	<1.6
BP-5 120 FT	<1.2	21.14	<1.2	<1.2	<2.4	<1.2	<1.2
BP-5 125 FT	<1.3	31.84	<1.3	3.98	<2.6	<1.3	<1.3
BP-5 140 FT	<2.2	49.03	<2.2	5.81	<4.4	<2.2	<2.2
BP-5 160 FT	<2.0	40.74	<2.0	5.00	<4.0	<2.0	<2.0
BP-5 180 FT	2.16	28.99	<1.6	3.78	<3.2	<1.6	<1.6
BP-5 206 FT	<1.1	3.09	<1.1	<1.1	<2.2	<1.1	<1.1

Table D-13. (continued)

SAMPLE	NO_3^-	$SO_4^=$	F^-	CL^-	PO_4^{3-}	BR^-	NO_2^-
BP-6 22 FT	<1.6	47.01	1.83	20.17	<3.2	<1.6	<1.6
BP-6 40 FT	<1.2	14.38	1.94	3.62	<2.4	<1.2	<1.2
BP-6 60 FT	<1.1	36.44	1.75	3.58	<2.2	<1.1	<1.1
BP-6 80 FT	<1.2	26.75	1.23	2.75	<2.4	<1.2	<1.2
BP-6 100 FT	<1.2	25.69	<1.2	2.38	<2.4	<1.2	<1.2
BP-6 120 FT	<1.0	19.63	<1.0	1.94	<2.0	<1.0	<1.0
BP-6 123 FT	<1.1	47.84	<1.1	4.27	<2.2	<1.1	<1.1
BP-6 129.5 FT	3.96	53.18	<1.2	2.57	<2.4	<1.2	<1.2
BP-6 140 FT	2.97	17.32	<1.0	2.04	<2.0	<1.0	<1.0
BP-9 20 FT	<1.3	37.18	1.33	2.67	<2.6	<1.3	<1.3
BP-9 40 FT	<1.2	22.02	<1.2	2.05	<2.4	<1.2	<1.2
BP-9 60 FT	<1.1	15.61	<1.1	2.19	<2.2	<1.1	<1.1
BP-9 80 FT	<1.0	11.22	<1.0	1.69	<2.0	<1.0	<1.0
BP-9 100 FT	<1.2	13.79	<1.2	1.52	<2.4	<1.2	<1.2
BP-9 120 FT	<1.1	13.53	<1.1	1.59	<2.2	<1.1	<1.1
BP-9 125 FT	2.27	13.82	<1.4	2.41	<2.8	<1.4	<1.4
BP-9 140 FT	4.59	16.11	<1.4	3.70	<2.8	<1.4	<1.4
BP-9 145 FT	<1.2	11.06	<1.2	1.87	<2.4	<1.2	<1.2
BP-9 160 FT	<1.4	15.83	<1.4	3.30	<2.8	<1.4	<1.4
BP-9 177 FT	1.6	24.76	3.46	2.49	<3.2	<1.6	<1.6

Table D-14. Results of Gross Beta Analyses of Sediment Samples Reported by U.S. Testing.

Well Number	Depth (ft)	Gross Beta (pCi/g)
BP-1	14	26.0 ± 4.34
BP-1	20	22.2 ± 3.90
BP-1	40	18.4 ± 3.52
BP-1	43	19.4 ± 3.59
BP-1	46-47	20.3 ± 3.71
BP-1	60	17.9 ± 3.46
BP-1	80	17.6 ± 3.39
BP-1	105	16.3 ± 3.25
BP-1	120	14.0 ± 2.98
BP-1	146	25.5 ± 4.26
BP-1	160	16.7 ± 3.29
BP-1	181	19.6 ± 3.66
BP-1	200	16.3 ± 3.22
BP-2	20	19.5 ± 3.59
BP-2	40	25.0 ± 4.22
BP-2	60	18.2 ± 3.44
BP-2	80	16.1 ± 3.22
BP-2	100	22.4 ± 3.95
BP-2	115	20.2 ± 3.67
BP-2	120	21.8 ± 3.84
BP-2	140	14.6 ± 3.06
BP-2	160	15.6 ± 3.20
BP-4	20	15.9 ± 3.21
BP-4	40	16.3 ± 3.26
BP-4	60	18.3 ± 3.46
BP-4	80	17.0 ± 3.32
BP-4	100	14.7 ± 3.04
BP-4	120	17.6 ± 3.44
BP-4	125	28.3 ± 4.56
BP-4	140	28.2 4.55
BP-5	20	18.4 ± 3.51
BP-5	40	17.1 ± 3.34
BP-5	60	16.7 ± 3.31
BP-5	80	22.0 ± 3.92
BP-5	101	16.9 ± 3.35
BP-5	120	18.0 ± 3.42
BP-5	125	20.5 ± 3.75
BP-5	140	27.7 ± 4.53
BP-5	160	30.5 ± 4.83
BP-5	180	26.7 ± 4.41
BP-5	206	20.4 ± 3.70
BP-6	22	17.0 ± 3.32
BP-6	40	15.1 ± 3.11
BP-6	60	16.5 ± 3.29
BP-6	80	16.5 ± 3.26
BP-6	100	17.2 ± 3.35
BP-6	120	15.1 ± 3.11
BP-6	123-124	25.9 ± 4.32
BP-6	129.5	21.4 ± 3.82
BP-6	140	22.3 ± 3.92
BP-9	20	15.3 ± 3.15
BP-9	40	14.8 ± 3.13
BP-9	60	17.5 ± 3.38
BP-9	80	17.6 ± 3.41
BP-9	100	17.6 ± 3.39
BP-9	120	14.3 ± 3.03
BP-9	125	26.8 ± 4.38
BP-9	140	27.2 ± 4.46
BP-9	145	22.3 ± 3.93
BP-9	160	21.7 ± 3.84
BP-9	177	39.0 ± 5.72

Table D-15. Results of X-Ray Fluorescence Spectrometry (XRF) Chemical Analysis of B Pond Sediment Samples.

Well Number Depth (ft)	BP-2 60	BP-2 115	BP-2 115 (duplicate analysis)
Major Elements weight %	Concentration	Concentration	Concentration
Al	8.30 ± 0.48	7.87 ± 0.46	8.00 ± 0.47
Si	30.9 ± 1.6	31.7 ± 1.6	31.2 ± 1.6
P	< 0.047	< 0.045	< 0.044
Cl	< 0.008	< 0.008	< 0.008
K	1.317 ± 0.068	1.368 ± 0.071	1.536 ± 0.079
Ca	2.67 ± 0.14	2.46 ± 0.13	2.54 ± 0.13
Ti	0.389 ± 0.020	0.373 ± 0.019	0.350 ± 0.018
Fe	3.28 ± 0.16	3.06 ± 0.15	3.18 ± 0.16
Minor Elements ppm			
V	126 ± 24	97 ± 23	100 ± 23
Cr	26 ± 12	< 23	39 ± 12
Mn	595 ± 33	549 ± 30	594 ± 33
Ni	22.9 ± 2.6	19.7 ± 2.4	27.3 ± 2.7
Cu	19.2 ± 1.8	18.5 ± 1.7	15.6 ± 1.6
Zn	51.8 ± 3.0	48.3 ± 2.9	49.5 ± 2.9
Ga	14.9 ± 1.1	13.7 ± 1.1	13.9 ± 1.1
As	2.86 ± 0.75	2.89 ± 0.77	3.93 ± 0.80
Se	< 0.87	< 0.86	< 0.85
Rb	45.9 ± 2.9	49.0 ± 3.1	56.4 ± 3.5
Sr	510 ± 31	488 ± 30	497 ± 30
Y	16.7 ± 1.4	18.1 ± 1.5	16.9 ± 1.4
Zr	117.7 ± 8.3	107.4 ± 7.6	113.2 ± 8.0
Nb	7.27 ± 0.77	7.74 ± 0.79	7.43 ± 0.77
Mo	2.81 ± 0.74	1.47 ± 0.71	2.40 ± 0.67
Hg	< 2.7	< 2.7	3.1 ± 1.4
Pb	9.5 ± 1.4	9.6 ± 1.5	9.8 ± 1.5
Th	< 3.7	4.0 ± 1.9	8.5 ± 1.9
U	< 3.8	< 3.8	< 4.0

Table D-15. (continued)

Well Number Depth (ft)	BP-4 20	BP-4 20 (duplicate analysis)	BP-4 60
Major Elements weight %	**Concentration**	**Concentration**	**Concentration**
Al	6.76 ± 0.43	6.65 ± 0.43	6.71 ± 0.43
Si	29.4 ± 1.6	29.4 ± 1.6	29.6 ± 1.6
P	< 0.44	< 0.44	< 0.44
Cl	< 0.011	< 0.011	< 0.011
K	1.360 ± 0.071	1.310 ± 0.068	1.407 ± 0.073
Ca	4.57 ± 0.23	4.47 ± 0.23	4.41 ± 0.22
Ti	0.978 ± 0.050	0.942 ± 0.048	0.939 ± 0.048
Fe	7.48 0.37	7.22 ± 0.36	7.03 ± 0.35
Minor Elements ppm			
V	267 ± 33	245 ± 32	292 ± 33
Cr	< 34	< 33 ±	< 33
Mn	1213 ± 65	1212 ± 64	1180 ± 63
Ni	19.6 ± 3.0	19.0 ± 3.0	23.6 ± 3.0
Cu	28.2 ± 2.6	30.7 ± 2.7	31.6 ± 2.7
Zn	107.4 ± 6.0	101.9 ± 5.7	106.5 ± 5.9
Ga	18.4 ± 1.5	17.9 ± 1.5	17.5 ± 1.5
As	3.44 ± 0.98	4.64 ± 0.96	2.98 ± 0.95
Se	< 1.1	< 1.1	< 1.1
Rb	42.7 ± 2.8	42.2 ± 2.7	44.9 ± 2.9
Sr	314 ± 19	323 ± 20	331 ± 20
Y	30.8 ± 2.3	31.3 ± 2.3	31.1 ± 2.3
Zr	170 ± 12	161 ± 11	167 ± 12
Nb	11.9 ± 1.1	12.0 ± 1.1	12.0 ± 1.0
Mo	1.98 ± 0.81	2.87 ± 0.80	2.73 ± 0.78
Hg	< 4.1	< 4.0	< 3.9
Pb	6.7 ± 1.7	6.3 ± 1.6	6.8 ± 1.7
Th	N.A (a)	N.A.	N.A.
U	< 3.8	4.0 ± 1.9	< 3.9

Table D-15. (continued)

Well Number	BP-4	BP-4	BP-4
Depth (ft)	100	125	125 (duplicate analysis)
Major Elements weight %	**Concentration**	**Concentration**	**Concentration**
Al	6.61 ± 0.42	8.26 ± 0.48	8.52 ± 0.50
Si	29.7 ± 1.6	30.0 ± 1.5	30.4 ± 1.5
P	< 0.43	< 0.044	< 0.044
Cl	< 0.011	< 0.008	< 0.008
K	1.304 ± 0.068	2.030 ± 0.105	2.060 ± 0.105
Ca	4.11 ± 0.21	1.43 ± 0.07	1.38 ± 0.07
Ti	0.826 ± 0.042	0.399 ± 0.021	0.422 ± 0.022
Fe	6.43 ± 0.32	3.68 ± 0.18	3.81 ± 0.19
Minor Elements ppm			
V	219 ± 30	109 ± 24	126 ± 24
Cr	< 31	64 ± 13	48 ± 12
Mn	1041 ± 56	595 ± 33	623 ± 34
Ni	21.5 ± 2.8	32.8 ± 3.0	37.8 ± 3.1
Cu	29.2 ± 2.5	24.7 ± 2.1	29.8 ± 2.3
Zn	91.2 ± 5.1	71.3 ± 4.0	76.1 ± 4.3
Ga	16.9 ± 1.4	15.7 ± 1.2	16.5 ± 1.3
As	3.90 ± 0.94	6.87 ± 0.95	8.15 ± 0.98
Se	< 1.1	< 0.92	< 0.94
Rb	41.8 ± 2.7	92.9 ± 5.7	93.8 ± 5.8
Sr	347 ± 21	243 ± 15	242 ± 15
Y	28.3 ± 2.1	28.8 ± 2.2	32.7 ± 2.4
Zr	165 ± 12	278 ± 20	266 ± 19
Nb	11.5 ± 1.0	19.4 ± 1.5	17.9 ± 1.4
Mo	2.86 ± 0.81	< 1.8	2.59 ± 0.90
Hg	< 3.7	< 2.8	< 2.8
Pb	7.5 ± 1.7	13.5 ± 1.6	14.5 ± 1.7
Th	N.A.(a)	7.2 ± 2.3	8.6 ± 2.3
U	< 3.8	< 4.9	7.4 ± 2.5

Table D-15. (continued)

Well Number	BP-5	BP-5	BP-5
Depth (ft)	60	101	125
Major Elements weight %	Concentration	Concentration	Concentration
Al	6.81 ± 0.44	6.55 ± 0.42	7.74 ± 0.47
Si	28.9 ± 1.6	29.9 ± 1.6	30.0 ± 1.6
P	< 0.44	< 0.43	< 0.39
Cl	< 0.011	< 0.011	< 0.011
K	1.317 ± 0.069	1.372 ± 0.072	1.791 ± 0.092
Ca	4.69 ± 0.24	3.91 ± 0.20	2.74 ± 0.14
Ti	1.069 ± 0.054	0.754 ± 0.039	0.646 ± 0.033
Fe	7.57 ± 0.38	6.07 ± 0.30	5.51 ± 0.28
Minor Elements ppm			
V	2.74 ± 35	222 ± 29	172 ± 26
Cr	38 ± 17	44 ± 16	32 ± 15
Mn	1297 ± 69	1033 ± 55	851 ± 46
Ni	15.9 ± 2.9	22.1 ± 2.8	25.1 ± 2.7
Cu	30.1 ± 2.6	26.7 ± 2.4	25.4 ± 2.3
Zn	109.7 ± 6.1	80.4 ± 4.6	82.1 ± 4.7
Ga	17.7 ± 1.5	16.8 ± 1.4	17.6 ± 1.4
As	4.3 ± 1.2	3.31 ± 0.93	2.90 ± 0.98
Se	< 1.1	< 1.0	1.40 ± 0.53
Rb	42.4 ± 2.8	42.2 ± 2.7	73.5 ± 4.6
Sr	335 ± 21	317 ± 20	247 ± 16
Y	33.6 ± 2.5	29.0 ± 2.2	32.9 ± 2.5
Zr	163 ± 11	159 ± 11	191 ± 13
Nb	13.0 ± 1.1	11.0 ± 1.0	14.4 ± 1.3
Mo	2.70 ± 0.82	1.58 ± 0.75	2.64 ± 0.91
Hg	< 4.2	< 3.6	< 3.5
Pb	33.5 ± 2.6	7.8 ± 1.6	15.8 ± 1.9
Th	N.A. (a)	N.A.	N.A.
U	5.5 ± 2.0	< 3.8	< 4.7

Table D-15. (continued)

Well Number	BP-6	BP-6	BP-6
Depth (ft)	22	60	100
Major Elements weight %	**Concentration**	**Concentration**	**Concentration**
Al	6.64 ± 0.42	6.78 ± 0.43	7.31 ± 0.45
Si	28.7 ± 1.5	30.0 ± 1.6	28.5 ± 1.4
P	< 0.43	< 0.44	< 0.053
Cl	< 0.011	< 0.011	0.014 ± 0.005
K	1.337 ± 0.070	1.349 ± 0.070	1.227 ± 0.064
Ca	4.14 ± 0.21	4.24 ± 0.21	4.30 ± 0.22
Ti	0.848 ± 0.043	0.886 ± 0.045	0.861 ± 0.044
Fe	6.31 ± 0.32	6.65 ± 0.33	6.65 ± 0.33
Minor Elements ppm			
V	258 ± 31	237 ± 31	259 ± 36
Cr	34 ± 16	< 32	49 ± 16
Mn	1112 ± 59	1132 ± 60	1139 ± 60
Ni	18.2 ± 2.7	21.7 ± 3.0	29.1 ± 3.5
Cu	23.9 ± 2.3	28.8 ± 2.5	25.9 ± 2.4
Zn	85.6 ± 4.9	94.2 ± 5.3	89.3 ± 5.0
Ga	16.5 ± 1.4	16 ± 1.4	13.8 ± 1.3
As	2.79 ± 0.91	3.97 ± 0.95	2.93 ± 0.89
Se	< 1.1	< 1.1	< 1.0
Rb	44.5 ± 2.8	41.9 ± 2.7	38.0 ± 2.4
Sr	346 ± 21	328 ± 20	318 ± 20
Y	31.5 ± 2.4	29.1 ± 2.2	29.1 ± 2.2
Zr	166 ± 12	171 ± 12	168 ± 12
Nb	11.9 ± 1.1	12.4 ± 1.1	11.8 ± 1.0
Mo	4.21 ± 0.82	1.73 ± 0.80	4.10 ± 0.78
Hg	4.3 ± 1.9	5.3 ± 2.0	5.0 ± 1.9
Pb	6.6 ± 1.6	8.7 ± 1.6	8.8 ± 1.6
Th	N.A. (a)	N.A.	< 3.7
U	< 4.0	< 3.8	< 3.7

Table D-15. (continued)

Well Number	BP-6	BP-9	BP-9
Depth (ft)	129.5	20	60
Major Elements weight %	**Concentration**	**Concentration**	**Concentration**
Al	8.09 ± 0.48	6.66 ± 0.42	6.28 ± 0.41
Si	32.8 ± 1.7	28.9 ± 1.6	30.4 ± 1.6
P	< 0.045	< 0.41	< 0.44
Cl	< 0.008	< 0.011	< 0.011
K	1.734 ± 0.089	1.280 ± 0.067	1.428 ± 0.074
Ca	1.14 ± 0.06	4.24 ± 0.22	4.16 ± 0.21
Ti	0.532 ± 0.027	0.867 ± 0.044	0.875 ± 0.045
Fe	2.85 ± 0.14	6.57 ± 0.33	6.65 ± 0.33
Minor Elements ppm			
V	109 ± 25	281 ± 32	246 ± 32
Cr	24 ± 12	< 32	< 33
Mn	446 ± 25	1082 ± 58	1108 ± 59
Ni	19.9 ± 2.3	19.1 ± 2.9	19.6 ± 2.8
Cu	18.9 ± 1.8	27.8 ± 2.4	28.3 ± 2.5
Zn	56.0 ± 3.2	97.5 ± 5.4	90.6 ± 5.1
Ga	14.5 ± 1.2	18.0 ± 1.4	17.1 ± 1.5
As	3.15 ± 0.85	5.10 ± 0.95	4.02 ± 0.98
Se	< 0.91	< 1.0	< 1.1
Rb	76.5 ± 4.8	42.1 ± 2.7	46.4 ± 3.0
Sr	241 ± 15	313 ± 19	314 ± 20
Y	26.1 ± 2.0	30.2 ± 2.3	28.0 ± 2.1
Zr	231 ± 16	183 ± 13	165 ± 12
Nb	17.2 ± 1.4	12.5 ± 1.1	11.9 ± 1.0
Mo	2.69 ± 0.87	4.46 ± 0.89	3.65 ± 0.82
Hg	< 2.7	< 3.9 ±	4.7 ± 2.0
Pb	15.4 ± 1.7	5.9 ± 1.6	8.4 ± 1.7
Th	7.6 ± 2.2	N.A. (a)	N.A.
U	< 4.5 ±	< 3.9	< 3.9

Table D-15. (continued)

Well Number	BP-9	BP-9	BP-9
Depth (ft)	100	100 (duplicate analysis)	145
Major Elements weight %	**Concentration**	**Concentration**	**Concentration**
Al	7.60 ± 0.45	6.88 ± 0.44	6.28 ± 0.40
Si	28.7 ± 1.5	29.0 ± 1.6	31.1 ± 1.6
P	< 0.41	< 0.42	< 0.050
Cl	< 0.010	< 0.011	< 0.008
K	1.287 ± 0.067	1.307 ± 0.068	1.491 ± 0.077
Ca	4.37 ± 0.22	4.47 ± 0.23	2.59 ± 0.13
Ti	0.912 ± 0.047	0.920 ± 0.047	0.433 ± 0.022
Fe	6.96 ± 0.35	6.96 ± 0.35	3.83 ± 0.19
Minor Elements ppm			
V	284 ± 32	256 ± 32	135 ± 25
Cr	55 ± 17	46 ± 17	65 ± 13
Mn	1164 ± 62	1178 ± 62	681 ± 37
Ni	21.2 ± 3.0	18.9 ± 2.9	23.5 ± 2.8
Cu	30.6 ± 2.6	28.2 ± 2.5	17.9 ± 1.8
Zn	93.9 ± 5.3	90.5 ± 5.1	58.1 ± 3.4
Ga	15.9 ± 1.4	17.0 ± 1.5	13.2 ± 1.1
As	< 1.8	2.72 ± 0.95	4.71 ± 0.87
Se	< 1.1	< 1.1	< 0.93
Rb	40.3 ± 2.6	39.3 ± 2.5	60.9 ± 3.8
Sr	307 ± 19	314 ± 20	245 ± 15
Y	30.3 ± 2.3	30.7 ± 2.3	33.4 ± 2.5
Zr	179 ± 13	184 ± 13	293 ± 21
Nb	12.4 ± 1.1	13.8 ± 1.2	16.1 ± 1.3
Mo	3.51 ± 0.86	< 1.6	2.97 ± 0.87
Hg	< 3.9	< 4.0	< 2.9
Pb	8.8 ± 1.7	6.0 ± 1.7	12.2 ± 1.5
Th	N.A. (a)	N.A.	6.4 ± 2.0
U	< 3.8	< 3.9	< 4.1

Table D-15. (continued)

Well Number	BP-9
Depth (ft)	177

Major Elements weight %	Concentration
Al	9.28 ± 0.53
Si	28.1 ± 1.4
P	0.055 ± 0.023
Cl	< 0.008
K	1.820 ± 0.093
Ca	1.16 ± 0.06
Ti	0.490 ± 0.025
Fe	5.12 ± 0.26

Minor Elements ppm	
V	135 ± 25
Cr	51 ± 13
Mn	194 ± 15
Ni	36.4 ± 3.3
Cu	36.5 ± 2.6
Zn	98.0 ± 5.4
Ga	21.5 ± 1.5
As	5.37 ± 0.97
Se	7.32 ± 0.68
Rb	109.3 ± 6.8
Sr	171 ± 11
Y	39.4 ± 2.9
Zr	189 ± 13
Nb	21.7 ± 1.7
Mo	1.79 ± 0.81
Hg	< 2.9
Pb	20.9 ± 1.9
Th	9.6 ± 2.4
U	19.1 ± 2.9

(a) N.A. = Not analyzed.

Table D-16. Results of Inductively-Coupled Plasma Atomic Emission Spectroscopy (ICP) Analysis and Ion Chromatography (IC) Analysis of Water Sample from Well BP-5.

Element	Concentration (ppb)
Zn	40
Ca	25074
Ba	37
Cd	<2
Cr	<10
Ag	<10
Na	2845
Ni	<10
Cu	<10
V	<5
Al	1347
Mn	40
K	1365
Fe	2721
Mg	6216
Be	<5
Sr	140
Sb	<100
B	<10
Co	<20
Li	<10
Mo	<40
Si	5821
Sn	<30
Ti	115
Zr	<50

SPECIES Species	Concentration (ppb)
NO_3^-	< 500
SO_4^{2-}	14500
F^-	<500
Cl^-	1100
PO_4^{3-}	< 1000
Br^-	< 1000
NO_2^-	< 1000

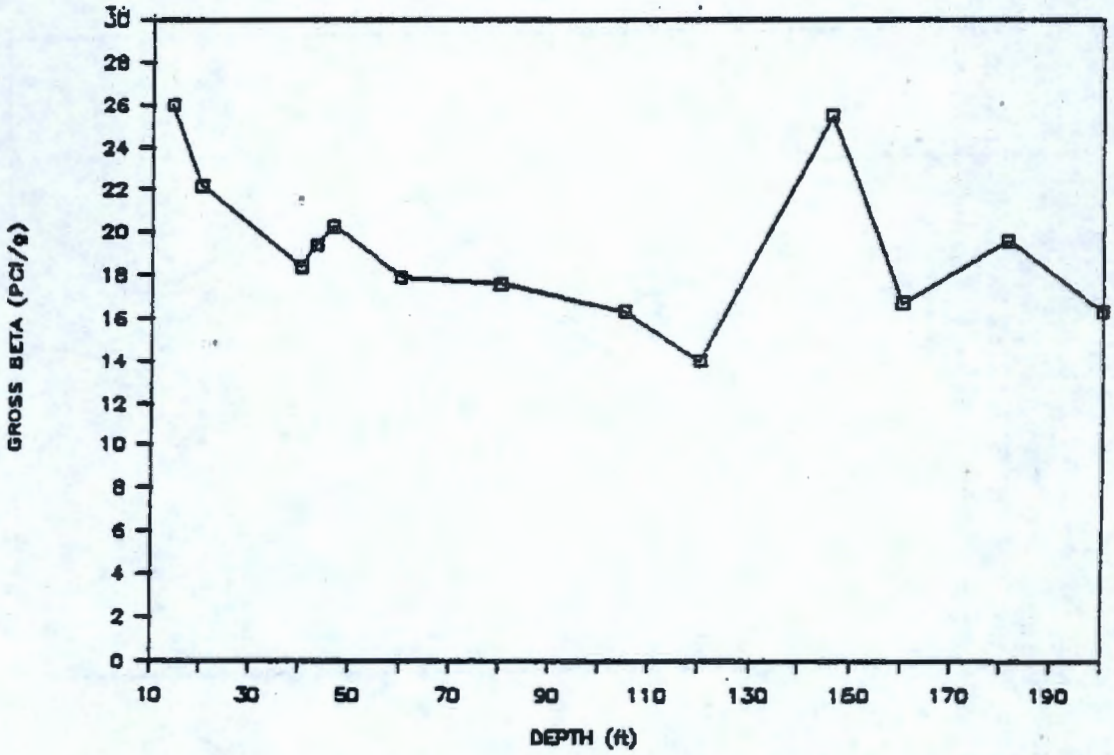

Figure D-1. Beta Activity Versus Depth, Well BP-1.

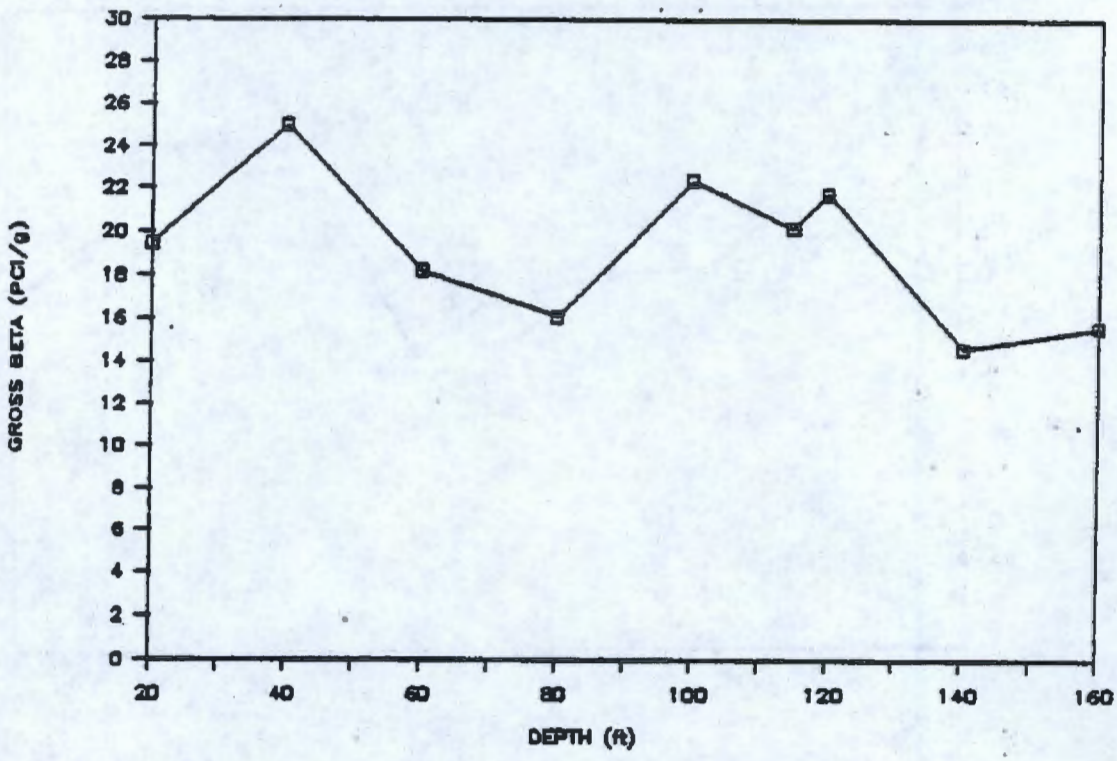

Figure D-2. Beta Activity Versus Depth, Well BP-2.

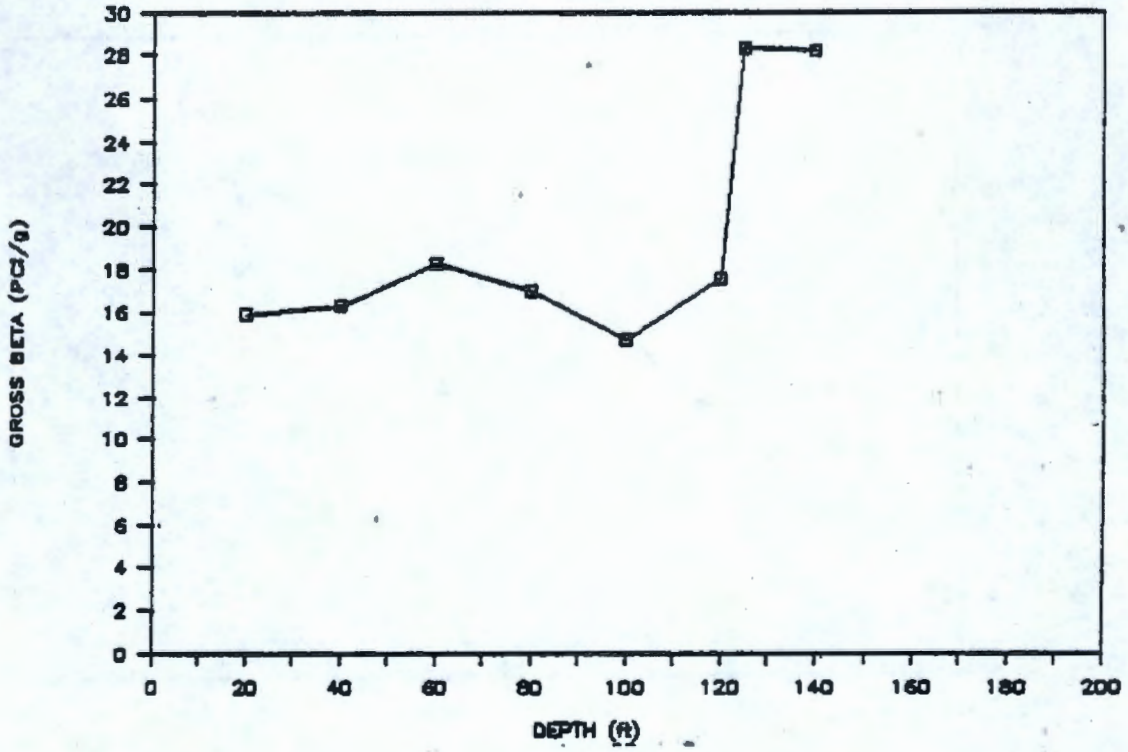

Figure D-3. Beta Activity Versus Depth, Well BP-4.

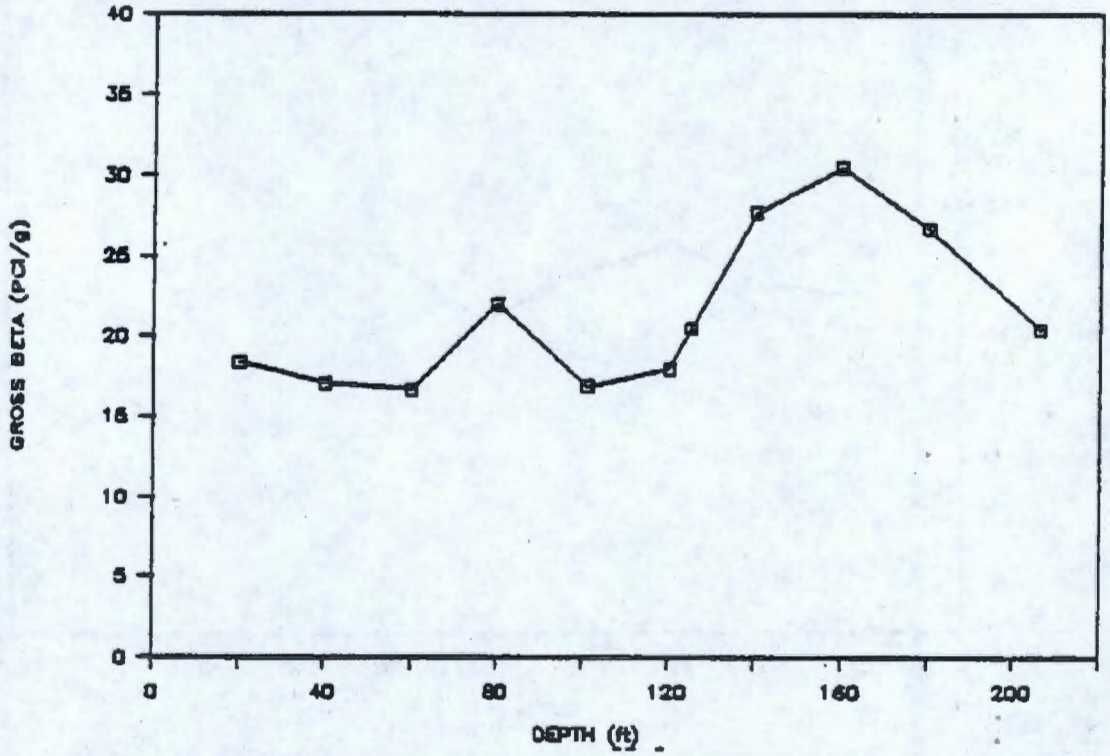

Figure D-4. Beta Activity Versus Depth, Well BP-5.

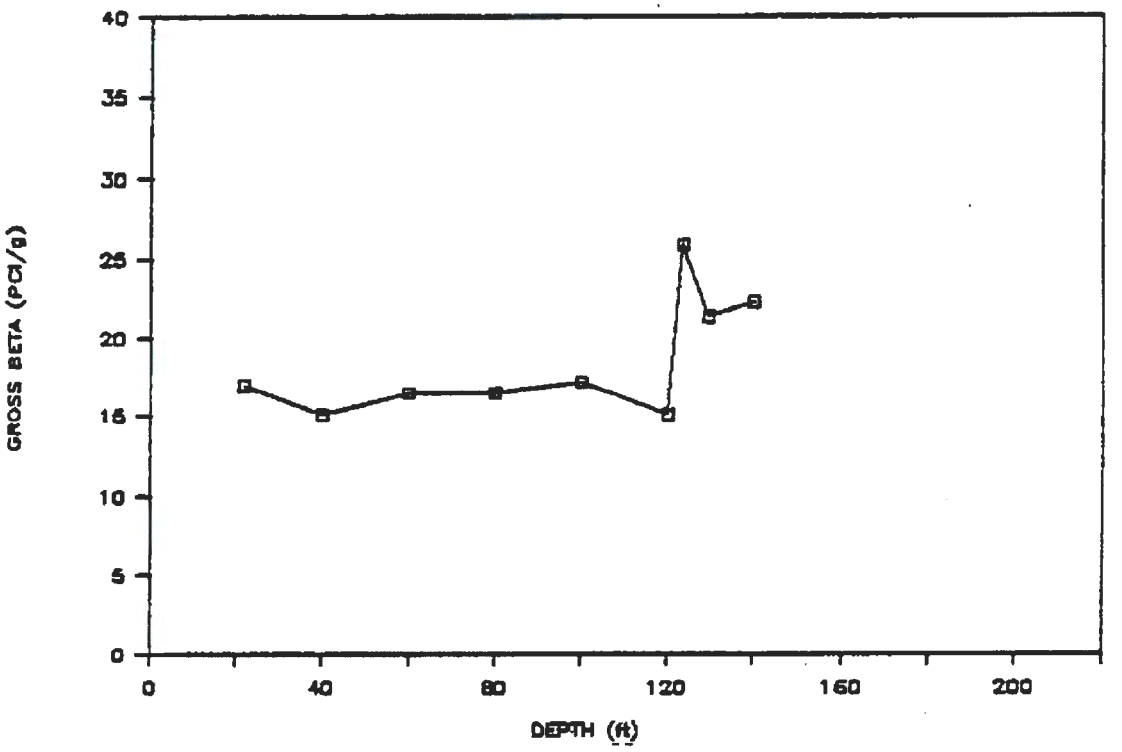

Figure D-5. Beta Activity Versus Depth, Well BP-6.

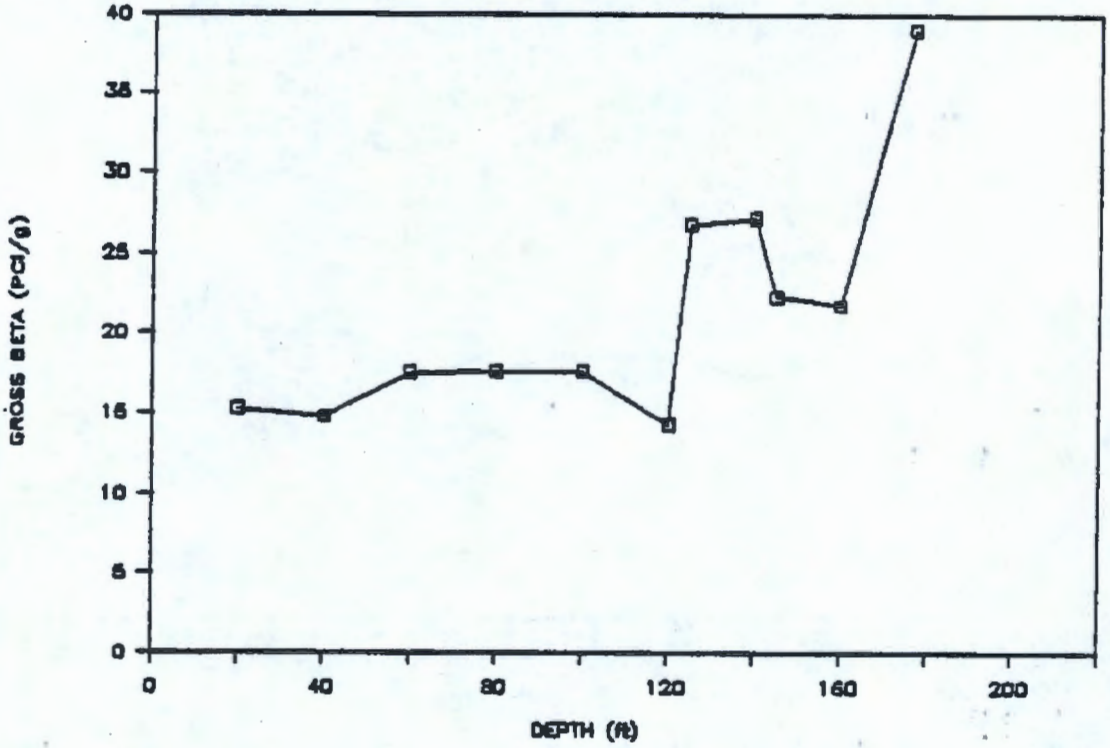

Figure D-6. Beta Activity Versus Depth, Well BP-9.

APPENDIX E

WATER-LEVEL DATA AND HYDROGRAPHS FOR WELLS NEAR THE 216-B-3 POND

This appendix provides water-level data from the Hanford Ground Water Data Base for several wells in the vicinity of the 216-B-3 Pond. Data from the following wells are presented:

- 299-E25-9 (Table E-1 and Figure E-1)
- 299-E25-25 (Table E-2 and Figure E-2)
- 299-E25-32 (Table E-3 and Figure E-3)
- 699-39-39 (Table E-4 and Figure E-4)
- 699-40-33A (Table E-5 and Figure E-5)
- 699-42-40A (Table E-6 and Figure E-6)
- 699-42-40B (Table E-7 and Figure E-7)
- 699-42-40C (Table E-8 and Figure E-8)
- 699-42-42B (Table E-9 and Figure E-9)
- 699-43-42 (Table E-10 and Figure E-10)
- 699-43-42J (Table E-11 and Figure E-11)
- 699-43-43 (Table E-12 and Figure E-12)
- 699-44-42 (Table E-13 and Figure E-13)
- 699-45-42 (Table E-14 and Figure E-14)
- 699-47-35A (Table E-15 and Figure E-15)
- 699-47-35B (Table E-16 and Figure E-16).

Hydrographs plotted from these data are also presented (Figures E-1 through E-16).

Head data are listed in two columns, computed head and hydraulic head. Computed head data values were computed by Hanford Site ground water data base programs from water level and casing elevation data entered and stored in the data base. Hydraulic head data values were determined by hand using water level and casing elevation data, then entered and stored in the data base. "N.A." indicates the column does not apply. All measurements taken in feet above MSL (mean sea level).

TABLE E-1. Water Level Data for Well 299-E25-9

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
5/31/56	N.A.	403.94	654.86
11/11/58	N.A.	400.54	654.86
9/28/60	N.A.	402.39	654.86
1/14/65	N.A.	403.94	654.86
5/01/73	N.A.	404.47	654.86
7/18/73	N.A.	404.39	654.86
8/13/73	N.A.	404.21	654.86
8/31/73	N.A.	403.33	654.86
9/10/73	N.A.	404.13	654.86
10/08/73	N.A.	404.18	654.86
10/16/73	N.A.	404.18	654.86
4/11/74	N.A.	403.61	654.86
7/11/74	N.A.	403.20	654.86
10/18/74	N.A.	403.31	654.86
1/08/75	N.A.	403.38	654.86
4/14/75	N.A.	403.14	654.86
7/07/75	N.A.	403.19	654.86
12/03/75	N.A.	403.07	654.86
6/15/76	N.A.	402.88	654.86
12/08/76	N.A.	402.88	654.86
7/01/77	N.A.	402.82	654.86
12/07/77	N.A.	403.08	654.86
6/01/78	N.A.	402.95	654.86
12/01/78	N.A.	402.77	654.86
6/01/80	N.A.	402.72	654.86
12/01/80	N.A.	402.99	654.86
6/01/81	N.A.	402.61	654.86
12/01/81	N.A.	402.02	654.86
6/01/82	N.A.	401.28	654.86
12/01/82	N.A.	402.95	654.86
6/01/83	N.A.	403.12	654.86
12/01/83	N.A.	404.56	654.86
6/01/84	N.A.	404.30	654.86
12/01/84	N.A.	406.04	654.86
6/20/85	405.27	N.A.	654.86
12/18/85	406.56	N.A.	654.86
12/29/86	405.92	N.A.	654.86

TABLE E-2. Water Level Data for Well 299-E25-25

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
6/17/85	405.82	N.A.	669.42
12/09/86	406.58	N.A.	669.42
12/10/87	406.64	N.A.	669.42
1/19/88	N.A.	N.A.	669.42
8/05/88	407.41	N.A.	669.42
10/18/88	408.30	N.A.	669.42
1/03/89	N.A.	N.A.	669.42
2/28/89	N.A.	N.A.	669.42
3/10/89	406.88	N.A.	669.42
6/21/89	404.96	N.A.	669.42
6/23/89	406.34	N.A.	669.42

TABLE E-3. Water Level Data for Well 299-E25-32

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
8/11/88	N.A.	N.A.	669.19
10/19/88	408.13	N.A.	669.19
11/21/88	408.34	N.A.	669.19
1/04/89	407.53	N.A.	670.04
2/23/89	407.46	N.A.	670.04
2/24/89	409.82	N.A.	670.04

TABLE E-4. Water Level Data for Well 699-39-39

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
9/14/71	N.A.	407.41	536.65
3/20/72	N.A.	407.46	536.65
4/05/72	N.A.	407.33	536.65
7/11/72	N.A.	407.52	536.65
10/04/72	N.A.	407.60	536.65
1/05/73	N.A.	407.51	536.65
4/10/73	N.A.	407.50	536.65
7/10/73	N.A.	407.56	536.65
8/15/73	N.A.	407.52	536.65
8/29/73	N.A.	407.61	536.65
9/11/73	N.A.	407.50	536.65
10/08/73	N.A.	407.60	536.65
10/16/73	N.A.	407.51	536.65
4/18/74	N.A.	406.85	536.65
7/10/74	N.A.	407.40	536.65
10/18/74	N.A.	407.38	536.65
1/08/75	N.A.	407.38	536.65
4/14/75	N.A.	407.33	536.65
7/07/75	N.A.	407.36	536.65
12/03/75	N.A.	407.28	536.65
6/15/76	N.A.	407.29	536.65
12/08/76	N.A.	407.01	536.65
7/01/77	N.A.	407.17	536.65
12/07/77	N.A.	407.20	536.65
6/01/78	N.A.	407.21	536.65
12/01/78	N.A.	407.18	536.65
12/01/79	N.A.	407.24	536.65
6/01/80	N.A.	407.22	536.65
12/01/80	N.A.	407.34	536.65
6/01/81	N.A.	407.18	536.65
12/01/81	N.A.	407.22	536.65
6/01/82	N.A.	407.12	536.65
12/01/82	N.A.	407.32	536.65
12/15/82	407.31	N.A.	536.65
6/01/83	N.A.	407.32	536.65
6/15/83	407.28	N.A.	536.65
12/01/83	N.A.	409.19	536.65
12/15/83	409.15	N.A.	536.65
5/31/84	N.A.	409.12	536.65
5/31/84	409.12	N.A.	536.65
6/01/84	N.A.	409.38	536.65
6/13/84	N.A.	409.16	536.65
6/13/84	409.16	N.A.	536.65

TABLE E-4. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
6/15/84	409.38	N.A.	536.65
6/20/84	N.A.	409.39	536.65
6/20/84	409.39	N.A.	536.65
6/27/84	N.A.	409.27	536.65
6/27/84	409.27	N.A.	536.65
7/11/84	N.A.	409.42	536.65
7/11/84	409.42	N.A.	536.65
7/24/84	N.A.	409.58	536.65
7/25/84	409.58	N.A.	536.65
8/08/84	409.69	N.A.	536.65
8/21/84	N.A.	409.78	536.65
8/22/84	409.78	N.A.	536.65
9/05/84	N.A.	409.88	536.65
9/06/84	409.88	N.A.	536.65
9/18/84	N.A.	409.91	536.65
9/19/84	409.91	N.A.	536.65
10/03/84	409.80	N.A.	536.65
10/19/84	409.56	N.A.	536.65
11/01/84	409.51	N.A.	536.65
11/20/84	409.67	N.A.	536.65
12/01/84	N.A.	410.34	536.65
12/12/84	410.11	N.A.	536.65
12/28/84	410.34	N.A.	536.65
1/09/85	410.28	N.A.	536.65
1/23/85	410.29	N.A.	536.65
2/06/85	410.25	N.A.	536.65
2/21/85	410.22	N.A.	536.65
3/07/85	410.18	N.A.	536.65
3/22/85	410.04	N.A.	536.65
4/02/85	41N.A.	N.A.	536.65
4/17/85	409.99	N.A.	536.65
5/15/85	409.89	N.A.	536.65
5/27/85	410.01	N.A.	536.65
6/13/85	410.25	N.A.	536.65
6/13/85	410.25	N.A.	536.65
6/26/85	410.38	N.A.	536.65
7/10/85	410.29	N.A.	536.65
8/07/85	410.70	N.A.	536.65
12/31/85	411.75	N.A.	536.65
12/12/86	411.45	N.A.	536.65
12/08/87	412.62	N.A.	536.65
1/05/88	412.42	N.A.	536.65
5/23/88	416.10	N.A.	536.65

TABLE E-4. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
12/16/88	419.71	N.A.	536.65
2/23/89	419.92	N.A.	536.65
3/28/89	419.88	N.A.	536.65
4/24/89	419.53	N.A.	536.65
5/24/89	414.67	N.A.	536.65
6/08/89	415.98	N.A.	536.65
6/22/89	414.46	N.A.	536.65

TABLE E-5. Water Level Data for Well 699-40-33A

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
6/01/84	N.A.	408.23	518.05
12/01/84	N.A.	409.00	518.05
6/20/85	408.68	N.A.	518.05
12/31/85	411.86	N.A.	518.05
12/23/86	410.58	N.A.	518.05
6/11/87	410.82	N.A.	518.05
9/03/87	411.06	N.A.	518.05
12/07/87	411.02	N.A.	518.05
12/14/88	411.37	N.A.	518.05
2/23/89	411.58	N.A.	518.05
3/28/89	411.65	N.A.	518.05
4/24/89	411.62	N.A.	518.05
5/24/89	411.48	N.A.	518.05
6/08/89	411.59	N.A.	518.05
6/22/89	411.48	N.A.	518.05

TABLE E-6. Water Level Data for Well 699-42-40A

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
6/13/84	423.00	N.A.	545.53
6/15/84	422.95	N.A.	545.53
6/20/84	N.A.	422.96	545.53
6/20/84	422.96	N.A.	545.53
6/27/84	N.A.	423.04	545.53
6/27/84	423.04	N.A.	545.53
7/11/84	N.A.	423.59	545.53
7/11/84	423.59	N.A.	545.53
7/24/84	N.A.	425.02	545.53
7/25/84	425.02	N.A.	545.53
8/08/84	423.07	N.A.	545.53
8/21/84	N.A.	424.45	545.53
8/22/84	424.45	N.A.	545.53
9/05/84	N.A.	424.23	545.53
9/06/84	424.49	N.A.	545.53
9/18/84	N.A.	423.35	545.53
9/19/84	423.35	N.A.	545.53
10/03/84	421.68	N.A.	545.53
10/19/84	421.06	N.A.	545.53
11/01/84	422.31	N.A.	545.53
11/20/84	424.81	N.A.	545.53
12/01/84	N.A.	425.65	545.53
12/12/84	425.59	N.A.	545.53
12/26/84	425.75	N.A.	545.53
1/09/85	425.75	N.A.	545.53
1/23/85	424.51	N.A.	545.53
2/06/85	423.96	N.A.	545.53
2/21/85	423.31	N.A.	545.53
3/07/85	423.01	N.A.	545.53
3/22/85	422.90	N.A.	545.53
4/02/85	422.64	N.A.	545.53
4/17/85	422.36	N.A.	545.53
5/03/85	421.86	N.A.	545.53
5/15/85	422.22	N.A.	545.53
5/28/85	426.05	N.A.	545.53
6/13/85	422.95	N.A.	545.53
6/13/85	422.95	N.A.	545.53
6/26/85	423.04	N.A.	545.53
7/10/85	424.64	N.A.	545.53
8/07/85	424.43	N.A.	545.53
12/31/85	421.95	N.A.	545.53
5/12/86	422.86	N.A.	545.53

TABLE E-6. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
8/05/86	424.33	N.A.	545.53
12/12/86	421.03	N.A.	545.53
1/08/88	424.29	N.A.	545.53
11/22/88	424.56	N.A.	545.53
2/15/89	423.26	N.A.	545.53
2/23/89	423.12	N.A.	545.53
3/28/89	423.03	N.A.	545.53
4/24/89	422.92	N.A.	545.53

TABLE E-7. Water Level Data for Well 699-42-40B

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
6/01/83	N.A.	415.68	546.46
6/15/83	415.68	N.A.	546.46
12/01/83	N.A.	422.28	546.46
12/15/83	422.27	N.A.	546.46
5/31/84	N.A.	422.46	546.46
5/31/84	422.46	N.A.	546.46
6/01/84	N.A.	422.47	546.46
6/13/84	N.A.	422.47	546.46
6/13/84	422.47	N.A.	546.46
6/15/84	422.47	N.A.	546.46
6/20/84	N.A.	422.47	546.46
6/20/84	422.49	N.A.	546.46
6/27/84	N.A.	422.48	546.46
6/27/84	422.48	N.A.	546.46
7/11/84	N.A.	423.08	546.46
7/11/84	423.08	N.A.	546.46
7/24/84	N.A.	424.13	546.46
7/25/84	424.13	N.A.	546.46
8/06/84	422.97	N.A.	546.46
8/08/84	422.97	N.A.	546.46
8/21/84	N.A.	424.00	546.46
8/22/84	424.00	N.A.	546.46
9/05/84	N.A.	423.89	546.46
9/06/84	423.89	N.A.	546.46
9/18/84	N.A.	414.10	546.46
9/19/84	423.10	N.A.	546.46
10/03/84	421.92	N.A.	546.46
10/09/84	420.98	N.A.	546.46
10/10/84	420.93	N.A.	546.46
10/11/84	420.76	N.A.	546.46
10/12/84	420.70	N.A.	546.46
10/13/84	420.50	N.A.	546.46
10/14/84	420.52	N.A.	546.46
10/15/84	420.40	N.A.	546.46
10/16/84	420.65	N.A.	546.46
10/17/84	420.86	N.A.	546.46
10/18/84	420.70	N.A.	546.46
10/19/84	420.98	N.A.	546.46
10/20/84	421.06	N.A.	546.46
10/21/84	421.05	N.A.	546.46
10/22/84	421.06	N.A.	546.46
10/23/84	421.27	N.A.	546.46
10/24/84	421.40	N.A.	546.46
10/25/84	421.94	N.A.	546.46

TABLE E-7. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
10/26/84	421.89	N.A.	546.46
10/27/84	421.72	N.A.	546.46
10/28/84	421.80	N.A.	546.46
10/29/84	421.52	N.A.	546.46
10/30/84	421.81	N.A.	546.46
10/31/84	421.42	N.A.	546.46
11/01/84	421.81	N.A.	546.46
11/02/84	422.33	N.A.	546.46
11/03/84	421.92	N.A.	546.46
11/04/84	421.69	N.A.	546.46
11/05/84	421.94	N.A.	546.46
11/06/84	422.23	N.A.	546.46
11/07/84	422.01	N.A.	546.46
11/08/84	422.13	N.A.	546.46
11/09/84	421.81	N.A.	546.46
11/10/84	422.18	N.A.	546.46
11/11/84	422.16	N.A.	546.46
11/12/84	422.31	N.A.	546.46
11/13/84	422.59	N.A.	546.46
11/14/84	422.26	N.A.	546.46
11/15/84	422.73	N.A.	546.46
11/20/84	423.91	N.A.	546.46
11/21/84	423.74	N.A.	546.46
11/22/84	423.71	N.A.	546.46
11/23/84	424.06	N.A.	546.46
11/24/84	423.87	N.A.	546.46
11/25/84	423.54	N.A.	546.46
11/26/84	423.27	N.A.	546.46
11/27/84	423.84	N.A.	546.46
12/01/84	425.26	N.A.	546.46
12/11/84	424.85	N.A.	546.46
12/12/84	424.91	N.A.	546.46
12/13/84	424.67	N.A.	546.46
12/14/84	425.31	N.A.	546.46
12/15/84	425.17	N.A.	546.46
12/16/84	424.99	N.A.	546.46
12/17/84	424.86	N.A.	546.46
12/18/84	424.69	N.A.	546.46
12/19/84	424.78	N.A.	546.46
12/20/84	425.03	N.A.	546.46
12/21/84	424.90	N.A.	546.46
12/22/84	425.07	N.A.	546.46
12/23/84	424.94	N.A.	546.46

TABLE E-7. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
12/24/84	424.96	N.A.	546.46
12/25/84	425.25	N.A.	546.46
12/26/84	425.26	N.A.	546.46
12/27/84	425.37	N.A.	546.46
12/28/84	425.11	N.A.	546.46
12/29/84	425.09	N.A.	546.46
12/30/84	424.92	N.A.	546.46
12/31/84	424.81	N.A.	546.46
1/01/85	424.96	N.A.	546.46
1/02/85	425.03	N.A.	546.46
1/03/85	425.16	N.A.	546.46
1/04/85	425.32	N.A.	546.46
1/05/85	425.44	N.A.	546.46
1/06/85	425.50	N.A.	546.46
1/07/85	425.53	N.A.	546.46
1/08/85	425.40	N.A.	546.46
1/09/85	425.19	N.A.	546.46
1/10/85	424.96	N.A.	546.46
1/11/85	424.77	N.A.	546.46
1/12/85	424.90	N.A.	546.46
1/13/85	424.91	N.A.	546.46
1/14/85	424.96	N.A.	546.46
1/15/85	424.68	N.A.	546.46
1/16/85	424.52	N.A.	546.46
1/17/85	424.55	N.A.	546.46
1/18/85	424.52	N.A.	546.46
1/19/85	424.31	N.A.	546.46
1/20/85	424.23	N.A.	546.46
1/21/85	424.05	N.A.	546.46
1/22/85	424.02	N.A.	546.46
1/23/85	423.97	N.A.	546.46
1/24/85	423.93	N.A.	546.46
1/25/85	423.89	N.A.	546.46
1/26/85	423.88	N.A.	546.46
1/27/85	423.97	N.A.	546.46
1/28/85	423.93	N.A.	546.46
1/29/85	423.83	N.A.	546.46
1/30/85	423.69	N.A.	546.46
1/31/85	423.70	N.A.	546.46
2/01/85	424.04	N.A.	546.46
2/02/85	423.78	N.A.	546.46
2/03/85	423.58	N.A.	546.46
2/04/85	423.46	N.A.	546.46

TABLE E-7. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
2/05/85	423.61	N.A.	546.46
2/06/85	423.51	N.A.	546.46
2/07/85	423.67	N.A.	546.46
2/08/85	423.56	N.A.	546.46
2/09/85	423.41	N.A.	546.46
2/10/85	423.22	N.A.	546.46
2/11/85	423.37	N.A.	546.46
2/12/85	423.05	N.A.	546.46
2/13/85	423.07	N.A.	546.46
2/14/85	423.30	N.A.	546.46
2/15/85	423.25	N.A.	546.46
2/16/85	423.21	N.A.	546.46
2/17/85	423.10	N.A.	546.46
2/18/85	423.07	N.A.	546.46
2/19/85	423.32	N.A.	546.46
2/20/85	422.95	N.A.	546.46
2/21/85	422.91	N.A.	546.46
2/22/85	422.75	N.A.	546.46
2/23/85	422.74	N.A.	546.46
2/24/85	422.76	N.A.	546.46
2/25/85	422.64	N.A.	546.46
2/26/85	422.77	N.A.	546.46
2/27/85	422.80	N.A.	546.46
2/28/85	422.92	N.A.	546.46
3/01/85	422.85	N.A.	546.46
3/02/85	422.69	N.A.	546.46
3/03/85	422.67	N.A.	546.46
3/04/85	422.76	N.A.	546.46
3/05/85	422.60	N.A.	546.46
3/06/85	422.60	N.A.	546.46
3/07/85	422.43	N.A.	546.46
3/08/85	422.23	N.A.	546.46
3/09/85	422.34	N.A.	546.46
3/10/85	422.37	N.A.	546.46
3/11/85	422.29	N.A.	546.46
3/12/85	422.22	N.A.	546.46
3/13/85	422.21	N.A.	546.46
3/14/85	422.34	N.A.	546.46
3/15/85	422.33	N.A.	546.46
3/16/85	422.42	N.A.	546.46
3/17/85	422.43	N.A.	546.46
3/18/85	422.46	N.A.	546.46
3/19/85	422.47	N.A.	546.46

TABLE E-7. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
3/20/85	422.49	N.A.	546.46
3/21/85	422.50	N.A.	546.46
3/22/85	422.48	N.A.	546.46
3/23/85	422.55	N.A.	546.46
3/24/85	422.39	N.A.	546.46
3/25/85	422.30	N.A.	546.46
3/26/85	422.59	N.A.	546.46
3/27/85	422.50	N.A.	546.46
3/28/85	422.14	N.A.	546.46
3/29/85	421.98	N.A.	546.46
3/30/85	422.12	N.A.	546.46
3/31/85	421.94	N.A.	546.46
4/01/85	422.01	N.A.	546.46
4/02/85	422.11	N.A.	546.46
4/03/85	422.24	N.A.	546.46
4/04/85	422.17	N.A.	546.46
4/05/85	422.16	N.A.	546.46
4/06/85	422.09	N.A.	546.46
4/07/85	422.05	N.A.	546.46
4/08/85	422.10	N.A.	546.46
4/09/85	422.18	N.A.	546.46
4/10/85	422.23	N.A.	546.46
4/11/85	421.93	N.A.	546.46
4/12/85	421.79	N.A.	546.46
4/13/85	421.96	N.A.	546.46
4/14/85	422.11	N.A.	546.46
4/15/85	422.19	N.A.	546.46
4/16/85	422.05	N.A.	546.46
4/17/85	421.91	N.A.	546.46
4/18/85	421.91	N.A.	546.46
4/19/85	421.84	N.A.	546.46
4/20/85	421.87	N.A.	546.46
4/21/85	421.89	N.A.	546.46
4/22/85	421.67	N.A.	546.46
4/23/85	421.56	N.A.	546.46
4/24/85	421.46	N.A.	546.46
4/25/85	421.49	N.A.	546.46
4/26/85	421.54	N.A.	546.46
4/27/85	421.72	N.A.	546.46
4/28/85	421.73	N.A.	546.46
4/29/85	421.49	N.A.	546.46
4/30/85	421.51	N.A.	546.46
5/01/85	421.69	N.A.	546.46

TABLE E-7. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
5/02/85	421.71	N.A.	546.46
5/03/85	421.49	N.A.	546.46
5/04/85	421.38	N.A.	546.46
5/05/85	421.48	N.A.	546.46
5/06/85	421.48	N.A.	546.46
5/07/85	421.39	N.A.	546.46
5/08/85	421.35	N.A.	546.46
5/09/85	421.46	N.A.	546.46
5/10/85	421.48	N.A.	546.46
5/11/85	421.34	N.A.	546.46
5/12/85	421.38	N.A.	546.46
5/13/85	421.54	N.A.	546.46
5/14/85	421.45	N.A.	546.46
5/15/85	421.55	N.A.	546.46
5/16/85	421.69	N.A.	546.46
5/17/85	421.73	N.A.	546.46
5/18/85	421.82	N.A.	546.46
5/19/85	421.86	N.A.	546.46
5/20/85	421.73	N.A.	546.46
5/21/85	421.65	N.A.	546.46
5/22/85	421.86	N.A.	546.46
5/23/85	423.02	N.A.	546.46
5/24/85	423.57	N.A.	546.46
5/25/85	424.06	N.A.	546.46
5/26/85	424.41	N.A.	546.46
5/27/85	424.66	N.A.	546.46
5/28/85	424.66	N.A.	546.46
5/29/85	424.74	N.A.	546.46
5/30/85	424.66	N.A.	546.46
5/31/85	424.80	N.A.	546.46
6/01/85	424.66	N.A.	546.46
6/02/85	424.30	N.A.	546.46
6/03/85	424.08	N.A.	546.46
6/04/85	423.68	N.A.	546.46
6/05/85	423.61	N.A.	546.46
6/06/85	423.61	N.A.	546.46
6/07/85	423.61	N.A.	546.46
6/08/85	423.07	N.A.	546.46
6/09/85	423.00	N.A.	546.46
6/10/85	422.74	N.A.	546.46
6/11/85	421.65	N.A.	546.46

TABLE E-7. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
6/11/85	422.58	N.A.	546.46
6/12/85	422.71	N.A.	546.46
6/13/85	422.71	N.A.	546.46
6/14/85	422.80	N.A.	546.46
6/15/85	422.81	N.A.	546.46
6/16/85	422.67	N.A.	546.46
6/17/85	422.68	N.A.	546.46
6/18/85	422.94	N.A.	546.46
6/19/85	422.96	N.A.	546.46
6/20/85	422.85	N.A.	546.46
6/21/85	422.75	N.A.	546.46
6/22/85	422.90	N.A.	546.46
6/23/85	422.77	N.A.	546.46
6/24/85	422.58	N.A.	546.46
6/25/85	422.47	N.A.	546.46
6/26/85	422.46	N.A.	546.46
6/27/85	422.61	N.A.	546.46
6/28/85	422.62	N.A.	546.46
6/29/85	422.93	N.A.	546.46
6/30/85	422.67	N.A.	546.46
7/01/85	422.72	N.A.	546.46
7/02/85	422.99	N.A.	546.46
7/03/85	423.17	N.A.	546.46
7/04/85	423.44	N.A.	546.46
7/05/85	423.48	N.A.	546.46
7/06/85	423.65	N.A.	546.46
7/07/85	423.72	N.A.	546.46
7/08/85	423.69	N.A.	546.46
7/09/85	423.89	N.A.	546.46
7/10/85	423.91	N.A.	546.46
7/11/85	424.03	N.A.	546.46
7/12/85	424.13	N.A.	546.46
7/13/85	424.10	N.A.	546.46
7/14/85	424.19	N.A.	546.46
7/15/85	424.26	N.A.	546.46
7/16/85	424.24	N.A.	546.46
7/17/85	424.16	N.A.	546.46
7/18/85	424.11	N.A.	546.46
7/19/85	424.15	N.A.	546.46
7/20/85	424.18	N.A.	546.46
7/21/85	424.19	N.A.	546.46
7/22/85	424.17	N.A.	546.46
7/23/85	424.14	N.A.	546.46

TABLE E-7. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
7/25/85	424.09	N.A.	546.46
7/26/85	424.09	N.A.	546.46
7/27/85	424.01	N.A.	546.46
7/28/85	423.92	N.A.	546.46
7/29/85	423.84	N.A.	546.46
7/30/85	423.87	N.A.	546.46
7/31/85	423.81	N.A.	546.46
8/01/85	423.81	N.A.	546.46
8/02/85	423.73	N.A.	546.46
8/03/85	423.77	N.A.	546.46
8/04/85	423.85	N.A.	546.46
8/05/85	423.84	N.A.	546.46
8/06/85	424.02	N.A.	546.46
8/07/85	423.99	N.A.	546.46
8/08/85	423.96	N.A.	546.46
8/09/85	424.18	N.A.	546.46
8/10/85	424.14	N.A.	546.46
8/11/85	424.22	N.A.	546.46
8/12/85	424.25	N.A.	546.46
8/13/85	424.02	N.A.	546.46
8/14/85	424.11	N.A.	546.46
8/15/85	424.16	N.A.	546.46
8/16/85	423.97	N.A.	546.46
8/17/85	423.99	N.A.	546.46
8/18/85	423.94	N.A.	546.46
8/19/85	423.90	N.A.	546.46
8/20/85	423.82	N.A.	546.46
8/21/85	423.80	N.A.	546.46
8/22/85	423.78	N.A.	546.46
8/23/85	423.83	N.A.	546.46
8/24/85	423.89	N.A.	546.46
8/25/85	423.88	N.A.	546.46
8/26/85	423.84	N.A.	546.46
8/27/85	423.80	N.A.	546.46
8/28/85	423.79	N.A.	546.46
8/29/85	423.91	N.A.	546.46
8/30/85	423.83	N.A.	546.46
8/31/85	423.78	N.A.	546.46
9/01/85	423.98	N.A.	546.46
9/02/85	423.93	N.A.	546.46
9/03/85	424.11	N.A.	546.46
12/31/85	423.98	N.A.	546.46
12/12/86	421.98	N.A.	546.46

TABLE E-7. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
12/10/87	423.06	N.A.	546.46
11/22/88	424.49	N.A.	546.46
12/16/88	423.41	N.A.	546.46
2/23/89	423.02	N.A.	546.46
3/10/89	423.14	N.A.	546.46
3/28/89	422.97	N.A.	546.46
4/24/89	422.88	N.A.	546.46
5/24/89	422.86	N.A.	546.46
5/31/89	423.02	N.A.	546.46
6/01/89	423.04	N.A.	546.46
6/08/89	423.05	N.A.	546.46
6/22/89	422.98	N.A.	546.46

TABLE E-8. Water Level Data for Well 699-42-40C

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
5/19/82	409.30	N.A.	546.16
6/14/82	409.11	N.A.	546.16
8/24/82	409.50	N.A.	546.16
8/31/82	409.44	N.A.	546.16
9/07/82	409.53	N.A.	546.16
9/14/82	409.40	N.A.	546.16
9/15/82	409.57	N.A.	546.16
10/15/82	409.63	N.A.	546.16
11/16/82	409.90	N.A.	546.16
12/15/82	409.83	N.A.	546.16
1/18/83	409.80	N.A.	546.16
2/15/83	409.60	N.A.	546.16
3/21/83	409.63	N.A.	546.16
4/19/83	409.67	N.A.	546.16
5/20/83	409.53	N.A.	546.16
6/15/83	409.60	N.A.	546.16
7/15/83	409.69	N.A.	546.16
8/15/83	409.70	N.A.	546.16
9/15/83	409.74	N.A.	546.16
10/18/83	409.94	N.A.	546.16
11/15/83	410.49	N.A.	546.16
12/01/83	N.A.	411.02	546.16
12/14/83	411.01	N.A.	546.16
12/15/83	411.02	N.A.	546.16
5/31/84	N.A.	413.19	546.16
5/31/84	412.89	N.A.	546.16
6/13/84	N.A.	413.38	546.16
6/13/84	413.08	N.A.	546.16
6/20/84	N.A.	413.45	546.16
6/20/84	413.15	N.A.	546.16
6/27/84	N.A.	413.43	546.16
6/27/84	413.13	N.A.	546.16
7/11/84	N.A.	413.77	546.16
7/11/84	413.47	N.A.	546.16
7/18/84	N.A.	413.90	546.16

TABLE E-8. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
7/19/84	413.60	N.A.	546.16
7/23/84	N.A.	413.97	546.16
7/24/84	413.67	N.A.	546.16
7/25/84	413.80	N.A.	546.16
7/26/84	413.80	N.A.	546.16
7/27/84	N.A.	414.17	546.16
7/27/84	413.85	N.A.	546.16
7/28/84	413.87	N.A.	546.16
7/29/84	413.85	N.A.	546.16
7/30/84	N.A.	414.21	546.16
7/30/84	413.88	N.A.	546.16
7/31/84	N.A.	414.28	546.16
7/31/84	413.91	N.A.	546.16
8/01/84	N.A.	414.22	546.16
8/01/84	413.98	N.A.	546.16
8/02/84	N.A.	414.19	546.16
8/02/84	413.92	N.A.	546.16
8/03/84	N.A.	414.24	546.16
8/03/84	413.89	N.A.	546.16
8/04/84	N.A.	414.32	546.16
8/04/84	413.94	N.A.	546.16
8/05/84	N.A.	414.14	546.16
8/05/84	414.02	N.A.	546.16
8/06/84	N.A.	414.11	546.16
8/06/84	413.84	N.A.	546.16
8/07/84	N.A.	414.17	546.16
8/07/84	413.81	N.A.	546.16
8/08/84	N.A.	414.27	546.16
8/08/84	413.87	N.A.	546.16
8/09/84	N.A.	414.30	546.16
8/09/84	413.97	N.A.	546.16
8/10/84	N.A.	414.23	546.16
8/10/84	414.00	N.A.	546.16
8/11/84	N.A.	414.21	546.16
8/11/84	413.93	N.A.	546.16
8/12/84	N.A.	414.11	546.16
8/12/84	413.91	N.A.	546.16
8/13/84	N.A.	414.18	546.16
8/13/84	413.81	N.A.	546.16

TABLE E-8. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
8/14/84	N.A.	414.25	546.16
8/14/84	413.88	N.A.	546.16
8/15/84	N.A.	414.27	546.16
8/15/84	413.95	N.A.	546.16
8/16/84	N.A.	414.26	546.16
8/16/84	413.97	N.A.	546.16
8/17/84	N.A.	414.30	546.16
8/17/84	413.96	N.A.	546.16
8/18/84	N.A.	414.31	546.16
8/18/84	414.00	N.A.	546.16
8/19/84	N.A.	414.35	546.16
8/19/84	414.01	N.A.	546.16
8/20/84	N.A.	414.37	546.16
8/20/84	414.05	N.A.	546.16
8/21/84	N.A.	414.42	546.16
8/21/84	414.07	N.A.	546.16
8/22/84	N.A.	414.43	546.16
8/22/84	414.12	N.A.	546.16
8/23/84	N.A.	414.44	546.16
8/23/84	414.13	N.A.	546.16
8/24/84	N.A.	414.41	546.16
8/24/84	414.14	N.A.	546.16
8/25/84	N.A.	414.48	546.16
8/25/84	414.11	N.A.	546.16
8/26/84	N.A.	414.50	546.16
8/26/84	414.18	N.A.	546.16
8/27/84	N.A.	414.33	546.16
8/27/84	414.20	N.A.	546.16
8/28/84	N.A.	414.35	546.16
8/28/84	414.03	N.A.	546.16
8/29/84	N.A.	414.42	546.16
8/29/84	414.05	N.A.	546.16
8/30/84	N.A.	414.53	546.16
8/30/84	414.12	N.A.	546.16
8/31/84	N.A.	414.41	546.16
8/31/84	414.23	N.A.	546.16
9/01/84	N.A.	414.41	546.16
9/01/84	414.11	N.A.	546.16
9/02/84	N.A.	414.49	546.16
9/02/84	414.11	N.A.	546.16
9/03/84	N.A.	414.54	546.16
9/03/84	414.19	N.A.	546.16
9/04/84	N.A.	414.64	546.16

TABLE E-8. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
9/04/84	414.24	N.A.	546.16
9/05/84	N.A.	414.53	546.16
9/05/84	414.34	N.A.	546.16
9/06/84	N.A.	414.50	546.16
9/06/84	414.23	N.A.	546.16
9/07/84	N.A.	414.55	546.16
9/07/84	414.20	N.A.	546.16
9/08/84	N.A.	414.62	546.16
9/08/84	414.24	N.A.	546.16
9/09/84	414.25	N.A.	546.16
9/10/84	N.A.	414.71	546.16
9/10/84	414.32	N.A.	546.16
9/11/84	N.A.	414.52	546.16
9/11/84	414.41	N.A.	546.16
9/12/84	N.A.	414.42	546.16
9/12/84	414.22	N.A.	546.16
9/13/84	N.A.	414.51	546.16
9/13/84	414.12	N.A.	546.16
9/14/84	N.A.	414.63	546.16
9/14/84	414.21	N.A.	546.16
9/15/84	N.A.	414.59	546.16
9/15/84	414.33	N.A.	546.16
9/16/84	N.A.	414.60	546.16
9/16/84	414.29	N.A.	546.16
9/17/84	N.A.	414.50	546.16
9/17/84	414.27	N.A.	546.16
9/18/84	414.20	N.A.	546.16
9/19/84	414.18	N.A.	546.16
9/20/84	414.32	N.A.	546.16
9/21/84	414.23	N.A.	546.16
9/22/84	414.27	N.A.	546.16
9/23/84	414.11	N.A.	546.16
9/24/84	413.96	N.A.	546.16
9/25/84	413.99	N.A.	546.16
9/26/84	414.04	N.A.	546.16
9/27/84	413.93	N.A.	546.16
9/28/84	413.93	N.A.	546.16
9/29/84	413.95	N.A.	546.16
9/30/84	414.09	N.A.	546.16
10/01/84	414.00	N.A.	546.16
10/02/84	413.93	N.A.	546.16
10/03/84	413.96	N.A.	546.16
10/04/84	413.97	N.A.	546.16
10/05/84	413.82	N.A.	546.16

TABLE E-8. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
10/06/84	413.75	N.A.	546.16
10/07/84	413.68	N.A.	546.16
10/08/84	413.76	N.A.	546.16
10/09/84	413.82	N.A.	546.16
10/10/84	413.91	N.A.	546.16
10/11/84	413.82	N.A.	546.16
10/12/84	413.70	N.A.	546.16
10/13/84	413.55	N.A.	546.16
10/14/84	413.48	N.A.	546.16
10/15/84	413.45	N.A.	546.16
10/16/84	413.59	N.A.	546.16
10/17/84	413.61	N.A.	546.16
10/18/84	413.41	N.A.	546.16
10/19/84	413.46	N.A.	546.16
10/20/84	413.41	N.A.	546.16
10/21/84	413.34	N.A.	546.16
10/22/84	413.25	N.A.	546.16
10/23/84	413.27	N.A.	546.16
10/24/84	413.31	N.A.	546.16
10/25/84	413.63	N.A.	546.16
10/26/84	413.64	N.A.	546.16
10/27/84	413.51	N.A.	546.16
10/28/84	413.54	N.A.	546.16
10/29/84	413.35	N.A.	546.16
10/30/84	413.45	N.A.	546.16
10/31/84	413.22	N.A.	546.16
11/01/84	413.38	N.A.	546.16
11/02/84	413.77	N.A.	546.16
11/03/84	413.54	N.A.	546.16
11/04/84	413.29	N.A.	546.16
11/05/84	413.34	N.A.	546.16
11/06/84	413.58	N.A.	546.16
11/07/84	413.45	N.A.	546.16
11/08/84	413.53	N.A.	546.16
11/09/84	413.30	N.A.	546.16
11/10/84	413.51	N.A.	546.16
11/11/84	413.51	N.A.	546.16
11/12/84	413.62	N.A.	546.16
11/13/84	413.68	N.A.	546.16
11/14/84	413.27	N.A.	546.16
11/20/84	413.67	N.A.	546.16
11/21/84	413.56	N.A.	546.16
11/22/84	413.58	N.A.	546.16

TABLE E-8. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
11/23/84	413.95	N.A.	546.16
11/24/84	414.00	N.A.	546.16
11/25/84	413.89	N.A.	546.16
11/26/84	413.73	N.A.	546.16
11/27/84	414.17	N.A.	546.16
11/28/84	414.18	N.A.	546.16
12/01/84	414.81	N.A.	546.16
12/11/84	414.31	N.A.	546.16
12/12/84	414.41	N.A.	546.16
12/13/84	414.22	N.A.	546.16
12/14/84	414.61	N.A.	546.16
12/15/84	414.55	N.A.	546.16
12/16/84	414.41	N.A.	546.16
12/17/84	414.34	N.A.	546.16
12/18/84	414.31	N.A.	546.16
12/19/84	414.43	N.A.	546.16
12/20/84	414.63	N.A.	546.16
12/21/84	414.51	N.A.	546.16
12/22/84	414.60	N.A.	546.16
12/23/84	414.59	N.A.	546.16
12/24/84	414.59	N.A.	546.16
12/25/84	414.80	N.A.	546.16
12/26/84	414.78	N.A.	546.16
12/27/84	414.92	N.A.	546.16
12/28/84	414.74	N.A.	546.16
12/29/84	414.67	N.A.	546.16
12/30/84	414.50	N.A.	546.16
12/31/84	414.34	N.A.	546.16
1/01/85	414.38	N.A.	546.16
1/02/85	414.48	N.A.	546.16
1/03/85	414.55	N.A.	546.16
1/04/85	414.67	N.A.	546.16
1/05/85	414.78	N.A.	546.16
1/06/85	414.88	N.A.	546.16
1/07/85	415.00	N.A.	546.16
1/08/85	414.87	N.A.	546.16
1/09/85	414.79	N.A.	546.16
1/10/85	414.69	N.A.	546.16
1/11/85	414.59	N.A.	546.16
1/12/85	414.68	N.A.	546.16
1/13/85	414.75	N.A.	546.16
1/14/85	414.87	N.A.	546.16
1/15/85	414.72	N.A.	546.16

TABLE E-8. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
1/16/85	414.66	N.A.	546.16
1/17/85	414.75	N.A.	546.16
1/18/85	414.82	N.A.	546.16
1/19/85	414.76	N.A.	546.16
1/20/85	414.78	N.A.	546.16
1/21/85	414.68	N.A.	546.16
1/22/85	414.73	N.A.	546.16
1/23/85	414.71	N.A.	546.16
1/24/85	414.68	N.A.	546.16
1/25/85	414.63	N.A.	546.16
1/26/85	414.63	N.A.	546.16
1/27/85	414.73	N.A.	546.16
1/28/85	414.76	N.A.	546.16
1/29/85	414.71	N.A.	546.16
1/30/85	414.59	N.A.	546.16
1/31/85	414.59	N.A.	546.16
2/01/85	414.84	N.A.	546.16
2/02/85	414.71	N.A.	546.16
2/03/85	414.59	N.A.	546.16
2/04/85	414.48	N.A.	546.16
2/05/85	414.61	N.A.	546.16
2/06/85	414.61	N.A.	546.16
2/07/85	414.83	N.A.	546.16
2/08/85	414.86	N.A.	546.16
2/09/85	414.67	N.A.	546.16
2/10/85	414.51	N.A.	546.16
2/11/85	414.57	N.A.	546.16
2/12/85	414.40	N.A.	546.16
2/13/85	414.31	N.A.	546.16
2/14/85	414.42	N.A.	546.16
2/15/85	414.43	N.A.	546.16
2/16/85	414.42	N.A.	546.16
2/17/85	414.39	N.A.	546.16
2/18/85	414.40	N.A.	546.16
2/19/85	414.60	N.A.	546.16
2/20/85	414.43	N.A.	546.16
2/21/85	414.41	N.A.	546.16
2/22/85	414.32	N.A.	546.16
2/23/85	414.28	N.A.	546.16
2/24/85	414.30	N.A.	546.16
2/25/85	414.14	N.A.	546.16
2/26/85	414.27	N.A.	546.16
2/27/85	414.24	N.A.	546.16

TABLE E-8. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
2/28/85	414.38	N.A.	546.16
3/01/85	414.42	N.A.	546.16
3/02/85	414.36	N.A.	546.16
3/03/85	414.36	N.A.	546.16
3/04/85	414.55	N.A.	546.16
3/05/85	414.40	N.A.	546.16
3/06/85	414.38	N.A.	546.16
3/07/85	414.26	N.A.	546.16
3/08/85	414.06	N.A.	546.16
3/09/85	414.13	N.A.	546.16
3/10/85	414.19	N.A.	546.16
3/11/85	414.14	N.A.	546.16
3/12/85	414.12	N.A.	546.16
3/13/85	414.12	N.A.	546.16
3/14/85	414.18	N.A.	546.16
3/15/85	414.13	N.A.	546.16
3/16/85	414.14	N.A.	546.16
3/17/85	414.11	N.A.	546.16
3/18/85	414.10	N.A.	546.16
3/19/85	414.10	N.A.	546.16
3/20/85	414.10	N.A.	546.16
3/21/85	414.16	N.A.	546.16
3/22/85	414.12	N.A.	546.16
3/23/85	414.21	N.A.	546.16
3/24/85	414.21	N.A.	546.16
3/25/85	414.14	N.A.	546.16
3/26/85	414.23	N.A.	546.16
3/27/85	414.27	N.A.	546.16
3/28/85	414.00	N.A.	546.16
3/29/85	413.84	N.A.	546.16
3/30/85	413.89	N.A.	546.16
3/31/85	413.78	N.A.	546.16
4/01/85	413.76	N.A.	546.16
4/02/85	413.81	N.A.	546.16
4/03/85	413.95	N.A.	546.16
4/04/85	413.91	N.A.	546.16
4/05/85	413.92	N.A.	546.16
4/06/85	413.84	N.A.	546.16
4/07/85	413.79	N.A.	546.16
4/08/85	413.78	N.A.	546.16
4/09/85	413.79	N.A.	546.16
4/10/85	413.92	N.A.	546.16
4/11/85	413.70	N.A.	546.16

TABLE E-8. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
4/12/85	413.59	N.A.	546.16
4/13/85	413.74	N.A.	546.16
4/14/85	413.88	N.A.	546.16
4/15/85	413.98	N.A.	546.16
4/16/85	413.92	N.A.	546.16
4/17/85	413.87	N.A.	546.16
4/18/85	413.88	N.A.	546.16
4/19/85	413.84	N.A.	546.16
4/20/85	413.83	N.A.	546.16
4/21/85	413.90	N.A.	546.16
4/22/85	413.80	N.A.	546.16
4/23/85	413.75	N.A.	546.16
4/24/85	413.61	N.A.	546.16
4/25/85	413.61	N.A.	546.16
4/26/85	413.68	N.A.	546.16
4/27/85	413.78	N.A.	546.16
4/28/85	413.74	N.A.	546.16
4/29/85	413.57	N.A.	546.16
4/30/85	413.57	N.A.	546.16
5/01/85	413.71	N.A.	546.16
5/02/85	413.77	N.A.	546.16
5/03/85	413.67	N.A.	546.16
5/04/85	413.55	N.A.	546.16
5/05/85	413.60	N.A.	546.16
5/06/85	413.65	N.A.	546.16
5/07/85	413.72	N.A.	546.16
5/08/85	413.71	N.A.	546.16
5/09/85	413.73	N.A.	546.16
5/10/85	413.76	N.A.	546.16
5/11/85	413.59	N.A.	546.16
5/12/85	413.53	N.A.	546.16
5/13/85	413.61	N.A.	546.16
5/14/85	413.54	N.A.	546.16
5/15/85	413.51	N.A.	546.16
5/16/85	413.60	N.A.	546.16
5/17/85	413.63	N.A.	546.16
5/18/85	413.69	N.A.	546.16
5/19/85	413.71	N.A.	546.16
5/20/85	413.63	N.A.	546.16
5/21/85	413.53	N.A.	546.16
5/22/85	413.64	N.A.	546.16
5/23/85	413.66	N.A.	546.16
5/24/85	413.65	N.A.	546.16

TABLE E-8. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
5/25/85	413.68	N.A.	546.16
5/26/85	413.80	N.A.	546.16
5/27/85	413.93	N.A.	546.16
5/28/85	414.01	N.A.	546.16
5/29/85	414.10	N.A.	546.16
5/30/85	414.14	N.A.	546.16
5/31/85	414.31	N.A.	546.16
6/01/85	414.40	N.A.	546.16
6/02/85	414.42	N.A.	546.16
6/03/85	414.49	N.A.	546.16
6/04/85	414.57	N.A.	546.16
6/05/85	414.44	N.A.	546.16
6/06/85	414.46	N.A.	546.16
6/07/85	414.53	N.A.	546.16
6/08/85	414.26	N.A.	546.16
6/09/85	414.33	N.A.	546.16
6/10/85	414.32	N.A.	546.16
6/11/85	414.30	N.A.	546.16
6/12/85	414.40	N.A.	546.16
6/13/85	414.37	N.A.	546.16
6/14/85	414.36	N.A.	546.16
6/15/85	414.28	N.A.	546.16
6/16/85	414.20	N.A.	546.16
6/17/85	414.20	N.A.	546.16
6/18/85	414.26	N.A.	546.16
6/19/85	414.35	N.A.	546.16
6/20/85	414.37	N.A.	546.16
6/21/85	414.28	N.A.	546.16
6/22/85	414.28	N.A.	546.16
6/23/85	414.23	N.A.	546.16
6/24/85	414.18	N.A.	546.16
6/25/85	414.17	N.A.	546.16
6/26/85	414.19	N.A.	546.16
6/27/85	414.25	N.A.	546.16
6/28/85	414.21	N.A.	546.16
6/29/85	414.33	N.A.	546.16
6/30/85	414.17	N.A.	546.16
7/01/85	414.14	N.A.	546.16
7/02/85	414.21	N.A.	546.16
7/03/85	414.27	N.A.	546.16
7/04/85	414.36	N.A.	546.16
7/05/85	414.31	N.A.	546.16
7/06/85	414.37	N.A.	546.16

TABLE E-8. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
7/07/85	414.44	N.A.	546.16
7/08/85	414.42	N.A.	546.16
7/09/85	414.45	N.A.	546.16
7/10/85	414.44	N.A.	546.16
7/11/85	414.49	N.A.	546.16
7/12/85	414.57	N.A.	546.16
7/13/85	414.56	N.A.	546.16
7/14/85	414.63	N.A.	546.16
7/15/85	414.73	N.A.	546.16
7/16/85	414.79	N.A.	546.16
7/17/85	414.78	N.A.	546.16
7/18/85	414.77	N.A.	546.16
7/19/85	414.81	N.A.	546.16
7/20/85	414.88	N.A.	546.16
7/21/85	414.94	N.A.	546.16
7/22/85	414.99	N.A.	546.16
7/23/85	414.96	N.A.	546.16
7/25/85	414.80	N.A.	546.16
7/26/85	414.82	N.A.	546.16
7/27/85	414.85	N.A.	546.16
7/28/85	414.90	N.A.	546.16
7/29/85	414.95	N.A.	546.16
7/30/85	415.01	N.A.	546.16
7/31/85	414.90	N.A.	546.16
8/01/85	414.85	N.A.	546.16
8/02/85	414.81	N.A.	546.16
8/03/85	414.85	N.A.	546.16
8/04/85	414.95	N.A.	546.16
8/05/85	414.93	N.A.	546.16
8/06/85	415.00	N.A.	546.16
8/07/85	415.03	N.A.	546.16
8/08/85	414.96	N.A.	546.16
8/09/85	415.01	N.A.	546.16
8/10/85	414.99	N.A.	546.16
8/11/85	415.06	N.A.	546.16
8/12/85	415.12	N.A.	546.16
8/13/85	414.99	N.A.	546.16
8/14/85	415.07	N.A.	546.16
8/15/85	415.21	N.A.	546.16
8/16/85	415.13	N.A.	546.16
8/17/85	415.19	N.A.	546.16
8/18/85	415.19	N.A.	546.16
8/19/85	415.19	N.A.	546.16

TABLE E-8. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
8/20/85	415.15	N.A.	546.16
8/21/85	415.08	N.A.	546.16
8/22/85	415.04	N.A.	546.16
8/23/85	415.08	N.A.	546.16
8/24/85	415.17	N.A.	546.16
8/25/85	415.20	N.A.	546.16
8/26/85	415.18	N.A.	546.16
8/27/85	415.13	N.A.	546.16
8/28/85	415.13	N.A.	546.16
8/29/85	415.19	N.A.	546.16
8/30/85	415.16	N.A.	546.16
8/31/85	415.09	N.A.	546.16
9/01/85	415.20	N.A.	546.16
9/02/85	415.19	N.A.	546.16
9/03/85	415.31	N.A.	546.16
1/07/86	415.37	N.A.	546.16
12/12/86	415.09	N.A.	546.16
5/25/89	415.32	N.A.	546.16
6/01/89	415.30	N.A.	546.16

TABLE E-9. Water Level Data for Well 699-42-42B

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
11/22/88	N.A.	N.A.	583.23
12/13/88	418.32	N.A.	583.23
2/23/89	417.61	N.A.	583.23
2/24/89	N.A.	N.A.	583.23
3/28/89	417.58	N.A.	583.23
4/24/89	417.64	N.A.	583.23
4/28/89	417.54	N.A.	583.23
5/24/89	417.58	N.A.	583.23
5/25/89	417.58	N.A.	583.23
6/16/89	417.64	N.A.	583.23
6/22/89	417.71	N.A.	583.23

TABLE E-10. Water Level Data for Well 699-43-42

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
7/14/66	N.A.	418.17	564.48
11/02/66	N.A.	418.48	564.48
12/27/66	N.A.	418.33	564.48
3/28/67	N.A.	418.29	564.48
10/19/67	N.A.	418.64	564.48
3/20/68	N.A.	418.47	564.48
4/24/69	N.A.	418.82	564.48
5/15/69	N.A.	418.70	564.48
9/14/71	N.A.	419.65	564.48
3/20/72	N.A.	418.99	564.48
7/11/72	N.A.	419.08	564.48
10/05/72	N.A.	418.84	564.48
1/05/73	N.A.	418.88	564.48
4/10/73	N.A.	418.89	564.48
7/10/73	N.A.	419.43	564.48
8/15/73	N.A.	418.99	564.48
8/29/73	N.A.	419.16	564.48
9/11/73	N.A.	419.21	564.48
10/01/73	N.A.	419.54	564.48
10/16/73	N.A.	419.33	564.48
4/18/74	N.A.	418.89	564.48
7/16/74	N.A.	419.70	564.48
10/18/74	N.A.	418.79	564.48
1/08/75	N.A.	419.18	564.48
4/14/75	N.A.	418.81	564.48
7/07/75	N.A.	419.39	564.48
12/03/75	N.A.	419.24	564.48
12/15/76	N.A.	418.35	564.48
7/01/77	N.A.	418.89	564.48
12/07/77	N.A.	418.30	564.48
6/01/78	N.A.	418.54	564.48
12/01/78	N.A.	418.03	564.48
12/01/79	N.A.	418.51	564.48
6/01/80	N.A.	419.11	564.48
12/01/80	N.A.	418.56	564.48
6/01/81	N.A.	419.09	564.48
12/01/81	N.A.	418.75	564.48
6/01/82	N.A.	418.43	564.48
12/01/82	N.A.	418.37	564.48
12/15/82	418.38	N.A.	564.48
6/01/83	N.A.	418.70	564.48
6/15/83	418.71	N.A.	564.48
12/01/83	N.A.	423.49	564.48
12/15/83	423.50	N.A.	564.48

TABLE E-10. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
6/01/84	N.A.	424.16	564.48
6/01/84	424.16	N.A.	564.48
6/13/84	N.A.	423.87	564.48
6/13/84	423.87	N.A.	564.48
6/15/84	423.76	N.A.	564.48
6/20/84	N.A.	423.78	564.48
6/20/84	423.78	N.A.	564.48
6/27/84	N.A.	423.93	564.48
6/27/84	423.93	N.A.	564.48
7/11/84	N.A.	424.60	564.48
7/11/84	424.60	N.A.	564.48
7/25/84	424.25	N.A.	564.48
8/08/84	422.80	N.A.	564.48
8/22/84	423.57	N.A.	566.36
9/06/84	423.46	N.A.	566.36
9/19/84	422.64	N.A.	566.36
10/03/84	422.99	N.A.	566.36
10/19/84	421.50	N.A.	566.36
11/01/84	421.76	N.A.	566.36
11/20/84	423.44	N.A.	566.36
12/01/84	N.A.	421.96	566.36
12/12/84	423.79	N.A.	566.36
12/28/84	423.84	N.A.	566.36
1/09/85	423.74	N.A.	566.36
1/23/85	422.60	N.A.	566.36
2/06/85	422.21	N.A.	566.36
2/21/85	421.73	N.A.	566.36
3/07/85	421.44	N.A.	566.36
3/22/85	421.53	N.A.	566.36
4/02/85	421.36	N.A.	566.36
4/17/85	421.18	N.A.	566.36
5/03/85	420.88	N.A.	566.36
5/15/85	420.99	N.A.	566.36
5/28/85	423.09	N.A.	566.36
6/13/85	421.28	N.A.	566.36
6/13/85	421.28	N.A.	566.36
6/26/85	421.64	N.A.	566.36
7/10/85	422.49	N.A.	566.36
8/07/85	423.36	N.A.	566.36
12/31/85	422.16	N.A.	566.36
12/10/87	421.82	N.A.	566.36
12/16/88	421.99	N.A.	566.36
6/08/89	421.46	N.A.	566.36

TABLE E-11. Water Level Data for Well 699-43-42J

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
11/22/88	N.A.	N.A.	581.68
12/13/88	420.59	N.A.	581.68
2/23/89	419.67	N.A.	581.68
2/24/89	N.A.	N.A.	581.68
3/10/89	419.66	N.A.	581.68
3/28/89	419.67	N.A.	581.68
4/24/89	419.63	N.A.	581.68
4/28/89	419.61	N.A.	581.68
5/24/89	419.64	N.A.	581.68
5/25/89	419.65	N.A.	581.68
6/15/89	419.77	N.A.	581.68
6/22/89	419.74	N.A.	581.68

TABLE E-12. Water Level Data for Well 699-43-43

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
10/19/88	N.A.	N.A.	N.A.
11/21/88	N.A.	N.A.	579.37
12/06/88	416.23	N.A.	579.37
12/13/88	416.20	N.A.	579.37
2/23/89	415.33	N.A.	579.37
2/24/89	415.33	N.A.	579.37
3/28/89	415.33	N.A.	579.37
4/24/89	415.31	N.A.	579.37
5/24/89	415.40	N.A.	579.37
6/15/89	415.73	N.A.	579.37

TABLE E-13. Water Level Data for Well 699-44-42

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
11/21/88	N.A.	N.A.	579.22
12/13/88	422.07	N.A.	579.22
2/17/89	421.22	N.A.	579.22
2/23/89	421.27	N.A.	579.22
3/28/89	421.30	N.A.	579.22
4/24/89	421.24	N.A.	579.22
5/24/89	421.25	N.A.	579.22
6/15/89	421.35	N.A.	579.22
6/22/89	421.32	N.A.	579.22

TABLE E-14. Water Level Data for Well 699-45-42

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
11/26/48	N.A.	404.84	577.33
12/30/48	N.A.	405.02	577.33
1/27/49	N.A.	405.35	577.33
2/24/49	N.A.	405.73	577.33
3/31/49	N.A.	405.47	577.33
4/28/49	N.A.	405.54	577.33
5/26/49	N.A.	405.42	577.33
6/30/49	N.A.	404.93	577.33
7/28/49	N.A.	404.78	577.33
8/25/49	N.A.	404.62	577.33
9/29/49	N.A.	404.46	577.33
10/28/49	N.A.	404.28	577.33
11/25/49	N.A.	404.27	577.33
12/29/49	N.A.	404.43	577.33
1/26/50	N.A.	404.18	577.33
2/23/50	N.A.	404.36	577.33
3/30/50	N.A.	404.43	577.33
4/27/50	N.A.	404.51	577.33
5/25/50	N.A.	404.30	577.33
6/29/50	N.A.	404.30	577.33
7/27/50	N.A.	404.36	577.33
8/31/50	N.A.	404.25	577.33
9/28/50	N.A.	404.13	577.33
10/26/50	N.A.	404.38	577.33
11/24/50	N.A.	404.18	577.33
12/28/50	N.A.	404.35	577.33
1/25/51	N.A.	404.43	577.33
2/27/51	N.A.	404.60	577.33
3/27/51	N.A.	404.48	577.33
4/24/51	N.A.	404.62	577.33
5/29/51	N.A.	404.46	577.33
6/26/51	N.A.	404.67	577.33
7/31/51	N.A.	404.56	577.33
8/28/51	N.A.	404.73	577.33
9/25/51	N.A.	404.60	577.33
10/30/51	N.A.	404.41	577.33
11/27/51	N.A.	404.49	577.33
12/26/51	N.A.	404.31	577.33
1/29/52	N.A.	404.47	577.33
2/26/52	N.A.	404.61	577.33

TABLE E-14. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
3/26/52	N.A.	404.71	577.33
4/29/52	N.A.	404.92	577.33
5/27/52	N.A.	404.89	577.33
6/24/52	N.A.	405.02	577.33
7/29/52	N.A.	404.70	577.33
8/26/52	N.A.	404.53	577.33
9/30/52	N.A.	404.34	577.33
10/28/52	N.A.	404.30	577.33
11/25/52	N.A.	404.22	577.33
12/30/52	N.A.	404.32	577.33
1/27/53	N.A.	404.00	577.33
2/24/53	N.A.	403.84	577.33
3/31/53	N.A.	403.68	577.33
4/28/53	N.A.	403.76	577.33
5/27/53	N.A.	403.42	577.33
6/30/53	N.A.	403.30	577.33
7/28/53	N.A.	403.17	577.33
8/25/53	N.A.	402.99	577.33
9/29/53	N.A.	402.63	577.33
10/27/53	N.A.	402.35	577.33
11/24/53	N.A.	402.08	577.33
12/29/53	N.A.	401.61	577.33
1/26/54	N.A.	401.48	577.33
2/23/54	N.A.	401.05	577.33
3/30/54	N.A.	400.68	577.33
4/27/54	N.A.	400.48	577.33
5/25/54	N.A.	400.18	577.33
6/30/54	N.A.	399.85	577.33
7/27/54	N.A.	399.60	577.33
8/31/54	N.A.	399.31	577.33
9/28/54	N.A.	399.21	577.33
10/26/54	N.A.	398.78	577.33
11/30/54	N.A.	398.71	577.33
12/28/54	N.A.	398.68	577.33
1/25/55	N.A.	398.43	577.33
2/23/55	N.A.	398.37	577.33
3/29/55	N.A.	398.31	577.33
4/25/55	N.A.	398.26	577.33
5/31/55	N.A.	398.13	577.33
6/28/55	N.A.	398.00	577.33
7/26/55	N.A.	397.98	577.33
8/31/55	N.A.	398.14	577.33

TABLE E-14. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
9/27/55	N.A.	397.67	577.33
10/25/55	N.A.	397.61	577.33
11/29/55	N.A.	397.62	577.33
12/26/55	N.A.	397.61	577.33
1/31/56	N.A.	397.28	577.33
2/15/56	N.A.	396.43	577.33
2/18/56	N.A.	396.48	577.33
2/26/56	N.A.	396.53	577.33
3/01/56	N.A.	396.63	577.33
3/10/56	N.A.	397.03	577.33
3/20/56	N.A.	397.53	577.33
3/27/56	N.A.	397.63	577.33
4/03/56	N.A.	397.88	577.33
4/10/56	N.A.	398.63	577.33
4/17/56	N.A.	398.83	577.33
4/24/56	N.A.	399.23	577.33
4/27/56	N.A.	399.38	577.33
5/11/56	N.A.	401.28	577.33
5/19/56	N.A.	400.83	577.33
6/02/56	N.A.	401.33	577.33
6/08/56	N.A.	401.58	577.33
6/16/56	N.A.	401.88	577.33
6/23/56	N.A.	402.18	577.33
7/03/56	N.A.	402.68	577.33
7/10/56	N.A.	403.03	577.33
7/17/56	N.A.	403.32	577.33
7/24/56	N.A.	403.73	577.33
7/31/56	N.A.	404.08	577.33
8/07/56	N.A.	404.85	577.33
8/14/56	N.A.	404.93	577.33
8/21/56	N.A.	405.20	577.33
9/04/56	N.A.	405.92	577.33
9/11/56	N.A.	406.53	577.33
9/18/56	N.A.	407.13	577.33
9/25/56	N.A.	407.88	577.33
10/01/56	N.A.	407.90	577.33
10/09/56	N.A.	408.60	577.33
10/16/56	N.A.	408.64	577.33
10/23/56	N.A.	409.15	577.33
10/30/56	N.A.	409.37	577.33
11/06/56	N.A.	408.99	577.33
11/20/56	N.A.	409.27	577.33
11/27/56	N.A.	409.59	577.33

TABLE E-14. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
12/12/56	N.A.	410.28	577.33
1/09/57	N.A.	410.08	577.33
1/15/57	N.A.	409.89	577.33
1/28/57	N.A.	410.43	577.33
2/05/57	N.A.	410.48	577.33
2/12/57	N.A.	410.18	577.33
2/26/57	N.A.	410.38	577.33
3/26/57	N.A.	410.53	577.33
4/02/57	N.A.	410.52	577.33
4/10/57	N.A.	410.73	577.33
4/17/57	N.A.	410.71	577.33
4/25/57	N.A.	410.48	577.33
5/03/57	N.A.	410.51	577.33
5/17/57	N.A.	411.35	577.33
6/14/57	N.A.	411.37	577.33
7/08/57	N.A.	411.40	577.33
8/23/57	N.A.	411.42	577.33
9/20/57	N.A.	411.71	577.33
10/25/57	N.A.	411.65	577.33
11/22/57	N.A.	411.54	577.33
12/19/57	N.A.	412.11	577.33
2/12/58	N.A.	411.59	577.33
3/24/58	N.A.	411.43	577.33
4/24/58	N.A.	411.35	577.33
6/20/58	N.A.	411.55	577.33
9/05/58	N.A.	411.63	577.33
11/10/58	N.A.	411.49	577.33
12/15/58	N.A.	411.46	577.33
3/20/59	N.A.	411.76	577.33
6/25/59	N.A.	412.07	577.33
9/30/59	N.A.	411.19	577.33
12/23/59	N.A.	411.32	577.33
4/01/60	N.A.	410.85	577.33
6/21/60	N.A.	411.51	577.33
9/23/60	N.A.	411.97	577.33
12/12/60	N.A.	411.21	577.33
3/23/61	N.A.	411.72	577.33
6/28/61	N.A.	411.07	577.33
12/13/61	N.A.	410.76	577.33
2/26/62	N.A.	410.41	577.33
7/27/62	N.A.	410.20	577.33
1/09/63	N.A.	410.48	577.33

TABLE E-14. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
7/25/63	N.A.	410.23	577.33
12/17/63	N.A.	410.21	577.33
7/28/64	N.A.	410.66	577.33
1/11/65	N.A.	411.30	577.33
8/19/65	N.A.	411.38	577.33
9/20/65	N.A.	411.23	577.33
10/20/65	N.A.	411.22	577.33
1/05/66	N.A.	411.33	577.33
3/04/66	N.A.	411.22	577.33
4/13/66	N.A.	411.16	577.33
5/20/66	N.A.	411.56	577.33
7/14/66	N.A.	411.40	577.33
11/02/66	N.A.	411.49	577.33
12/27/66	N.A.	411.70	577.33
3/28/67	N.A.	412.61	577.33
10/19/67	N.A.	412.62	577.33
3/19/68	N.A.	412.84	577.33
4/22/69	N.A.	414.61	577.33
5/15/70	N.A.	414.45	577.33
9/09/71	N.A.	414.58	577.33
3/20/72	N.A.	414.71	577.33
7/11/72	N.A.	414.43	577.33
10/24/72	N.A.	414.56	577.33
1/05/73	N.A.	414.57	577.33
8/15/73	N.A.	414.59	577.33
8/29/73	N.A.	414.75	577.33
9/11/73	N.A.	414.68	577.33
10/01/73	N.A.	414.64	577.33
10/16/73	N.A.	414.65	577.33
4/18/74	N.A.	414.75	577.33
7/16/74	N.A.	414.98	577.33
10/18/74	N.A.	414.89	577.33
1/08/75	N.A.	414.44	577.33
4/14/75	N.A.	414.43	577.33
7/07/75	N.A.	414.54	577.33
12/03/75	N.A.	414.34	577.33
6/15/76	N.A.	414.19	577.33
12/15/76	N.A.	414.00	577.33
7/01/77	N.A.	414.05	577.33
12/07/77	N.A.	413.77	577.33
6/01/78	N.A.	413.89	577.33
12/01/78	N.A.	413.62	577.33

TABLE E-14. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
12/01/79	N.A.	413.50	577.33
6/01/80	N.A.	413.50	577.33
12/01/80	N.A.	413.71	577.33
6/01/81	N.A.	413.58	577.33
12/01/81	N.A.	413.70	577.33
12/01/83	N.A.	416.53	577.33
12/15/83	416.53	N.A.	577.33
5/31/84	N.A.	417.43	577.33
5/31/84	417.43	N.A.	577.33
6/01/84	N.A.	417.65	577.33
6/13/84	N.A.	417.65	577.33
6/13/84	417.65	N.A.	577.33
6/15/84	417.64	N.A.	577.33
6/20/84	N.A.	417.66	577.33
6/20/84	417.66	N.A.	577.33
6/27/84	N.A.	417.63	577.33
6/27/84	417.63	N.A.	577.33
7/11/84	N.A.	417.94	577.33
7/11/84	417.94	N.A.	577.33
7/24/84	N.A.	418.04	577.33
7/25/84	418.04	N.A.	577.33
8/08/84	417.80	N.A.	577.33
8/21/84	N.A.	417.88	577.33
8/22/84	417.88	N.A.	577.33
9/05/84	N.A.	417.83	577.33
9/06/84	417.83	N.A.	577.33
9/18/84	N.A.	417.81	577.33
9/19/84	417.81	N.A.	577.33
10/03/84	417.68	N.A.	577.33
10/19/84	417.16	N.A.	577.33
11/01/84	417.14	N.A.	577.33
11/20/84	417.30	N.A.	577.33
12/01/84	N.A.	418.11	577.33
12/12/84	417.93	N.A.	577.33
12/28/84	418.11	N.A.	577.33
1/09/85	418.10	N.A.	577.33
1/23/85	418.08	N.A.	577.33
2/06/85	418.09	N.A.	577.33
2/21/85	417.89	N.A.	577.33
3/07/85	417.69	N.A.	577.33
3/22/85	417.66	N.A.	577.33
4/02/85	417.54	N.A.	577.33
4/17/85	417.37	N.A.	577.33

TABLE E-14. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
5/03/85	417.18	N.A.	577.33
5/15/85	416.95	N.A.	577.33
5/28/85	417.26	N.A.	577.33
6/13/85	417.32	N.A.	577.33
6/13/85	417.32	N.A.	577.33
6/27/85	417.35	N.A.	577.33
7/10/85	417.36	N.A.	577.33
8/07/85	418.08	N.A.	577.33
12/30/85	417.74	N.A.	577.33
5/12/86	418.69	N.A.	577.33
8/05/86	418.73	N.A.	577.33
12/16/86	418.01	N.A.	577.33
12/08/87	418.57	N.A.	577.33
1/08/88	418.78	N.A.	577.33
8/15/88	419.40	N.A.	577.33
12/16/88	419.16	N.A.	577.33
1/16/89	420.10	N.A.	577.33
2/23/89	418.75	N.A.	577.33
3/28/89	418.56	N.A.	577.33
4/24/89	418.63	N.A.	577.33
5/24/89	418.31	N.A.	577.33
6/09/89	418.38	N.A.	577.33
6/22/89	418.30	N.A.	577.33

TABLE E-15. Water Level Data for Well 699-47-35A

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
10/27/55	N.A.	395.28	476.36
11/18/55	N.A.	395.42	476.36
1/26/56	N.A.	395.49	476.36
3/21/56	N.A.	395.65	476.36
4/18/56	N.A.	395.50	476.36
5/25/56	N.A.	395.60	476.36
6/20/56	N.A.	395.57	476.36
8/21/56	N.A.	395.57	476.36
8/28/56	N.A.	395.64	476.36
9/04/56	N.A.	395.58	476.36
9/11/56	N.A.	395.65	476.36
9/18/56	N.A.	395.72	476.36
9/25/56	N.A.	395.77	476.36
10/01/56	N.A.	395.62	476.36
10/09/56	N.A.	395.79	476.36
10/16/56	N.A.	395.65	476.36
10/23/56	N.A.	395.73	476.36
10/30/56	N.A.	395.75	476.36
11/06/56	N.A.	395.56	476.36
11/20/56	N.A.	395.54	476.36
11/27/56	N.A.	395.63	476.36
12/11/56	N.A.	395.87	476.36
12/19/56	N.A.	395.70	476.36
1/09/57	N.A.	395.79	476.36
2/21/57	N.A.	395.98	476.36
3/13/57	N.A.	395.96	476.36
4/18/57	N.A.	396.40	476.36
5/15/57	N.A.	396.57	476.36
6/14/57	N.A.	396.75	476.36
8/28/57	N.A.	396.91	476.36
9/17/57	N.A.	397.26	476.36
10/25/57	N.A.	397.31	476.36
12/19/57	N.A.	397.73	476.36
2/12/58	N.A.	397.99	476.36
3/24/58	N.A.	397.95	476.36
4/24/58	N.A.	398.00	476.36
6/20/58	N.A.	398.16	476.36
9/04/58	N.A.	398.51	476.36
12/15/58	N.A.	398.88	476.36
3/18/59	N.A.	399.29	476.36
6/25/59	N.A.	399.60	476.36
9/25/59	N.A.	399.89	476.36

TABLE E-15. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
12/23/59	N.A.	400.26	476.36
4/01/60	N.A.	400.25	476.36
6/21/60	N.A.	400.77	476.36
9/23/60	N.A.	400.90	476.36
12/12/60	N.A.	401.11	476.36
3/23/61	N.A.	401.50	476.36
6/23/61	N.A.	401.65	476.36
12/13/61	N.A.	402.07	476.36
2/26/62	N.A.	402.02	476.36
7/27/62	N.A.	402.43	476.36
1/09/63	N.A.	402.84	476.36
7/25/63	N.A.	403.05	476.36
12/17/63	N.A.	403.30	476.36
1/11/65	N.A.	403.94	476.36
8/16/65	N.A.	404.40	476.36
9/20/65	N.A.	404.33	476.36
10/18/65	N.A.	404.48	476.36
1/05/66	N.A.	404.58	476.36
3/04/66	N.A.	404.57	476.36
4/11/66	N.A.	404.88	476.36
5/19/66	N.A.	404.84	476.36
7/15/66	N.A.	404.98	476.36
10/18/66	N.A.	404.98	476.36
12/29/66	N.A.	405.06	476.36
3/28/67	N.A.	405.30	476.36
10/19/67	N.A.	405.48	476.36
3/15/68	N.A.	405.76	476.36
4/22/69	N.A.	406.50	476.36
5/11/70	N.A.	406.95	476.36
3/15/72	N.A.	407.48	476.36
6/16/72	N.A.	407.74	476.36
10/06/72	N.A.	407.61	476.36
1/05/73	N.A.	407.80	476.36
4/10/73	N.A.	407.88	476.36
7/10/73	N.A.	407.96	476.36
8/15/73	N.A.	408.05	476.36
8/29/73	N.A.	408.04	476.36
9/11/73	N.A.	408.02	476.36
10/03/73	N.A.	407.78	476.36
10/16/73	N.A.	407.92	476.36
4/18/74	N.A.	408.15	476.36
7/16/74	N.A.	408.08	476.36

TABLE E-15. (contd)

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
10/18/74	N.A.	408.03	476.36
1/08/75	N.A.	408.04	476.36
4/14/75	N.A.	408.26	476.36
7/07/75	N.A.	408.24	476.36
12/16/88	413.78	N.A.	476.36
3/28/89	414.18	N.A.	476.36
4/24/89	414.45	N.A.	476.36
5/24/89	414.26	N.A.	476.36
6/09/89	414.29	N.A.	476.36
6/22/89	414.30	N.A.	476.36

TABLE E-16. Water Level Data for Well 699-47-35B

Date	Computed Head, ft above MSL	Hydraulic Head, ft above MSL	Casing Elevation, ft above MSL
12/03/75	N.A.	408.08	476.65
6/15/76	N.A.	407.80	476.65
12/15/76	N.A.	407.55	476.65
7/01/77	N.A.	408.49	476.65
12/07/77	N.A.	408.18	476.65
6/01/78	N.A.	408.46	476.65
12/01/78	N.A.	408.54	476.65
12/01/79	N.A.	408.18	476.65
6/01/80	N.A.	408.27	476.65
12/01/80	N.A.	408.19	476.65
6/01/81	N.A.	408.40	476.65
12/01/81	N.A.	408.26	476.65
6/01/82	N.A.	408.40	476.65
12/01/82	N.A.	408.40	476.65
6/01/83	N.A.	408.27	476.65
12/01/83	N.A.	408.50	476.65
6/01/84	N.A.	408.63	476.65
12/01/84	N.A.	409.38	476.65
6/18/85	410.42	N.A.	476.65
12/31/85	411.18	N.A.	476.65
12/16/86	412.15	N.A.	476.65
12/08/87	413.54	N.A.	476.65

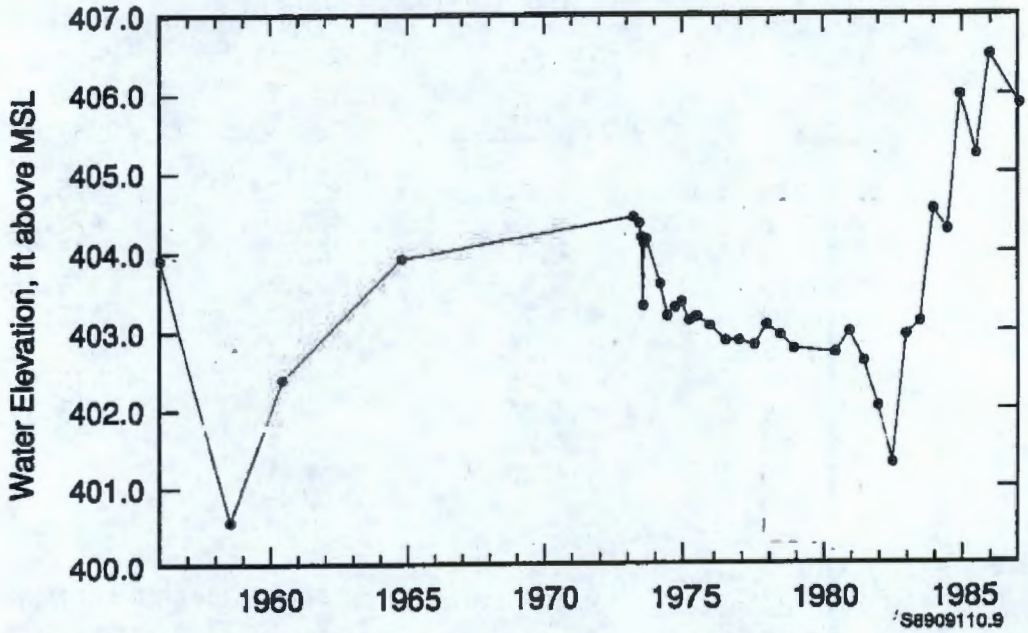

FIGURE E-1. Water Levels for Well 299-E25-9, May 31, 1956, to December 29, 1986

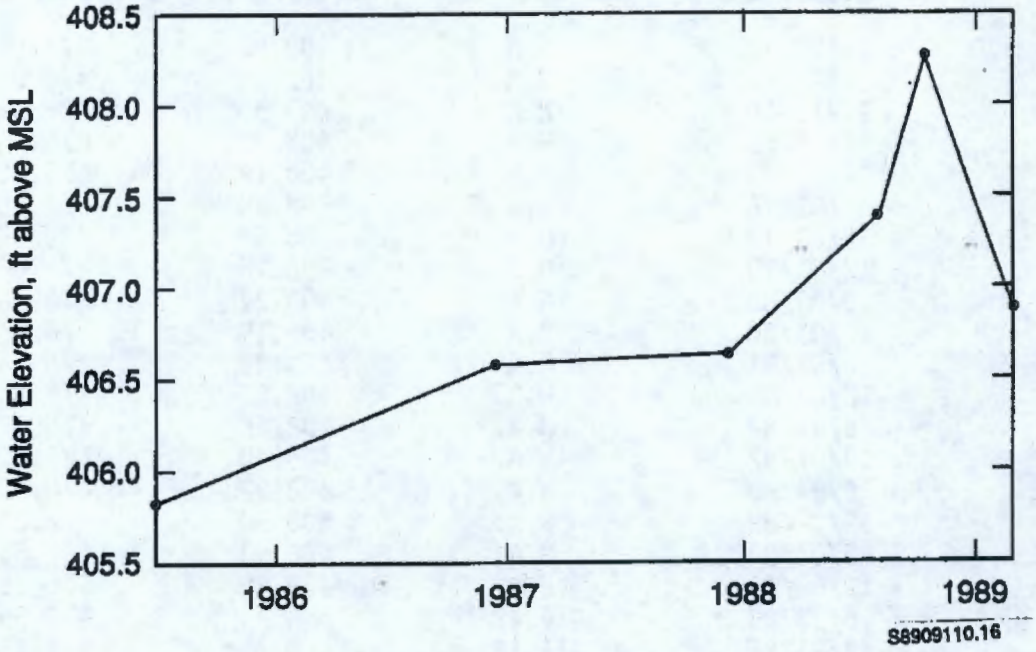

FIGURE E-2. Water Levels for Well 299-E25-25, June 17, 1985, to March 10, 1989

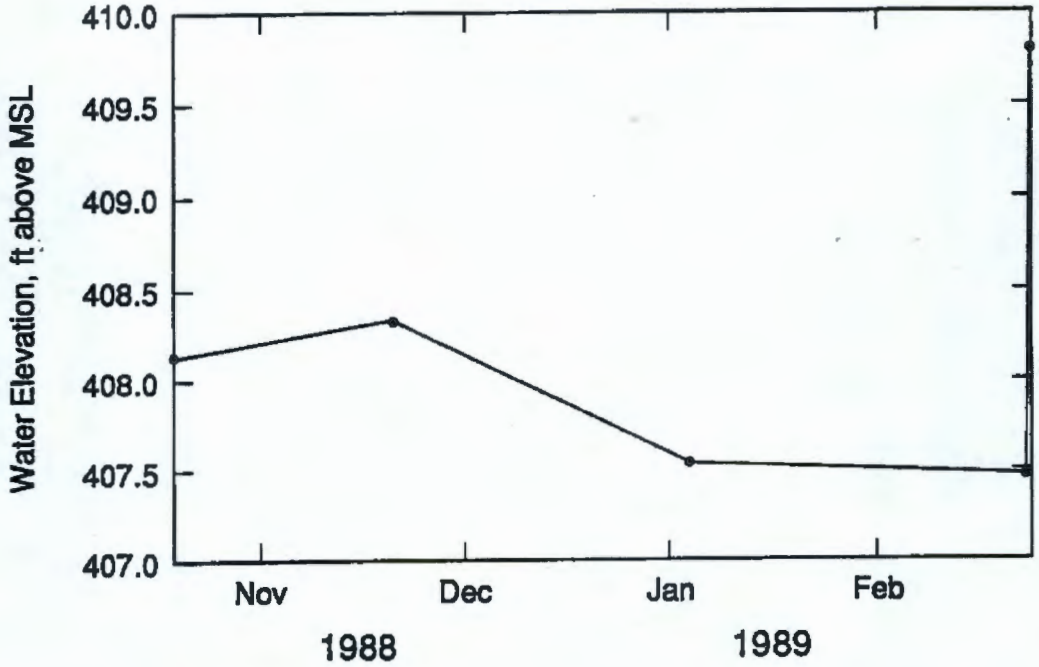

FIGURE E-3. Water Levels for Well 299-E25-32, October 19, 1988, to February 24, 1989

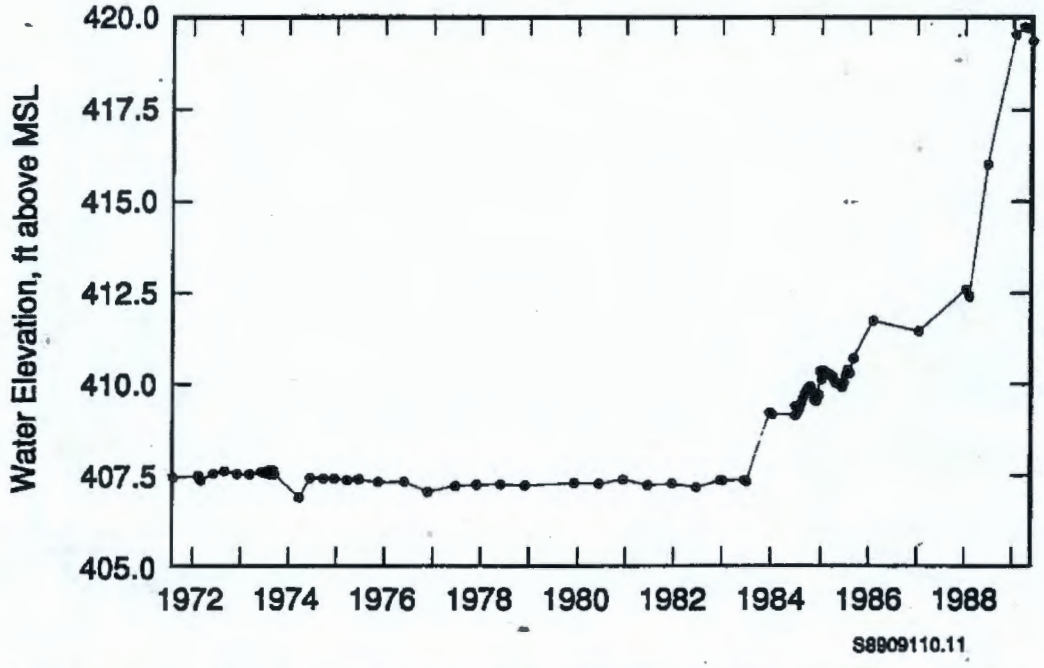

FIGURE E-4. Water Levels for Well 699-39-39, September 14, 1971, to April 24, 1989

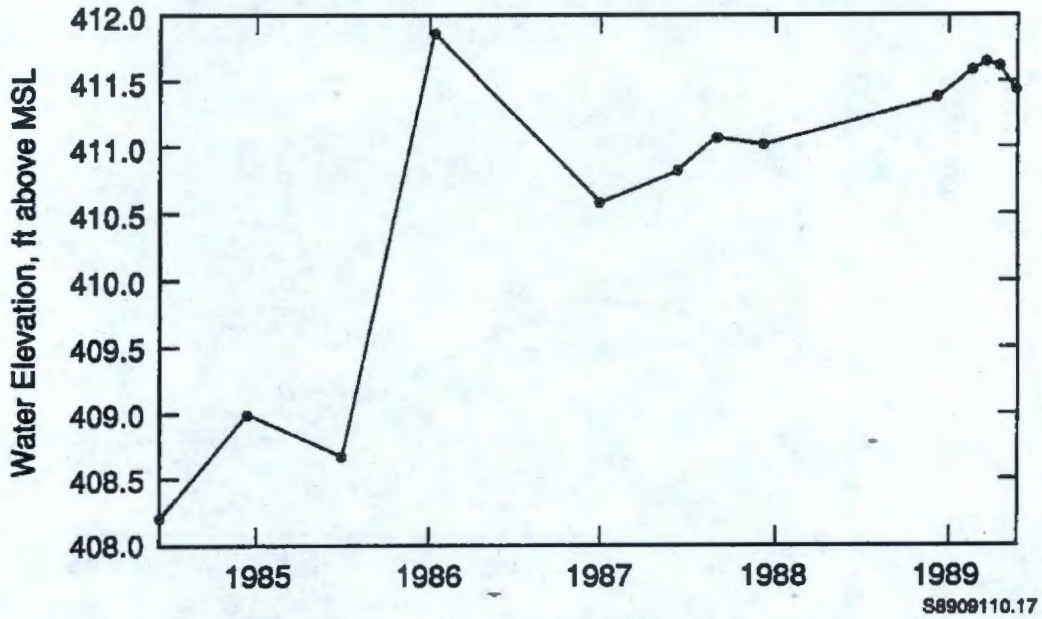

FIGURE E-5. Water Levels for Well 699-40-33A, June 1, 1984, to May 24, 1989

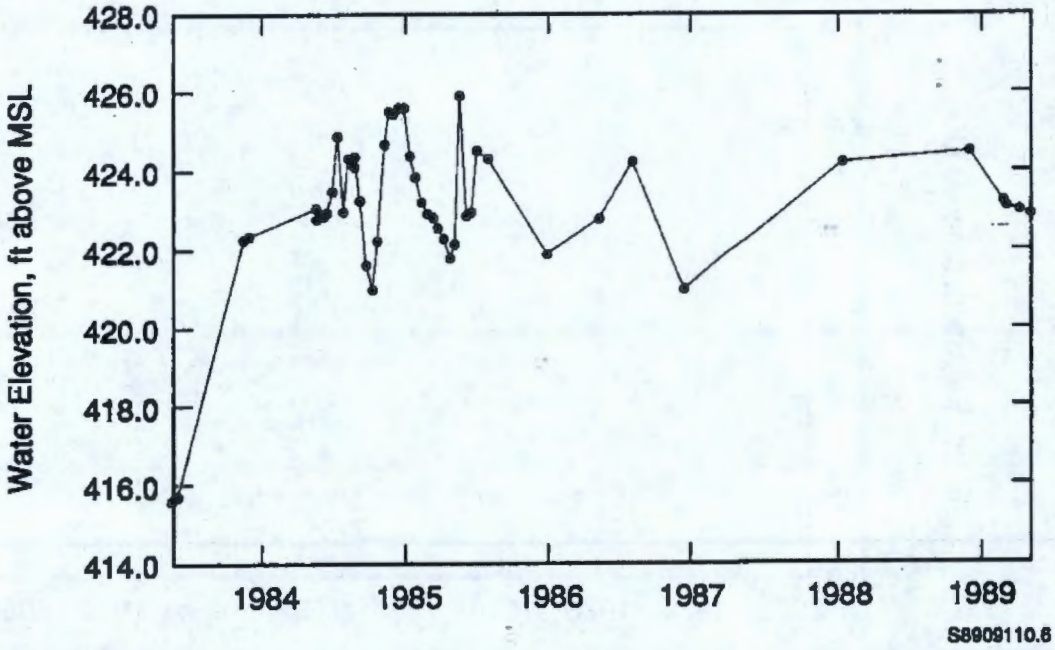

FIGURE E-6. Water Levels for Well 699-42-40A, June 1, 1983, to April 24, 1989

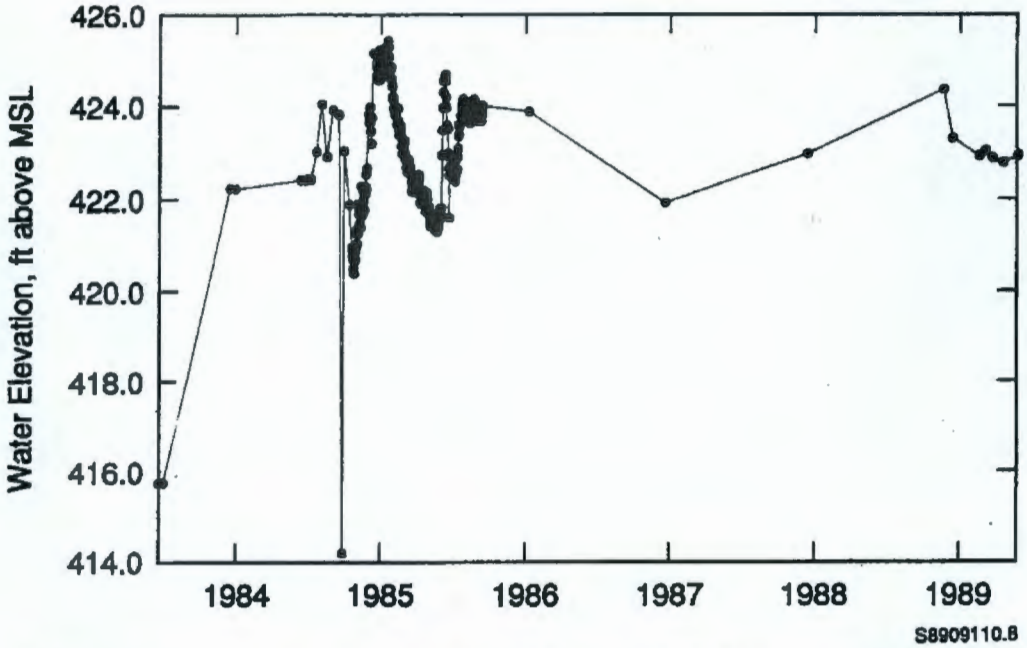

FIGURE E-7. Water Levels for Well 699-42-40B, June 1, 1983, to June 1, 1989

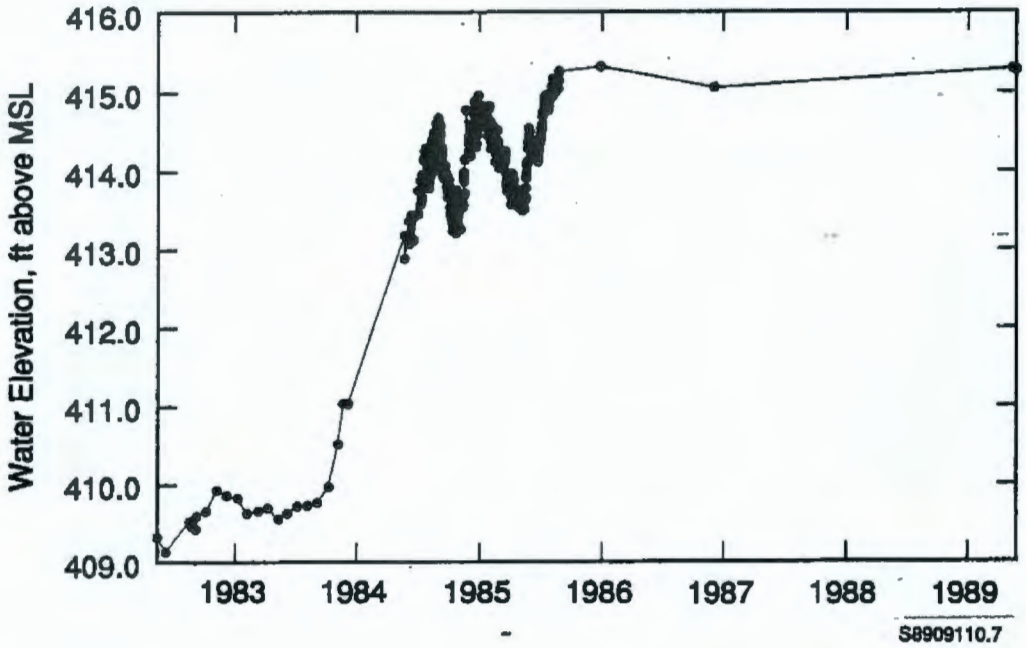

FIGURE E-8. Water Levels for Well 699-42-40C, May 19, 1982, to June 1, 1989

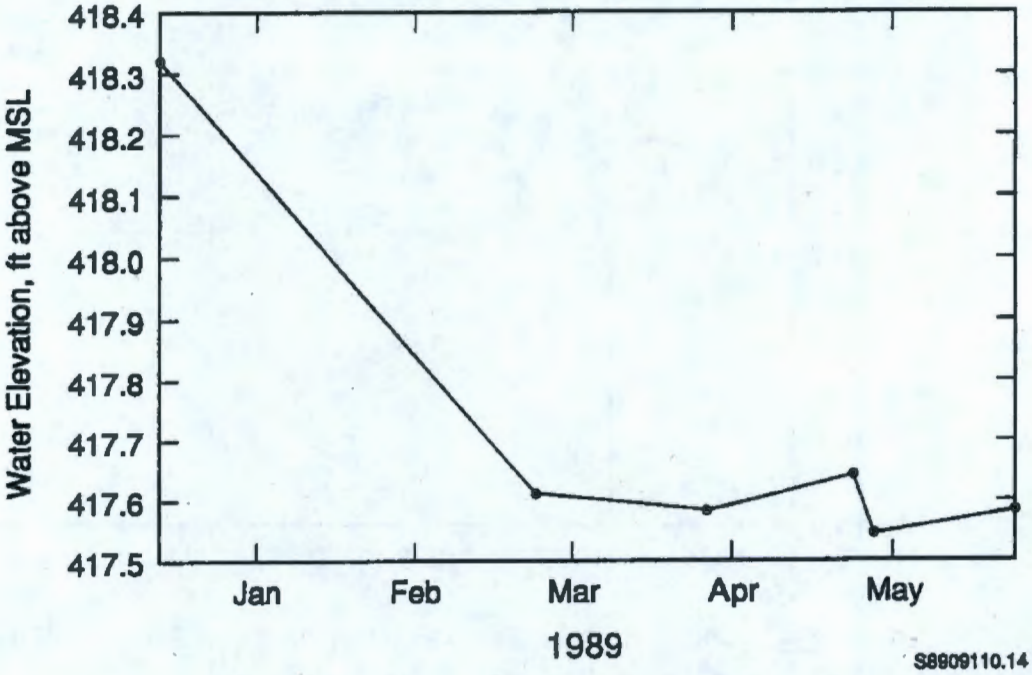

FIGURE E-9. Water Levels for Well 699-42-42B, December 13, 1988, to May 25, 1989

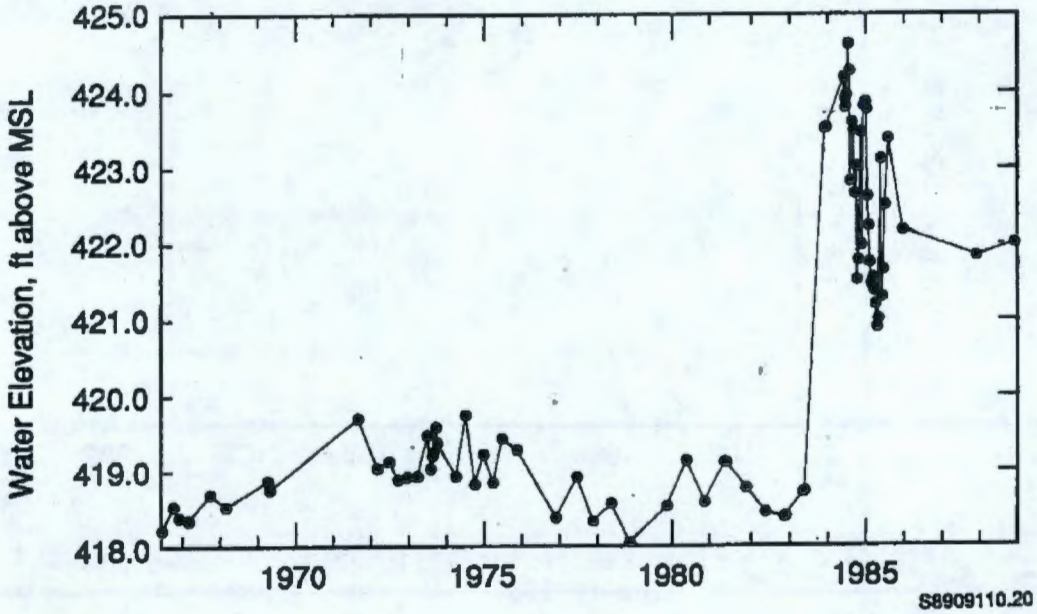

FIGURE E-10. Water Levels for Well 699-43-42, July 14, 1966, to December 16, 1988

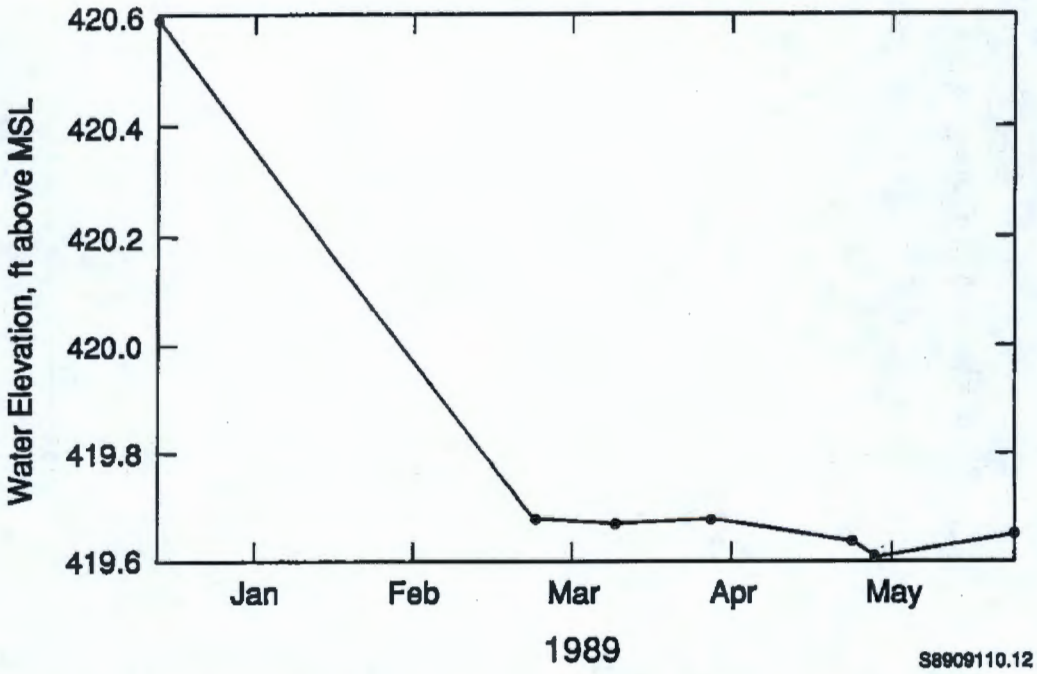

FIGURE E-11. Water Levels for Well 699-43-42J, December 13, 1988, to May 25, 1989

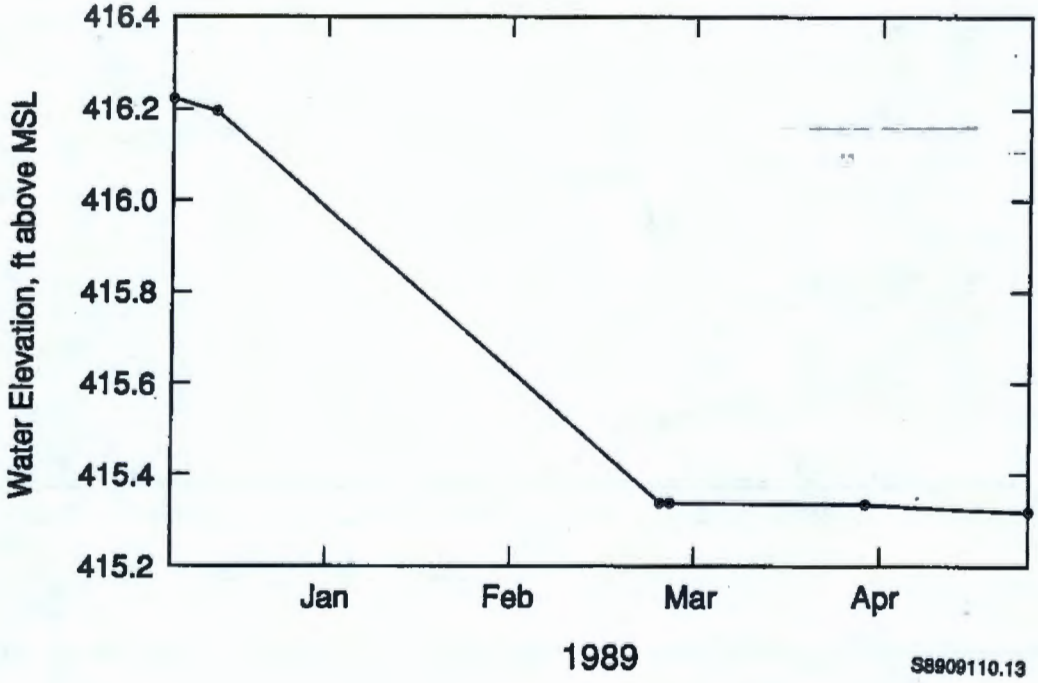

FIGURE E-12. Water Levels for Well 699-43-43, December 6, 1988, to April 24, 1989

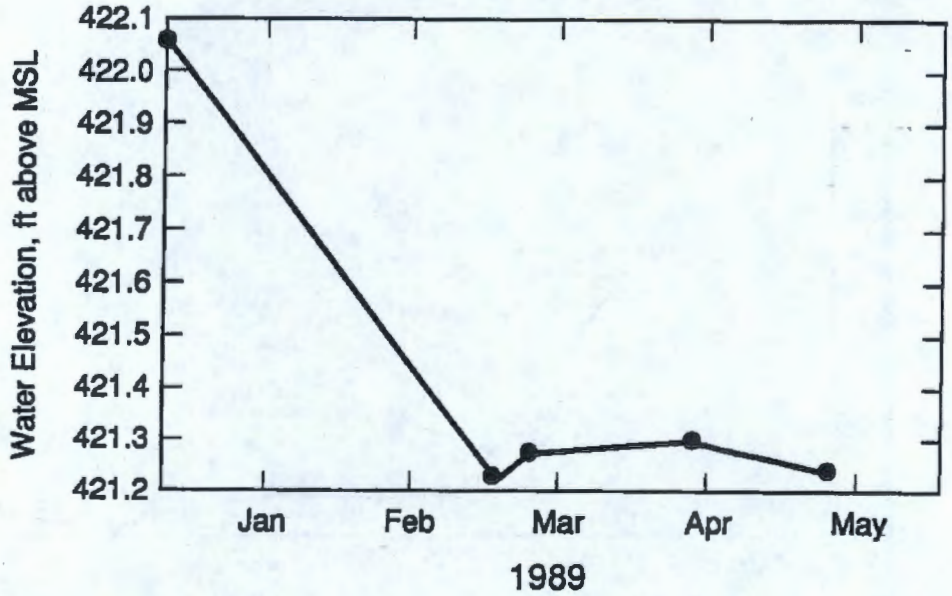

FIGURE E-13. Water Levels for Well 699-44-42, December 13, 1988, to April 24, 1989

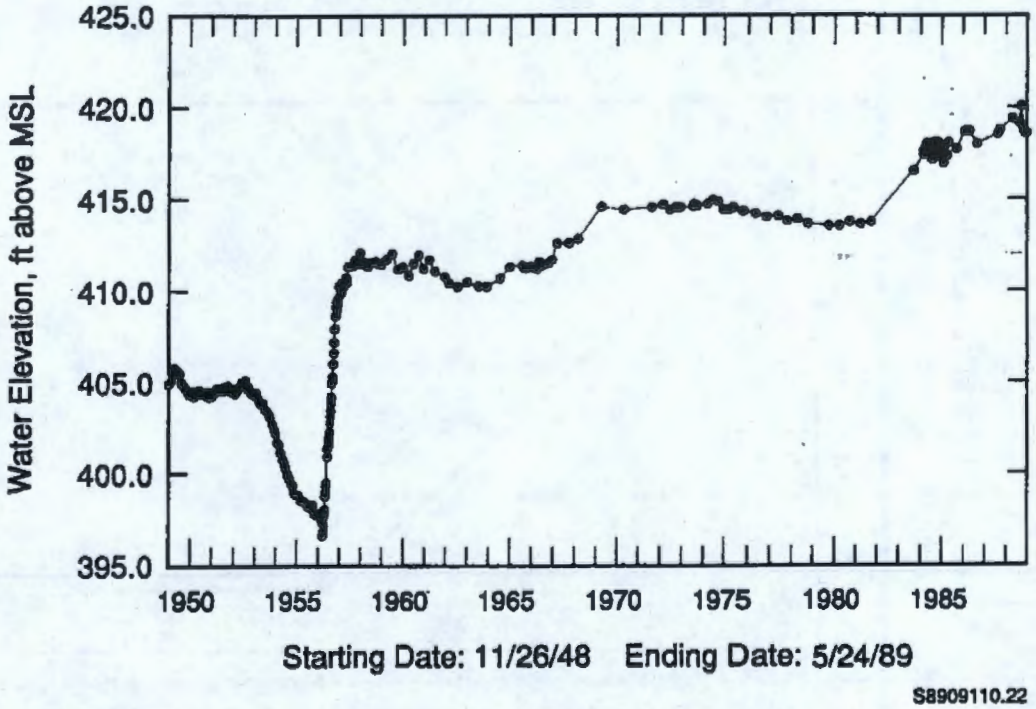

FIGURE E-14. Water Levels for Well 699-45-42, November 26, 1948, to May 24, 1989

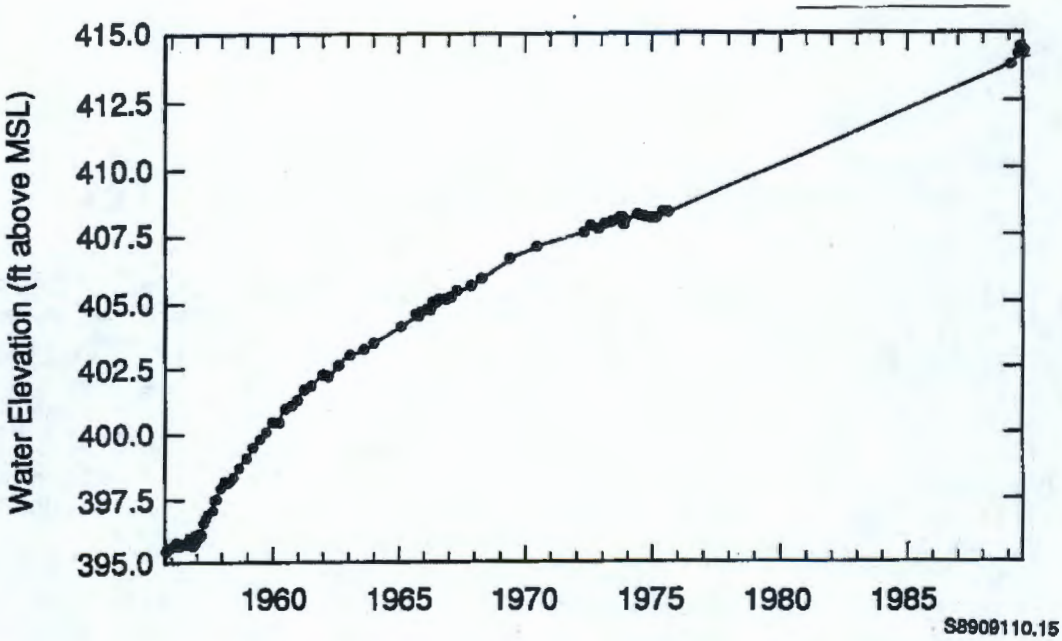

FIGURE E-15. Water Levels for Well 699-47-35A, October 27, 1955, to June 22, 1989

FIGURE E-16. Water Levels for Well 699-47-35B, December 3, 1975, to December 8, 1987

APPENDIX F

GROUND WATER CHEMISTRY ANALYSES FOR WELLS NEAR THE 216-B-3 POND AND FOR UPGRADIENT MONITORING WELLS FOR THE 216-B-3 POND

This appendix presents ground water analytical results for samples collected from wells near the 216-B-3 Pond and from the upgradient monitoring wells for the 216-B-3 Pond. Additional data are presented in RCRA quarterly reports.

Table F-1 includes constituents with at least one detected value for samples from monitoring wells 299-E18-1, 299-E32-4, 699-42-40A, 699-42-42B, 699-43-42J, 699-43-43, and 699-44-42. Table F-2 includes a constituent list and summary of sampling results for these wells.

Table F-3 includes constituents with at least one detected value for samples from wells 299-E25-25 and 699-45-42. Table F-4 includes a constituent list and summary of sampling results for these wells.

Table F-5 includes results of analyses for samples from the Rattlesnake Ridge Interbed as reported by Graham et al. (1984) for wells 299-E26-8, 699-42-40C, 699-47-50, and 699-50-45.

TABLE F-1. Constituents with at Least One Detected Value for Wells 299-E18-1, 299-E32-4, 699-42-40A, 699-42-42B, 699-43-42J, 699-43-43, and 699-44-42, November 10, 1988, Through March 13, 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 2000/.	TOXLDL ppb 10/.
2-E18-1	10NOV88		595	571	7.90	8.60	#400	#4
		1	594	586	7.90	8.60	#300	#0
		2	593	588	8.00	8.50	#300	#3
		3	594	583	7.90	8.50	#300	#3
	23NOV88		633	.	.	8.50	.	.
	15FEB89		537	514	7.90	7.00	#200	#5
		1	534	512	7.80	7.00	#200	#5
		2	532	510	7.70	6.90	#200	#0
		3	531	517	7.80	6.90	#200	#5
2-E32-4	28DEC88		364	423	8.00	7.80	#200	#2
		1	365	422	8.00	7.90	#200	#6
		2	365	422	8.00	7.90	#200	#6
		3	366	422	8.00	7.90	#200	#9
	01MAR89		395	414	7.93	7.90	#500	#5
		1	395	.	.	7.90	#500	#6
		2	397	.	.	7.90	#200	#7
		3	396	.	.	8.10	#200	#6
	13MAR89		422	418	8.00	8.00	#200	#5
		1	.	417	8.00	.	#200	#4
		2	.	418	8.00	.	#200	#6
		3	.	421	8.00	.	#300	#4
6-42-40A	22NOV88		170	.	.	8.30	#800	#9
		1	169	.	.	8.30	#800	#6
		2	169	.	.	8.30	#800	#1
		3	169	.	.	8.30	#800	#-2
	15FEB89		161	164	8.10	8.40	#800	#7
		1	161	.	.	8.40	#800	#6
		2	162	.	.	8.40	#800	#6
		3	162	.	.	8.40	#800	#6

TABLE F-1. (cont)

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 2000/.	TOXLDL ppb 10/.
6-42-42B	22NOV88		251	.	.	8.40	#400	#4
		1	252	.	.	8.30	#400	#1
		2	251	.	.	8.40	#400	#-2
		3	250	.	.	8.40	#400	#2
	24FEB89		230	242	8.00	7.60	#500	#5
		1	230	.	.	7.60	#400	#3
		2	230	.	.	7.70	#500	#5
		3	230	.	.	7.70	#500	#7
6-43-42J	22NOV88		187	.	.	8.00	#600	#2
		1	187	.	.	8.20	#600	#6
		2	187	.	.	8.00	#800	#4
		3	187	.	.	8.30	#700	#5
	24FEB89		239	222	8.00	8.10	#500	#5
		1	239	.	.	8.10	#700	#8
		2	240	.	.	8.10	#600	#4
		3	240	.	.	8.10	#500	#5
6-43-43	21NOV88		172	.	.	8.00	#600	#1
		1	172	.	.	8.00	#600	#2
		2	172	.	.	8.00	#600	#6
		3	172	.	.	8.00	#600	#5
	24FEB89		217	195	8.10	7.80	#600	#1
		1	214	.	.	7.80	#600	#1
		2	214	.	.	7.70	#500	#8
		3	214	.	.	7.80	#500	#6
6-44-42	21NOV88		182	.	.	8.00	#600	#3
		1	182	.	.	8.20	#600	#2
		2	182	.	.	8.20	#600	#2
		3	181	.	.	8.20	#700	#4
	17FEB89		240	222	8.10	7.60	#1800	#5
		1	239	.	.	7.60	#1900	#6
		2	240	.	.	7.60	#1800	#5
		3	239	.	.	7.60	#1700	#2

TABLE F-1. (cont)

Regular Monitoring Data

Well name	Collection Date	Duplicate sample number	ACETONE ppb 10/.	ALPHA pCi/L 4/15	ALPHAHI pCi/L 4/15	ARSENIC ppb 5/50	FARSENI ppb 5/50	BARIUM ppb 6/1000	FBARIUM ppb 6/1000	BETA pCi/L 8/50	BORON ppb 10/.
2-E18-1	10NOV88		#2	3.8300	.	<5	<5	42	43	8.45	.
	10NOV88	1	#2	3.9000	.	<5	<5	38	38	10.70	.
	10NOV88	2	#3	.	.	.	.	.	.	.	.
	10NOV88	3	#1	.	.	.	.	.	.	.	.
	23NOV88		<10	.	.	.	.	.	.	.	.
	15FEB89		<10	.	4.870	<5	<5	29	31	6.85	33
2-E32-4	28DEC88		.	2.0900	.	<5	<5	67	70	6.50	.
	01MAR89		<10	.	4.250	<5	<5	74	73	5.99	31
	13MAR89		<10	.	5.890	<5	<5	73	72	3.72	38
6-42-40A	22NOV88		.	*0.1600	.	<5	<5	6	<6	4.08	.
	15FEB89		<10	.	2.320	<5	<5	<6	<6	*1.32	<10
6-42-42B	22NOV88		.	1.3700	.	7	6	30	32	5.48	.
	24FEB89		<10	.	*0.769	6	6	28	26	*1.64	14
6-43-42J	22NOV88		.	*0.7080	.	9	9	12	13	8.01	.
	24FEB89		<10	.	2.340	8	8	13	12	4.52	14
6-43-43	21NOV88		.	0.9620	.	7	7	13	12	7.05	.
	24FEB89		<10	.	*0.302	7	7	14	13	3.99	14
	24FEB89	1	<10	.	*0.406	7	7	12	13	4.23	12
6-44-42	21NOV88		.	*0.0783	.	11	12	12	12	7.57	.
	17FEB89		<10	.	1.560	13	12	14	15	3.89	<10

Well name	Collection Date	Duplicate sample number	FBORON ppb 10/.	FCADMIU ppb 2/10	CADMIUM ppb 2/10	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLLATE ppb 300/.	CHLORID ppb 500/250000s	FCHROMI ppb 10/50
2-E18-1	10NOV88		.	<2	<2	63,200	67,400	<30	6,800	<10
	10NOV88	1	.	<2	<2	58,400	57,700	.	6,200	<10
	15FEB89		38	<2	<2	57,600	55,700	.	6,900	<10
2-E32-4	28DEC88		.	<2	<2	40,300	43,200	.	8,700	<10
	01MAR89		33	<2	<2	38,900	39,200	.	8,400	<10
	13MAR89		41	<2	<2	39,800	39,900	.	9,300	<10
6-42-40A	22NOV88		.	<2	<2	17,000	18,100	.	2,500	<10
	15FEB89		<10	<2	<2	21,700	20,700	.	3,100	<10
6-42-42B	22NOV88		.	<2	<2	22,000	22,200	.	3,700	<10
	24FEB89		17	<2	2	20,700	22,400	.	3,600	<10
6-43-42J	22NOV88		.	<2	<2	23,400	22,400	.	2,800	<10
	24FEB89		16	3	2	24,800	25,000	.	3,000	<10
6-43-43	21NOV88		.	<2	<2	23,500	25,200	.	2,900	<10
	24FEB89		20	<2	<2	22,600	24,600	.	2,900	<10
	24FEB89	1	13	<2	<2	22,600	25,400	.	2,900	10
6-44-42	21NOV88		.	<2	<2	24,100	24,100	.	3,100	<10
	17FEB89		12	<2	<2	22,300	21,700	.	3,300	<10

TABLE F-1. (cont)

Well name	Collection Date	Duplicate sample number	CHROMUM ppb 10/50	CO-60 pCi/L 22.5/100r	COPPER ppb 10/1300p	CS-137 pCi/L 20/200r	FLUORID ppb 500/4000	IRON ppb 30/300s	FIRON ppb 30/300s	LEADGF ppb 5/50
2-E18-1	10NOV88		30	.	<10	.	<500	355	<30	<5
	10NOV88	1	20	.	12	.	<500	265	<30	<5
	15FEB89		22	.	<10	.	<500	182	<30	<5
2-E32-4	28DEC88		38	.	<10	.	600	197	<30	<5
	01MAR89		30	.	13	.	500	299	<30	5
	13MAR89		43	*-0.195	<10	*1.44	600	267	41	<5
6-42-40A	22NOV88		<10	.	<10	.	<500	309	57	<5
	15FEB89		<10	.	<10	.	<500	130	53	<5
6-42-42B	22NOV88		16	.	<10	.	<500	137	<30	<5
	24FEB89		37	.	<10	.	<500	221	<30	<5
6-43-42J	22NOV88		33	.	<10	.	<500	153	<30	<5
	24FEB89		41	.	<10	.	<500	216	33	<5
6-43-43	21NOV88		57	.	<10	.	<500	231	<30	<5
	24FEB89		34	.	<10	.	<500	132	<30	<5
	24FEB89	1	23	.	<10	.	<500	98	31	<5
6-44-42	21NOV88		18	.	<10	.	<500	104	<30	<5
	17FEB89		<10	.	<10	.	<500	44	<30	<5

Well name	Collection Date	Duplicate sample number	MAGNES ppb 50/.	FMAGNES ppb 50/.	FMANGAN ppb 5/50s	MANGESE ppb 5/50s	METHYCH ppb 5/.	NICKEL ppb 10/.	FNICKEL ppb 10/.	NITRATE ppb 500/45000
2-E18-1	10NOV88		15,200	15,300	<5	12	<10	25	18	8,400
	10NOV88	1	14,700	14,700	<5	12	<10	19	15	8,400
	10NOV88	2	.	.	.	.	<10	.	.	.
	10NOV88	3	.	.	.	.	<10	.	.	.
	23NOV88		.	.	.	.	<10	.	.	.
	15FEB89		13,900	14,400	<5	<5	<5	<10	<10	11,400
2-E32-4	28DEC88		13,300	14,000	<5	5	#2	21	<10	24,200
	01MAR89		13,300	13,400	<5	8	<5	15	<10	24,600
	13MAR89		13,600	13,500	<5	5	<5	22	<10	24,800
6-42-40A	22NOV88		4,700	4,430	<5	12	<10	<10	<10	700
	15FEB89		5,230	5,680	5	8	<5	<10	<10	600
6-42-42B	22NOV88		7,790	7,740	<5	5	<10	<10	<10	6,200
	24FEB89		7,720	7,130	<5	7	<5	22	<10	6,400
6-43-42J	22NOV88		5,640	5,850	<5	<5	<10	19	<10	1,000
	24FEB89		8,350	6,380	5	8	<5	29	12	1,800
6-43-43	21NOV88		5,770	5,270	<5	<5	<10	25	<10	800
	24FEB89		5,810	5,430	<5	<5	<5	20	<10	700
	24FEB89	1	5,950	5,370	<5	<5	<5	16	<10	700
6-44-42	21NOV88		6,510	6,450	<5	<5	<10	<10	<10	1,100
	17FEB89		6,020	6,230	<5	<5	<5	<10	<10	1,400

TABLE F-1. (cont)

Well name	Collection Date	Duplicate sample number	FPOTASS ppb 100/.	POTASUM ppb 100/.	RADIUM pCi/L 1/5	RU-106 pCi/L 172.5/30r	FSELENI ppb 5/10	SELENUM ppb 5/10	FSILICO ppb 50/.	SILICON ppb 50/.
2-E18-1	10NOV88		6,540	6,330	0.27200	.	7	7	.	.
	10NOV88	1	6,380	6,410	0.20700	.	6	7	.	.
	15FEB89		5,800	5,570	0.24700	.	7	7	14,000	13,600
2-E32-4	28DEC88		6,400	6,080	*0.05200	.	<5	<5	.	.
	01MAR89		5,950	5,890	0.25300	.	<5	<5	16,400	16,600
	13MAR89		6,050	6,330	*0.01310	*-15	<5	<5	16,600	16,700
6-42-40A	22NOV88		2,770	2,910	*0.09960	.	<5	<5	.	.
	15FEB89		2,490	2,190	*0.08110	.	<5	<5	3,950	3,830
6-42-42B	22NOV88		4,050	4,080	*0.19400	.	<5	<5	.	.
	24FEB89		3,880	4,130	0.50800	.	<5	<5	18,000	19,200
6-43-42J	22NOV88		4,750	4,610	*0.12700	.	<5	<5	.	.
	24FEB89		5,370	5,190	0.24400	.	<5	<5	15,900	16,000
6-43-43	21NOV88		5,480	5,900	*-0.00618	.	<5	<5	.	.
	24FEB89		5,750	5,990	*0.00741	.	<5	<5	13,400	14,500
	24FEB89	1	5,600	6,140	.	.	<5	<5	13,300	14,900
6-44-42	21NOV88		5,310	5,190	0.18900	.	<5	<5	.	.
	17FEB89		5,080	4,980	0.23000	.	<5	<5	16,300	15,800

Well name	Collection Date	Duplicate sample number	SODIUM ppb 200/.	FSODIUM ppb 200/.	SR-90 pCi/L 5/8	FSTRONT ppb 20/.	STRONUM ppb 20/.	SULFATE ppb 500/250000s	TC ppb 1000/.	TC-99 pCi/L 15/900r
2-E18-1	10NOV88		25,900	28,100	.	255	249	172,000	21,500	.
	10NOV88	1	27,000	26,700	.	241	241	169,000	.	.
	15FEB89		25,800	27,100	.	241	240	149,000	23,800	.
2-E32-4	28DEC88		26,500	28,500	*-0.0512	215	209	55,900	24,900	*4.50
	01MAR89		27,500	27,300	.	230	233	60,800	25,900	.
	13MAR89		28,200	27,000	*-0.3380	231	236	67,400	.	*4.44
6-42-40A	22NOV88		3,920	3,770	.	84	89	12,200	.	.
	15FEB89		3,540	4,040	.	104	101	13,500	17,700	.
6-42-42B	22NOV88		21,800	22,600	.	153	156	19,600	.	.
	24FEB89		20,200	19,600	.	150	162	18,400	23,100	.
6-43-42J	22NOV88		9,830	10,200	.	107	102	11,300	.	.
	24FEB89		13,100	13,500	.	121	121	12,600	23,900	.
6-43-43	21NOV88		7,450	7,020	.	105	112	9,300	.	.
	24FEB89		7,860	7,510	.	110	120	11,000	20,500	.
	24FEB89	1	8,050	7,290	.	110	121	11,000	20,500	.
6-44-42	21NOV88		14,400	14,900	.	129	128	12,000	.	.
	17FEB89		16,500	16,900	.	128	125	14,000	22,700	.

TABLE F-1. (cont)

Well name	Collection Date	Duplicate sample number	TRITIUM pCi/L 500/20000	TURBID ntu 0.1/1	U pCi/L 0.5/600d	UNKALI ppb 0/.	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
2-E18-1	10NOV88		*-287	.	.	.	<5	6	79	26
	10NOV88	1	.	.	.	.	<5	<5	53	41
	15FEB89		*-56	1.40	.	.	6	<5	23	30
2-E32-4	28DEC88		1,890	.	2.460	6	12	19	12	12
	01MAR89		5,650	0.95	4.160	.	17	18	22	8
	13MAR89		5,590	.	4.270	.	13	20	9	<5
6-42-40A	22NOV88		*-371	0.40	.	.	<5	<5	5	<5
	15FEB89		*-25	0.25	0.703	.	<5	<5	<5	7
6-42-42B	22NOV88		77,800	2.00	.	.	27	25	109	43
	24FEB89		72,800	0.70	1.360	.	31	32	52	31
6-43-42J	22NOV88		1,200	1.10	.	.	51	48	8	8
	24FEB89		2,620	1.50	1.510	.	54	54	10	<5
6-43-43	21NOV88		539	0.80	.	.	33	34	<5	<5
	24FEB89		338	0.50	.	.	32	37	<5	<5
	24FEB89	1	432	.	.	.	32	37	7	<5
6-44-42	21NOV88		963	0.90	.	.	44	40	<5	<5
	17FEB89		1,140	0.40	.	.	47	47	<5	<5

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

TABLE F-2. Constituent List and Summary of Sampling Results for Wells 299-E18-1, 299-E32-4, 699-42-40A, 699-42-42B, 699-43-42J, 699-43-43, and 699-44-42, November 10, 1988, Through March 13, 1989

Constituent List=Contamination Indicator Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
088	CONDLAB	umho	.	22	0	700	WDOE		Specific conductance, laboratory
191	CONDFLD	umho	1	58	0	700	WDOE		Specific conductance, field
199	PHFIELD		0.1	58	0	6.5-8.5	EPAS	xxx	pH, field
207	PH-LAB		0.01	22	0	6.5-8.5	EPAS		pH, laboratory
C69	TOC	ppb	2000	60	0	.			Total organic carbon
H42	TOXLDL	ppb	10	60	0	.			Total organic halogens, low DL

Constituent List=Interim Primary Drinking Water Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	12	12 ***	1	EPA		Coliform bacteria
111	BETA	pCi/L	8	17	0	50	EPA		Gross beta
112	ALPHAHI	pCi/L	4	9	0	15	EPA		Gross alpha, high DL
181	RADIUM	pCi/L	1	16	0	5	EPA		Total radium
212	ALPHA	pCi/L	4	8	0	15	EPA		Gross alpha
A06	BARIUM	ppb	6	17	1	1000	EPA		Barium
A07	CADMIUM	ppb	2	17	15	10	EPA		Cadmium
A08	CHROMUM	ppb	10	17	3	50	EPA	xxx	Chromium
A10	SILVER	ppb	10	17	17 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	17	8	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	15	15 ***	2	EPA		Mercury
A22	SELENUM	ppb	5	17	14	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	15	15 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	15	15 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	15	15 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	15	15 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	15	15 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	15	15 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	15	15 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	17	16	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	17	0	45000	EPA		Nitrate
C74	FLUORID	ppb	500	17	14	4000	EPA		Fluoride
H13	2,4-D	ppb	2	15	15 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	15	15 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	17	2	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	17	16	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	17	16	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	17	17 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	17	8	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	15	15 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	17	14	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	17	17 ***	50	EPA		Lead, filtered
H60	TURBID	ntu	0.1	12	0	1	EPA	xxx	Turbidity, nephelometric

TABLE F-2. (cont)

Constituent List=Water Quality Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Drinking Water Standards Standard	Agency	Exceeded	Full name
A11	SODIUM	ppb	200	17	0		.			Sodium
A17	MANGESE	ppb	5	17	7		50	EPAS		Manganese
A19	IRON	ppb	30	17	0		300	EPAS	xxx	Iron
C67	PHENOL	ppb	10	1	1	***	.			Phenol
C73	SULFATE	ppb	500	17	0		250000	EPAS		Sulfate
C75	CHLORID	ppb	500	17	0		250000	EPAS		Chloride
H24	FSODIUM	ppb	200	17	0		.			Sodium, filtered
H29	FMANGAN	ppb	5	17	15		50	EPAS		Manganese, filtered
H31	FIRON	ppb	30	17	12		300	EPAS		Iron, filtered
H67	LPHENOL	ppb	10	14	14	***	.			Phenol, low DL

Constituent List=Site Specific and Other Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Drinking Water Standards Standard	Agency	Exceeded	Full name
D10	CO-60	pCi/L	22.5	1	0		100	EPAR		Cobalt-60
D24	CS-137	pCi/L	20	1	0		200	EPAR		Cesium-137
D34	RU-106	pCi/L	172.5	1	0		30	EPAR		Ruthenium-106
104	U	pCi/L	0.5	6	0		600	DOE		Uranium
108	TRITIUM	pCi/L	500	16	0		20000	EPA	xxx	Tritium (H-3)
121	SR-90	pCi/L	5	2	0		8	EPA		Strontium-90
197	TC-99	pCi/L	15	2	0		900	EPAR		Technetium-99
A01	BERYLUM	ppb	5	17	17	***	.			Beryllium
A03	STRONUM	ppb	20	17	0		.			Strontium
A04	ZINC	ppb	5	17	5		5000	EPAS		Zinc
A05	CALCIUM	ppb	50	17	0		.			Calcium
A12	NICKEL	ppb	10	17	6		.			Nickel
A13	COPPER	ppb	10	17	15		1300	EPAP		Copper
A14	VANADUM	ppb	5	17	4		.			Vanadium
A15	ANTIONY	ppb	100	17	17	***	.			Antimony
A16	ALUMNUM	ppb	150	17	17	***	.			Aluminum
A18	POTASUM	ppb	100	17	0		.			Potassium
A50	MAGNES	ppb	50	17	0		.			Magnesium
C76	PHOSPHA	ppb	1000	17	17	***	.			Phosphate
H16	TC	ppb	1000	10	0		.			Total carbon
H18	FZINC	ppb	5	17	8		5000	EPAS		Zinc, filtered
H19	FCALCIU	ppb	50	17	0		.			Calcium, filtered
H25	FNICKEL	ppb	10	17	14		.			Nickel, filtered
H26	FCOPPER	ppb	10	17	17	***	1300	EPAP		Copper, filtered
H27	FVANADI	ppb	5	17	4		.			Vanadium, filtered
H28	FALUMIN	ppb	150	17	17	***	.			Aluminum, filtered
H30	FPOTASS	ppb	100	17	0		.			Potassium, filtered

TABLE F-2. (cont)

Constituent List=Site Specific and Other Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
H32	FMAGNES	ppb	50	17	0	.		Magnesium, filtered
H33	FBERYLL	ppb	5	17	17 ***	.		Beryllium, filtered
H35	FSTRONT	ppb	20	17	0	.		Strontium, filtered
H36	FANTIMO	ppb	100	17	17 ***	.		Antimony, filtered
H66	BROMIDE	ppb	1000	16	16 ***	.		Bromide
H67	NITRITE	ppb	1000	16	16 ***	.		Nitrite
H86	FBORON	ppb	10	9	1	.		Boron, filtered
H87	FCOBALT	ppb	20	9	9 ***	.		Cobalt, filtered
H88	FLITHIU	ppb	10	9	9 ***	.		Lithium, filtered
H89	FMOLY	ppb	40	9	9 ***	.		Molybdenum, filtered
H90	FSILICO	ppb	50	9	0	.		Silicon, filtered
H91	FTIN	ppb	30	9	9 ***	.		Tin, filtered
H92	FTITAN	ppb	60	9	9 ***	.		Titanium, filtered
H93	FZIRCON	ppb	50	9	9 ***	.		Zirconium, filtered
P01	BORON	ppb	10	9	2	.		Boron
P02	COBALT	ppb	20	9	9 ***	.		Cobalt
P03	LITHIUM	ppb	10	9	9 ***	.		Lithium
P04	MOLY	ppb	40	9	9 ***	.		Molybdenum
P05	SILICON	ppb	50	9	0	.		Silicon
P06	TIN	ppb	30	9	9 ***	.		Tin
P07	TITAN	ppb	60	9	9 ***	.		Titanium
P08	ZIRCON	ppb	50	9	9 ***	.		Zirconium

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
A23	THALIUM	ppb	5	2	2 ***	.		Thallium
A24	THIOURA	ppb	200	1	1 ***	.		Thiourea
A25	ACETREA	ppb	200	1	1 ***	.		1-Acetyl-2-thiourea
A26	CHLOREA	ppb	200	1	1 ***	.		1-(o-Chlorophenyl) thiourea
A27	DIETROL	ppb	200	1	1 ***	.		Diethylstilbesterol
A28	ETHYREA	ppb	200	1	1 ***	.		Ethylenethiourea
A29	NAPHREA	ppb	200	1	1 ***	.		1-Naphthyl-2-thiourea
A32	PHENREA	ppb	500	1	1 ***	.		n-Phenylthiourea
A40	DDD	ppb	0.1	1	1 ***	.		DDD
A41	DDE	ppb	0.1	1	1 ***	.		DDE
A42	DDT	ppb	0.1	1	1 ***	.		DDT
A43	HEPTLOR	ppb	0.1	1	1 ***	0	EPAP	Heptachlor
A44	HEPTIDE	ppb	0.1	1	1 ***	0	EPAP	Heptachlor epoxide
A46	DIELRIN	ppb	0.1	1	1 ***	.		Dieldrin
A47	ALDRIN	ppb	0.1	1	1 ***	.		Aldrin
A48	CHLDANE	ppb	1	1	1 ***	0	EPAP	Chlordane

TABLE F-2. (cont)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
A49	ENDO1	ppb	0.1	1	1 ***	.		Endosulfan I (alpha)
A52	ENDO2	ppb	0.1	1	1 ***	.		Endosulfan II (beta)
A54	AR1016	ppb	1	1	1 ***	0	EPAP	Arochlor 1016
A55	AR1221	ppb	1	1	1 ***	0	EPAP	Arochlor 1221
A56	AR1232	ppb	1	1	1 ***	0	EPAP	Arochlor 1232
A57	AR1242	ppb	1	1	1 ***	0	EPAP	Arochlor 1242
A58	AR1248	ppb	1	1	1 ***	0	EPAP	Arochlor 1248
A59	AR1254	ppb	1	1	1 ***	0	EPAP	Arochlor 1254
A60	AR1260	ppb	1	1	1 ***	0	EPAP	Arochlor 1260
A61	TETRANE	ppb	5	20	20 ***	5	EPA	Tetrachloromethane [Carbon Tetrachloride
A62	BENZENE	ppb	5	14	14 ***	5	EPA	Benzene
A63	DIOXANE	ppb	500	5	5 ***	.		Dioxane
A64	METHONE	ppb	10	20	20 ***	.		Methyl ethyl ketone
A65	PYRIDIN	ppb	500	5	5 ***	.		Pyridine
A66	TOLUENE	ppb	5	14	14 ***	2000	EPAP	Toluene
A67	1,1,1-T	ppb	5	20	20 ***	200	EPA	1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	20	20 ***	.		1,1,2-Trichloroethane
A69	TRICENE	ppb	5	20	20 ***	5	EPA	Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	20	20 ***	.		Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	20	20 ***	440	EPAP	Xylene-o,p
A72	ACROLIN	ppb	10	5	5 ***	.		Acrolein
A73	ACRYILE	ppb	10	5	5 ***	.		Acrylonitrile
A74	BISTHER	ppb	5	5	5 ***	.		Bis(chloromethyl) ether
A75	BROMONE	ppb	5	5	5 ***	.		Bromoacetone
A76	METHBRO	ppb	10	5	5 ***	.		Methyl bromide
A77	CARBIDE	ppb	10	5	5 ***	.		Carbon disulfide
A78	CHLBENZ	ppb	5	5	5 ***	60	EPAP	Chlorobenzene
A79	CHLTHER	ppb	5	5	5 ***	.		2-Chloroethyl vinyl ether
A80	CHLFORM	ppb	5	20	20 ***	100	EPA	Chloroform [Trichloromethane]
A81	METHCHL	ppb	10	5	5 ***	.		Methyl chloride [Chloromethane]
A82	CHMTHER	ppb	10	5	5 ***	.		Chloromethyl methyl ether
A83	CROTONA	ppb	10	5	5 ***	.		Crotonaldehyde
A84	DIBRCHL	ppb	10	5	5 ***	0	EPAP	1,2-Dibromo-3-chloropropane
A85	DIBRETH	ppb	10	5	5 ***	.		1,2-Dibromoethane
A86	DIBRMET	ppb	10	5	5 ***	.		Dibromomethane
A87	DIBUTEN	ppb	10	5	5 ***	.		1,4-Dichloro-2-butene
A88	DICDIFM	ppb	10	5	5 ***	.		Dichlorodifluoromethane
A89	1,1-DIC	ppb	5	14	14 ***	.		1,1-Dichloroethane
A90	1,2-DIC	ppb	5	14	14 ***	5	EPA	1,2-Dichloroethane
A91	TRANDCE	ppb	5	14	14 ***	70	EPAP	trans-1,2-Dichloroethene
A92	DICETHY	ppb	10	5	5 ***	7	EPA	1,1-Dichloroethylene
A93	METHYCH	ppb	5	20	19	.		Methylene chloride [Dichloromethane]
A94	DICPANE	ppb	5	5	5 ***	5	EPAP	1,2-Dichloropropane
A95	DICPENE	ppb	5	5	5 ***	.		1,3-Dichloropropene
A96	NNDIEHY	ppb	10	5	5 ***	.		N,N-diethylhydrazine

TABLE F-2. (cont)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
A99	HYDRSUL	ppb	10	5	5 ***	.		Hydrogen sulfide
B01	IODOMET	ppb	10	5	5 ***	.		Iodomethane
B02	METHACR	ppb	10	5	5 ***	.		Methacrylonitrile
B03	METHTHI	ppb	10	5	5 ***	.		Methanethiol
B04	PENTACH	ppb	10	5	5 ***	.		Pentachloroethane
B05	1112-tc	ppb	10	5	5 ***	.		1,1,1,2-Tetrachloroethane
B06	1122-tc	ppb	5	5	5 ***	.		1,1,2,2-Tetrachloroethane
B08	BROMORM	ppb	5	5	5 ***	100	EPA	Bromoform [Tribromomethane]
B09	TRCMEOL	ppb	10	5	5 ***	.		Trichloromethanethiol
B10	TRCMFLM	ppb	10	5	5 ***	.		Trichloromonofluoromethane
B11	TRCPANE	ppb	10	5	5 ***	.		Trichloropropane
B12	123-trp	ppb	10	5	5 ***	.		1,2,3-Trichloropropane
B13	VINYIDE	ppb	10	14	14 ***	2	EPA	Vinyl chloride
B14	M-XYLE	ppb	5	20	20 ***	440	EPAP	Xylene-m
B15	DIETHY	ppb	10	5	5 ***	.		Diethylarsine
B19	ACETILE	ppb	3000	5	5 ***	.		Acetonitrile
B20	ACETOPH	ppb	10	1	1 ***	.		Acetophenone
B21	WARFRIN	ppb	10	1	1 ***	.		Warfarin
B22	ACEFENE	ppb	10	1	1 ***	.		2-Acetylaminofluorene
B23	AMINOYL	ppb	10	1	1 ***	.		4-Aminobiphenyl
B24	AMIISOX	ppb	10	1	1 ***	.		5-(Aminomethyl)-3-isoxazolol
B25	AMITROL	ppb	10	1	1 ***	.		Amitrole
B26	ANILINE	ppb	10	1	1 ***	.		Aniline
B27	ARAMITE	ppb	10	1	1 ***	.		Aramite
B28	AURAMIN	ppb	10	1	1 ***	.		Auramine
B29	BENZCAC	ppb	10	1	1 ***	.		Benz[c]acridine
B30	BENZAAN	ppb	10	1	1 ***	.		Benz[a]anthracene
B31	BENDICM	ppb	10	1	1 ***	.		Benzene, dichloromethyl
B32	BENTHOL	ppb	10	1	1 ***	.		Benzenethiol
B33	BENDINE	ppb	10	1	1 ***	.		Benzidine
B34	BENZBFL	ppb	10	1	1 ***	.		Benzo[b]fluoranthene
B35	BENZJFL	ppb	10	1	1 ***	.		Benzo[j]fluoranthene
B36	PBENZQU	ppb	10	1	1 ***	.		p-Benzoquinone
B37	BENZCHL	ppb	10	1	1 ***	.		Benzyl chloride
B38	BIS2CHM	ppb	10	1	1 ***	.		Bis(2-chloroethoxy) methane
B39	BIS2CHE	ppb	10	1	1 ***	.		Bis(2-chloroethyl) ether
B40	BIS2EPH	ppb	10	1	1 ***	.		Bis(2-ethylhexyl) phthalate
B41	BROPHEN	ppb	10	1	1 ***	.		4-Bromophenyl phenyl ether
B42	BUTBENP	ppb	10	1	1 ***	.		Butyl benzyl phthalate
B43	BUTDINP	ppb	10	1	1 ***	.		2-sec-Butyl-4,6-dinitrophenol (DNBP)
B44	CHALETH	ppb	10	1	1 ***	.		Chloroalkyl ethers
B45	CHLANIL	ppb	10	1	1 ***	.		p-Chloroaniline
B46	CHLCRES	ppb	10	1	1 ***	.		p-Chloro-m-cresol
B47	CHLEPOX	ppb	10	1	1 ***	0	EPAP	1-Chloro-2,3-epoxypropane
B48	CHLNAPH	ppb	10	1	1 ***	.		2-Chloronaphthalene

TABLE F-2. (con't)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
B49	CHLPHEN	ppb	10	1	1 ***	.		2-Chlorophenol
B50	CHRYSEN	ppb	10	1	1 ***	.		Chrysene
B51	CRESOLS	ppb	10	1	1 ***	.		Cresols
B52	CYCHDIN	ppb	10	1	1 ***	.		2-Cyclohexyl-4,6-dinitrophenol
B53	DIBAHAC	ppb	10	1	1 ***	.		Dibenz[a,h]acridine
B54	DIBAJAC	ppb	10	1	1 ***	.		Dibenz[a,j]acridine
B55	DIBAHAN	ppb	10	1	1 ***	.		Dibenz[a,h]anthracene
B56	DIBCGCA	ppb	10	1	1 ***	.		7H-Dibenzo[c,g]carbazole
B57	DIBAEPY	ppb	10	1	1 ***	.		Dibenzo[a,e]pyrene
B58	DIBAHPY	ppb	10	1	1 ***	.		Dibenzo[a,h]pyrene
B59	DIBAIPY	ppb	10	1	1 ***	.		Dibenzo[a,i]pyrene
B60	DIBPHTH	ppb	10	1	1 ***	.		Di-n-butyl phthalate
B61	12-dben	ppb	10	1	1 ***	.		1,2-Dichlorobenzene
B62	13-dben	ppb	10	1	1 ***	.		1,3-Dichlorobenzene
B63	14-dben	ppb	10	1	1 ***	75	EPA	1,4-Dichlorobenzene [p-Dichlorobenzene]
B64	DICHBEN	ppb	20	1	1 ***	.		3,3'-Dichlorobenzidine
B65	24-dchp	ppb	10	1	1 ***	.		2,4-Dichlorophenol
B66	26-dchp	ppb	10	1	1 ***	.		2,6-Dichlorophenol
B67	DIEPHTH	ppb	10	1	1 ***	.		Diethyl phthalate
B68	DIHYSAF	ppb	10	1	1 ***	.		Dihydrosafrole
B69	DIMETHB	ppb	10	1	1 ***	.		3,3'-Dimethoxybenzidine
B70	DIMEAMB	ppb	10	1	1 ***	.		p-Dimethylaminoazobenzene
B71	DIMBENZ	ppb	10	1	1 ***	.		7,12-Dimethylbenz[a]anthracene
B72	DIMEYLB	ppb	10	1	1 ***	.		3,3'-Dimethylbenzidine
B73	THIONOX	ppb	10	1	1 ***	.		Thiofanox
B74	DIMPHAM	ppb	10	1	1 ***	.		alpha,alpha-Dimethylphenethylamine
B75	DIMPHEN	ppb	10	1	1 ***	.		2,4-Dimethylphenol
B76	DIMPHTH	ppb	10	1	1 ***	.		Dimethyl phthalate
B77	DINBENZ	ppb	10	1	1 ***	.		Dinitrobenzene
B78	DINCRES	ppb	10	1	1 ***	.		4,6-Dinitro-o-cresol and salts
B79	DINPHEN	ppb	50	1	1 ***	.		2,4-Dinitrophenol
B80	24-dint	ppb	10	1	1 ***	.		2,4-Dinitrotoluene
B81	26-dint	ppb	10	1	1 ***	.		2,6-Dinitrotoluene
B82	DIOPHTH	ppb	10	1	1 ***	.		Di-n-octyl phthalate
B83	DIPHAMI	ppb	10	1	1 ***	.		Diphenylamine
B84	DIPHHYD	ppb	10	1	1 ***	.		1,2-Diphenylhydrazine
B85	DIPRNIT	ppb	10	1	1 ***	.		Di-n-propylnitrosamine
B86	ETHMINE	ppb	10	1	1 ***	.		Ethyleneimine
B87	ETHMETS	ppb	10	1	1 ***	.		Ethyl methanesulfonate
B88	FLUORAN	ppb	10	1	1 ***	.		Fluoranthene
B89	HEXCBEN	ppb	10	1	1 ***	.		Hexachlorobenzene
B90	HEXCBUT	ppb	10	1	1 ***	.		Hexachlorobutadiene
B91	HEXCCYC	ppb	10	1	1 ***	.		Hexachlorocyclopentadiene
B92	HEXCETH	ppb	10	1	1 ***	.		Hexachloroethane
B93	INDENOP	ppb	10	1	1 ***	.		Indeno(1,2,3-cd)pyrene

TABLE F-2. (cont)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
B94	ISOSOLE	ppb	10	1	1 ***	.		Isosafrole
B95	MALOILE	ppb	10	1	1 ***	.		Malononitrile
B96	MELPHAL	ppb	10	1	1 ***	.		Melphalan
B97	METHAPY	ppb	10	1	1 ***	.		Methapyrilene
B98	METHNYL	ppb	10	1	1 ***	.		Methomyl
B99	METAZIR	ppb	10	1	1 ***	.		2-Methylaziridine
C01	METCHAN	ppb	10	1	1 ***	.		3-Methylcholanthrene
C02	METBISC	ppb	10	1	1 ***	.		4,4'-Methylenebis(2-chloroaniline)
C03	METACTO	ppb	10	1	1 ***	.		2-Methyllactonitrile
C04	METACRY	ppb	10	5	5 ***	.		Methyl methacrylate
C05	METMSUL	ppb	10	1	1 ***	.		Methyl methanesulfonate
C06	METPROP	ppb	10	1	1 ***	.		2-Methyl-2-(methylthio) propionaldehyde-
C07	METHIOU	ppb	10	1	1 ***	.		Methylthiouracil
C08	NAPHQUI	ppb	10	1	1 ***	.		1,4-Naphthoquinone
C09	1-napha	ppb	10	1	1 ***	.		1-Naphthylamine
C10	2-napha	ppb	10	1	1 ***	.		2-Naphthylamine
C11	NITRANI	ppb	50	1	1 ***	.		p-Nitroaniline
C12	NITBENZ	ppb	10	1	1 ***	.		Nitrobenzene
C13	NITPHEN	ppb	50	1	1 ***	.		4-Nitrophenol [p-Nitrophenol]
C14	NNIBUTY	ppb	10	1	1 ***	.		n-Nitrosodi-n-butylamine
C15	NNIDIEA	ppb	10	1	1 ***	.		n-Nitrosodiethanolamine
C16	NNIDIEY	ppb	10	1	1 ***	.		n-Nitrosodiethylamine
C17	NNIDIME	ppb	10	1	1 ***	.		n-Nitrosodimethylamine
C18	NNIMETH	ppb	10	1	1 ***	.		n-Nitrosomethylethylamine
C19	NNIURET	ppb	10	1	1 ***	.		n-Nitroso-n-methylurethane
C20	NNIVINY	ppb	10	1	1 ***	.		n-Nitrosomethylvinylamine
C21	NNIMORP	ppb	10	1	1 ***	.		n-Nitrosomorpholine
C22	NNINICO	ppb	10	1	1 ***	.		n-Nitrosonornicotine
C23	NNIPIPE	ppb	10	1	1 ***	.		n-Nitrosopiperidine
C24	NITRPYR	ppb	10	1	1 ***	.		Nitrosopyrrolidine
C25	NITRTOL	ppb	10	1	1 ***	.		5-Nitro-o-toluidine
C26	PENTCHB	ppb	10	1	1 ***	.		Pentachlorobenzene
C27	PENTCHN	ppb	10	1	1 ***	.		Pentachloronitrobenzene
C28	PENTCHP	ppb	50	1	1 ***	220	EPAP	Pentachlorophenol
C29	PHENTIN	ppb	10	1	1 ***	.		Phenacetin
C30	PHENINE	ppb	10	1	1 ***	.		Phenylenediamine
C31	PHTHEST	ppb	10	1	1 ***	.		Phthalic acid esters
C32	PICOLIN	ppb	10	1	1 ***	.		2-Picoline
C33	PRONIDE	ppb	10	1	1 ***	.		Pronamide
C34	RESERPI	ppb	10	1	1 ***	.		Reserpine
C35	RESORCI	ppb	10	1	1 ***	.		Resorcinol
C36	SAFROL	ppb	10	1	1 ***	.		Safrol
C37	TETRCHB	ppb	10	1	1 ***	.		1,2,4,5-Tetrachlorobenzene
C39	TETRCHP	ppb	10	1	1 ***	.		2,3,4,6-Tetrachlorophenol
C40	THIURAM	ppb	10	1	1 ***	.		Thiuram

TABLE F-2. (cont)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standard	Water Standards Agency Exceeded	Full name
C41	TOLUDIA	ppb	10	1	1 ***	.		Toluenediamine
C42	OTOLHYD	ppb	10	1	1 ***	.		o-Toluidine hydrochloride
C43	TRICHLB	ppb	10	1	1 ***	.		1,2,4-Trichlorobenzene
C44	245-trp	ppb	50	1	1 ***	.		2,4,5-Trichlorophenol
C45	246-trp	ppb	10	1	1 ***	.		2,4,6-Trichlorophenol
C46	TRIPHOS	ppb	10	1	1 ***	.		O,o,o-triethyl phosphorothioate
C47	SYMTRIN	ppb	10	1	1 ***	.		Sym-trinitrobenzene
C48	TRISPHO	ppb	10	1	1 ***	.		Tris(2,3-dibromopropyl) phosphate
C49	BENZOPY	ppb	10	1	1 ***	.		Benzo[a]pyrene
C50	CHLNAPZ	ppb	10	1	1 ***	.		Chlornaphazine
C51	BIS2ETH	ppb	10	1	1 ***	.		Bis(2-chloroisopropyl) ether
C52	HEXAENE	ppb	10	1	1 ***	.		Hexachloropropene
C53	HYDRAZI	ppb	3000	1	1 ***	.		Hydrazine
C54	HEXACHL	ppb	10	1	1 ***	.		Hexachlorophene
C55	NAPHTHA	ppb	10	1	1 ***	.		Naphthalene
C56	123TRI	ppb	10	1	1 ***	.		1,2,3-Trichlorobenzene
C58	135TRI	ppb	10	1	1 ***	.		1,3,5-Trichlorobenzene
C59	1234TE	ppb	10	1	1 ***	.		1,2,3,4-Tetrachlorobenzene
C60	1235TE	ppb	10	1	1 ***	.		1,2,3,5-Tetrachlorobenzene
C61	TETEPYR	ppb	2	1	1 ***	.		Tetraethylpyrophosphate
C62	CHLLATE	ppb	300	1	0	.		Chlorobenzilate
C63	CARBPHT	ppb	2	1	1 ***	.		Carbophenothion
C64	DISULFO	ppb	2	1	1 ***	.		Disulfoton
C65	DIMETHO	ppb	2	1	1 ***	.		Dimethoate
C66	METHPAR	ppb	2	1	1 ***	.		Methyl parathion
C67	PARATHI	ppb	2	1	1 ***	.		Parathion
C70	CYANIDE	ppb	10	4	4 ***	.		Cyanide
C71	FORMALN	ppb	500	5	5 ***	.		Formalin
C77	PERCHLO	ppb	500	1	1 ***	.		Perchlorate
C78	SULFIDE	ppb	1000	1	1 ***	.		Sulfide
C79	KEROSEN	ppb	10000	1	1 ***	.		Kerosene
C80	AMMONIU	ppb	50	12	12 ***	.		Ammonium ion
C86	DIOXIN	ppb	0.1	1	1 ***	.		Dioxin [2,3,7,8-TCDD]
C87	CITRUSR	ppb	1000	1	1 ***	.		Citrus red
C90	PARALDE	ppb	2000	1	1 ***	.		Paraldehyde
C91	STRYCHN	ppb	50	1	1 ***	.		Strychnine
C92	MALHYDR	ppb	500	1	1 ***	.		Maleic hydrazide
C93	NICOTIN	ppb	100	1	1 ***	.		Nicotinic acid
C94	ACRYIDE	ppb	10000	1	1 ***	0	EPAP	Acrylamide
C95	ALLYLAL	ppb	2500	1	1 ***	.		Allyl alcohol
C97	CHLACET	ppb	16000	1	1 ***	.		Chloroacetaldehyde
C98	CHLPROP	ppb	4000	1	1 ***	.		3-Chloropropionitrile
H03	ETHCARB	ppb	5000	1	1 ***	.		Ethyl carbamate
H04	ETHCYAN	ppb	2000	1	1 ***	.		Ethyl cyanide
H05	ETHOXID	ppb	10	5	5 ***	.		Ethylene oxide

TABLE F-2. (cont)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
H08	ETHMETH	ppb	10	5	5 ***	.		Ethyl methacrylate
H09	ISOBUTY	ppb	1000	1	1 ***	.		Isobutyl alcohol
H11	PROPYLA	ppb	10000	1	1 ***	.		n-Propylamine
H12	PROPYNO	ppb	8000	1	1 ***	.		2-Propyn-1-ol
H15	2,4,5-T	ppb	2	9	9 ***	.		2,4,5-T
H40	FTHALLI	ppb	5	2	2 ***	.		Thallium, filtered
H62	LHYDRAZ	ppb	30	8	8 ***	.		Hydrazine, low DL
H68	HEXONE	ppb	10	20	20 ***	.		Hexone [Methyl isobutyl ketone]
I01	ACETONE	ppb	10	15	10	.		Acetone by VOA
I09	BUTANOL	ppb	5000	1	1 ***	.		1-Butanol
I10	PROPANO	ppb	5000	1	1 ***	.		2-Propanol
I21	TRIBUPH	ppb	10	1	1 ***	.		Tributylphosphoric acid
I28	TAF	ppb	10	14	14 ***	.		Tetrahydorfuran
I67	ETHANOL	ppb	5000	1	1 ***	.		Ethanol
I98	UNKALI	ppb	0	1	0	.		Unknown aliphatic HC
L20	MBP	ppb	5000	1	1 ***	.		Monobutylphosphate
L21	DBP	ppb	5000	1	1 ***	.		Dibutylphosphate
L63	14DBEN	ppb	5	9	9 ***	75	EPA	1,4-Dichlorobenzene [p-Dichlorobenzene]

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE F-3. Constituents with at Least One Detected Value for Wells 299-E25-25 and 699-45-42, August 20, 1985, Through June 23, 1989

Quadruplicate Contamination Indicator Parameters

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 2000/.	TOX ppb 100/.	TOXLDL ppb 10/.
2-E25-25	20AUG85		189	192	8.30	8.20	#970	#3.3	.
		1	.	.	.	.	1,190	.	.
		2	.	.	.	.	1,330	.	.
		3	.	.	.	.	1,360	.	.
2-E25-25	22AUG85		166	.	.	8.00	.	#3.6	.
		1	.	.	.	.	.	#4.1	.
		2	.	.	.	.	.	#6.0	.
		3	.	.	.	.	.	#3.4	.
2-E25-25	18SEP85		170	192	8.09	8.00	1000	<100	.
		1	173	.	.	8.00	1140	#22	.
		2	174	.	.	8.10	1430	<100	.
		3	173	.	.	8.10	1510	#51	.
2-E25-25	19DEC85		166	180	8.16	7.90	1850	#8.6	.
		1	165	.	.	7.90	1640	#4.4	.
		2	165	.	.	7.80	1440	#7.1	.
		3	117	.	.	7.70	1610	#5.3	.
2-E25-25	10MAR86		180	.	.	7.30	#979	#5.5	.
		1	180	.	.	7.20	1250	#4.8	.
		2	178	.	.	7.30	1320	#1.6	.
		3	181	.	.	6.40	1180	#7.0	.
2-E25-25	04JUN86		176	.	.	6.50	#884	#11.0	.
		1	175	.	.	6.70	1220	#12.0	.
		2	177	.	.	6.80	1040	#2.4	.
		3	177	.	.	7.00	#941	#5.4	.
2-E25-25	03SEP86		155	.	.	8.00	1010	#11.6	.
		1	155	.	.	8.00	#874	#16.8	.
		2	155	.	.	8.10	#867	#9.0	.
		3	155	.	.	8.10	#917	#6.4	.
2-E25-25	05DEC86		140	.	.	8.10	.	.	.
		1	142	.	.	8.10	.	.	.
		2	142	.	.	7.80	.	.	.
		3	143	.	.	7.50	.	.	.
2-E25-25	12DEC86		.	.	.	.	#630	<100	.
		1	.	.	.	.	#737	<100	.
		2	.	.	.	.	#595	<100	.
		3	.	.	.	.	#795	<100	.

TABLE F-3. (cont)

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 2000/.	TOX ppb 100/.	TOXLDL ppb 10/.
2-E25-25	12MAR87		207	.	.	7.50	#704	<100	.
		1	209	.	.	7.60	#718	<100	.
		2	208	.	.	7.70	#735	<100	.
		3	205	.	.	7.70	#640	<100	.
2-E25-25	01JUL87		136	.	.	7.20	1320	.	#8.1
		1	135	.	.	7.30	1050	.	#6.2
		2	135	.	.	7.40	1030	.	#8.4
		3	136	.	.	7.50	1020	.	#8.0
2-E25-25	30SEP87		151	.	.	7.60	#872	.	#7.2
		1	151	.	.	7.90	#733	.	#2.7
		2	151	.	.	7.80	#785	.	#1.9
		3	151	.	.	7.80	#772	.	#1.5
2-E25-25	19JAN88		163	.	.	7.90	#643	.	103
		1	163	.	.	7.90	#643	.	129
		2	162	.	.	7.90	#725	.	103
		3	162	.	.	7.90	#835	.	118
2-E25-25	29MAR88		124	.	.	10.00	#551	.	#6
		1	124	.	.	10.10	#600	.	#6
		2	124	.	.	10.20	#760	.	#5
		3	124	.	.	10.20	#606	.	#5
2-E25-25	05AUG88		118	.	.	7.90	#472	.	#14.6
		1	118	.	.	7.80	1050	.	#10.0
		2	119	.	.	7.80	1340	.	#9.7
		3	119	.	.	7.80	1390	.	#9.9
2-E25-25	18OCT88		168	.	.	8.10	#700	.	188
		1	168	.	.	8.20	#800	.	190
		2	168	.	.	8.20	#700	.	201
		3	168	.	.	8.20	#600	.	282
2-E25-25	03JAN89		164	.	.	8.50	#700	.	#9
		1	171	.	.	8.60	#500	.	#4
		2	172	.	.	8.50	#600	.	#5
		3	171	.	.	8.50	#500	.	#3
2-E25-25	28FEB89		170	.	.	8.70	#900	.	#8
		1	170	.	.	8.70	#900	.	#7
		2	169	.	.	8.70	#700	.	#9
		3	169	.	.	8.70	#700	.	#6

TABLE F-3. (cont).

Well name	Collection Date	Duplicate sample number	CONDFLD umho 1/700w	CONDLAB umho ./700w	PH-LAB 0.01/8.5s	PHFIELD 0.1/8.5s	TOC ppb 2000/.	TOX ppb 100/.	TOXLDL ppb 10/.
2-E25-25	21JUN89		106	.	.	7.89	#1000	.	#8
		1	105	.	.	7.90	#900	.	#8
		2	106	.	.	7.90	#900	.	#7
		3	106	.	.	7.89	#900	.	#6
2-E25-25	23JUN89		169	.	.	8.40	.	.	.
		1	169	.	.	8.41	.	.	.
		2	169	.	.	8.41	.	.	.
		3	169	.	.	8.41	.	.	.
6-45-42	22AUG85		248	300	8.05	7.50	#750	#7.8	.
		1	.	.	.	.	1050	#5.3	.
		2	.	.	.	.	#820	#1.2	.
		3	.	.	.	.	1040	#1.0	.
6-45-42	12MAY86		266	.	.	8.10	#626	#1.8	.
		1	.	.	.	.	#651	#0.8	.
		2	.	.	.	.	1030	#2.4	.
		3	.	.	.	.	1090	#1.0	.
6-45-42	05AUG86		248	.	.	7.60	#303.0	#8.7	.
		1	.	.	.	.	#-198.0	#1.0	.
		2	.	.	.	.	#-66.5	#0.2	.
		3	.	.	.	.	#60.5	<100.0	.
6-45-42	15NOV87		229	.	8.00	7.60	#355	.	#6.1
6-45-42	08JAN88		219	.	7.74	7.50	#368	.	#1.1
6-45-42	15JUN88		.	.	7.90	.	#622	.	#-5.6
6-45-42	15AUG88		262	.	7.90	7.80	#480	.	.
6-45-42	16JAN89		292	.	8.00	7.70	#400	.	.

TABLE F-3. (cont)

Regular Monitoring Data

Well name	Collection Date	Duplicate sample number	ACETONE ppb 10/.	ALKALIN ppb 20000/.	ALPHA pCi/L 4/15	ALPHAHI pCi/L 4/15	ALUMNUM ppb 150/.	AM-241 pCi/L 0.1/30d	AMMONIU ppb 50/.	ARSENIC ppb 5/50
2-E25-25	20AUG85		.	.	*0.375	.	<150	.	135	<5.00
	18SEP85		.	.	1.660	.	<150	.	110	<5.00
	19DEC85		11	.	*0.173	.	<150	.	65	<5.00
	10MAR86		.	.	1.600	.	224	.	<50	<5.00
	04JUN86		.	.	2.660	.	<150	.	<50	<5.00
	03SEP86		.	.	*0.425	.	<150	.	<50	<5.00
	12DEC86		.	.	*0.444	.	<150	.	<50	<5.00
	12MAR87		.	.	*0.631	.	<150	.	<50	<5.00
	01JUL87		.	.	1.040	.	<150	*-0.00647	<50	<5.00
	30SEP87		.	.	*0.392	.	<150	0.02140	<50	5.00
	19JAN88		.	.	.	.	<150	.	<50	6.00
	19JAN88	1	.	.	.	.	<150	.	.	<5.00
	29MAR88		.	.	*0.879	.	<150	.	<50	<5.00
	29MAR88	1	.	.	*0.287	.	.	.	<50	.
	05AUG88		.	.	*0.617	.	<150	.	<50	<5.00
	05AUG88	1	.	.	*0.275	.	<150	.	<50	<5.00
	18OCT88		.	.	*0.657	.	219	.	<50	<5.00
	03JAN89		.	.	*0.894	.	<150	.	.	<5.00
	28FEB89		.	.	.	*0.1960	<150	.	.	<5.00
	21JUN89		.	.	.	*0.0838	<150	.	.	.
	21JUN89	1	.	.	.	.	<150	.	.	.
	21JUN89	2	.	.	.	.	<150	.	.	.
	21JUN89	3	.	.	.	.	<150	.	.	.
6-45-42	22AUG85		.	.	1.820	.	<150	.	230	6.52
	12MAY86		.	.	1.780	.	<150	.	<50	<5.00
	05AUG86		.	.	2.920	.	<150	.	<50	<5.00
	15SEP87		.	.	1.710	.	.	.	.	.
	14OCT87		.	.	1.810	.	.	.	.	.
	15NOV87		.	103,000	1.890	.	<150	.	<50	<5.00
	03DEC87		.	.	1.670	.	.	.	.	.
	08JAN88		.	101,000	1.850	.	<150	.	<50	<5.00
	04FEB88		.	.	1.550	.	.	.	.	.
	17MAR88		.	.	1.870	.	.	.	.	.
	07APR88		.	.	2.620	.	.	.	.	.
	04MAY88		.	.	1.480	.	.	.	.	.
	06JUN88		.	.	2.230	.	.	.	.	.
	15JUN88		.	103,000	1.770	.	.	.	<50	.
	12AUG88		.	.	1.890	.	.	.	.	.
	15AUG88		.	101,000	0.433	.	.	.	.	.
	09SEP88		.	.	1.070	.	.	.	.	.
	06OCT88		.	.	1.610	.	.	.	.	.
	31OCT88		.	.	1.660	.	.	.	.	.
	13DEC88		.	.	1.230	.	.	.	.	.
	13JAN89		.	.	2.520	.	.	.	.	.
	16JAN89		.	102,000	.	.	.	.	.	.
	08FEB89		.	.	.	1.8100	.	.	.	.
	02MAR89		.	.	.	*-0.0375	.	.	.	.

TABLE F-3. (cont)

Well name	Collection Date	Duplicate sample number	FARSENI ppb 5/50	BARIUM ppb 6/1000	FBARIUM ppb 6/1000	BERYLUM ppb 5/.	BETA pCi/L 8/50	BORON ppb 10/.	FBORON ppb 10/.	C-14 pCi/L 20/2000r
2-E25-25	20AUG85		.	12.0	.	<5	6.92	.	.	.
	18SEP85		.	14.0	.	<5	4.33	.	.	.
	19DEC85		.	17.0	.	<5	*1.56	.	.	.
	10MAR86		.	15.0	.	<5	4.44	.	.	.
	04JUN86		.	15.0	.	<5	11.00	.	.	.
	03SEP86		.	14.0	.	<5	7.21	.	.	.
	12DEC86		.	14.0	.	<5	6.74	.	.	.
	12MAR87		.	11.0	.	<5	10.10	.	.	.
	01JUL87		<5	19.0	19	<5	5.54	.	.	*0.082
	30SEP87		.	19.0	.	<5	7.57	.	.	*0.174
	19JAN88		<5	14.0	19	<5	.	.	.	.
	19JAN88	1	6	15.0	18	<5	.	.	.	.
	29MAR88		<5	20.0	16	<5	8.40	.	.	.
	29MAR88	1	<5	.	18	.	5.38	.	.	.
	05AUG88		<5	12.0	<6	<5	*1.74	.	.	.
	05AUG88	1	<5	12.0	<6	<5	6.12	.	.	.
	18OCT88		<5	18.6	18	<5	7.42	.	.	.
	03JAN89		<5	15.0	13	<5	5.69	<10	11	.
	28FEB89		<5	10.0	14	<5	3.59	17	14	.
	21JUN89		.	15.0	12	<5	8.26	<10	<10	.
	21JUN89	1	.	14.0	13	<5	.	<10	<10	.
	21JUN89	2	.	12.0	12	<5	.	<10	<10	.
	21JUN89	3	.	14.0	11	<5	.	<10	<10	.
6-45-42	22AUG85		.	30.0	.	5	4.69	.	.	.
	12MAY86		.	34.0	.	<5	6.27	.	.	.
	05AUG86		.	34.0	.	<5	9.22	.	.	.
	15SEP87		.	.	.	.	4.01	.	.	.
	14OCT87		.	.	.	.	4.75	.	.	.
	15NOV87		<5	38.0	38	.	8.07	.	.	.
	03DEC87		.	.	.	.	4.07	.	.	.
	08JAN88		5	32.0	34	.	3.19	.	.	.
	04FEB88		.	.	.	.	4.22	.	.	.
	17MAR88		.	.	.	.	4.78	.	.	.
	07APR88		.	.	.	.	5.78	.	.	.
	04MAY88		.	.	.	.	4.04	.	.	.
	06JUN88		.	.	.	.	6.29	.	.	.
	15JUN88		6	.	35	.	7.25	.	.	.
	12AUG88		.	.	.	.	4.50	.	.	.
	15AUG88		.	.	16	.	5.91	.	.	.
	09SEP88		.	.	.	.	4.38	.	.	.
	06OCT88		.	.	.	.	4.17	.	.	.
	31OCT88		.	.	.	.	3.18	.	.	.
	13DEC88		.	.	.	.	4.44	.	.	.
	13JAN89		.	.	.	.	3.50	.	.	.
	16JAN89		.	.	34	.	.	.	14	.
	08FEB89		.	.	.	.	2.95	.	.	.
	02MAR89		.	.	.	.	2.85	.	.	.

TABLE F-3. (con·t)

Well name	Collection Date	Duplicat sample number	CADMIUM ppb 2/10	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLORID ppb 500/250000s	CHROMUM ppb 10/50	CO-60 pCi/L 22.5/100r	COLIFRM MPN 2.2/1	COPPER ppb 10/1300p
2-E25-25	20AUG85		<2	.	14,800	3,400	11.0	.	.	31
	22AUG85		.	.	.	.	.	.	<3.0	.
	18SEP85		3	.	14,100	3,850	<10.0	*-2.640	<3.0	<10
	19DEC85		<2	.	24,100	4,030	<10.0	*1.130	<3.0	<10
	10MAR86		<2	.	17,400	5,240	<10.0	*4.510	<3.0	16
	04JUN86		<2	.	18,000	5,180	<10.0	*-7.360	4.0	<10
	03SEP86		<2	.	16,000	4,740	<10.0	*1.130	<2.2	<10
	12DEC86		<2	.	16,600	3,870	<10.0	*-2.100	<2.2	<10
	12MAR87		<2	.	17,700	5,510	<10.0	*-12.700	<2.2	<10
	01JUL87		<2	18,200	17,500	3,840	<10.0	*-18.100	<2.2	<10
	30SEP87		<2	.	15,900	2,580	<10.0	6.070	<2.2	<10
	19JAN88		<2	17,300	16,500	2,310	<10.0	*0.670	.	<10
	19JAN88	1	<2	16,900	16,900	.	<10.0	.	.	<10
	29MAR88		<2	21,100	20,300	3,370	26.0	*-1.600	<2.2	<10
	29MAR88	1	.	20,400	.	3,340	.	.	.	.
	05AUG88		<2	20,200	18,200	3,250	<10.0	*-5.090	<2.2	<10
	05AUG88	1	<2	18,400	18,800	3,240	<10.0	.	.	<10
	18OCT88		<2	20,600	18,300	3,700	32.5	*-1.630	<2.2	<10
	03JAN89		<2	18,100	18,900	2,900	59.0	.	M	<10
	28FEB89		<2	18,500	17,400	3,100	<10.0	.	<2.2	<10
	21JUN89		<2	19,900	19,800	3,300	17.0	.	<2.2	<10
	21JUN89	1	<2	18,700	19,300	.	41.0	.	.	<10
	21JUN89	2	<2	18,400	19,000	.	<10.0	.	.	<10
	21JUN89	3	2	18,500	19,900	.	37.0	.	.	<10
6-45-42	22AUG85		<2	.	21,000	4,960	<10.0	30.000	<3.0	<10
	15DEC85	K	.	.	.	.	.	*-19.000	.	.
	05MAR86	K	.	.	.	.	.	*-10.000	.	.
	12MAY86		<2	.	23,600	4,780	<10.0	.	<3.0	<10
	19JUN86	K	.	.	.	.	.	*4.400	.	.
	05AUG86		<2	.	24,900	5,180	<10.0	.	<2.2	<10
	08SEP86	K	.	.	.	.	.	*20.000	.	.
	13DEC86	K	.	.	.	.	.	*16.000	.	.
	28FEB87		.	.	.	.	.	*-2.100	.	.
	11JUN87		.	.	.	.	.	0.000	.	.
	04AUG87		.	.	.	.	.	*-1.700	.	.
	15SEP87		.	.	.	.	.	*-2.100	.	.
	14OCT87		.	.	.	.	.	*4.050	.	.
	15NOV87		<2	20,600	25,200	5,960	<10.0	*-20.300	.	<10
	03DEC87		.	.	.	.	.	0.000	.	.
	08JAN88		<2	26,300	24,200	5,670	<10.0	*4.340	.	<10
	04FEB88		.	.	.	.	.	*3.600	.	.
	17MAR88		.	.	.	.	.	*2.020	.	.
	07APR88		.	.	.	.	.	*-0.564	.	.
	04MAY88		.	.	.	.	.	*-6.920	.	.
	06JUN88		.	.	.	.	.	*4.270	.	.
	15JUN88		.	26,900	.	5,650	.	.	.	.

TABLE F-3. (cont)

Well name	Collection Date	Duplicat sample number	CADMIUM ppb 2/10	FCALCIU ppb 50/.	CALCIUM ppb 50/.	CHLORID ppb 500/250000s	CHROMUM ppb 10/50	CO-60 pCi/L 22.5/100r	COLIFRM MPN 2.2/1	COPPER ppb 10/1300p
	12AUG88		.	.	.	.	.	*-0.169	.	.
	15AUG88		.	29,700	.	4,830	.	*-3.760	.	.
	09SEP88		.	.	.	.	.	*-1.820	.	.
	06OCT88		.	.	.	.	.	*-0.392	.	.
	31OCT88		.	.	.	.	.	*-4.260	.	.
	13DEC88		.	.	.	.	.	*-1.370	.	.
	13JAN89		.	.	.	.	.	*2.270	.	.
	16JAN89		.	26,600	.	5,400	.	.	.	.
	08FEB89		.	.	.	.	.	*2.350	.	.
	02MAR89		.	.	.	.	.	*2.460	.	.

TABLE F-3. (cont)

Well name	Collection Date	Duplicat sample number	FCOPPER ppb 10/1300p	CS-137 pCi/L 20/200r	CYANIDE ppb 10/.	DIMETHO ppb 2/.	FLUORID ppb 500/4000	LFLUORD ppb 20/4000	HNITRAT ppb 2500/45000	I-129 pCi/L 15/1r
2-E25-25	20AUG85		.	.	.	.	710	.	.	.
	18SEP85		.	*-14.100	.	.	<500	.	.	.
	19DEC85		.	*2.070	.	.	<500	.	.	.
	10MAR86		.	*-6.540	.	.	<500	.	.	.
	04JUN86		.	6.600	.	.	<500	.	.	.
	03SEP86		.	*4.470	.	.	<500	.	.	.
	12DEC86		.	*-3.840	.	.	<500	.	.	.
	12MAR87		.	*5.670	.	.	<500	.	.	.
	01JUL87		<10	7.660	<10	<5.00	<500	.	.	*1.070
	30SEP87		.	*4.160	.	.	<500	.	.	*0.248
	19JAN88		<10	*1.460	.	.	<500	.	.	.
	19JAN88	1	<10	.	.	.	.	.	.	.
	29MAR88		<10	*0.993	<10	2.54	<500	.	.	.
	29MAR88	1	<10	.	.	.	<500	.	.	.
	05AUG88		<10	*-5.250	.	.	<500	.	.	.
	05AUG88	1	<10	.	.	.	<500	.	.	.
	18OCT88		<10	*2.640	.	.	<500	.	.	.
	03JAN89		<10	.	.	.	<500	.	.	.
	28FEB89		<10	.	.	.	<500	.	.	.
	21JUN89		<10	.	.	.	<500	.	.	.
	21JUN89	1	<10	.	.	.	.	.	.	.
	21JUN89	2	<10	.	.	.	.	.	.	.
	21JUN89	3	<10	.	.	.	.	.	.	.
6-45-42	22AUG85		.	.	.	.	710	.	.	.
	12MAY86		.	.	.	.	<500	.	.	.
	05AUG86		.	.	.	.	<500	.	.	.
	28FEB87		.	*3.850	.	.	.	.	.	.
	11JUN87		.	*1.130	.	.	.	.	.	.
	04AUG87		.	*3.790	.	.	.	.	6510	.
	15SEP87		.	*-9.830	.	.	.	.	.	.
	14OCT87		.	*-2.560	.	.	.	.	.	.
	15NOV87		<10	7.280	<10	.	634	595	.	.
	03DEC87		.	*5.640	.	.	.	.	.	.
	08JAN88		<10	*-5.220	<10	.	667	.	6910	.
	04FEB88		.	*3.180	.	.	.	.	6140	.
	17MAR88		.	*-1.380	.	.	.	.	5210	.
	07APR88		.	*2.050	.	.	.	.	5960	.
	04MAY88		.	*2.760	.	.	.	.	6610	.
	06JUN88		.	*-2.320	.	.	.	.	7730	.
	15JUN88		<10	.	151	.	1200	488	.	.
	12AUG88		.	*6.140	.	.	.	.	5170	.
	15AUG88		<10	*-0.114	<10	.	<500	550	6870	.
	09SEP88		.	*1.830	.	.	.	.	6700	.
	06OCT88		.	*-1.560	.	.	.	.	6560	.
	31OCT88		.	*-6.070	.	.	.	.	6400	.
	13DEC88		.	*-5.650	.	.	.	.	7100	.
	13JAN89		.	*2.470	.	.	.	.	7000	.
	16JAN89		12	.	<10	.	<500	.	.	.
	08FEB89		.	*-3.130	.	.	.	.	7100	.
	02MAR89		.	*-1.770	.	.	.	.	6500	.

TABLE F-3. (cont)

Well name	Collection Date	Duplicate sample number	IRON ppb 30/300s	FIRON ppb 30/300s	LEADGF ppb 5/50	MAGNES ppb 50/.	FMAGNES ppb 50/.	FMANGAN ppb 5/50s	MANGESE ppb 5/50s	MERCURY ppb 0.1/2
2-E25-25	20AUG85		73	.	.	.	.	.	<5.0	<0.1
	18SEP85		142	.	.	.	.	.	<5.0	<0.1
	19DEC85		3820	.	11.8	.	.	.	48.0	<0.1
	10MAR86		6660	.	27.3	.	.	.	80.0	<0.1
	04JUN86		2570	.	<5.0	.	.	.	29.0	<0.1
	03SEP86		883	.	12.7	4,850	.	.	7.0	0.1
	12DEC86		440	.	<5.0	4,850	.	.	7.0	<0.1
	12MAR87		1880	.	<5.0	5,150	.	.	19.0	<0.1
	01JUL87		293	<50	<5.0	5,310	5,490	<5	<5.0	<0.1
	30SEP87		249	.	<5.0	4,780	.	.	<5.0	<0.1
	19JAN88		362	31	.	4,870	5,040	<5	6.0	.
	19JAN88	1	399	<30	.	4,990	4,890	<5	6.0	.
	29MAR88		385	<30	<5.0	5,980	6,150	<5	9.0	<0.1
	29MAR88	1	.	<30	.	.	5,790	<5	.	.
	05AUG88		353	<30	<5.0	5,640	5,660	<5	15.0	<0.1
	05AUG88	1	368	<30	<5.0	5,790	5,130	<5	14.0	.
	18OCT88		1490	<30	<5.0	5,370	5,500	<5	47.6	<0.1
	03JAN89		474	<30	<5.0	5,210	4,980	<5	8.0	<0.1
	28FEB89		269	<30	<5.0	5,230	5,460	<5	6.0	<0.1
	21JUN89		152	<30	<5.0	5,580	5,450	<5	<5.0	<0.1
	21JUN89	1	238	33	.	5,410	5,130	<5	5.0	.
	21JUN89	2	104	<30	.	5,290	5,070	<5	<5.0	.
	21JUN89	3	287	74	.	5,550	5,090	<5	<5.0	.
6-45-42	22AUG85		201	.	.	.	.	.	7.0	<0.1
	12MAY86		323	.	<5.0	.	.	.	13.0	<0.1
	05AUG86		661	.	<5.0	10,200	.	.	16.0	<0.1
	15NOV87		886	<30	<5.0	10,400	10,200	6	12.0	<0.1
	08JAN88		428	60	<5.0	10,100	10,500	10	<5.0	<0.1
	15JUN88		.	53	.	.	10,800	7	.	.
	15AUG88		.	<30	.	.	10,400	<5	.	.
	16JAN89		.	<30	.	.	10,200	<5	.	.

TABLE F-3. (cont)

Well name	Collection Date	Duplicate sample number	NICKEL ppb 10/.	NITRATE ppb 500/45000	NO3-ION mg/L 0.5/45	FPOTASS ppb 100/.	POTASUM ppb 100/.	PU-238 pCi/L 17/40d	PU39-40 pCi/L 17/30d	RADIUM pCi/L 1/5
2-E25-25	20AUG85		<10.0	2,300	.	.	4,050	.	.	*-0.01830
	18SEP85		13.0	1,390	.	.	3,970	.	.	*0.15400
	19DEC85		<10.0	1,910	.	.	4,450	.	.	*0.09070
	10MAR86		<10.0	971	.	.	3,660	.	.	*0.01820
	04JUN86		<10.0	875	.	.	3,640	.	.	*0.01980
	03SEP86		<10.0	909	.	.	4,130	.	.	*-0.01130
	12DEC86		<10.0	893	.	.	4,350	.	.	*0.03660
	12MAR87		<10.0	902	.	.	3,840	.	.	*-0.05530
	01JUL87		<10.0	1,080	.	3,910	3,650	.	.	*0.03860
	30SEP87		<10.0	785	.	.	4,390	*-0.000716	*-0.001370	*-0.02040
	19JAN88		<10.0	582	.	4,450	4,400	.	.	.
	19JAN88	1	<10.0	.	.	4,330	4,560	.	.	.
	29MAR88		13.0	746	.	4,020	3,880	.	.	*0.01920
	29MAR88	1	.	709	.	3,810	.	.	.	.
	05AUG88		<10.0	653	.	4,280	3,670	.	.	*0.00449
	05AUG88	1	<10.0	811	.	3,890	3,790	.	.	.
	18OCT88		18.9	600	.	4,440	4,320	.	.	0.17600
	03JAN89		34.0	700	.	4,210	4,520	.	.	*-0.01470
	28FEB89		<10.0	700	.	4,120	4,020	.	.	*0.03680
	21JUN89		11.0	800	.	3,490	3,760	.	.	*-0.03630
	21JUN89	1	22.0	.	.	3,240	3,540	.	.	.
	21JUN89	2	<10.0	.	.	3,270	3,500	.	.	.
	21JUN89	3	24.0	.	.	3,290	3,630	.	.	.
6-45-42	22AUG85		<10.0	8,230	16	.	4,320	.	.	*-0.01450
	15DEC85	K	.	.	34	.	.	.	.	.
	05MAR86	K	.	.	16	.	.	.	.	.
	12MAY86		<10.0	6,970	.	.	4,380	.	.	*0.01830
	19JUN86	K	.	.	15	.	.	.	.	.
	05AUG86		<10.0	7,290	.	.	4,470	.	.	*0.04860
	08SEP86		.	6,880	.	.	.	.	.	.
	13DEC86		.	6,260	.	.	.	.	.	.
	28FEB87		.	7,970	.	.	.	.	.	.
	11JUN87		.	7,350	.	.	.	.	.	.
	15SEP87		.	.	.	.	.	0.020100	*0.006190	.
	14OCT87		.	.	.	.	.	*-0.000717	*-0.001370	.
	15NOV87		<10.0	7,470	.	4,390	4,590	*-0.000716	*-0.003610	*-0.01960
	03DEC87		.	.	.	.	.	*-0.000717	*-0.001370	.
	08JAN88		<10.0	8,860	.	4,320	4,420	*-0.000717	*-0.001370	*0.04100
	04FEB88		.	.	.	.	.	*-0.000717	*-0.001370	.
	17MAR88		.	.	.	.	.	*0.002540	*-0.000165	.
	07APR88		.	.	.	.	.	*-0.008040	*0.002040	.
	04MAY88		.	.	.	.	.	*-0.001440	*0.003670	.
	06JUN88		.	.	.	.	.	*-0.001440	*0.003140	.
	15JUN88		.	7,270	.	3,920	.	.	.	.

TABLE F-3. (cont)

Well name	Collection Date	Duplicate sample number	NICKEL ppb 10/.	NITRATE ppb 500/45000	NO3-ION mg/L 0.5/45	FPOTASS ppb 100/.	POTASUM ppb 100/.	PU-238 pCi/L 17/40d	PU39-40 pCi/L 17/30d	RADIUM pCi/L 1/5
	12AUG88		.	.	.	.	.	*0.000554	*-0.002160	.
	15AUG88		.	6,650	.	4,460	.	*-0.001440	*-0.000165	.
	09SEP88		.	.	.	.	.	*-0.001440	*-0.000165	.
	06OCT88		.	.	.	.	.	*-0.001440	*-0.004150	.
	31OCT88		.	.	.	.	.	*-0.001440	*0.002190	.
	13DEC88		.	.	.	.	.	*-0.008530	*-0.000165	.
	13JAN89		.	.	.	.	.	*-0.001440	*-0.002150	.
	16JAN89		.	6,900	.	4,530	.	.	.	.
	08FEB89		.	.	.	.	.	*-0.001440	*-0.004070	.
	02MAR89		.	.	.	.	.	*-0.001440	*-0.004790	.

TABLE F-3. (cont)

Well name	Collection Date	Duplicate sample number	RU-106 pCi/L 172.5/30r	FSILICO ppb 50/.	SILICON ppb 50/.	SODIUM ppb 200/.	FSODIUM ppb 200/.	SOLIDS mg/L ./.	SR-90 pCi/L 5/8	FSTRONT ppb 20/.
2-E25-25	20AUG85		.	.	.	12,500	.	.	.	.
	18SEP85		*20.00	.	.	12,800	.	250	.	.
	19DEC85		*-63.90	.	.	12,300	.	14900	.	.
	10MAR86		*5.80	.	.	9,690	.	13800	.	.
	04JUN86		*-17.10	.	.	9,010	.	.	.	.
	03SEP86		*17.10	.	.	9,860	.	.	.	.
	12DEC86		*-32.00	.	.	8,690	.	.	.	.
	12MAR87		*-40.70	.	.	6,910	.	.	.	.
	01JUL87		*-44.30	.	.	7,000	7,550	.	.	<300
	30SEP87		*53.50	.	.	8,090	.	.	*0.00453	.
	19JAN88		*5.37	.	.	7,210	7,320	.	.	103
	19JAN88	1	.	.	.	7,630	7,290	.	.	101
	29MAR88		0.00	.	.	6,000	6,200	.	.	120
	29MAR88	1	.	.	.	.	5,780	.	.	114
	05AUG88		*43.10	.	.	6,010	6,450	.	.	103
	05AUG88	1	.	.	.	6,130	5,990	.	.	91
	18OCT88		*-3.14	.	.	6,500	6,520	.	.	114
	03JAN89		.	11,100	11,500	6,730	6,230	.	.	109
	28FEB89		.	9,550	9,190	5,500	5,710	.	.	114
	21JUN89		.	7,620	7,550	4,710	4,620	.	.	115
	21JUN89	1	.	7,200	7,460	4,540	4,340	.	.	106
	21JUN89	2	.	7,060	7,340	4,460	4,310	.	.	105
	21JUN89	3	.	7,100	7,660	4,650	4,320	.	.	107
6-45-42	22AUG85		.	.	.	17,800	.	.	.	.
	12MAY86		.	.	.	19,700	.	.	.	.
	05AUG86		.	.	.	18,500	.	.	.	.
	28FEB87		72.00	.	.	.	.	.	.	.
	11JUN87		63.40	.	.	.	.	.	.	.
	04AUG87		*-3.01	.	.	.	.	.	.	.
	15SEP87		*-72.30	.	.	.	.	.	*0.09880	.
	14OCT87		*-5.37	.	.	.	.	.	*-0.27400	.
	15NOV87		*-19.40	.	.	19,300	18,500	.	*0.19300	193
	03DEC87		*62.90	.	.	.	.	.	*0.22100	.
	08JAN88		*-56.60	.	.	18,800	18,400	.	*0.01730	192
	04FEB88		*27.10	.	.	.	.	.	*0.13700	.
	17MAR88		*13.30	.	.	.	.	.	*-0.17100	.
	07APR88		*29.20	.	.	.	.	.	*-0.26900	.
	04MAY88		*-21.60	.	.	.	.	.	*-0.05850	.
	06JUN88		*2.79	.	.	.	.	.	*0.40700	.
	15JUN88		.	.	.	.	17,300	.	.	196
	12AUG88		*-10.70	.	.	.	.	.	*0.16600	.
	15AUG88		*-12.60	.	.	.	18,000	.	*0.22400	183
	09SEP88		*-28.10	.	.	.	.	.	*-0.37400	.
	06OCT88		*-14.10	.	.	.	.	.	*0.06210	.
	31OCT88		*-20.20	.	.	.	.	.	*-0.29800	.
	13DEC88		*-6.03	.	.	.	.	.	*-0.21800	.
	13JAN89		*-11.80	.	.	.	.	.	*0.35100	.
	16JAN89		.	21,700	.	.	19,300	.	.	198
	08FEB89		*30.10	.	.	.	.	.	*0.16900	.
	02MAR89		*20.80	.	.	.	.	.	*-0.17900	.

TABLE F-3. (cont)

Well name	Collection Date	Duplicate sample number	STRONUM ppb 20/.	SULFATE ppb 500/250000s	TC ppb 1000/.	TC-99 pCi/L 15/900r	TDS ppb 5000/500000s	TRITIUM pCi/L 500/20000	U-234 pCi/L 0.1/500d
2-E25-25	20AUG85		<300	15,300	.	.	.	.	.
	18SEP85		<300	15,100	.	.	.	689	.
	19DEC85		<300	15,800	.	.	.	1,540	.
	10MAR86		<300	14,400	.	.	.	721	.
	04JUN86		<300	16,400	.	.	.	582	.
	03SEP86		<300	13,000	16,300	.	138,000	807	.
	12DEC86		<300	12,100	17,100	.	135,000	534	.
	12MAR87		<300	15,100	17,000	.	62,000	433	.
	01JUL87		<300	14,700	16,800	*0.291	17,500	413	.
	30SEP87		<300	12,200	16,200	*1.470	91,000	408	0.266
	19JAN88		101	11,000	17,500	0.340	.	558	.
	19JAN88	1	105	.	.	0.261	.	.	.
	29MAR88		116	14,000	16,700	0.180	.	486	.
	29MAR88	1	.	14,000	.	.	.	.	.
	05AUG88		115	11,800	15,700	0.662	.	*270	.
	05AUG88	1	116	11,800	.	0.369	.	.	.
	18OCT88		113	12,400	15,300	1.430	.	*-153	.
	03JAN89		114	11,700	.	0.100	.	442	.
	28FEB89		107	13,000	.	0.790	.	.	.
	21JUN89		114	14,000	.	.	.	.	.
	21JUN89	1	112	.	.	.	.	.	.
	21JUN89	2	111	.	.	.	.	.	.
	21JUN89	3	118	.	.	.	.	.	.
8-45-42	22AUG85		<300	33,900	.	.	.	54,000	.
	15DEC85	K	.	.	.	.	.	65,000	.
	05MAR86	K	.	.	.	.	.	52,000	.
	12MAY86		<300	32,400	.	.	.	.	.
	19JUN86	K	.	.	.	.	.	51,000	.
	05AUG86		<300	32,100	24,700	.	.	.	.
	06SEP86	K	.	.	.	.	.	51,000	.
	13DEC86	K	.	.	.	.	.	51,900	.
	28FEB87		.	.	.	.	.	51,800	.
	11JUN87		.	.	.	.	.	53,000	.
	04AUG87		.	.	.	.	.	54,100	.
	15SEP87		.	.	.	.	.	52,600	1.140
	14OCT87		.	.	.	.	.	52,900	1.070
	15NOV87		.	34,800	21,800	.	.	51,100	1.240
	03DEC87		.	.	.	.	.	51,200	1.020
	08JAN88		.	35,200	22,600	.	.	52,300	1.110
	04FEB88		.	.	.	.	.	50,100	1.160
	17MAR88		.	.	.	.	.	49,700	0.870
	07APR88		.	.	.	.	.	50,200	0.943
	04MAY88		.	.	.	.	.	49,400	1.080
	06JUN88		.	.	.	.	.	50,200	1.080
	15JUN88		.	34,200	23,300	.	.	.	.

TABLE F-3. (cont)

Well name	Collection Date	Duplicate sample number	STRONTIUM ppb 20/.	SULFATE ppb 500/250000s	TC ppb 1000/.	TC-99 pCi/L 15/900r	TDS ppb 5000/500000s	TRITIUM pCi/L 500/20000	U-234 pCi/L 0.1/500d
	12AUG88		.	.	.	.	.	46,000	1.020
	15AUG88		.	30,900	23,900	.	.	45,600	1.010
	09SEP88		.	.	.	.	.	47,100	1.020
	06OCT88		.	.	.	.	.	49,500	1.000
	31OCT88		.	.	.	.	.	46,300	0.849
	13DEC88		.	.	.	.	.	48,000	0.853
	13JAN89		.	.	.	.	.	44,500	1.130
	16JAN89		.	36,000	22,000	.	.	.	.
	08FEB89		.	.	.	.	.	42,500	1.190
	02MAR89		.	.	.	.	.	39,100	1.270

TABLE F-3. (cont)

Well name	Collection Date	Duplicate sample number	U-235 pCi/L 0.1/800d	U-238 pCi/L 0.1/800d	U-CHEM ug/L 0.725/.	FVANADI ppb 5/.	VANADUM ppb 5/.	ZINC ppb 5/5000s	FZINC ppb 5/5000s
2-E25-25	20AUG85		.	.	.	.	33.0	21.0	.
	18SEP85		.	.	.	.	36.0	16.0	.
	19DEC85		.	.	.	.	24.0	215.0	.
	10MAR86		.	.	.	.	17.0	54.0	.
	04JUN86		.	.	.	.	21.0	23.0	.
	03SEP86		.	.	.	.	24.0	14.0	.
	12DEC86		.	.	.	.	24.0	9.0	.
	12MAR87		.	.	.	.	17.0	27.0	.
	01JUL87		.	.	.	19	19.0	12.0	8
	30SEP87		*0.00984	0.202	.	.	20.0	96.0	.
	19JAN88		.	.	.	19	20.0	11.0	7
	19JAN88	1	.	.	.	20	21.0	10.0	8
	29MAR88		.	.	.	14	13.0	6.0	9
	29MAR88	1	.	.	.	8	.	.	<5
	05AUG88		.	.	.	<5	11.0	6.0	<5
	05AUG88	1	.	.	.	<5	12.0	13.0	<5
	18OCT88		.	.	.	24	14.3	15.8	5
	03JAN89		.	.	.	14	16.0	<5.0	<5
	28FEB89		.	.	.	13	11.0	10.0	5
	21JUN89		.	.	.	10	11.0	6.0	<5
	21JUN89	1	.	.	.	<5	11.0	<5.0	<5
	21JUN89	2	.	.	.	6	7.0	<5.0	<5
	21JUN89	3	.	.	.	5	12.0	<5.0	<5
6-45-42	22AUG85		.	.	.	.	31.0	7.0	.
	12MAY86		.	.	.	.	32.0	13.0	.
	05AUG86		.	.	.	.	29.0	6.0	.
	15SEP87		0.03520	0.860	1.85	.	.	.	.
	14OCT87		0.02820	0.881	2.54	.	.	.	.
	15NOV87		0.03300	0.994	1.98	32	31.0	8.0	7
	03DEC87		0.03000	0.802	2.48	.	.	.	.
	08JAN88		0.04180	0.856	2.17	30	28.0	<5.0	<5
	04FEB88		0.02220	0.873	2.32	.	.	.	.
	17MAR88		*0.01480	0.568	1.92	.	.	.	.
	07APR88		0.02090	0.786	1.88	.	.	.	.
	04MAY88		0.02810	0.823	2.07	.	.	.	.
	06JUN88		0.06330	0.890	2.03	.	.	.	.
	15JUN88		.	.	.	34	.	.	<5
	12AUG88		0.03930	0.822	2.10	.	.	.	.
	15AUG88		0.05640	0.730	2.82	20	.	.	82
	09SEP88		0.01780	0.696	2.13	.	.	.	.
	06OCT88		0.06520	0.794	2.28	.	.	.	.
	31OCT88		0.01720	0.533	2.16	.	.	.	.
	13DEC88		0.03040	0.672	2.20	.	.	.	.
	13JAN89		0.03100	0.856	2.51	.	.	.	.
	16JAN89		.	.	.	27	.	.	10
	08FEB89		0.02480	1.190	2.47	.	.	.	.
	02MAR89		*0.00392	0.932	2.68	.	.	.	.

TABLE F-3. (cont)

The column headers consist of : Constituent Name
Analysis Units
Contractual Detection Limit/Drinking Water Standard(suffix)

Suffix
none - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
r - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
p - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
s - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 (July, 1987) National Secondary Drinking Water Regulations
w - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

Data flags
< - Less than Contractual Detection Limit, reported as Limit
- Less than Contractual Detection Limit, measured value reported
* - For radioactive constituents, reported value is less than 2-sigma error

TABLE F-4. Constituent List and Summary of Sampling Results for Wells 299-E25-25 and 699-45-42, August 20, 1985, Through June 23, 1989

Constituent List=Contamination Indicator Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
088	CONDLAB	umho	.	4	0	700	WDOE		Specific conductance, laboratory
191	CONDFLD	umho	1	77	0	700	WDOE		Specific conductance, field
199	PHFIELD		0.1	77	0	6.5-8.5	EPAS	xxx	pH, field
207	PH-LAB		0.01	9	0	6.5-8.5	EPAS		pH, laboratory
C68	TOX	ppb	100	45	11	.			Total organic halogen
C69	TOC	ppb	2000	85	1	.			Total organic carbon
H42	TOXLDL	ppb	10	39	1	.			Total organic halogens, low DL

Constituent List=Interim Primary Drinking Water Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
109	COLIFRM	MPN	2.2	18	17	1	EPA	xxx	Coliform bacteria
111	BETA	pCi/L	8	42	0	50	EPA		Gross beta
112	ALPHAHI	pCi/L	4	4	0	15	EPA		Gross alpha, high DL
181	RADIUM	pCi/L	1	21	0	5	EPA		Radium, total
212	ALPHA	pCi/L	4	38	0	15	EPA		Gross alpha
A06	BARIUM	ppb	6	27	0	1000	EPA		Barium
A07	CADMIUM	ppb	2	27	25	10	EPA		Cadmium
A08	CHROMUM	ppb	10	27	20	50	EPA	xxx	Chromium
A10	SILVER	ppb	10	27	27 ***	50	EPA		Silver
A20	ARSENIC	ppb	5	23	20	50	EPA		Arsenic
A21	MERCURY	ppb	0.1	21	20	2	EPA		Mercury
A22	SELENUM	ppb	5	23	23 ***	10	EPA		Selenium
A33	ENDRIN	ppb	0.1	15	15 ***	0.2	EPA		Endrin
A34	METHLOR	ppb	3	15	15 ***	100	EPA		Methoxychlor
A35	TOXAENE	ppb	1	15	15 ***	5	EPA		Toxaphene
A36	a-BHC	ppb	0.1	15	15 ***	4	EPA		Lindane, alpha-BHC
A37	b-BHC	ppb	0.1	15	15 ***	4	EPA		Lindane, beta-BHC
A38	g-BHC	ppb	0.1	15	15 ***	4	EPA		Lindane, gamma-BHC
A39	d-BHC	ppb	0.1	15	15 ***	4	EPA		Lindane, delta-BHC
A51	LEADGF	ppb	5	19	16	50	EPA		Lead (graphite furnace)
C72	NITRATE	ppb	500	31	0	45000	EPA		Nitrate
C74	FLUORID	ppb	500	27	22	4000	EPA		Fluoride
H13	2,4-D	ppb	2	15	15 ***	100	EPA		2,4-D [2,4-Dichlorophenoxyacetic acid]
H14	2,4,5TP	ppb	2	15	15 ***	10	EPA		2,4,5-TP silvex
H20	FBARIUM	ppb	6	19	2	1000	EPA		Barium, filtered
H21	FCADMIU	ppb	2	19	19 ***	10	EPA		Cadmium, filtered
H22	FCHROMI	ppb	10	19	19 ***	50	EPA		Chromium, filtered
H23	FSILVER	ppb	10	19	19 ***	50	EPA		Silver, filtered
H37	FARSENI	ppb	5	13	10	50	EPA		Arsenic, filtered
H38	FMERCUR	ppb	0.1	10	10 ***	2	EPA		Mercury, filtered
H39	FSELENI	ppb	5	13	13 ***	10	EPA		Selenium, filtered
H41	FLEAD	ppb	5	11	11 ***	50	EPA		Lead, filtered
H63	LFLUORD	ppb	20	3	0	4000	EPA		Fluoride, low DL
H65	HNITRAT	ppb	2500	16	0	45000	EPA		Nitrate, high DL

TABLE F-4. (cont)

Constituent List=Water Quality Parameters

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A11	SODIUM	ppb	200	27	0	.			Sodium
A17	MANGESE	ppb	5	27	8	50	EPAS	xxx	Manganese
A19	IRON	ppb	30	27	0	300	EPAS	xxx	Iron
C67	PHENOL	ppb	10	14	14 ***	.			Phenol
C73	SULFATE	ppb	500	27	0	250000	EPAS		Sulfate
C75	CHLORID	ppb	500	27	0	250000	EPAS		Chloride
H24	FSODIUM	ppb	200	19	0	.			Sodium, filtered
H29	FMANGAN	ppb	5	19	16	50	EPAS		Manganese, filtered
H31	FIRON	ppb	30	19	14	300	EPAS		Iron, filtered
H57	LPHENOL	ppb	10	6	6 ***	.			Phenol, low DL

Constituent List=Site Specific and Other Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
010	CO-60	pCi/L	22.5	41	0	100	EPAR		Cobalt-60
024	CS-137	pCi/L	20	35	0	200	EPAR		Cesium-137
034	RU-106	pCi/L	172.5	35	0	30	EPAR	xxx	Ruthenium-106
063	SOLIDS	mg/L	.	3	0	.			Suspended solids
081	I-129	pCi/L	15	2	0	1	EPAR	xxx	Iodine-129
100	PU39-40	pCi/L	17	20	0	30	DOE		Plutonium-239,240
102	PU-238	pCi/L	17	20	0	40	DOE		Plutonium-238
105	AM-241	pCi/L	0.1	2	0	30	DOE		Americium-241
108	TRITIUM	pCi/L	500	42	0	20000	EPA	xxx	Tritium (H-3)
116	NO3-ION	mg/L	0.5	4	0	45	EPA		Nitrate (ion specific electrode)
121	SR-90	pCi/L	5	20	0	8	EPA		Strontium-90
124	U-CHEM	ug/L	0.725	19	0	.			Uranium, chemical
183	U-234	pCi/L	0.1	20	0	500	DOE		Uranium-234
184	U-235	pCi/L	0.1	20	0	600	DOE		Uranium-235
185	U-238	pCi/L	0.1	20	0	600	DOE		Uranium-238
193	C-14	pCi/L	20	2	0	2000	EPAR		Carbon-14
197	TC-99	pCi/L	15	10	0	900	EPAR		Technetium-99
A01	BERYLUM	ppb	5	25	24	.			Beryllium
A02	OSMIUM	ppb	300	13	13 ***	.			Osmium
A03	STRONUM	ppb	20	26	13	.			Strontium
A04	ZINC	ppb	5	27	5	5000	EPAS		Zinc
A05	CALCIUM	ppb	50	27	0	.			Calcium
A09	LEAD	ppb	30	4	4 ***	.			Lead (discontinued ICP, use A51-LEADGF)
A12	NICKEL	ppb	10	27	20	.			Nickel
A13	COPPER	ppb	10	27	25	1300	EPAP		Copper
A14	VANADUM	ppb	5	27	0	.			Vanadium
A15	ANTIONY	ppb	100	25	25 ***	.			Antimony

TABLE F-4. (cont)

---------- Constituent List=Site Specific and Other Constituents ----------

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
A16	ALUMNUM	ppb	150	27	25	.		Aluminum
A18	POTASUM	ppb	100	27	0	.		Potassium
A50	MAGNES	ppb	50	20	0	.		Magnesium
C76	PHOSPHA	ppb	1000	27	27 ***	.		Phosphate
H16	TC	ppb	1000	15	0	.		Total carbon
H17	TDS	ppb	5000	5	0	500000	EPAS	Total dissolved solids
H18	FZINC	ppb	5	19	10	5000	EPAS	Zinc, filtered
H19	FCALCIU	ppb	50	19	0	.		Calcium, filtered
H25	FNICKEL	ppb	10	19	19 ***	.		Nickel, filtered
H26	FCOPPER	ppb	10	19	18	1300	EPAP	Copper, filtered
H27	FVANADI	ppb	5	19	3	.		Vanadium, filtered
H28	FALUMIN	ppb	150	19	19 ***	.		Aluminum, filtered
H30	FPOTASS	ppb	100	19	0	.		Potassium, filtered
H32	FMAGNES	ppb	50	19	0	.		Magnesium, filtered
H33	FBERYLL	ppb	5	19	19 ***	.		Beryllium, filtered
H34	FOSMIUM	ppb	300	1	1 ***	.		Osmium, filtered
H35	FSTRONT	ppb	20	19	1	.		Strontium, filtered
H36	FANTIMO	ppb	100	19	19 ***	.		Antimony, filtered
H58	ALKALIN	ppb	20000	5	0	.		Total alkalinity, as CaCO3 (Method B)
H66	BROMIDE	ppb	1000	12	12 ***	.		Bromide
H67	NITRITE	ppb	1000	12	12 ***	.		Nitrite
H86	FBORON	ppb	10	7	4	.		Boron, filtered
H87	FCOBALT	ppb	20	7	7 ***	.		Cobalt, filtered
H88	FLITHIU	ppb	10	7	7 ***	.		Lithium, filtered
H89	FMOLY	ppb	40	7	7 ***	.		Molybdenum, filtered
H90	FSILICO	ppb	50	7	0	.		Silicon, filtered
H91	FTIN	ppb	30	7	7 ***	.		Tin, filtered
H92	FTITAN	ppb	60	7	7 ***	.		Titanium, filtered
H93	FZIRCON	ppb	50	7	7 ***	.		Zirconium, filtered
P01	BORON	ppb	10	6	5	.		Boron
P02	COBALT	ppb	20	6	6 ***	.		Cobalt
P03	LITHIUM	ppb	10	6	6 ***	.		Lithium
P04	MOLY	ppb	40	6	6 ***	.		Molybdenum
P05	SILICON	ppb	50	6	0	.		Silicon
P06	TIN	ppb	30	6	6 ***	.		Tin
P07	TITAN	ppb	60	6	6 ***	.		Titanium
P08	ZIRCON	ppb	50	6	6 ***	.		Zirconium

TABLE F-4. (cont)

---------- Constituent List=WAC 173-303-9905 Constituents ----------

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency	Exceeded	Full name
A23	THALIUM	ppb	5	2	2 ***	.			Thallium
A24	THIOURA	ppb	200	2	2 ***	.			Thiourea
A25	ACETREA	ppb	200	2	2 ***	.			1-Acetyl-2-thiourea
A26	CHLOREA	ppb	200	2	2 ***	.			1-(o-Chlorophenyl) thiourea
A27	DIETROL	ppb	200	2	2 ***	.			Diethylstilbesterol
A28	ETHYREA	ppb	200	2	2 ***	.			Ethylenethiourea
A29	NAPHREA	ppb	200	2	2 ***	.			1-Naphthyl-2-thiourea
A32	PHENREA	ppb	500	2	2 ***	.			n-Phenylthiourea
A40	DDD	ppb	0.1	2	2 ***	.			DDD
A41	DDE	ppb	0.1	2	2 ***	.			DDE
A42	DDT	ppb	0.1	2	2 ***	.			DDT
A43	HEPTLOR	ppb	0.1	2	2 ***	0	EPAP		Heptachlor
A44	HEPTIDE	ppb	0.1	2	2 ***	0	EPAP		Heptachlor epoxide
A46	DIELRIN	ppb	0.1	2	2 ***	.			Dieldrin
A47	ALDRIN	ppb	0.1	2	2 ***	.			Aldrin
A48	CHLOANE	ppb	1	2	2 ***	0	EPAP		Chlordane
A49	ENDO1	ppb	0.1	2	2 ***	.			Endosulfan I (alpha)
A52	ENDO2	ppb	0.1	2	2 ***	.			Endosulfan II (beta)
A54	AR1016	ppb	1	9	9 ***	0	EPAP		Arochlor 1016
A55	AR1221	ppb	1	9	9 ***	0	EPAP		Arochlor 1221
A56	AR1232	ppb	1	9	9 ***	0	EPAP		Arochlor 1232
A57	AR1242	ppb	1	9	9 ***	0	EPAP		Arochlor 1242
A58	AR1248	ppb	1	9	9 ***	0	EPAP		Arochlor 1248
A59	AR1254	ppb	1	9	9 ***	0	EPAP		Arochlor 1254
A60	AR1260	ppb	1	9	9 ***	0	EPAP		Arochlor 1260
A61	TETRANE	ppb	5	16	16 ***	5	EPA		Tetrachloromethane [Carbon Tetrachloride
A62	BENZENE	ppb	5	11	11 ***	5	EPA		Benzene
A63	DIOXANE	ppb	500	11	11 ***	.			Dioxane
A64	METHONE	ppb	10	16	16 ***	.			Methyl ethyl ketone
A65	PYRIDIN	ppb	500	11	11 ***	.			Pyridine
A66	TOLUENE	ppb	5	11	11 ***	2000	EPAP		Toluene
A67	1,1,1-T	ppb	5	16	16 ***	200	EPA		1,1,1-Trichloroethane
A68	1,1,2-T	ppb	5	16	16 ***	.			1,1,2-Trichloroethane
A69	TRICENE	ppb	5	16	16 ***	5	EPA		Trichloroethylene [1,1,2-Trichloroethene
A70	PERCENE	ppb	5	16	16 ***	.			Perchloroethylene [Tetrachloroethene]
A71	OPXYLE	ppb	5	16	16 ***	440	EPAP		Xylene-o,p
A72	ACROLIN	ppb	10	6	6 ***	.			Acrolein
A73	ACRYILE	ppb	10	6	6 ***	.			Acrylonitrile
A74	BISTHER	ppb	5	6	6 ***	.			Bis(chloromethyl) ether
A75	BROMONE	ppb	5	6	6 ***	.			Bromoacetone
A76	METHBRO	ppb	10	6	6 ***	.			Methyl bromide
A77	CARBIDE	ppb	10	6	6 ***	.			Carbon disulfide
A78	CHLBENZ	ppb	5	6	6 ***	60	EPAP		Chlorobenzene
A79	CHLTHER	ppb	5	6	6 ***	.			2-Chloroethyl vinyl ether

TABLE F-4. (cont)

---------- Constituent List=WAC 173-303-9905 Constituents ----------

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
A80	CHLFORM	ppb	5	11	11 ***	100	EPA	Chloroform [Trichloromethane]
A81	METHCHL	ppb	10	6	6 ***	.		Methyl chloride [Chloromethane]
A82	CHMTHER	ppb	10	6	6 ***	.		Chloromethyl methyl ether
A83	CROTONA	ppb	10	6	6 ***	.		Crotonaldehyde
A84	DIBRCHL	ppb	10	6	6 ***	0	EPAP	1,2-Dibromo-3-chloropropane
A85	DIBRETH	ppb	10	6	6 ***	.		1,2-Dibromoethane
A86	DIBRMET	ppb	10	6	6 ***	.		Dibromomethane
A87	DIBUTEN	ppb	10	6	6 ***	.		1,4-Dichloro-2-butene
A88	DICDIFM	ppb	10	6	6 ***	.		Dichlorodifluoromethane
A89	1,1-DIC	ppb	5	6	6 ***	.		1,1-Dichloroethane
A90	1,2-DIC	ppb	5	6	6 ***	5	EPA	1,2-Dichloroethane
A91	TRANDCE	ppb	5	6	6 ***	70	EPAP	trans-1,2-Dichloroethene
A92	DICETHY	ppb	10	6	6 ***	7	EPA	1,1-Dichloroethylene
A93	METHYCH	ppb	5	11	11 ***	.		Methylene chloride [Dichloromethane]
A94	DICPANE	ppb	5	6	6 ***	6	EPAP	1,2-Dichloropropane
A95	DICPENE	ppb	5	6	6 ***	.		1,3-Dichloropropene
A96	NNDIEHY	ppb	10	6	6 ***	.		N,N-diethylhydrazine
A97	1,1-DIM	ppb	10	1	1 ***	.		1,1-Dimethylhydrazine
A98	1,2-DIM	ppb	10	1	1 ***	.		1,2-Dimethylhydrazine
A99	HYDRSUL	ppb	10	6	6 ***	.		Hydrogen sulfide
B01	IODOMET	ppb	10	6	6 ***	.		Iodomethane
B02	METHACR	ppb	10	6	6 ***	.		Methacrylonitrile
B03	METHTHI	ppb	10	6	6 ***	.		Methanethiol
B04	PENTACH	ppb	10	6	6 ***	.		Pentachloroethane
B05	1112-tc	ppb	10	6	6 ***	.		1,1,1,2-Tetrachloroethane
B06	1122-tc	ppb	5	6	6 ***	.		1,1,2,2-Tetrachloroethane
B08	BROMORM	ppb	5	6	6 ***	100	EPA	Bromoform [Tribromomethane]
B09	TRCMEOL	ppb	10	6	6 ***	.		Trichloromethanethiol
B10	TRCMFLM	ppb	10	6	6 ***	.		Trichloromonofluoromethane
B11	TRCPANE	ppb	10	6	6 ***	.		Trichloropropane
B12	123-trp	ppb	10	6	6 ***	.		1,2,3-Trichloropropane
B13	VINYIDE	ppb	10	6	6 ***	2	EPA	Vinyl chloride
B14	M-XYLE	ppb	5	16	16 ***	440	EPAP	Xylene-m
B15	DIETHY	ppb	10	6	6 ***	.		Diethylarsine
B19	ACETILE	ppb	3000	6	6 ***	.		Acetonitrile
B20	ACETOPH	ppb	10	4	4 ***	.		Acetophenone
B21	WARFRIN	ppb	10	4	4 ***	.		Warfarin
B22	ACEFENE	ppb	10	4	4 ***	.		2-Acetylaminofluorene
B23	AMINOYL	ppb	10	4	4 ***	.		4-Aminobiphenyl
B24	AMIISOX	ppb	10	4	4 ***	.		5-(Aminomethyl)-3-isoxazolol
B25	AMITROL	ppb	10	4	4 ***	.		Amitrole
B26	ANILINE	ppb	10	4	4 ***	.		Aniline
B27	ARAMITE	ppb	10	4	4 ***	.		Aramite
B28	AURAMIN	ppb	10	4	4 ***	.		Auramine

TABLE F-4. (cont)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
B29	BENZCAC	ppb	10	4	4 ***	.		Benz[c]acridine
B30	BENZAAN	ppb	10	4	4 ***	.		Benz[a]anthracene
B31	BENDICM	ppb	10	4	4 ***	.		Benzene, dichloromethyl
B32	BENTHOL	ppb	10	4	4 ***	.		Benzenethiol
B33	BENDINE	ppb	10	4	4 ***	.		Benzidine
B34	BENZBFL	ppb	10	4	4 ***	.		Benzo[b]fluoranthene
B35	BENZJFL	ppb	10	4	4 ***	.		Benzo[j]fluoranthene
B36	PBENZQU	ppb	10	4	4 ***	.		p-Benzoquinone
B37	BENZCHL	ppb	10	4	4 ***	.		Benzyl chloride
B38	BIS2CHM	ppb	10	4	4 ***	.		Bis(2-chloroethoxy) methane
B39	BIS2CHE	ppb	10	4	4 ***	.		Bis(2-chloroethyl) ether
B40	BIS2EPH	ppb	10	4	4 ***	.		Bis(2-ethylhexyl) phthalate
B41	BROPHEN	ppb	10	4	4 ***	.		4-Bromophenyl phenyl ether
B42	BUTBENP	ppb	10	4	4 ***	.		Butyl benzyl phthalate
B43	BUTDINP	ppb	10	4	4 ***	.		2-sec-Butyl-4,6-dinitrophenol (DNBP)
B44	CHALETH	ppb	10	4	4 ***	.		Chloroalkyl ethers
B45	CHLANIL	ppb	10	4	4 ***	.		p-Chloroaniline
B46	CHLCRES	ppb	10	4	4 ***	.		p-Chloro-m-cresol
B47	CHLEPOX	ppb	10	4	4 ***	0	EPAP	1-Chloro-2,3-epoxypropane
B48	CHLNAPH	ppb	10	4	4 ***	.		2-Chloronaphthalene
B49	CHLPHEN	ppb	10	4	4 ***	.		2-Chlorophenol
B50	CHRYSEN	ppb	10	4	4 ***	.		Chrysene
B51	CRESOLS	ppb	10	4	4 ***	.		Cresols
B52	CYCHDIN	ppb	10	4	4 ***	.		2-Cyclohexyl-4,6-dinitrophenol
B53	DIBAHAC	ppb	10	4	4 ***	.		Dibenz[a,h]acridine
B54	DIBAJAC	ppb	10	4	4 ***	.		Dibenz[a,j]acridine
B55	DIBAHAN	ppb	10	4	4 ***	.		Dibenz[a,h]anthracene
B56	DIBCGCA	ppb	10	4	4 ***	.		7H-Dibenzo[c,g]carbazole
B57	DIBAEPY	ppb	10	4	4 ***	.		Dibenzo[a,e]pyrene
B58	DIBAHPY	ppb	10	4	4 ***	.		Dibenzo[a,h]pyrene
B59	DIBAIPY	ppb	10	4	4 ***	.		Dibenzo[a,i]pyrene
B60	DIBPHTH	ppb	10	4	4 ***	.		Di-n-butyl phthalate
B61	12-dben	ppb	10	14	14 ***	.		1,2-Dichlorobenzene
B62	13-dben	ppb	10	14	14 ***	.		1,3-Dichlorobenzene
B63	14-dben	ppb	10	14	14 ***	75	EPA	1,4-Dichlorobenzene [p-Dichlorobenzene]
B64	DICHBEN	ppb	20	4	4 ***	.		3,3'-Dichlorobenzidine
B65	24-dchp	ppb	10	4	4 ***	.		2,4-Dichlorophenol
B66	26-dchp	ppb	10	4	4 ***	.		2,6-Dichlorophenol
B67	DIEPHTH	ppb	10	4	4 ***	.		Diethyl phthalate
B68	DIHYSAF	ppb	10	4	4 ***	.		Dihydrosafrole
B69	DIMETHB	ppb	10	4	4 ***	.		3,3'-Dimethoxybenzidine
B70	DIMEAMB	ppb	10	4	4 ***	.		p-Dimethylaminoazobenzene
B71	DIMBENZ	ppb	10	4	4 ***	.		7,12-Dimethylbenz[a]anthracene
B72	DIMEYLB	ppb	10	4	4 ***	.		3,3'-Dimethylbenzidine

TABLE F-4. (cont)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
B73	THIONOX	ppb	10	4	4 ***	.		Thiofanox
B74	DIMPHAM	ppb	10	4	4 ***	.		alpha,alpha-Dimethylphenethylamine
B75	DIMPHEN	ppb	10	4	4 ***	.		2,4-Dimethylphenol
B76	DIMPHTH	ppb	10	4	4 ***	.		Dimethyl phthalate
B77	DINBENZ	ppb	10	4	4 ***	.		Dinitrobenzene
B78	DINCRES	ppb	10	4	4 ***	.		4,6-Dinitro-o-cresol and salts
B79	DINPHEN	ppb	50	4	4 ***	.		2,4-Dinitrophenol
B80	24-dint	ppb	10	4	4 ***	.		2,4-Dinitrotoluene
B81	26-dint	ppb	10	4	4 ***	.		2,6-Dinitrotoluene
B82	DIOPHTH	ppb	10	4	4 ***	.		Di-n-octyl phthalate
B83	DIPHAMI	ppb	10	4	4 ***	.		Diphenylamine
B84	DIPHHYD	ppb	10	4	4 ***	.		1,2-Diphenylhydrazine
B85	DIPRNIT	ppb	10	4	4 ***	.		Di-n-propylnitrosamine
B86	ETHMINE	ppb	10	4	4 ***	.		Ethyleneimine
B87	ETHMETS	ppb	10	4	4 ***	.		Ethyl methanesulfonate
B88	FLUORAN	ppb	10	4	4 ***	.		Fluoranthene
B89	HEXCBEN	ppb	10	14	14 ***	.		Hexachlorobenzene
B90	HEXCBUT	ppb	10	4	4 ***	.		Hexachlorobutadiene
B91	HEXCCYC	ppb	10	4	4 ***	.		Hexachlorocyclopentadiene
B92	HEXCETH	ppb	10	4	4 ***	.		Hexachloroethane
B93	INDENOP	ppb	10	4	4 ***	.		Indeno(1,2,3-cd)pyrene
B94	ISOSOLE	ppb	10	4	4 ***	.		Isosafrole
B95	MALOILE	ppb	10	4	4 ***	.		Malononitrile
B96	MELPHAL	ppb	10	4	4 ***	.		Melphalan
B97	METHAPY	ppb	10	4	4 ***	.		Methapyrilene
B98	METHNYL	ppb	10	4	4 ***	.		Methiolonyl
B99	METAZIR	ppb	10	4	4 ***	.		2-Methylaziridine
C01	METCHAN	ppb	10	4	4 ***	.		3-Methylcholanthrene
C02	METBISC	ppb	10	4	4 ***	.		4,4'-Methylenebis(2-chloroaniline)
C03	METACTO	ppb	10	4	4 ***	.		2-Methyllactonitrile
C04	METACRY	ppb	10	8	8 ***	.		Methyl methacrylate
C05	METMSUL	ppb	10	4	4 ***	.		Methyl methanesulfonate
C06	METPROP	ppb	10	4	4 ***	.		2-Methyl-2-(methylthio) propionaldehyde-
C07	METHIOU	ppb	10	4	4 ***	.		Methylthiouracil
C08	NAPHQUI	ppb	10	4	4 ***	.		1,4-Naphthoquinone
C09	1-napha	ppb	10	4	4 ***	.		1-Naphthylamine
C10	2-napha	ppb	10	4	4 ***	.		2-Naphthylamine
C11	NITRANI	ppb	50	4	4 ***	.		p-Nitroaniline
C12	NITBENZ	ppb	10	4	4 ***	.		Nitrobenzene
C13	NITPHEN	ppb	50	4	4 ***	.		4-Nitrophenol [p-Nitrophenol]
C14	NNIBUTY	ppb	10	4	4 ***	.		n-Nitrosodi-n-butylamine
C15	NNIDIEA	ppb	10	4	4 ***	.		n-Nitrosodiethanolamine
C16	NNIDIEY	ppb	10	4	4 ***	.		n-Nitrosodiethylamine
C17	NNIDIME	ppb	10	4	4 ***	.		n-Nitrosodimethylamine

TABLE F-4. (cont)

---------- Constituent List=WAC 173-303-9905 Constituents ----------

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection		Drinking Water Standards Standard	Agency Exceeded	Full name
C18	NNIMETH	ppb	10	4	4	***	.		n-Nitrosomethylethylamine
C19	NNIURET	ppb	10	4	4	***	.		n-Nitroso-n-methylurethane
C20	NNIVINY	ppb	10	4	4	***	.		n-Nitrosomethylvinylamine
C21	NNIMORP	ppb	10	4	4	***	.		n-Nitrosomorpholine
C22	NNINICO	ppb	10	4	4	***	.		n-Nitrosonornicotine
C23	NNIPIPE	ppb	10	4	4	***	.		n-Nitrosopiperidine
C24	NITRPYR	ppb	10	4	4	***	.		Nitrosopyrrolidine
C25	NITRTOL	ppb	10	4	4	***	.		5-Nitro-o-toluidine
C26	PENTCHB	ppb	10	14	14	***	.		Pentachlorobenzene
C27	PENTCHN	ppb	10	4	4	***	.		Pentachloronitrobenzene
C28	PENTCHP	ppb	50	4	4	***	220	EPAP	Pentachlorophenol
C29	PHENTIN	ppb	10	4	4	***	.		Phenacetin
C30	PHENINE	ppb	10	4	4	***	.		Phenylenediamine
C31	PHTHEST	ppb	10	4	4	***	.		Phthalic acid esters
C32	PICOLIN	ppb	10	4	4	***	.		2-Picoline
C33	PRONIDE	ppb	10	4	4	***	.		Pronamide
C34	RESERPI	ppb	10	4	4	***	.		Reserpine
C35	RESORCI	ppb	10	4	4	***	.		Resorcinol
C36	SAFROL	ppb	10	4	4	***	.		Safrol
C37	TETRCHB	ppb	10	14	14	***	.		1,2,4,5-Tetrachlorobenzene
C39	TETRCHP	ppb	10	4	4	***	.		2,3,4,6-Tetrachlorophenol
C40	THIURAM	ppb	10	4	4	***	.		Thiuram
C41	TOLUDIA	ppb	10	4	4	***	.		Toluenediamine
C42	OTOLHYD	ppb	10	4	4	***	.		o-Toluidine hydrochloride
C43	TRICHLB	ppb	10	14	14	***	.		1,2,4-Trichlorobenzene
C44	245-trp	ppb	50	4	4	***	.		2,4,5-Trichlorophenol
C45	246-trp	ppb	10	4	4	***	.		2,4,6-Trichlorophenol
C46	TRIPHOS	ppb	10	4	4	***	.		O,o,o-triethyl phosphorothioate
C47	SYMTRIN	ppb	10	4	4	***	.		Sym-trinitrobenzene
C48	TRISPHO	ppb	10	4	4	***	.		Tris(2,3-dibromopropyl) phosphate
C49	BENZOPY	ppb	10	4	4	***	.		Benzo[a]pyrene
C50	CHLNAPZ	ppb	10	4	4	***	.		Chlornaphazine
C51	BIS2ETH	ppb	10	4	4	***	.		Bis(2-chloroisopropyl) ether
C52	HEXAENE	ppb	10	8	8	***	.		Hexachloropropene
C53	HYDRAZI	ppb	3000	2	2	***	.		Hydrazine
C54	HEXACHL	ppb	10	14	14	***	.		Hexachlorophene
C55	NAPHTHA	ppb	10	14	14	***	.		Naphthalene
C56	123TRI	ppb	10	14	14	***	.		1,2,3-Trichlorobenzene
C58	135TRI	ppb	10	14	14	***	.		1,3,5-Trichlorobenzene
C59	1234TE	ppb	10	14	14	***	.		1,2,3,4-Tetrachlorobenzene
C60	1235TE	ppb	10	14	14	***	.		1,2,3,5-Tetrachlorobenzene
C61	TETEPYR	ppb	2	2	2	***	.		Tetraethylpyrophosphate
C62	CHLLATE	ppb	300	5	5	***	.		Chlorobenzilate
C63	CARBPHT	ppb	2	2	2	***	.		Carbophenothion

TABLE F-4. (cont)

Constituent List=WAC 173-303-9905 Constituents

Constituent Code	Name	Units	Detection Limit	Samples	Below Detection	Drinking Water Standards Standard	Agency Exceeded	Full name
C84	DISULFO	ppb	2	2	2 ***	.		Disulfoton
C85	DIMETHO	ppb	2	2	1	.		Dimethoate
C86	METHPAR	ppb	2	2	2 ***	.		Methyl parathion
C87	PARATHI	ppb	2	2	2 ***	.		Parathion
C70	CYANIDE	ppb	10	7	6	.		Cyanide
C71	FORMALN	ppb	500	11	11 ***	.		Formalin
C78	SULFIDE	ppb	1000	2	2 ***	.		Sulfide
C79	KEROSEN	ppb	10000	14	14 ***	.		Kerosene
C80	AMMONIU	ppb	50	22	18	.		Ammonium ion
C81	ETHYGLY	ppb	10000	1	1 ***	.		Ethylene glycol
C86	DIOXIN	ppb	0.1	1	1 ***	.		Dioxin [2,3,7,8-TCDD]
C87	CITRUSR	ppb	1000	2	2 ***	.		Citrus red
C88	CYANBRO	ppb	3000	1	1 ***	.		Cyanogen bromide
C89	CYANCHL	ppb	3000	1	1 ***	.		Cyanogen chloride
C90	PARALDE	ppb	10000	2	2 ***	.		Paraldehyde
C91	STRYCHN	ppb	50	7	7 ***	.		Strychnine
C92	MALHYDR	ppb	500	7	7 ***	.		Maleic hydrazide
C93	NICOTIN	ppb	100	7	7 ***	.		Nicotinic acid
C94	ACRYIDE	ppb	10000	2	2 ***	0	EPAP	Acrylamide
C95	ALLYLAL	ppb	10000	2	2 ***	.		Allyl alcohol
C96	CHLORAL	ppb	3000	1	1 ***	.		Chloral
C97	CHLACET	ppb	16000	2	2 ***	.		Chloroacetaldehyde
C98	CHLPROP	ppb	10000	2	2 ***	.		3-Chloropropionitrile
C99	CYANOGN	ppb	3000	1	1 ***	.		Cyanogen
H01	DICPROP	ppb	3000	1	1 ***	.		Dichloropropanol
H03	ETHCARB	ppb	10000	2	2 ***	.		Ethyl carbamate
H04	ETHCYAN	ppb	10000	2	2 ***	.		Ethyl cyanide
H05	ETHOXID	ppb	10	6	6 ***	.		Ethylene oxide
H06	ETHMETH	ppb	10	6	6 ***	.		Ethyl methacrylate
H07	FLUOROA	ppb	3000	1	1 ***	.		Fluoroacetic acid
H08	GLYCIDY	ppb	3000	1	1 ***	.		Glycidylaldehyde
H09	ISOBUTY	ppb	10000	2	2 ***	.		Isobutyl alcohol
H10	METZINE	ppb	3000	1	1 ***	.		Methyl hydrazine
H11	PROPYLA	ppb	10000	2	2 ***	.		n-Propylamine
H12	PROPYNO	ppb	10000	2	2 ***	.		2-Propyn-1-ol
H15	2,4,5-T	ppb	2	4	4 ***	.		2,4,5-T
H40	FTHALLI	ppb	5	3	3 ***	.		Thallium, filtered
H62	LHYDRAZ	ppb	30	1	1 ***	.		Hydrazine, low DL
H68	HEXONE	ppb	10	5	5 ***	.		Hexone [Methyl isobutyl ketone]
I01	ACETONE	ppb	10	1	0	.		Acetone by VOA
I21	TRIBUPH	ppb	10	4	4 ***	.		Tributylphosphoric acid

TABLE F-4. (cont)

*** - Indicates all samples were reported as below contractual detection limits
xxx - Indicates that Drinking Water Standards were exceeded
EPA - based on Maximum Contaminant Levels given in 40 CFR Part 141 (July,1987) National Primary Drinking Water Regulations as amended by 52 FR 25690
EPAR - based on National Interim Primary Drinking Water Regulations, Appendix IV, EPA-570/9-76-003
EPAP - based on proposed Maximum Contaminant Level Goals in 50 FR 46936
EPAS - based on Secondary Maximum Contaminant Levels given in 40 CFR Part 143 National Secondary Drinking Water Regulations
WDOE - based on additional Secondary Maximum Contaminant Levels given in WAC 248-54, Public Water Supplies

TABLE F-5 Major Cations and Anions and Field Measurements for Wells Completed in the Rattlesnake Ridge Interbed (from Graham et al. 1984)

Well Number	Date	Temp., Degrees Celsius	Field pH	Lab pH	Electrical Conductivity, µmhos/cm	Total Dissolved Solids, mg/L	Calcium, mg/L	Magnesium, mg/L	Sodium, mg/L	Potassium, mg/L	Iron, mg/L	Silica, mg/L	HCO-3 Alkalinity, mg/L as $CaCO_3$	Total Alkalinity, mg/L as $CaCO_3$	Sulfate, mg/L	Chloride, mg/L	Nitrate, mg/L as N	Fluoride, mg/L
299-E26-8	5/19/82	20.6	?	8.3	375	249	19	9.2	19	9.9	<0.03	79	99	104	37	8.1	2.2	0.53
699-42-40C	5/21/82	19.6	8.45	8.2	330	230	10	4.6	35	13.6	<0.03	72	115	125	16	4.0	0.11	0.84
699-47-50	7/15/82	19.4	7.80	7.8	560	362	46	18.5	22	7.2	0.06	51	84	95	100	31.0	2.3	0.66
699-50-45	8/06/82	17.6	7.60	8.2	410	256	92	15.7	17	6.0	0.04	58	105	114	18	22.0	0.71	0.60

REFERENCE

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-12 P, Rockwell Hanford Operations, Richland, Washington.

APPENDIX G

HYDROMETER ANALYSES RESULTS FOR WELL 699-42-42B AT THE 216-B-3 POND

Hydrometer analyses are useful for determining the particle-size distribution of sediments containing >50% mud (i.e., silt and clay). The figures on the following pages show a cumulative curve of the distribution of particles that are ≤2 mm (very coarse sand) in size. The vertical axis represents the cumulative weight percent, and the horizontal axis represents particle size. The bulk of the particles occur where the curve is steepest. Each sample is given a Folk classification depending on the sand:silt:clay ratio (Figure A-2).

This appendix contains results of five hydrometer analyses conducted on samples from the interval from 161.1 to 180 ft below land surface in well 699-42-42B (Figures G-1 to G-5). The material size is silt in the upper two samples, sandy silt in the third sample, and silty sand in the bottom two samples. A list summarizing the results is given below.

Depth Interval, ft	Classification
161.1 - 161.4	Silt
164.2 - 164.5	Silt
169.75 - 170.0	Sandy Silt
175.75 - 176.0	Silty Sand
180	Silty Sand.

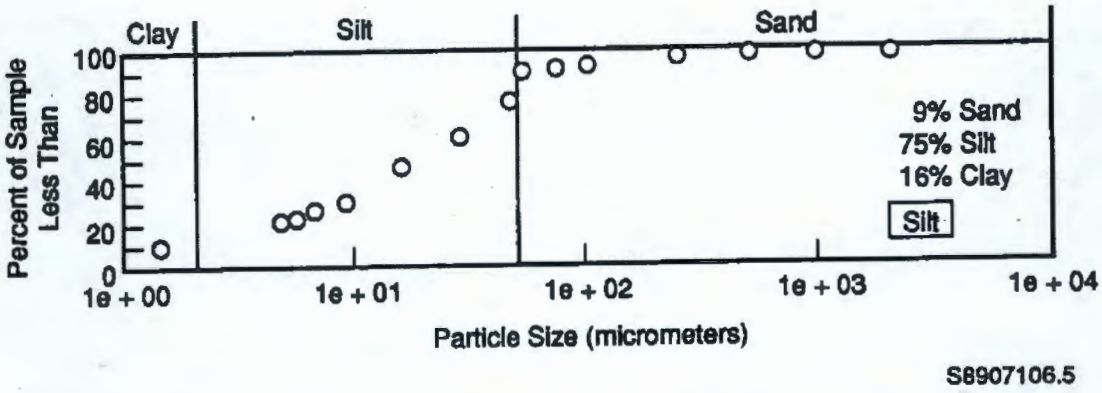

Figure G-1. Particle-Size Analysis for Well 699-42-42B, 161.1 to 161.4 Feet

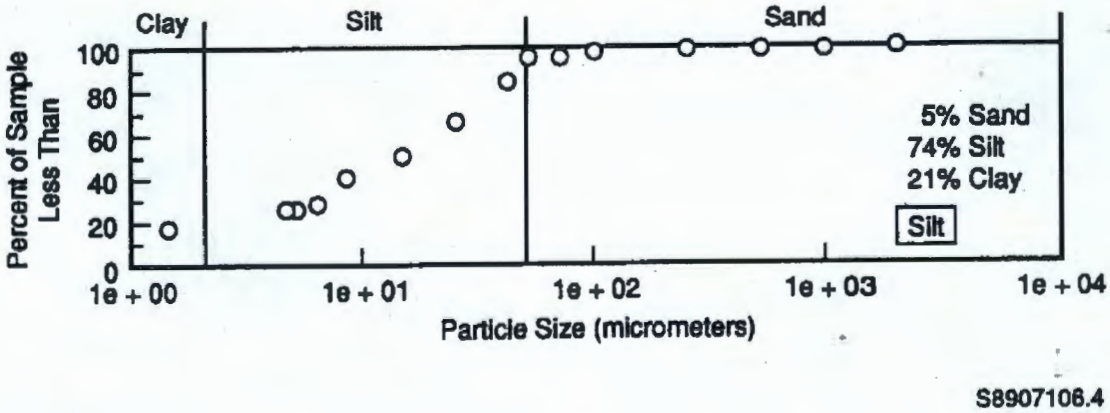

Figure G-2. Particle-Size Analysis for Well 699-42-42B, 164.2 to 164.5 Feet

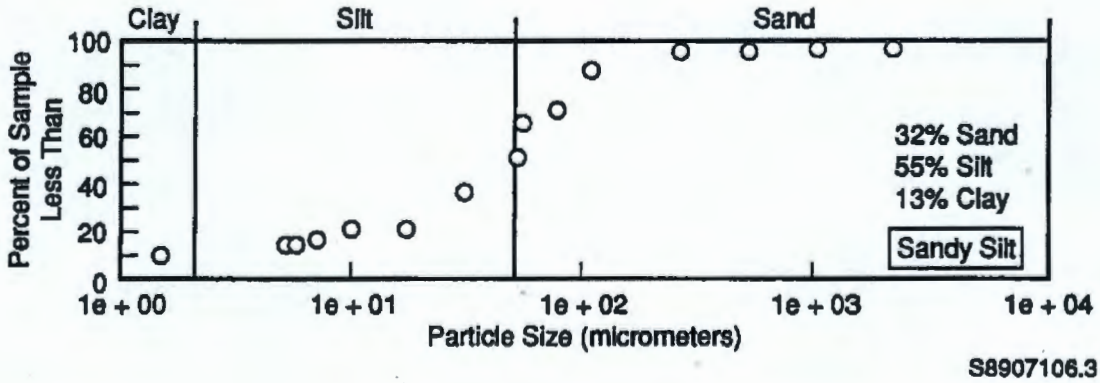

Figure G-3. Particle-Size Analysis for Well 699-42-42B, 169.75 to 170 Feet

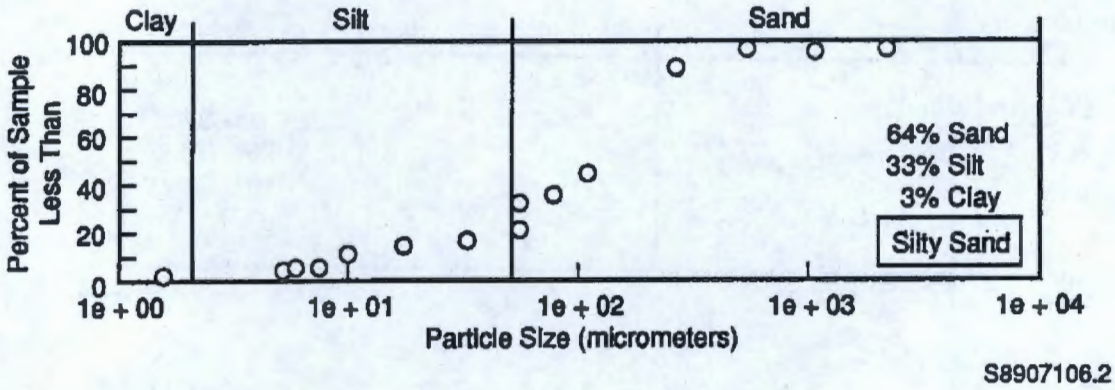

Figure G-4. Particle-Size Analysis for Well 699-42-42B, 175.75 to 176 Feet

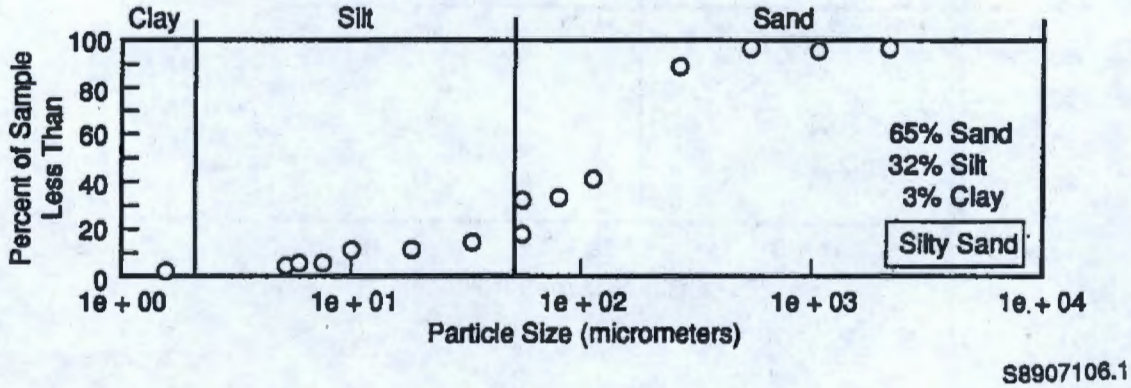

Figure G-5. Particle-Size Analysis for Well 699-42-42B, 180 Feet

APPENDIX H

PERMEAMETER ANALYSES RESULTS FOR WELL 699-42-42B AT THE 216-B-3 POND

This appendix contains the results of permeameter tests conducted to determine vertical hydraulic conductivity on two samples from well 699-42-42B at the 216-B-3 Pond. The tests were conducted on sample intervals of 165.0 to 165.2 ft and 178.4 to 178.65 ft below land surface. The results are approximately 6.63×10^{-7} cm/s and 2.46×10^{-5} cm/s, respectively.

Hydraulic Conductivities, Well 699-42-42B

Vertical Flow: 178.40 - 178.65 ft (bottom)

Beginning head = 138 cm (falling head method)

Std Pipe #3: 0.54 cm/ml, 1.50 cm dia = 1.77 cm^2 area

Sample: width: 6.05 cm = 28.75 cm^2 area
length: 7.15 cm

Time	mLs	Δ Time (sec)	Δ mLs	h_2	h_1	K sat (cm/sec)
10:25	0	0	0	138.0	138.0	0
10:35	7.0	600	7.0	134.22	138.0	2.04e-05
10:52	20.4	1020	13.4	126.98	134.22	2.39e-05
11:00	26.0	480	5.6	123.96	126.98	2.21e-05
11:08	31.0	480	5.0	121.26	123.96	2.02e-05
11:18	37.8	600	6.8	117.59	121.26	2.25e-05
11:25	42.0	420	4.2	115.32	117.59	2.04e-05
11:30	45.8	300	3.8	113.27	115.32	2.63e-05
11:58	56.2	1680	10.4	107.65	113.29	1.33e-05
12:04	64.6	360	8.4	103.12	107.65	5.26e-05

K sat average = 2.46e-05 cm/sec

Vertical Flow: 165.0 - 165.2 ft

head = 408 cm (0.4 bar) (constant head method)

Sample: width: 8.60 cm = 58.09 cm^2 area
length: 5.00 cm

Time	mLs	Δ Time (sec)	Δ mLs	K sat cm/sec
11:51	2.0	0	0	0
12:03	4.1	720	1.9	5.57e-07
12:13	5.9	600	1.8	6.33e-07
12:23	7.6	600	1.7	5.98e-07
12:33	9.7	600	2.1	5.98e-07
12:45	1.2	720	restart	
12:55	4.0	600	2.8	9.84e-07
13:05	5.8	600	1.8	6.33e-07
13:15	7.6	600	1.8	6.33e-07
13:26	9.7	660	2.1	6.71e-07

K sat average = 6.63e-07 cm/sec

APPENDIX I

WELL DEVELOPMENT DATA AND AQUIFER TEST RESULTS AND DATA FOR WELLS AT THE 216-B-3 POND

This appendix contains information pertaining to development of the ten wells installed around the 216-B-3 Pond in 1988 and 1989. A summary of well development information is provided below. Specific information pertaining to each well is included on the following pages.

Well Number	Approximate Volume Pumped	Final Turbidity
699-40-39 (BP-5)	443 gal	4.6 NTU[1]
699-41-40 (BP-6)	402 gal	1.7 NTU
699-42-42B (BP-10)	2,560 gal	4.6 NTU
699-43-41E (BP-4)	107 gal	1.3 NTU
699-43-41F (BP-9)	3,718 gal	1.2 NTU
699-43-42J (BP-7)	315 gal	4.1 NTU
699-43-43 (BP-8)	580 gal	1.5 NTU
699-43-45 (BP-1)	1,149 gal	2.7 NTU
699-44-42 (BP-3)	1,075 gal	3.2 NTU
699-44-43B (BP-2)	6,850 gal	1.3 NTU.

This appendix also contains data and results for aquifer tests conducted at wells near the 216-B-3 Pond. Aquifer pumping tests were conducted at wells 699-42-42B, 699-43-43, and 699-44-42 in 1988. Slug tests were performed in five of the wells installed in 1989.

[1] NTU = nephelometric turbidity unit

AQUIFER TEST SUMMARY

WELL 699-43-41F (BP-9)

Purpose of Test: To estimate hydraulic properties of the aquifer opposite the screened interval.

Types of Tests Performed: slug injection

Hydrogeologic unit tested: Ringold (confined aquifer)

Depth of interval tested:

Top: 166 ft Bottom: 176 ft

Date of test: 5/30/89 Start time of test: 1450

Duration of test: 1100 min

Pre-test water-level depth (below land surface): 129.27 ft

Water-level measurement methods: pressure transducer

Analysis methods and results:

Method	Transmissivity (ft^2/d)	Hydraulic conductivity (ft/d)
Cooper, et al. (1967)	34 to 45	3.4 to 4.5

Remarks:

The slug test was conducted in the completed well (4-in diameter stainless steel casing and channel pack screen). The lithology at the screened interval is gravelly muddy sand grading into muddy sandy gravel.

The Cooper, et al. (1967) method yields transmissivity. Hydraulic conductivity was estimated by dividing transmissivity by the thickness of the screened interval (10 ft).

INFORMATION FOR WELL 699-40-39 (BP-5)

WELL DEVELOPMENT LOG

Well Number BP-5 (699-40-39)
Location B Pond
Procedure PNL-MA-567, ~~GC-6~~ GC-7, Rev. 0

Start Date/Time 9/15/89 ~~0923~~ 0904 hrs. (cyclic) DRN 9/15/89
End Date/Time 9/21/89 0853 hrs.
Page 1 of 5

Well Depth ~210' below TOC Pump Depth (Intake)_____ Initial Water Level_____

Date	Time	Pump on	Pump off	Water Level	Flow Rate	Turbidity	Person Meas.	Person Rec.	Comments
9/15	0906	0904	0908:20	DRN 9/15/89	5-10?	35	DRN	DRN	Calibrated Turbidimeter on 0-90 NTU scale
	0926	0923	1013:50		1.1	51	DRN	DRN	
	0952	0923 ~~0932~~ DRN 9/15/89	1013:50		0.59	35	DRN	DRN	
	1012	0923	1013:50		0.59	49	DRN	DRN	
	1242	1235	1411	196.18' @ 1245:30	0.35	53	DRN	DRN	Recalibrated turbidimeter on 0-90 NTU scale
	1310	1235	1411	199.44' @ 1307	0.21	38	DRN	DRN	
	1335	1235	1411		0.21	28	DRN	DRN	
	1400	1235	1411		0.21	20	DRN	DRN	Recal. turb. on 0-90 NTU scale.
9/18									Submersible pump removed and Hydrostar pump placed

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment: Hach Turbidimeter
Make: Hach
Model: 16800
Serial #: 880703336
Standards:
Manufacturer:_____
Lot #:_____

FIGURE 1. Well Development Log

PNL TECHNICAL PROCEDURE

WELL DEVELOPMENT LOG

Well Number BP-5 (699-40-39)
Location B Pond
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 9/15/89 0904 hrs. cyclic pumping
End Date/Time 9/21/89 0853 hrs.
Page 2 of 5

Well Depth _____ Pump Depth (Intake) 205.74' Initial Water Level _____

Date	Time	Flow Rate	Turbidity	Person Meas.	Person Rec.	Comments
9/18	1455	~3	44	JVB		~~Simpson~~ ~~calibrated~~ turbidimeter 0-90 NTU
9/19	0900	.71				~~Simpson~~ ~~calibrated~~ turbidimeter SN 88090340 9 0-90 NTU - this meter used all day
	947		32	JVB		
	1000	1.7	21	JVB		
	1009		18	JVB		
	1104	2	18			
	1320	.77	~~26~~ 22			Knocked air bubbles off sides of tube for final reading.
	1335	.77	22.5			
	1435	.94	25			~~Scientifica~~ meter 0-90 NTU restandardized
	1450	~.86	28			
	1510	.89	58			
	1522	.34	62			
	1539	.32	64			

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment: Turbidimeter
Make: Hach
Model: 16800
Serial #: 88070336
See comment section for meter change

FIGURE 1. Well Development Log Form

PNL TECHNICAL PROCEDURE

WELL DEVELOPMENT LOG

Well Number BP-5 (699-40-39)
Location B Pond
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 9/15/89 0904 hrs. (cyclic pumping)
End Date/Time 9/21/89 0853 hrs.
Page 3 of 5

Well Depth _____ Pump Depth (Intake) 205.74' Initial Water Level _____

Date	Time	Flow Rate	Turbidity	Person Meas.	Person Rec.	Comments
9/20	0830	0.98	>10	DRN	DRN	Calibrated turbidimeter with standard on 0-8 NTU range
	0830	0.98	79	DRN	DRN	100 NTU range (can't use 0-90 NTU standard to calibrate because it is >100 NTU during lab calibration
	0845	0.63	~~>10~~ 9.5 DRN 9/20/89	DRN	DRN	10 NTU range
	0905	0.58	>10	DRN	DRN	10 NTU range
	0905	0.58	13	DRN	DRN	100 NTU range
	0930	0.76	>10	DRN	DRN	10 NTU range
	0930	0.76	19	DRN	DRN	100 NTU range
	0950	0.65	>10	DRN	DRN	10 NTU range
	0950	0.65	30	DRN	DRN	100 NTU range
	1102	1.20	>10	DRN	DRN	10 NTU range
	1102	1.20	38	DRN	DRN	100 NTU range
	1115	0.73	>10	DRN	DRN	10 NTU range
↓	1115	0.73	23	DRN	DRN	100 NTU range

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment: Turbidimeter
Make: Hach
Model: 16800
Serial #: 880703336

NOTE: This turbidimeter was calibrated in the lab on 9/18/89. The turbidimeter was adjusted to a linear scale

FIGURE 1. Well Development Log Form

PNL TECHNICAL PROCEDURE

WELL DEVELOPMENT LOG

Well Number BP-5 (699-40-39)
Location B Pond
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 9/15/89 0904 hrs. (cyclic pumping)
End Date/Time 9/21/89 0853 hrs.
Page 4 of 5

Well Depth _____ Pump Depth (Intake) 205.74' Initial Water Level _____

Date	Time	Flow Rate	Turbidity	Person Meas.	Person Rec.	Comments
9/20	1126	0.73	>10	DRN	DRN	10 NTU range
	1126	0.73	32	DRN	DRN	100 NTU range
	1305	0.75	>10	DRN	DRN	Recalibrated turbidimeter with 0-8 NTU standard; used 10 NTU range
	1305	0.75	38	DRN	DRN	100 NTU range
	1330	0.72	>10	DRN	DRN	10 NTU range
	1330	0.72	12	DRN	DRN	100 NTU range
	1502	0.78	>10	DRN	DRN	10 NTU range
	1502	0.78	17	DRN	DRN	100 NTU range
	1520	0.76	8.1	DRN	DRN	10 NTU range
	1540	0.76	>10	DRN	DRN	10 NTU range
	1540	0.76	15	DRN	DRN	100 NTU range

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment: Turbidimeter
Make: Hach
Model: 16800
Serial #: 880703336

FIGURE 1. Well Development Log Form

PNL TECHNICAL PROCEDURE

WELL DEVELOPMENT LOG

Well Number BP-5 (699-40-39)
Location B-Pond
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 9/15/89 0904 hrs.
End Date/Time 9/21/89 0853 hrs.
Page 5 of 5

Well Depth _____ Pump Depth (Intake) 205.74' Initial Water Level _____

Date	Time	Flow Rate	Turbidity	Person Meas.	Person Rec.	Comments
9/21	0816	0.65	3.3	DRN	DRN	Calibrated Turbidimeter using 8 NTU standard
"	0830	1.36	4.6	DRN	DRN	10 NTU range

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment: Turbidimeter
Make: Hach
Model: 16800
Serial #: 880703336

FIGURE 1. Well Development Log Form

Aquifer Test Data

Data for Well BP-5 (699-40-39)
Pumping Well BP-5 (699-40-39)
Observation Wells N/A

Location B Pond Well BP-5 (699-40-39)
Type of Aquifer Test Well Development
How Q Measured 1½" Inline Rockwell Internat'l flowmeter (S/N 40027614); Bucket/watch
How W.L.'s Measured Transducer, E-tape (S/N 12998)
Rad/Dist. of/From Pumping Well 2"
Meas. Point for W.L.'s Top of 6" I.D. Casing
Elevation of Meas. Point
Top of 6" I.D. Casing is 2.93 ft above top of cement pad

Depth of Pump/Airpipe
Pump On: date 9/15/89 time 0904 hrs.
Pump Off: date 9/21/89 time 0853 hrs.
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9/15					~~125~~ DRN 9/15/89		Pump set is a			1.5 HP pump			
	0812				127.19 (E-tape)					Depth to Bottom is			about 210' from top of 6" casing
	0845				37.35								Transducer
	0846				37.46	Set Ref = 0, 2 mm int. Input Channel 1							Transducer
	0853												Begin logging on data logger @0853
	0854									9948.0			
	0904					Start pump at about 0904 hrs. – had a little trouble starting pump							
					first water was muddy					flow rate approx 10-12 gpm by drillers est.			
										adjusted flowrate to ~2-3 gpm by drillers est			
	0908:20				Stopped pump @ 0908:20 because flowmeter is not working at all								
					Drillers will replace flowmeter with flowmeter at BP-4								
										11864			
	0923												Turn pump on
	0930					Water looks cloudy					1.1		:56/1 gal
	0939				186.58								E-tape
	0941												Decreased flow rate slightly
	0945										0.71		1:25/1 gal
	0948				194.62								
	0949												Decreased flow rate slightly
	0951:12				196.87								
	0956										0.59		1:41/1 gal
	0957:20				201.08								
	1000												Collected UST samples
	1008				208.42								
	1013:50					Turned pump off to prevent pump from sucking air							
	1015:30				199.38								
	1018:05				197.94								
	1037				191.93								
	1057:30				189.26								
	1100									11898		DRN	
	1113				185.82							DRN	
						Stopped collected data on datalogger at 11:30 and reset transducer							
						down hole further, may have lost data from previous cycles							
					Not sure what depth transducer is set, however marked cable at TOC with white tape.								
	1156				179.54	Set Ref = 0, Input Channel 1, S = 0							
	1159												Begin logging data on datalogger

Aquifer Test Data

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Data for Well BP-5 (699-40-39)
Pumping Well BP-5 (699-40-39)
Observation Wells N/A

Location B Pond Well BP-5 (699-40-39)
Type of Aquifer Test Well Development
How Q Measured 1½" Inline Flowmeter (See page 1)
How W.L.'s Measured Transducer, E-tape (S/N 12998)
Rad./Dist. of/From Pumping Well 2"
Meas. Point for W.L.'s Top of 6" I.D. Casing
Elevation of Meas. Point

Depth of Pump/Airpipe
Pump On: date 9/15/89 time 0904 hrs. (cyclic)
Pump Off: date 9/21/89 time 0853 hrs.
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9/15	1204:40											DRN	Turn generator and pump on
	1208				Turn generator off because pump stopped working							DRN	~~Turn pump off~~ DRN 9/15/89
	1211				Turn generator on, but pump is not working; get help from driller.								
	1235											DRN	Turn pump on
	1240				Driller closed valve down while I measured flow rate						0.35	DRN	1:25 / ½ gal
	1245:30				196.18							DRN	
	1255:40				198.15							DRN	
	1307				199.44							DRN	
	1312					flow rate has noticeably decreased					0.21	DRN	2:25 / ½ gal
	1320:30				201.08							DRN	
	1326				201.70							DRN	
	1332				202.33							DRN	
	1343				203.84							DRN	
	1351									11916.2		DRN	
	1402										0.21	DRN	1:13 / ¼ gal
	1411:3				205.94							DRN	
	1411											DRN	Turned pump off
	1412									11920		DRN	
	1424				Noticed cable was disconnected from transducer reel, so I connected it. Possibly no data for last cycle of pumping, however recovery will be be measured. Leave transducer in well BP-5 over weekend								
↓													
				W.L.	Set Hydrostar pump on Mon.					9/18/89		DRN	
										11917		JVR	
9/18	0732									↓			
	0741				127.30	E-tape				5		JVR	clock time
	0739				51.52	turns						JVR	trans. clock time
	0740												stopped trans. log waiting for Hydrostar pump to be placed
	1424				127.39	— measuring pt top of plastic fitting						JVR	Hydrostar installed
	1430				pump on							JVR	Flowrate set at 0.3 gpm
↓	1512				pump off								

Aquifer Test Data

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Data for Well BP-5 (699-40-30)
Pumping Well BP-5 (699-40-30)
Observation Wells N/A

Location B-Pond BP-5 (699-40-30)
Type of Aquifer Test Well Development
How Q Measured bucket
How W.L.'s Measured E-tape 12998
Rad./Dist. of/From Pumping Well
Meas. Point for W.L.'s w/ Mpduction - top of plastic fitting
Elevation of Meas. Point

Depth of Pump/Airpipe 205.74' (Intake)
Pump On: date cyclic 9/15/89 time 0924 hrs.
Pump Off: date 9/21/89 time 0853 hrs.
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9/9	801				127.51							JVB	Tape difficult to get down hole
													need to move top plate
	812				pump on							JVB	would not down stroke
	819				pump off								tried 4 dif
													positions would not
													down stroke in the pos
													(raised) upstroke in
													the lowest position -
													called D. Hanson asked
													to get word to Don
													Glover
	850												Brett (Riser driller) set pump at
	945				pump on						.71	JVB	16gal / 1.24
													flow rate for 3 min ~ 32 gpm
													then back to ~ 7.5 gpm
	955										1.7	JVB	1gal / 0.35
													difficult to maintain
													constant rate - pump
													occasionally stops on
													up stroke
	1010				pump off								still water - pump
													off for closer look
	1052				160.30							JVB	with determined that
													the problem was a short
	1240												and rod (2'), switching
													last two rods (rod was
													hitting plastic fitting)
	1302				pump on								
	1305										2	JVB	1gal / 0.29
	1307										2		1gal / 0.31
	1310										.79		1 / 1.16
	1313										.78		1 / 1.17
	1315										.86		1 / 1.10
	1317										.77		1 / 1.18
	1327										.74		1 / 1.21
	1332										.77		1 / 1.18
	1336				pump off								
✓					unable to get WL tape stuck								

Aquifer Test Data

Data for Well BP-5 (699-40-3)
Pumping Well BP-5 (699-40-3)
Observation Wells N/A

Location B-Pond BP-5 (699-40-39)
Type of Aquifer Test Well development
How Q Measured bucket
How W.L.'s Measured E-tape 12998
Rad./Dist. of From Pumping Well 2"
Meas. Point for W.L.'s top of plastic fitting
Elevation of Meas. Point

Depth of Pump/Airpipe 205.74' (Intake)
Pump On: date cyclic 9/15/89 time 0904 hrs.
Pump Off: date 9/21/89 time 0853 hrs.
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9/18	1430				pump	on						JVR	
	1438										.91		1/1:04
	1449										.86		1/1:10
	1451												compressor out of gas
													pump was off 21 min
	1510										.89		1.25/1:07
	1514										.55		1/1:50
	1521										.34		1/2:59
	1539										.32		.5/1:34
	1541				pump	off							
9/20	0814				127.58							DRN	E-tape
	0822				pump	on						DRN	Turn pump on
	0823					Leak in hose joint - catch water with bucket							Air compression is 35 psi
	0828												Increase pressure to 100 psi
													and adjusted flow rate
	0832										0.98		1:01/1gal
	0834												Reduced flow rate slightly
	0836				140.40								
	0839										0.63		1:36/1gal
	0846				150.15								
	0858				160.26								
	0903										0.58		1:44/1gal
	0916				174.83								
	0930				185.11								
	0931										0.76		1:19/1gal
	0942				192.84								
	0945				195.60								
	0949										0.65		1:32/1gal
	0951:36				199.24								
	0952				Pump	off							
	1005												Fixed leak in hose joint
	1008				193.40								
	1020				189.51								
	1027				186.51								
	1058				178.32								
	1100				Pump	on							
	1101												Adjusted valve
	1103										1.20		:50/1gal

Aquifer Test Data

Data for Well BP-5 (699-40-39)
Pumping Well BP-5 (699-40-39)
Observation Wells N/A

Location B-Pond, Well BP-5 (699-40-39)
Type of Aquifer Test Well Development
How Q Measured bucket/watch
How W.L.'s Measured E-tape (S/N 12998)
Rad. Dist. of From Pumping Well 2"
Meas. Point for W.L.'s top of plastic fitting
Elevation of Meas. Point

Depth of Pump/Airpipe 205.74' (intake)
Pump On: date 9/15/89 time 0904 hrs. (cyclic)
Pump Off: date 9/21/89 time 0853 hrs.
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9/20	1104											DRN	Reduced flow rate
	1107										1.07		:56/1gal
	1108				Could not adjust valve down without piston sticking								Reduced flow rate
	1111				190.51								
	1114										0.73		1:22/1gal
	1118				195.29								
	1125				200.36								
	1127										0.73		1:22/1gal
	1129:30				203.20								
	1130				Pump off								
	1229				183.34								
	1242				179.79								
	1255				176.38								
	1300				Pump on								
	1303					Water in bucket looks turbid					0.75		1:20/1gal
	1308				181.44								
	1314				186.21								
	1320										0.75		1:20/1gal
	1323				192.80								
	1331										0.72		1:23/1gal
	1334				200.09								
	1339				203.38								
	1340:20				Pump off								
	1357				197.26								
	1415				191.19								
	1432				186.00								
	1450				180.92								
	1459				178.37								
	1500				Pump on								
	1503										0.78		1:17/1gal
	1510:30				186.49								
	1518										0.76		1:19/1gal
	1528				199.35								
	1538										0.76		1:19/1gal
	1545				Pump off								
9/21	0750				127.63							DRN	
	0805				Pump on							DRN	
						Turned pump off for 5 min. to tighten hose fitting on Hydrostar							

Aquifer Test Data

page 6 of 6

Data for Well BP-5 (699-40-39)
Pumping Well BP-5 (699-40-39)
Observation Wells N/A

Location B Pond, Well BP-5 (699-40-39)
Type of Aquifer Test Well Development
How Q Measured Bucket/watch
How W.L.'s Measured E-tape (S/N 12998)
Rad./Dist. of/From Pumping Well 2"
Meas. Point for W.L.'s top of plastic fitting
Elevation of Meas. Point

Depth of Pump/Airpipe 205.74' (Intake)
Pump On: date 9/15/89 time 0904 hrs (cyclic)
Pump Off: date 9/21/89 time 0853 hrs
Duration of Aquifer Test

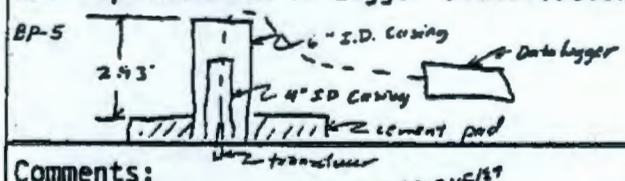
Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9/21	0815										0.65	DRN	1:33/1gal
	0819				138.31								
	0825				142.43								
	0826												Increased flow rate
	0829										1.36		:44/1gal
	0837:40				160.75								
	0839:30				163.69								Pump off @ 0840 hrs
	0842:25				163.50								
	0843:40				163.19								
	0845					Turn pump on @ 0845 hrs to get a							UST sample
	0853					Pump off							
	0855:30				169.63								

BP-5

Equipment Record Form for the Installation and Removal of Data Loggers and Pressure Transducers

Initial Check: ok		
Purpose of Installation: To monitor water levels while developing well BP-5 (699-40-39)		
Monitored Hydrologic Unit or Water Body: Uppermost ~~unconfined~~ DRN 9/15/89 aquifer		
Date/Time of Installation: 9/15/89 0945	Procedure Followed: WL-4	
Data Logger Make/Model: In Situ Hermit Model SE1000B		
Serial No.: IKB-701	Number of Channels Used: 1	
Pressure Transducer Make/Model: Druck PTX-161D SIN 259096	Full Scale Range: 20 psi	Well No.: BP-5
	Serial No.: 259096	Depth: ~164' below TOC
Pressure Transducer Make/Model:	Full Scale Range:	Well No.:
	Serial No.:	Depth:

Description of Data Logger Installation and Well Head Configuration:



Comments:

Select TEST DRN 9/15/89 0, Linear sampling rate @ 2 min intervals, Ref = 0 @ 37.96', offset = -0.04, dSP = En:Sur
Water level dropped below transducer after a few minutes of pumping during first two pumping cycles. Transducer is incapable of measuring over entire height of head in well. ReSet transducer to a greater depth @ 1130 9/15/89

Equipment Installed By D.R. Newcomer

Date/Time of Equipment Removal: 0740 9/18/89

Decontamination Procedure (if required):

Equipment Removed By J. L. Berglund

Battelle
Pacific Northwest Laboratories

CALCULATION WORKSHEET 637

Calc. No. _____
Page ____ of ____

BP-5 (699-40-39)

	Cycle	Duration	Flow rate		Total gallons est
9/20/89	Cycle 1	90 min.	(0.58 - 0.98)		
			0.98 x 17	=	16.7
			0.63 x 24	=	15.1
			0.58 x 28	=	16.2
			0.76 x 18	=	13.7
			0.65 x 3		2.0
					63.7
	Cycle 2	30 min.	(0.73 - 1.2)		
			1.20 x 4	=	4.8
			1.07 x 4	=	4.28
			0.73 x 22	=	6.6
					15.68 ≈ 15.7
	3	40.3 min	0.74		29.8
	4	45 min.	0.76		34.2
		205.3 min		Total	143.4 gal
9/21/89	1	43	0.65 x 21	=	13.7
			1.36 x 22	=	29.9
				Total =	43.6 gallons

	Duration	Total Pumped
9/15/89	151	56
9/18/89	22	66
9/19/89	137	134
9/20/89	205.3	143.4
9/21/89	43	43.6
Totals	≈ 558 min	≈ 443 gal

Title		Project:	
Prepared by:	Date	Reviewed by:	Date

AQUIFER TEST SUMMARY

WELL 699-40-39 (BP-5)

Purpose of Test: To estimate hydraulic properties of the aquifer opposite the screened interval.

Types of Tests Performed: slug injection

Hydrogeologic unit tested: Ringold (confined)

Depth of interval tested:

Top: 202 ft Bottom: 212 ft

Date of test: 8/4/89 Start time of test: 1120

Duration of test: 4300 min

Pre-test water-level depth (below land surface): 127.55 ft

Water-level measurement methods: pressure transducer

Analysis methods and results:

Method	Transmissivity (ft^2/d)	Hydraulic conductivity (ft/d)
Cooper, et al. (1967)	4.5	0.45

Remarks:

The well was completed with 4-in diameter stainless steel casing and screen with a sand pack. The lithology at the screened interval is gravelly sandy mud grading into gravelly muddy sand and muddy sandy gravel.

The Cooper, et al. (1967) method yields transmissivity. Hydraulic conductivity was estimated by dividing transmissivity by the thickness of the screened interval (10 ft).

Location B Pond Date of Test 8/4/89

Well Number BP-5 Procedure Number AT-6

Type of Test(s) Slug

Personnel Conducting Test W.E. Cronin

WELL CONFIGURATION

Well Depth 210' Borehole Diameter 8"

Well Casing Inside Diameter 4" Well Screen Inside Diameter 4"

Length of Screened Interval 10' Depth of Screen 200' - 210'

Comments

SLUG INFORMATION

Slug Construction Materials Steel

Length of Slug 8.1' Diameter of Slug ≈ 0.225' (not measured with calipers)

Comments Diameter of slug measured with ~~caliper~~ engineer tape

Volume of Attachments (if applicable)

MEASUREMENT EQUIPMENT INFORMATION

	Make	Model	Serial Number
Electric Tape	—	—	—
Steel Tape	Lufkin	300'	L300-11
Data logger	In situ	SE1000B	IKB-701
Transducer	In situ	10 PSI	259198
Other			

Equipment Record Form for the Installation and Removal of Data Loggers and Pressure Transducers

Initial Check: Done in lab 8/3/89		
Purpose of Installation: To Conduct Slug test.		
Monitored Hydrologic Unit or Water Body: Aquifer Below B Pond		
Date/Time of Installation: 8/4/89 8:14	Procedure Followed: WL-4	
Data Logger Make/Model: In Situ SE 1000B		
Serial No.: KB-701	Number of Channels Used: 1	
Pressure Transducer Make/Model: In-situ 10 PSI	Full Scale Range: to 8237	Well No.: BP-5
	Serial No.: 259198	Depth: 18.29' below static
Pressure Transducer Make/Model:	Full Scale Range:	Well No.:
	Serial No.:	Depth:
Description of Data Logger Installation and Well Head Configuration: transducer taped to outer stainless steel Casing		
Comments: Top Slug dropped to 138', approximately 8' below static water level. Transducer set at 18.29 ft below static water level. Slug entered water at the log2 Cycle on transducer readout.		
Equipment Installed By William E Cronin		
Date/Time of Equipment Removal: 8/7 11:00		
Decontamination Procedure (if required): N/A		
Equipment Removed By Steve Teel		

Aquifer Test Data

page 1 of 1

Data for Well BP-5

Pumping Well

Observation Wells

Location B Pond

Type of Aquifer Test Slug

How Q Measured

How W.L.'s Measured Steel Tape L300-11

Rad./Dist. of/From Pumping Well

Meas. Point for W.L.'s TOC

Elevation of Meas. Point

set reference, measure slug

Depth of Pump/Airpipe

Pump On: date time

Pump Off: date time

Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level 127.55					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
3/4	8:41				stopped data logger already in well								
					removed data logger + transducer								
	8:32				127.55	D/W		TOC					steel tape
	8:35				127.55								steel tape
	8:38				127.54			18.24					
					XD	set at 18.23 ft below static							
	8:05		XD		water level								18.29 XD
	918				18.29								XD
	9:33				18.29								XD
	10:57				18.29								XD
	11:09				18.29	Reference set							XD
	11:20		slug		dropped to 135' ~ 8 ft below static								
	11:32				2.91								XD
	11:34				124.57								steel tape
	11:35				2.61								XD
	11:38				2.47								XD

(5/18/89, Rev. 0)

ELECTRONIC DATA CONTROL FORM

DATE AND START TIME OF DATA ACQUISITION 8/4/89 11:20

DATE AND END TIME OF DATA ACQUISITION 8/7/89 11:00

WELL NUMBER BP-5

TYPE OF TEST OR DATA Slug Injection

TYPE AND IDENTIFICATION NUMBER OF DATA LOGGER
Hermit SE100B S/N 701

TEST NUMBER 0

CHANNEL OR INPUT NUMBER 1

UNITS OF VALUES RECORDED Ft. from ref. level

NUMBER OF PAGES ATTACHED 5

COMMENTS:
• Slug removed at t @ 3600 min
• Transducer at maximum end of full scale range ~(23 ft)
at t = .1666

DATA VALIDATION STATEMENT:

The attached data represent the data as originally recorded on the data logger. Any exceptions and reasons for such are indicated in the comments section.

Jane V. Boyhere, Scientist — 8/9/89
Name, title — Date

WELL: BP-5
TEST DATE: August 4, 1989
START TIME: 1120

SE1000B
Environmental Logger
08/08 09:20

Unit# 00701 Test# 0

INPUT 1: Level (F)

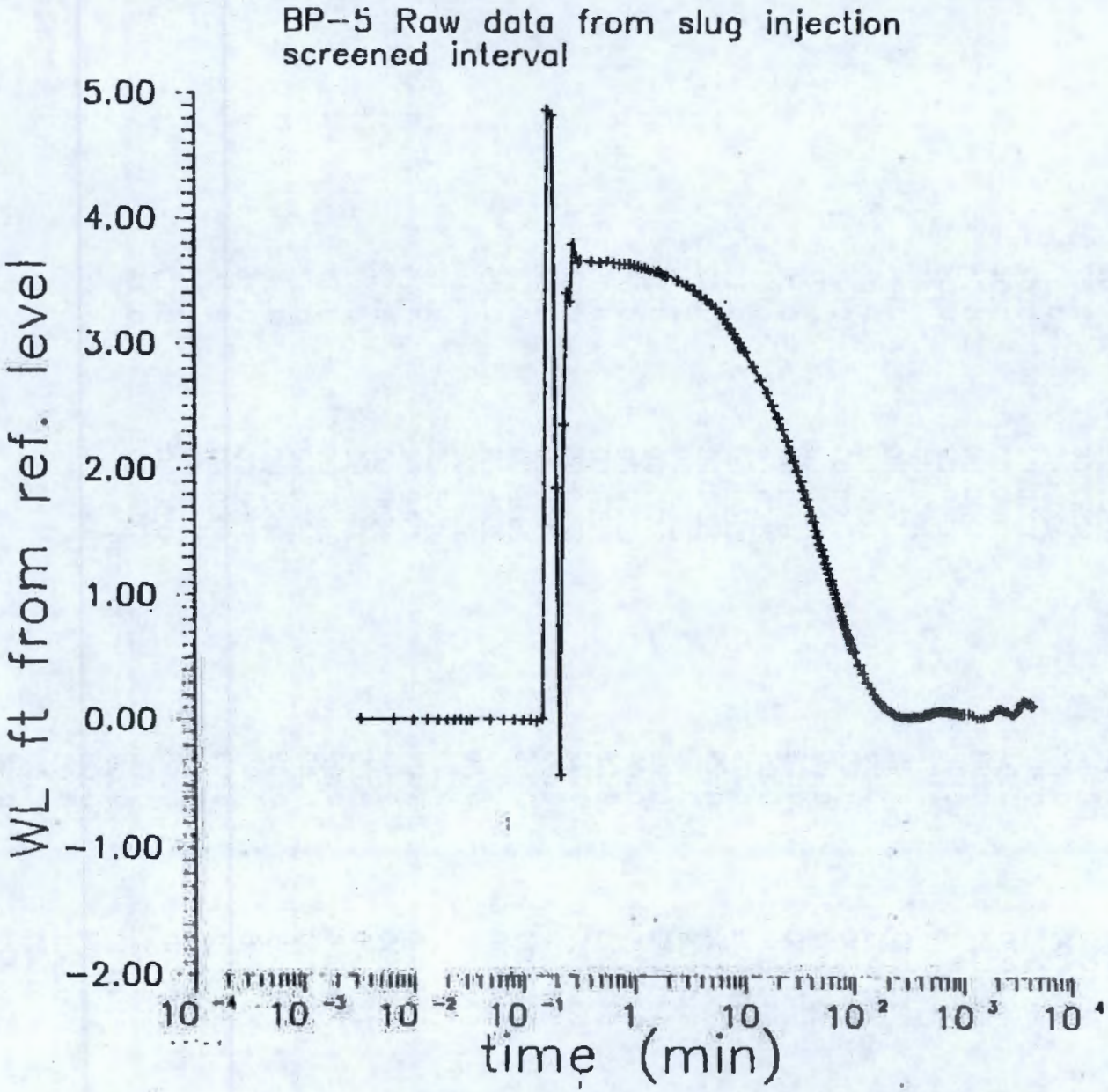
Reference 0.00
Scale factor 9.99
Offset - 0.01

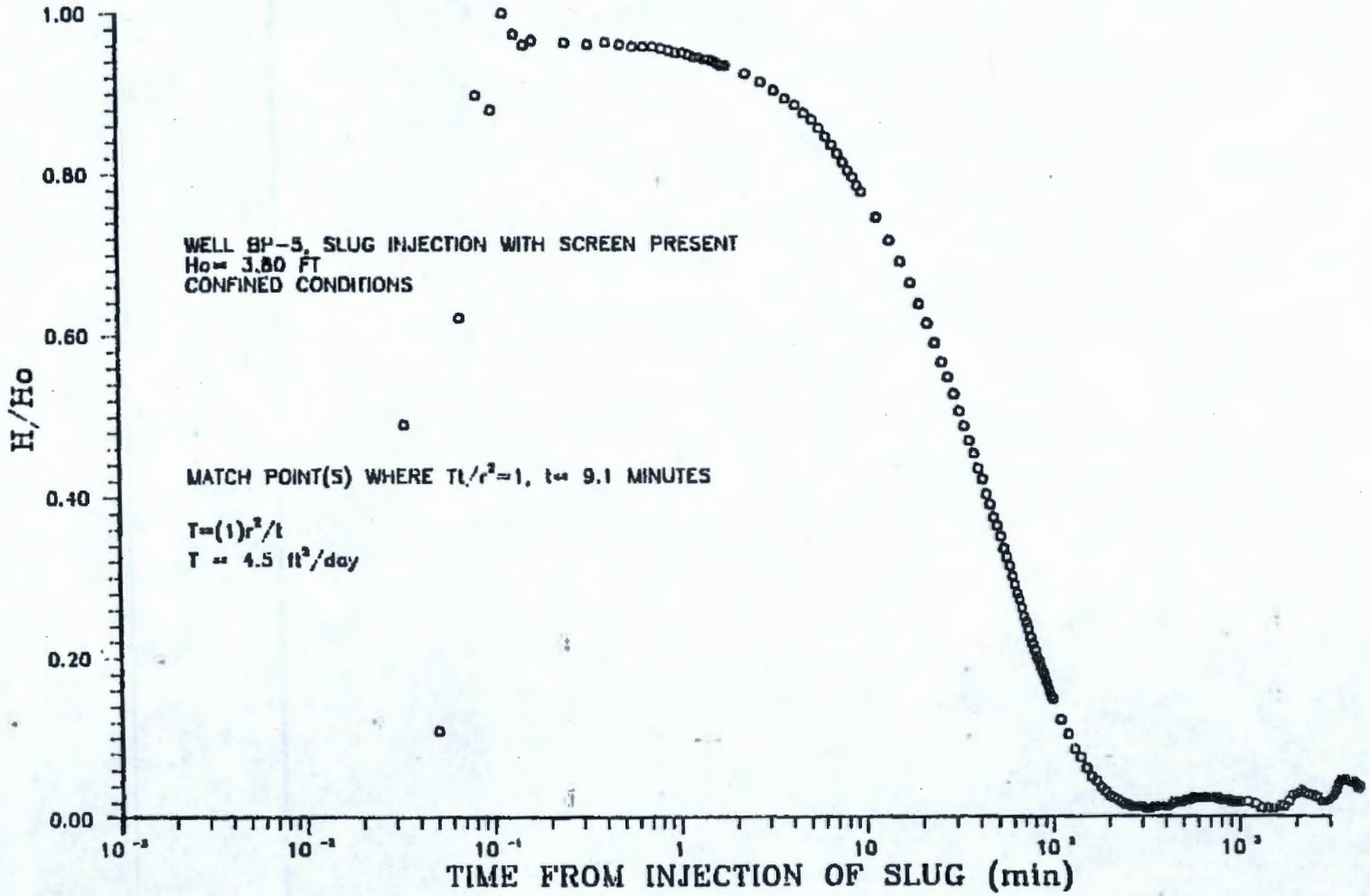
Step# 0 08/04 11:20

Elapsed Time	Value
0.0000	0.01
0.0033	0.01
0.0066	0.01
0.0099	0.01
0.0133	0.01
0.0166	0.01
0.0200	0.01
0.0233	0.01
0.0266	0.01
0.0300	0.01
0.0333	0.01
0.0500	0.01
0.0666	0.01
0.0833	0.01
0.1000	0.01
0.1166	0.01
0.1333	0.00
0.1500	0.02
0.1666	4.87
0.1833	4.83
0.2000	1.86
0.2166	- 0.41
0.2333	2.36
0.2500	3.41
0.2666	3.34
0.2833	3.80
0.3000	3.70
0.3166	3.65
0.3333	3.67
0.4167	3.66
0.5000	3.65
0.5833	3.66
0.6667	3.65
0.7500	3.64
0.8333	3.64
0.9167	3.64
1.0000	3.63
1.0833	3.62
1.1667	3.61
1.2500	3.61
1.3333	3.60
1.4166	3.59
1.5000	3.59
1.5833	3.58
1.6667	3.58
1.7500	3.57
1.8333	3.56
1.9167	3.55
2.0000	3.55
2.5000	3.51
3.0000	3.47
3.5000	3.43
4.0000	3.39
4.5000	3.36
5.0000	3.32
5.5000	3.29
6.0000	3.25
6.5000	3.21
7.0000	3.17
7.5000	3.13
8.0000	3.09
8.5000	3.05
9.0000	3.02
9.5000	2.98
10.0000	2.95
12.0000	2.83
14.0000	2.72
16.0000	2.62
18.0000	2.52
20.0000	2.42
22.0000	2.33
24.0000	2.24
26.0000	2.15
28.0000	2.08
30.0000	2.00
32.0000	1.92
34.0000	1.85
36.0000	1.78
38.0000	1.72
40.0000	1.65
42.0000	1.60
44.0000	1.53
46.0000	1.48
48.0000	1.42
50.0000	1.38
52.0000	1.33
54.0000	1.27
56.0000	1.23
58.0000	1.19
60.0000	1.14
62.0000	1.10
64.0000	1.06
66.0000	1.03
68.0000	0.99
70.0000	0.95
72.0000	0.92
74.0000	0.89
76.0000	0.85
78.0000	0.82
80.0000	0.79
82.0000	0.76
84.0000	0.74
86.0000	0.71
88.0000	0.69
90.0000	0.67
92.0000	0.64
94.0000	0.62
96.0000	0.59
98.0000	0.57
100.000	0.56
110.000	0.46
120.000	0.39
130.000	0.32
140.000	0.28
150.000	0.23
160.000	0.19
170.000	0.17
180.000	0.14
190.000	0.12
200.000	0.10
210.000	0.09
220.000	0.08
230.000	0.07
240.000	0.06
250.000	0.06
260.000	0.05
270.000	0.05
280.000	0.05
290.000	0.05
300.000	0.05
310.000	0.04
320.000	0.04
330.000	0.04
340.000	0.05
350.000	0.05
360.000	0.05

370.000	0.05
380.000	0.05
390.000	0.05
400.000	0.05
410.000	0.05
420.000	0.06
430.000	0.06
440.000	0.07
450.000	0.07
460.000	0.07
470.000	0.07
480.000	0.07
490.000	0.07
500.000	0.08
510.000	0.08
520.000	0.08
530.000	0.08
540.000	0.08
550.000	0.09
560.000	0.09
570.000	0.09
580.000	0.09
590.000	0.09
600.000	0.09
610.000	0.09
620.000	0.09
630.000	0.09
640.000	0.09
650.000	0.09
660.000	0.09
670.000	0.09
680.000	0.09
690.000	0.09
700.000	0.09
710.000	0.09
720.000	0.09
730.000	0.09
740.000	0.09
750.000	0.09
760.000	0.09
770.000	0.08
780.000	0.08
790.000	0.08
800.000	0.08
810.000	0.08
820.000	0.08
830.000	0.08
840.000	0.08
850.000	0.08
860.000	0.08
870.000	0.08
880.000	0.08
890.000	0.07
900.000	0.07
910.000	0.07
920.000	0.07
930.000	0.07
940.000	0.07
950.000	0.07
960.000	0.07
970.000	0.07
980.000	0.07
990.000	0.07
1000.00	0.07
1100.00	0.07
1200.00	0.06
1300.00	0.04
1400.00	0.04
1500.00	0.04
1600.00	0.05
1700.00	0.05
1800.00	0.07
1900.00	0.10
2000.00	0.11
2100.00	0.12
2200.00	0.11
2300.00	0.10
2400.00	0.10
2500.00	0.09
2600.00	0.09
2700.00	0.07
2800.00	0.07
2900.00	0.08
3000.00	0.09
3100.00	0.10
3200.00	0.12
3300.00	0.15
3400.00	0.17
3500.00	0.17
3600.00	0.17
3700.00	0.17
3800.00	0.16
3900.00	0.16
4000.00	0.16
4100.00	0.15
4200.00	0.13
4300.00	0.14

END


BP--5 Raw data from slug injection
screened interval
WL ft from ref. level
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
10 -4
10 -3
10 -2
10 -1
1
10
10 2
10 3
10 4
time (min)


WELL BP-5, SLUG INJECTION WITH SCREEN PRESENT
Ho= 3.80 FT
CONFINED CONDITIONS
MATCH POINT(S) WHERE Tt/r²=1, t= 9.1 MINUTES
T=(1)r²/t
T = 4.5 ft²/day
H/Ho
1.00
0.80
0.60
0.40
0.20
0.00
10⁻³
10⁻²
10⁻¹
1
10
10²
10³
TIME FROM INJECTION OF SLUG (min)

INFORMATION FOR WELL 699-41-40 (BP-6)

WELL DEVELOPMENT LOG

Collector Borghese Date 9/5/89 On/OFF Pumping

Well Number BP-6 (199-B8-4D) Location B-Pond Pumping Rate 0.5 Time Pump Start 9/5/89 0847 Pump Stop 9/13/89 0946 hrs.

Date	Time	Sample #	pH	Conductivity	Temp	Turbidity	Fe	Cr(VI)	Comments
9/5	0855	0855	7.58	376	20.3	>10			pH standards 7 + 10 calibrated turbidity meter to 0-9 NTU sample tested at 0930
	1020	1020	7.74	365	21.8	>10			pH 7 buffer lot # 8158 pH 10 buffer lot # 5869231
	1130	1130	7.49	366	23.8	>10			Incomplete Hach Kit (not enough reagents) for Fe + Cr(VI) analysis - did not analyze ~~Fe~~ Fe or Cr
	1236	1236	7.60	365	26.8	>10			
	1345	1341	7.57	362	23.5	16			recalibrated turbidimeter to 0-90 NTU
	1455	1449	7.58	356	22.2	14			
9/8	0738	0733	7.98	365	17.2	49			Hydrostar in well pump rate .63 gpm, pH standard 7+10 calibrated turbidity meter 0-90 NTU
	0818	0800	7.97	368	17.2	10			
	835	0830	7.99	370	17.5	31			
	955	948	7.99	371	19.5	46			Discharge turned cloudy after sample was taken
	1145	1140	8.00	360	23.1	11			
	1314	1310	8.07	368	28.9	8.2			
	1443	1436	8.02	357	24.9	6.2			No significant change in pH & cond - discontinued measurement

NOTE: Unless otherwise noted, the following units are assumed:

Pumping rate-gpm Fe - mg/L
pH - pH units Conductivity - µS/cm
Turbidity-NTU Cr - mg/L

Equipment:

pH 890205934 Fe
Cond. 890362145 Cr(VI)
Turb. 890903409

Procedure PNL-MA-567 GC-5 Rev. 0

recalibrated turbidimeter to 0-9 NTU for 1436 sample

WELL DEVELOPMENT LOG

Collector Borghese, D.R. Newcomb Date 9/11 - 9/12, 1989 cyclic pumping

Well Number BP6 (6441-46) Location B-Pond Pumping Rate variable Time Pump Start 9/5/89 0847 hrs Pump Stop 9/13/89 0946 hrs.

Date	Time	Sample #	pH	Conductivity	Temp	Turbidity	Fe	Cr(VI)	Comments
9/11	0733		–	–	–	5.8	–	–	calibrated turbidimeter 0 - 9 NTU before use
	0749		–	–	–	13	–	–	recalibrated turbidimeter to 0 - 90 NTU
	0818		–	–	–	6.6	–	–	recalibrated turbidimeter to 0-9 NTU
	0930		–	–	–	14	–	–	recalibrated turbidimeter to 0-90 NTU
9/12	0802		–	–	–	6.2	–	–	calibrated turbidimeter 0-9 NTU before using
	0832		–	–	–	2.4	–	–	recalibrated turbidimeter at 0-9 NTU range
	0900		–	–	–	1.7	–	–	Air compressor increased from 40 to 100 psi @ 0854 recalibrated turbidimeter at 0-9 NTU range
	0930		–	–	–	2.4	–	–	Recalibrated turbidimeter at 0-9 NTU range Moved turbidimeter off truck with generator to eliminate vibration
	1000		–	–	–	>10 17	–	–	Recalibrated at 0-9 range calibrated at 0-90 NTU range
	1000		–	–	–	17	–	–	Rechecked previous measurement Recalibrated at 0-90 NTU range
	1115		–	–	–	>10	–	–	Calibrated 0-9 NTU range
	1201		–	–	–	19	–	–	Calibrated turbidimeter at 0-90 NTU range
	1310		–	–	–	9			Calibrated at 0-90 NTU range

NOTE: Unless otherwise noted, the following units are assumed:

Pumping rate-gpm
pH - pH units
Turbidity-NTU
Fe - mg/L
Conductivity - µS/cm
Cr - mg/L

Equipment: Hach

pH _____ Fe _____
Cond. _____ Cr(VI) _____
Turb. model 16800
S/N 880903409
No lot # on standards
CAT NO 9NTU 22957-02
90NTU 22957-03

Procedure PNL-MA-567 GC-5 Rev. 0

WELL DEVELOPMENT LOG

Collector D R. Newcomer Date 9/12/89 (cyclic pumping)

Well Number BP 6 (699-41-40) Location B Pond Pumping Rate variable Time Pump Start 9/13/89 0847 Pump Stop 9/13/89 0946 hrs.

Date	Time	Sample #	pH	Conductivity	Temp	Turbidity	Fe	Cr(VI)	Comments
9/12	1310		–	–		8.2	–	–	Repeated measurement, but use ~~0-10~~ 0-7 NTU scale Calibrated turbidimeter at ~~0-10~~ 0-7 NTU scale DR
↓	1416		–	–	–	17	–	–	Calibrated turbidimeter at 0-90 scale
	1434		–	–	–	14	–	–	Calibrated turbidimeter at 0-90 scale

NOTE: Unless otherwise noted, the following units are assumed:

Pumping rate-gpm Fe - mg/L
pH - pH units Conductivity - µS/cm
Turbidity-NTU Cr - mg/L

Equipment:

pH _____ Fe _____
Cond. _____ Cr(VI) _____
Turb. _____

Procedure PNL-MA-567 GC-5 Rev. 0

WELL DEVELOPMENT LOG

Well Number BP-6 (699-41-40)
Location B-Pond
Procedure PNL-MA-567, GC-6, Rev. 0

Start Date/Time 9/5/89 0847 hrs.
End Date/Time 9/13/89 0946 hrs.
Page 4 of 4

Well Depth ~171' Pump Depth (Intake) ~ Initial Water Level 128.51' below TOC (see Aquifer Test Data sheets)

Date	Time	Pump on	Pump off	Water Level	Flow Rate	Turbidity	Person Meas.	Person Rec.	Comments
9/13	0825	0820	0946	–	0.38	13	DRN	DRN	Calibrated turbidimeter on 0-90 NTU scale
↓	0900	0820	0946	145.20' @ 0913 hrs	0.38	2.6	DRN	DRN	Calibrated turbidimeter on 0-9 NTU scale
↓	0920	0820	0946	157.38' @ 0930 hrs	0.79	1.7	DRN	DRN	Calibrated turbidimeter on 0-9 NTU scale

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment: Hach Turbidimeter
Make: Hach
Model: 16800
Serial No.: 880903409
Standards:
Manufacturer:
Lot No.:

FIGURE 1. Well Development Log

Aquifer Test Data

Data for Well BP-6 (699-41-40)
Pumping Well BP-6 (699-41-40)
Observation Wells —

Location B-Pond BP-6 (699-41-40
Type of Aquifer Test Well development, step-drawdown
How Q Measured Rockwell International 40027879
How W.L.'s Measured E-tape
Rad./Dist. of/From Pumping Well —
Meas. Point for W.L.'s Top of outer casing
Elevation of Meas. Point Not yet surveyed
length of stand pipe: 2.94 ft

Depth of Pump/~~Airpipe~~ unknown, est ~ 171
Pump On: date 9/5/89 time 0947 hrs
Pump Off: date 9/13/89 time 0946 hrs
Duration of Aquifer Test 618.5 min
submersible 1½ HP pump

Time t = _____ at t' = 0					Water Level Data Static Water Level _____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9/5	0723				127.57							JVB	E-tape 12174
	737				128.51							JVB	Steel tape L300-11
													lined some difficulty
													at ~ 125'
	0745											JVB	Depth to Bottom
	0838				10.01	ref set							~ 171
	0940										9940	JVB	
	0852										1.5	JVB	
	0904										0041		Flow meter stopped
													1½ flow found [illegible]
													1.... – flow from
													sample port
	911				-10.06						4946.4		turned pump off
	923				153.40						JVB		E tape
	0924				148.2						JVB		tape stuck
													at about 145
	1015					pump on	- flow meter working				B		5 gpm est
	1034					pump off							
											99304	JVB	after pump off
													turned off – no
													sucking in discharge line
													caused flow meter to
													turn backwards
	1037				133.71	(wet casing?)						JVB	E-tape - freed
	1045				157.75							JVB	E-tape
	1125				154.03							JVB	"
	1129				pump	on				99304		JVB	
	1132				pump	off							
	1134				165.55							JVB	
	1135				158.02							JVB	
	1136				158.28					99341		JVB	
	1230				153.97							JVB	
	1235				pump	on						JVB	
	1240				pump	off				9936		JVB	[illegible]
	1243				152.79							JVB	[illegible]
	1244				158.57							JVB	before [illegible]
	1255				156.89							JVB	
	1311				156.2							JVB	
	1323				154.5							JVB	

Aquifer Test Data

Data for Well BP-6 (699-41-40)
Pumping Well BP-6 (699-41-40)
Observation Wells N/A

Location B-Pond (699-41-40) BP-6
Type of Aquifer Test well development
How Q Measured 9/7 - bucket/watch
How W.L.'s Measured E-Tape
Rad./Dist. of/From Pumping Well 24"
Meas. Point for W.L.'s
~~Elevation of Meas. Point~~ Top of outer casing w/ Hydrostop w/ Hydrostop taped plastic fitting

Depth of Pump/Airpipe
Pump On: date 9/5/89 time 0847 hrs.
Pump Off: date ~~9/6~~ 9/13/89 time 0946 hrs.
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9/5	1340				pump on							JVB	E-Tape 12174
	1343				off					99485		JVB	
	1355				157.91							JVB	
	1411				156.57							JVB	
	1425				155.35							JVB	
	1445				153.83							JVB	
	1448				pump on					1:54RO			
	1450				pump off					1:54RO		JVB	
	1453				161.72								
	1503				157.72							JVB	
9/6	~~9/5~~ 0715				12842	E-tape 12174						JVB	Hydrostop in well
													ref point is top of
													plastic fitting
													3.05 above Pond
	727				pump on							JVB	
	735				tape sticking which to get							JVB	
					parent								
	733										.63 gpm		1.0 gal / 1 min 36 sec
	753				tape sticking - pulled out to 97'								
					all wet								
	802										.69	JVB	1.0 gal / 1 min 27 sec
	817										.63	JVB	1.0 gal / 1 min 3.5 sec
													measured at end
													of discharge line
	845												1 gal / 3 min
	846				pump off								
	856				174.56							JVB	
	0905				172.72							JVB	
	0925				168.85							JVB	
	0941				165.80							JVB	
	1050										.75	JVB	1.5 gal / 30 sec
	1047				pump on							JVB	
	1000				tape sticking							JVB	
	1107				pump off								
	1015				tape sticking								

Aquifer Test Data

Data for Well BP-6 (1:046-46)
Pumping Well BP-6
Observation Wells N/A

Location B-Pond (699-41-43) BP-6
Type of Aquifer Test Well development
How Q Measured Bucket / watch
How W.L.'s Measured E-Tape 161 79
Rad./Dist. of/From Pumping Well 2"
Meas. Point for W.L.'s Top of plastic fitting
Elevation of Meas. Point

Depth of Pump/Airpipe
Pump On: date 9/5/89 time 0847 hrs
Pump Off: date 9/13/89 time 0946 hrs
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9/8	1049				168.62							JVB	
	1131				162.05							JVB	
	1138				pump on								
	1141										12	JVB	1gal/5sec
	~~1153~~												dec rate a bit
	1150										.85	JVB	1gal / 1.1min
	1150				pump off								
	1200				tape sticking								
	1205				"	"							
	1218				"	"							
	1235				"	"							
	1303				164.59							JVB	
	1308				pump on								
	~~1315~~ 12										.80		1gal/1.15
	1326				pump off								
	1330				tape sticking								
	1342				"	"							
	1354				"	"						JVB	
	1428				165.48								
	1434				pump on								
	1437										1.03	JVB	1gal/58sec
	1439										1.0	JVB	1gal/1min
	1451				pump off								
	1456				tape sticking							JVB	
9/11	no activity over weekend												
	0724				138.57							JVB	E-Tape #2 12174
	0731				pump on								
	0734										1.03	JVB	1gal/5sec
	0736										.91	JVB	1gal/66sec
	0751										.81	JVB	1gal/74sec
	0759				tape sticking							JVB	
	810										.42	JVB	2gal/2.11
	816				tape sticking							JVB	1gal/1.36
	820				~~pump off~~						.63	JVB	
	822				pump off							JVB	
	919				164.21							JVB	
	926				pump on								
	928										.39	JVB	1gal/2.32

Aquifer Test Data

Data for Well BP-6 (699-41-40)
Pumping Well BP-6 (699-41-40)
Observation Wells N/A

Location B-Pond BP-6 (699-41-40)
Type of Aquifer Test Well development
How Q Measured Bucket / watch
How W.L.'s Measured E-Tape, Solinst
Rad./Dist. ~~of~~ From Pumping Well 2"
Meas. Point for W.L.'s top of plastic fitting
Elevation of Meas. Point top of plastic fitting is 0.11' above TOC (6" diam)

Depth of Pump/Airpipe
Pump On: date 9/5/89 time 0847 hrs.
Pump Off: date 9/12/89 time 0946 hrs.
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9/11	0950				pump off							JVB	
	952				tape sticking							JVB	
	1012				162.46							JVB	
	1042				157.63							JVB	
					~~Pump~~ generator had difficulty starting								
					spark - intermittant - Don will								
					take to shop								
	1109				154.12							JVB	
V													
9/12	0745				Today we used a different air compressor							DRN	Set up compressor on bank
					which was on bed of pickup truck								of pickup. It was turned
													on by Don Glover for about
													a minute and then turned off
	0755				129.07	-0.11	Filled gasoline fuel tank				0.50	DRN	E-tape (500' length) s/n 12998
	0800					Air compressor reading 100 psi						DRN	Pump on (cycle 14)
	0810										0.26	DRN	3:55 / 1 gal
						DRN 9/12/89							Generator kicked in higher RPM
						NOTE: This only regulates compression and does not affect pumping							for about 30 sec. @ 0807 hrs.
	0829				132.61							DRN	
	0845					Actuator is beginning to stick					0.14	DRN	5:15 / 3/4 gal
	~~0855~~	DRN 9/12/89											~~Opened valve slightly to prevent~~
	0852				131.98							DRN	~~sticking~~ DRN 9/12/89
	0854				Air compression has decreased to 40 psi							DRN	opened valve on air compressor
					Flow rate is not constant because compression is not constant								from 40 to 100 psi
	0855											DRN	Actuator not sticking - moving fine
	0900										0.90	DRN	1.07 / 1 gal
	0903				140.91							DRN	
	0907:20				144.59							DRN	
	0920					E-tape sticking - difficult to obtain a water-level measurement							
	0921					Air compressor is ~85 psi						DRN	
	0931										0.65	DRN	1:33 / 1 gal
	0946											DRN	Air compressor reads ~70 psi
	0958										0.48	DRN	2.05 / 1 gal
	1006					E-tape down passed 170' and does not buzz							DRN 9/12/89
	1009					Compressor off @ 1009:30						DRN	~~Generator~~ ~~Pump~~ off @ 1009 hrs.
	1012:45				176.27	E-tape sticking - difficult to measure water level						9/12/89	Measure nearby
	1027:40				171.97							DRN	
	1041:30				168.70							DRN	
V	1048:40				167.01							DRN	

Aquifer Test Data

page 5 of 6

Data for Well BP-6 (699-41-40)
Pumping Well BP-6 (699-41-40)
Observation Wells N/A

Location B-Pond, Well BP-6 (699-41-40)
Type of Aquifer Test Well Development
How Q Measured 2 gal bucket (with 1 quart markings) / Watch
How W.L.'s Measured E-tape, model 51453, S/N 12998
Rad./Dist. of/From Pumping Well 2"
Meas. Point for W.L.'s top of plastic fitting
Elevation of Meas. Point
Top of plastic fitting is 0.11' above 6" casing top

Depth of Pump/Airpipe
Pump On: date 9/5/89 time 0847 hrs.
Pump Off: date 9/13/89 time 0946 hrs
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q (gpm)		
9/12	1104				164.14							DRN	
	1110											DRN	Turned pump on (cycle 15)
													Air compressor set to 100 psi
	1114											DRN	Actuator began working
													after opening valve on Hydrostar
	1116										0.90	DRN	1:07 / 1 gal
	1119											DRN	Air compressor reads ~70 psi
	1123				171.71							DRN	
	1129											DRN	No water discharging from hose line
	1130											DRN	Turn generator and compressor off
	1132:30				176.30	E-tape sticking						DRN	Not accurate measurement
	1146				172.69							DRN	
	1201:30				169.08							DRN	
	1219				165.50							DRN	
	1241				161.84							DRN	
	1248:30				160.81							DRN	
	1250										(Cycle 16)		Turned pump on - Air comp. 100 psi
	1253										0.75	DRN	1:20 / 1 gal
	1256											DRN	Air comp. is reading 60 psi
	1307				173.64							DRN	
	1312										0.39	DRN	2:55 / 1 gal
	1319:30											DRN	Turn pump off because
	1329				174.60							DRN	no water from discharge line
	1345				170.94							DRN	
	1359				168.09							DRN	
	1411:30				165.74							DRN	
	1415											DRN	Turn pump on (Cycle 17)
	1417					Air compressor @ ~90 psi					1.36	DRN	0:44 / 1 gal
	1434					Water come out of discharge line every						2 or 3	pump strokes on actuator
	1436											DRN	Turn pump off
	1443				175.13							DRN	
✓												DRN	Allow well to recovery over night
9/13						Today we use Procedure GC-6 in place of Procedure GC-5							
9/13	0813				128.82	Plastic fitting come off - measuring point is top of stainless steel plate, which							
	~~0820~~	DRN 9/13/89										DRN	is 0.01' above TOC
	0820					Air compressor is 100 psi						DRN	Turned pump on (cycle 18)
✓	0821												Adjusted flow rate as low as possible

Aquifer Test Data

page 6 of 6

Data for Well BP-6

Pumping Well BP-6

Observation Wells N/A

Location B-Pond (699-41-40)

Type of Aquifer Test Well Development

How Q Measured 2 gal bucket / watch

How W.L.'s Measured E-tape model 51453, S/N 12998

Rad./Dist. of/From Pumping Well 2"

Meas. Point for W.L.'s Top of stainless steel plate

Elevation of Meas. Point

stainless steel plate is 0.01' above TOC

Depth of Pump/Airpipe

Pump On: date 9/5/89 time 0847 hrs.

Pump Off: date 9/13/89 time 0946 hrs.

Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9/13	0830										0.38	DRN	2:40/1 gal
	0845					E-tape sticking - unable to get water level						DRN	
	0901					Air compression is 100 psi					0.38	DRN	2:36/1 gal
	0913				145.70	E-tape sticking - difficult to get						DRN	Compressor regulator is working
						accurate measurement							well today, we are getting
													a constant flow rate
	0915											DRN	Slightly increased flow rate
													(choked valve very little)
	0921										0.79	DRN	1:16/1 gal.
	0930				157.38							DRN	
	0940											DRN	Collected UST samples.
	0946					Cease development at this well						DRN	Turned pump off
✓	1024				162.32							DRN	Recovery
													No water levels collected during
													prepare for development @ BP-4

Battelle
Pacific Northwest Laboratories

CALCULATION WORKSHEET

Calc. No. _____

Page ____ of ____

BP-6 (699-41-W)

Estimate of Volume Purged (BV x 30 gal)

		Duration of pumping	est. flow rate	Est total gal. purged	@ 1 gpm
9/5/89	Cycle 1 Submersible	84 min	~ .5 gpm	42	84
	2	19	.5	9.5	19
	3	3	.5	1.5	3
235	4	5	.5	2.5	5
	5	3	.5	1.5	3
	6	3	.5	1.5	3
9/8	~~5~~ Hydrostar				
	7	79 min	.65	51.35	
	8	20	.75	15.0	
	9	20	1.03	205	
	10	18	.8	14.4	
1434	11	17	1	17	
9/11	12	~~710~~ 51	~~.06~~	43.86 ~~[illegible]~~	
				Total → 220.6 ~~[illegible]~~	279.11 ~~[illegible]~~
	13	12	.39	~~[illegible]~~ 5	
9/12	14	129 min.	45 min @ avg 0.26 9 min @ 0.14 37 min @ 0.90 ~~variable flow rate~~ 27 min @ 0.65 11 min @ 0.48	~~[illegible]~~ 11.7 17.6 1.3 5.3 33.3	~~[illegible]~~
	15	~~16~~ 19 min	0.90	17.1	
	16.	29.5 min.	avg = 0.55	16.2	
	17	21 min.	1.36	28.6	
9/13	18	86 min.	55 min. @ 0.38 31 min. @ 0.79	20.9 24.5	

Title: Total: 618.5 min.

Project: Total: 402 gal

Prepared by: | Date | Reviewed by: | Date

BF-6 (694-41-40)

Equipment Record Form for the Installation and Removal of Data Loggers and Pressure Transducers

Initial Check: In Lab		
Purpose of Installation: Monitor WL changes during well development		
Monitored Hydrologic Unit or Water Body: BP-6 - Ringold second interval		
Date/Time of Installation:	Procedure Followed: WL-7	
Data Logger Make/Model: SE 1000B IN SITU		
Serial No.: 1KB-700	Number of Channels Used: 1	
Pressure Transducer Make/Model: In situ DRUCK PTX-161D	Full Scale Range: 20	Well No.: BP-6
	Serial No.: 259096	Depth:
Pressure Transducer Make/Model:	Full Scale Range:	Well No.:
	Serial No.:	Depth:
Description of Data Logger Installation and Well Head Configuration:		
Comments:		
Equipment Installed By		
Date/Time of Equipment Removal:		
Decontamination Procedure (if required):		
Equipment Removed By		

AQUIFER TEST SUMMARY

WELL 699-41-40 (BP-6)

Purpose of Test: To estimate hydraulic properties of the aquifer in an open interval.

Types of Tests Performed: "bailer"

Hydrogeologic unit tested: Ringold (confining unit)

Depth of interval tested:

Top: 147 ft Bottom: 158 ft

Date of test: 5/25 to 5/30/89 Start time of test: 1130

Duration of test: 4.5 days

Pre-test water-level depth (below land surface): 158.6 ft

Water-level measurement methods: steel tape

Analysis methods and results:

Method	Transmissivity (ft^2/d)	Hydraulic conductivity (ft/d)
Skibitzke (1958)	0.01	0.001

Remarks:

The rise in water level in the open hole and casing was monitored after water was encountered during drilling. The lithology at the open interval was mud.

The Skibitzke (1958) method yields an estimate of transmissivity. Hydraulic conductivity was estimated by dividing transmissivity by the thickness of the open interval (11 ft).

AQUIFER TEST SUMMARY

WELL 699-41-40 (BP-6)

Purpose of Test: To estimate hydraulic properties of the aquifer opposite the screened interval.

Types of Tests Performed: slug injection

Hydrogeologic unit tested: Ringold (confined aquifer)

Depth of interval tested:

Top: 164 ft Bottom: 174 ft

Date of test: 7/7/89 Start time of test: 1315

Duration of test: 4400 min

Pre-test water-level depth (below land surface): 126.54 ft

Water-level measurement methods: pressure transducer

Analysis methods and results:

Method	Transmissivity (ft^2/d)	Hydraulic conductivity (ft/d)
Cooper, et al. (1967)	2.0 to 3.4	0.2 to 0.34

Remarks:

The slug test was conducted in the completed well (4-in diameter stainless steel casing and channel pack screen). The lithology at the screened interval is alternating sand and muddy sandy gravel.

The Cooper, et al. (1967) method yields transmissivity. Hydraulic conductivity was estimated by dividing transmissivity by the thickness of the screened interval (10 ft).

Location BP-6-BPond Date of Test 7/7/89

Well Number BP-6 Procedure Number AT-6

Type of Test(s) Slug

Personnel Conducting Test W.E. Cronin

WELL CONFIGURATION

Well Depth 174.5 Borehole Diameter 8"

Well Casing Inside Diameter 4" Well Screen Inside Diameter 4"

Length of Screened Interval 10' Depth of Screen 163.94 - 174.3

Comments

SLUG INFORMATION

Slug Construction Materials Steel

Length of Slug 6.1 ft Diameter of Slug 0.25'

Comments Slug Tapered at Both ends

Volume of Attachments (if applicable) Total Volume - 0.402 ft^3

MEASUREMENT EQUIPMENT INFORMATION

	Make	Model	Serial Number
Electric Tape	—		
Steel Tape	Lufkin		L300-11
Data logger	In Situ	SE100B	1KB-332
Transducer	In Situ	PTX-1610D	2161
Other			

BP-6

Equipment Record Form for the Installation and Removal of the Instrumentation Northwest Data Loggers and Pressure Transducers

Initial Check: Performed in Lab		
Purpose of Installation: Slug Test BP-6		
Monitored Hydrologic Unit or Water Body: Aquifer Below B Pond		
Date/Time of Installation: 7/7/87 12:24	Procedure Followed: WL-4	
Data Logger Make/Model: in situ SE1000B		
Serial No.: 1KB-382	Number of Channels Used: 1	
Pressure Transducer Make/Model: In situ PTX-1610D	Full Scale Range: 10 PSI	Well No.: BP-6
	Serial No.: 2161	Depth: 17.02'
Pressure Transducer Make/Model:	Full Scale Range:	Well No.:
	Serial No.:	Depth:
Description of Data Logger Installation and Well Head Configuration: Transducer was taped to inner stainless steel casing and set at a depth of 17.02 ft below static water level		
Comments: Depth to water = ~~[illegible]~~ 126.21 ft slug top set at 135', Bottom = 143'. transducer set at 143 ft below static water level.		
Equipment Installed By ~~[illegible]~~ William E Cronin		
Date/Time of Equipment Removal: 7/10/89		
Decontamination Procedure (if required):		
Equipment Removed By SM Goodwin		

Aquifer Test Data

page 1 of 1

Data for Well BP-6

Pumping Well

Observation Wells

Location B Pond — set reference

Type of Aquifer Test slug

How Q Measured

How W.L.'s Measured steel tape

Rad./Dist. of/From Pumping Well

Meas. Point for W.L.'s TOC (TIC) stainless steel

Elevation of Meas. Point

Depth of Pump/Airpipe

Pump On: date time

Pump Off: date time

Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level 126.54					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
7/7	11:54				126.55	static	wl					wla	steel tape
1	11:56				126.54							wla	steel tape
1	12:10				174.5	depth	bottom hole						steel tape
1	12:24				Transducer set at 17.02								
1					Below Sill								
1	12:24				17.02								XD
1	12:29				126.49								steel Tape
1	12:32				126.49								steel tape
1	12:43				16.76								XD
1	13:15				slug	dropped							
1	13:26				3.230								XD
1	13:29				123.35								steel tape
1	15:30				5.08								XD
1	15:33				2.97								XD
					Static water levels measured from top of stainless steel casing								
					Test #0 on Data logger								

(5/18/89, Rev. 0)

ELECTRONIC DATA CONTROL FORM

DATE AND START TIME OF DATA ACQUISITION 7/7/89 1224

DATE AND END TIME OF DATA ACQUISITION 7/10/89

WELL NUMBER BP-6

TYPE OF TEST OR DATA Slug Injection

TYPE AND IDENTIFICATION NUMBER OF DATA LOGGER

Hermit SE1000B 382

TEST NUMBER Ø

CHANNEL OR INPUT NUMBER 1

UNITS OF VALUES RECORDED Ft. from referenced level

NUMBER OF PAGES ATTACHED X5

COMMENTS: Test conducted in ~~screened~~ completed well ~~interval~~

DATA VALIDATION STATEMENT:

The attached data represent the data as originally recorded on the data logger. Any exceptions and reasons for such are indicated in the comments section.

Jane V. Brigham, Scientist — 7/21/89

Name, title — Date

WELL: BP-6
TEST DATE: July 7, 1989
START TIME: 1315

SE1000B
Environmental Logger
07/14 15:06

Unit# 00382 Test# 0

INPUT 1: Level (F)

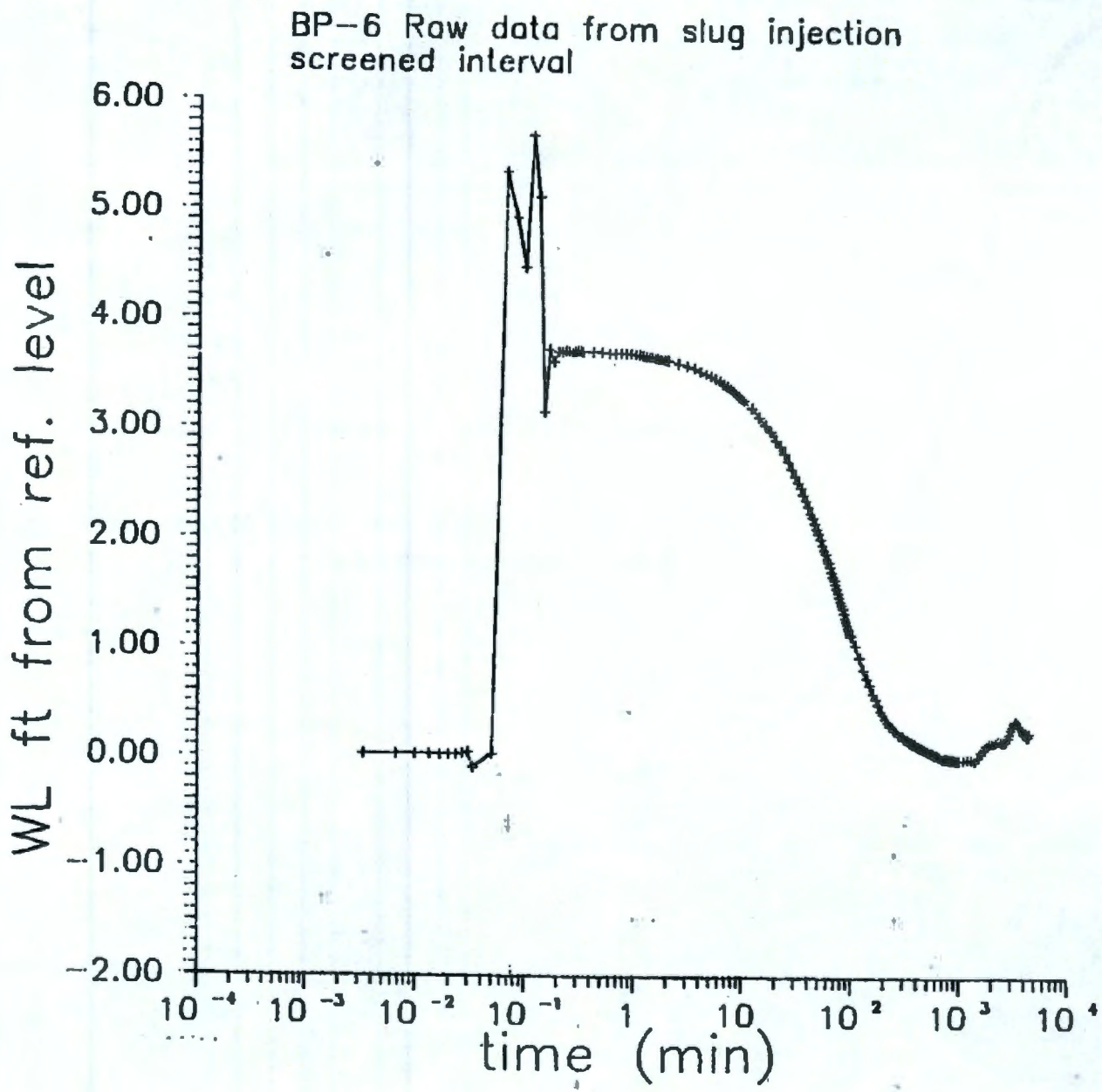
Reference 0.00
Scale factor 10.07
Offset - 0.07

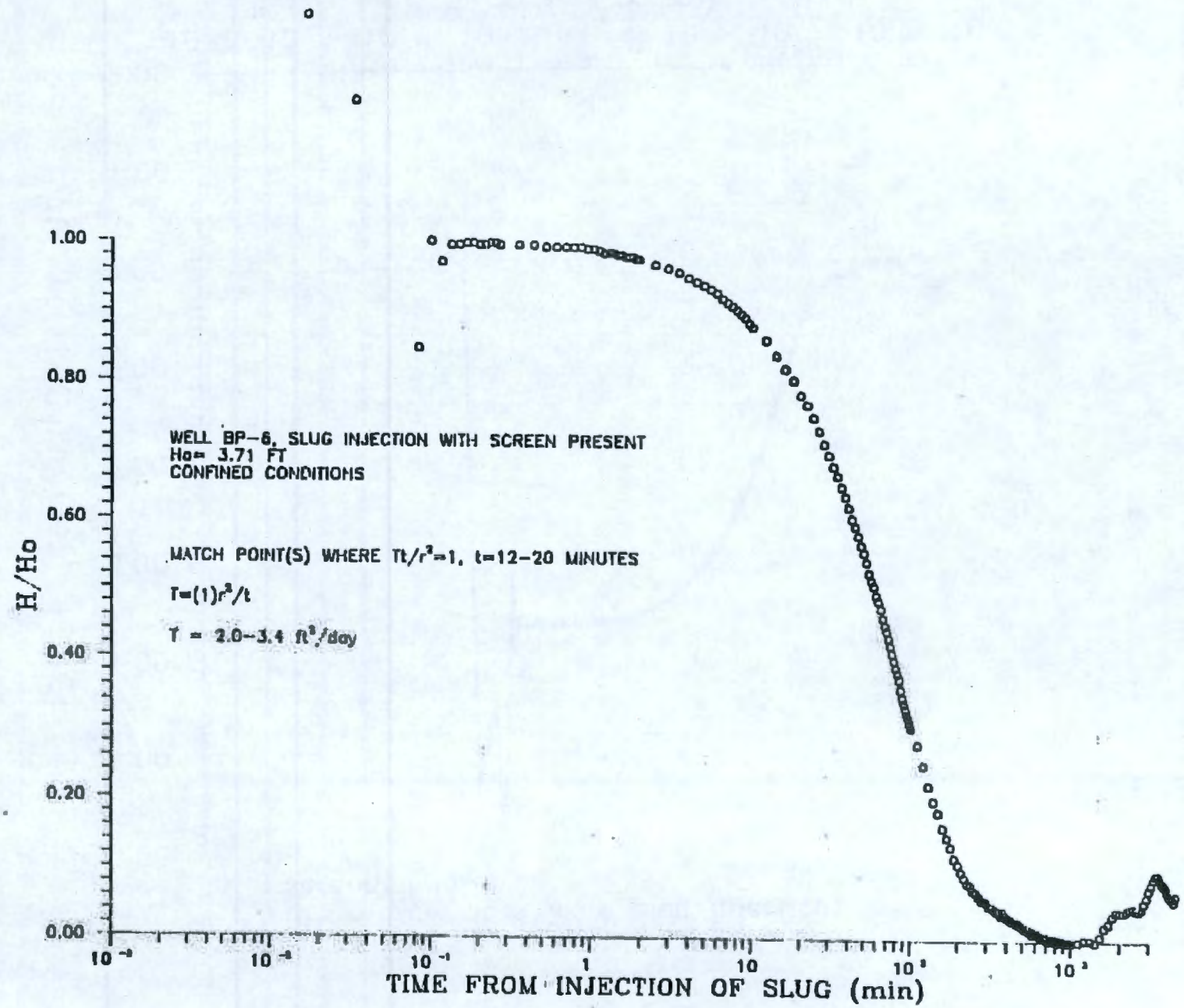
Step# 0 07/07 13:15

Elapsed Time	Value
0.0000	0.02
0.0033	0.02
0.0066	0.02
0.0099	0.02
0.0133	0.02
0.0166	0.02
0.0200	0.02
0.0233	0.02
0.0266	0.03
0.0300	0.04
0.0333	- 0.10
0.0500	0.02
0.0666	5.34
0.0833	4.92
0.1000	4.46
0.1166	5.68
0.1333	5.11
0.1500	3.14
0.1666	3.71
0.1833	3.60
0.2000	3.69
0.2166	3.69
0.2333	3.70
0.2500	3.70
0.2666	3.69
0.2833	3.69
0.3000	3.70
0.3166	3.70
0.3333	3.69
0.4167	3.69
0.5000	3.69
0.5833	3.68
0.6667	3.68
0.7500	3.68
0.8333	3.68
0.9167	3.68
1.0000	3.67
1.0833	3.67
1.1667	3.66
1.2500	3.65
1.3333	3.65
1.4166	3.65
1.5000	3.64
1.5833	3.64
1.6667	3.63
1.7500	3.63
1.8333	3.63
1.9167	3.62
2.0000	3.62
2.5000	3.59
3.0000	3.57
3.5000	3.55
4.0000	3.52
4.5000	3.50
5.0000	3.48
5.5000	3.46
6.0000	3.44
6.5000	3.41
7.0000	3.39
7.5000	3.37
8.0000	3.35
8.5000	3.33
9.0000	3.31
9.5000	3.28
10.0000	3.26
12.0000	3.19
14.0000	3.11
16.0000	3.04
18.0000	2.98
20.0000	2.90
22.0000	2.85
24.0000	2.78
26.0000	2.71
28.0000	2.64
30.0000	2.58
32.0000	2.52
34.0000	2.47
36.0000	2.41
38.0000	2.36
40.0000	2.30
42.0000	2.24
44.0000	2.20
46.0000	2.15
48.0000	2.10
50.0000	2.06
52.0000	2.01
54.0000	1.95
56.0000	1.91
58.0000	1.88
60.0000	1.83
62.0000	1.80
64.0000	1.76
66.0000	1.71
68.0000	1.67
70.0000	1.64
72.0000	1.60
74.0000	1.56
76.0000	1.52
78.0000	1.48
80.0000	1.44
82.0000	1.41
84.0000	1.38
86.0000	1.33
88.0000	1.29
90.0000	1.26
92.0000	1.23
94.0000	1.20
96.0000	1.18
98.0000	1.15
100.000	1.13
110.000	1.04
120.000	0.93
130.000	0.82
140.000	0.74
150.000	0.68
160.000	0.60
170.000	0.55
180.000	0.50
190.000	0.44
200.000	0.41
210.000	0.37
220.000	0.34
230.000	0.31
240.000	0.30
250.000	0.27
260.000	0.26
270.000	0.24
280.000	0.22
290.000	0.22
300.000	0.21
310.000	0.19
320.000	0.19
330.000	0.18
340.000	0.17
350.000	0.16
360.000	0.16

370.000	0.14
380.000	0.16
390.000	0.14
400.000	0.13
410.000	0.13
420.000	0.12
430.000	0.11
440.000	0.11
450.000	0.11
460.000	0.10
470.000	0.10
480.000	0.09
490.000	0.09
500.000	0.08
510.000	0.08
520.000	0.07
530.000	0.07
540.000	0.07
550.000	0.06
560.000	0.06
570.000	0.06
580.000	0.04
590.000	0.05
600.000	0.05
610.000	0.05
620.000	0.04
630.000	0.04
640.000	0.03
650.000	0.03
660.000	0.03
670.000	0.03
680.000	0.03
690.000	0.03
700.000	0.03
710.000	0.01
720.000	0.02
730.000	0.01
740.000	0.02
750.000	0.02
760.000	0.02
770.000	0.01
780.000	0.02
790.000	0.02
800.000	0.01
810.000	0.00
820.000	0.01
830.000	0.01
840.000	0.01
850.000	0.01
860.000	0.01
870.000	0.01
880.000	0.01
890.000	0.00
900.000	0.00
910.000	0.00
920.000	0.00
930.000	0.00
940.000	0.00
950.000	0.00
960.000	- 0.00
970.000	- 0.00
980.000	- 0.00
990.000	- 0.00
1000.00	- 0.00
1100.00	0.00
1200.00	- 0.01
1300.00	- 0.01
1400.00	- 0.00
1500.00	0.03
1600.00	0.08
1700.00	0.10
1800.00	0.14
1900.00	0.16
2000.00	0.16
2100.00	0.16
2200.00	0.17
2300.00	0.18
2400.00	0.18
2500.00	0.17
2600.00	0.17
2700.00	0.18
2800.00	0.21
2900.00	0.24
3000.00	0.28
3100.00	0.31
3200.00	0.34
3300.00	0.36
3400.00	0.36
3500.00	0.34
3600.00	0.32
3700.00	0.31
3800.00	0.30
3900.00	0.27
4000.00	0.25
4100.00	0.24
4200.00	0.24
4300.00	0.22
4400.00	0.25

END


BP-6 Raw data from slug injection
screened interval
WL ft from ref. level
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
10 -4
10 -3
10 -2
10 -1
1
10
10 2
10 3
10 4
time (min)


WELL BP-6, SLUG INJECTION WITH SCREEN PRESENT
Ho= 3.71 FT
CONFINED CONDITIONS
MATCH POINT(S) WHERE Tt/r²=1, t=12-20 MINUTES
T=(1)r²/t
T = 2.0-3.4 ft²/day
H/Ho
1.00
0.80
0.60
0.40
0.20
0.00
10⁻³
10⁻²
10⁻¹
1
10
10²
10³
TIME FROM INJECTION OF SLUG (min)

INFORMATION FOR WELL 699-42-42B (BP-10)

DRILL LOG	By K.R. Oster	Rig Kaiser Pump Setting Rig	Well Number BP-10 699-42-42B	Computer Number N/A	Project or Work Order No. B-Pond
	Date 10-13-88		Depth Pre-developement		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Took Depth to bottom of well before installation		
				of Submersible pump for well development		
				Depth to bottom = 203.15' Nfl. 10/3/88	1000	
				Pump set at 1' from bottom. on 10/13/88		

REMARKS:

Karen R. Oster
10/13/88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

DRILL LOG	By K.R. Oster	Rig N/A	Well Number BP-10 699-42-42 B	Computer Number N/A	Project or Work Order No.
	Date 10/17/88		Depth 203.15' To Developement		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Stick-up = 3.38' a.l.s., t.c. - 3.38' = l.s.		
				D/W = 164.82 b.t.c. Flowmeter reads 0.0 gallons	1115	
				Developement of well through overpumping with a 1½ HP		Could not get transducer down well - need tremie for aquifer test later
				submersible pump.		
				2.6 gal/1 min. (flowmeter) @ 1136 hrs.	1132	Pump on
				5 gal bucket/1 min. 55 sec. (≈ 2.6 gal/min) @ 1136 hrs.	1136	closed valve down
				Water is clouldy and contains quite a bit of sand		
				at 1st then sand clears but water cloudy. > 100 NTU		
				Water level is 175.33' from TOC	1138	
				flowmeter reads 31.6 gal. @ 1143:00 hrs.	1143	
				Depth to water is 174.55' from TOC	1145	
				flowmeter: 2.6 gal/1 min.	1148	
				Water slightly cloudy 14 NTU	1150	
				Water level 173.64' from TOC	1201	
				9 NTU @ 1200 hrs.	1202	Pump off
				flowmeter 75.3 gal.	1204	
				13.0 NTU @ 1208 hrs.	1207	Pump on
				1.6 gal/min (flowmeter) @ 1211 hrs.	1211	

REMARKS: D/B = 203.15' b.l.s.

Karen R. Oster
10/17/88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

DRILL LOG	By DR. Newcomer	Rig N/A	Well Number BP-10 699-42-42B	Computer Number N/A	Project or Work Order No.
	Date 10-17-88		Depth 203.15' To Development		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				W.L. = 168.54' from TOC	1214	
				14 NTU @ 1218:30 hrs.	1218	Increased flow rate slightly
				1 min. 48 sec to fill bucket (≈ 2.8 gal/min)	1223	
				flowmeter 2.8 gpm	1225	
				Difficult to measure water level (between 174' and 175') from TOC	1230	Difficult to take E-tape measurements
				4.5 NTU	1255	at greater depths than static
				flowmeter 2.95 gpm	1257	
				flowmeter 247.7 gal totalized @ 1306 hrs.	1305	pump off
				Water level 164.50' from TOC	1309	
					1311	pump on
				9.1 NTU, water is clear but contains some v.f. sand	1312	
				flowmeter 2.9 gpm	1318	
				flowmeter 3.0 gpm	1337	
				5 gal / 1 min 40 sec. (3 gpm) using bucket	1341	
				4.8 NTU, water is clear and no fines are present	1345	
				3.7 NTU, water looks clear, no fines	1408	
					1410	pump off
				flowmeter totalizer = 410.5 gal.	1413	

REMARKS:

Darrell Newcomer 10-' 88

D - Drive Barrel H - Hand Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

DRILL LOG	By D.R. Newcomer	Rig N/A	Well Number BP-10 699-42-42B	Computer Number N/A	Project or Work Order No.
	Date 10-17-88		Depth 203.15' To Development		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
					1420	Pump on
				5.3 NTU, water is clear w/ a few fine sands	1421	
				flowmeter 3.1gpm	1424	
				4.4 & 4.6 NTU, water is clear w/ a few fine sand grains	1436	
					1437	Pump off
				Sample first water has layer of fine sand at bottom	1445	pump on
				of jar, slightly cloudy 9.5 NTU		
				flowmeter 3.8 gal/min. @ 1452 hrs.	1450	slightly opened valve @ 1450 hrs.
				5 gal / 1 min 20 sec. (≈ 3.8gpm) using bucket	1456	
				8.4 NTU, water slightly cloudy, no grains	1458	
					1501	Pump off
				Water is slightly cloudy, v.f. sand layer at bottom 11 NTU	1505	Pump on
					1516	Pump off
				Water is slightly cloudy, v.f. sand layer at bottom 9.5 NTU	1521	Pump on
					1531	Pump off
				Sample water is slightly cloudy w/ v.f. sands 9.0 NTU	1535	pump on
					1543	pump off
				Slightly cloudy water, v.f. sands at bottom. 8.5 NTU	1550	pump on

REMARKS:

Darrell Newcomer 10-17-88

D - Drive Barrel H - Hand Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

DRILL LOG	By D.R. Newcomer	Rig N/A	Well Number BP-10 699-42-42B	Computer Number N/A	Project or Work Order No.
	Date 10-17-88		Depth 203.15' To Development		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				flowmeter: 3.6 gal/min. @ 1559 hrs.	1600	pump off
				Water sample is slightly cloudy, v.f. sand at bottom 10 NTU	1605	Pump on
					1613	pump off
				Water is slightly cloudy, v.f. sand grains at bottom 9.7 NTU (some grains are dark)	1618	Pump on
					1623	Pump off

REMARKS:

Darrell Newcomer 10-17-88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____Standing Water

A 6000-021 (8-85)

DRILL LOG	By D.R. Newcomer	Rig N/A	Well Number BP-10 699-42-42B	Computer Number N/A	Project or Work Order No.
	Date 10-18-88		Depth 203.15' To Development		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				SWL = 164.89' from top of tremie pipe (0.16' above TOC)	0940	All water levels from top of ½" tremie
				flowmeter totalizer = 695.6 gal	0940	
				Water sample is cloudy with a few v.f. sands settled out 88 NTU	0945	Pump on
				Water level is 176.87' from top of tremie pipe	0949	
				flowmeter 3.8 gpm	0950	
				Water sample is clear, no sand grains 16.5 NTU	1001	
				Water level is 178.06' from top of tremie	1002	
				Water sample is ~~clear~~ slightly cloudy, few grains settled out 12.5 NTU	1005	Increased flow rate
				flowmeter: 4.7 gpm	1006	
				Water level = 179.82'	1007	
				Water level 180.99'	1011:30	
				5 gal / 1 min. 15 sec to fill bucket	1015	
				Water level = 181.52'	1018:15	
				Water sample looks clear w/ a few visible silt grains 9.1 NTU	1029	
				Water level = 181.66'	1031	
				flowmeter 4.7 gpm	1034	
				Water level = 182.04'	1044	
				Totalizer = 960.7 gal. @ 1046 hrs	1045	Pump off

REMARKS: (Generator noise chopped off some)

Darrell Newcomer 10-18-88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____Standing Water A-6000-021 (5-85)

DRILL LOG	By: D.R. Newcomer	Rig: N/A	Well Number: BP-10 699-42-42B	Computer Number: N/A	Project or Work Order No.
	Date: 10-18-88		Depth: 203.15' To Develop		Subcontract No.: N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Water level = 165.83'	1047:30	
				Water level = 165.11'	1057	
				Water is cloudy w/ v.f. sands settling out on bottom 45.5 NTU	1100	Pump on
				W.L. = 178.88'	1103:30	
				flowmeter 4.2 gpm	1106	
				Water sample looks clear w/ a few minor (v.f. sand) grains at bottom of jar 8.4 NTU	1110	
				W.L. = 180.40'	1114	
				Water is clear and no sand grains ~~[illegible]~~ 4.8 NTU	1120	
				W.L. = 180.60'	1126	
				Water sample is clear w/ a very few v.f. sand grains 3.8 NTU	1130	Increased flow rate then slightly decreased it
				flowmeter 3.0 gal / 30 sec = 6.0 gpm	1132	
				W.L. = 185.38'	1133:30	
				flowmeter 5.5 gpm 5.0 gal / 55 sec. to fill bucket	1136	
				W.L. = 185.04'	1140	
				W.L. = 185.08'	1156	
				totalizer = 1,246.1	1158	Pump off
				W.L. = 165.19'	1214	
				Water is slightly cloudy w/ v.f. sand grains	1215	Pump on.

REMARKS: settled at 20.5 NTU

Darrell Newcomer 10-18-88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

DRILL LOG	By: DR Newcomer	Rig: N/A	Well Number: BP-10 699-42-42B	Computer Number: N/A	Project or Work Order No.
	Date: 10-18-88		Depth: 203.15' To Development		Subcontract No.: N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				flowmeter = 3.7 gpm	1218	
				flowmeter = 5.9 gpm	1222	Increased flow rate by opening valve
				W.L. = 183.01' water in bucket is clear	1224:30	
				flowmeter = 10.6 gpm	1229	Increased flow rate (probably too much)
				W.L. = 196.30' water level dropping fast	1231:30	
				Water is cloudy	1233	Pump off
					1234	Closed valve one turn
				Changed 200' E-tape (S.N. 11053) for 300' E-tape (S.N. 10998)	1242	
					1245	Pump on
				Had trouble turning pump on—it would quit sucking air, so turned it off @ 1246 hrs.		
				Water very cloudy, some v. f. sand settled out	1252	Pump on.
				flowmeter 4.3 gpm	1258	
				W.L. = 179.53'	1301	
				Water is clearing up, but still somewhat cloudy	1302	
				flowmeter = 6.9 gpm Water slightly cloudy	1310	Increased flow rate
				W.L. = 184.66'	1313	
				Water has cleared up w/ only minor silt grains NTU	1326	
				flowmeter = 6.8 gpm (overranges on 10 scale) 75 NTU (low scale) water remains clear	1331	Increased flow slightly
REMARKS:				W.L. 189.15'	1334	

Darrell Newcomer 10-19-88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-8000-021 (5-85)

DRILL LOG	By DR Newcomer	Rig N/A	Well Number BP-10 699-42-42B	Computer Number N/A	Project or Work Order No.
	Date 10-18-88		Depth 203.15' To Development		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Totalizer = 1609.2 gal	1340	Pump off
				Water is slightly cloudy, v.f. sand and silt settled out in a thin layer 15.5 NTU	1350	Pump on.
				flowmeter = 6.4 gpm	1352	
				W.L. = 188.76' Water is cleaning up	1359	
					1402	Pump off
				Water slightly cloudy w/ a thin layer of v.f. sand at bottom of jar	1411	Pump on
				flowmeter 3.3 gal/30 sec. ≈ 6.6 gpm	1412	8.1 NTU
				W.L. = 185.88'	1415:30	
					1427	Pump off
				Water is clear w/ minor v.f. sand and silt 4.6 NTU	1435	pump on
				flowmeter 7.3 gpm	1437	increased flow rate slightly
				W.L. = 190.31'		
				Increased flow rate to 8.2 gpm	1445	Increased flow rate slightly (twice)
				W.L. = 196.26' Water looks clear	1446	
				Totalizer = 1897.4 gal	1450	Pump off
				Water is pretty clear w/ a few v.f. sand grains 9.5 NTU	1500	Pump on
				flowmeter = 8.3 gpm	1502	
				Water is clear with 2 or 3 v.f. sand grains 7.4 NTU	1505	

REMARKS:

Darrell Newcomer 10-18-88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

DRILL LOG	By: DR. Newcomer	Rig: N/A	Well Number: B-P-10 699-42-42 B	Computer Number: N/A	Project or Work Order No.
	Date: 10-18-88		Depth: 203.15' To Development		Subcontract No.: N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				W.L. = 196.45'	1508	
				Water is clear w/ very few silt grains 7.9 NTU	1510	
				flowmeter 9.5 gpm	1513	Increased flow rate
				water has turned very cloudy	1515	
				W.L. = 199.30'	1516	
				W.L. = 199.87' water cleared up some	1517	
					1518:30	Pump off
				Water is cloudy w/ v.f. sand on bottom 20 NTU	1528	pump on
				W.L. = 195.87 9.5 gpm	1532	
				Water has cleared up some w/ a very few silt grains 7.2 NTU	1533	
				W.L. = 199.36'	1537:30	
				Flow rate would not increase, flowmeter reading dropped to ~7.5 gpm. Flow was not constant	1540	opened valve slightly
				Water level is near pump intake	1543	Pump off
				Generator out of gas - refill	1550	
				water slightly cloudy 8.9 NTU a few silt grains.	1555	pump on
				flowmeter 10.2 gpm	1554	
				W.L. = 199.32' E-tape probe at bottom of tremie pipe	1601	
					1601:30	pump off

REMARKS:

Darrell Newcomer 10-18-88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

DRILL LOG	By D.R. Newcomer	Rig N/A	Well Number BP-10 699-42-42B	Computer Number N/A	Project or Work Order No.
	Date 10-18-88		Depth 203.15' To Development		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Water slightly cloudy, some silt grains settled out 18.5 NTU	1610	Pump on.
					1614	closed valve slightly
				flowmeter 7.0 gpm 4.2 NTU	1615	
				W.L. = 194.45'	1618	
					1620	opened valve ~~[illegible]~~
					1621	Pump off
				Water is clear, but sample has a few v.f. sand	1630:30	Pump on
				grains at bottom of jar 6.7 NTU		
				flowmeter 8.7 gpm	1636	
				W.L. = 196.75'	1637	
				Water is clear with a very few silt grains (barely visible)	1638	4.6 NTU
				Closed valve to 6 gpm @ 1643 hrs.	1644	pump off
					1650	pump on
				adjusted flowmeter to 5.2 gpm	1655	
				5.0 gal/1 min. to fill bucket	1658	
				With discharge line connected, flowmeter is 4.7 gpm	1702	
				flowmeter totalizer =	1705	pump off

REMARKS:

Darrell Newcomer 10-18-88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WELL 699-42-42B (BP-10)

Purpose of Test: To estimate hydraulic properties (transmissivity hydraulic conductivity, and storativity) of the aquifer beneath the 216-B-3 Pond in the 200-East Area.

Types of Tests Performed:

Slug Test ( ) Specific Capacity ( ) Constant Discharge (x) Recovery ( )

Hydrogeologic Unit Tested: Ringold Formation

Depth of Formation:

Top: 182 ft Bottom: 204 ft

Depth of Screened Interval Tested:

Top: 192.90 ft Bottom: 203.15 ft

Observation Well Used: 699-43-42J Distance from Pumping Well: 64.9 ft

Depth of Screened Interval of Observation Well:

Top: 157 ft Bottom: 177 ft

Date of Test: 10/19/88 Start Time of Test: 1045 hrs

Pumping Rate: 3.25 gpm Duration of Test: 390 min

Pre-test Water-level Depth (b.l.s.):

Pumping Well: 162.09 ft
Observation Well: 157.61 ft

Water-level Measurement Methods:

Pumping Well: Electric tape
Observation Well: Electric tape, pressure transducer

Maximum Drawdown:

Pumping Well: 11.67 ft
Observation Well: 0.03 ft

Analysis Methods and Results:

Methods	Transmissivity (ft^2/day)	Hydraulic Conductivity (ft/day)	Storativity
Constant Discharge Cooper and Jacob (1946)	140	6	N/A

Remarks:

Casing Storage Effects
t_c = < 1 minute (Schafer 1978)
t_c = < 1 minute (Hargis 1979)
Observation well: 699-43-42J (BP-7)

Aquifer Test Data

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Data for Well 299-BP-10

Pumping Well 299-BP-10

Observation Wells 299-BP-7, 699-42-40B

Location 200 East Area (B-Pond)

Type of Aquifer Test Constant Discharge

How Q Measured 1½" Inline Flowmeter (Rockwell International) S.N. 40027877

How W.L.'s Measured 300' E-Tape S.N. 10998

Depth of Pump/Airpipe 203.15' b.l.s.

Rad./Dist. of/From Pumping Well ~~6449~~ 2" DRN 10-19-88

Pump On: date 10-19-88 time 10:45:00 hours

Meas. Point for W.L.'s Top of ½" Tremie Pipe (0.16' abv Top)

Pump Off: date 10-19-88 time 1715 hours

Elevation of Meas. Point Top of Casing is 3.38' above l.s.

Elev. of TOC = 583.23'

Duration of Aquifer Test 6½ hours (390 min)

Time t = 390 at t' = 0					Water Level Data Static Water Level 165.47'					Discharge		Recorded By	Comments Could not get pressure transducer down well
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading (gallons)	Q gpm		
10/19	1045	0			165.47			—		2477.5		DRN	Pump on
	1046	1			175.97			10.50					
	1047	2			176.00			10.53					0.11' OD pipe column
	1048	3			175.95			10.48					for discharge line
	1049	4			176.13			10.66					4" ID screen 10 slot
	1050	5			176.12			10.65					
	1051	6			176.20			10.73					
	1052	7			176.25			10.78					
	1053	8			176.31			10.84					
	1054	9			176.32			10.85					
	1055	10			176.44			10.97			3.3		Flow rate is timed as 3.3 gpm
	1057	12			176.45			10.98					
	1059	14			176.50			11.03					
	1101	16			176.53			11.06					
	1103	18			176.54			11.07			3.0		
	1105	20			176.61			11.14					
	1110	25			176.74			11.27					3.3 gpm @ 1112 hrs
	1115	30			176.72			11.25					
	1120	35			176.84			11.37					
	1125	40			176.92			11.45					
	1130	45			176.79			11.32					
	1135	50			176.88			11.41		2638.7	@ 1133		
	1145	60			176.98	DRN 10-19-88		11.51					
	1155	70			~~176.92~~	176.98		11.41					
	1205	80			176.93			11.46					
	1215	90			176.95			11.48					
	1225	100			176.98			11.51					
	1245	120			176.73			11.36		2862.5	@ 1244		3.1 gpm @ 1249 hrs.
	1305	140			176.85			11.38					1 min 35 sec to fill 5-gal bucket
	1325	160			176.97	DRN 10-19-88		11.50		2999.3	@ 1326 hrs.		3.1 gpm @ 1328 hrs.
	1345	180			~~177.039~~	~~177.04~~ 177.035		11.565					
	1405	200			177.01			11.54					E-tape measurements
	1425	220			~~177.07~~	177.075		11.605			3.2		made from 176' mark because
	1455	260			177.10	DRN 10-19-88		11.63					one foot increment on E-tape
	1525	280			177.14			11.67					does not equal one foot
	1555	310			177.02			11.55		3499	3.2		increment on hard tape
	1625	340			176.94			11.47					
	1655	370			176.89			11.42					
	1710	385			176.85			11.38					
	1715	390			—			—					Pump off @ 1715 hrs.

Totalizer = 3745.8 gal @ 1728 hrs. Avg. 3.25 gpm

Aquifer Test Data

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Data for Well 299-BP-10
Pumping Well 299-BP-10
Observation Wells 299-BP-7, 699-42-40B

Location 200 East Area (B-Pond)
Type of Aquifer Test Constant Discharge Recovery
How Q Measured 1½" Inline Flowmeter (Rockwell Internat'l) S.N. 40027879
How W.L.'s Measured 300' E-tape S.N. 10998 Depth of Pump/Airpipe 203.15' b.l.s.
Rad./Dist. of/From Pumping Well 649.9' 2" PZN 10-19-88 Pump On: date 10-19-88 time 10:45:00
Meas. Point for W.L.'s Top of ½" tremie pipe (0.16' above TOC) Pump Off: date 10-19-88 time 17:15:00
Elevation of Meas. Point Top of Casing is 3.38' above land surface Duration of Aquifer Test 6½ hours
Elev. of TOC = 583.23'

Time t = 390 at t' = 0					Water Level Data Static Water Level 165.47'					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'	s'	Reading	Q		
10/19	1715:30		30 sec		168.90				3.43				Begin Recovery @ 1715 hrs.
	1716		1		165.47				0.00				
	1717		2		163.53				-1.94				(No check valve on pump)
	1718		3		163.16				-2.31				
	1719		4		163.87				-1.60				
	1720		5		164.56				-0.91				
	1721		6		164.94				-0.53				
	1722		7		165.27				-0.20				
	1723		8		165.36				-0.11				
	1724		9		165.50				-0.03				
	1725		10		165.53				0.06				
	1730		15		165.54				0.07				
	1735		20		165.55				0.08				
	1740		25		165.52				0.05				
	1745		30										

Aquifer Test Data

page 3 of 4

Data for Well 299-BP-7
Pumping Well 299-BP-10
Observation Wells 299-BP-7, #49-42-408

Location 200 East Area (B-Pond)
Type of Aquifer Test Constant Discharge
How Q Measured 1½" Inline Flowmeter (Rockwell Intercept)
How W.L.'s Measured 200' E-tape SN 1053/10 psi Press. Transducer
Rad./Dist. of/From Pumping Well 649'
Meas. Point for W.L.'s TOC (Top of Casing is 3.41' above LS)
Elevation of Meas. Point 581.68'

Depth of Pump/Airpipe 203.15' (BP-10)
Pump On: date 10-19-88 time 1045:00 hrs.
Pump Off: date 10-19-88 time 1715 hrs.
Duration of Aquifer Test 6½ hours (390 min)

Time t = 390 at t' = 0					Water Level Data Static Water Level 161.02'					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	t. of. Q. Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
10/19	1045	0			161.02'			—				KRD	Pump on @ 1045 hrs.
	1046	1			161.02'			0					
	1047	2			161.02'			0					
	1048	3			161.03'			0.01					
	1049	4			161.03'			0.01					
	1050	5			161.03'			0.01					
	1051	6			161.03'			0.01					
	1052	7			161.04'			0.02					
	1053	8			161.04'			0.02					
	1054	9			161.04'			0.02					
	1055	10			161.04'			0.02					
	1057	12			161.04'			0.02					
	1059	14			161.04'			0.02					
	1101	16			161.04'			0.02					
	1103	18			161.04'			0.02					
	1105	20			161.04'			0.02					
	1110	25			161.04'			0.02					
	1115	30			161.05			0.03				DRN	
	1120	35			161.05			0.03					
	1125	40			161.05			0.03					
	1130	45			161.05			0.03					
	1135	50			161.05			0.03					
	1140	55			—								
	1145	60			161.05			0.03					
	1155	70			161.05			0.03					
	1205	80			161.05			0.03					
	1215	90			161.05			0.03					
	1225	100			161.05			0.03					
	1245	120			161.04			0.02					
	1306	141			161.04			0.02					
	1329	164			161.03			0.01					
	1346	181			161.025			0.005					
	1406	201			161.025			0.005					
	1428	223			161.025			0.005					
	1500	255			161.02			0					
	1526	281			161.02			0					
	1550	305			161.02			0					
	1630	345			161.01			-0.01					
	1700	375			161.01			-0.01					Pump off @ 1715 hrs.

Aquifer Test Data

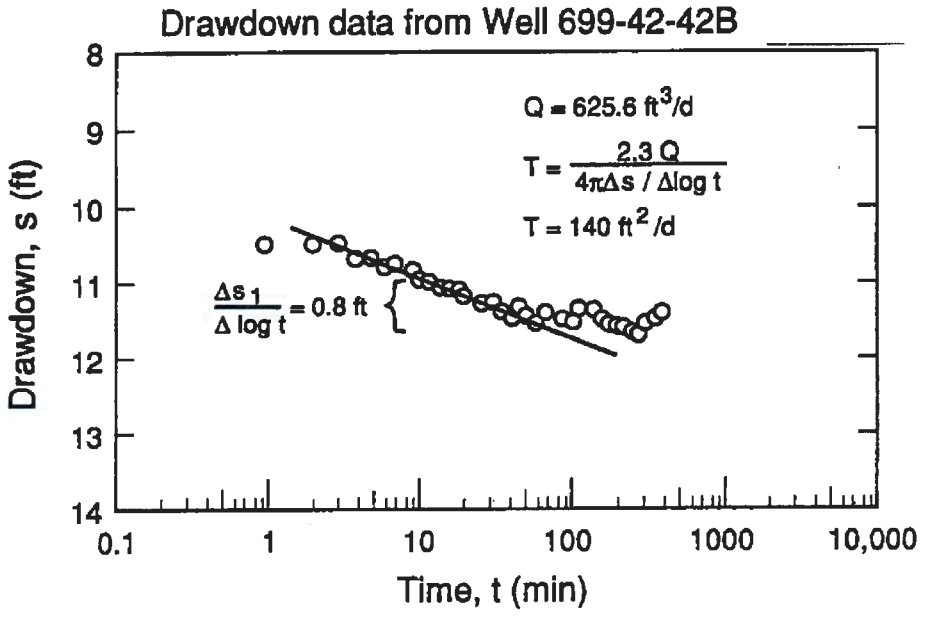
page 4 of 4

Data for Well 299-BP-7
Pumping Well 299-BP-10
Observation Wells 299-BP-7, 699-42-40B

Location 200 East Area (B-Pond)
Type of Aquifer Test Constant Discharge Recovery
How Q Measured 1½" Inline Flowmeter
How W.L.'s Measured 200' E-tape / 10 psi press. Trans.
Rad./Dist. of/From Pumping Well 64.9'
Meas. Point for W.L.'s TOC is 3.41' a.l.s.
Elevation of Meas. Point 581.68'

Depth of Pump/Airpipe 203.15' in 299-BP-10
Pump On: date 10-19-88 time 1045:00 hrs.
Pump Off: date 10-19-88 time 1715:00 hrs.
Duration of Aquifer Test 6½ hours (390 min)

Time t = 390 at t' = 0					Water Level Data Static Water Level 161.02'					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Read-ing	Q		
10/19	1715		0										Pump off
↓	1726		11		160.99								
↓	1736		21		160.99								


Drawdown data from Well 699-42-42B
Q = 625.6 ft³/d
T = 2.3 Q / 4πΔs / Δlog t
T = 140 ft²/d
Δs1 / Δ log t = 0.8 ft
Drawdown, s (ft)
8
9
10
11
12
13
14
0.1
1
10
100
1000
10,000
Time, t (min)

S8907115.10

INFORMATION FOR WELL 699-43-41E (BP-4)

WELL DEVELOPMENT LOG

Well Number BP-4 (699-43-41E)
Location B-Pond
Procedure PNL-MA-567, GC-6, Rev. 0

Start Date/Time 9/13/89 1446 hrs
End Date/Time 9/14/89 1335 hrs.
Page 1 of 1

Well Depth 139.9' Pump Depth (Intake) ~139' Initial Water Level 128.35 below TOC
Measurements from top of 6" I.D. Casing

Date	Time	Pump on	Pump off	Water Level	Flow Rate	Turbidity	Person Meas.	Person Rec.	Comments
9/13	1450	1446	1451	–	–	53	DRN	DRN	Calibrated turbidimeter on 0-90 NTU Scale
9/13	1533	1530	1630	–	0.71 gpm	53	DRN	DRN	Calibrated turbidimeter on 0-90 NTU Scale
↓	1605	1530	1630	–	0.71	15	DRN	DRN	Calibrated turbidimeter on 0-90 NTU scale
↓	1625	1530	1630	–	0.67	20	DRN	DRN	Calibrated turbidimeter on 0-90 NTU scale
9/14	0830	0812	0850	–	0.44	28	DRN	DRN	Calibrated turbidimeter on 0-90 NTU scale
↓	1130	1112	1335	–	0.44	21	DRN	DRN	Calib. turb. on 0-90 NTU Scale
↓	1200	1112	1335	–	0.41	~~6~~ DRN 9/14/89 5	DRN	DRN	Calib. turb. on 0-90 NTU scale
↓	"	"	"	–	"	4.9	DRN	DRN	Calib. turb. on 0-9 NTU scale
↓	1230	1112	1335	–	0.38	2.0	DRN	DRN	Calib. turb. on 0-9 NTU scale
↓	1255	1112	1335	–	0.54	1.3	DRN	DRN	Calib. turb. on 0-9 NTU Scale

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment: Turbidimeter
Make: Hach Turbidimeter
Model: 16800
Serial No.: 880903409
Standards:
Manufacturer:
Lot No.:

FIGURE 1. Well Development Log

Aquifer Test Data

page 1 of 2

Data for Well BP-4 (699-43-41B)
Pumping Well BP-4 (699-43-41B)
Observation Wells ~~BP-9~~ DRN 9/13/89
N/A

Location B Pond BP-4
Type of Aquifer Test Well Development
How Q Measured 1½" Inline Rockwell Internat'l flowmeter S/N 40027614; bucket and watch
How W.L.'s Measured ~~E-tape~~ DRN Steel tape, Transducer
Rad./Dist. of/From Pumping Well 2"
Meas. Point for W.L.'s Top of 6" I.D. casing
Elevation of Meas. Point
Top of 6" I.D. Casing is 2.98' above top of cement pad

Depth of Pump/Airpipe ~139' from top of 6" I.D. casing
Pump On: date 9/13/89 time ~~1446~~ 1530 hrs. ~~1446~~ DRN 9/13/89
Pump Off: date 9/14/89 time 1335 hrs.
Duration of Aquifer Test 256 minutes

Time t = ____ at t' = 0					Water Level Data Static Water Level 128.35' below TOC					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9/13	1130											DRN	Set up hose line to tanker truck
	1144				128.39							DRN	Steel Tape # L300-11
	1150				D/B is approximately 1329'							DRN	
	1300					Set Transducer in well near bottom						DRN	
	1309				128.35							DRN	Steel Tape # L300-11
	1310				11.60 (of head)							DRN	Transducer reading
	1318					Set reference @ 1317 hrs.						DRN	Began logging data on data logger
	1327									11741		DRN	
	1340					Turn generator on						DRN	
	1343					Turn generator off because it was leaking oil badly and smoking							
	1419				Center of Flowmeter is 1.25' from center of T at wellhead (See diagram on Equipment Record Form)								
					Center of control valve is 51' from center of T at well head								
	~1446	times are approximate				Drillers helped to start generator and pump; pump on (Cycle 2)							
	~1447					Flowmeter began working - water flowing							
	~1451					Began sucking air, so we turned pump off.							
	1503									11750		DRN	
	1510				-1.29							DRN	Transducer reading
	1518				-0.57							DRN	
	1528				-0.14							DRN	
	1530											DRN	Turn pump (Cycle 2) on, and
	1535	Collected			UST samples							DRN	adjusted flow as low as possible
	1541				-11.69							DRN	
	1554				-11.69							DRN	
	1557										0.71	DRN	1:24 / 1 gal using bucket
	1559				~~-11~~ DRN 9/13/89				DRN 9/14/89	~~11877~~ 11777		DRN	
	1603				-11.69							DRN	
	1620				-11.69							DRN	
	1621									~~11669~~		DRN	
	1626								DRN 9/14/89	11783	0.67	DRN	1:30 / 1 gal.
	~~1629~~	DRN	9/13/89										
	1630											DRN	Turn pump off
	1631									~~11693~~		DRN	
									DRN 9/14/89	11793			Leave transducer in well overnight

Aquifer Test Data

page 2 of 2

Data for Well BP-4 (699-43-41E)
Pumping Well BP-4 (699-43-41E)
Observation Wells N/A

Location B Pond, Well BP-4
Type of Aquifer Test Well Development
How Q Measured 1½" in line flowmeter, bucket and watch
How W.L.'s Measured Transducer, steel tape
Rad./Dist. of/From Pumping Well 2"
Meas. Point for W.L.'s Top of 6" I.D. Casing
Elevation of Meas. Point

Depth of Pump/Airpipe
Pump On: date 9/13/89 time ~~1320~~ 1446 hrs. DRN 9/13/
Pump Off: date 9/14/89 time 1335 hrs.
Duration of Aquifer Test 256 minutes

Time t = ____ at t' = 0					Water Level Data Static Water Level 128.33' below TOC					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9/14	0759				0.09							DRN	Transducer reading
	0802				128.33							DRN	Steel Tape # L300-11
	0812											DRN	Turn pump on (Cycle 3)
	0820					(Adjusted valve down slightly @ 0815 hrs)					0.65	DRN	1:32 / 1 gal
	0822											DRN	Adjusted valve down slightly
	0828										0.44	DRN	2:16 / 1 gal
	0835:30				-10.33							DRN	Transducer reading
	0845				-9.19							DRN	
	0850					Turn pump and generator off — oil leaking badly							
	0856:30				-1.27								
	1020									11809.5		DRN	
						Drillers brought new generator to replace bad one @ 1100 hrs.							
	1112											DRN	Turn pump on and adjusted
	1115:30				-8.44							DRN	valve down as low as possible
	1117:30				-9.27							DRN	(Cycle
	1120										0.76	DRN	1:19 / 1 gal
	1122				(Observed water level on datalogger while valving down)							DRN	Close valve down slightly
	1128										0.44	DRN	2:16 / 1 gal
	1134				-10.34							DRN	
	1144				-9.86							DRN	
	1158										0.41	DRN	2:25 / 1 gal
	1200:30				-9.20							DRN	
	1203									11831		DRN	
	1210				-8.86							DRN	
	1225				-8.59							DRN	
	1228										0.38	DRN	2:38 / 1 gal
	1237				-8.41							DRN	
	1237				~~128.57~~	136.87						DRN	Steel tape # L300-11
					DRN 9/14/89								
	1244:30				-8.37							DRN	
	1245											DRN	Begin slowly increasing flow rate
	1250										0.54	DRN	1.51 / 1 gal
	1252:30				-9.45							DRN	
	1253									11848		DRN	
	1304				-10.04							DRN	
✓	1335					Finish developing well						DRN	Turn pump off

final reading on totalizer 11863.6 DRN

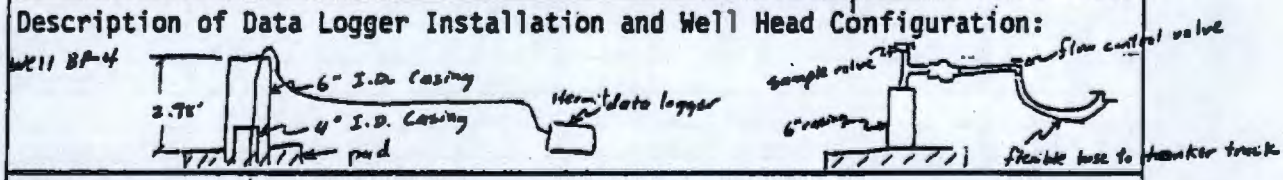
Leave transducer in well BP-4 overnight

BP-4

Equipment Record Form for the Installation and Removal of Data Loggers and Pressure Transducers

Initial Check: Yes		
Purpose of Installation: To monitor water levels while developing well BP-4		
Monitored Hydrologic Unit or Water Body: Uppermost ~~unconfined~~ aquifer beneath B-Pond DRN 9/18/89		
Date/Time of Installation: 9/13/89 1300 hrs.	Procedure Followed: WL-4	
Data Logger Make/Model: In Situ Hermit Model SE 1000B		
Serial No.: 1KB-700	Number of Channels Used: 1	
Pressure Transducer Make/Model: Druck PTX 161/D - 0869	Full Scale Range: 10 psi	Well No.: BP-4 (699-43-91E)
	Serial No.: 259212	Depth: ~139' below TOC
Pressure Transducer Make/Model:	Full Scale Range:	Well No.:
	Serial No.:	Depth:

Description of Data Logger Installation and Well Head Configuration:



Comments:

Transducer may be set near intake of submersible pump
Select Test 0, Linear sampling rate @ 2 min. intervals, Ref = 0, offset = 0, dSP = En:Sar
Stop collecting data @ 0737 hrs. 9/15/89. Transducer and cable that was submersed was rinsed off with dionized water and wiped clean with towel

Equipment Installed By D.R. Newcomer	
Date/Time of Equipment Removal: 9/15/89 0745 hrs.	
Decontamination Procedure (if required):	
Equipment Removed By Darrell Newcomer	Darrell Newcomer

Battelle
Pacific Northwest Laboratories

CALCULATION WORKSHEET

Calc. No. _____

Page _____ of _____

BP-4 (670-03.41.2)

Borehole Volume

$$BV = \pi\left(\frac{7}{12}\right)^2(139.9 - 128.3) - \pi\left(\frac{0.75}{12}\right)^2(139.9 - 128.3)$$

$$= 1.01229 - 0.142353 = 0.869937 \text{ ft}^3 = \sim 6.51 \text{ gal}$$

Title			Project:	
Prepared by:	Date	Reviewed by:		Date

DRILL LOG	By Borghese	Rig B Pump Rig	Well Number BP-4 (699-43-41F)	Computer Number	Project or Work Order No. U-017
	Date 9/21/89		Depth To		Subcontract No.

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Removing Hydrostar pump + pipe		
				Broke upset pump — fine sand and basalt chips in pump. also white paint chip pipe on ~~pump~~ rack collected sample of material in pump.		
				D/B 146.75' L300-05		
				Standpipe 2.90'		
				143.85 +2.7 from 0-mark bend of tape weight		
				reported D/B 145.84		

REMARKS:

D - Drive B H - Hard Tool L - Large M - Medium S - Small VC - Very Large C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-88)

AQUIFER TEST SUMMARY

WELL 699-43-41E (BP-4)

Purpose of Test: To estimate hydraulic properties of the aquifer opposite the screened interval.

Types of Tests Performed: slug injection

Hydrogeologic unit tested: Ringold (confined)

Depth of interval tested:

Top: 138 ft Bottom: 148 ft

Date of test: 6/29/89 Start time of test: 1400

Duration of test: 1200 min

Pre-test water-level depth (below land surface): 128.47 ft

Water-level measurement methods: pressure transducer

Analysis methods and results:

Method	Transmissivity (ft^2/d)	Hydraulic conductivity (ft/d)
Cooper, et al. (1967)	15 to 19	1.5 to 1.9

Remarks:

The well was completed with 4-in diameter stainless steel casing and a channel pack screen. The lithology at the screened interval is slightly gravelly sandy mud grading into muddy sandy gravel.

The Cooper, et al. (1967) method yields transmissivity. Hydraulic conductivity was estimated by dividing transmissivity by the thickness of the screened interval (10 ft).

Location B - Pond Date of Test 6-29/30-1989

Well Number BP-4 Procedure Number AT-6, WL-4

Type of Test(s) Slug

Personnel Conducting Test Bill Cronin

WELL CONFIGURATION

Well Depth 151.6 ft from top of SS casing Borehole Diameter ~~8"~~ 10" around screen

Well Casing Inside Diameter 4 in. Well Screen Inside Diameter 4 in.

Length of Screened Interval 10 ft. Depth of Screen 138.04 - 148.69 from top of SS casing

Comments channel pack screen

SLUG INFORMATION

Slug Construction Materials steel

Length of Slug 8.1 ft Diameter of Slug .25 ft

Comments slug tapered at both ends (length tapered .06 ft)

Volume of Attachments (if applicable) volume of rebar hook = .0041

Total volume: 0.402 ft³, Theoretical water level change inside 4 inch casing. 4.61 ft

MEASUREMENT EQUIPMENT INFORMATION

	Make	Model	Serial Number
Electric Tape	–		
Steel Tape	Lufkin		L200-01
Data logger	In Situ Hermit	SE1000B	P5
Transducer	In Situ	PTX 160/0	1998
Other			

Equipment Record Form for the Installation and Removal of Data Loggers and Pressure Transducers

Initial Check: Performed in lab		
Purpose of Installation: slug test BP-4		
Monitored Hydrologic Unit or Water Body: Aquifer Below B Pond		
Date/Time of Installation: 6/29 2:00	Procedure Followed: WL-4	
Data Logger Make/Model: Insitu SE1000		
Serial No.: P5	Number of Channels Used: 1	
Pressure Transducer Make/Model: Insitu PTX 160/D	Full Scale Range: 10 PSI	Well No.: BP-4
	Serial No.: 1998	Depth: 17' below static
Pressure Transducer Make/Model:	Full Scale Range:	Well No.:
	Serial No.:	Depth:
Description of Data Logger Installation and Well Head Configuration: Transducer was taped to stainless steel casing, and set at a depth of approximately 17' below static water level.		
Comments: Data logger was started at approximately 1400 hours. The ~~co~~ readout displayed the Log 2 cycle by the time the slug was submerged. Top of slug depth = 130' Screen = 133'-148' Transducer depth = 145' SWL = 128.44'		
Equipment Installed By William E. Ovenin		
Date/Time of Equipment Removal: 6/30/89		
Decontamination Procedure (if required): N/A		
Equipment Removed By SM Goodwin		

Aquifer Test Data

set reference!

page 1 of 1

Data for Well BP-4

Pumping Well N/A

Observation Wells N/A

Location BP-4 - B Pond

Type of Aquifer Test Slug

How Q Measured N/A

How W.L.'s Measured Steel tape L200-01

Rad./Dist. of/From Pumping Well N/A

Meas. Point for W.L.'s Stainless Steel, Top of Casing

Elevation of Meas. Point

Depth of Pump/Airpipe N/A

Pump On: date ____ time ____

Pump Off: date N/A time N/A

Duration of Aquifer Test 6/29/89

Time t = ____ at t' = 0					Water Level Data Static Water Level 128.47					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
6/29	11:24				151.3	Bottom of hole						WEC	Light force
	11:40				128.47	Reach to water				ITOC		WEC	steel tape
	11:42				128.465							WEC	"
	12:00				set transducer at					17'		WEC	
					Below SWL = 145.47'							WEC	
	12:22				17.03							WEC	transducer reading
	12:28				128.44							WEC	steel tape
	12:32				128.440							WEC	steel tape
	12:39				17.01							WEC	trans. XD
	12:44				17.05	Retapped around casing lip						WEC	XD
	12:47				17.05							WEC	XD
	12:55				128.44							WEC	XD
	12:58				17.05							WEC	XD
	1:25				17.06							WEC	XD
	1:35				17.00	reference						WEC	XD
	1:49				17.02	reference						WEC	XD
	2:00				water levels started								
					slug submerged at								
					half time.								
	2:17				1.01							WEC	XD
	2:20				0.83							WEC	XD

(5/18/89, Rev. 0)

ELECTRONIC DATA CONTROL FORM

DATE AND START TIME OF DATA ACQUISITION 6/29/89 1400

DATE AND END TIME OF DATA ACQUISITION 6/30/89

WELL NUMBER BP-4

TYPE OF TEST OR DATA Slug

TYPE AND IDENTIFICATION NUMBER OF DATA LOGGER

Hermit SE1000B P5

TEST NUMBER 0

CHANNEL OR INPUT NUMBER 1

UNITS OF VALUES RECORDED Ft. from referenced level

NUMBER OF PAGES ATTACHED 5

COMMENTS:

DATA VALIDATION STATEMENT:

The attached data represent the data as originally recorded on the data logger. Any exceptions and reasons for such are indicated in the comments section.

Jane V. Boyhee, Scientist — 7/21/89

Name, title — Date

WELL: BP-4
TEST DATE: June 29, 1989
START TIME: 1400

SE1000B
Environmental Logger
07/06 16:11

Unit# 00005 Test# 0

INPUT 1: Level (F)

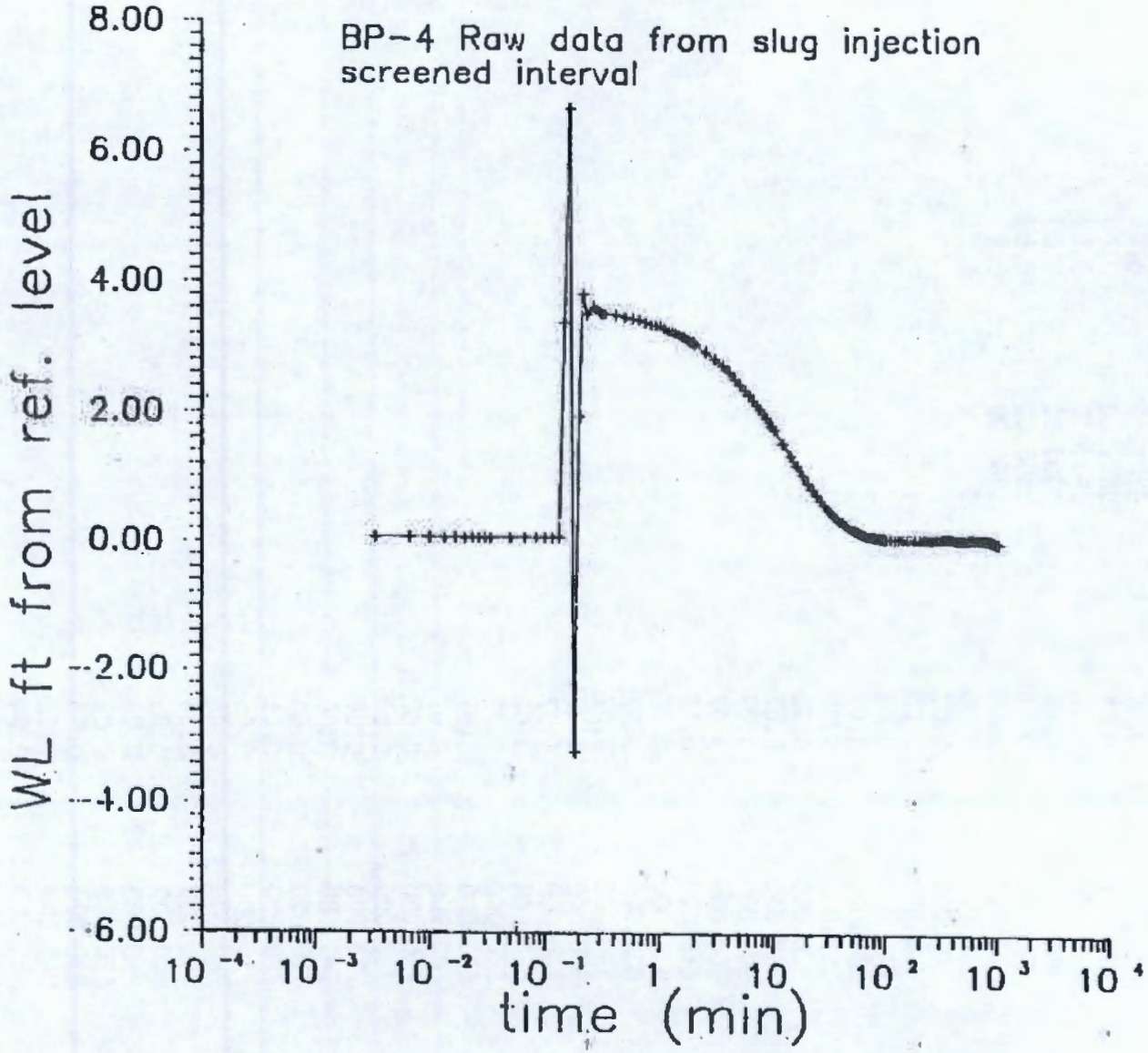
Reference 0.00
Scale factor 10.10
Offset - 0.09

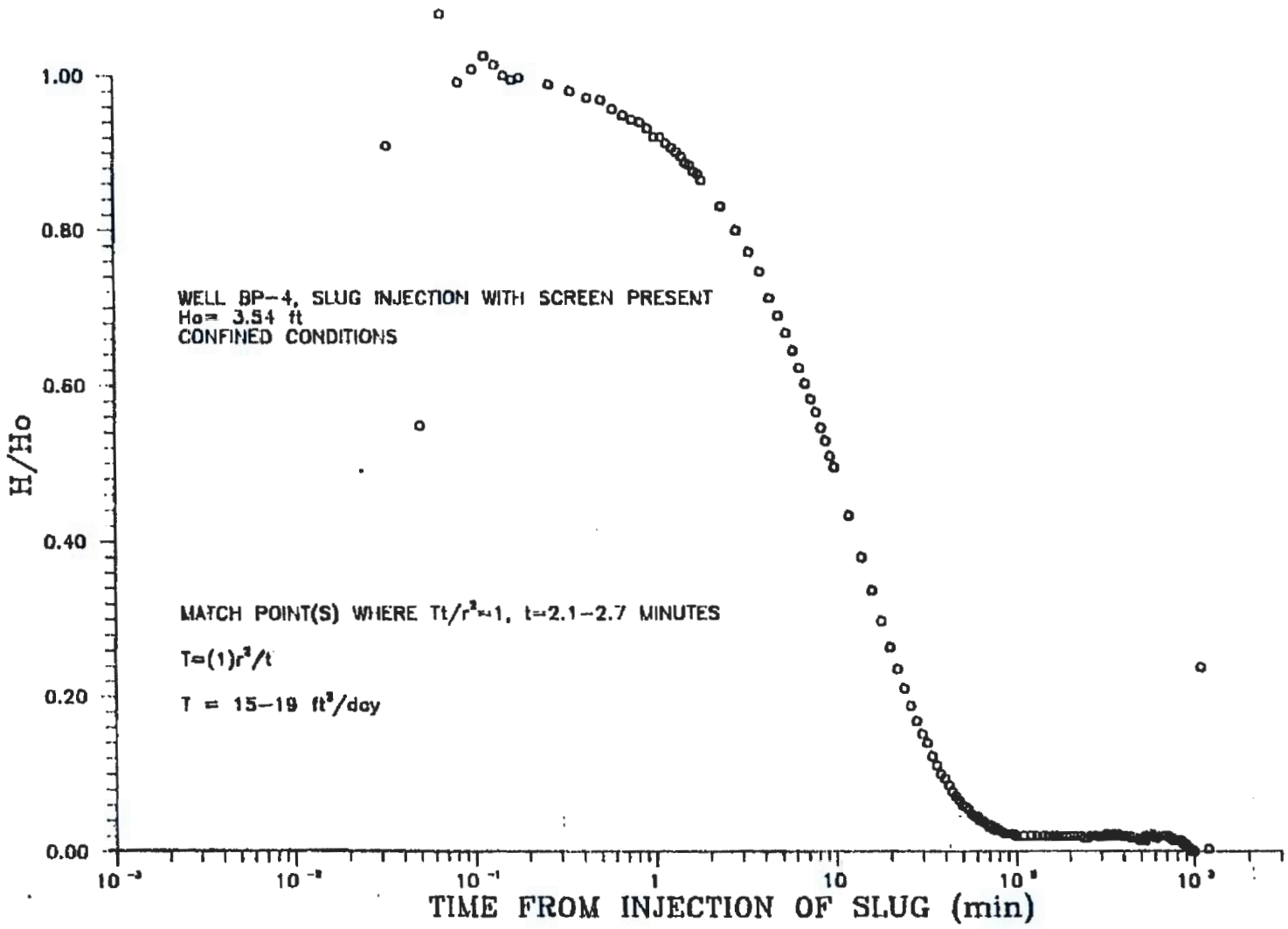
Step# 0 06/29 14:00

Elapsed Time	Value
0.0000	0.07
0.0033	0.07
0.0066	0.07
0.0099	0.07
0.0133	0.06
0.0166	0.07
0.0200	0.06
0.0233	0.07
0.0266	0.06
0.0300	0.07
0.0333	0.06
0.0500	0.06
0.0666	0.07
0.0833	0.07
0.1000	0.07
0.1166	0.07
0.1333	0.07
0.1500	3.38
0.1666	6.67
0.1833	- 3.22
0.2000	1.94
0.2166	3.82
0.2333	3.51
0.2500	3.57
0.2666	3.63
0.2833	3.59
0.3000	3.54
0.3166	3.52
0.3333	3.53
0.4167	3.50
0.5000	3.47
0.5833	3.44
0.6667	3.43
0.7500	3.39
0.8333	3.36
0.9167	3.34
1.0000	3.33
1.0833	3.30
1.1667	3.26
1.2500	3.26
1.3333	3.23
1.4166	3.21
1.5000	3.19
1.5833	3.17
1.6667	3.14
1.7500	3.13
1.8333	3.10
1.9167	3.09
2.0000	3.06
2.5000	2.94
3.0000	2.83
3.5000	2.73
4.0000	2.64
4.5000	2.52
5.0000	2.44
5.5000	2.36
6.0000	2.28
6.5000	2.20
7.0000	2.13
7.5000	2.06
8.0000	2.00
8.5000	1.93
9.0000	1.87
9.5000	1.80
10.0000	1.75
12.0000	1.53
14.0000	1.34
16.0000	1.19
18.0000	1.05
20.0000	0.93
22.0000	0.83
24.0000	0.74
26.0000	0.66
28.0000	0.59
30.0000	0.53
32.0000	0.49
34.0000	0.43
36.0000	0.39
38.0000	0.35
40.0000	0.33
42.0000	0.30
44.0000	0.27
46.0000	0.25
48.0000	0.23
50.0000	0.21
52.0000	0.20
54.0000	0.19
56.0000	0.17
58.0000	0.16
60.0000	0.16
62.0000	0.14
64.0000	0.14
66.0000	0.13
68.0000	0.12
70.0000	0.11
72.0000	0.12
74.0000	0.10
76.0000	0.11
78.0000	0.10
80.0000	0.10
82.0000	0.09
84.0000	0.09
86.0000	0.08
88.0000	0.08
90.0000	0.08
92.0000	0.08
94.0000	0.08
96.0000	0.08
98.0000	0.07
100.000	0.07
110.000	0.07
120.000	0.07
130.000	0.07
140.000	0.07
150.000	0.07
160.000	0.07
170.000	0.07
180.000	0.07
190.000	0.07
200.000	0.07
210.000	0.07
220.000	0.07
230.000	0.07
240.000	0.06
250.000	0.06
260.000	0.07
270.000	0.07
280.000	0.07
290.000	0.07
300.000	0.07
310.000	0.07
320.000	0.08
330.000	0.07
340.000	0.07
350.000	0.08
360.000	0.07

370.000	0.08
380.000	0.07
390.000	0.07
400.000	0.07
410.000	0.07
420.000	0.07
430.000	0.07
440.000	0.06
450.000	0.06
460.000	0.06
470.000	0.06
480.000	0.06
490.000	0.05
500.000	0.06
510.000	0.06
520.000	0.07
530.000	0.05
540.000	0.07
550.000	0.07
560.000	0.08
570.000	0.08
580.000	0.07
590.000	0.07
600.000	0.07
610.000	0.06
620.000	0.07
630.000	0.07
640.000	0.07
650.000	0.07
660.000	0.07
670.000	0.07
680.000	0.07
690.000	0.07
700.000	0.07
710.000	0.07
720.000	0.07
730.000	0.06
740.000	0.06
750.000	0.06
760.000	0.05
770.000	0.05
780.000	0.05
790.000	0.05
800.000	0.05
810.000	0.05
820.000	0.05
830.000	0.05
840.000	0.05
850.000	0.04
860.000	0.04
870.000	0.03
880.000	0.03
890.000	0.03
900.000	0.03
910.000	0.02
920.000	0.02
930.000	0.02
940.000	0.01
950.000	0.01
960.000	0.00
970.000	0.01
980.000	0.00
990.000	0.00
1000.00	0.00
1100.00	0.84
1200.00	0.01

END


BP-4 Raw data from slug injection
screened interval
WL ft from ref. level
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
10 -4
10 -3
10 -2
10 -1
1
10
10 2
10 3
10 4
time (min)


WELL BP-4, SLUG INJECTION WITH SCREEN PRESENT
Ho= 3.54 ft
CONFINED CONDITIONS
MATCH POINT(S) WHERE Tt/r²=1, t=2.1-2.7 MINUTES
T=(1)r²/t
T = 15-19 ft²/day
H/Ho
1.00
0.80
0.60
0.40
0.20
0.00
10⁻³
10⁻²
10⁻¹
1
10
10²
10³
TIME FROM INJECTION OF SLUG (min)

INFORMATION FOR WELL 699-43-41F (BP-9)

WELL DEVELOPMENT LOG

Collector JP McDonald, Bill Cronin, J.D. Horsman Date 8/30/89 - 8/31/89

Well Number BF-9 (105 [illegible]) Location B Pond Pumping Rate ~5, 1 gpm Time Pump Start 8/30/89 1315 Pump Stop 8/31/89 1310 hrs

Date	Time	Sample #	pH	Conductivity	Temp	Turbidity	Fe	Cr(VI)	Comments
8/30	13:20		7.23	305	21.0°C	>10	.65	<0	meter reads <0 7 and 10 buffer but sample appears slightly pink
	13:50		7.35	298	28.0	5.5	.90	~.05	
	14:20		7.69	302	22.5	7.1	.50	<0	No color – discontinue Cr
	14:50		7.94	300	23.9	1.8	.23	0	
	15:20		7.98	281	23.1	1.1	0.14	–	
	1620		7.90	~~28~~ 293	22.3	>10	0.3	–	Sampling discontinued — field personnel returned to office because of end of shift
8/30	23:06		7.94	.281 mS/cm	18.9	5.4	.17	–	VCR windy out – Blowing dust ~~[illegible]~~
8/30	23:23		7.54						Repeated pH measurement on sample 2306 (w.cc)
8/31				Flow rate is ~3 gpm	started pump at	1020 hrs			
8/31	1026		7.8	288	21.1	>10	>1	<0	Sample analyzed at 10:47 7 and 10 buffer
	1055		8.04	300	21.3	4.7	0.14	–	sample analyzed at 11:35 to 11:42
	1121		8.08	296	21.3	6.5	0.24	–	Sample analyzed at 11:45 to 11:52
	1151		8.07	293	20.7	1.9	0.08	–	sample analyzed at 12:10

NOTE: Unless otherwise noted, the following units are assumed:

Pumping rate-gpm
pH - pH units
Turbidity-NTU
Fe - mg/L
Conductivity - µS/cm
Cr - mg/L

Equipment: Hach

pH Model 43500, S/N 890205934 Fe S/N 8702 34455 Model 41100-93
Cond. Model 4964 Cr(VI) S/N 8702 34065 Model 41100-53
Turb. S/N 88 090 3409 Model 16800
S/N 890302145

Procedure PNL-MA-567 GC-5 Rev. 0

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WELL DEVELOPMENT LOG

Collector J.P. McDonald, Bill Cronin / J V Burghese, DR Newcomer Date 8/31/89

Well Number BP-9 (699-43-41D) Location B-Pond Pumping Rate 3 gpm - fluctuates see Aq. Test Log Restart 8/31/89 Time Pump Start 1020 Pump Stop 9/1/89 1310 hrs.

Date	Time	Sample #	pH	Conductivity	Temp	Turbidity	Fe	Cr(VI)	Comments
8/31	1220		8.00	299	20.5	1.9	0.07	—	turbidity not stabilizing recalibrated — still not stabilize 7 and 10 buffer
	1320		7.94	291	20.1	1.9	0.08	—	
	1355		7.82	298	19.5	4.6	0.14	—	Pumping rate increased from 2.7 to 3.0 gpm
	1455		7.91	300	20.4	4.0	0.02	—	
9/1	0014		7.86	285		8.1		—	
9/1	0014					7.8	.26	—	Turbidity meter - calibrated 0-9 NTU — Fe + Turbidity checked at 8:00
9/1	0730		8.05	282	16.8	.07	~.01	—	rechecked turbidity at 1005 read 1.1
	0830		8.09	292	19.4	.06	~.01	—	rechecked turbidity at 1006 read .5
	0930		8.01	294	20.0	1.5	~.02	—	
	0930					1.5	—	—	rechecked turbidity w/ 1/2 aliquot
	1000		7.97	294	20.5	.5	—	—	
	1020		7.90	292	20.6	4.7	.06	—	increased flow rate 2.8 gpm

NOTE: Unless otherwise noted, the following units are assumed:

Pumping rate-gpm; pH - pH units; Turbidity-NTU; Fe - mg/L; Conductivity - µS/cm; Cr - mg/L

Equipment: Hach

pH S/N 8902-05934 Cond. S/N 8903021 45 Turb. S/N 88 0903409

Fe S/N 8902344 55 Cr(VI) S/N

Procedure PNL-MA-567 GC-5 Rev. 0

WELL DEVELOPMENT LOG

J.P. McDonald, Bill Crann

Collector JV Borghese, DR Newcomer Date 9/1/89

Well Number BP-9 (1-19-93-415) Location B Pond Pumping Rate 2.8 Time Pump Start 8/31/89 1315 Pump Stop 9/1/89 1310

Date	Time	Sample #	pH	Conductivity	Temp	Turbidity	Fe	Cr(VI)	Comments
~~9/1~~ 0.	1047		7.93	287	20.8	4.8	-	-	almost out of reagent wanted to use on another well
2103	1115		7.96	294	20.6	5.2	-	-	7 and 10 buffer
2133	1145		7.85	296	18.9	2.0	-	-	
2163	1215		7.86	275/296	19.3	1.9	-	-	Rechecked conductivity disloge air bubbles for 2nd reading
2193	1245		7.82	298	19.6	1.2	-	-	

NOTE: Unless otherwise noted, the following units are assumed:

Pumping rate-gpm Fe - mg/L
pH - pH units Conductivity - µS/cm
Turbidity-NTU Cr - mg/L

Equipment: Hach

pH S/N 870205934 Fe
Cond. S/N 870302145 Cr(VI)
Turb. S/N 870302145

Procedure PNL-MA-567 GC-5 Rev. 0

Aquifer Test Data

Data for Well BP-9 (699-43-41
Pumping Well BP-7 (699-43-41F
Observation Wells BP-4 (699-43-

Location BP-9, B-Pond (699-43-41F)
Type of Aquifer Test Well Development
How Q Measured Inline 2" flowmeter (Rockwell Internat'l) S/N 40027877
How W.L.'s Measured Transducer (In Situ)
Rad./Dist. of/From Pumping Well 4" I.D.
Meas. Point for W.L.'s Top of Casing
Elevation of Meas. Point
Depth of Pump/Airpipe
Pump On: date 8/31/89 time 1315 hrs.
Pump Off: date 9/1/89 time 1310 hrs.
Duration of Aquifer Test

STAND PIPE: 2.93 ft from base of PAD Disch. column is 1" ID

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
8/30	0919				128.57								E-TAPE 1299B
	822				128.62								Steel Tape 4300-11
						D/B = 171.7'							
	0845					ref. set 20.01							Trans. reading
	1105				20.11								Trans. reading
	1152				20.12								Trans. reading ref set
	1307				20.15					6210.4			Trans. rdg: 20.15'
	1321	6				Pump on @	1315 hours			6236.5			Began datalogger @ 1310 hrs
	1323	8											10 divisions in 30 sec. = 2 gpm
	1324	9											
	1328	13											Decreased flow rate to ~0.5 gpm
	1404	53								6258.8		JWB	
	1410	55			-2.85								transducer reading
	1415	60								6258.8			checked out-low
	1416	61			-2.70								back 1:Hz < .5 gpm
	1435	80								6253.0		DRN	Increased flow rate to 1.05 gpm
	1449	94									0.95 gpm	DRN	
	1552	157								6323	0.9	DRN	
	1631	196			-5.51							DRN	No personnel available between
↓	1633	198								6367	0.8	DRN	1633 and 2248 hrs.
* See page 4												JWB	Generator out of gas perf. stopped
9/1	0711				.79					6663			overnight
	0757				127.93	Steel tape # 4300-11						DRN	unable to keep
													generator running
	0936				.59	Transducer						JWB	KAISER will take care of it
	1020					Restart pumping						DRN	Pump on
								Stopped @		6670.4	3 gpm	DRN	Flow rate decreased to < 3 gpm
						~~Generator out of gas during night~~							water flowing from discharge line
													but flowmeter stopped working
	1103							Opened gate valve to		1:Hz			Adjusted flowmeter to 3 gpm
	1115				-18.12	manual						JWB	flowmeter works now
	1117				-18.01								
	1117½				-17.98								flowmeter is not sensitive enough to
	1119									~~2.7~~	2.7	DRN	totalize while pumping less than
	1154				-17.83					6875	2.7	JWB	3 gpm
	1216									6879	2.7	JWB	
↓	1230				-17.66					6919	2.7		

Aquifer Test Data

page 2 of 8 4

Data for Well BP-9 (699-[illegible])
Pumping Well BP-9 (699-[illegible])
Observation Wells BP-4 (699-4[illegible])

Location BP-9. B Pond
Type of Aquifer Test Well Development
How Q Measured 1" inline Rockwell Internat/ flowmeter S/N 4002787 9
How W.L.'s Measured In Situ Datalogger/Transducer
Rad./Dist. of/From Pumping Well 4" I.D.
Meas. Point for W.L.'s Top of 6" Diam. casing (2.93' above pad)
Elevation of Meas. Point 6" Standpipe is 2.93 ft. from top of pad

Depth of Pump/Airpipe
Pump On: date 8/30/89 time 1315 hrs
Pump Off: date 9/1/89 time 1310 hrs.
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
8/31	1300				-17.65						2.7	DRN	
	1301									6998.5		DRN	
	1322									7083.3	2.7	JVB	
	1336				-17.51							JVB	
	1342									7108.0		DRN	[illegible] 9/1/89
	1343					Opened gate valve slightly					5.4	DRN	1.8 gal/20sec
	1344					Closed gate valve down a little					3.3	DRN	1.1 gal/20sec
	1347										3.3	DRN	1.1 gal/20sec.
	1352										3.0	DRN	3.0 gal/60sec
	1359									7144	3.0	JVB	
	1409										3.1	DRN	3.1 gal/60sec
	1410									7195.0		DRN	
	1452									7310.0	3.0	DRN	
	1453				-19.61							DRN	
	1529				-19.74					7420.8		DRN	No personnel available for night hours; let pump run overnight
9/1	0011									7791.3		JAM	
	0705									7288.2	1.1	JVB	
	[illegible]				-9.47							JVB	
	0753				138.12							DRN	Steel tape #L300-11
	0755				-9.37							DRN	
	[illegible]									9392.5	1.1	JVB	
	0910				-9.34							JVB	
	921									9459.7	1.1	JVB	
	1011									7481.5	1.1	DRN	
	1012				-9.26							JVB	
	1016											DRN	Increased flow rate to 1 gal/20 min
	1018										2.8	DRN	2.8 gpm/
	1022										2.8	DRN	
	1040									9558.3	2.6	JVB	
	1042				-18.74								
	[illegible]									[illegible]	2.7	JVB	
	1100				-18.51							DRN	
	1132									9689.5	2.5	DRN	
	1134				-18.51							DRN	
	1210				-18.35					9797	2.5	JVB	
	1234									9856	2.5	JVB	
	1330				-18.33							JVB	

Aquifer Test Data

Data for Well BP-9 (LOG-U
Pumping Well BP-9 (LOG-12-U15)
Observation Wells BP-4 (LOG-U

Location B Pond, BP-9
Type of Aquifer Test Well Development Recovery
How Q Measured N/A
How W.L.'s Measured E-tape (Slope Indicator), transducer (In situ)
Rad./Dist. of/From Pumping Well
Meas. Point for W.L.'s Top of 6" Stainless steel casing
Elevation of Meas. Point
6" Standpipe is 2.93 ft. from top of pad

Depth of Pump/Airpipe
Pump On: date 8/30/89 time 1315 hrs.
Pump Off: date 9/1/89 time 1310 hrs.
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9/1	~~1306~~				~~145.07~~	DRN 9/1/89						DRN	E-tape #12998 (500' length)
	1306				147.07							DRN	(measurements taken from
	1308				147.14							DRN	first mark for held value)
	1310:15				144.76								Pump off @ 1310 hrs.
	1311		1		138.99								
	1311:30		1.5		136.20								
	1312		2		134.39								
	1312:30		2.5		133.02								
	1313		3		132.01								
	1313:30		3.5		131.12								
	1314		4		130.34								
	1314:30		4.5		129.50								
	1315:03		5.05		128.79								
	1315:30		5.5		128.20								
	1316		6		127.62								
	1316:30		6.5		127.16								
	1317		7		126.71								
	1317:35		7.58		126.25								
	1318		8		125.98								
	1319		9		125.355								
	1320		10		124.87								
	1322		12		124.14								
	1324		14		123.67								
	1326		16		123.36								
	1328		18		123.14								
	1328:40		19.67		123.02								
	1337		27		121.35								
↓	1339									99288		DRN	Final Totalizer reading
													Left transducer
													over weekend

Aquifer Test Data

Data for Well BP-9 (699-[illegible]-41F)
Pumping Well BP-9 (699-[illegible])
Observation Wells BP-4 (699-[illegible]-41F)

Location BP-9
Type of Aquifer Test Development
How Q Measured 1" in line Rockwell Internat'l flowmeter S/N 40027879
How W.L.'s Measured In Situ Datalogger/Transducer
Rad./Dist. of/From Pumping Well 4" I.D.
Meas. Point for W.L.'s Top of 6" Casing
Elevation of Meas. Point
6" Standpipe is 2.93' above top of pad

Depth of Pump/Airpipe
Pump On: date 8/30/89 time 1315 hrs.
Pump Off: date 9/1/89 time 1310 hrs.
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
8/30	22:[illegible]				Tote Gauge = 6.75 gal/min							WEC	Totalizer dial reading,
	22:51					≈ 7.5 gal/min						WEC	not timed flow rate
	23:50				Tanker truck has							WEC	DRN
					small leak - did							WEC	
↓					not turn off pump							WEC	
													No personnel available
													for 8/31 early morning hours
													between midnight and 0700 hrs;
													let pump run through the night

Aquifer Test Data

page 1 of 1

Data for Well BP-4 (699-43-4
Pumping Well BP-9 (699-43-6
Observation Wells BP-4 (699-43-4

Location BP-4 E-Fund (699-43-41E)
Type of Aquifer Test Well Development
How Q Measured N/A
How W.L.'s Measured E-tape, Steel tape, Trans
Rad./Dist. of/From Pumping Well 4" I.D.
Meas. Point for W.L.'s Top of Casing
Elevation of Meas. Point
6" Standpipe is

Depth of Pump/Airpipe
Pump On: date 8/30/89 time 1315 hrs.
Pump Off: date 9/1/89 time 1310 hrs.
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Read-ing	Q		
8/30	1110				128.53								E tape 12998
	1110				128.58								Steel Tape L300-11
	1152				14.30								transducer, set ref.
	1309				14.36'								Trans. 14.36'
	1410				0	transducer							Begin datalogger @ 1310 hrs
	1916				0.01	"							
↓	1630				0.04							DRN	
8/31	0713				-.03							JUB	
	0748				128.64	Steel tape	#L300-11					DRN	
	0937				-.03	transducer						JUB	
	815				-.11							JUB	
	1118				-.12								
	1154				-.14								
	1230				-.14								
	1300				-.15							DRN	
	1336				-.15							JUB	
↓	1453				-.15							DRN	
9/1	0708				-0.06							JUB	
	0743				128.70	Steel tape						DRN	Steel tape #L300-11
	0756				-0.06							DRN	
	820				-0.05							JUB	
	913				-0.05							JUB	
	1012				-0.06								
	1104				-0.09							DRN	
↓	1134				-0.09							DRN	
↓	1310											DRN	Pump off in well BP-9
												DRN	Left datalogger and transducer,
													running in well BP-4 and BP-9
													over Labor Day weekend

Aquifer Test Data

page _____ of _____

Data for Well _____
Pumping Well _____
Observation Wells _____

Location B-Pond BP-9 (699-43-41F)
Type of Aquifer Test _____
How Q Measured _____
How W.L.'s Measured Transducer
Rad./Dist. of/From Pumping Well _____
Meas. Point for W.L.'s _____
Elevation of Meas. Point _____

Depth of Pump/Airpipe _____
Pump On: date _____ time _____
Pump Off: date _____ time _____
Duration of Aquifer Test _____

Time t = _____ at t' = 0					Water Level Data Static Water Level _____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Read-ing	Q		
					Transducer		reading after	increase					
					flow	rate	to	5.5 gpm		initially			
8/31	:242				417.55							JWB	
	-3				-17.66	flow rate increased							
	1245:5				-17.82								
	:30				-17.99								
	25				-18.15								
	34				-18.35								
	40				-18.463								
	50				-18.577								
	3:42				-18.65								
	26				-19.36								
	37				-19.55								
	45				-19.73								
	50				-19.75								
	1315:5				-19.82								
	20				-19.85								
	30				-19.88								
	45				-19.90						3.0		
13	46 11				-19.92								
	30				-19.95								
	45				-19.96								
	4700				-19.97								
	15				-19.98								
	30				-19.99								
	4745				-20.00								
13	4815				-19.99								
	30				-20.0								
	45				-20.0								
	49:00				-20.00								
	49:15				-20.00								
	49:35				-20.00								
	49:45				-20.00								
	50:15				-20.01								
	50:30				-19.99								
	5045				-19.99								
	51:00				-19.97								
	5200				-19.95						3.0		
	5300				-19.90								

Aquifer Test Data

page _____ of _____

Data for Well _____
Pumping Well _____
Observation Wells _____

Location B-Pond BP-9 (699-43-41F)
Type of Aquifer Test _____
How Q Measured _____
How W.L.'s Measured Transducer
Rad./Dist. of/From Pumping Well _____
Meas. Point for W.L.'s _____
Elevation of Meas. Point _____

Depth of Pump/Airpipe _____
Pump On: date _____ time _____
Pump Off: date _____ time _____
Duration of Aquifer Test _____

Time t = _____ at t' = 0					Water Level Data Static Water Level _____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
					Transducer reading at BP-9 after flow rate increase								
9/1	1016 10				-9.50							JVB	
	20				-10.13								
	30				-10.53								
	45				-11.08								
	1017 00				-11.55								
	15				-12.10								
	30				-12.58								
	45				-12.97								
	1018 00				-13.34								
	15				-13.63								
	30				-14.19								
	45				-14.65								
	1019 00				-14.96								
	15				-15.29								
	30				-15.56								
	45				-15.85								
	1020 00				-16.24								
	15				-16.64								
	30				-17.02								
	45				-17.22								
	1021 00				-17.36								
	15				-17.54								
	30				-17.67								
	45				-17.79								
	1022 00				-17.87								
	30				-18.10								
	1023				-18.21								
	1025				-18.40								

Aquifer Test Data

page 1 of 2

Data for Well _____
Pumping Well _____
Observation Wells _____

Location B-Pond BP-9 (699-43-41F)
Type of Aquifer Test [illegible] from well down
How Q Measured _____
How W.L.'s Measured Transducer
Rad./Dist. of/From Pumping Well _____
Meas. Point for W.L.'s _____
Elevation of Meas. Point _____

Depth of Pump/Airpipe _____
Pump On: date _____ time _____
Pump Off: date _____ time _____
Duration of Aquifer Test _____

Time t = _____ at t' = 0					Water Level Data Static Water Level _____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Read-ing	Q		
					Transducer data recovery								
4/1	1310:00				pump off								
	1030				-13.75								
	45				-11.64								
	1100				-10.05								
	1115				-8.51								
	1130												
	1145				-6.47								
	1200:00				-5.57								
	15				-4.93								
	30				-4.30								
	45				-3.42								
	1300				-3.33								
	15				-2.77								
	30				-2.37								
	45				-2.00								
	1400				-1.64								
	15				-1.17								
	30				-.84								
	45				-.36								
	1500				-.20								
	15				+.27								
	30				.54								
	45				.63								
	1600				.09								
	15				1.38								
	30				1.55								
	45				1.81								
	1700				2.05								
	15				2.21								
	30				2.40								
	45				2.57								
	1800				2.74								
	1815				2.86								
	30				3.06								
	45												
	1900				3.36								
	30				3.46								
	30				3.62								

Aquifer Test Data

page 2 of 2

Data for Well
Pumping Well
Observation Wells

Location B-Pond BP-9 (699-43-41F)
Type of Aquifer Test Recovery from well dev
How Q Measured
How W.L.'s Measured Transducer
Rad./Dist. of/From Pumping Well
Meas. Point for W.L.'s
Elevation of Meas. Point

Depth of Pump/Airpipe
Pump On: date time
Pump Off: date time
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Read-ing	Q		
					Transducer Data Recovery continued								
9/1	131945				3.75								
	1320				3.81								
	2030				4.09								
	2100				4.22								
	2130				4.26								
	2200				4.26								
	2230				4.26								
	2300				4.26								
	~~2330~~												
	~~2400~~												
	~~2430~~												
	~~0230~~												

DRILL LOG	By Borghese	Rig Pump Rig	Well Number BP-9 (699434IF)	Computer Number	Project or Work Order No. W-617
	Date 9/21/89		Depth To		Subcontract No.

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Hydrostar pump removing + placement	12 45	
				drillers: Darrell Lada, Brett Strode		
				Reported P/B 175.68 from land surface		
				stand pipe: ~~2.97'~~ 2.95'		
				D/B 176.64 +2.7 from TOC		
				muddy water inside pump		
				and loose teflon		

REMARKS:

D - Drive L I H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

129
18
147

Equipment Record Form for the Installation and Removal of Data Loggers and Pressure Transducers

Initial Check: ✓ In lab May 18, 1989		
Purpose of Installation: To Conduct Slug test		
Monitored Hydrologic Unit or Water Body: Aquifer. Below Bond		
Date/Time of Installation: 5/30/89 13:30	Procedure Followed: AT-4 Draft WA-4	
Data Logger Make/Model: In Situ SE 1000B		
Serial No.: 1KB-382	Number of Channels Used: 1 (one)	
Pressure Transducer Make/Model: Hermit-In-Situ PTX-16100	Full Scale Range: 10 PSI 23 FT Max	Well No.: BP9
	Serial No.: 2161	Depth: ~ 147'
Pressure Transducer Make/Model:	Full Scale Range:	Well No.:
	Serial No.:	Depth:
Description of Data Logger Installation and Well Head Configuration: Data logger was taped to the outer casing of BP-9. Transducer was installed approximately 18 ft below static water level at 147' depth		
Comments:		
Equipment Installed By W.E. Cronin		
Date/Time of Equipment Removal: 5/31/89 Removed 9:21 A.M		
Decontamination Procedure (if required):		
Equipment Removed By WE Cronin		

Test stopped 9:21
5/31

Location 200 East Date of Test 5/30/89

Well Number BP-9 Procedure Number AT-6, Draft WL-4

Type of Test(s) Slug Test

Personnel Conducting Test W.E. Cronin

WELL CONFIGURATION

Well Depth ≈ 175.56 ft Borehole Diameter ~~8~~"

Well Casing Inside Diameter 4 1/6" Well Screen Inside Diameter ~~4~~

Length of Screened Interval 10' Depth of Screen 165.5' - 175.5'

Comments 2.6 ft from inner TOC to outer TOC

SLUG INFORMATION

Slug Construction Materials steel - Hollow Tube

Length of Slug 8.1 ft Diameter of Slug 0.25 ft

Comments Slug Tapered at both ends - last .06 ft - tapered to .13 ft diam

Volume of Attachments (if applicable) Volume rebar 3/4 (2.1 ft length) = [illegible] ft³

Diameter = .05 ft

1.8
.3
2.1

MEASUREMENT EQUIPMENT INFORMATION

	Make	Model	Serial Number
Electric Tape	Water Level Indicator	31453	11044
Steel Tape	Lufkin	-	L200-01 ~~PAL-PA-567~~
Data logger	In situ	SE 10008	1K8-382
Transducer	In situ	ATX-1600	2161
Other			

Aquifer Test Data

page one 1 of one 1

Data for Well BP9

Pumping Well —

Observation Wells —

Location 200 East

Type of Aquifer Test Slug

How Q Measured

How W.L.'s Measured Steel tape - E Tape

Rad./Dist. of/From Pumping Well

Meas. Point for W.L.'s Outer TOC -10"

Elevation of Meas. Point

Depth of Pump/Airpipe —

Pump On: date — time —

Pump Off: date — time —

Duration of Aquifer Test

Time t = _____ at t' = 0					Water Level Data Static Water Level _____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
5/30	12:44				128.29							wec	E Tape 11044
	12:45				129.01							wec	"
	12:46				129.15							wec	"
	12:52				129.27	Lufkin MA-657							Steel tape L200-01
	13:30				transducer reading								= 17.78
	13:37				129.25							wec	transducer = 17.78
	13:43					transducer reading						wec	= 17.98
					Outer Casing - land surface =					3.74			
	13:56				transducer reading							wec	= 18.01
	14:04				129.25							wec	steel tape
	14:07					transducer reading						wec	= 18.04 = Reference
	14:57				128.31							wec	steel tape 18.04
					Transducer started and								18.57 actual Range
					slug dropped at								
					14:50								
	14:58					transducer reading						wec	= 0.55
	15:03					transducer reading						wec	= 0.34
	15:09					transducer reading						wec	= 0.17
	15:14					transducer reading						wec	= 0.11
	15:18				129.21							wec	steel tape
	15:19					transducer reading						wec	= 0.10
5/31	9:59					Transducer reading						wec	= 0.15
	9:04				129.28							wec	steel tape
	9:05					transducer reading						wec	= 0.12
	9:12					Transducer reading						wec	= 0.10
	9:17				129.27							wec	steel tape
	9:20					transducer reading						wec	= 0.10
	9:21					test stopped							

ELECTRONIC DATA CONTROL FORM

DATE AND START TIME OF DATA ACQUISITION 5/30/89 1330

DATE AND END TIME OF DATA ACQUISITION 0921 5/31/89

WELL NUMBER BP-9

TYPE OF TEST OR DATA Slug injection

TYPE AND IDENTIFICATION NUMBER OF DATA LOGGER

Hermit SE1000B S/N 382

TEST NUMBER 0

CHANNEL OR INPUT NUMBER 1

UNITS OF VALUES RECORDED ft from reference

NUMBER OF PAGES ATTACHED 4

COMMENTS:

Slug diameter: .25' length: 8.1

DATA VALIDATION STATEMENT:

The attached data represent the data as originally recorded on the data logger. Any exceptions and reasons for such are indicated in the comments section.

Jane V Boykese Scientist — May 31, 1991

Name, title — Date

Data Logger Printout from Slug Injection Test at Well BP-9

SE1000B
Environmental Logger
05/31 11:51

Unit# 00382 Test# 0

INPUT 1: Level (F)

Reference	0.00
Scale factor	10.07
Offset	- 0.07

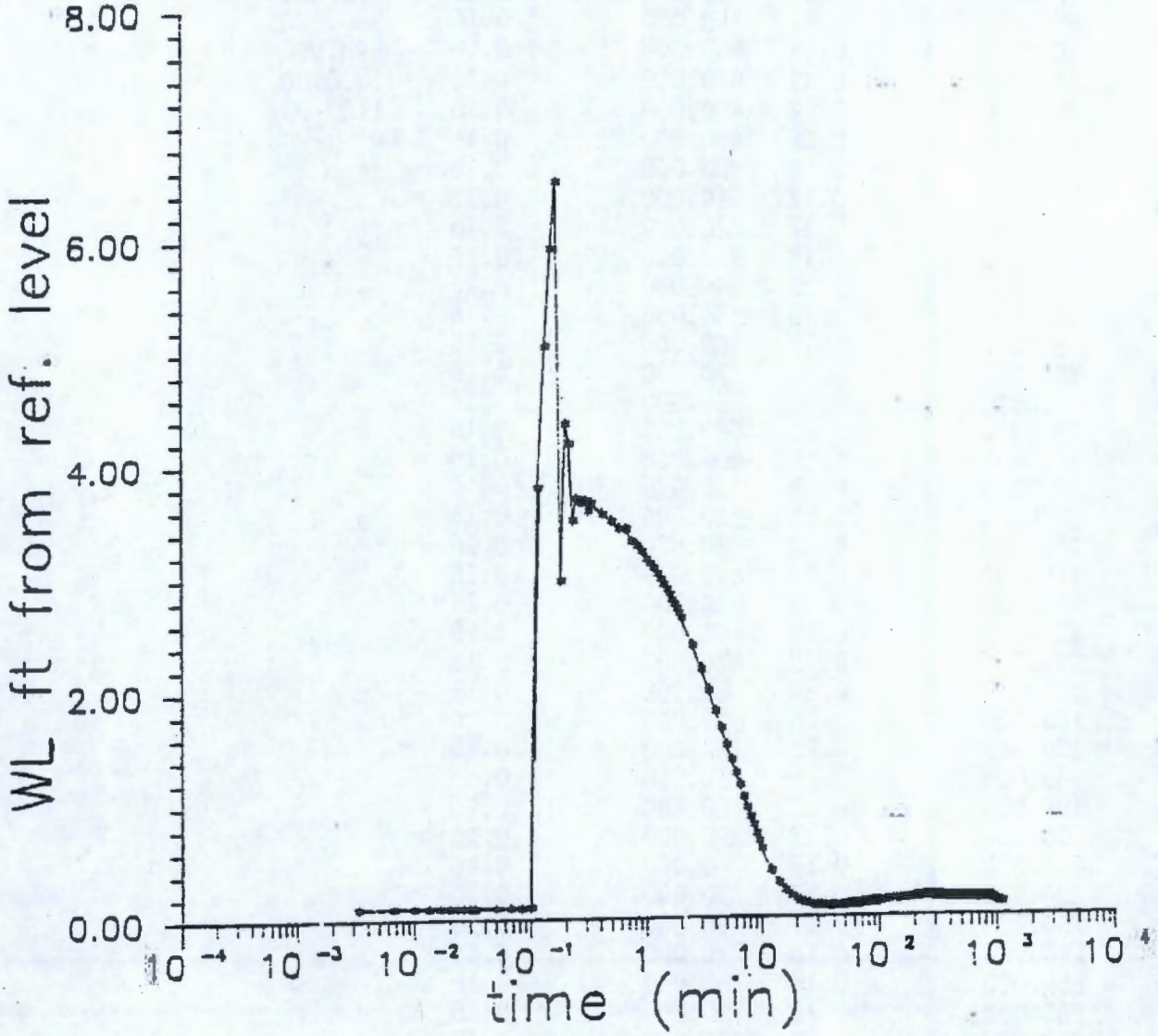
Step# 0 05/30 14:50

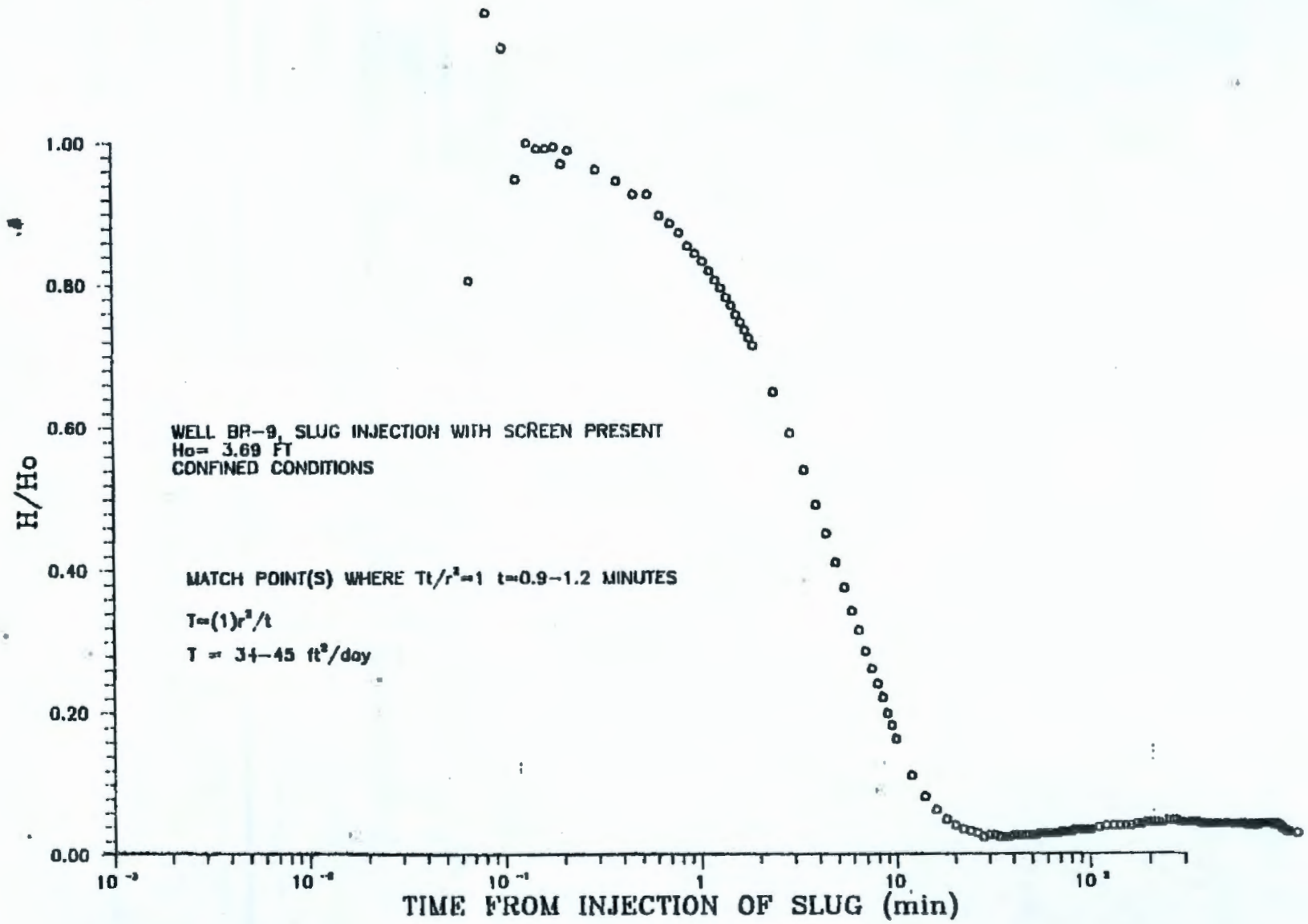
Elapsed Time	Value
0.0000	0.10
0.0033	0.10
0.0066	0.10
0.0099	0.10
0.0133	0.10
0.0166	0.10
0.0200	0.10
0.0233	0.10
0.0266	0.10
0.0300	0.10
0.0333	0.10
0.0500	0.10
0.0666	0.10
0.0833	0.10
0.1000	0.11
0.1166	3.79
0.1333	5.05
0.1500	5.92
0.1666	6.50
0.1833	2.97
0.2000	4.36
0.2166	4.18
0.2333	3.50
0.2500	3.69
0.2666	3.66
0.2833	3.66
0.3000	3.67
0.3166	3.58
0.3333	3.65
0.4167	3.55
0.5000	3.49
0.5833	3.42
0.6667	3.42
0.7500	3.31
0.8333	3.27
0.9167	3.22
1.0000	3.15
1.0833	3.11
1.1667	3.07
1.2500	3.02
1.3333	2.97
1.4166	2.93
1.5000	2.88
1.5833	2.84
1.6667	2.79
1.7500	2.75
1.8333	2.71
1.9167	2.67
2.0000	2.63
2.5000	2.39
3.0000	2.18
3.5000	1.99
4.0000	1.81
4.5000	1.66
5.0000	1.51
5.5000	1.38
6.0000	1.26
6.5000	1.16
7.0000	1.05
7.5000	0.96
8.0000	0.88
8.5000	0.81
9.0000	0.73
9.5000	0.67
10.0000	0.60
12.0000	0.41
14.0000	0.30
16.0000	0.23
18.0000	0.18
20.0000	0.15
22.0000	0.13
24.0000	0.12
26.0000	0.11
28.0000	0.09
30.0000	0.10
32.0000	0.10
34.0000	0.09
36.0000	0.09
38.0000	0.09
40.0000	0.10
42.0000	0.10
44.0000	0.10
46.0000	0.10
48.0000	0.10
50.0000	0.10
52.0000	0.10
54.0000	0.11
56.0000	0.11
58.0000	0.11

Data Logger Printout from Slug Injection Test at Well BP-P (contd)

60.0000	0.11	430.000	0.16	960.000	0.13
62.0000	0.11	440.000	0.16	970.000	0.12
64.0000	0.11	450.000	0.16	980.000	0.12
66.0000	0.11	460.000	0.16	990.000	0.12
68.0000	0.11	470.000	0.16	1000.00	0.12
70.0000	0.12	480.000	0.16	1100.00	0.11
72.0000	0.12	490.000	0.16	END	
74.0000	0.12	500.000	0.16		
76.0000	0.12	510.000	0.16		
78.0000	0.12	520.000	0.16		
80.0000	0.12	530.000	0.16		
82.0000	0.13	540.000	0.16		
84.0000	0.13	550.000	0.16		
86.0000	0.13	560.000	0.16		
88.0000	0.13	570.000	0.16		
90.0000	0.13	580.000	0.16		
92.0000	0.13	590.000	0.16		
94.0000	0.13	600.000	0.16		
96.0000	0.13	610.000	0.15		
98.0000	0.13	620.000	0.16		
100.000	0.13	630.000	0.16		
110.000	0.14	640.000	0.16		
120.000	0.15	650.000	0.16		
130.000	0.15	660.000	0.15		
140.000	0.15	670.000	0.15		
150.000	0.15	680.000	0.15		
160.000	0.15	690.000	0.16		
170.000	0.16	700.000	0.15		
180.000	0.16	710.000	0.16		
190.000	0.17	720.000	0.16		
200.000	0.17	730.000	0.16		
210.000	0.17	740.000	0.16		
220.000	0.17	750.000	0.16		
230.000	0.17	760.000	0.16		
240.000	0.18	770.000	0.16		
250.000	0.18	780.000	0.16		
260.000	0.18	790.000	0.16		
270.000	0.18	800.000	0.16		
280.000	0.17	810.000	0.16		
290.000	0.17	820.000	0.16		
300.000	0.17	830.000	0.16		
310.000	0.17	840.000	0.15		
320.000	0.17	850.000	0.16		
330.000	0.17	860.000	0.16		
340.000	0.17	870.000	0.16		
350.000	0.17	880.000	0.15		
360.000	0.16	890.000	0.15		
370.000	0.16	900.000	0.15		
380.000	0.16	910.000	0.15		
390.000	0.16	920.000	0.14		
400.000	0.16	930.000	0.13		
410.000	0.16	940.000	0.13		
420.000	0.16	950.000	0.13		

BP-9 Raw data from slug injection screened interval




WELL BR-9, SLUG INJECTION WITH SCREEN PRESENT
Ho= 3.69 FT
CONFINED CONDITIONS
MATCH POINT(S) WHERE Tt/r²=1 t=0.9-1.2 MINUTES
T=(1)r²/t
T = 34-45 ft²/day
H/Ho
1.00
0.80
0.60
0.40
0.20
0.00
10⁻³
10⁻²
10⁻¹
1
10
10²
TIME FROM INJECTION OF SLUG (min)

INFORMATION FOR WELL 699-43-42J (BP-7)

Developement.

DRILL LOG	By K.R. Oster	Rig N/A	Well Number BP-7 699-43-42J	Computer Number N/A	Project or Work Order No. B-Pond
	Date 10-13-88		Depth 177.35' To Bottom.		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Took Depth to bottom before installation of 1½hp		
				submersible pump for well developement.		
				10/13/88 Depth to bottom = 177.35' to ground level KRO.	0945	
				Pump set 6" from bottom on 10/13/88 KRO		

REMARKS:

Karen P. Oster
10/13/88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-8000-021 (5-85)

DRILL LOG	By K.R. Oster	Rig N/A	Well Number (BP-7) 699-43-42 J	Computer Number N/A	Project or Work Order No. B-Pond
	Date 10/14/88		Depth 177.35' To Developement		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Detelapement by overpumping with 1½ Hp Submersible		
				pump. Depth to water (D/W) before starting 160.85' b.t.c.	1035	
				Stick-up = 3.43' (t.c. - 3.43' = l.s.)	1045	Pump on.
				D/W = 169.60' b.t.c. } Water is clear at 1st then gets	1047	
				D/W = 167.45' b.t.c. } slightly cloudy	1051	
				Pump Rate 5:31 per 5gal	1047	
				D/W.		
				Water Sample. Clear 8.9 NTU	1055	
				D/W = 166.40' b.t.c.	1056	
				D/W = 165.85' b.t.c.	1104	
				Pump Rate = 5:21 min / 5gals	1105	
				Water Sample - Clear no silt or sand: 4.1 NTU	1110	
				D/W = 165.55' b.t.c.	1116	
				D/W = 165.50' b.t.c.	1126	
					1130	Adjust Valve
				Pump Rate = 3:10 min / 5gals	1135	
				D/W = 170.17' b.t.c.	1137	
				Water Sample Clear no silt or sand: 2.4 NTU	1138	

REMARKS: D/B = 177.35' b.l.s. b.t.c = below top of casing

Karen R. Oster
10/14/88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

DRILL LOG	By K.R. Oster	Rig N/A	Well Number (BP-7) 699-43-42J	Computer Number N/A	Project or Work Order No. B-Pond
	Date 10/14/88		Depth 177.35' To Development		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				D/W= 169.08' b.t.c.	1146	
				D/W= 168.60' b.t.c.	1156	
				D/W= 168.45' b.t.c.	1212	
				D/W= 168.31' b.t.c.	1227	
				Pump rate = 3:05 min /5gal	1229	
				Water Sample Clear-no sand or silt: 1.6 NTU	1232	
					1235	Adjust Valve
				D/W = 169.50' b.t.c.	1236	
				Pumprate = 2 min /5gals.	1238	
				Water Sample Clear-no sand/silt 1.0 NTU.	1240	
				D/W= 174.60' b.t.c. -very hard to get measurement this deep 1246. Pump Off		
				D/W = 160.98' b.t.c.	1251	
				D/W = 161.00' b.t.c.	1300	
				D/W = 160.86' b.t.c.	1324	
					1325	Pump on
				D/W = 171.30' b.t.c.	1328	
				Pump rate = 2:10 /5gals	1329	
				Water Sample - Slightly Cloudy (very little) some sand. 9.5 NTU.	1330	

REMARKS:

Karen R. Oster
10/14/88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (6-85)

DRILL LOG	By K.R. Oster	Rig N/A	Well Number (BP-7) 699-43-42J	Computer Number N/A	Project or Work Order No. B-Pond
	Date 10/14/88		Depth 177.35' To Developement		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				D/W = 170.57' b.t.c.	1337	
				Water Sample-clear no silt/sand 1.8 NTU.	1338	
				D/W = 170.62' b.t.c	1342	
					1345	Pump off.
				D/W = 160.20' b.t.c.	1347	
				D/W = 161.00' b.t.c.	1352	
					1355	Pump on
				D/W = 170.48' b.t.c.	1358	
				Pump rate = 2:51 min / 5 gal bucket	1359	
				Water Sample Clear - no sand/silt. 3.1 NTU	1400	
				D/W = 168.14' b.t.c.	1404	
					1405	Pump off.
				D/W = 160.16' b.t.c	1407	
				Water Sample-Clear-small amount sand appears just as pump	1410	Pump on
				is turned on but not later. Sample of 1ST water. 3.8 NTU	1411	
					1415	Pump off
				Water Sample. Clear small amount sand appears just as	1420	Pump on
				pump is on. 5.6 NTU	1421	

REMARKS:

Karen R. Oster
10/14/88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

DRILL LOG	By K.R. Oster	Rig N/A	Well Number (BP-7) 699-43-42J	Computer Number N/A	Project or Work Order No. B-Pond
	Date 10/14/88		Depth 177.35' To Developement		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
					1425	Pump off.
				1ST water 6.4 NTU	1430	Pump on
					1435	Pump off.
				Rinse jar then took sample. 3.1 NTU.	1439	Pump on
				It appears that if sample is taken from the 1ST water out	1444	Pump off
				of the pipe it is above 5 NTU but when sample is		
				taken from 2nd pint H_2O out of pipe it is below 5 NTU.		
				1ST jar of water 4.4 NTU.	1447	Pump on
					1449	Pump off
				1ST jar of water 4.1 NTU.	1454	Pump on
				Saved pint of water from last sample.	1459	Pump off
						Done developing

REMARKS:

Karen R. Oster
10/14/E

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

INFORMATION FOR WELL 699-43-43 (BP-8)

Development of BP-8

Page 1 of 1

DRILL LOG	By HJ Cartmell	Rig N/A	Well Number 299-BP-8 699-43-43	Computer Number N/A	Project or Work Order No. B-Pond
	Date 10/20/88		Depth 163.00' To Water		Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Develope by Overpumping using 1½ hp submersible		
				pump. Depth to bottom = 171.65' ground level		taken 10/19/88
				Depth to water (D/W) = 163.00' Top of Casing	1300	
				Pump [illegible]	1349	Pump on
				Water Sample. clear	1351	
				Pump Rate. 32 oz/5 gal = 9.37 gal/min. (g/m)	1353	
				D/W. 163.17'	1357	
				Pump Rate 32 oz/5 gal. = 9.37 g/m. clear.	1403	
				D/W. 163.18'	1407	
				Water Sample. 3.6 NTU	1414	
				D/W. 163.18'	1418	
				Turn Pump off and on twice to sparge well	1419	Pump off } 6
				D/W. 163.00'	1425	Pump on.
					1431	Pump off. } 7
				D/W. 163.00'	1438	Pump on.
				Pump Rate. 9.37 g/m.	1440	
				Water Sample. 1.5 NTU	1452	
				D/W. 163.17'	1504	Pump off

REMARKS:

Karen F. Oster for H.J. Cartmell
10/20/88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (6-86)

WELL 699-43-43 (BP-8)

Purpose of Test: To estimate hydraulic properties (transmissivity and hydraulic conductivity) of the aquifer beneath 216-B-3 Pond in the 200-East Area.

Types of Tests Performed:

Slug Test ( ) Specific Capacity ( ) Constant Discharge (x) Recovery ( )

Hydrogeologic Unit Tested: Ringold Formation, Hanford formation

Depth of Formation:

Top: 159 ft Bottom: Unknown

Depth of Screened Interval Tested:

Top: 162 ft Bottom: 180 ft

Observation Well Used: N/A

Date of Test: 9/9/88 Start Time of Test: 1030 hrs

Pumping Rate: 216 gpm Duration of Test: 290 min

Pre-test Water-level Depth (b.l.s.):

158.85 ft

Water-level Measurement Methods:

Electric tape

Maximum Drawdown: 0.45 ft

Analysis Methods and Results:

Methods	Transmissivity (ft^2/day)	Hydraulic Conductivity (ft/day)	Storativity
Constant Discharge Cooper and Jacob (1946)	37,000	N/A	N/A

Remarks:

Casing Storage Effects
t_c < 1 minute (Schafer 1978)
t_c < 1 minute (Hargis 1979)

Aquifer Test Data

$d_c = 7.5''$
$d_p = 3.25''$

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Date for Well 299-BP-8

Pumping Well 299-BP-8

Observation Wells none

Location B-Pond (200 East)

Type of Aquifer Test Step drawdown/Development/Recovery

How Q Measured In-line McCrometer flowmeter Pat. No. 3449009

How W.L.'s Measured E-tape (Slope Ind.) S.N. 11053 Depth of Pump/Airpipe ~ 177' from ground surface

Rad./Dist. of/From Pumping Well ~~blank~~ 3.75" Pump On: date 9-8-88 time 13:15:00

Mess. Point for W.L.'s Top of tremie pipe (0.24' below TOC) Pump Off: date 9-9-88 time 15:45

Elevation of Meas. Point _____ Duration of Aquifer Test 2.5 hours

TOC is 2.34' above ground level

Time: t = 150 min. at t' = 0					Water Level Data: Static Water Level 161.04'					Discharge		Recorded By	Comments: Set 5 psi transducer just above bottom of tremie pipe @ 1445 hrs. but did not collect data. (25 hp pump)
Day	Clock Time	t	t'	t/t'	(feet) Reading	Conversions or Corrections	Water Level	s or s'		Reading (gallons)	Q (gpm)		
9-8	1315	0			161.04			0		1000		DRN	~~began pumping at a rate of~~
	1318	3			161.13			0.09		1090 @ 1317 hrs.			150-200 gpm, but ~~quickly~~ dropped it
	1322	7			161.12			0.08		1550 @ 1323:10			closed valve slowly to ~ 22 gpm
	1330	15			161.22			0.18		2230	62	DRN	-gauge holding steady
	-	-			-								-Pipe is leaky just beyond gate valve
	-	-			-								-water looks clear from faucet valve and pipe is full of water
	-	-			-								
	1340	25			161.23			0.19				DRN	
	1341	26			-					2710	~62	DRN	-flow rate pretty steady
	1347.5	32.5			161.27			0.23		3230	109	DRN	-Opened valve slowly to ~110 gpm
	-	-			-					-	-		-Cannot measure flow rate at
	-	-			-					-	-		outlet into B-pond because of
	1355	40			161.29			0.25		4030	105-110	DRN	~~unauthorized~~ unauthorization DRN 9-8-88
	1405	50			161.29			0.25		5130	105-115	DRN	Opened valve to 160 gpm
	1418	63			161.37			0.33		6680	160	DRN	@ 1415 hrs
	1425	70			161.39			0.34		-	160-162	DRN	
	1435	80			161.405			0.365		9663	160-162	DRN	
	1450	95			161.47			0.43		12890	~220	DRN	opened valve all the way
	1502	107			161.51			0.47		-	223	DRN	to ~ 220 gpm @ 1445 hrs.
	1515	120			161.54			0.50		17790	223	DRN	Fluctuations betw. 220 and 225 gpm
	1530	135			161.57			0.53		-	~223	DRN	Water remains clear
	1542	147			161.59			0.55		23250	222	DRN	
	(Begin recovery)												
	1545	150	0		161.59			0.55		~24567	(fixed rdg.)		Pump shut off @ 1545:05
	1545:30	150.5	0.5	301	161.46			0.42				DRN	(Pressed "off" button on generator
	1546	151	1	151	161.44			0.40					a few seconds late)
	1546:30	151.5	1.5	101	161.43			0.39					
	1547	152	2	76	161.415			0.375					
	1547:30	152.5	2.5	61	161.38			0.34					
	1548	153	3	51	161.31			0.27					
	1549	154	4	38.5	161.295			0.245					
	1550:30	155.5	5.5	28.3	161.27			0.23					
	1551	156	6	26	161.26			0.22					
	1552	157	7	22.4	161.255			0.215					
	1553	158	8	19.8	161.25			0.21					
	1555	160	10	16	161.24			0.20					
	1557	162	12	13.5	161.23			0.19					
	1600	165	15	11	161.23			0.19					

Aquifer Test Data

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Data for Well 299-BP-3
Pumping Well 299-BP-3
Observation Wells None

Location B-Pond (200 East Area)
Type of Aquifer Test (Continue) Step drawdown/Development/Recovery
How Q Measured In-line McCrometer Flowmeter
How W.L.'s Measured 200' E-tape (Steps Indicator) Depth of Pump/Airpipe ~177' from ground surface
Rad./Dist. of/From Pumping Well N/A 3.75" DRN 9-8-88 Pump On: date 9-8-88 time 1315 hrs.
Meas. Point for W.L.'s Top of 1" Tremie Pipe (0.24' abv. TOC) Pump Off: date 9-8-88 time 1545 hrs.
Elevation of Meas. Point TOC is 2.0±1' above land surface Duration of Aquifer Test 2.5 hours

Time t = 150 min at t' = 0					Water Level Data Static Water Level 161.04'					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9-8	1605	170	20	8.5	161.215			0.175				DRN	
	1610	175	25	7	161.19			0.15				DRN	
	1615	180	30	6	161.19??			0.15?				DRN	Difficult to tell where
	1620	185	35	5.3	161.19??			0.15?				DRN	E-tape measurement is
	1625	190	40	4.75	161.13			0.09				DRN	
	1635	200	50	4	161.115			0.075				DRN	
	1645	210	60	3.5	161.11			0.07				DRN	

Aquifer Test Data

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Data for Well 299-BP-8
Pumping Well 299-BP-3
Observation Wells None

Location B-Pond (200 East Area)
Type of Aquifer Test Constant Discharge
How Q Measured In-line McCrometer Flowmeter
How W.L.'s Measured E-tape / transducer
Rad./Dist. of/From Pumping Well ~~AFA~~ 3.75' DRN 9-9-88
Meas. Point for W.L.'s Top of Tremix Pipe
Elevation of Meas. Point

Depth of Pump/Airpipe ~177' from ground surface
Pump On: date 9-9-88 time 09:30:00
Pump Off: date — time —
Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level 161.15'					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9-9	930	0			161.15'					24567		DRN	Generator is on, but
		0.5											pump would not start.
		1											John Keller got it started
		1.5											approx. 1000 hrs. and let
		2											it run for a few seconds.
		2.5											Voltage on generator was
		3											not tweaked enough.
		4											
		5											Need to restart test

Aquifer Test Data

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Data for Well 299-BP-8
Pumping Well 299-BP-8
Observation Wells None

Location B-Pond (200 East Area)
Type of Aquifer Test Constant Discharge
How Q Measured Inline McCrometer Flow meter S.N. 87-3-1163
How W.L.'s Measured 300' E-tape (Steve Saul) S.N. 12174 / Transducer 5 psi #00232 (I.N.W.) Depth of Pump/Airpipe ~177' from ground surface
Rad./Dist. of/From Pumping Well ~~N/A~~ 3.75" DRN 9-8-88 Pump On: date 9-9-88 time 10:30:00
Meas. Point for W.L.'s Top of Tremie Pipe (2.25' above ground level) Pump Off: date 9-9-88 time 15:20:00
Elevation of Meas. Point Duration of Aquifer Test 290 min.

Time t = 290 min at t' = 0					Water Level Data DRN 9-9-88 Static Water Level ~~161.10'~~ 161.13'					Discharge		Recorded By	(25 hp pump) Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading (gallons)	Q gpm		
9-9	1030	0			161.13					24750	~223	DRN	Began pumping @~223 gpm
	1030:30	0.5			161.21			0.08				DRN	but leveled off to 220 gpm
	1031	1			161.29			0.16				DRN	-Flow rate is very steady
	1031:30	1.5			161.31			0.18				DRN	E-tape is difficult
	1032	2			161.315			0.185				DRN	to use
	1032:30	2.5			161.33			0.20				DRN	Joint in discharge line is
	1033	3			161.325			0.195				DRN	leaky just beyond gate valve.
	1034	4			161.33			0.20				DRN	
	1035	5			161.33			0.20				DRN	
	1036	6			161.33			0.20				DRN	
	1038	8			161.39?			0.26				DRN	
	1040	10			161.32			0.20	~	27000	220	DRN	Flow rate is steady
	1042	12			161.33			0.20				DRN	
	1044	14			161.33			0.20		27840	218-220	DRN	
	1046	16			161.33			0.20				DRN	windy weather conditions.
	1048	18			161.33			0.20				DRN	
	1050	20			161.35			0.22			~220	DRN	
	1055	25			161.37			0.24				DRN	
	1100	30			161.37			0.24		31390	218-220	DRN	
	1105	35			161.395			0.265				DRN	
	1110	40			161.41			0.28		33600	218-220	DRN	
	1120	50			161.42			0.29				DRN	
	1130	60			161.45			0.32		38010	218-220	DRN	
	1140	70			161.46			0.33				DRN	
	1150	80			161.47			0.34				DRN	
	1200	90			161.485			0.355		44640	218-220	DRN	
	1210	100			161.485			0.355			215	DRN	Flow rate dropped a little
	1230	120			161.50			0.37		51155	210-212	DRN	to 212-215 gpm.
	1300	150			161.51			0.38		57320	212	DRN	Accidently awoke Tecno data
	1330	180			161.525			0.395			210-212	DRN	logger. Restarted @ 1212 hrs.
	1400	210			161.56			0.43			210-212	DRN	Noticed that wind subsided
	1430	240			161.56			0.43		76750	210-212	DRN	Sometime approximately 1330 hrs
	1500	270			161.58			0.45				DRN	
	1515	285			161.58			0.45		86430	210-212	DRN	
													Shut pump off
									final →	87475			@ 1520 hrs
													Avg. flow rate = 216 gpm

Aquifer Test Data

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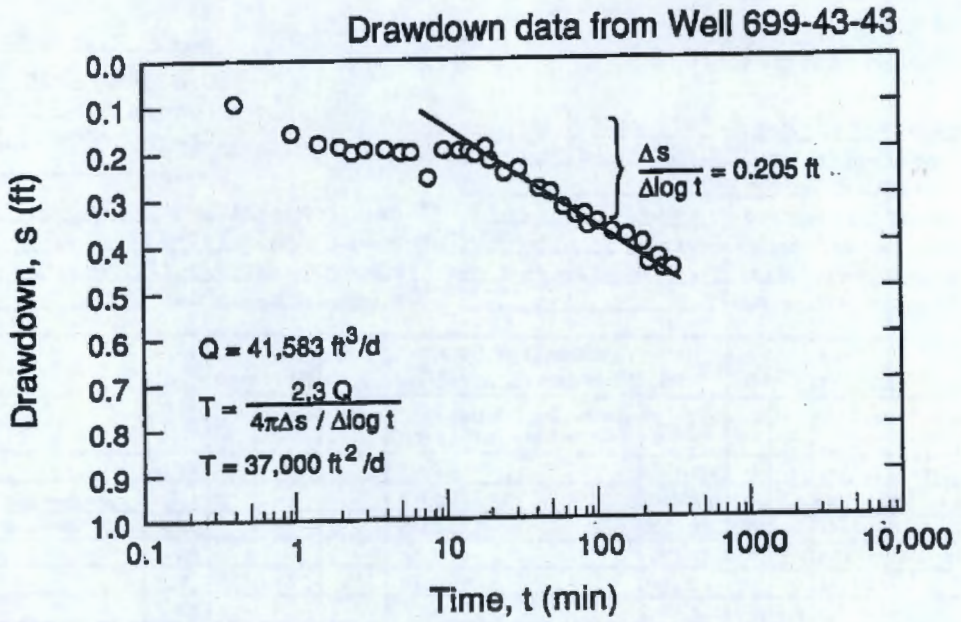
Data for Well 299-BP-8
Pumping Well 299-BP-8
Observation Wells None

Location B-Pond (200 East Area)
Type of Aquifer Test Constant Discharge Recovery
How Q Measured N/A
How W.L.'s Measured 300' E-tape / Transducer (5 psi #00232)
Rad./Dist. of/From Pumping Well ~~N/A~~ 3.75" SPN 9-9-88
Meas. Point for W.L.'s Top of Tremie Pipe (2.28' above land surface)
Elevation of Meas. Point

Depth of Pump/Airpipe ~177' below land surface
Pump On: date 9-7-88 time 10:30:00
Pump Off: date 9-9-88 time 15:20:00
Duration of Aquifer Test 290 min

Time: t = 290 min at t' = 0
Water Level Data: Static Water Level 161.13'

Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or (s')		Discharge: Reading	Discharge: Q	Recorded By	Comments
9-9	1520	290	0	–	161.58			0.45				DRN	
	1520:30	290.5	0.5	581	161.54			0.41				DRN	Driller said there is no
	1521	291	1	291	161.525			0.395				DRN	check valve on pump
	1521:30	291.5	1.5	194.3	161.51			0.38				DRN	
	1522	292	2	146	161.50			0.37				DRN	
	1522:30	292.5	2.5	117	161.50			0.37				DRN	
	1523	293	3	97.7	161.47			0.34				DRN	E-tape is shorting out(?)
	1524	294	4	73.5	161.455			0.325				DRN	and not registering well
	1525	295	5	59	161.46			0.33				DRN	
	1526:30	296.5	6.5	45.6	161.37			0.24				DRN	
	1528	298	8	37.3	161.38			0.25				DRN	
	1529	299	9	33.2	161.40			0.27				DRN	
	1530	300	10	30	161.39			0.26				DRN	
	1532	302	12	25.2	161.38			0.25				DRN	
	1534	304	14	21.7	161.39			0.26				DRN	
	1536	306	16	19.1	161.30			0.17				DRN	
	1538	308	18	17.1	161.27			0.14				DRN	
	1540	310	20	15.5	161.26			0.13				DRN	
	1545	315	25	12.6	161.25			0.12				DRN	
	1550	320	30	10.7	161.32			0.19				DRN	
	1555	325	35	9.3	161.28			0.15				DRN	
	1600	330	40	8.25	161.29			0.16				DRN	
	1610	340	50	6.8	161.27			0.14				DRN	
	1620	350	60	5.83	161.24			0.11				DRN	
	1630	360	70	5.14	161.23			0.10				DRN	
	1640	370	80	4.63	161.26			0.13				DRN	
	1650	380	90	4.22	161.18			0.05				DRN	


Drawdown data from Well 699-43-43
Drawdown, s (ft)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
0.1
1
10
100
1000
10,000
Time, t (min)
Δs / Δlog t = 0.205 ft
Q = 41,583 ft³/d
T = 2.3 Q / 4πΔs / Δlog t
T = 37,000 ft² /d

S8907115.9

INFORMATION FOR WELL 699-43-45 (BP-1)

WELL DEVELOPMENT LOG

Collector JVB, DRN SHH Date 8/30/89

Well Number BP-1 Location B-Pond Pumping Rate 7.5 Time Pump Start 9:35 Pump Stop _____

Date	Time	Sample #	pH	Conductivity	Temp	Turbidity	Fe	Cr(VI)	Comments
8/30	9:39	BP-1 9:39 (294-43-45)	8.04	245	20.7	99	>1	<.01	
8/30	10:05	BP-1 10:05 (294-43-45)	8.04	244	21.2	2.3	.07	<.01	
8/30	10:35	BP-1 10:35 (294-43-45)	8.02	243	21.7	0.9	.06	<.01	Discontinue Cr, pH, cond, temp
8/30	11:05	BP-1 11:05 (294-43-45)				0.7	<.02	~~<.01~~	

NOTE: Unless otherwise noted, the following units are assumed:

Pumping rate-gpm Fe - mg/L
pH - pH units Conductivity - µS/cm
Turbidity-NTU Cr - mg/L

Equipment:

pH Model 43600 S/N 890209234
Cond. Model 44600 S/N 890202145
Turb. Model 16800 S/N 880903409
Fe Model 41100-93 S/N 890234455
Cr(VI) Model 41100-53 S/N 890234065

Procedure PNL-MA-567 GC-5 Rev. 0

Aquifer Test Data

page 1 of 2

Data for Well BP-1 (bio-aug us)
Pumping Well BP-1 (bio-aug
Observation Wells N/A

Location BP-1 B-Pond
Type of Aquifer Test Well development
How Q Measured In-line Niagara 2" flowmeter (totalizer) S/N 8906222 type 211
How W.L.'s Measured Slope Indicator E-Tape
Depth of Pump/Airpipe
Rad./Dist. of/From Pumping Well 2" radius (4" 3.5)
Pump On: date 8/30/89 time 0935 hrs
Meas. Point for W.L.'s Top of Stainless Casing
Pump Off: date 8/30/89 time 1240 hrs
Elevation of Measured Point
Duration of Aquifer Test 182 min.

Stand pipe 2.98 ft above pad discharge column is 2 1/4" o.d.

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
8/30	0715				190.96								E-TAPE 12174
	0720				190.02								Steel Tape L300-11
													D/B ~198'
													man in hangup
	0740				Dropping transducer - tight fit								
					at 130' - would not fit								
					down well								
8/30	930				190.90								
										631.9			
	935	0											START PUMP
	936	1			190.19								E-tape sticking to side
	937	2			191.02					763.9			
	938	3								771.5			7.5 gpm
	939:30	4.5			191.18					~~771.5~~			
	941:30	6.5			191.17								
	943	8			191.17								7.5 gpm
	947	12										DRN	7.0 gpm
	953	18			E tape sticking to casing							JVB	7.0 gpm
	955-30	205								893.6			
	10:02	27			Pulled E-tape out, cable wet all the way down							JVB	7.0 gpm
	10:20	45								1058			
	10:23	48			Attempted to take steel tape measurement,							JVB	7.0 gpm
	10:37	64			however tape was wet most of the way down					1183		DRN	7.0 gpm
	11:01	86								1234		DRN	6.9 gpm
	11:14	99								1323		DRN	7.0 gpm
	~~11:15~~												
	11:18	103			7.8 GPM Discharge							wec	
	11:19	104			≈8.5 GPM Discharge							wec	
	11:23	108			≈9.9 GPM -							wec	
	11:29	114			Pump shut off due							wec	
					to leaky tanker								
					truck.								
	11:32				Pump turned back on							wec	
	11:36				Pumping rate = 10 GPM								
	11:37				9.1 GPM Pumping rate							wec	
	1230				191.21					9		JVB	7.5 gpm
	1237				191.21					2178.1		JVB	9.0 gpm
													~~1516.2~~ (totalizer reading)
	1240	185								2178.2			Pump off

DRN 9/5/89

Totalizer reading checked on 9/5/89

Aquifer Test Data

Data for Well BP1 (1299-[illegible]
Pumping Well BP-1 (1299-[illegible]
Observation Wells N/A

Location BP-1 B-Pond
Type of Aquifer Test Well Development Recovery
How Q Measured
How W.L.'s Measured Slope Indicator E-tape
Rad./Dist. of/From Pumping Well
Meas. Point for W.L.'s Top of stainless steel casing
Elevation of Meas. Point
Standpipe is 2.98 ft above pad

Depth of Pump/Airpipe
Pump On: date 8/30/89 time 0935 hrs.
Pump Off: date 8/30/89 time 1240 hrs.
Duration of Aquifer Test 182 min

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
8/30	1240		0										
	1240:10		10		191.02							JUB	
	1240:25		25		190.94							JUB	
	1240:30		30										
	1240:47		47		191.01							JUB	
	1240:50		50										
	1241		1.00										
	1241:10		1.10										
	1241:20		1.20										
	1241:30		1:30		190.99							JUB	
	1241:40		1.40										
	1241:54		1:54		190.97							JUB	
	1242		2.00										
			2:30										
			3:00										
	1242:17		3:17		190.86							JUB	
	1242:54		3:54		190.87							JUB	
	1243:30		3:30		190.98								NOT ACCURATE - Tape stiff
	1244		4.00		190.85								
	1244:36		4:36		190.85								
	1245:14		5:14		190.79								
	1245:40		5:40		190.85								

DRILL LOG	By Borghese	Rig Pump Rig	Well Number BP-1 (599-43-45)	Computer Number	Project or Work Order No.
	Date 9/21/89		Depth To		Subcontract No.

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Replacement of Hydrostar Pump		
				drillers: Brett Stroda, Darrell Ludke		
				D/B from TOC - 205' +2.7 L 300-05		
				W/L from TOC 190.95 E-tape 12174		
				190.92' steel tape		
				190.90' " "		
				sand inside pump - called project		
				manager Stuart Luthell not in office		
				Curt Hoover title III inspector took		
				pump. wrapped pipe in plastic		
				left at site. Will not place		
				pump or pipe in hole today.		
				drillers reported a		
				Problem w/ couplings - coupling is		
				tapered pipe is not.		

REMARKS:

D - Drive el H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

DRILL LOG	By Borghese	Rig D. Ludtke Pump Rig	Well Number B P-1 (699-113-45)	Computer Number	Project or Work Order No. W017
	Date 9/25/89		Depth To		Subcontract No.

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				standpipe height 2.95'		
				pad height .35' on north side		
				tape 0 to end of weight: 2.53'		
				D/B 204.4 + 2.5 = 206.9 from TOC	1030	Steel Tape: L300-14
				D/W 190.88 E-tape 12174		
				D/W 190.96 ~~12.53~~ from TOC steel tape		
				D/W 190.98 from TOC steel tape		
				BAILER'S removed: THH waited 10min for sand to settle		WATER + sediment
				THH THH, crude volume ~25 gal ~40gal removed		dumped into 55gal drum
				D/B 204.27 + 2.5 = 206.77	1241	
				Sand came up with 1st two bailer loads		
				then just silty muddy water		

REMARKS:

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

Equipment Record Form for the Installation and Removal of Data Loggers and Pressure Transducers

Initial Check: In lab		
Purpose of Installation: Monitor WL during development		
Monitored Hydrologic Unit or Water Body: screened interval BP-1 (699-43-43)		
Date/Time of Installation: 10/9/89 0730	Procedure Followed: WL-4	
Data Logger Make/Model: Hermit SE1000B		
Serial No.: 1KB - 701	Number of Channels Used: 1	
Pressure Transducer Make/Model: In-Situ PTX 161D	Full Scale Range: 10 psi	Well No.: BP-1
	Serial No.: 259198	Depth: 5.93' below static WL
Pressure Transducer Make/Model:	Full Scale Range:	Well No.:
	Serial No.:	Depth:
Description of Data Logger Installation and Well Head Configuration: Data logger 10' from well, Transducer cable taped to pump collumn.		
Comments: Test 0 - Baseline hrly measurement Test 1 - during pumping - measure every minute		
Equipment Installed By JV Borghese D.L. Ludeke (KEH)		
Date/Time of Equipment Removal: Data Logger Removed 10/12/89 1300		
Decontamination Procedure (if required): —		
Equipment Removed By JVB, DLL		

WELL DEVELOPMENT LOG

Well Number BP-1 (6-79-43-45)
Location B Pond
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 10/9/89 1022
End Date/Time 10/9/89 1126
Page 1 of 1

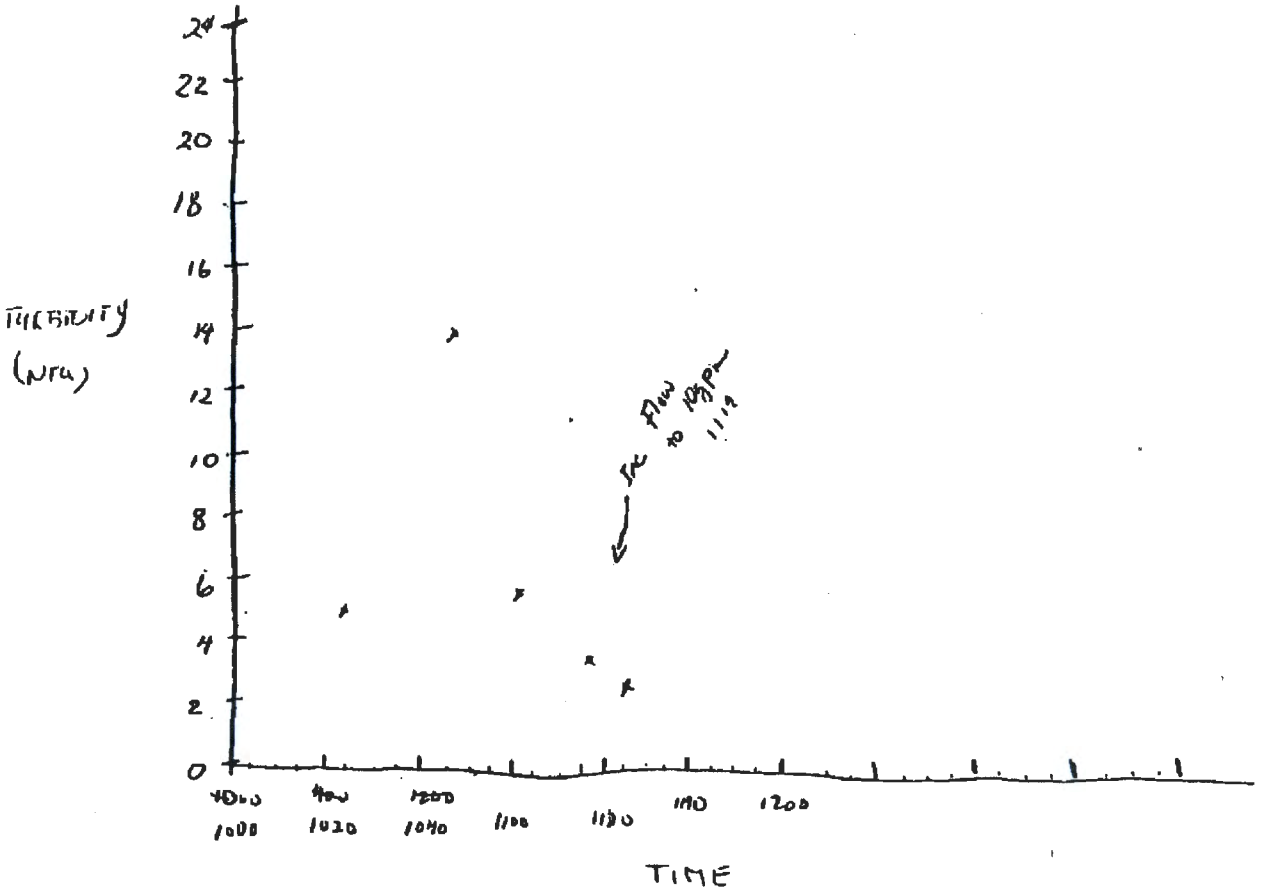
Well Depth 206.9 TOC Pump Depth (Intake) ~206 Initial Water Level 190.98 TOC

Date	Time	Flow Rate	Turbidity	Person Meas.	Person Rec.	Comments
10/9/89	815			SJB	—	STANDARDIZED METER 0-89 NTU
	1025	7	5.0			" " 0-10
	1045	8	14.0			" " 0-89
	1100	7	5.6			" " 0-10
	1115	~7	3.6			
	1124	10	2.7			

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment:
Make: HACH
Model: 16800
Serial #: 880903409

BP-1 (699 43-15) 10/9/89



Aquifer Test Data

page 1 of 1

Data for Well BP-1 (699-63-43)
Pumping Well BP-1 (699-63-43)
Observation Wells —

Location K. Pond BP-1
Type of Aquifer Test well dev
How Q Measured Rockwell In-line Flowmeter 40027614
How W.L.'s Measured transducer
Rad./Dist. of/From Pumping Well —
Meas. Point for W.L.'s
Elevation of Meas. Point

Depth of Pump/Airpipe 1' from bottom
Pump On: date 10/9 time 1022
Pump Off: date 10/9 time 1126
Duration of Aquifer Test 1 hr 4 min

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
10/9	0755				5.98	trans reading						JUB	Ref. out
	0757									15543			
	810				0.00	trans reading							Test 0 Baseline started 0757
	857				-.01								
	0920				0.00								
	0928												Tried to run pump off generator in Delay unsuccessful
	1017												started Test 1 on D.L.
	1022												pump on
	1024										7		
	1028										8		
	1036				-0.02	trans							
	1042									15700			
	1052									15771	7		
	1053				-.17	trans							
	1104									15840	7		
	1119									15970	10		Inc. Flow rate
	1126									16046			Pump off
													503 gals. pumped
	1130				0.00	trans							
	1241				0.00	trans							Data Logger off
	1242				5.99	trans.							

(5/18/89, Rev. 0)

ELECTRONIC DATA CONTROL FORM

DATE AND START TIME OF DATA ACQUISITION 10/9/89 7:57

DATE AND END TIME OF DATA ACQUISITION 10/9/89 8:57

WELL NUMBER BP-1 (699-43-45)

TYPE OF TEST OR DATA BASELINE

TYPE AND IDENTIFICATION NUMBER OF DATA LOGGER

HERMIT SE1000B 1KB-701

TEST NUMBER 0

CHANNEL OR INPUT NUMBER 1

UNITS OF VALUES RECORDED FE from ref.

NUMBER OF PAGES ATTACHED 1

COMMENTS:
WL MSRMNTS PRIOR TO
well development 10/9/89

DATA VALIDATION STATEMENT:

The attached data represent the data as originally recorded on the data logger. Any exceptions and reasons for such are indicated in the comments section.

Jim L'Bonshin, Scientist — 10/9/89
Name, title — Date

SE1000B
Environmental Logger
10/10 09:29

Unit# 00701 Test# 0

INPUT 1: Level (F)

Reference	0.00
Scale factor	9.99
Offset	- 0.01

Step# 0 10/09 07:57

Elapsed Time	Value
0.0000	0.00
60.0000	- 0.01

END

(5/18/89, Rev. 0)

ELECTRONIC DATA CONTROL FORM

DATE AND START TIME OF DATA ACQUISITION 10/4/89 10:13

DATE AND END TIME OF DATA ACQUISITION 10/4/89 1241

WELL NUMBER BP-1 (699-43-45)

TYPE OF TEST OR DATA Well development

TYPE AND IDENTIFICATION NUMBER OF DATA LOGGER

Hermit SE1000B 1KB-701

TEST NUMBER 1

CHANNEL OR INPUT NUMBER 1

UNITS OF VALUES RECORDED Ft. From referenced WL

NUMBER OF PAGES ATTACHED 4

COMMENTS:

DATA VALIDATION STATEMENT:

The attached data represent the data as originally recorded on the data logger. Any exceptions and reasons for such are indicated in the comments section.

Jane V. Borghese, Scientist — Name, title

10/10/89 — Date

SE10008
Environmental Logger
10/10 09:30

Unit# 00701 Test# 1

INPUT 1: Level (F)

Reference	0.00
Scale factor	9.99
Offset	- 0.01

Step# 0 10/09 10:18

Elapsed Time	Value
0.0000	0.00
1.0000	0.00
2.0000	0.00
3.0000	- 0.19
4.0000	- 0.16
5.0000	- 0.15
6.0000	- 0.18
7.0000	- 0.18
8.0000	- 0.17
9.0000	- 0.19
10.0000	- 0.18
11.0000	- 0.17
12.0000	- 0.18
13.0000	- 0.18
14.0000	- 0.17
15.0000	- 0.20
16.0000	- 0.20
17.0000	- 0.20
18.0000	- 0.19
19.0000	- 0.19
20.0000	- 0.18
21.0000	- 0.19
22.0000	- 0.18
23.0000	- 0.17
24.0000	- 0.17
25.0000	- 0.18
26.0000	- 0.19
27.0000	- 0.17
28.0000	- 0.17
29.0000	- 0.18
30.0000	- 0.16
31.0000	- 0.19
32.0000	- 0.19
33.0000	- 0.19
34.0000	- 0.17

35.0000	-	0.19
36.0000	-	0.18
37.0000	-	0.18
38.0000	-	0.17
39.0000	-	0.19
40.0000	-	0.17
41.0000	-	0.19
42.0000	-	0.18
43.0000	-	0.17
44.0000	-	0.17
45.0000	-	0.17
46.0000	-	0.19
47.0000	-	0.19
48.0000	-	0.18
49.0000	-	0.19
50.0000	-	0.18
51.0000	-	0.20
52.0000	-	0.19
53.0000	-	0.19
54.0000	-	0.19
55.0000	-	0.17
56.0000	-	0.18
57.0000	-	0.20
58.0000	-	0.18
59.0000	-	0.18
60.0000	-	0.23
61.0000	-	0.25
62.0000	-	0.24
63.0000	-	0.24
64.0000	-	0.25
65.0000	-	0.23
66.0000	-	0.24
67.0000	-	0.25
68.0000	-	0.25
69.0000	-	0.00
70.0000		0.03
71.0000	-	0.00
72.0000	-	0.00
73.0000	-	0.00
74.0000	-	0.00
75.0000	-	0.00
76.0000	-	0.00
77.0000	-	0.00
78.0000	-	0.00
79.0000	-	0.00
80.0000	-	0.00
81.0000	-	0.00
82.0000	-	0.00
83.0000	-	0.00
84.0000	-	0.00
85.0000	-	0.00
86.0000	-	0.00

87.0000	-	0.00
88.0000	-	0.00
89.0000	-	0.00
90.0000	-	0.00
91.0000	-	0.00
92.0000	-	0.00
93.0000	-	0.00
94.0000		0.00
95.0000		0.00
96.0000		0.00
97.0000		0.00
98.0000		0.00
99.0000		0.00
100.000		0.00
101.000		0.00
102.000		0.00
103.000		0.00
104.000		0.00
105.000		0.00
106.000		0.00
107.000		0.00
108.000		0.00
109.000		0.00
110.000		0.00
111.000		0.00
112.000		0.00
113.000		0.00
114.000		0.00
115.000		0.00
116.000		0.00
117.000		0.00
118.000		0.00
119.000		0.00
120.000		0.00
121.000		0.00
122.000		0.00
123.000		0.00
124.000		0.00
125.000		0.00
126.000		0.00
127.000		0.00
128.000		0.00
129.000		0.00
130.000		0.00
131.000		0.00
132.000		0.00
133.000		0.00
134.000		0.00
135.000		0.00
136.000		0.00
137.000		0.00
138.000		0.00

139.000	0.00
140.000	0.00
141.000	0.00
142.000	0.00
143.000	0.00

END

INFORMATION FOR WELL 699-44-42 (BP-3)

Pg 1 of 2

Developement of BP-3

DRILL LOG	By: HJ Cartwell	Rig: N/A	Well Number: 699-44-42	Computer Number: N/A	Project or Work Order No.: B-Pond
	Date: 10/20/88		Depth: 157.15' To water.		Subcontract No.: N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Developed by overpumping using 1½ hp Submersible		
				pump Depth to Bottom = 171.65' ground level.		Taken. 10/19/88
				Depth to Water (D/W) = 157.15 Top of Casing	0930	
					0939	Pump on
				Water Sample. Light brown, cloudy, <⅛ tsp FS	0940	
		474		and silt. — water cleared at 0942		
		3.94		Pump Rate. 29 sec/5 gal. = 10.34 g/m	0941	
		TOO		D/W. 157.15'	0944	
				Pump Rate 10.34 g/min water clear	0954	18 min.
				D/W 157.15'	0957	
				Open Valve rest of way open. Pumprate = 27'/5 gal.	0957	11.11 gal/min.
				Water Sample. clear 6.2 NTU	1002	
				D/W. 157.15	1011	
				Turn pump on and off twice to sparge well	1012	Pump off
				D/W. 157.15 / few particles of sand.	1025	Pump on >13
				Pump Rate. 27'/5 gal = 11.11 gal/min (g.m.)	1038	
					1040	Pump off
				water looks clear.	1050	Pump on

REMARKS:

Karen R. Osten for H.J. Cartwell 10/20/88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000-021 (5-85)

Development of BP-3

DRILL LOG	By: HJ Cartwell	Rig: N/A	Well Number: 699-44-42	Computer Number: N/A	Project or Work Order No.: B-Pond
	Date: 10/20/88		Depth: 157.15' To water.		Subcontract No.: N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				D/W. 157.15'	1114	
				Pump Rate. 11.11 g/min clear	1116	
				Water Sample clear. 5.2 NTU	1118	
				Water Sample clear. 3.2 NTU.	1136	
				D/W 157.15'	1140	Pump off
				Total gallons Pumped 1075 gallons.		
				D/W. 157.15'	1147	

REMARKS: Well is acceptable HJ Cartwell, 10/20/88

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WELL 699-44-42 (BP-3)

Purpose of Test: To estimate hydraulic properties (transmissivity and hydraulic conductivity) of the aquifer beneath 216-B-3 Pond in the 200-East Area.

Types of Tests Performed:

Slug Test ( ) Specific Capacity ( ) Constant Discharge (x) Recovery ( )

Hydrogeologic Units Tested: Ringold Formation, Hanford formation

Depth of Aquifer:

Top: 153 ft Bottom: Unknown

Depth of Screened Interval Tested:

Top: 155.33 ft Bottom: 173.59 ft

Observation Well Used: N/A

Date of Test: 9/22/88 Start Time of Test: 1300 hrs

Pumping Rate: 216 gpm Duration of Test: 420 min

Pre-test Water-level Depth (b.l.s.):

152.93 ft

Water-level Measurement Methods:

Electric tape

Maximum Drawdown: 1.92 ft

Analysis Methods and Results:

Methods	Transmissivity (ft^2/day)	Hydraulic Conductivity (ft/day)	Storativity
Constant Discharge Cooper and Jacob (1946)	76,000	--	N/A

Remarks:

The time-drawdown data indicate negative boundary effects after 150 minutes of pumping.

Casing Storage Effects
t_c < 1 minute (Schafer 1978)
t_c < 1 minute (Hargis 1979)

Aquifer Test Data

3.25" o.d. column pipe
~7.5" I.D. casing

page 1 of 3

Data for Well BP-3
Pumping Well BP-3
Observation Wells None

Location 200 East Area (B-Pond)
Type of Aquifer Test Step DD / Development / Recovery
How Q Measured In-line McCrometer Flowmeter S.N. '97 3 116
How W.L.'s Measured Entapp SN 11053 psi transducer (INW) Depth of Pump/Airpipe bottom of pump @ 172' b.l.s. intake @ 169' b.l.s.
Rad./Dist. of/From Pumping Well ~~[illegible]~~ 3.75" pkr @ 9-22-88 Pump On: date 9-22-88 time 11:00:00
Meas. Point for W.L.'s Top of 15" tremie pipe (72 cm above TOC) Pump Off: date 9-22-88 time 12:00:00
Elevation of Meas. Point (Top is 77 cm from land surface) Duration of Aquifer Test 1 hour

Time t = 60 min at t' = 0					Water Level Data Static Water Level 155.68'					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'	s'	Reading (cal/min)	Q (gpm)		
9-22	1100	0			155.68			0		27475		DRN	Flowmeter Gauge responded @ 11:00:15
	1103	3			157.48			1.80				DRN	Flow rate @ 220 gpm on 9-22-88
	1109	9			157.37			1.69			215	DRN	but immediately reduced valve, but flowmeter did not
	1113	13			157.39			1.71				DRN	decrease. pump made noise
													so opened valve up
													Closed and opened valve @
													1105 hrs., but no change in
	1122	22			156.39			0.71			125	DRN	flow on flowmeter. Closed
	1125	25			156.38			0.70			125	DRN	Valve ~~[illegible]~~ down @ 1124 hrs.
	1130	30			156.38			0.70		92960	~125	DRN	@ 125 gpm on 9-22-88
	1135	35			156.95			1.27			180	DRN	opened valve to 180 gpm @ 1135 hrs.
	1140	40			156.97			1.29		94530	180	DRN	
	1145	45			157.42	Changed configuration for transducer and start taking 2 min. reds. @ 1148 hrs.		1.74			212-215	DRN	Flow rate is steady
													opened gate all the way @
													1144 hrs. to ~215 gpm.
	1150	50			157.42			1.74			212-215	DRN	
	1155	55			157.44			1.76			~215	DRN	
Recovery	1200	60	0	–	–				~	78732		DRN	Shut off pump @ 1200 hrs.
	1200:30	60.5	0.5	121	155.73				0.05			DRN	
	1201	61	1	61	155.74				0.06			DRN	
	1201:30	61.5	1.5	41	155.73				0.05			DRN	Driller said there is no
	1203	63	3	21	155.73				0.05			DRN	check valve on this pump (25 hp)
	1204	64	4	16	155.725				0.045			DRN	
	1205	65	5	13	155.73				0.05			DRN	
	1207:30	67.5	7.5	9	155.72				0.04			DRN	
	1209:30	69.5	9.5	7.3	155.70				0.02			DRN	
	1214	104	14	7.4	155.70				0.02			DRN	
	1219:30	114.5	19.5	6.1	155.695				0.005			DRN	
	1258	118	58	2.0	155.69				0.01			DRN	

Aquifer Test Data

page 2 of 3

Data for Well BP-3
Pumping Well BP-3
Observation Wells None

Location 200 East Area (B-Ponds)
Type of Aquifer Test Constant Discharge
How Q Measured In-line McCrometer Flowmeter S.N. 87 3 116 transducer (INW)
How W.L.'s Measured 200' E-tape S.N. 11053 (Slop-Ind.) / 10 psi
Rad./Dist. of/From Pumping Well ~~BP-3 3.75" 2RN 9-22-88~~
Meas. Point for W.L.'s Top of 1.5" Tremie Pipe (~84cm. above land surf.)
~~Elevation of Meas. Point~~

Intake @ 169' b.l.s.
Depth of Pump/Airpipe Bottom of pump @ 172' b.l.s.
Pump On: date 9-22-88 time 13:00:00
Pump Off: date 9-22-88 time 20:00:00
Duration of Aquifer Test 7 hours (~~390~~ 420 min) 2RN 9-27-88

Time t = ____ at t' = 0					Water Level Data Static Water Level 155.69'					Discharge		Recorded By	Comments: Began monitoring water level with datalogger in BP-7 @ 1215 hrs. Began monitoring water-level with datalogger @ 1230 hrs.
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9-22	1300	0			155.69			0		~98732		DRN	
	1301:30	0.5			157.36			1.67				DRN	Flow rate is ~212 gpm (max.)
	1301	1			157.365			1.675				DRN	
	1301:30	1.5			157.38			1.69				DRN	Flow rate fluctuates from
	1302	2			157.385			1.695				DRN	210 to 215 gpm
	1302:30	2.5			157.39			1.70				DRN	
	1303	3			157.39			1.70				DRN	
	1304	4			157.39			1.70				DRN	
	1305	5			157.435 (?)			(1.7455)				DRN	
	1306	6			157.39			1.70				DRN	
	1308	8			157.40			1.71				DRN	
	1310	10			157.40			1.71		100890		DRN	
	1315	15			157.41			1.72			~212	DRN	
	1320	20			157.41			1.72				DRN	
	1325	25			157.42			1.73				DRN	
	1330	30			157.43			1.74				DRN	
	1335	35			157.44			1.75			212	DRN	Flow rate very steady
	1340	40			157.435			1.745				DRN	
	1350	50			157.44			1.75				DRN	
	1400	60			157.46			1.77		111620	210-212	DRN	
	1410	70			157.47			1.78				DRN	
	1420	80			157.47			1.78				DRN	
	1430	90			157.47			1.78				DRN	
	1440	100			157.475			1.785				DRN	
	1500	120			157.50			1.81				DRN	
	1530	150			157.50			1.81				DRN	
	1600	180			157.52			1.83		137620	212	DRN	
	1630	210			157.535			1.845				DRN	
	1700	240			157.54			1.85				DRN	
	1730	270			157.56			1.87				DRN	
	1800	300			157.57			1.88		163570	212	DRN	
	1830	330			157.575			1.885				DRN	Changed configuration in
	1900	360			157.59			1.90				DRN	datalogger for recovery test
	1930	390			157.60			1.91		183055	212	DRN	@ 1440 hrs.
	1959	420			157.61			1.92				DRN	Shut pump off @ 2000 hrs
									final	189560			
													Avg. flow rate = 216 gpm

Aquifer Test Data

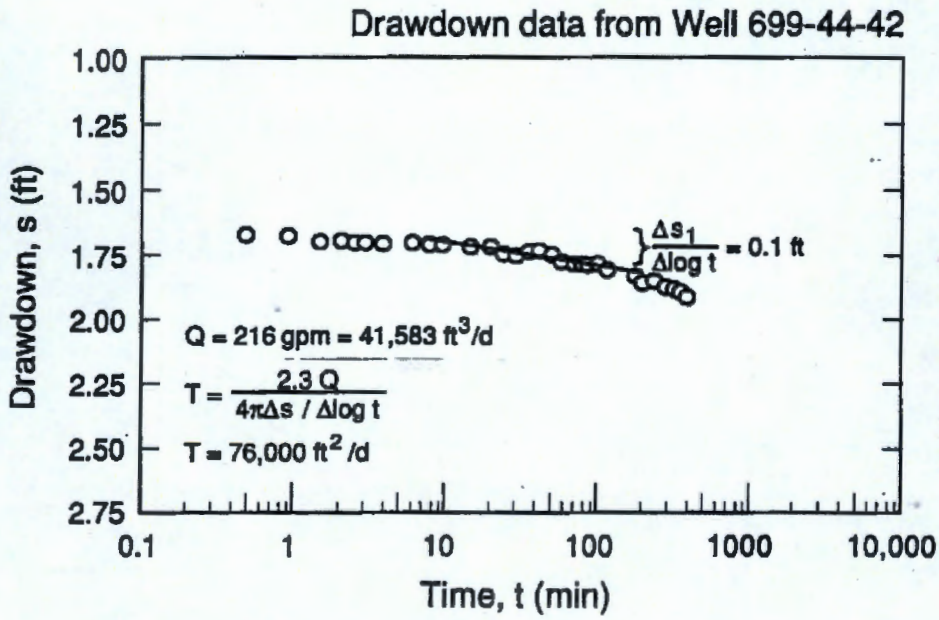
page 3 of 3

Data for Well BP-3
Pumping Well BP-3
Observation Wells None

Location 200 East Area (B-Ponds)
Type of Aquifer Test Constant Discharge Recovery
How Q Measured N/A
How W.L.'s Measured E-tape S.N. 11853 /10 psi Transducer
Rad./Dist. of/From Pumping Well N/A 3.75" DRN 9-22-88
Meas. Point for W.L.'s Top of 1.5" Tremie Pipe (~84cm above land surface)
Elevation of Meas. Point

Intake at 169' b.l.s.
Depth of Pump/Airpipe Bottom of pump @ 172' b.l.s.
Pump On: date 9-22-88 time 13:00:00
Pump Off: date 9-22-88 time 20:00:00
Duration of Aquifer Test 7 hours

Time t = 390 at t' = 0					Water Level Data Static Water Level 155.69'					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
9-22	2000	390	0		—								
		421.5	0.5	841	155.90			0.21				DRN	No check valve on pump
		421.5	1.5	281	155.91			0.22				DRN	
		422.5	2.5	169	155.86			0.17				DRN	
		423.5	3.5	121	155.87			0.18				DRN	
		424.5	4.5	94.3	155.86			0.17				DRN	
		425	5	85	155.86			0.17				DRN	
		429	9	47.7	155.85			0.16				DRN	
		432	12	36	155.85			0.16				DRN	
		435	15	29	155.83			0.14				DRN	


Drawdown data from Well 699-44-42
Drawdown, s (ft)
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
0.1
1
10
100
1000
10,000
Time, t (min)
Δs1 / Δlog t = 0.1 ft
Q = 216 gpm = 41,583 ft3/d
T = 2.3 Q / 4πΔs / Δlog t
T = 76,000 ft2 /d

S8907115.8

INFORMATION FOR WELL 699-44-43B (BP-2)

WELL DEVELOPMENT LOG

pg. 1

Collector DRN, JVB (J. P. McDonald) Date 8/30/89 - 8/31/89

Well Number BP2 (89-44438) Location B-Pond Pumping Rate ~5 Time Pump Start 1412 Pump Stop 1600

Date	Time	Sample #	pH	Conductivity	Temp	Turbidity	Fe	Cr(VI)	Comments
8/30	1420		7.73	265	23.0	>9			could not cal zero — standardize with 7 and 10 buffer
	1450		8.14	276	23.1	>10	0.44	0	7 and 10 buffer
	1522		8.14	236	22.8	>10	0.24	0.01	No visible color for Cr — 7 and 10 buffer
	1551		8.08	268	23.8	.72	.15	0	No color for Cr — 7 and 10 buffer
8/31	0915		8.22	290	19.3	>10	>1		Pump started ~0905 — could not right set Cr — 7 and 10 buffer
	0945		8.18	288	19.8	710	.26	0	7 and 10 buffer
	1015		8.10	276	20.4	>10	.19	~0	7 and 10 buffer
	1045		8.10	270	20.5	>10	.25	~0	discontinued Cr
	1145		8.15	287	20.8	7.8	0.16 ~2	—	
	1300		8.06	293	21.1	7.1	.04	—	
	1405		8.18	281	21.0	4.9	0.08	—	
	1459		8.11	292	21.4	4.5	0.05		

NOTE: Unless otherwise noted, the following units are assumed:

Pumping rate-gpm Fe - mg/L
pH - pH units Conductivity - µS/cm
Turbidity-NTU Cr - mg/L

Equipment: Hach

pH Model 43800 S/N 89020573A Fe Model 41100-93 S/N 89023445S
Cond. Model 44600 S/N 89020145 Cr(VI) Model 41100-53 S/N 89023406S
Turb. Model 16800 S/N 89090349

Procedure PNL-MA-567 GC-5 Rev. 0

I-147

WHC-SD-EN-EV-002, Rev. 0

WELL DEVELOPMENT LOG

Collector J. R. Mc Donald / JV Berghase, DR Newcomer Date 8/31/89 to 9/1/89

Well Number BP-2 (699-48-43B) Location B-Pond Pumping Rate 4.0 gpm Time Pump Start 8/30/89 1350 hrs Pump Stop 9/1/89 1420 hrs

Date	Time	Sample #	pH	Conductivity	Temp	Turbidity	Fe	Cr(VI)	Comments
894 8/31	2359		7.93	291	15.1°C	0.3			Turbidity read on 10 range. Can't get 1.0 range to work. Won't calibrate
894 8/31	2359					1.5	.02		Fe and Turbidity tested at 750 9/1/89
1340 9/1	0725		8.23	275/292	18.4°C	1.0	.02		pumping rate = 3.5 gpm 2nd Cond - msrd at 951
1400	0825		8.19	291	18.9	1.0	.02		7 and 10 buffer
1460	0925		8.18	291	19.8	1.1	.01		
1585	130		8.02	294	21.1	1.2	—		
1711	1336		8.06	282	20.8	1.0	—		
1743	1408		8.04	289	21.0	1.3	—		

NOTE: Unless otherwise noted, the following units are assumed:

Pumping rate-gpm Fe - mg/L
pH - pH units Conductivity - µS/cm
Turbidity-NTU Cr - mg/L

Equipment: Hach

pH S/N 890205934
Cond. S/N 890302145
Turb. S/N 880902409

Fe Model 41100-93 S/N 890234455
Cr(VI) Model 41100-53 S/N 890234065

Procedure PNL-MA-567 GC-5 Rev. 0

Aquifer Test Data

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Data for Well BP-2 (699-44-43B)
Pumping Well BP-2 (699-44-43B)
Observation Wells N/A

Location BP-2, B-Pond
Type of Aquifer Test Uphill development
How Q Measured Inline Niagara 2" Flowmeter (SN 892214)
How W.L.'s Measured N/A
Rad./Dist. of/From Pumping Well 4" S.D.
Meas. Point for W.L.'s Top of 6" stainless steel casing
Elevation of Meas. Point 6" Stand pipe 2.92 ft from pad

Depth of Pump/Airpipe
Pump On: date 8/30/89 time 1350 hrs.
Pump Off: date 9/1/89 time 1420 hrs.
Duration of Aquifer Test 31 hr 30 min (1890 min)
discharge line is 2½" O.D.

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
8/30	0804				E-Tape #11044			stuck		in well			~125'
					decided	not		to		put		transducer	down
					therefore	unable		to		do any		WL	
					measurements			at		BP-2			
	1345									634.75			
	1350	0											Pump on.
													Got no water - Olin came to help
	1412										6gpm		Pump on
	1422										4.9		
	1423									784.0			
	701									822.6	5	JVB	
	1533									1073.2	4.8	JVB	
	1551									1102.0	4.5	JVB	
	1600									1121.7			Increased Flow Rate
	1600				Turned pump and generator off							DRN	No water discharge at
													Problem with pump
8/31	0724									1144.2		JVB	Back on line
	0855	0											Pump turned on
	0857												Pump does not run
													continuously -
													Kaiser Personnel trying
													to get it going
	900												Pumping continuously
													for 2 min - slight
													surging -
	903												pump stops &
													then on and off again
	908										3.0	gpm JVB	
	909										4.5		Pumping rate erratic
	910										4.5		varied from 65 to 9 gpm at
	911										4.0		the beginning - stabilized at
	913									1214.0		DRN	about 4-4.5 gpm.
	0924										4.0	DRN	
	0935									1305.4		DRN	
	0939										4.1	DRN	Flow rate a little erratic
	1010									1452.0	4.0	DRN	
	1046									1677.0		DRN	
	1141									1818.7	4.0	JVB	
	1202									2127.6	4.0	JVB	~1500 gals pumped

Aquifer Test Data

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Data for Well BP2 [illegible]
Pumping Well BP-2 [illegible]
Observation Wells N/A

Location BP-2 B Pond
Type of Aquifer Test Well Development
How Q Measured 2" Inline Niagara Flowmeter (S/N 8906219)
How W.L.'s Measured N/A
Rad./Dist. of/From Pumping Well 4" I.D.
Meas. Point for W.L.'s Top of Stainless Steel Casing (6")
Elevation of Meas. Point
6" Diam. Standpipe is 2.92 ft from pad

Depth of Pump/Airpipe
Pump On: date 8/30/89 time 1350 hrs
Pump Off: date 9/1/89 time 1420 hrs
Duration of Aquifer Test 31 hr 30 min (1890 min)

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
8/31	1407									7472	4.0	JVB	
8/31	1500									7667	3.8	JVB	
8/31	1535									7797	3.5	JVB	No personnel available for
8/31	2356									4553.7		JAm	night hours, let pump run
9/1	0657									5921.0	3.7	DRN	overnight
	0724									6020.0	3.5	DRN	
	0824									6227.7	3.5	DRN	
	0924									6427.3	3.4	DRN	
	1133									6951.1	3.5	JVB	
	1238									7062.0	3.2	DRN	
	1346									7397.2	3.0	JVB	[illegible]
	1352									7315.1	3.15	JVB	
	1401	Increased Pumping rate - slowing											
	1403										3.3	JVB	[illegible]
													[illegible]
	1414												[illegible]
	1417										3.3	JVB	[illegible]
	1417									7477	3.1	JVB	
	1420												Pump off
	1421									7485.4	final	reading JVB	

AQUIFER TEST SUMMARY

WELL 699-44-43B (BP-2)

Purpose of Test: To estimate hydraulic properties of the open borehole interval.

Types of Tests Performed: slug injection

Hydrogeologic unit tested: Ringold (unconfined)

Depth of exposed interval tested:

Top: 173.0 ft Bottom: 176.1 ft

Date of test: 5/19/89 Start time of test: 0845

Duration of test: 240 min

Pre-test water-level depth (below land surface): 162.7 ft

Water-level measurement methods: pressure transducer

Analysis methods and results:

Method	Transmissivity (ft^2/d)	Hydraulic conductivity (ft/d)
Bouwer and Rice (1976)		
slug injection:	0.3	0.1
slug withdrawal:	0.8	0.2

Remarks:

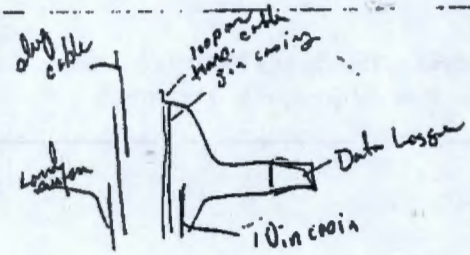
At the time the test was conducted the hole was cased with an 8-in. nominal diameter temporary carbon steel casing. The lithology of the open interval was muddy gravel and sand.

The slug was only partially submerged during the test. The length of slug submerged was 3.38 ft. The length of the slug is 7.01 ft. The length of slug submerged was determined by noting the water line and depth to water upon slug removal.

The Bouwer and Rice (1976) method yields hydraulic conductivity. Transmissivity was estimated by multiplying by the thickness the open interval (3.1 ft).

Equipment Record Form for the Installation and Removal of the Instrumentation Northwest Data Loggers and Pressure Transducers

Purpose of Installation: Slug Test BP-2 5/19/89		
Monitored Hydrologic Unit or Water Body:		
Date/Time of Installation: 5/19/89 0830	Procedure Followed: DRAFT WL-4	
Data Logger Make/Model: In Situ Hermit SE1000B		
Serial No.: P5	Number of Channels Used: 1	
Pressure Transducer Make/Model: In Situ PTX 160/D	Full Scale Range: 10 psi	Well No.: BP-2
	Serial No.: 1998	Depth: 14.36' (below static WL)
Pressure Transducer Make/Model:	Full Scale Range:	Well No.:
	Serial No.:	Depth:
Description of Data Logger Installation and Well Head Configuration: see figure below for slug injection slug withdrawal test had no loop in cable		
Comments: D/B 176.12 ft from land surface D Rat w casing 175.0 3.12 ft open hole Data Logger clock synchronize to Stewarts watch		
Equipment Installed By J V Borghese W E Cronin		
Date/Time of Equipment Removal: ~1500 May 22, 1989		
Equipment Removed By Steve Airhart, Shannon Goodwin		



approx. length of trans. cable loop ~16 ft

SLUG TEST RECORD FORM

Location B - Pond Date of Test 5/19/89

Well Number BP-2 Procedure Number HT-6, Draft WL-4

Type of Test(s) Slug injection / slug withdrawal

Personnel Conducting Test JV Borghese, Bill Cronin

WELL CONFIGURATION

Well Depth 176.12 from land surface Borehole Diameter 8"

Well Casing Inside Diameter 7 3/4" Well Screen Inside Diameter N/A

Length of ~~Screened~~ OPEN Interval 3.12 ft Depth of Screen N/A

Comments open hole, casing stickup 2.0 ft

SLUG INFORMATION

Slug Construction Materials carbon steel casing

Length of Slug 7.01 ft Diameter of Slug 0.37' at top

Comments volume of cylinder slug ≈ 0.814 ft³

Volume of Attachments (if applicable) chain block ≈ .008 ft

MEASUREMENT EQUIPMENT INFORMATION

	Make	Model	Serial Number
Electric Tape	Slope indicator	200'	10998, 11653, 11044
Steel Tape	Lufkin	"	090
Data logger	In-Situ	SE100DB	D5
Transducer	In-Situ	PTX 1160D	1998
Other			

Note: only 3.38 ft of slug submerged below water. Depth submerged noted by water line on slug when removed.

Aquifer Test Data

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Data for Well EP-2
Pumping Well N/A
Observation Wells N/A

Location BP-2 - E-Pond
Type of Aquifer Test Slug Injection
How Q Measured N/A
How W.L.'s Measured E-tape ~~steps initiated~~ 1105
Rad./Dist. of/From Pumping Well N/A
Meas. Point for W.L.'s Top of 3" casing
Elevation of Meas. Point
Depth of Pump/Airpipe
Pump On: date time
Pump Off: date time
Duration of Aquifer Test

J.V. Borghese W.E. Cronin

Time t = ____ at t' = 0					Water Level Data Static Water Level 162.69					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
8/A	0800				162.84							JVB	Steel tape S/N 090
	0759				162.69							JVB	
	823					transducer	ref	0.00	reading	14.33		below	water
	833				162.57							JVB	Immersion ~ 3' of slug
	842				162.56							JVB	
						E-tape	stuck						9am to immersion slug
	845	0000				switch	to	1044	slope	indicator			
					1099	Not	working		switched				
						to	steel	tape					
	857				steel	tape	may	have	moved				
					transducer	+	line	tangled	-	on			
		mins			weight	hook	-	smoothed	out				
		~~[illegible]~~											
		17:00											
	9:05			Steel	Tape	must	be	hung up	on	something			
					bell at	170'	-	tape	not	wet			
					transducer	reading		.62	~35 min	into	test	(time value estimated)	
								.46	~50	"	"	"	
					157'	from Top		catching	something	on	side		
						probably		a weld					
					tape	161.5		wet					
							Trend	.42	30 min				
								.39	1 hr	3 min			
					153	Hit	something						
					~~[illegible]~~								
	10:37				162.7	1099 - E tape - 1099						WEC	
	10:47				162.56							WEC	
	11:49				162.61							SMG	.11 Time reading
	12:49				162.70							JVB	.05 " "
						watch time	12:43		stopwatch			00:00	

used bottom mark 1 1...

ELECTRONIC DATA CONTROL FORM

DATE AND START TIME OF DATA ACQUISITION May 19, 1989 8:43

DATE AND END TIME OF DATA ACQUISITION May 19, 1989 1250

WELL NUMBER BP-2

TYPE OF TEST OR DATA Slug injection

TYPE AND IDENTIFICATION NUMBER OF DATA LOGGER In-Situ SE1000B S/N P5

TEST NUMBER Ø

CHANNEL OR INPUT NUMBER 1

UNITS OF VALUES RECORDED Ft from referenced level

NUMBER OF PAGES ATTACHED 3

COMMENTS:
Slug injected at 0845

DATA VALIDATION STATEMENT:

The attached data represent the data as originally recorded on the data logger. Any exceptions and reasons for such are indicated in the comments section.

Jane V. Boghese, Scientist — May 23, 1989

Name, title — Date

Data Logger Printout from Slug Injection Test of Well BP-2

SE1000B
Environmental Logger
05/23 10:19

Unit# 00005 Test# 0

INPUT 1: Level (F)

Reference	0.00
Scale factor	10.10
Offset	- 0.09

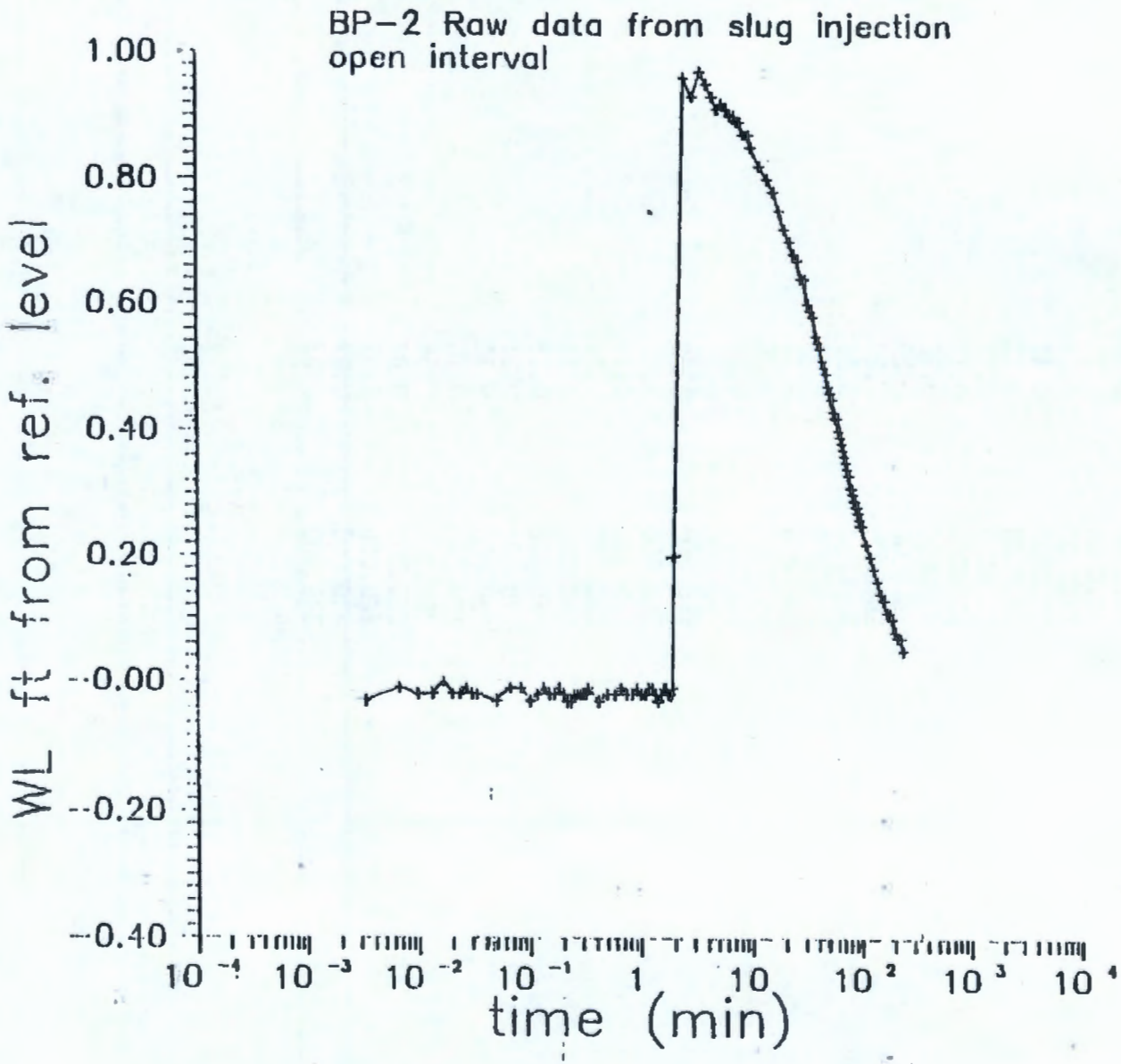
Step# 0 05/19 08:43

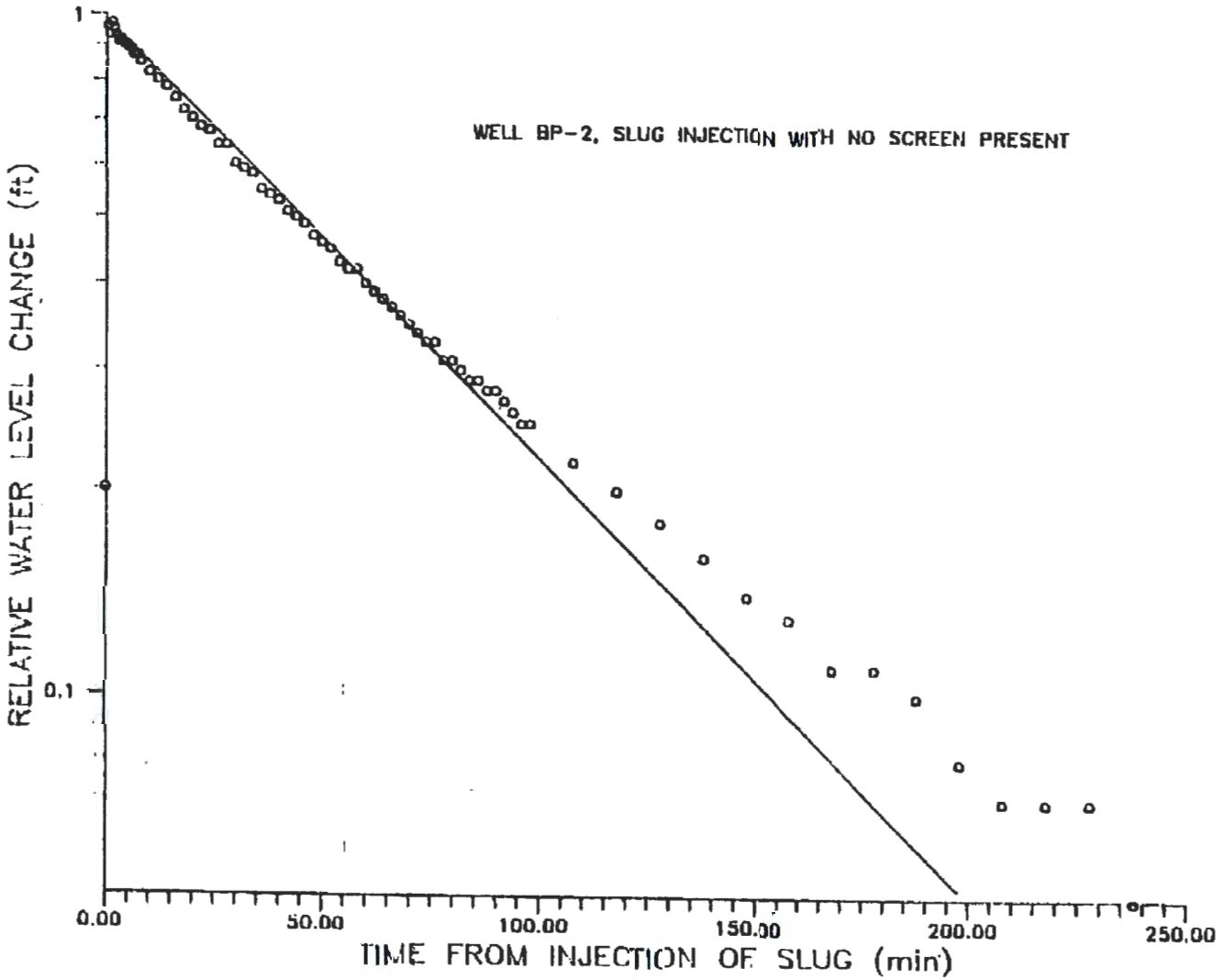
Elapsed Time	Value
0.0000	- 0.02
0.0033	- 0.03
0.0066	- 0.01
0.0099	- 0.02
0.0133	- 0.02
0.0166	- 0.00
0.0200	- 0.02
0.0233	- 0.02
0.0266	- 0.01
0.0300	- 0.02
0.0333	- 0.02
0.0500	- 0.03
0.0666	- 0.01
0.0833	- 0.01
0.1000	- 0.03
0.1166	- 0.02
0.1333	- 0.01
0.1500	- 0.02
0.1666	- 0.02
0.1833	- 0.01
0.2000	- 0.02
0.2166	- 0.03
0.2333	- 0.03
0.2500	- 0.02
0.2666	- 0.02
0.2833	- 0.02
0.3000	- 0.02
0.3166	- 0.02
0.3333	- 0.01
0.4167	- 0.03
0.5000	- 0.02
0.5833	- 0.02
0.6667	- 0.01
0.7500	- 0.02
0.8333	- 0.02
0.9167	- 0.01
1.0000	- 0.02
1.0833	- 0.02
1.1667	- 0.01
1.2500	- 0.01
1.3333	- 0.02
1.4166	- 0.03
1.5000	- 0.02
1.5833	- 0.01
1.6667	- 0.01
1.7500	- 0.02
1.8333	- 0.02
1.9167	- 0.01
2.0000	0.20
2.5000	0.96
3.0000	0.93
3.5000	0.97
4.0000	0.95
4.5000	0.93
5.0000	0.91
5.5000	0.92
6.0000	0.91
6.5000	0.90
7.0000	0.90
7.5000	0.89
8.0000	0.89
8.5000	0.87
9.0000	0.87
9.5000	0.87
10.0000	0.85
12.0000	0.82
14.0000	0.80
16.0000	0.78
18.0000	0.75
20.0000	0.72
22.0000	0.70
24.0000	0.68
26.0000	0.67
28.0000	0.64
30.0000	0.64
32.0000	0.60
34.0000	0.59
36.0000	0.58
38.0000	0.55
40.0000	0.54
42.0000	0.53
44.0000	0.51
46.0000	0.50
48.0000	0.49
50.0000	0.47
52.0000	0.46
54.0000	0.45
56.0000	0.43
58.0000	0.42

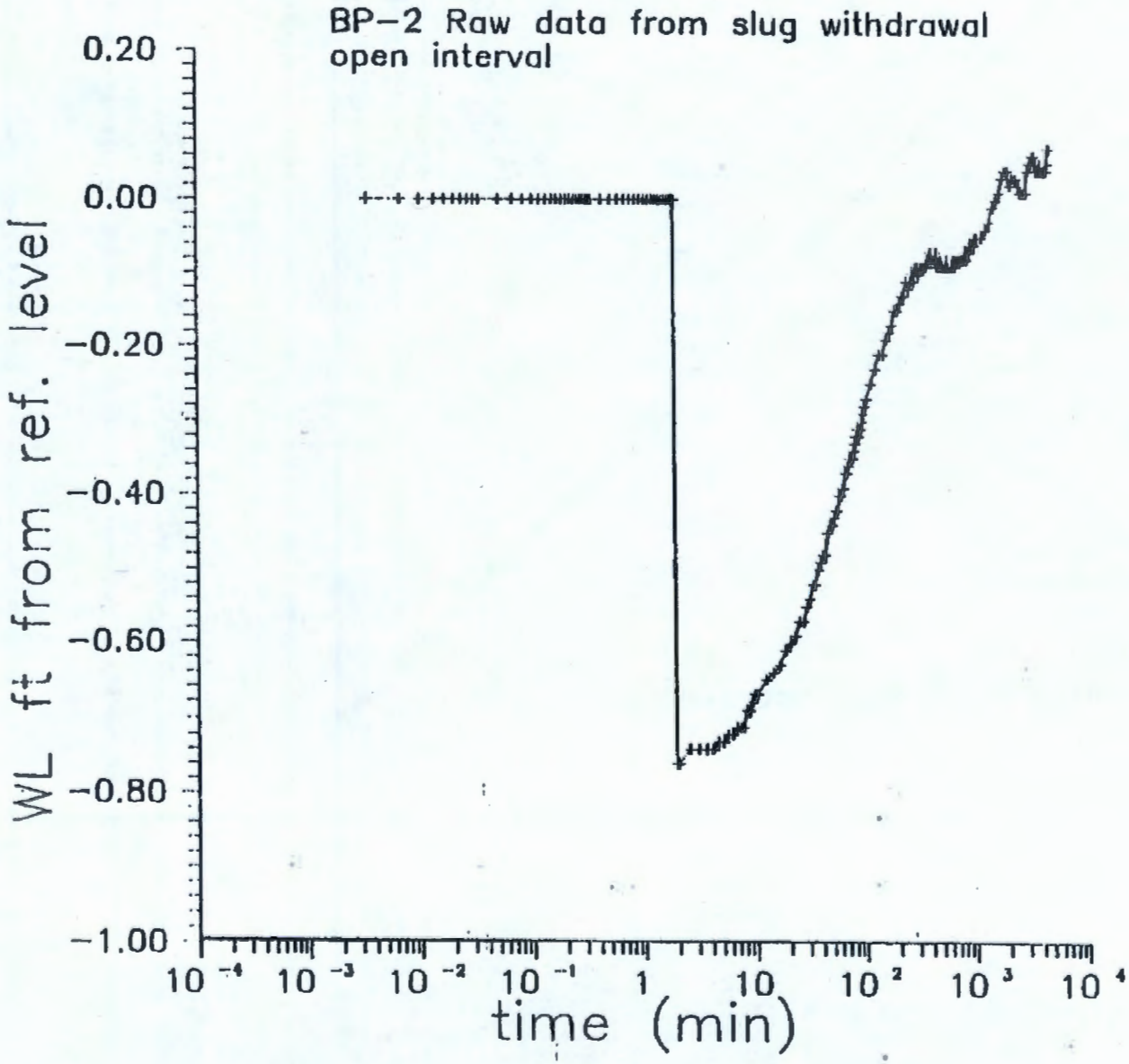
Data Logger Printout from Slug Injection Test of Well BP-2 (contd)

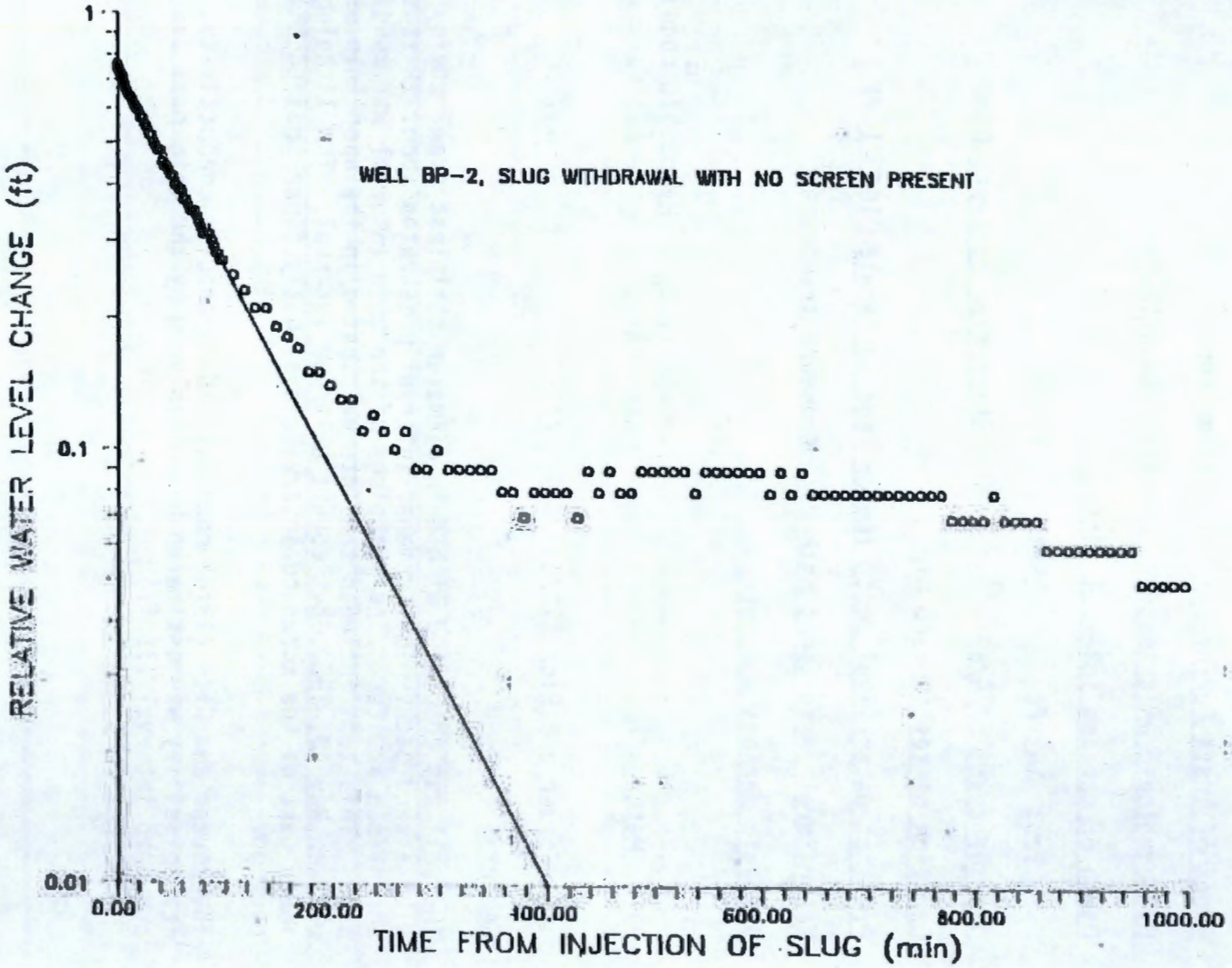
60.0000	0.42
62.0000	0.40
64.0000	0.39
66.0000	0.38
68.0000	0.37
70.0000	0.36
72.0000	0.35
74.0000	0.34
76.0000	0.33
78.0000	0.33
80.0000	0.31
82.0000	0.31
84.0000	0.30
86.0000	0.29
88.0000	0.29
90.0000	0.28
92.0000	0.28
94.0000	0.27
96.0000	0.26
98.0000	0.25
100.000	0.25
110.000	0.22
120.000	0.20
130.000	0.18
140.000	0.16
150.000	0.14
160.000	0.13
170.000	0.11
180.000	0.11
190.000	0.10
200.000	0.08
210.000	0.07
220.000	0.07
230.000	0.07
240.000	0.05

END


BP-2 Raw data from slug injection
open interval
1.00
0.80
0.60
0.40
0.20
-0.00
-0.20
-0.40
WL ft from ref. level
10 -4
10 -3
10 -2
10 -1
1
10
10 2
10 3
10 4
time (min)


WELL BP-2, SLUG INJECTION WITH NO SCREEN PRESENT
RELATIVE WATER LEVEL CHANGE (ft)
1
0.1
0.00
50.00
100.00
150.00
200.00
250.00
TIME FROM INJECTION OF SLUG (min)


BP-2 Raw data from slug withdrawal
open interval
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
WL ft from ref. level
10 -4
10 -3
10 -2
10 -1
1
10
10 2
10 3
10 4
time (min)


WELL BP-2, SLUG WITHDRAWAL WITH NO SCREEN PRESENT
RELATIVE WATER LEVEL CHANGE (ft)
1
0.1
0.01
0.00
200.00
400.00
600.00
800.00
1000.00
TIME FROM INJECTION OF SLUG (min)

AQUIFER TEST SUMMARY

WELL 699-44-43B (BP-2)

Purpose of Test: To estimate hydraulic properties of the aquifer opposite the screened interval.

Types of Tests Performed: slug injection

Hydrogeologic unit tested: Ringold (unconfined)

Depth of exposed interval tested:

Top: 161 ft Bottom: 176 ft

Date of test: 7/6/89 Start time of test: 0950

Duration of test: 160 min

Pre-test water-level depth (below land surface): 165.21 ft

Water-level measurement methods: pressure transducer

Analysis methods and results:

Method	Transmissivity (ft^2/d)	Hydraulic conductivity (ft/d)
Bouwer and Rice (1976)	71	4.7

Remarks:

The well was completed with 4-in diameter stainless steel casing and screen with a sand pack. The screened interval penetrates about 18 ft into the unconfined aquifer. The lithology of the open interval was muddy gravel and sand. This test included the interval tested in the open hole of the same well on May 19, 1989, but covers a larger interval. The lithology in the lower part of the screened interval is slightly finer-grained than the upper portion.

The Bouwer and Rice (1976) method yields hydraulic conductivity. Transmissivity was estimated by multiplying by the thickness the saturated screened interval (15 ft).

Location B-Pond Date of Test 7-5-89

Well Number BP-2 Procedure Number AT-6

Type of Test(s) Slug

Personnel Conducting Test W.E. Cronin

WELL CONFIGURATION

Well Depth 180' TOC Borehole Diameter ~~0.4'~~ 8"

Well Casing Inside Diameter ~~0.4'~~ 4" Well Screen Inside Diameter 4"

Length of Screened Interval _____ Depth of Screen _____

Comments _____

SLUG INFORMATION

Slug Construction Materials Steel

Length of Slug 8.1 ft Diameter of Slug .25'

Comments Slug Tapered at Both ends length Taper = .06'

Volume of Attachments (if applicable) vol Rebar hook = .0041'
Total Volume = 0.402 ft3

MEASUREMENT EQUIPMENT INFORMATION

	Make	Model	Serial Number
Electric Tape	—	—	—
Steel Tape	Lufkin		L300-11
Data logger	In-situ	SE100B	1KB-342
Transducer	In situ	PTX-16100	2161
Other			

Equipment Record Form for the Installation and Removal of the Instrumentation Northwest Data Loggers and Pressure Transducers

Initial Check: Performed in Lab		
Purpose of Installation: Slug test BP-2 7/5/89		
Monitored Hydrologic Unit or Water Body: aquifer below B Pond		
Date/Time of Installation: 7/5/89 12:48	Procedure Followed: WL-4	
Data Logger Make/Model: Insitue SE 1000 B		
Serial No.: 1KB-332	Number of Channels Used: 1	
Pressure Transducer Make/Model: Insitu PTX-1601D	Full Scale Range: 10 PSI	Well No.: BP-2
	Serial No.: 2161	Depth: 14.12'
Pressure Transducer Make/Model:	Full Scale Range:	Well No.:
	Serial No.:	Depth:
Description of Data Logger Installation and Well Head Configuration: Transducer was taped to outer iron casing, and set at a depth of approximately 14' below static water level.		
Comments: After the ~~transducer~~ data logger started, the slug was dropped and snapped on the casing. The readout displayed the log2 time cycle when slug was submerged.		
Equipment Installed By William E Cronin		
Date/Time of Equipment Removal: ~~[illegible]~~ ~~[illegible]~~ 12:30 7/6		
Decontamination Procedure (if required):		
Equipment Removed By SM Goodwin		

Aquifer Test Data

Test 0

page 1 of 2

Data for Well BP-2

Pumping Well

Observation Wells

Location B pond

Type of Aquifer Test slug

How Q Measured

How W.L.'s Measured steel tape

Rad./Dist. of/From Pumping Well

Meas. Point for W.L.'s Top of Outer Casing

Elevation of Meas. Point

Depth of Pump/Airpipe

Pump On: date time

Pump Off: date time

Duration of Aquifer Test

Time: t = ____ at t' = 0					Water Level Data: Static Water Level 165.21 TOC					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
7/15	12:13				165.21	TOC						WEC	steel tape
	12:14				165.21	TOC							steel tape
					185	Depth to Bottom							steel tape
	12:46				Transducer Indicates only								
					15' of water in hole								
	12:46				Transducer set at 14.12								
					Below static								
	12:48				14.12	reference							XD
	13:10				slug dropped maybe didn't								
					hit but 1 cycle due to								
					snagging slug probably								
					log 2								
	13:22				.03								XD reading
	13:34				165.26								steel tape
	13:34				.05	Correlates with steel							XD
						Tape							
						Snag occurs at at							
						a depth of 155'							
	13:41				.06								XD
	13:47				.07								XD
	13:56				.07							✓	XD
	13:58				.08								
					.92 ft from OC to TC								
7/16	8:59				.21								XD
	9:00				pulled slug - Not even wet - Baseline data								
					for test #2 transducer wrapped								
					around slug - slug not submerged								
	9:04				Started Test 0								
					Test 0 is basically Baseline								
	9:05				14.32								XD

Aquifer Test Data

test #1

page 2 of 2

Data for Well BP-2

Pumping Well

Observation Wells

Location B Pond

Type of Aquifer Test slug

How Q Measured

How W.L.'s Measured

Rad./Dist. of/From Pumping Well

Meas. Point for W.L.'s TOC

Elevation of Meas. Point

Depth of Pump/Airpipe

Pump On: date time

Pump Off: date time

Duration of Aquifer Test

Time t = ____ at t' = 0					Water Level Data Static Water Level ____					Discharge		Recorded By	Comments
Day	Clock Time	t	t'	t/t'	Reading	Conversions or Corrections	Water Level	s or s'		Reading	Q		
7/6	9:08				14.32	Below	static	water	level				
					14.31								
	9:50				slug	disposal	To	170'	should				
					BP	5' below	the	surface.					

ELECTRONIC DATA CONTROL FORM

DATE AND START TIME OF DATA ACQUISITION 7/6 0950

DATE AND END TIME OF DATA ACQUISITION 7/6 1230

WELL NUMBER BP-2

TYPE OF TEST OR DATA Slug Injection

TYPE AND IDENTIFICATION NUMBER OF DATA LOGGER
SE 1000 B S/N 382

TEST NUMBER 1

CHANNEL OR INPUT NUMBER 1

UNITS OF VALUES RECORDED Ft from ref.

NUMBER OF PAGES ATTACHED 3

COMMENTS:
Test conducted in final screened interval

DATA VALIDATION STATEMENT:

The attached data represent the data as originally recorded on the data logger. Any exceptions and reasons for such are indicated in the comments section.

J.V. Bayhase, Scientist — July 6, 1989
Name, title — Date

WELL: BP-2
TEST DATE: July 6, 1989
START TIME: 0950

SE1000B
Environmental Logger
07/06 17:18

Unit# 00382 Test# 1

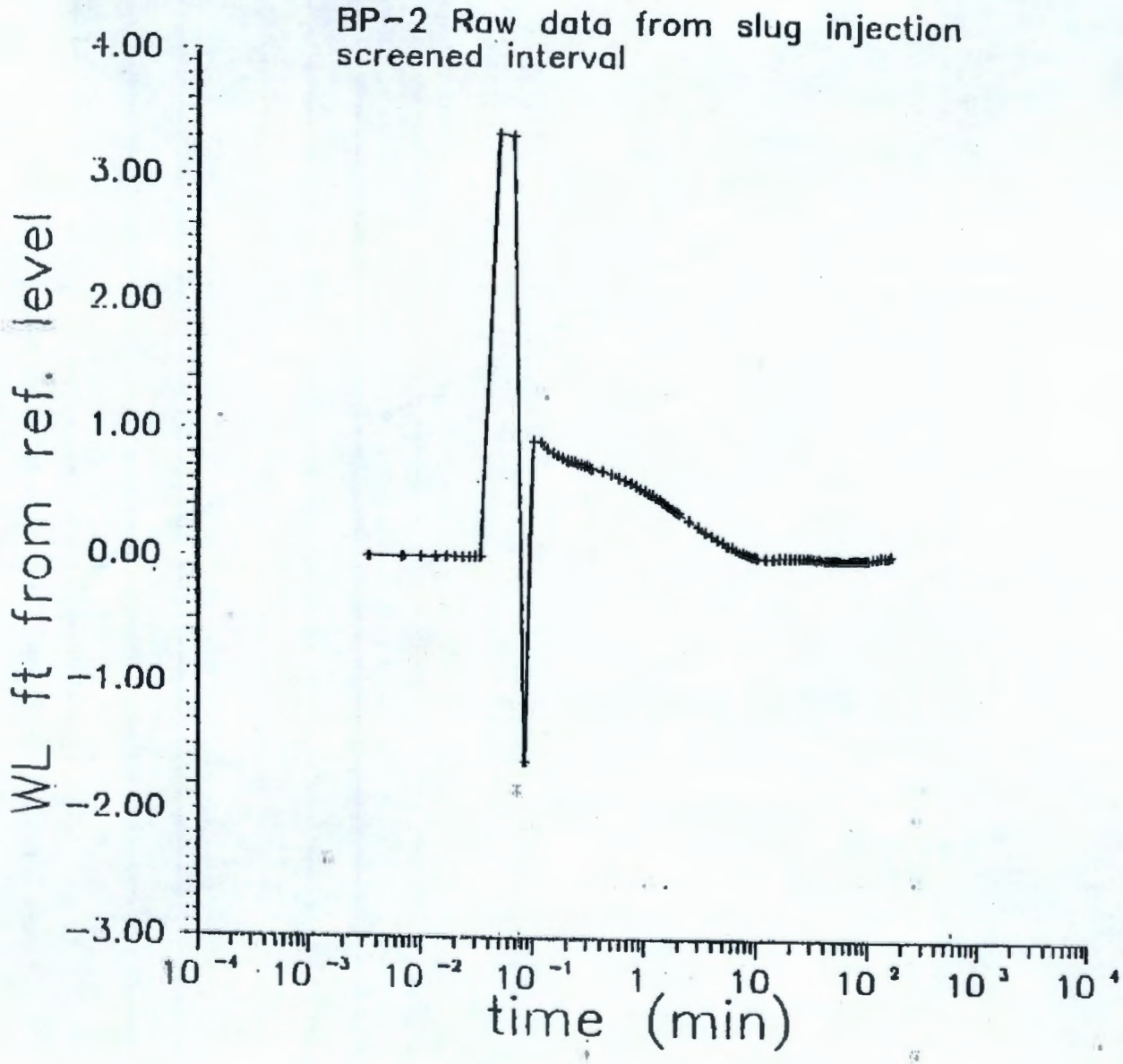
INPUT 1: Level (F)

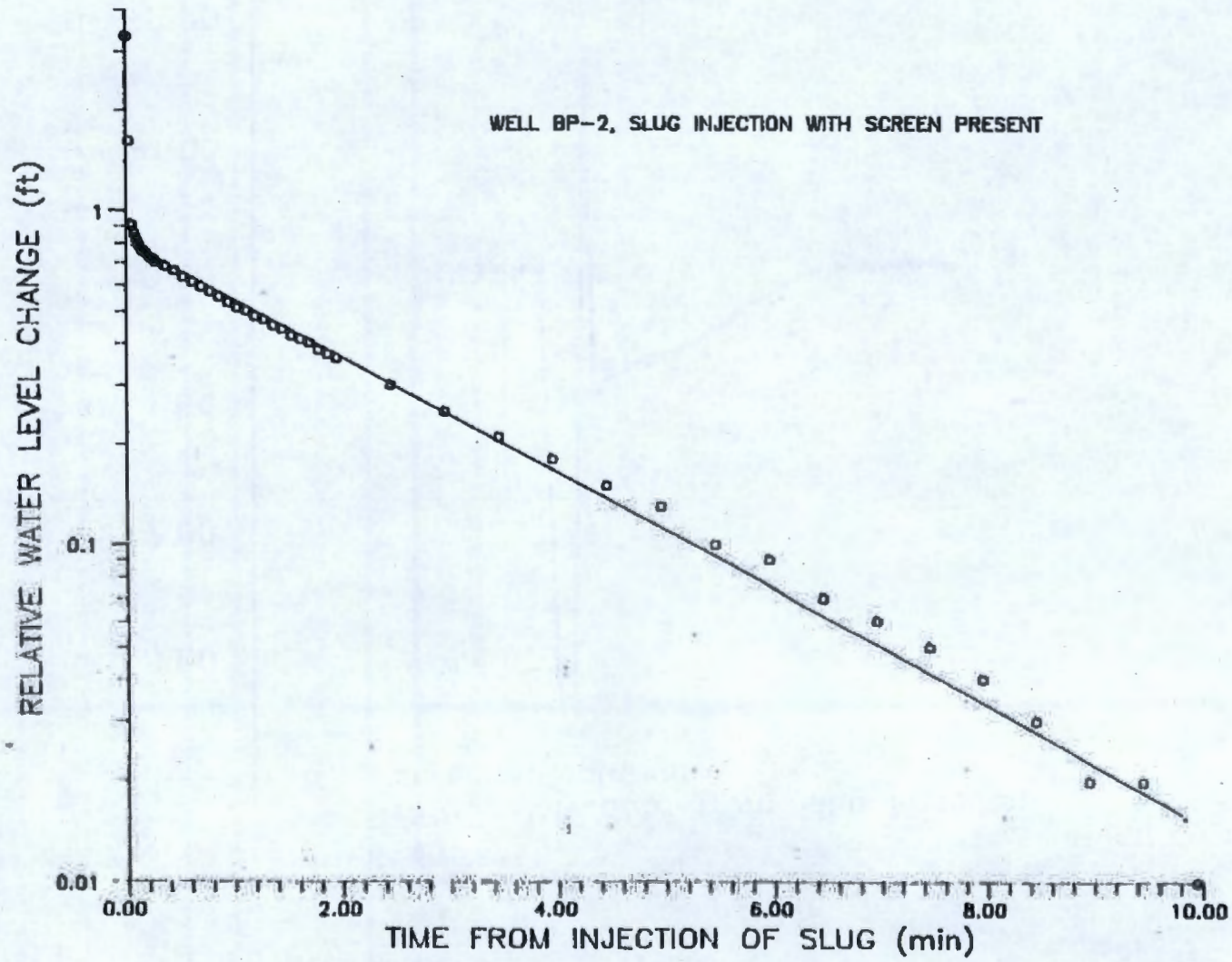
Reference 0.00
Scale factor 10.07
Offset - 0.07

Step# 0 07/06 09:50

Elapsed Time	Value
0.0000	0.00
0.0033	0.00
0.0066	0.00
0.0099	0.00
0.0133	- 0.00
0.0166	- 0.00
0.0200	- 0.00
0.0233	- 0.00
0.0266	- 0.00
0.0300	- 0.00
0.0333	0.00
0.0500	3.34
0.0666	3.32
0.0833	- 1.61
0.1000	0.91
0.1166	0.90
0.1333	0.85
0.1500	0.82
0.1666	0.80
0.1833	0.78
0.2000	0.76
0.2166	0.76
0.2333	0.75
0.2500	0.74
0.2666	0.73
0.2833	0.72
0.3000	0.72
0.3166	0.71
0.3333	0.70
0.4167	0.68
0.5000	0.66
0.5833	0.63
0.6667	0.61
0.7500	0.59
0.8333	0.57
0.9167	0.55
1.0000	0.53
1.0833	0.51
1.1667	0.50
1.2500	0.48
1.3333	0.47
1.4166	0.45
1.5000	0.44
1.5833	0.42
1.6667	0.41
1.7500	0.40
1.8333	0.38
1.9167	0.37
2.0000	0.36
2.5000	0.30
3.0000	0.25
3.5000	0.21
4.0000	0.18
4.5000	0.15
5.0000	0.13
5.5000	0.10
6.0000	0.09
6.5000	0.07
7.0000	0.06
7.5000	0.05
8.0000	0.04
8.5000	0.03
9.0000	0.02
9.5000	0.02
10.0000	0.01
12.0000	0.00
14.0000	- 0.00
16.0000	- 0.01
18.0000	- 0.01
20.0000	- 0.01
22.0000	- 0.01
24.0000	- 0.01
26.0000	- 0.01
28.0000	- 0.01
30.0000	- 0.01
32.0000	- 0.01
34.0000	- 0.00
36.0000	- 0.01
38.0000	- 0.00
40.0000	- 0.00
42.0000	- 0.00
44.0000	- 0.00
46.0000	- 0.00
48.0000	- 0.00
50.0000	- 0.00
52.0000	- 0.00
54.0000	- 0.00
56.0000	- 0.00
58.0000	- 0.00
60.0000	- 0.00
62.0000	- 0.00
64.0000	- 0.00
66.0000	- 0.00
68.0000	0.00
70.0000	0.00
72.0000	0.00
74.0000	0.00
76.0000	0.00
78.0000	0.00
80.0000	0.00
82.0000	0.00
84.0000	0.00
86.0000	0.00
88.0000	0.00
90.0000	0.00
92.0000	0.00
94.0000	0.00
96.0000	0.00
98.0000	0.00
100.000	0.00
110.000	0.01
120.000	0.01
130.000	0.02
140.000	0.02
150.000	0.02
160.000	0.03

END


BP-2 Raw data from slug injection
screened interval
WL ft from ref. level
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
10 -4
10 -3
10 -2
10 -1
1
10
10 2
10 3
10 4
time (min)


WELL BP-2, SLUG INJECTION WITH SCREEN PRESENT
RELATIVE WATER LEVEL CHANGE (ft)
1
0.1
0.01
0.00
2.00
4.00
6.00
8.00
10.00
TIME FROM INJECTION OF SLUG (min)