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Page 1 of 1

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WHC-SD-EN-AP-170, Rev. 0

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SUPPORTING DOCUMENT

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7. Abstract

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EXECUTIVE SUMMARY

This document presents a groundwater monitoring plan for contaminant indicator parameter-evaluation monitoring of the 216-A-10 and 216-A-36B Cribs located in the 200 East Area on the Hanford Site in southeastern Washington State. It has been determined that hazardous materials were disposed to these cribs during past operations. In 1988, groundwater monitoring networks were designed and implemented to detect whether hazardous chemicals are entering the groundwater from these cribs.

This document summarizes the available data from the monitoring networks established in 1988 at the 216-A-10 and 216-A-36B Cribs and presents a plan to continue contaminant indicator parameter-evaluation monitoring at both facilities. The plan calls for the continued monitoring of water quality in five of the eight monitoring wells at the 216-A-10 Crib that were part of the two monitoring networks established in 1988. Water levels will continue to be collected from all eight wells.

At the 216-A-36B Crib, water quality monitoring will continue using seven monitoring wells. Five of the seven monitoring wells were part of the monitoring network established in 1988. The other two monitoring wells are upgradient (background) monitoring wells that are also being used in the revised 216-A-10 Crib monitoring network. Water levels will continue to be collected from all seven wells in the 1988 monitoring network. Indicator parameter-evaluation monitoring will continue semiannually at both cribs to detect adverse impacts of the units on groundwater quality and monitor general groundwater quality. The wells at both cribs will also be sampled annually for water quality, drinking water, and site-specific parameters.

GLOSSARY

AR	average replicate
CRCL	contract required quantification limit
DOE	U.S. Department of Energy
DWS	drinking water standards
Ecology	Washington State Department of Ecology
EII	Environmental Investigation Instructions
EPA	U.S. Environmental Protection Agency
GWMP	Groundwater Monitoring Program
LOQ	limit of quantification
MEMO	Monitoring Efficiency Model
msl	mean sea level
PNL	Pacific Northwest Laboratory
PUREX	Plutonium-Uranium Extraction
QA/QC	quality assurance/control
RCRA	Resource Conservation and Recovery Act of 1976
200 EAST AAMS	200 East Aggregate Area Management Study
WHC	Westinghouse Hanford Company
WIDS	Waste Information Data System

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FIGURES:

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1.0 INTRODUCTION

This document presents the revised plan for indicator parameter-evaluation groundwater monitoring for two Resource Conservation and Recovery Act of 1976 (RCRA) waste management units, the 216-A-10 and 216-A-36B Cribs. This groundwater monitoring plan is based on requirements for interim-status facilities as defined by RCRA and amended by the Hazardous and Solid Waste Amendments of 1984. These regulations are promulgated by the U.S. Environmental Protection Agency (EPA) in 40 CFR 265, Subpart F, and are implemented by the Washington State Department of Ecology (Ecology) in WAC 173-303-400 (Ecology 1993).

Under RCRA interim status, the 216-A-10 and 216-A-36B Cribs require a detection-level/groundwater monitoring program. This section presents the purpose and objectives of the plan for this program. The 216-A-10 and 216-A-36B Cribs have received low-level radioactive wastes and potentially hazardous substances. No wastes have been discharged since 1987, and no additional hazardous substances are expected to be received by the 216-A-10 and 216-A-36B Cribs.

Two draft groundwater monitoring plans were developed in 1988 and addressed groundwater monitoring independently at each crib. These plans were implemented by the U.S. Department of Energy (DOE) in 1988.

This revised monitoring plans update the monitoring plans established in 1988 and provide continuity to the monitoring program for the two RCRA Hazardous Waste Units. This plan, in conjunction with the applicable Westinghouse Hanford Company (WHC) procedures known as Environmental Investigation Instructions (EII) (WHC 1988), are provided to satisfy the RCRA requirement for a groundwater sampling and analysis plan as discussed in 40 CFR 265.92 (a). These plans specify a program that will detect significant statistical changes of the quality of the groundwater in the uppermost aquifer beneath the 216-A-10 and 216-A-36B Cribs, in accordance with 40 CFR 265.90 (a). The objectives of this program are the following:

- Continue indicator parameter-evaluation monitoring of groundwater beneath the two waste management units to determine whether hazardous constituents from the two waste management units have affected groundwater quality

- Establish efficient groundwater monitoring networks for the waste management units that utilize wells in the existing networks in order to provide at least 90% monitoring efficiency.

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2.0 BACKGROUND INFORMATION

2.1 DESCRIPTION OF WASTE MANAGEMENT FACILITIES

As shown in Figure 2-1, the 216-A-10 and 216-A-36B Cribs are located on the Hanford Site in the southeast portion of the 200 East Area. This section describes the physical characteristics of both cribs and their history of operation, and presents a summary of the waste characteristics. Waste streams are described in more detail in Waste Information Data System (WIDS) General Summary Reports that are included in Appendix A. The overviews provided in the following subsections (i.e., Sections 2.1.1 through 2.2.3.3) are taken with few modifications from Annual Report for RCRA Groundwater Monitoring Projects at Hanford Site Facilities for 1993 (DOE-RL 1994, pgs. 4.8-1 and 4.7-1).

2.1.1 216-A-10 Crib Facility Overview

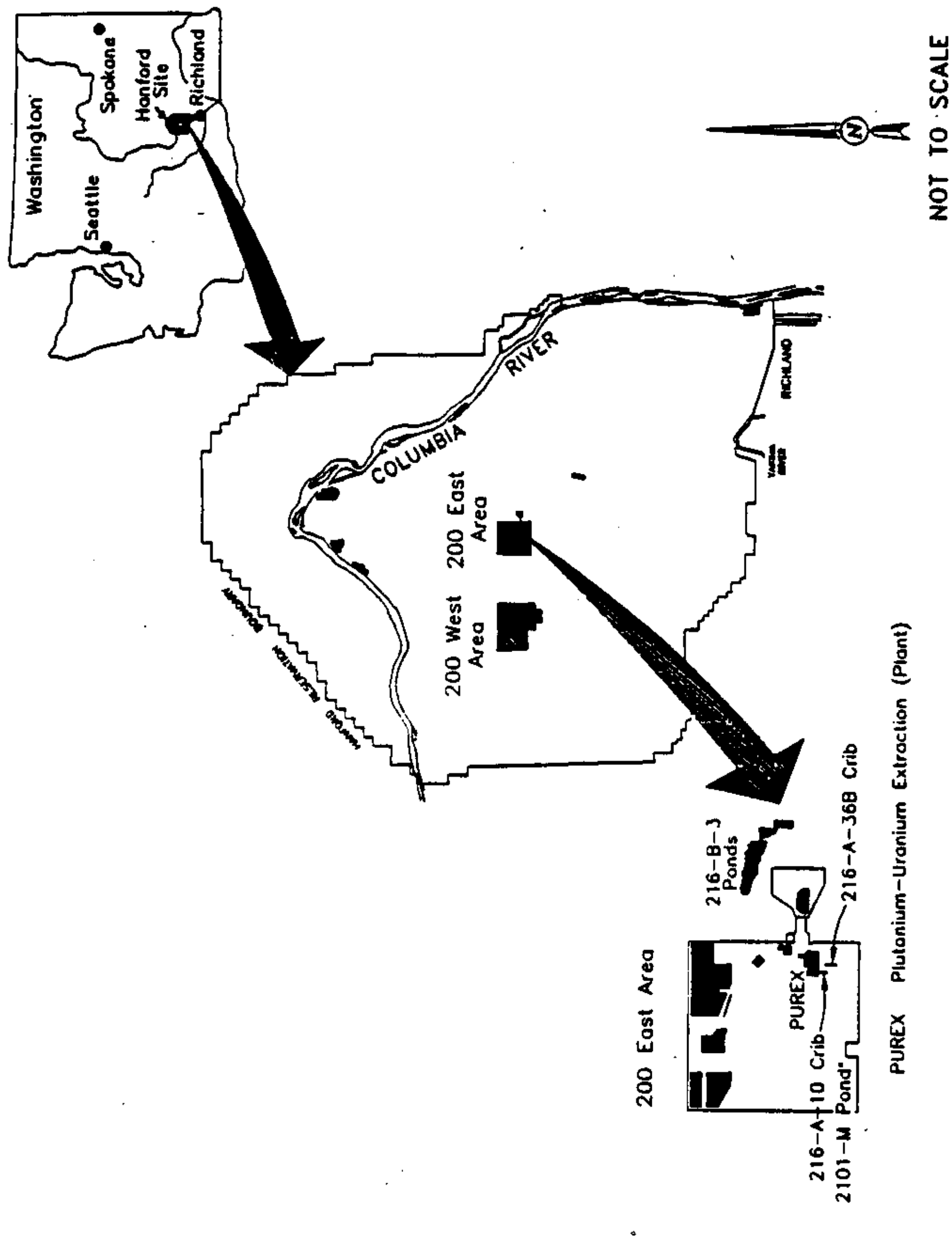
The 216-A-10 Crib, now retired from use, was a liquid waste disposal facility for the Plutonium-Uranium Extraction (PUREX) Plant. The 216-A-10 Crib is located in the 200 East Area approximately 122 m (400 ft) south of the PUREX Plant. It is also located approximately 110 m (360 ft) west of the 216-A-36B Crib (Figure 2-2).

The 216-A-10 Crib is 84 m (275 ft) long, has a V-shaped cross section, and is 14 m (45 ft) deep. Several waste streams, collectively described as the process distillate discharge, were disposed to the 216-A-10 Crib and were allowed to percolate through the soil column. The 216-A-10 Crib first received liquid wastes over a four-month period during the PUREX start-up in 1956. In 1961, the 216-A-10 Crib replaced the 216-A-5 Crib and received PUREX effluent continuously until 1973. Periodic discharges were received in 1977, 1978, and 1981. From 1982 to 1987, effluent discharges resumed on a continuous basis. Discharge between 1981 to 1986 averaged 1×10^8 L (2.6×10^7 gal)/yr. In 1987, the 216-A-10 Crib was taken out of service and replaced by the 216-A-45 Crib.

The process distillate discharge waste stream to the 216-A-10 Crib was characteristically acidic and contained concentrated salts. Other waste stream constituents included:

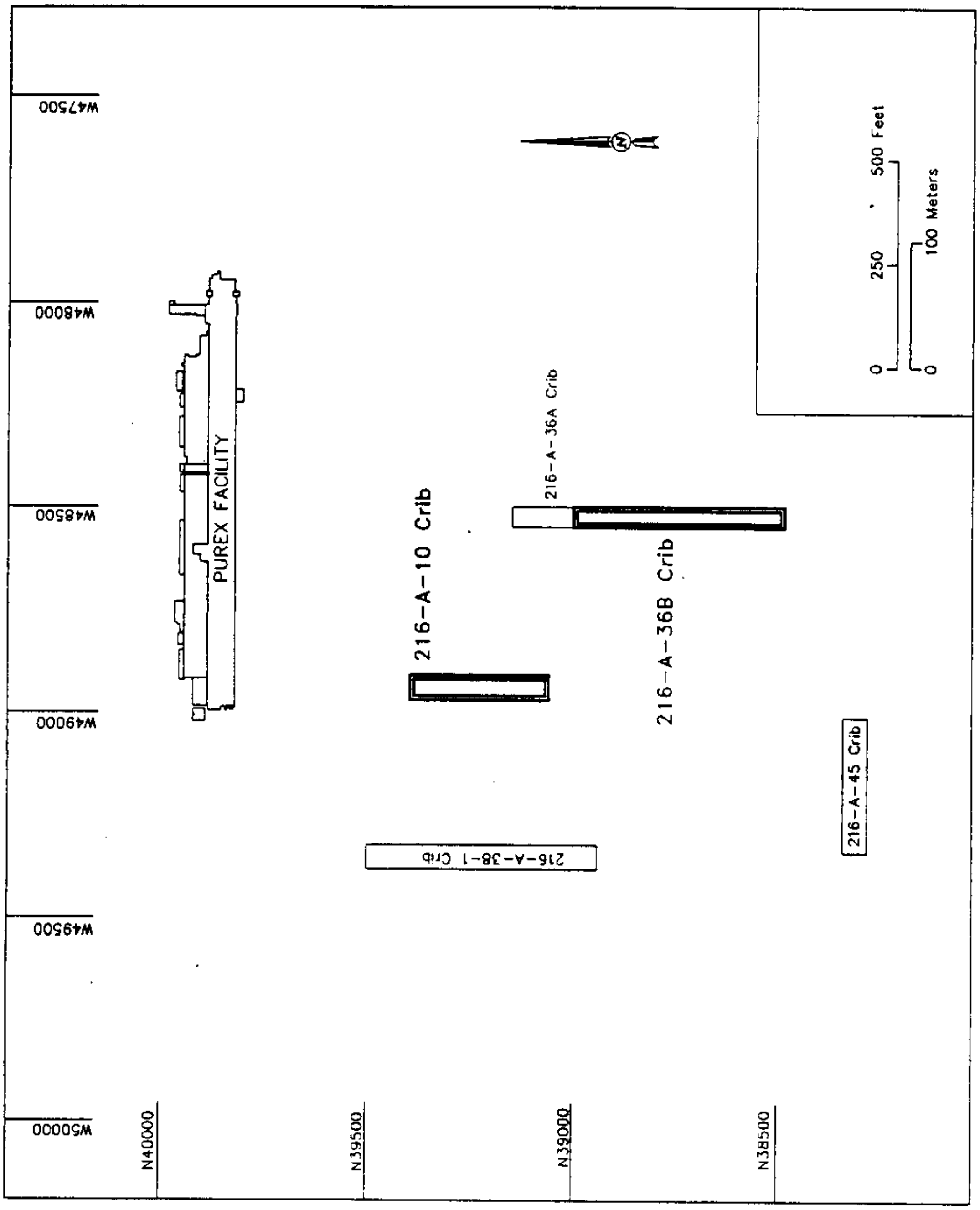
- Aliphatic hydrocarbon compounds
- Organic complexants
- The following radionuclides: plutonium, uranium, ^{90}Sr, ^{60}Co, ^{134}Cs, ^{137}Cs, ^{103}Ru, ^{106}Ru, and tritium (Aldrich 1987).

Figure 2-1. Locations of the 216-A-10 and 216-A-36B Cribs on the Hanford Site



Modified from: DOE-RL 1994 Pg. 1-5

Figure 2-2. Locations of 216-A-10 and 216-A-36B Cribs at the Purex Facility.



Modified from: DOE-RL 1994 pgs. 4.7-2 and 4.8-2

Waste disposed in the 216-A-10 Crib reportedly encountered approximately 97 m (318 ft) of unsaturated Hanford formation sediments above the water table (DOE-RL 1994, pg. 4.8-1). The water table beneath the 216-A-10 Crib occurs very near the hard-to-distinguish contact between the Hanford formation upper gravel and sandy sequences, and the underlying Ringold Formation gravel unit E. Approximately 40 m (130 ft) of Ringold Formation sediments comprise the saturated zone beneath the 216-A-10 Crib (WHC 1992). Section 2.2.4 provides additional information on the hydrogeologic setting for the 216-A-10 Crib.

An interim-status RCRA groundwater monitoring program has been active at the 216-A-10 Crib since November 1988. The groundwater monitoring program is currently in indicator parameter-evaluation status.

2.1.2 216-A-36B Crib Facility Overview

The 216-A-36B Crib, now retired from use, was a liquid waste disposal facility for the PUREX Plant. The 216-A-36B Crib is located in the 200 East Area approximately 360 m (1,200 ft) south of the PUREX Plant and is also approximately 110 m (360 ft) east of the nearby 216-A-10 Crib. The 216-A-36B Crib is the southernmost 150 m (500 ft) of the crib originally known as the 216-A-36 Crib (see Figure 2-2). The original crib dimensions were 180 m (600 ft) long, 4 m (12 ft) wide, and 4 m (12 ft) deep. At the bottom of the crib, a 0.02 m (0.5 ft) diameter perforated distributor pipe was placed on a 0.3 m (1 ft) bed of gravel, covered with another 0.3 m (1 ft) of gravel, and backfilled to grade. Through the distribution pipe, ammonia scrubber distillate waste from the PUREX Plant was discharged to the crib and allowed to percolate through the soil column.

The original crib (216-A-36) received liquid effluent from September 1965 to March 1966. A substantial inventory of radionuclides was disposed and assumed to have infiltrated sediments near the inlet to the crib. To continue effluent discharge to the crib, the crib was divided into two sections: 216-A-36A and 216-A-36B. Grout was injected into the gravel layer to form a curtain separating the two sections. The liquid effluent discharge point was moved to the 216-A-36B Crib section and the 216-A-36A Crib section was no longer used. Discharge to the 216-A-36B Crib resumed in March 1966 and continued until 1972, when the crib was temporarily removed from service. The 216-A-36B Crib was placed back in service in November 1982 and operated until taken out of service again in October 1987.

Ammonia scrubber distillate disposed to the 216-A-36B Crib consisted of a condensate from nuclear fuel decladding operations in which zirconium cladding was removed from irradiated fuel by boiling in a solution of ammonium fluoride and ammonium nitrate. Other waste stream constituents included the radionuclides of tritium, ^{90}Sr, ^{137}Cs, ^{106}Ru, ^{60}Co, and uranium (Buelt et al. 1988).

As with the nearby 216-A-10 Crib, waste disposed in the 216-A-36B Crib encountered approximately 97 m (318 ft) of unsaturated Hanford formation sediments above the water table (DOE-RL 1994, pg. 4.7-1). Section 2.2.4 provides additional information on the hydrogeologic setting for the 216-A-36B Crib.

An interim-status RCRA groundwater monitoring program has been in operation at the 216-A-36B Crib since May 1988. The groundwater monitoring program at the 216-A-36B Crib is currently in indicator parameter-evaluation status.

2.2 HYDROGEOLOGIC SETTING OF THE 200 EAST AREA

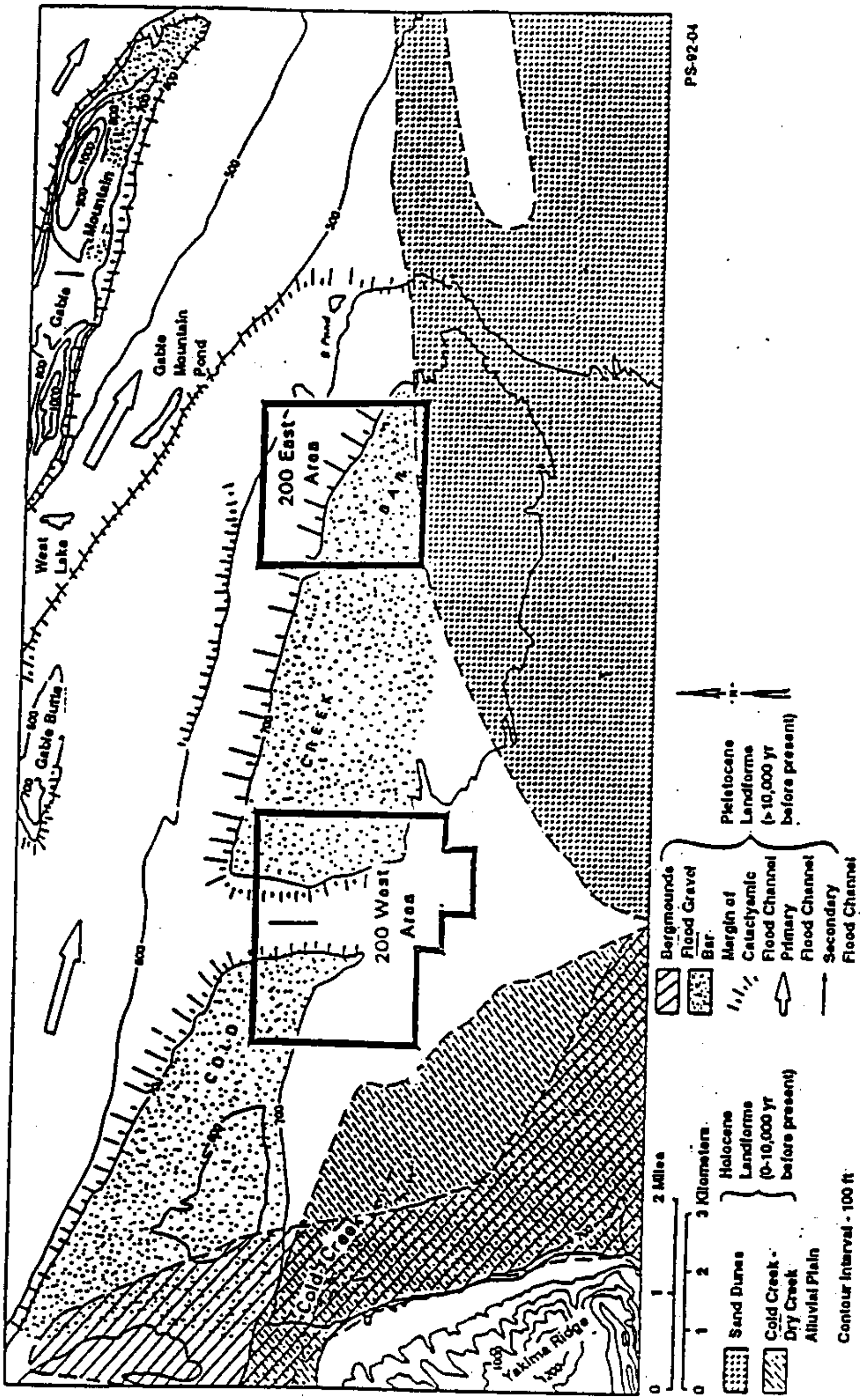
The 200 Areas encompass a large region central to the Hanford Site. Within the 200 Areas are the 200 West Area and the 200 East Area, where retired nuclear fuel processing plants and various waste management facilities exist. Most of the hydrogeologic data and information presented in this section are excerpted from DOE-RL (1994). Other key geological and hydrogeological references for the area include 200 East Groundwater Aggregate Area Management Study Report (DOE-RL 1993b), Geology and Hydrology of the Hanford Site: A Standardized Text for Use in Westinghouse Hanford Company Documents and Reports (Delaney et al. 1991), and Geologic Setting of the 200 East Area: An Update (Lindsey et al. 1992). These documents were drafted to support the recently completed 200 East Aggregate Area Management Study (200 East AAMS). A primary objective of the 200 East AAMS was to collate and evaluate all available 200 East Area environmental data. Hydrogeologic data collected and evaluated in the 200 East AAMS reports have resulted in the most current understanding of the 200 East Areas' hydrogeology. Other more recent reports and references have been used to supplement information extracted from the 200 East AAMS reports and are referenced where appropriate.

2.2.1 Physiography and Topography of the 200 East Area

The 200 Areas are situated on a broad plateau commonly referred to as the 200 Areas Plateau. The 200 Areas Plateau is located in a synclinal flexure in the Columbia River Basalt known as the Cold Creek Syncline. Land surface elevation for the 200 Areas Plateau ranges from approximately 200 to 400 m (656 to 755 ft) above mean sea level (msl). The plateau decreases in elevation to the north, northwest, and east with elevation changes between 15 to 30 m (49 to 98 ft) near the plateau escarpments to the north.

As illustrated in Figure 2-3, the 200 Areas Plateau is formed primarily by the Cold Creek bar, an east-west trending depositional feature that developed as a result of large-scale flood events associated with periodic catastrophic draining of ancient Lake Missoula during the Pleistocene Epoch. The northern extent of the 200 Areas Plateau is defined by the Gable Mountain-Gable Butte anticline complex and two major northwest-southeast trending flood channels. In addition to these main channels, a north-south, trending secondary flood channel transects the 200 West Area. The geomorphology to the south of the 200 Area is

Figure 2-3. Geomorphic Features Surrounding the 200 Areas



Source: DOE -RL 1994 pg 4.1-2

dominated by the Cold Creek-Dry Creek alluvial plain and Holocene sand dune and sheet sand deposits. Holocene sand dunes and sheet sands also dominate to the east of the 200 Areas. To the west, the Cold Creek-Dry Creek alluvial plain and berg mounds deposited during the Lake Missoula catastrophic flood events dominate the landscape.

2.2.2 Geology and Stratigraphy of the 200 East Area

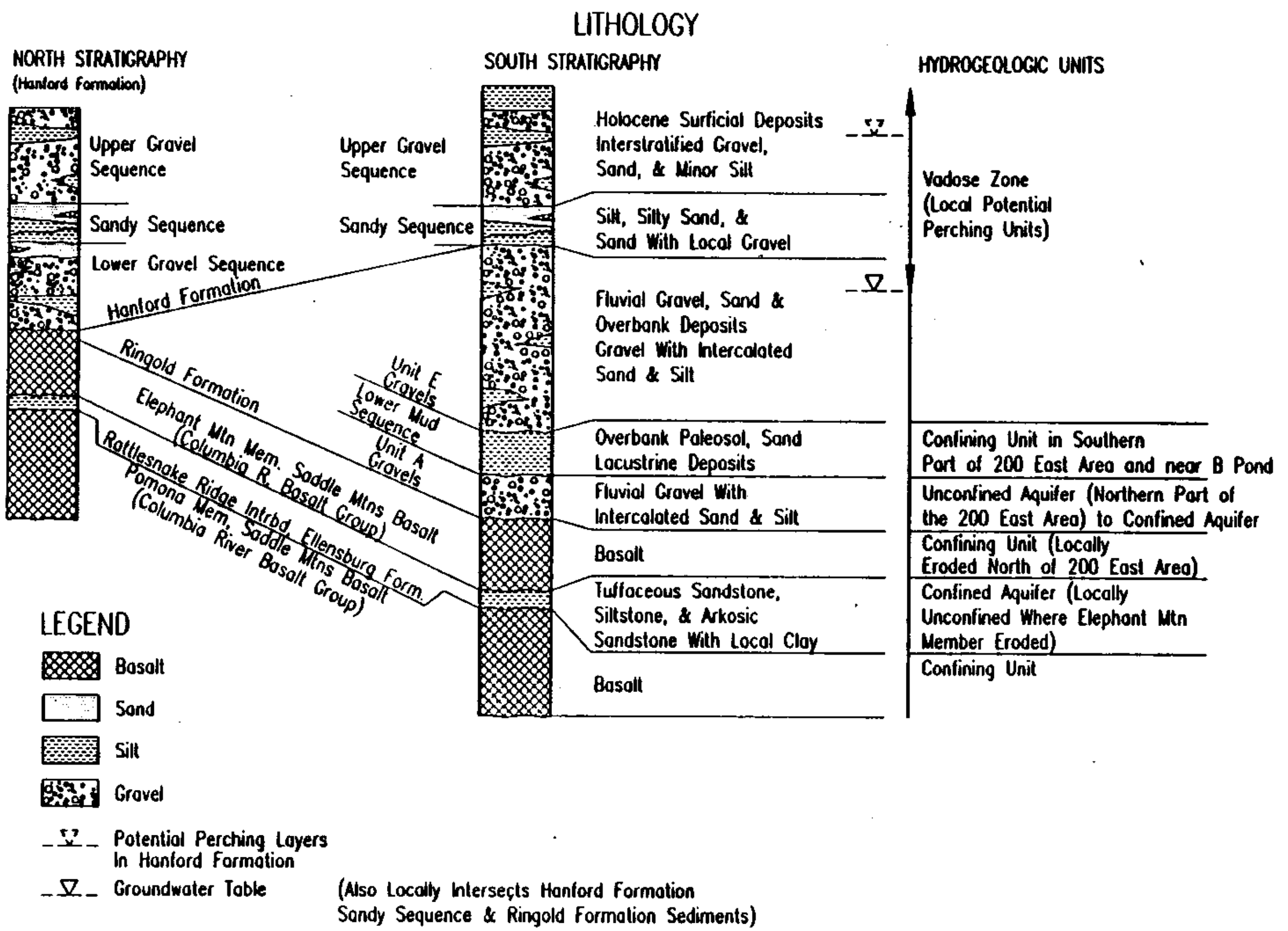
Geologic and stratigraphic characteristics, distinctive of the 200 East Area, are provided in this section and are presented in Figure 2-4. Significant stratigraphic characteristics including thickness variations, dip trends, and spatial relationships are also provided. Stratigraphic units of significance in the 200 East Area include:

- Pomona Member and Elephant Mountain Members of the Saddle Mountains Basalt
- Rattlesnake Ridge interbed of the Ellensburg Formation
- Ringold Formation including units A, C, E; the lower mud sequence; and upper Ringold unit
- Hanford formation.

2.2.2.1 Pomona and Elephant Mountain Members. The Pomona and Elephant Mountain Members of the Saddle Mountains Basalt are continuous throughout the 200 East Area except in those locations where the Elephant Mountain Member has eroded. The Pomona Member ranges from 56 to 60 m (184 to 197 ft) in thickness beneath the 200 East Area. The Elephant Mountain Member generally ranges from 21 to 36 m (69 to 118 ft) in thickness. However, north of the 200 East Area, erosional processes have removed the entire section of the Elephant Mountain Member extending from the Gable Mountain-Gable Gap area to the south, terminating near the northern boundary of the 200 East Area.

Studies conducted to date do not indicate the presence of faults or significant fracture systems in the Elephant Mountain Member beneath the 200 East Area. However, a complex fault and fracture system is present to the north of the 200 East Area associated with the Gable Mountain-Gable Butte anticline complex. Generally, basalts are composed of various interflow structures that affect their geologic and hydrologic characteristics. Site-specific data on these features for the Pomona and Elephant Mountain Members are not available for the 200 East Area.

2.2.2.2 Rattlesnake Ridge Interbed. The Rattlesnake Ridge interbed forms a sedimentary interbed between the lower Pomona Member and the overlying Elephant Mountain Member. Thickness of the Rattlesnake Ridge interbed ranges from a minimum of 6 m (20 ft) to the north of the 200 East Area to over 24 m (79 ft) south of the 200 East Area. The Rattlesnake Ridge interbed is composed of fluvially reworked volcanic ash beds and fine- to coarse-grained sand bodies. These sands and ash units are poorly indurated except in those



Source: DOE-RL 1994 pg 4.1-32

SJT\011794-A

Figure 2-4 Generalized Hydrostratigraphy of the 200 East Area locations of silica cementation and significant low-grade contact metamorphism associated with "baking" of the Rattlesnake Ridge sediments during extrusion of the Elephant Mountain Member basalt flow.

2.2.2.3 Ringold Formation. Beneath the 200 East Area, the Ringold Formation is composed of fluvial gravel units A, C, and E; the lower mud sequence; and the upper Ringold unit. The fluvial gravels of the Ringold Formation are dominated by clast-supported granule to cobble gravel with a sandy matrix (DOE-RL 1993b, p. 3-16). Intercalated sands and muds are also found. Clast composition is very variable, with basalt, quartzite, porphyritic volcanics, and greenstones being common. Sands in these units are generally quartzo-feldspathic, with basalt contents generally in the range of 5 to 25% (DOE-RL 1993b, p. 3-16; Lindsey et al. 1992). The lacustrine deposits of the lower mud sequence are characterized by plane-laminated to massive clay with thin silt and silty sand interbeds displaying some soft-sediment deformation. Coarsening upwards sequences less than 1 m (3 ft) to 10 m (30 ft) thick are common in the association (DOE-RL 1993b, p. 3-17; Lindsey et al. 1992).

Fluvial gravel unit A directly overlies the Elephant Mountain Member. Unit A displays a relatively flat surface that dips to the south and southwest towards the axis of the Cold Creek Syncline. Unit A generally pinches out in the central portion of the 200 East Area against structural highs in the underlying basalt bedrock. Thin, lenticular occurrences of unit A are found locally in the area between the northeast 200 East Area and Gable Mountain. Most of the Ringold gravels that are centrally located in the 200 East Area probably belong to unit A. Intercalated lenticular sand and silt are found locally in the middle section of the unit A gravels in the southeastern portion of the 200 East Area. Unit A ranges in thickness from 0 m (0 ft) in the northern portion of the 200 East Area to greater than 35 m (115 ft) east and south of the 200 East Area.

The fine-grained lacustrine deposits of the lower mud sequence thicken and dip to the southeast in a manner similar to the Ringold fluvial gravel unit A. However, the lower mud sequence is absent throughout much of the central portion of the 200 East Area. The lower mud sequence pinches out against structural highs in the basalt bedrock and, in some locations, is truncated by the overlying Ringold fluvial gravel unit E or Hanford formation. In the region between Gable Mountain and the northern 200 East Area boundary, and in the vicinity of the 216-B-3 Pond system, the lower mud sequence forms the uppermost section of the Ringold Formation and is directly overlain by Hanford formation sediments. Throughout the rest of the 200 East Area, the lower mud sequence is overlain by the Ringold fluvial gravel unit E. The lower mud sequences range in thickness from 0 m (0 ft) to more than 29 m (95 ft) southeast of the 200 East Area.

Fluvial gravel unit C and the upper Ringold unit are present near the southeast corner of the 200 East Area. These units pinch out immediately north and west but thicken to the south-southwest into the Cold Creek Syncline.

Overlying the lower mud sequence is fluvial gravel unit E. This unit thickens to the south and southwest in the 200 East Area. Unit E is restricted primarily to the southern portion of the 200 East Area, and is absent in the 216-B-3 Pond area and between the 200 East Area and Gable Mountain. In addition to the gravels typical of unit E, discontinuous silt and sand lenses are present locally. Unit E reaches a maximum thickness of 35 m (115 ft) south of the 200 East Area.

2.2.2.4 Hanford Formation. The glacio fluvial sands and gravels of the Hanford formation overlie the fluvial and lacustrine sediments of the Ringold Formation in the southern two-thirds of the 200 East Area, but directly overlie basalt bedrock in the northern third and further north of the area where the Ringold Formation is absent. The Hanford formation in the 200 East Area and surrounding localities has been subdivided into three stratigraphic sequences. These sequences include:

- The lower gravel sequence
- The sandy sequence
- The upper gravel sequence.

The lower gravel sequence is composed of a heterogeneous mix of gravels, sand, and some silt. The sequence ranges in thickness from 0 m (0 ft) to 44 m (144 ft) and is found throughout most of the 200 East Area, although it is notably absent in the east-central portion of the 200 East Area and to the west. In locations where the sandy sequence is absent, the lower gravel sequence is directly overlain by the upper gravel sequence. At these locations, it is impossible to distinguish the upper sequence from the lower sequence.

The sandy sequence consists of a heterogeneous mixture of sand and silt with minor amounts of gravel. Texturally, the sandy sequence exhibits graded bedding with fining upward sequences. Fine to coarse sands dominate to the north while silt dominates to the south. Thin lenticular silty paleosols with high carbonate content have been found in the northern part of the 200 East Area within the sandy sequence. The sandy sequence pinches out to the north of the 200 East Area but dips and thickens to the west of the 200 East Area. Maximum thickness of the sandy sequence exceeds 90 m (295 ft) west of the 200 East Area. The sandy sequence is probably correlative with the lower fine-grained sequence of the Hanford formation found in the 200 West Area. Clastic dikes are found randomly distributed in the sandy sequence typically oriented in a near-vertical position..

The upper gravel sequence of the Hanford formation consists of a heterogeneous mix of gravels, sand, and some silt, which are similar to the lower gravel sequence. The upper and lower gravel sequences are so similar that without the intervening sandy sequence, the upper gravel sequence cannot be distinguished from the lower gravel sequence. The sequence ranges in thickness up to 55 m (180 ft) or more north and possibly west of the 200 East Area. In the northern portion of the 200 East Area, the upper gravel sequence forms an elongated, northwest- to southeast-trending gravel deposit. North of the 200 East Area, the upper gravel sequence cannot be distinguished from the lower sequence because of the absence of the sandy sequence.

2.2.3 Hydrogeology of the 200 East Area

The two major hydrogeologic units of interest are the vadose zone and the uppermost unconfined aquifer. The following discussion provides further detail on the composition, thickness, and hydraulic properties of the vadose zone and uppermost aquifer beneath the 200 East Area. The generalized hydrostratigraphy of the 200 East Area is illustrated in Figure 2-4.

2.2.3.1 200 East Area Vadose Zone Characteristics. The vadose zone in the 200 East Area is composed primarily of the Ringold gravel unit A through the central and southern portions of the area and the Ringold lower mud unit to the east near 216-B-3 Pond (DOE-RL 1993b, p. 3-47). Because of the discontinuous nature of the Ringold Formation north of the central portion of the 200 East Area, the vadose zone is dominated by Hanford formation sediments between the 200 East Area and Gable Mountain-Gable Gap. North of the 200 East Area where basalt rises above the water table elevation, the basalt is included as a hydrostratigraphic unit in the vadose zone. The lower mud sequence of the Ringold Formation composes the lower portion of the vadose zone beneath and surrounding the 216-B-3 Pond system in the eastern portion of the 200 East Area, and to the areas north and northeast of the 216-B-3 Pond. Thickness of the vadose zone in the 200 East Area ranges from 104 m (341 ft) near the southern border of the area to 37 m (121 ft) thick near the 216-B-3 Pond system (DOE-RL 1993b, p. 3-47).

Flow of water through the vadose zone is a function of the relationship between recharge rates, moisture content, matric potential, and unsaturated hydraulic conductivity for each hydrostratigraphic unit. In the 200 East Area, recharge rates are governed by both artificial and natural sources, with artificial sources greatly dominating the flux of water through the vadose zone near an active liquid waste disposal facility. Natural recharge rates range from 0.1 to 10 cm/yr (0.039 to 3.9 in/yr), depending on surface soil type and vegetation cover (DOE-RL 1993b, p. 3-52).

Generally, water will flow and spread laterally at a much greater rate in the fine-grained units than in coarse-grained units under saturated conditions. Fine-grained units in the Hanford formation and the lower mud sequence of the Ringold Formation significantly influence the lateral distribution and flux of water to the uppermost aquifer in the 200 East Area. Measured saturated horizontal hydraulic conductivities for the lower mud sequence are on the order of 10^{-8} cm/s (10^{-4} ft/d). The sandy sequence of the Hanford formation exhibits much more variability in saturated horizontal hydraulic conductivity, ranging from 10^{-2} to 10^{-5} cm/s (10^{2} to 10^{-1} ft/d) (WHC 1992).

Coarse-grained hydrostratigraphic units may impede the flux of water through the vadose zone under unsaturated flow conditions because of the formation of a capillary barrier between the coarse-grained units and overlying fine-grained units. The Hanford lower and upper gravel sequences and Ringold fluvial gravel units A and E could potentially induce a capillary barrier effect under favorable hydraulic conditions. Typically, lateral dispersion of water is minimal in the coarse-grained units in the 200 East Area. Measured saturated hydraulic conductivities for the coarse-grained hydrostratigraphic units range from 10^{-2} to 10^{-6} cm/s (10^{2} to 10^{-2} ft/d) for gravel units containing a large percentage of fine-grained matrix (WHC 1992).

The primary potential for perched water at the Hanford Site is associated with Plio-Pleistocene calcareous paleosols and the Pleistocene early "Palouse" soil (DOE-RL 1993b, p. 3-51). These units, however, are not present in the vicinity of the 200 East Area. In the 200 East Area, the fine-grained paleosols and silts found in the sandy sequence of the Hanford formation could potentially produce local perched conditions, although these units typically are not laterally persistent (DOE-RL 1993b, p. 3-51).

2.2.3.2 200 East Area Uppermost Aquifer Characteristics. The hydrogeology of the 200 East Area is relatively complex because of the depositional and erosional history of the area. The uppermost aquifer in the 200 East Area is generally unconfined but also exhibits confined to semiconfined conditions in the eastern portion of the 200 East Area. The aquifer occurs within the Hanford formation and the Ringold Formation throughout the 200 East Area. In the southern and eastern portions of the 200 East Area, the lower mud sequence of the Ringold Formation provides the base for the uppermost aquifer. Elsewhere, the Elephant Mountain Member forms the base of the uppermost aquifer, excluding those locations to the north where erosion has removed the Elephant Mountain Member. In these locations, the Pomona Member forms the base of the uppermost aquifer. The thickness of the uppermost aquifer ranges from 0 m (0 ft), where the basalt bedrock lies above the static water level to the north, to greater than 60 m (197 ft) in the south and west portions of the 200 East Area.

In locations north of the 200 East Area where the Elephant Mountain Member has been removed by erosion, the uppermost aquifer is in direct communication with the Rattlesnake Ridge aquifer. In the past, when the defense program mission was active, the hydraulic head in the uppermost aquifer has been greater than the hydraulic head in the Rattlesnake Ridge aquifer due to the liquid waste disposed in trenches, cribs, and ponds that percolated to the uppermost aquifer (DOE-RL 1993b). As a result, groundwater contaminants contained in the uppermost aquifer may have moved downward into the Rattlesnake Ridge aquifer at those locations of downward gradient. Current conditions are such that the Rattlesnake Ridge aquifer exhibits a slightly greater hydraulic head compared to the uppermost aquifer throughout most of the 200 East Area (WHC 1992). This greatly reduces or negates the flux of additional dissolved contaminants from the uppermost aquifer into the Rattlesnake Ridge aquifer. However, a downward hydraulic gradient does exist in the vicinity of the 216-B-3 Pond system due to the mounding of groundwater in the uppermost aquifer beneath the facility. Hydraulic head in the uppermost aquifer beneath the 216-B-3 Pond exceeds the hydraulic head in the Rattlesnake Ridge aquifer by approximately 6 m (20 ft).

The uppermost aquifer is under unconfined conditions throughout most of the 200 East Area. However, in the vicinity of the 216-B-3 Pond system, the uppermost aquifer becomes confined to semiconfined beneath the lower mud sequence of the Ringold Formation. Water has been encountered overlying the lower mud sequence at this location, but these bodies of water are considered to be discontinuous perched water zones and not part of the uppermost aquifer.

has been encountered overlying the lower mud sequence at this location, but these bodies of water are considered to be perched water zones and not part of the uppermost aquifer.

Hydraulic properties of the uppermost aquifer vary significantly in the 200 East Area. Horizontal hydraulic conductivity values range from 8 to 7,600 m/d (26 to 24,934 ft/d) for the upper portion of the uppermost aquifer system (WHC 1992).

2.2.3.3 Groundwater Flow Characteristics in the 200 East Area. The 216-B-3 Pond system significantly influences groundwater flow direction and hydraulic gradients in the uppermost aquifer throughout the 200 East Area (Figure 2-5). Although the 216-B-3 Pond is still active, a decrease in the volume of wastewater disposed to the 216-B-3 Pond has affected water levels in the uppermost aquifer throughout the 200 East Area. In general, water levels in the uppermost aquifer have decreased in response to the reduction in effluent volume disposed to the 216-B-3 Pond system as well as the reduction or cessation of effluent disposal to various other facilities in the 200 East Area. Hydrographs show a recent water level decrease with respect to historical water level trends throughout the 200 East Area.

Groundwater flow in much of the 200 East Area and specifically in and around the 216-A-10 and 216-A-36B Cribs (Figure 2-6) is characterized by relatively low hydraulic gradients in the range of 0.0001 to 0.0002 (WHC 1992). As shown in Figure 2-5, water table elevations in the uppermost aquifer generally decrease from the margins of the Yakima Ridge in the west to the Columbia River in the east. Based on the water table elevations shown in Figure 2-5, it appears there is potential for flow from the 200 West Area to bifurcate east of the Gable Butte subcrop with a lesser flow component in a northerly direction toward the gap between Gable Butte and Gable Mountain and the remaining flow in an easterly direction toward the Columbia River. The distribution of tritium in the uppermost aquifer as shown in the Hanford Site Tritium Plume Map (DOE-RL 1994, pg. 2-17/2-18) for data from 1991 through September 1993 (Figure 2-7) suggests that groundwater flow direction in the vicinity of the cribs is toward the southeast.

The mound resulting from discharge from the 216-B-3 Pond is a notable perturbation to the general easterly gradient direction observed in Figure 2-5. Near the western portion of the mound, gradient direction has been reversed to a westerly direction. The magnitude of this gradient direction reversal is currently diminishing as the mound decays. The gradient direction in the vicinity of the cribs is probably more southerly than it would be under undisturbed conditions, due to the radial flow pattern of the B Pond mound (see Figure 2-5). Gradient direction in the southeastern portion of the 200 East Area is expected to resume a more easterly direction as the mound decays.

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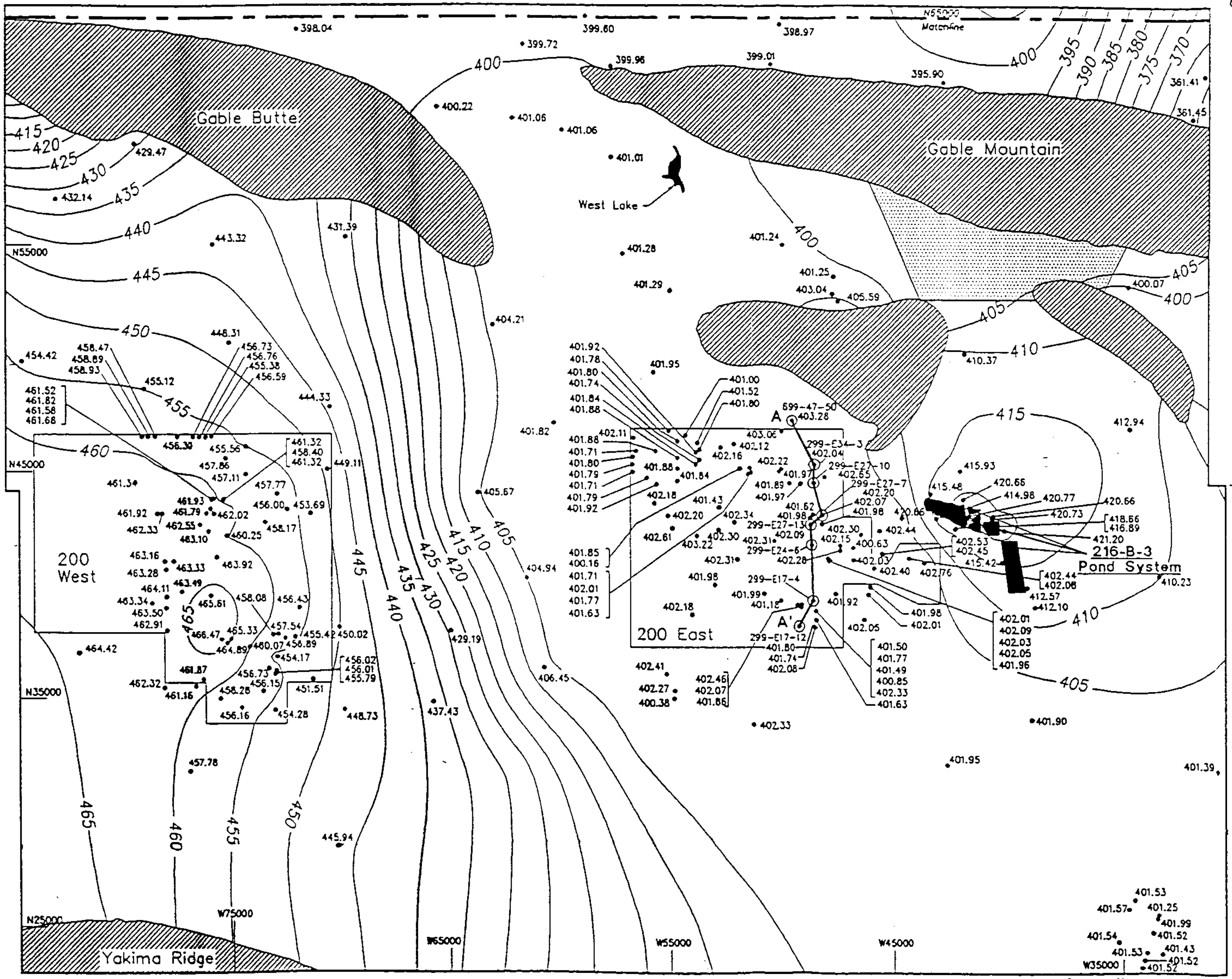
Figure 2-5.
200 Area Water Table Elevation, June 1993 and Cross Section Location



Source: Kasza, et al, 1994

Monitoring Well or Boring used in Cross Section A-A' and Identification

402.49 Water Table elevation (feet above mean sea level)

405 Water table elevation Contour Interval = 5 ft

Ponds

Areas where the basalt surface is generally above the water table

Area of conflicting data

The 200 Areas water table elevation map has been prepared by the Geohydrologic Engineering Function, Westinghouse Hanford Company.

Note: To convert to metric, multiply elevation (ft) by 0.3048 to obtain elevation (m).

0 1 Mile

0 1 Kilometer

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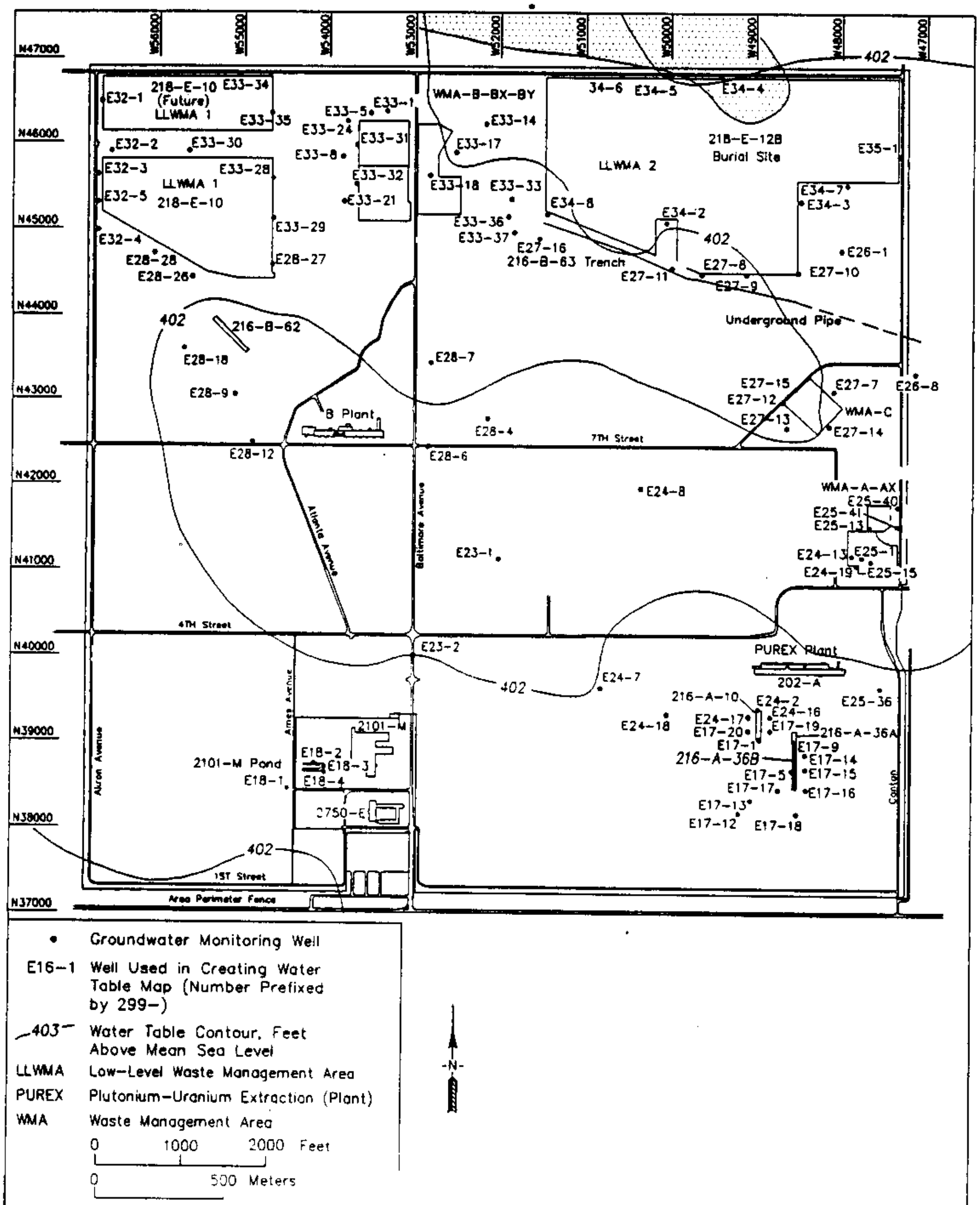
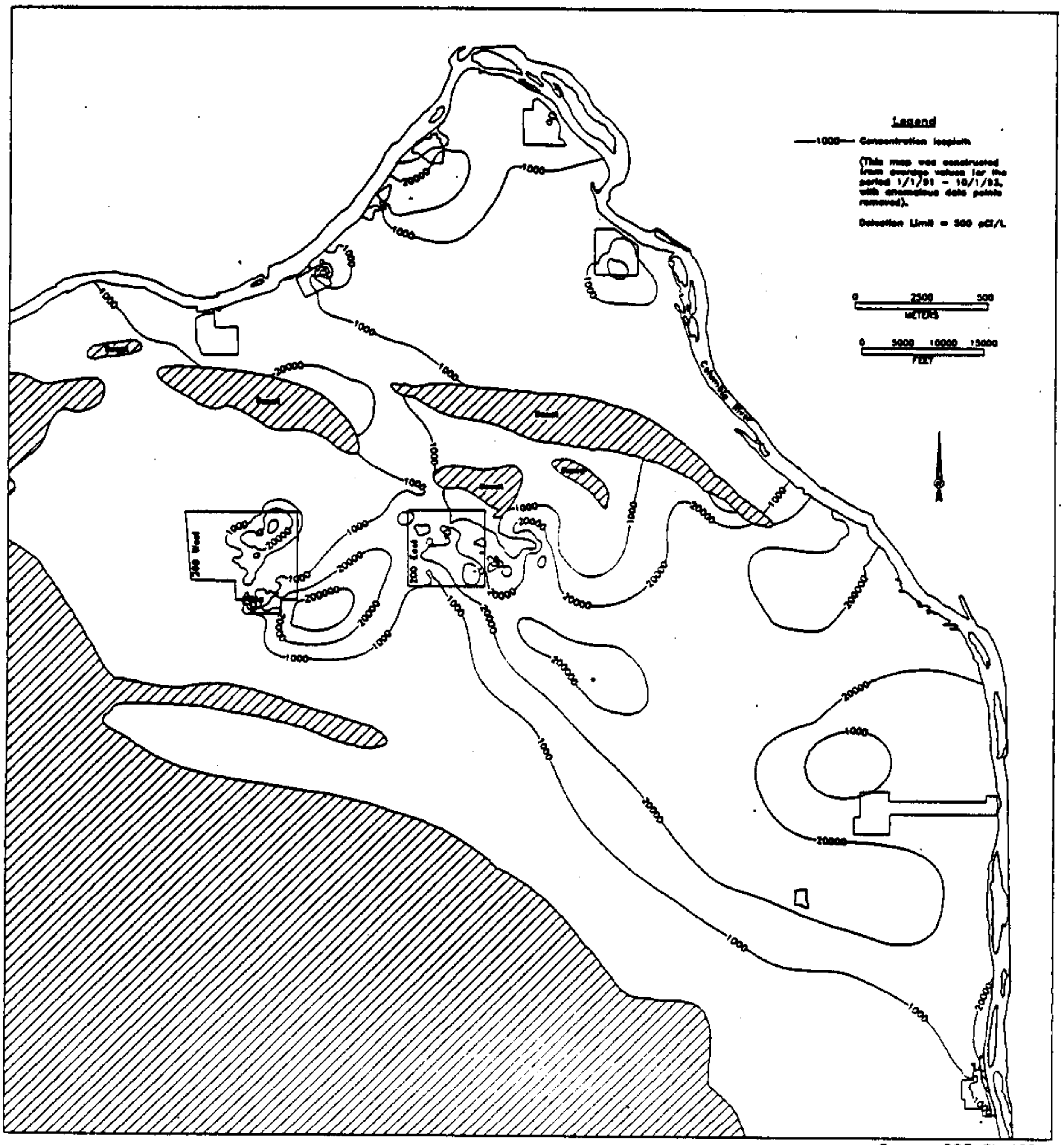
Figure 2-6. 200 East Area and Vicinity of the 216-A-10 and 216-A-36B Cribs, June 1993



Source: DOE-RL 1994

Figure 2-7. Tritium Distribution in the Uppermost Aquifer, Hanford Site



Source: DOE-RL 1994

2.2.4 Site-Specific Hydrogeology

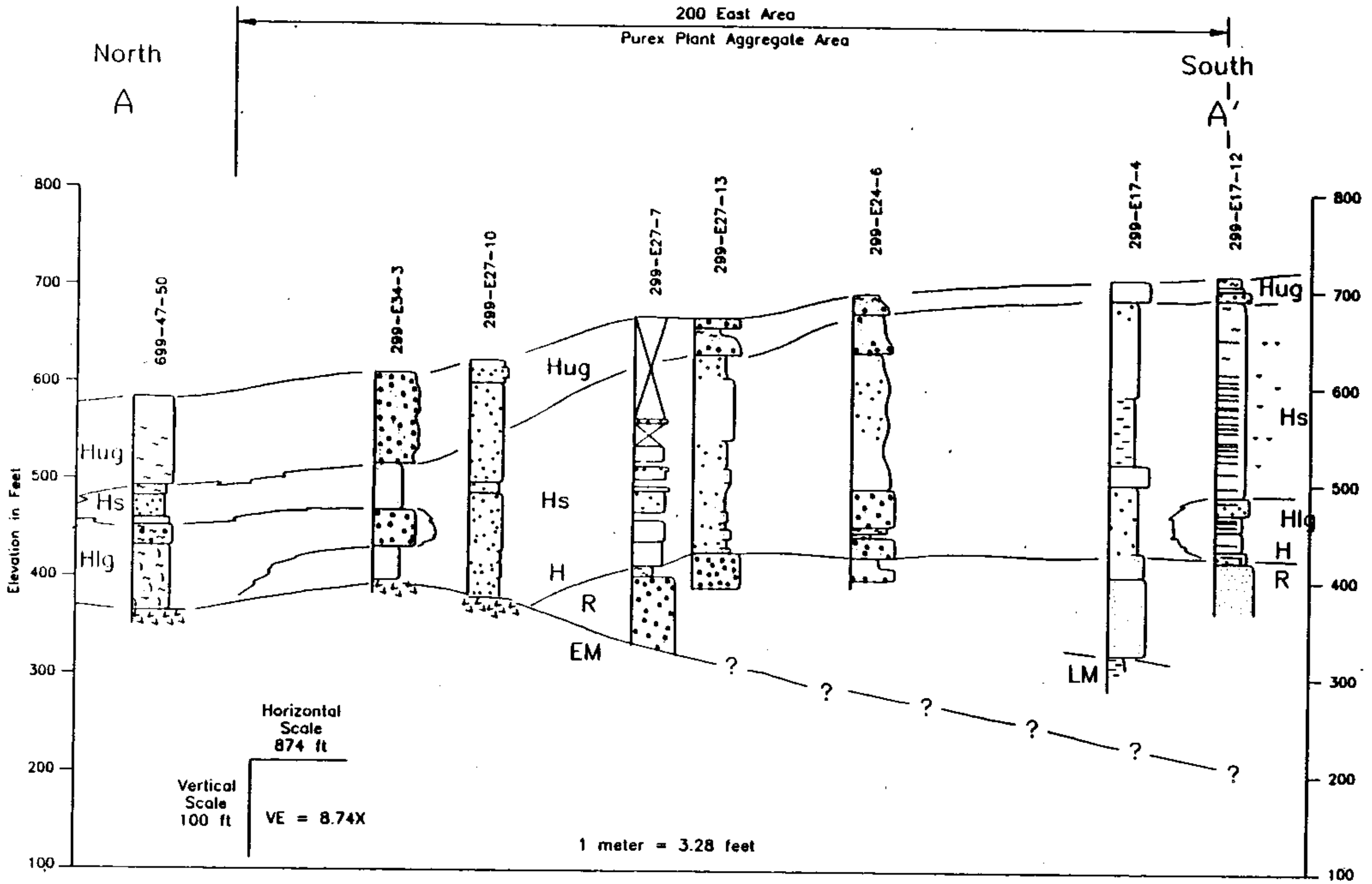
In the local area of the 216-A-10 and 216-A-36B Cribs, the uppermost aquifer is unconfined and lies within gravel and sand of unit E of the Ringold Formation (DOE-RL 1994). Lithologic descriptions presented in the Well Construction and Completion Summary diagrams (Ledgerwood 1993) included in Appendix B indicate that the aquifer is comprised primarily of sandy gravel but locally includes silty sand and gravel. DOE-RL (1994, p. 4.7-1) reports that approximately 40 m (130 ft) of saturated Ringold Formation sediments are present beneath the Cribs.

The base of the unconfined aquifer may be the lower mud sequence of the Ringold Formation or the top of the Elephant Mountain Member. An isopach map of the lower mud sequence of the Ringold Formation (DOE-RL 1993b, Figure 3-30) indicates that this unit may not be present beneath the 216-A-10 and 216-A-36B Cribs. The nearest well that was drilled deep enough to encounter the lower mud sequence is well 299-E17-4, located approximately 250 m (975 ft) to the south. The thickness of the lower mud sequence at that location is approximately 3 m (12 ft) (DOE-RL 1993b, Figure 3-30). The lower mud sequence is interpreted to pinch out approximately 200 m (780 ft) to the north of well 299-E17-4 (DOE-RL 1993b, Figure 3-30). Figure 2-8 presents a geologic cross section, part of which shows the area near the cribs. The cross-section legend and location are presented on Figures 2-9 and 2-5, respectively. At its closest point, which is near well 299-E17-4, this cross section is approximately 250 m (975 ft) west of the cribs.

The drill log for well 299-E17-9 near the 216-A-36B Crib (Appendix B) indicated the presence of a zone of perched water at a depth of 88.0 to 88.5 ft at the time the well was drilled (June 1968). No other indication of perched water in the vicinity of these cribs is noted on drill logs.

Groundwater levels measured in wells near the cribs generally conform to the overall groundwater flow characteristics of the 200 East Area as discussed in Section 2.2.3.3 and assessment of hydraulic gradients for the 200 East Area suggest that local groundwater flow is probably toward the south or southeast (WHC 1992). Groundwater levels in the vicinity of the cribs as measured in June 1993 are shown on Figure 2-10. At this local scale, it is not possible to develop a meaningful water table elevation contour map using the data shown on Figure 2-10. The groundwater gradient is extremely small in this area (see Figures 2-5 and 2-6) and the monitoring well spacing is relatively close. Under these conditions, small errors in measurement (survey and/or water-level measurements) result in large apparent gradient direction changes. Also, the water-level data may not be amenable to contouring at this scale in a dynamic system because of naturally occurring heterogeneities in the system that effect groundwater flow parameters such as hydraulic conductivity.

Figures 2-11 and 2-12, hydrographs of wells from the 216-A-10 and 216-A-36B Cribs, show a generally linear decline in water-level elevations at the site. The average rate of decline was approximately 0.5 ft/yr during the period June 1992 through June 1993 (DOE-RL 1994). This trend is a continuation of the long-term decline in water levels that



NOTE:
Refer to Figure 2-5 for cross section location and Figure 2-9 for legend. This figure based on Lindsey et al. 1992.

Figure 2-8. 200 East Area Geologic Cross Section A-A'

Figure 2-9. Cross Section Legend

EXPLANATION

Lithologic Symbols Including
Subordinate Lithologies

Clay rich

Silt rich

Sandy

Pebbly to Cobbly

Bouldery

Calcium carbonate present

Basalt

OTHER SYMBOLS

Formational contact, ? where inferred

? Unit or sequence contact, ? where inferred

UNIT ABBREVIATIONS

Hug – Upper Gravel Unit, Hanford Formation

Hs – Sandy sequence, Hanford formation

Hlg – Lower fine gravel unit, Hanford formation

H/R – Hanford/Ringold contact

PP – Plio-Pleistocene unit

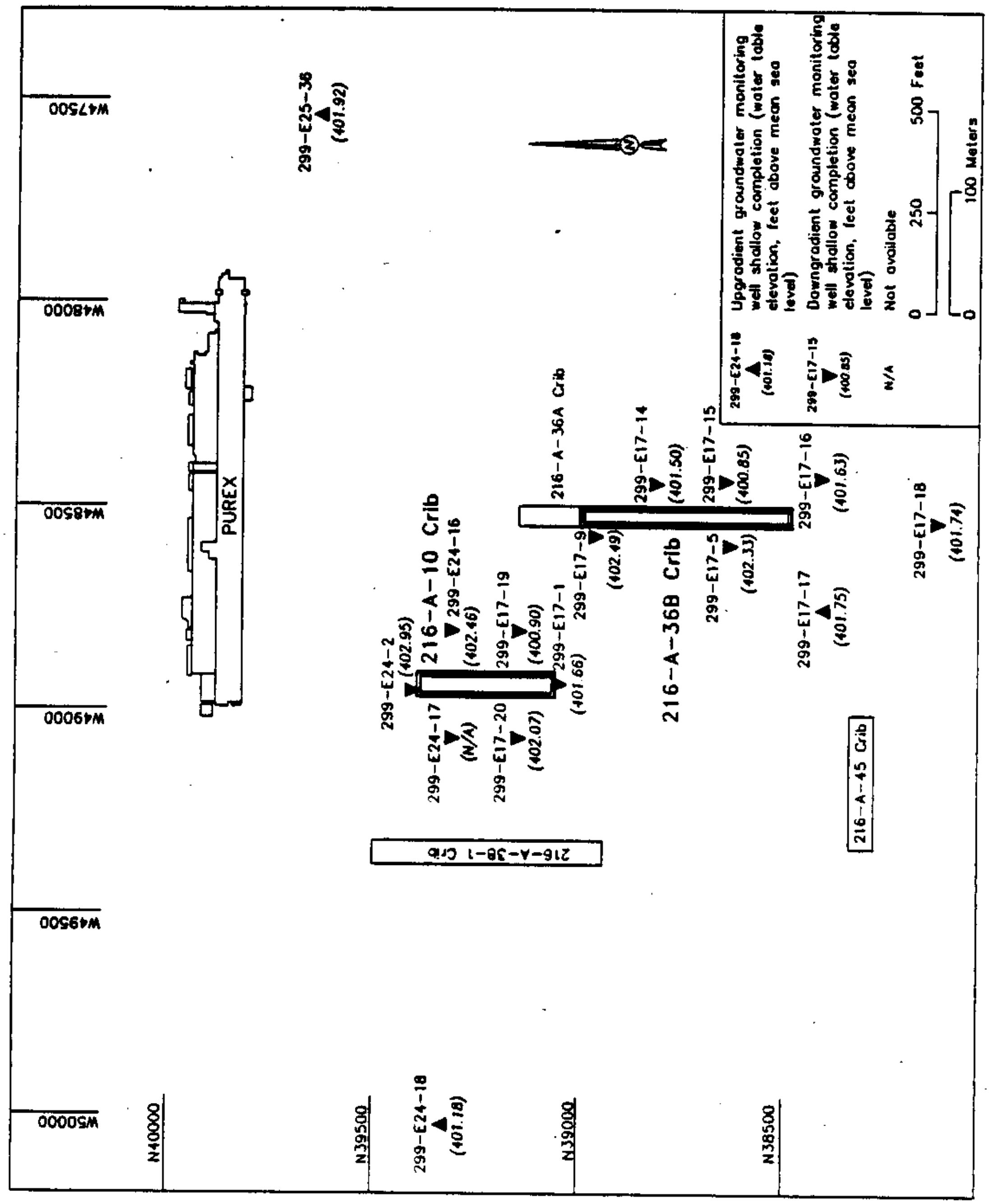
R – Ringold Formation

LM – Lower mud sequence, Ringold Formation

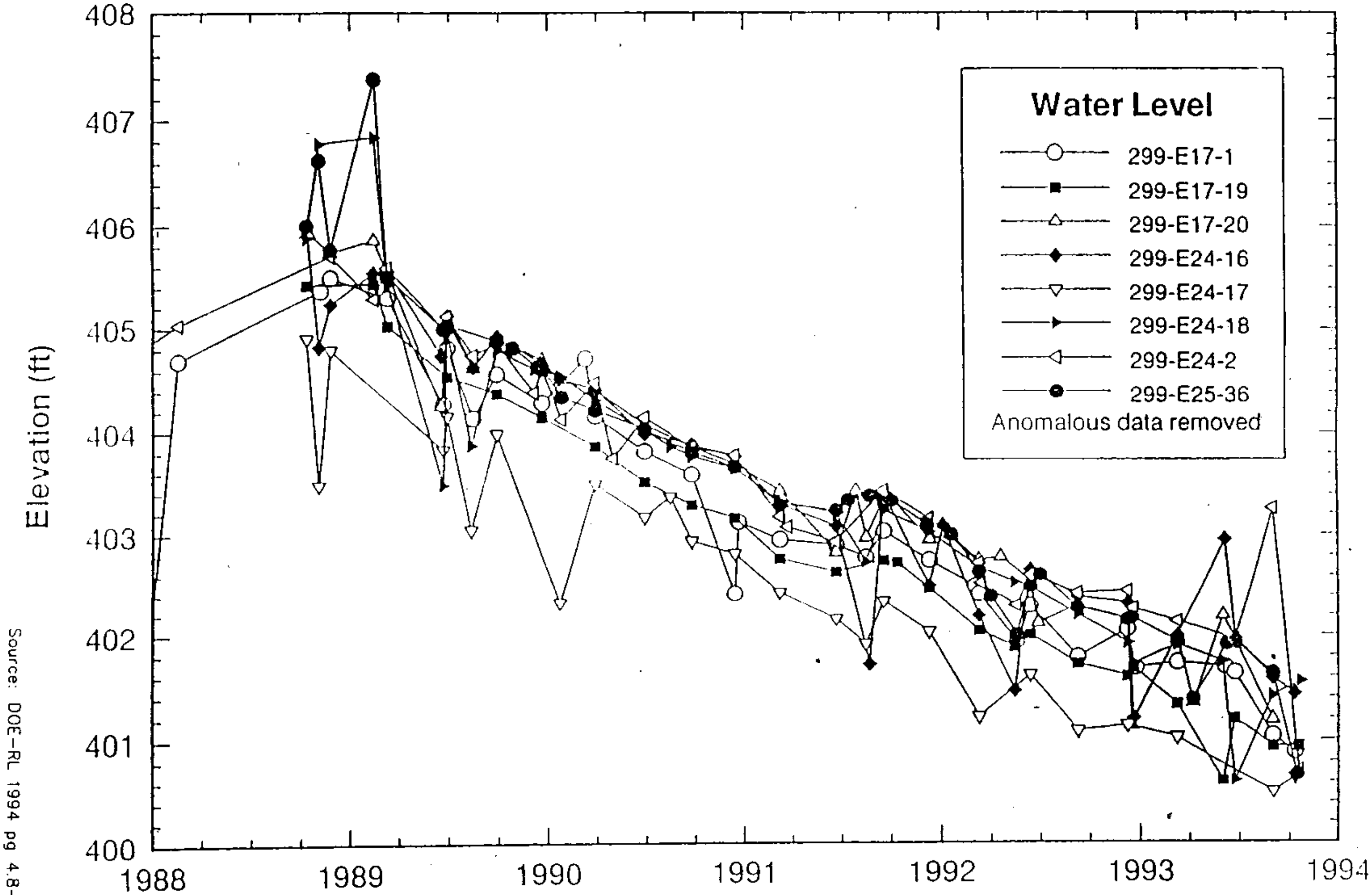
EM – Elephant Mountain Member, Saddle Mountains Basalt

NOTE:
1. Refer to Figure 2-5 for cross section location and designation. Cross section presented on Figure 2-8.
2. Figures based on Lindsey et al. 1992.

Figure 2-10. Water Level Elevations for June 1993



Modified from: WHC 1993



Source: DOE-RL 1994 pg 4.8-9

Figure 2-11. Composite Hydrograph for the 216-A-10 Crib Network Wells

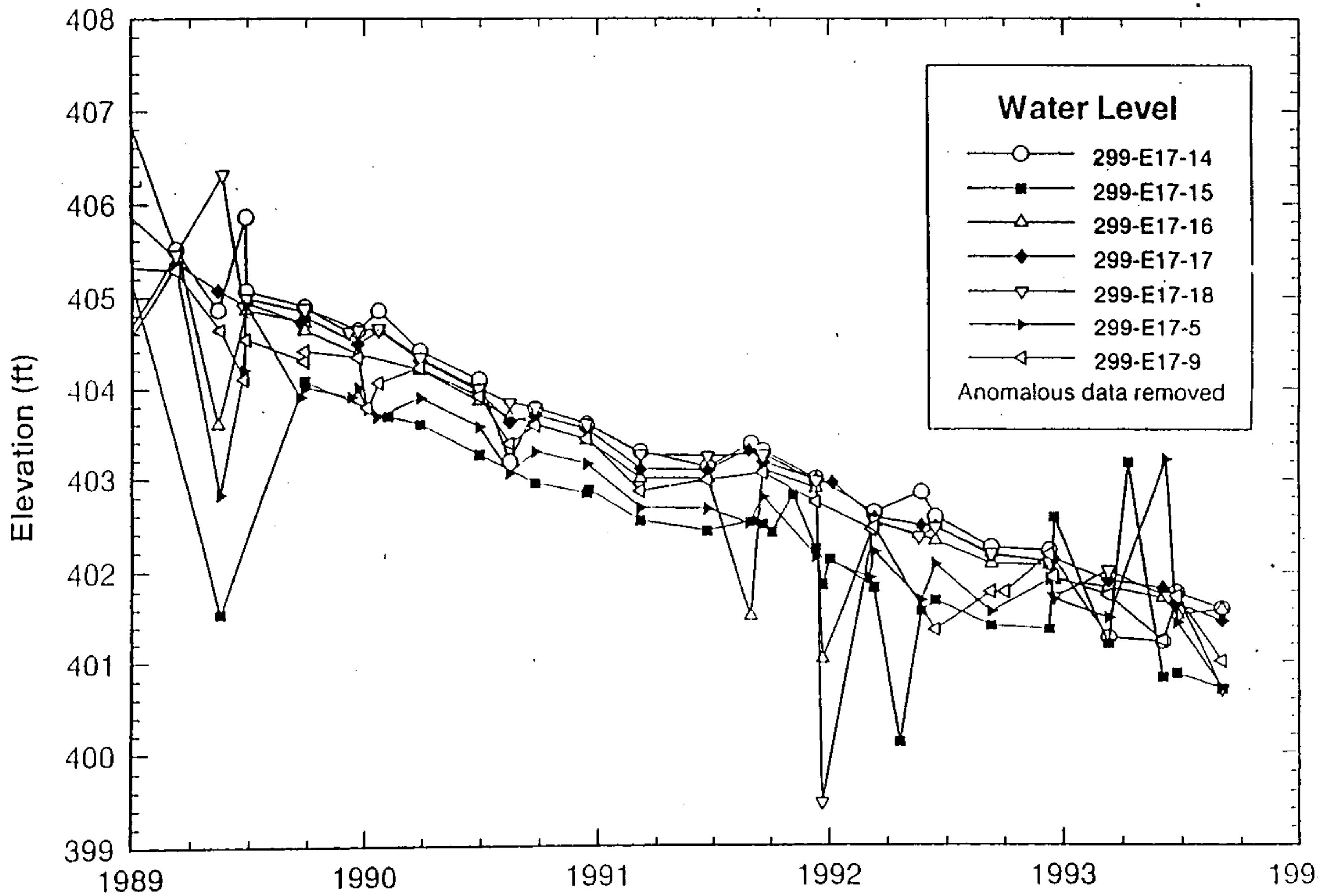


Figure 2-12. Composite Hydrograph for the 216-A-36B Crib Network Wells

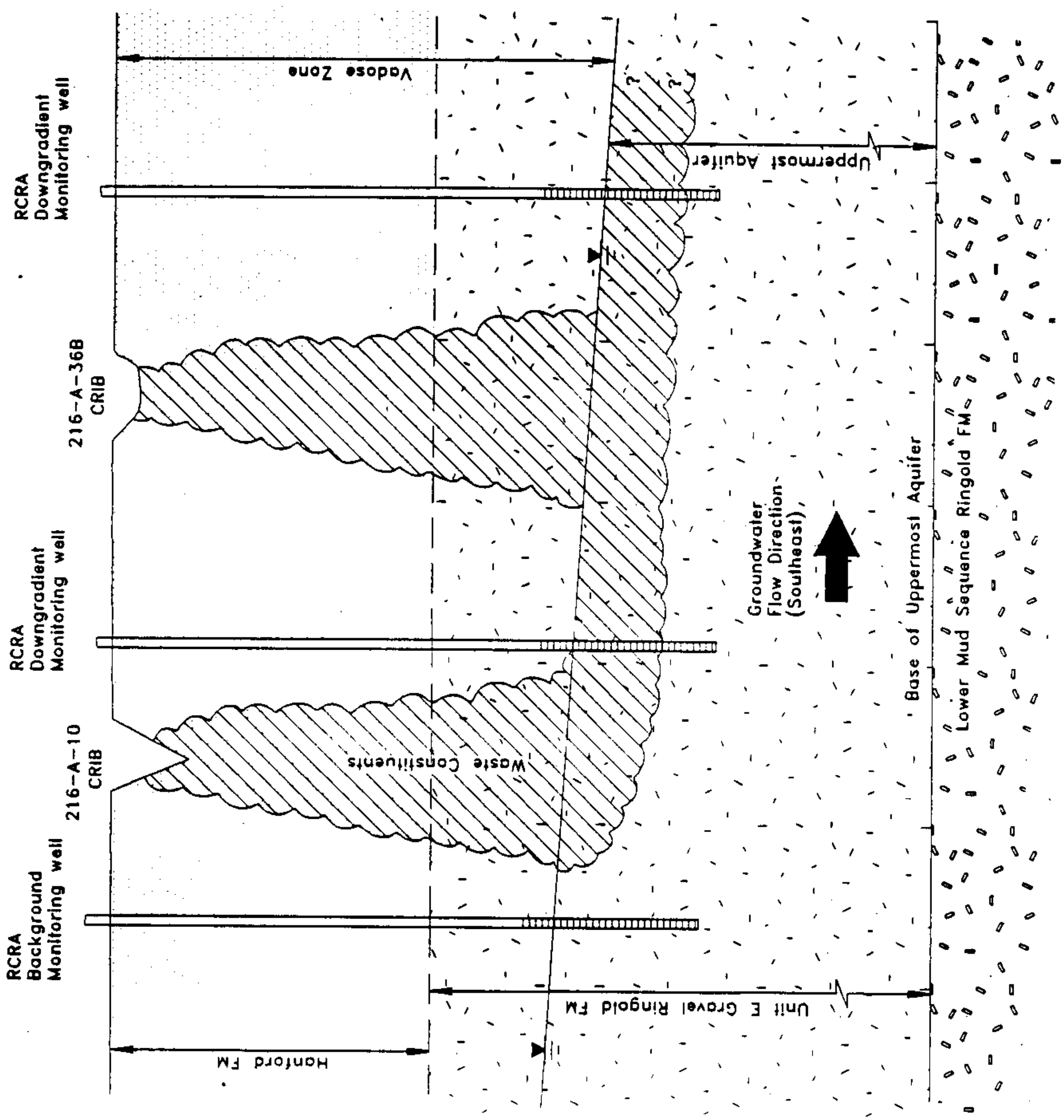
Source: DOE-RL 1994 pg 4.7-9

began during 1988 after the shutdown of PUREX Plant operations and cessation of discharges to the cribs.

Groundwater velocities in the unconfined aquifer near the cribs have been estimated to range from 0.2 to 0.8 ft/d as reported in DOE-RL (1994). This range was reported determined based on groundwater gradient magnitude in the upper aquifer of 0.0001 to 0.0002, a porosity value of 0.25 and hydraulic conductivity of 500 to 1,000 ft/d, also as reported in DOE-RL (1994). The gradient magnitude is consistent with the water table map shown in Figure 2-5.

Figure 2-13 presents a conceptualization of the site hydrogeology and the influence of waste management during active disposal of liquid wastes. Liquid wastes were released in the cribs, percolated vertically downward, and spread laterally an unknown distance as it flowed through the vadose (unsaturated) zone. As the wastes intercepted and mixed with groundwater in the unconfined aquifer, they moved laterally by advection in the groundwater flow direction. Monitoring wells, located both upgradient and downgradient, have screen placements that will allow groundwater samples to be collected from the top of the unconfined aquifer. The degree that waste management practices have affected groundwater quality can be determined by comparing groundwater quality from background (upgradient direction) and downgradient monitoring wells.

Figure 2-13. Conceptual Site Hydrogeologic Model



Not to Scale

3.0 GROUNDWATER MONITORING PROGRAM

Interim-status RCRA groundwater monitoring programs for the two waste management units have been active since 1988.

This plan, which describes interim-status indicator parameter-evaluation groundwater monitoring programs for the 216-A-10 and 216-A-36B Cribs, is an update to the program initiated in 1988 and has been developed in accordance with RCRA regulatory requirements contained in 40 CFR 265.92 and implemented by Ecology in Dangerous Waste Regulations (Ecology 1993). The plan follows appropriate guidance from RCRA Ground-Water Monitoring: Draft Technical Guidance (EPA 1992), RCRA Ground Water Monitoring Technical Enforcement Guidance Document (EPA 1986), Environmental Investigation and Site Characterization Manual, WHC-CM-7-7 (WHC 1988) and Quality Assurance Project Plan for RCRA Groundwater Monitoring Activities, WHC-SD-EN-QAPP-001 (WHC 1993).

3.1 OBJECTIVE

The objective of the current interim-status indicator parameter-evaluation groundwater monitoring program is to "Determine the facility's impact on the quality of groundwater in the uppermost aquifer underlying the facility (40 CFR 265.90[a])."

3.2 APPROACH

The approach taken in this document to meet the above objective is to evaluate and update the groundwater monitoring plans established in 1988 into one referencable document and assure that the resulting plans comply with applicable provisions of RCRA as found in 40 CFR 265 Subpart F as implemented by Ecology in WAC 173-303-400 (Ecology 1993). This approach to meeting the above objective is accomplished through the implementation of the following activities:

- Continued monitoring of background groundwater quality (semiannually) for the waste management units (216-A-10 and 216-A-36B Cribs)
- Continued monitoring for statistically significant differences in concentrations of contaminant indicator parameters in groundwater downgradient of the waste management units (semiannually), by comparison with background groundwater quality
- Continued monitoring of general water quality by analyzing samples from all wells in the networks for groundwater quality, drinking water and site-specific parameters

- Provision of an abbreviated outline for the assessment-level monitoring program that would be required should statistically significant concentrations of hazardous constituents be detected downgradient of the waste disposal units. The objective of the assessment groundwater monitoring plan would be to (1) determine if a waste unit is the actual source of contamination and (2) characterize the rate and extent of migration of hazardous constituents and concentrations of those constituents.

An evaluation of the detection-level sampling and analysis program implemented in 1988 demonstrated that it complied with 40 CFR 265.92 and 265.93. The groundwater monitoring programs for the two waste units established in 1988 included the sampling and analysis requirements specified in 40 CFR 265.92.

The procedures for appropriate sample collection, sample handling, and sample analysis were included in the 1988 plan directly or by reference. Samples have been analyzed for the parameters specified in 40 CFR 265.92(b)(1) (drinking water parameters), 40 CFR 265.92(b)(2) (groundwater quality parameters), and 40 CFR 265.92(b)(3) (contaminant indicator parameters). Samples have also been analyzed for site-specific parameters. A groundwater monitoring network was designed and implemented in accordance with the 1988 plans that allowed for the establishment of background concentrations (or values) of the above parameters and for the indication of groundwater contamination as specified in 40 CFR 265.92(c).

The 1988 Groundwater Monitoring Program (GWMP) also included an outline of a groundwater quality assessment program as required by 40 CFR 265.93(a). Statistical analysis of analytical results from background and downgradient wells for both cribs have been performed as part of the 1988 GWMP in accordance with 40 CFR 265.93(b). There have not been any reportable increases (or pH decreases) for either of the cribs since the 1988 plan was implemented.

3.3 GROUNDWATER MONITORING NETWORKS

This section describes the aquifer that will be monitored, the groundwater monitoring networks established in 1988 for the 216-A-10 and 216-A-36B cribs, the revised monitoring networks, the sampling frequency and groundwater quality analysis parameters, and data analyses and reporting requirements. Sampling and associated activities will be conducted according to applicable WHC procedures. Specific EIIs are cited in the following sections of this plan (WHC 1988). The EIIs are by reference, an integral part of this monitoring plan. Together, the EIIs and this GWMP satisfy the requirements of 40 CFR 265.92 (a). The EIIs are part of a controlled WHC procedure document that is available onsite and have been provided to both Ecology and EPA.

3.3.1 Definition of the Uppermost Aquifer

As discussed in Section 2.2.4, the uppermost aquifer in the southeastern portion of the 200 East Area is contained within the Ringold Formation. The lower mud sequence of the Ringold Formation or the top of the Elephant Mountain Member provides the base of the unconfined aquifer. Approximately 97 m (318 ft) of unsaturated Hanford formation sediments occur above the water table. The unconfined aquifer consists of approximately 40 m (130 ft) of Ringold Formation sediments (DOE-RL 1994). The local groundwater flow direction has been determined from local and regional data to be toward the south to southeast and average groundwater flow velocity is approximately 0.2 to 0.8 ft/d (DOE-RL 1994).

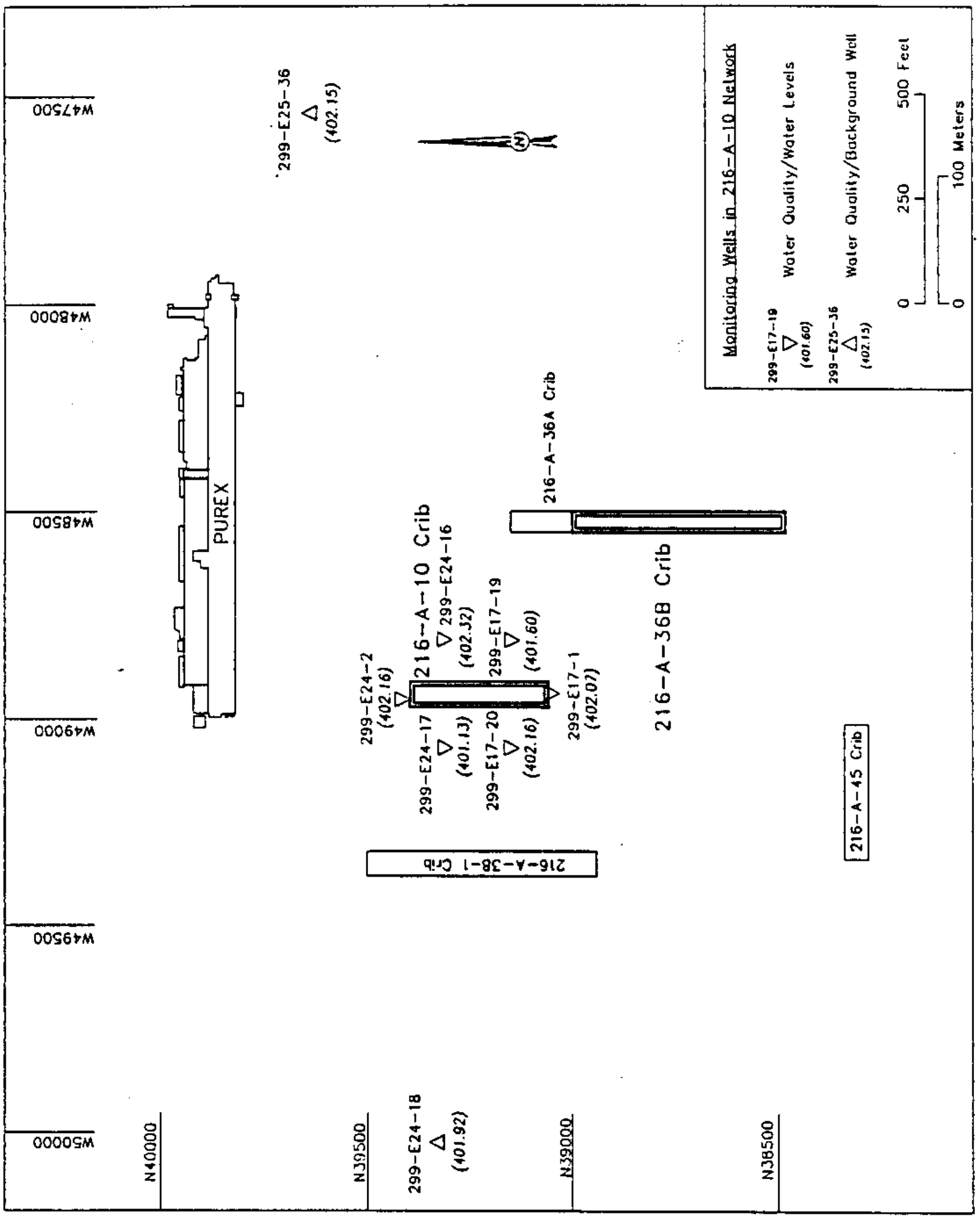
3.3.2 Groundwater Monitoring Networks Established in 1988

3.3.2.1 Groundwater Monitoring Network for the 216-A-10 Crib. The monitoring network established in 1988 at 216-A-10 consisted of two upgradient (background) wells (299-E24-18 and 299-E25-36) and six downgradient wells (299-E17-1, 299-E17-19, 299-E17-20, 299-E24-2, 299-E24-16, and 299-E24-17) (Figure 3-1). With the exception of wells 299-E17-1 and 299-E24-2, these wells were installed in 1988 in accordance with RCRA standards. Wells 299-E17-1 and 299-E24-2 were constructed in the mid-1950's. These two wells were upgraded to RCRA construction standards in December 1981 and January 1982 by injecting grout between the well casing and the formation above the water table to form an annular seal. The older wells were not used in the statistical evaluation of the groundwater quality network. Table 3-1 provides a summary of the well construction for each of these wells. All of these wells are equipped with either Hydrostar (a trademark of Instrumentation Northwest, Inc.) or electric submersible pumps (Table 3-1). Well-construction diagrams including lithologic descriptions are provided in Appendix B.

3.3.2.1.1 Summary of Available Analytical Data. Groundwater samples were first collected from the 216-A-10 network in November 1988. Four sets of quarterly groundwater samples were collected between November 1988 and October 1989. Subsequently, indicator parameter-evaluation sampling has been performed semiannually. These samples were analyzed for the parameters listed in Table 3-2.

Statistical evaluations of the indicator parameter-evaluation data have been performed since 1990 (DOE-RL 1991). The statistical method used to summarize background data is the averaged replicate (AR) t-test method as described in Section 3.5. The statistical evaluation of the quarterly data collected in 1988-1989 did not indicate impacts to the groundwater quality attributable to disposal at the 216-A-10 Crib (DOE-RL 1991). Statistical evaluations of the data collected semiannually have also been performed. To date, none of these evaluations have indicated impacts to the groundwater quality attributable to the 216-A-10 Crib (DOE-RL 1992; DOE-RL 1993c; and DOE-RL 1994).

Figure 3-1. Monitoring Well Locations Established in 1988 for the 216-A-10 Crib



Modified from: DOE-RL 1994

Table 3-1. Well Construction Information for 216-A-10 Crib Groundwater Monitoring Network Established in 1988.

Well	Location	Hanford coordinates	Elev. top of casing (ft above msl)	Drill date	Depth to bottom (ft)	Casing/screen material	Elevation well intake interval (ft above msl)	Water level elevation 12/92 (ft above msl)	Sampling pump
299-E17-1	downgradient	N 39053.2 W 48942.0	719.17	12/55	336	cs/pc	414-384	402.07	submersible
299-E17-19	downgradient	N 39147.1 W 48810.4	719.33	9/88	327	ss/ss	410-390	401.60	Hydrostar
299-E17-20	downgradient	N 39149.3 W 49069.9	719.23	9/88	327	ss/ss	413-392	402.16	Hydrostar
299-E24-2	downgradient	N 39403.9 W 48952.6	717.47	6/56	350	cs/pc	420-367	402.16	submersible
299-E24-16	downgradient	N 39309.5 W 48808.6	718.27	9/88	329	ss/ss	409-389	402.32	Hydrostar
299-E24-17	downgradient	N 39308.8 W 49070.4	718.69	9/88	329	ss/ss	407-387	401.13	Hydrostar
299-E24-18	upgradient	N 39330.7 W 50024.3	719.28	9/88	330	ss/ss	408-387	401.92	Hydrostar
299-E25-36	upgradient	N 39640.5 W 47541.0	707.39	8/88	319	ss/ss	408-387	402.15	Hydrostar

NOTES: All depths in ft below land surface; elevations in feet above mean sea level. Depths are rounded to nearest foot.
Hydrostar is a registered trade name of Instrumentation Northwest, Redmond, Washington. Additional well construction details are provided in Appendix B.

cs = carbon steel casing
pc = perforated casing
ss = stainless steel casing/screen

Table 3-2. Constituents Analyzed in the 216-A-10 Crib Groundwater Monitoring Network Established in 1988.

Contamination Indicator Parameters[a]		
pH Specific conductance	Total organic carbon Total organic halogen	
Groundwater Quality Parameters[b]		
Chloride Iron	Manganese Phenols	Sodium Sulfate
Drinking Water Parameters[c]		
2,4-D 2,4,5-TP Silvex Arsenic Barium Cadmium Chromium Coliform bacteria	Endrin Fluoride Gross alpha Gross beta Lead Lindane Mercury	Methoxychlor Nitrate Radium Selenium Silver Toxaphene Turbidity
Site-Specific Parameters[d]		
1-butynol Dibutyl phosphate Gamma scan	Monobutyl phosphate Tetrahydrofuran Tributyl phosphate	Tritium Uranium

[a] 40 CFR Part 265.92(b)(3)
[b] 40 CFR Part 265.92(b)(2)
[c] 40 CFR Part 265.92(b)(1)
[d] DOE-RL (1994)

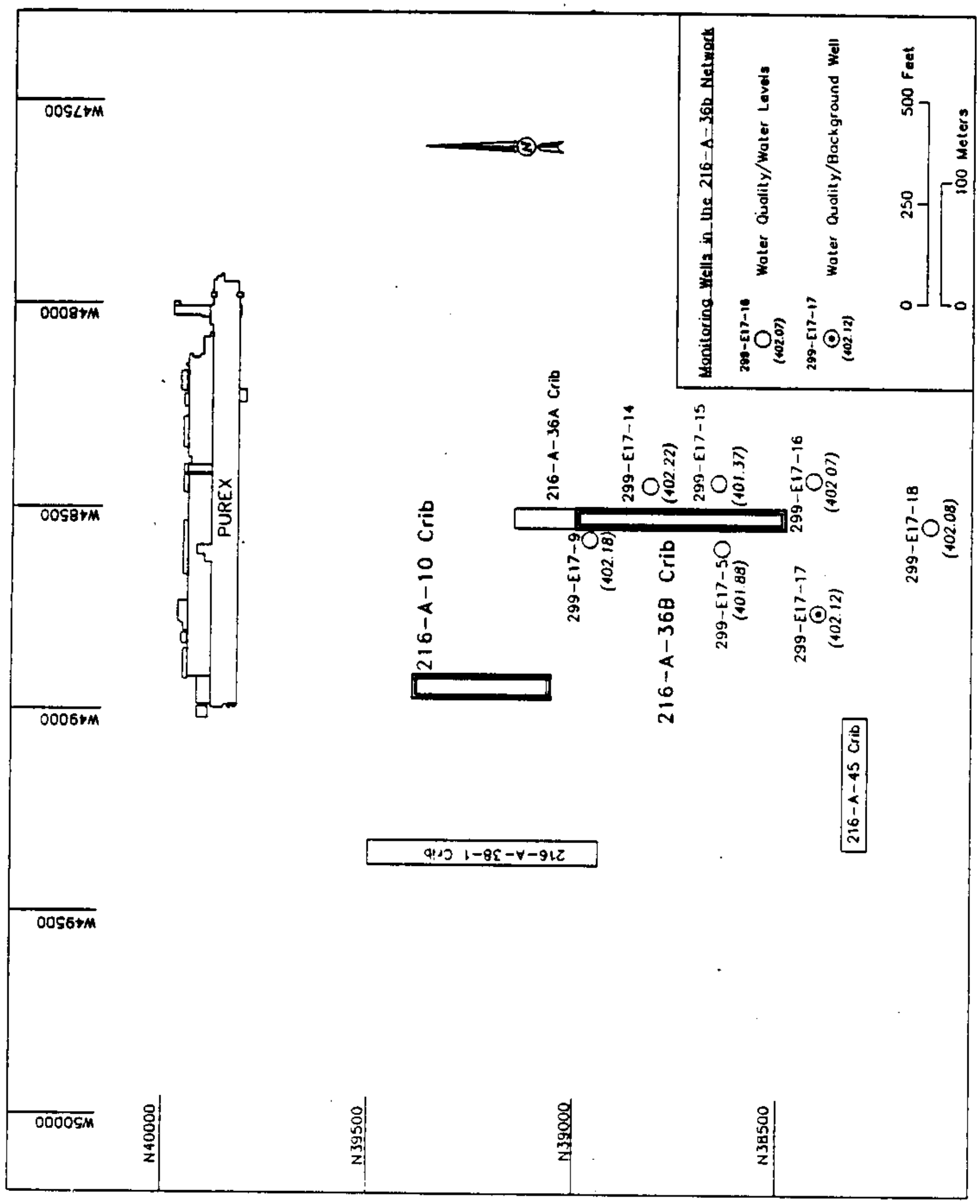
In addition to the statistical evaluation of the contamination indicator parameters, the groundwater quality data for these wells have also been evaluated for comparison to primary and secondary drinking water standards (DWS) and to monitor concentration trends. Since monitoring was initiated, nitrate, tritium, unfiltered iron, and unfiltered chromium have routinely exceeded DWS (DOE-RL 1994). DOE-RL (1994) reports that concentrations of nitrate and tritium displayed a continuing downward trend. The contribution, if any, to plumes of nitrate and tritium from the 216-A-10 Crib is difficult to assess because other liquid effluent disposal sites in close proximity to the crib received waste effluent similar in composition to that discharged to the 216-A-10 Crib (DOE-RL 1994). The presence of relatively high concentrations of unfiltered iron and chromium in samples is believed to be a result of particles of well materials in the groundwater (DOE-RL 1994).

The available results for the analysis of site-specific parameters were reviewed to determine whether these parameters have been, and will continue to be, effective in monitoring potential releases from the 216-A-10 Crib. Appendix C contains the analytical results for the evaluation of the site-specific parameters for samples from the wells in the monitoring network established in 1988. All results for 1-butanol, dibutyl phosphate, monobutyl phosphate, tetrahydrofuran, and tributyl phosphate have been reported as less than detection limits since monitoring was initiated for these parameters. Several gamma-emitting radionuclides have been detected sporadically since monitoring began; however, there are no evident trends in the data that would indicate contribution of these radionuclides to groundwater from the 216-A-10 Crib. As discussed in the previous paragraph, the plume of tritium in the groundwater beneath the 216-A-10 Crib likely is the result of releases from multiple facilities in the 200 East Area. The analysis of uranium was discontinued in 1992 because the results for this parameter do not indicate any contamination attributable to the 216-A-10 Crib.

3.3.2.2 Monitoring Network for the 216-A-36B Crib Established in 1988. As shown on Figure 3-2, the monitoring network established in 1988 at 216-A-36B consisted of one upgradient well (299-E17-17) and six downgradient wells (299-E17-5, 299-E17-9, 299-E17-14, 299-E17-15, 299-E17-16, and 299-E17-18). With the exception of wells 299-E17-5 and 299-E17-9, these wells were installed in 1988. The wells installed in 1988 were constructed in accordance with RCRA well construction guidance. Wells 299-E17-5 and 299-E17-9 were drilled in the mid-1960's. These wells were upgraded to RCRA construction standards in 1982 by perforating the original carbon steel casing and inserting a carbon steel liner with a packer on the end inside the original casing so that the packer was positioned approximately 5 ft above the water table. The wells were then grouted between the liner and the original casing to provide an annular seal. The older wells were not used in statistical evaluation of the groundwater quality network. Table 3-3 provides a summary of well construction for each of the wells. All of these wells are equipped with either Hydrostar or electric submersible pumps (Table 3-3). Well construction diagrams and lithologic descriptions are provided in Appendix B.

3.3.2.2.1 Summary of Available Analytical Data. Interim-status groundwater monitoring has been conducted at the 216-A-36B Crib since May 1988. Groundwater samples were collected from the 216-A-36B monitoring well network for seven quarters beginning May 1988. Subsequently indicator parameter sampling was continued semiannually. All of these samples were analyzed for the parameters listed in Table 3-4. PNL (1990) first reported the statistical evaluation of the quarterly indicator parameter-evaluation data and concluded that there was no statistical evidence that downgradient concentrations were increased over upgradient concentrations. To date, statistical evaluations of the data collected from this monitoring network have not indicated groundwater impacts attributable to this facility (DOE-RL 1991; DOE-RL 1992; DOE-RL 1993c; and DOE-RL 1994). The statistical method employed has been the AR t-test, discussed in Section 3.5.

Figure 3-2. Monitoring Well Locations Established in 1988 for the 216-A-36B Crib



Modified from: DOE-RL 1994

Table 3-3. Well Construction Information for 216-A-36B Crib Groundwater Monitoring Network Established in 1988.

Well	Location	Hanford coordinates	Elev. top of casing (ft above msl)	Drill date	Depth to bottom (ft)	Casing/screen material	Elevation well intake interval (ft above msl)	Water level elevation 12/92 (ft above msl)	Sampling pump
299-E17-5	downgradient	N 38669.1 W 48559.8	718.69	7/65	340	cs/pc	419-382	401.88	submersible
299-E17-9	downgradient	N 39027.3 W 48538.0	717.64	6/68	325	cs/pc	406-396	402.18	Hydrostar
299-E17-14	downgradient	N 38879.7 W 48406.2	722.18	5/88	335	ss/ss	408-388	402.22	Hydrostar
299-E17-15	downgradient	N 38710.2 W 48399.6	721.78	5/88	330	ss/ss	409-389	401.37	Hydrostar
299-E17-16	downgradient	N 38476.2 W 48390.5	720.58	5/88	337	ss/ss	408-388	402.07	Hydrostar
299-E17-17	upgradient	N 38473.7 W 48717.3	719.92	5/88	331	ss/ss	406-386	402.12	Hydrostar
299-E17-18	downgradient	N 38190.4 W 48500.7	720.65	5/88	331	ss/ss	406-386	402.08	Hydrostar

NOTES: All depths in feet below land surface; elevations in feet above mean sea level. Depths are rounded to nearest foot.
Hydrostar is a registered trade name of Instrumentation Northwest, Redmond, Washington. Additional well construction details are provided in Appendix B.

cs = carbon steel casing
pc = perforated casing
ss = stainless steel casing/screen

In addition to the statistical evaluation of the contamination indicator parameters, the other groundwater quality data for these wells have also been evaluated for comparison to primary and secondary DWS and to monitor concentration trends. Since monitoring was initiated, gross beta, nitrate, tritium, unfiltered iron, and unfiltered chromium have routinely exceeded DWS (DOE-RL 1994). DOE-RL (1994) reports that concentrations of gross beta, nitrate, and tritium all displayed a continuing downward trend. As with the plumes present beneath the 216-A-10 Crib (Section 3.3.2.1.1), the contribution of contaminants, if any, from the 216-A-36B Crib to the plumes present beneath the facility is difficult to assess (DOE-RL 1994). The presence of relatively high concentrations of unfiltered iron and chromium in samples may be due to the same reasons discussed in Section 3.3.2.1.1.

The available results for the analysis of the site-specific parameters shown on Table 3-4 were reviewed to determine whether these parameters have been, and will continue to be, effective in monitoring potential releases from the 216-A-36B Crib. Appendix C contains the analytical results for the evaluation of the site-specific parameters for samples from the wells in the monitoring network established in 1988. All analyses for benzyl alcohol have been less than detection since monitoring was initiated. Ammonium was detected sporadically in samples collected from these wells in 1988 but has not been detected since. Several gamma-emitting radionuclides have been detected in samples from these wells. With the exception of ^{60}Co, the detection of gamma-emitting radionuclides has been sporadic. Cobalt-60 has been routinely detected in downgradient wells 299-E17-15 and 299-E17-17. As discussed in the previous paragraph, the plume of tritium in the groundwater beneath the 216-A-36B Crib likely is the result of releases from multiple facilities in the 200 East Area. Zinc, in both filtered and unfiltered samples, was detected in several wells during the initial stages of monitoring but has not been detected since 1991. A comparison of the concentrations of zinc detected during the initial stages of monitoring indicate that the concentrations upgradient of the crib were similar to those detected downgradient.

3.3.3 Revised Groundwater Monitoring Network

This section describes the evaluation of the monitoring networks established in 1988 and the resulting revisions to the 216-A-10 and 216-A-36B Crib network groundwater monitoring. Both networks were evaluated using MEMO (Golder Associates 1992, Version 1.1) to determine which wells could be eliminated or which additional wells might be needed to achieve a minimum of 90% monitoring efficiency. Monitoring efficiency is defined as the ratio of the area from which a release would be detected to the total potential source area. The results of the MEMO modeling effort are presented in Appendix D.

Table 3-4. Constituents Analyzed in the 216-A-36B Crib Groundwater Monitoring Network Established in 1988.

	Contamination Indicator Parameters[a]	
pH	Total organic carbon	
Specific conductance	Total organic halogen	
	Groundwater Quality Parameters[b]	
Chloride	Manganese	Sodium
Iron	Phenols	Sulfate
	Drinking Water Parameters[c]	
2,4-D	Endrin	Methoxychlor
2,4,5-TP Silvex	Fluoride	Nitrate
Arsenic	Gross alpha	Radium
Barium	Gross beta	Selenium
Cadmium	Lead	Silver
Chromium	Lindane	Toxaphene
Coliform bacteria	Mercury	Turbidity
	Site-Specific Parameters[d]	
Ammonium ion	Gamma scan	Zinc
Benzyl alcohol	Tritium	Uranium

[a] 40 CFR Part 265.92 (b)(3)
[b] 40 CFR Part 265.92 (b)(2)
[c] 40 CFR Part 265.92 (b)(1)
[d] DOE-RL (1994)

All wells were assessed for compliance with the appropriate guidance and to determine if well screen placement was appropriate to monitor the top of the unconfined aquifer. The relationship between current water level elevations and the elevations of the intake interval of all wells used during the monitoring program established in 1988 (see Tables 3-1 and 3-3) indicates that all of the monitoring wells in the network established in 1988 are appropriately screened for monitoring the top of the uppermost aquifer and that there is an adequate water column to provide water quality samples. In addition, all wells constructed in 1988 (see Tables 3-1 and 3-3) comply with EPA construction guidance (EPA 1986) for RCRA monitoring wells. Only one well (299-E17-1) in the revised networks was installed prior to promulgation of RCRA and was upgraded in 1982 as shown in Appendix B. This well now meets the 40 CFR 265.91 requirements for interim-status groundwater monitoring and was not shown to yield a significantly different quality of water (indicator parameters) as compared to results from sampling and analyses from the newer RCRA compliant wells (see Section 3.3.2.2.1).

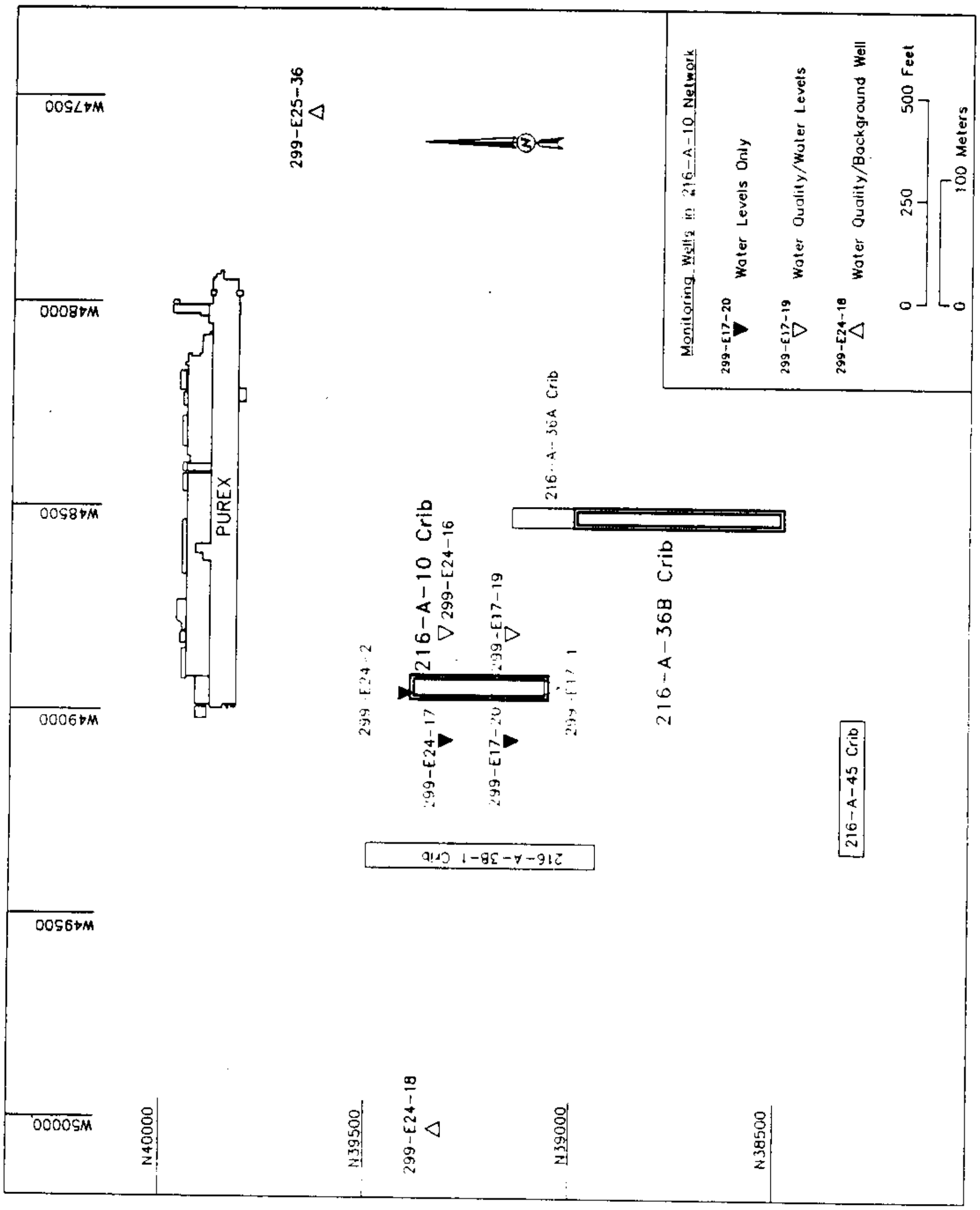
3.3.3.1 Revised Monitoring Network at the 216-A-10 Crib. The monitoring network established in 1988 consists of two upgradient (background) wells and six downgradient wells. This network was evaluated using the MEMO model to determine the most practical configuration that would achieve a minimum of 90% monitoring efficiency. The flow and transport parameters used to define the problem and the modeling results are presented in Appendix D. As presented in Appendix D, the hydraulic gradient magnitude and direction are 0.0002 ft/ft (DOE-RL 1994) and southeast, respectively. The MEMO monitoring efficiency was also estimated for gradient directions of east and south to assure that the revised monitoring network was sufficiently robust considering the uncertainty in groundwater gradient direction.

The results of the modeling showed that the network could be reduced to five wells (Figure 3-3) and still achieve 96.6% efficiency. This modified network consisting of wells 299-E17-1, 299-E24-16, 299-E17-19, 299-E25-36 and 299-E24-18 is RCRA 40 CFR 265.92 compliant and will be used for indicator parameter-evaluation monitoring. Both 299-E25-36 and 299-E24-18 were used as upgradient (background) wells in the monitoring network established in 1988 and will continue to serve as such in this revised monitoring network. As presented in Table 3-5, all wells in the 1988 monitoring network will continue to be used to collect water level data.

The upgradient (background) wells used in the 1988 monitoring well network are retained for use as background wells in this revised network. These wells have provided acceptable background groundwater quality data in the uppermost aquifer since 1988. They are located beyond the extent of potential contamination from the 216-A-10 Crib and are providing samples representative of background water quality.

They are also screened at approximately the same stratigraphic horizon as the downgradient wells for data comparability. Well 299-E24-18 is hydraulically upgradient of the 216-A-10 Crib even given the uncertainty of gradient direction discussed previously. Well 299-E25-36 is hydraulically upgradient of the 216-A-10 Crib under most likely gradient directions. It is over 411 m (1,350 ft) from the crib, and the observed water quality from this well is not affected by the crib.

Figure 3-3. Revised Monitoring Well Locations for the 216-A-10 Crib



Modified from: DOE-RL 1994

Table 3-5. Monitoring Schedule for Wells in the Revised 216-A-10 Crib Network.

Well	Aquifer	Sampling frequency	Water levels	Well construction standards
299-E24-18^{88}	top of unconfined	S/A	Q	RCRA
299-E25-36^{88}	top of unconfined	S/A	Q	RCRA
299-E17-19^{88}	top of unconfined	S/A	Q	RCRA
299-E17-20^{88}	top of unconfined	D	Q	RCRA
299-E24-16^{88}	top of unconfined	S/A	Q	RCRA
299-E24-17^{88}	top of unconfined	NS	Q	RCRA
299-E17-1^{55}	top of unconfined	S/A	Q	PRE
299-E24-2^{56}	top of unconfined	NS	Q	PRE

NOTES: Shading denotes background wells. Superscript following well number denotes the year of installation.
Q = Frequency on a quarterly basis.
PRE = Well was constructed before RCRA-specified standards.
RCRA = Well is constructed to RCRA-specified standards.
D = Dependent on monitoring program for 216-A-29 Waste Management Unit.
NS = No sampling.
S/A = Sampled for indicator parameters semiannually and sampled annually for groundwater quality parameters, drinking water parameters, and site-specific parameters.

The revised monitoring network has three fewer monitoring wells than the 1988 network, yet still achieves a monitoring efficiency of over 96%. The result is an effective monitoring network that reduces the cost of sampling and analysis compared to the 1988 network.

3.3.3.2 Revised Monitoring Network at the 216-A-36B Crib. The monitoring network established in 1988 consists of one upgradient and six downgradient wells (see Table 3-3). This network was evaluated using the MEMO model to determine the most practical configuration that would achieve a minimum of 90% monitoring efficiency. The flow and transport parameters used to define the problem and the modeling results are presented in Appendix D. As presented in Appendix D, the hydraulic gradient magnitude and direction used in the MEMO modeling are as used for the 216-A-10 Crib (see Section 3.3.3.1). Also, as with the 216-A-10 Crib, the MEMO monitoring efficiency was estimated for gradient directions of east and south in addition to southeast.

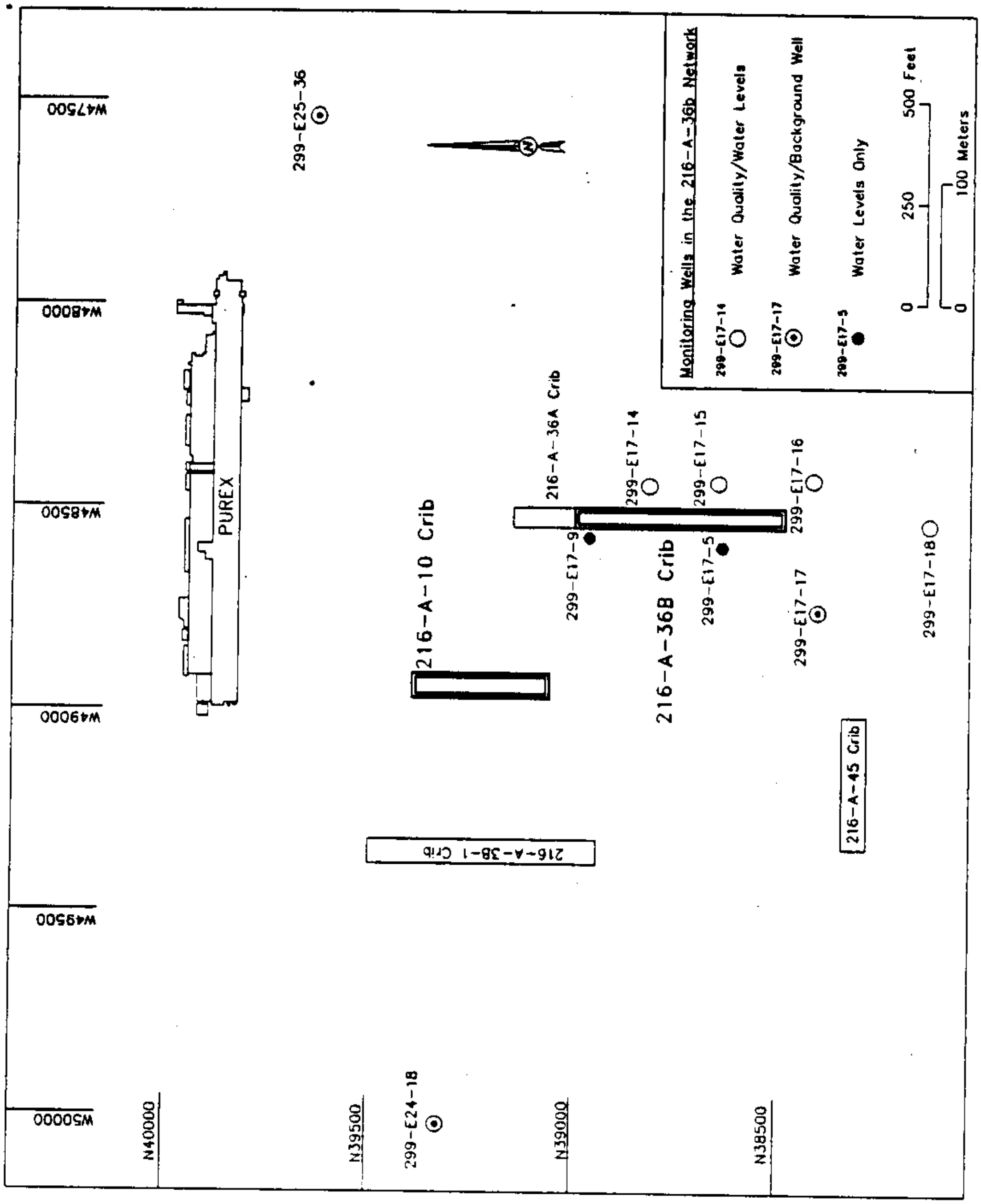
The revised groundwater monitoring network for the 216-A-36B Crib consists of a total of seven wells: three upgradient (background) and four downgradient with a monitoring efficiency of approximately 99% (Figure 3-4). The upgradient wells are:

- 299-E17-17, which was used in the 1988 network for the 216-A-36B Crib
- 200-E24-18 and 299-E25-36, which were (and continue to be) used in the 1988 network for the 216-A-10 Crib.

These wells have provided acceptable background groundwater quality data in the uppermost aquifer since 1988. They are located beyond the extent of potential contamination from the 216-A-36B Crib and are providing samples representative of background water quality. They are also screened at approximately the same stratigraphic horizon as the downgradient wells for data comparability. Wells 299-E24-18 and 299-E17-17 are hydraulically upgradient of the 216-A-36B Crib even given the uncertainty of gradient direction discussed previously. Well 299-E25-36 is hydraulically upgradient of the 216-A-36B Crib under most likely gradient directions. It is more than 345 m (1,130 ft) from the crib, and the observed water quality from this well is not affected by the crib. The addition of these two upgradient wells from the 216-A-10 Crib network reduces the risk of false indication of contamination release (EPA 1986, p. 67) and better accounts for heterogeneities in the background water quality.

The downgradient wells selected for this monitoring network are 299-E17-14, 299-E17-15, 299-E17-16, and 299-E17-18. As presented in Table 3-6, all wells in the 1988 216-A-36B Crib monitoring network will continue to be used to collect water level data. The revised monitoring network has the same number of monitoring wells as did the 1988 network, yet still achieves a reduction in sampling and analysis cost while achieving a monitoring efficiency of over 99%. This was accomplished by reducing the number of downgradient monitoring wells in the network from six in the 1988 network to four and adding the two upgradient wells from the 216-A-10 Crib network. Adding these two wells did not increase sampling and analytical costs as they were already part of the 216-A-10 Crib network. It does provide the advantage of reducing the risk of false indication of contamination release and better accounts for heterogeneities in the background water quality.

Figure 3-4. Revised Monitoring Well Locations for the 216-A-36 Crib



Modified from: DOE-RL 1994

Table 3-6. Monitoring Schedule for Wells in the Revised 216-A-36B Crib Network.

Well	Aquifer	Sampling frequency	Water levels	Well construction standard
299-E17-16[88]	top of unconfined	S/A	Q	RCRA
299-E17-17[88]	top of unconfined	S/A	Q	RCRA
299-E17-18[88]	top of unconfined	S/A	Q	RCRA
299-E17-15[88]	top of unconfined	S/A	Q	RCRA
299-E17-14[88]	top of unconfined	S/A	Q	RCRA
299-E17-9[68]	top of unconfined	NS	Q	PRE
299-E17-5[65]	top of unconfined	NS	Q	PRE
299-E24-18[88]	top of unconfined	S/A	Q	RCRA
299-E25-36[88]	top of unconfined	S/A	Q	RCRA

NOTES: Shading denotes background wells. Superscript following well number denotes the year of installation.
PRE = Well was constructed before RCRA-specified standards.
RCRA = Well is constructed to RCRA-specified standards.
Q = Frequency on a quarterly basis.
S = Frequency on a semiannual basis.
D = Dependent on monitoring program for 216-A-29 Waste Management Unit.
NS = No sampling.
S/A = Sampled for indicator parameters semiannually and sampled annually for groundwater quality parameters, drinking water parameters, and site-specific parameters.

3.4 GROUNDWATER SAMPLING AND ANALYSIS

This section describes or references procedures for groundwater sampling, sample collection documentation, chain-of-custody requirements, and laboratory-analysis. The detailed description of specific standard sampling and analysis procedures are provided by reference to the specific EIIs (WHC 1988) and the Quality Assurance Project Plan for RCRA Groundwater Monitoring Activities (WHC 1993). Work by subcontractors shall be conducted to their equivalent approved standard operating procedures such as PNL-MA-567 (PNL 1994).

All field sampling activities will be recorded in the proper field logbook as specified in EII 1.5. Electric submersible or Hydrostar pumps will continue to be used in existing monitoring wells for purging and sampling. Prior to sampling each well, the static water level will be measured and recorded as specified in EII 10.2. Based on the measured water level and well construction details, the volume of water in the well will be calculated and documented in the well sampling form or field notebook. As specified in EII 5.8, prior to sampling, each well will be purged until the approved criteria is met. Purge water will be managed according to EII 10.3. In the situations where well pumps dry because of very slow recharge, the sample will be collected after recharge. Samples will be collected and field preserved as specified in EII 5.8. Sampling equipment decontamination will follow procedures specified in EII 5.4.

Sample preservation, chain-of-custody procedures, and sample analysis in accordance with 40 CFR 265.92 are discussed in EII 5.1. The quality assurance/control (QA/QC) protocol as specified in WHC (1993). The purpose of the QC activities is to determine and document that samples were carefully collected and transferred to an analytical laboratory, that the quality of the analytical results being produced by the laboratory are defensible, and to see that corrective actions will be taken as necessary.

Under the indicator parameter-evaluation monitoring program, water-level elevation data will be evaluated at least annually to determine if the monitoring wells are strategically located. If the evaluation indicates that existing wells are no longer adequately located, the groundwater monitoring network will be modified to bring it into compliance with 40 CFR 265.91(a).

The wells in both monitoring networks will continue to be in the indicator parameter-evaluation monitoring program. These wells will be sampled on a semiannual basis for indicator parameters and annually for the other parameters shown in Table 3-7. The list of site-specific parameters to be analyzed for at both facilities was reduced from that shown on Tables 3-2 and 3-4 to include only tritium and gamma scans. Although radionuclides are not regulated under RCRA, trends in concentrations of these constituents will be useful in monitoring the direction of groundwater flow and will assist in monitoring the existing radionuclide plumes in the 200 East Area. The annual sampling event will be concurrent with one of the semiannual sampling events. All samples will be submitted to the current analytical laboratory contractor for RCRA facilities at the Hanford Site under chain-of-custody procedures as specified in EII 5.1.

3.5 STATISTICAL ANALYSIS OF GROUNDWATER MONITORING DATA

3.5.1 Establishing Background Groundwater Quality

Background groundwater quality refers to local groundwater chemistry that is in a general upgradient location and therefore unaffected by waste management practices at the 216-A-10 or 216-A-36B Cribs. However, groundwater quality may have been affected by hazardous constituents from other Hanford Site activities.

Monitoring wells 299-E24-18 and 299-E25-36 will continue to serve as background monitoring wells for the 216-A-10 Crib (see Figure 3-3). Monitoring well 299-E17-17 will continue to serve to monitor background water quality at the 216-A-36B Crib (Figure 3-4) in addition to wells 299-E24-18 and 299-E25-36.

Table 3-7. Analytical Parameters for the Revised 216-A-10 Crib and 216-A-36B Crib Groundwater Monitoring Networks.

Contamination Indicator Parameters[a]		
pH	Total organic carbon	
Specific conductance	Total organic halogen	
Groundwater Quality Parameters[b]		
Chloride	Manganese	Sodium
Iron	Phenols	Sulfate
Drinking Water Parameters[c]		
2,4-D	Endrin	Methoxychlor
2,4,5-TP Silvex	Fluoride	Nitrate
Arsenic	Gross alpha	Radium
Barium	Gross beta	Selenium
Cadmium	Lead	Silver
Chromium	Lindane	Toxaphene
Coliform bacteria	Mercury	Turbidity
Site-Specific Parameters		
Gamma scan	Tritium	

[a] 40 CFR Part 265.92(b)(3)
[b] 40 CFR Part 265.92(b)(2)
[c] 40 CFR Part 265.92(b)(1)

The statistical method used to summarize background data is the AR t-test method as described in EPA (1986) and Chou (1991). Appendix C of DOE-RL (1994)provides details of this method, and the method is summarized in the following discussion. The AR t-test method results in the calculation of a test statistic that is based on the average results for each parameter from background (upgradient) and downgradient wells. This test statistic can then be compared to the Bonferroni critical value to determine if there is statistical evidence of contamination. This test can be reformulated, using only data from background wells, in such a way that the critical mean (or critical range for pH) for each parameter can be calculated. The critical mean (or range for pH) is the value above which (or above/below for pH) a compared value is determined to be statistically different from background. Tables 3-8 and 3-9 provide critical means for indicator parameters for the 216-A-10 Crib and 216-A-36B Crib monitoring networks, respectively, as reported in DOE-RL (1994) for the monitoring network established in 1988.

Samples will continue to be collected from background wells and analyzed for indicator parameters semiannually (see Tables 3-5 and 3-6). Annual samples will be collected concurrent with one of the semiannual sampling events and will be analyzed for water quality, drinking water and site-specific parameters. In addition, groundwater elevations will continue to be measured quarterly. These data will be evaluated to determine trends in background groundwater quality and to assure that the wells continue to reflect background groundwater quality. If necessary, the critical means (or ranges) will be recalculated to reflect changes in background groundwater quality. As noted on Tables 3-8 and 3-9, critical means for total organic halogens were not established because data problems preclude the determination of a limit of quantification (LOQ) for this parameter. Critical means will be calculated for total organic halogen when data of suitable quality are available.

Table 3-8. Critical Means Table for 24 Comparisons -- Background Contamination Indicator Parameter-Evaluation Data from Groundwater Monitoring Network Established in 1988 for the 216-A-10 Crib[a].

Constituent (unit)	n[b]	df[c]	t_c[d]	Average background	Standard deviation	Critical mean	Upgradient/ downgradient comparison value
Specific conductance (μmho/cm)	8	7	5.5799	273.31	77.643	732.8	732.8
Field pH	8	7	6.2684	8.0241	0.319	[5.90, 10.14]	[5.90, 10.14]
Total organic carbon[e,f] (ppb)	8	7	5.5799	618.75	117.83	1,316.1	1,316.1
Total organic halogen[e,f] (ppb)	8	7	5.5799	4.47	1.544	13.6	NC[g]

[a] Data collected from November 1988 to August 1989 for upgradient wells 2-E24-18 and 2-E25-36. Values calculated on 24 comparisons.
[b] n = number of background replicate averages
[c] df = degrees of freedom (n-1)
[d] t_c = Bonferroni critical t-value for appropriate df and 24 comparisons.
[e] Critical mean were calculated from values reported below the contractually required quantitation limits (DOE-RL 1991).
[f] Critical mean were calculated using data analyzed by U.S. Testing, Inc., Richland, Washington.
[g] Upgradient/downgradient comparison value for total organic halogen cannot be established because problems associated with data quality preclude the determination of total organic halogen limit of quantitation. NC = not calculated.

Table 3-9. Critical Means Table for 20 Comparisons -- Background Contamination Indicator Parameter-Evaluation Data from Groundwater Monitoring Network Established in 1988 for the 216-A-36B Crib[a].

Constituent (unit)	n[b]	df[c]	t_c[d]	Average background	Standard deviation	Critical mean	Upgradient/ downgradient comparison value
Specific conductance (μmho/cm)	4	3	12.924	298.31	51.291	1,039.4	1,039.4
Field pH	4	3	16.326	7.8111	0.175	[4.62, 11.00]	[6.29, 9.27][h]
Total organic carbon[e,f] (ppb)	4	3	12. 924	558.63	149.13	2,713.5	2,713.5
Total organic halogen[e,f] (ppb)	4	3	12.924	3.29	3.25	50.3	NC[g]

[a] Data collected from September 1988 to June 1989 for upgradient well 2-E17-17. Values calculated on 20 comparisons.
[b] n = number of background replicate averages
[c] df = degrees of freedom (n-1)
[d] t_c = Bonferroni critical t-value for appropriate df and 20 comparisons.
[e] Critical mean were calculated from values reported below the contractually required quantitation limits (DOE-RL 1991).
[f] Critical mean were calculated using data analyzed by U.S. Testing, Inc., Richland, Washington.
[g] Upgradient/downgradient comparison value for total organic halogen cannot be established because problems associated with data quality preclude the determination of total organic halogen limit of quantitation. NC = not calculated.
[h] Upgradient/downgradient comparison values for pH were calculated using data collected from September 1988 to June 1993 (well 2-E17-17) because the critical range calculated using four quarters of data is too large to be meaningful.

If over 50% of the total organic carbon and total organic halogen values from the upgradient well are below the contractually established detection limits, a LOQ will be calculated from the field blank data. The LOQ is defined as the mean blank value plus 10 standard deviations (EPA 1989). For cases where the calculated critical mean is below the LOQ, the LOQ will be used as the comparison value between upgradient and downgradient groundwater quality. This approach makes use of quality control data to target the limits of quantifiable data and provides a realistic approach for upgradient-downgradient groundwater quality comparison.

3.5.2 Evaluation of Downgradient Groundwater Quality

Groundwater quality downgradient of each crib will be compared to background groundwater quality to determine if waste management at the cribs is affecting groundwater quality. Figure 3-3 identifies the three downgradient monitoring wells in the 216-A-10 monitoring network, and Figure 3-4 identifies the four downgradient monitoring wells in the 216-A-36B monitoring network.

As discussed in Section 3.3.2, statistical analysis of these data indicate that groundwater has not been affected by waste management practices at the two cribs, and groundwater will continue to be monitored under the indicator parameter-evaluation monitoring program.

Wells will continue to be sampled semiannually for indicator parameters and annually for water quality, drinking water, and site-specific parameters as presented in Table 3-7. The monitoring program will continue to use the critical means (or ranges) of indicator parameters for comparison of downgradient water quality to upgradient water quality. Groundwater will also be sampled annually, concurrent with one of the semiannual sampling events, and analyzed for water quality, drinking water and site-specific parameters (Table 3-7).

3.6 NOTIFICATION AND REPORTS

A summary of the reports required for compliance with 40 CFR 265, Subpart F, is given in Table 3-10. The monitoring programs have already met the requirement of reporting the four quarters of the first year of monitoring [40 CFR 265.94(a)(2)(i)]. Results of semiannual and annual sampling and analysis will be included in the routine quarterly report of RCRA groundwater monitoring data produced for the Hanford Site. Reports issued annually for RCRA groundwater monitoring projects at Hanford Site facilities such as DOE-RL 1994 will contain summaries of water quality and groundwater flow characteristics. Water-level data will be presented in the quarterly RCRA reports.

Table 3-10. Reports Required for Compliance with 40 CFR 265, Subpart F, for Groundwater Monitoring.

Submittal	Status and submittal period	Reference
First year of sampling only: concentrations of interim primary drinking water constituents, identifying those that exceed the limits of 40 CFR 265, Appendix III.	Quarterly (completed)	40 CFR 265.94(a)(2)(i)
Concentration and statistical analyses of groundwater contamination indicator parameters, noting significant differences in upgradient wells.	Annually, by March 1 of following year (ongoing)	40 CFR 265.94(a)(2)(ii)
Results of groundwater surface elevation evaluation and description of response, if appropriate.	Annually, by March 1 of following year (ongoing)	40 CFR 265.94(a)(2)(iii)

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4.0 PHASE II CONTINGENCY GROUNDWATER QUALITY ASSESSMENT PROGRAM

This chapter discusses the criteria that would require notification of regulatory agencies and initiation of a groundwater quality assessment program. The notifications for compliance with 40 CFR 265, Subpart F, are presented, and the contents of the groundwater quality assessment program are outlined.

In compliance with 40 CFR 265.92, groundwater samples from all monitoring wells have been and will be tested semiannually for indicator parameters 40 CFR 265.92(3), and annually for interim primary drinking water constituents (Appendix III of 40 CFR 265) excluding pesticides 40 CFR 265.92(1), water quality parameters 40 CFR 265.92(2) and site-specific parameters (see Table 3-7). The indicator parameters for the downgradient wells will be statistically compared to the established background critical mean values to determine if there is a significant difference (see Section 3.5.2). If a parameter is significantly elevated and indicates that a crib may be affecting groundwater, the well(s) with the elevated values will be resampled. If the results are verified by the second sampling, Ecology will be notified in writing within 7 days of verification. A groundwater quality assessment plan will be developed and sent to Ecology within 15 days following the notification.

The groundwater quality assessment program will include: (1) number, location, and depth of wells in the monitoring network; (2) sampling and analytical methods used; (3) evaluation procedures; and (4) a schedule of implementation. The assessment program will also provide an investigative approach to determine rate and extent of migration of hazardous waste or hazardous constituents in groundwater and their concentrations of hazardous waste constituents. As soon as technically feasible, these determinations will be made and a report of the findings sent to Ecology. Table 4-1 provides a schedule for reports and notifications.

Table 4-1. Reports and Notifications.

Submittal	Submittal period	Reference
Required whether or not the unit might be affecting ground water:		
First year of sampling only: concentrations of interim primary drinking water standards, identifying those that exceed the limits of 40 CFR 265, Appendix III.	Quarterly	40 CFR 265.94(a)(2)(i)
Concentrations and statistical analyses of groundwater contamination indicator parameters, noting significant differences in upgradient wells.	Annually, by March 1 of following year	40 CFR 265.94(a)(2)(ii)
Results of groundwater surface elevation and description of response, if appropriate.	Annually, by March 1 of following year	40 CFR 265.94(a)(2)(iii)
Required if the unit might be affecting groundwater:		
Notification that the unit might be affecting groundwater.	Within 7 days of confirmation of a statistically significant difference over background	40 CFR 265.93(d)(1)
Groundwater quality assessment plan.	Within 15 days of the above notification	40 CFR 265.93(d)(2)
Report on assessment of groundwater quality, including concentrations of hazardous waste constituents and their rate and extent of migration.	Within 15 days of first determination (as soon as technically feasible)	40 CFR 265.93(d)(5)
Results of the groundwater quality assessment program.	Annually, by March 1 of following year, until closure of unit	40 CFR 265.94(b)(2)

5.0 REFERENCES

40 CFR 265, Subpart F, 1987, U.S. Environmental Protection Agency, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," U.S. Code of Federal Regulations, Washington, D.C.

Aldrich, R. C., 1987, Radioactive Liquid Wastes Discharged to Ground in the 200 Areas During 1986, RHO-HQ-SR-86-3, 4QLIQP, Rockwell Hanford Company, Richland, Washington.

Buelt, J. L., W. Coubere, M. D. Freshley, R. J. Hicks, W. L. Kuhn, D. A. Lamar, R. J. Serne, and J. L. Smoot, 1988, The Predicted Impacts to the Ground Water and Columbia River from Ammoniated Water Discharged to the 216-A-36B Crib, PNL-6463, Pacific Northwest Laboratory, Richland, Washington.

Chou, C. J., 1991, Statistical Approach on RCRA Groundwater Monitoring Projects at the Hanford Site, WHC-SA-1124-FP, Westinghouse Hanford Company, Richland , Washington.

Davis, J. D., D. B. Barnett, L. C. Swanson, W. J. McMahon, and C. D. Palomares, 1993, Site Characterization Report: Results of Detailed Evaluation of the Suitability of the Site Proposed for Disposal of 200 Areas Treated Effluent, WHC-SD-EN-ES-004, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Delaney, C. D., K. A. Lindsey, and S. P. Reidel, 1991, Geology and Hydrogeology of the Hanford Site: A Standardized Text for Use in Westinghouse Hanford Company Documents and Reports, WHC-SD-ER-TI-003, Westinghouse Hanford Company, Richland, Washington.

DOE-RL, 1991, Annual Report for RCRA Groundwater Monitoring Projects at Hanford Site Facilities for 1990, DOE/RL-91-03, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1992, Annual Report for RCRA Groundwater Monitoring Projects at Hanford Site Facilities for 1991, DOE/RL-92-03, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1993a, 200 West Groundwater Aggregate Area Management Study Report, DOE/RL-92-16, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1993b, 200 East Groundwater Aggregate Area Management Study Report, DOE/RL-92-19, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1993c, Annual Report for RCRA Groundwater Monitoring Projects at Hanford Site Facilities for 1992, DOE/RL-93-09, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1993d, Groundwater Monitoring Plan for the 1301-N and 1325-N Facilities, WHC-SD-EN-AR038, Rev. 1, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1993e, Quarterly Report for RCRA Groundwater Monitoring Data for the Period of April 1, 1993 through June 30, 1993, DOE/RL3-93-56-2, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1994, Annual Report for RCRA Groundwater Monitoring Projects at Hanford Site Facilities for 1993, DOE/RL-93-88, U.S. Department of Energy, Richland Field Office, Richland, Washington.

Ecology, EPA, and DOE, 1992, Hanford Federal Facility Agreement and Consent Order, 2 vols., as amended, Washington Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

EPA, 1992, RCRA Groundwater Monitoring: Draft Technical Guidance, EPA/530-R-93-001, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1986, RCRA Groundwater Monitoring Technical Enforcement Guidance Document, OSWER-9950.1, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1989, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities -- Interim Final Guidance, PB89-151047, U.S. Environmental Protection Agency, Washington, D.C.

Golden Associates, Inc., 1992, Modeling Efficiency Model (MEMO), Version 1.1, Redmond, Washington.

Heath, Ralph C., 1983, Basic Groundwater Hydrology, U.S. Geological Survey, Water Supply Paper 2220.

Kasza, G. L. and S. M. Goodwin, 1991, Groundwater Monitoring Plan for the 216-A-29 Ditch, WHC-SD-AP-045, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Kasza, G. L., M. J. Hartman, W. A. Jordan, D. C. Weekes, Groundwater Maps of the Hanford Site, June 1993, WHC-EP-0394-7, Westinghouse Hanford Company, Richland, Washington.

Ledgerwood, R. K., 1993, Summaries of Well Construction Data and Field Observations for Existing 200 East Resource Protection Wells, WHC-SD-ER-TI-007, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Lindsey, K. A., B. N. Bjornstad, J. W. Lindberg, and K. M. Hoffman, 1992, Geologic Setting of the 200 East Area: An Update, WHC-SD-EN-TI-012, Westinghouse Hanford Company, Richland , Washington.

PNL, 1990, RCRA Groundwater Monitoring Projects for Hanford Facilities: Annual Progress Report for 1989, PNL-7305, Pacific Northwest Laboratory, Richland, Washington.

PNL, 1994, Procedures for Groundwater Investigations, PNL-MA-567, Pacific Northwest Laboratory, Richland, Washington.

Ecology, 1993, Washington State Department of Ecology, Dangerous Waste Regulations, Washington Administrative Code 173-303, Olympia, Washington.

WHC, 1988, Environmental Investigation and Site Characterization Manual, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.

WHC, 1992, Hydrologic Model for the 200 East Groundwater Aggregate Area, WHC-SD-EN-TI-019, Rev. O, Westinghouse Hanford Company, Richland, Washington.

WHC, 1993, Quality Assurance Project Plan for RCRA Groundwater Monitoring Activities, WHC-SD-EN-QAPP-001, Westinghouse Hanford Company, Richland, Washington.

Wilson, C. R., C. M. Einberger, R. L. Jackson, and R. B. Mercer, 1992, Design of Groundwater Monitoring Network Using the Modeling Efficiency Model (MEMO), Groundwater, Vol. 130, No. 6, pgs 965-970

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APPENDIX A

WASTE INFORMATION DATA SYSTEM REPORTS

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Waste Information Data System
General Summary Report
February 25, 1992

SITE NAME: 216-A-10 [58]
ALIASES:
216-A-10 Crib [315]

SITE TYPE: Crib [315]
WASTE CATEGORY: Mixed Waste [308]
WASTE TYPE: Liquid [315]

STATUS: Inactive [315] Post-1980 [308]
START DATE: 1956 [120]
END DATE: March 1987 [308]

OPERABLE UNIT: 200-PO-2 [329]
O.U. CATEGORY: TSD [323]
TSD NUMBER: D-2-2 [323]
DOE/RL PROGRAM: Radiation Areas Reduction [358]

This site is included in the Tri-Party Agreement Action Plan [329]

The following have been submitted for this site: Part A Permit [308]

HANFORD AREA: 200 East, A Plant [315]
COORDINATES: N39090 W48952, N39370 W48952 (centerline) [58]
LOCATION: ~390 ft south of the 202-A Building [315]

WASTE VOLUME RECEIVED: 3,210,000,000.00 liters [306]
CONTAMINATED SOIL VOLUME: 33,000.00 cubic meters [253]
OVERBURDEN SOIL VOLUME: 190,000.00 cubic meters [253]

GROUND ELEVATION: 714.00 feet above MSL [58]
WATER TABLE DEPTH: 312.00 feet below grade [NR]

SITE DIMENSIONS (Bottom) [58]:
Length: 275.00 feet [58]
Width: 45.00 feet [58]
Depth: 45.00 feet [58]

SITE DESCRIPTION: The unit consists of an 8-in. SST pipe placed horizontally 30 ft below grade, 27 ft east of the centerline. The site has a wedge-shaped cross section and a side slope of 1:1.5. The excavation has 15 ft (414,000 cu ft) of rock fill, backfilled over [408].

SITE NAME: 216-A-10

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2/25/92
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ASSOCIATED STRUCTURES:
The original distribution pipe, 8-in. V.C.P., 30 ft below grade;
The new distribution pipe, 8-in. SCH 5 pipe, ~5 ft long;
Two layers of vinyl plastic 26, 304 sq ft, separating the gravel from the backfill;
Two vent structures made of 8-in. SST piping, 30 ft long;
A vent box resting on a 6-ft by 4-ft concrete pad;
Three 6-in. SCH 5 risers extending from the bottom to the vent structures [408].

WASTE TYPES AND AMOUNTS: During 1956, the site was used only for testing purposes using nonradioactive water [120]. From 1956 to November 1961, the site was inactive [60]. From November 1961 to January 1978, the site received process condensate from the 202-A Building [74]. From January 1978 to October 1981, the site was again inactive. From October 1981 to 1986, the site received the process condensate from the 202-A Building [NR].

COMMENTS: The Part A Permit Application will be withdrawn [308].

ENVIRONMENTAL MONITORING: Radiological surveys of the surface are performed quarterly [349]. Well Number #299-E17-01: Since the beginning of CY 1984, contaminant H-3 has presented an increasing trend, exceedeing the September 1985 number for the first time since PUREX resumed operations. NO3 has been on a continual increasing trend since March 1984. Concentration has tripled since September 1985. Well Number #299-E24-02: Observation determined a sixfold increase (alpha) in September 1985. It is presently at approximately two times the U-238 concentration limit. The NO3 trend has been increasing since June 1985, currently fluctuating about five times the Drinking Water Standard (DWS) [103].

SURVEILLANCE INFORMATION [682]

SURVEY DATE: 12/90
SURVEY SCHEDULE: Quarterly
SITE POSTING: Underground Radioactive Material

RESULTS/STATUS: No contamination detected and no change in activity since the last survey.

This unit is in compliance with the Environmental Compliance Manual.

WIDS Radionuclide Inventory
March 2, 1992
216-A-10

Isotope data [612]

Curies decayed through 12/31/89

^{241}Am:	7.730e-001 Ci	^{147}Pm:	3.120e-001 Ci	^{241}Pu:	4.230e+001 Ci
^{137}Cs:	8.050e+001 Ci	^{238}Pu:	3.290e-001 Ci	^{106}Ru:	3.090e-001 Ci
^{3}H:	1.850e+004 Ci	^{239}Pu:	3.490e+000	^{90}Sr:	8.250e+001 Ci
^{129}I:	1.070e-001 Ci				

Gross Data:

Plutonium:	3.500e+002 g	[260]
Alpha:	2.810e+001 Ci	[612]
Beta:	3.600e+002 Ci	[612]
U-Gross:	8.100e-002 Ci	[612]

Waste Information Data System
General Summary Report
February 25, 1992

SITE NAME: 216-A-36B [58]
ALIASES:
216-A-36 Crib [315]; Purex Ammonia Scrubber Distillate (ASD) [410]

SITE TYPE: Crib [315]
WASTE CATEGORY: Mixed Waste [308]
WASTE TYPE: Liquid [315]

STATUS: Inactive [349] Post-1980 [410]
START DATE: March 1966 [58]
END DATE: September 6, 1987 [410]

OPERABLE UNIT: 200-PO-2 [329]
O.U. CATEGORY: TSD [323]
TSD NUMBER: D-2-4 [323]
DOE/RL PROGRAM: Surveillance and Maintenance [358]

This site is included in the Tri-Party Agreement Action Plan [329]

The following have been submitted for this site: Part A Permit [308]
Interim Closure Plan [308]

HANFORD AREA: 200 East, A Plant [315]
COORDINATES: N38500 W48525, N39000 W48525 (centerline) [409]
LOCATION: 1,200 ft south of the 202-A Building [315]

WASTE VOLUME RECEIVED: 317,000,000.00 liters [306]
CONTAMINATED SOIL VOLUME: 830.00 cubic meters [253]
OVERBURDEN SOIL VOLUME: 14,000.00 cubic meters [253]

GROUND ELEVATION: 715.00 feet above MSL [409]
WATER TABLE DEPTH: 316.00 feet below grade [NR]

SITE DIMENSIONS (Bottom) [58]: Length: 500.00 feet [58]
Width: 11.00 feet [58]
Depth: 25.00 feet [58]

SITE DESCRIPTION: The unit is a gravel structure with a 6-in. M-8 perforated pipe placed horizontally, 23 ft below grade. The excavation has 3 ft (22,000 cu ft) of gravel fill, and the site has been backfilled. The side slope is 1:1.5 [409].

SITE NAME: 216-A-36B

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2/25/92
Page 2

ASSOCIATED STRUCTURES:
An 8-in. V.C.P. gage well extending from bottom to 3.5 ft above grade;
A plastic barrier separating the gravel from the backfill;
An 8-in. vent with a 2-in. drain at the bottom elevation; the vent filter extends 4 ft above grade [409].

WASTE TYPES AND AMOUNTS: Until 10/72, the site received the ammonia scrubber waste from the 202-A Building (PUREX) [58]. The site was retired in 10/72 [104]. In 11/82, the site was reactivated to receive the above wastes when PUREX operations restarted [251]. The waste is low salt and neutral/basic [58].

ENVIRONMENTAL MONITORING: Radiological surveys of the surface are performed quarterly [349]. Well #299-E17-05 shows total alpha and total uranium concentrations are two times the concentration limit for U-238. However, concentrations of uranium isotopes are below the concentration limits. H-3 has an increasing trend since August 1984. An increasing trend occurred in the contaminant NO3 from June 1984 to February 1985. NO3 currently fluctuates around two times the drinking water standards (DWS). Well #299-E17-09 shows an increasing trend in its H-3 contaminant. NO3 continues to be above the DWS. It fluctuates between two and three times the DWS. - Groundwater Monitoring Compliance Report for August 1986 (9/19/86) [103].

SURVEILLANCE INFORMATION [682]

SURVEY DATE: 12/90
SURVEY SCHEDULE: Quarterly
SITE POSTING: Underground/Surface

RESULTS/STATUS: No contamination reported. No change since last survey.

This unit is in compliance with the Environmental Compliance Manual.

WIDS Radionuclide Inventory
March 2, 1992
216-A-36B

Isotope data [612]

Curies decayed through 12/31/89

^{241}Am:	2.170e-001 Ci	^{147}Pm:	1.990e+000 Ci	^{106}Ru:	3.170e+000 Ci
^{137}Cs:	3.500e+002 Ci	^{239}Pu:	5.690e-002	^{113}Sn:	5.790e-004 Ci
^{3}H:	5.070e+002 Ci	^{241}Pu:	5.580e-001 Ci	^{90}Sr:	3.310e+002 Ci
^{129}I:	8.420e-003 Ci				

Gross Data:

Plutonium:	1.780e+002 g	[260]
Alpha:	1.100e+001 Ci	[612]
Beta:	1.360e+003 Ci	[612]
U-Gross:	3.980e-002 Ci	[612]

3/03/92

Waste Information Data System
Hazardous Chemical Inventory
(In Kilograms)

Site Name: 216-A-36B
Operable Unit: 200-PO-2
Bibliography: [ ]

INORGANICS

Aluminum Nitrate:	Nitrite:
Aluminum Fluoride/Nitrate:	Nitric Acid:
Ammonium Carbonate:	Oxalate:
Ammonium Nitrate:	Phosphate:
Beryllium:	Potassium:
Calcium Nitrate:	Potassium Borate:
Cadmium (II):	Silver (I):
Chromium (VI):	Sodium:
Copper (II):	Sodium Aluminate:
Copper Sulfate:	Sodium Dichromate:
Ferric Nitrate:	Sodium Hydroxide:
Ferrocyanide:	Sodium Oxalate:
Flouride:	Sodium Silicate:
Lead (II):	Sodium Sulfamate:
Magnesium Nitrate:	Sulfamic Acid:
Mercury:	Sulfate:
Nickel (II):	Sulfuric Acid:
Nitrate:	Uranium
	Zinc (II):

ORGANICS

CCL4:	Normal Paraffin Hydrocarbons:
BP:	Tributyl Phosphate:
DBBP:	Tributyl Phosphonate:
MIBK:	Trichloroethylene:

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APPENDIX B

GEOLOGIC AND WELL CONSTRUCTION DIAGRAMS FOR EXISTING WELLS

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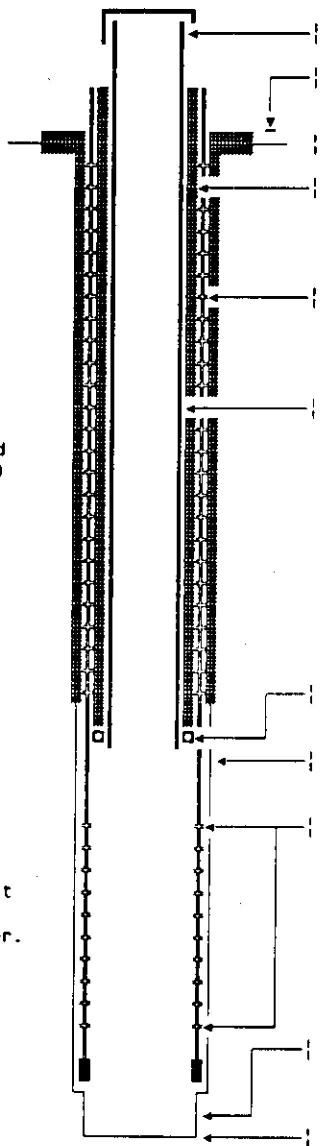
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel Hard tool	WELL NUMBER: 299-E17-1 TEMPORARY WELL NO: 216 A-10 #1
Drilling Fluid Used: Water	Additives Used: Not documented	Hanford Coordinates: N/S N 39,053.2 E/W W 48,942.0
Driller's Name: Row/Richards	WA State Lic Nr: Not documented	State Coordinates: N 444,229 E 2,246,283
Drilling Company: Not documented	Company Location: Not documented	Start Card #: Not documented T___ R___ S___
Date Started: 15Nov55	Date Complete: 28Dec55	Elevation Ground surface: 716.7-ft Estimated

Depth to water: 323-ft Dec55
(Ground surface) 315.8-ft 22Jun93

GENERALIZED STRATIGRAPHY — Driller's Log

0↔160: SAND
160↔180: SILT-SAND
180↔220: SAND
220↔255: SAND, some SILT
255↔275: SAND
275↔285: SAND and GRAVEL
285↔290: SAND-SILT
290↔295: SILT, heavy SAND
295↔300: SILT, SAND and GRAVEL
300↔305: GRAVEL
305↔314: GRAVEL and SAND
314↔315: Pure GRAVEL
315↔327: GRAVEL-SAND
(Stuck tools, retrieved and sidetracked hole @ 320-ft)
327↔335: Not documented
335↔336: Clean GRAVEL



Elevation of reference point: (top of casing) [719.17-ft]
Height of reference point above ground surface [2.5-ft]
Depth of surface seal [0↔275-ft]
Type of surface seal:
Cement grout between 6-in liner and 8-in (perforated) casing
8-in ID carbon steel casing, +ND↔334.8-ft
Perforated during remediation, 0↔275-ft, 2 cuts/ft/rd
6-in ID carbon steel liner, +2.5↔280-ft
Packer set @ 280-ft
Hole diameter, 9-in nominal 0↔334.8-ft
8-in casing perforations, 0↔275-ft, 2 cuts/rd/ft (see above) 303↔333-ft, 6 holes/ft
Hole diameter, 8-in nominal, 334.8↔336-ft
Borehole drilled depth: [336-ft]

REMEDIATION:
Dec81↔Feb82 by D. Garcia?
Perforated 0↔275-ft, 2 cuts/rd/ft
Placed 6-in liner to to 280-ft top-of-casing. Assumed on packer.
Placed 10-gals sand, 518-gals cement grout.
DTB, 324-ft, DTW, 312-ft.

Drawing By: RKL/2E17-01.ASB
Date : 03Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-1

WELL DESIGNATION	:	299-E17-1
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 Aggregate Area Management Study
HANFORD COORDINATES	:	N 39,053.2 W 48,942.05 [03Mar88-200East]
LAMBERT COORDINATES	:	N 444,229 E 2,246,283 [HANCONV]
DATE DRILLED	:	Dec55
DEPTH DRILLED (GS)	:	336-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	323-ft, Dec60; 315.4-ft, 22Jun93
CASING DIAMETER	:	8-in, carbon steel, +‾2.0↔334.8-ft 6-in, carbon steel, +2.5↔280.0-ft
ELEV TOP CASING	:	719.17-ft, [03Mar88-200E]
ELEV GROUND SURFACE	:	716.7-ft, Estimated
PERFORATED INTERVAL	:	0↔275 and 303↔333-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 06Feb90, 6 and 8-in carbon steel casing. 2-ft concrete pad, no posts, capped and locked. ID stamped on brass cap in pad. Not in radiation zone. Hole in casing.
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A-36 Crib quarterly water level measurement, 01May73↔22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring, WHC ES&M RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Electric submersible
MAINTENANCE	:	

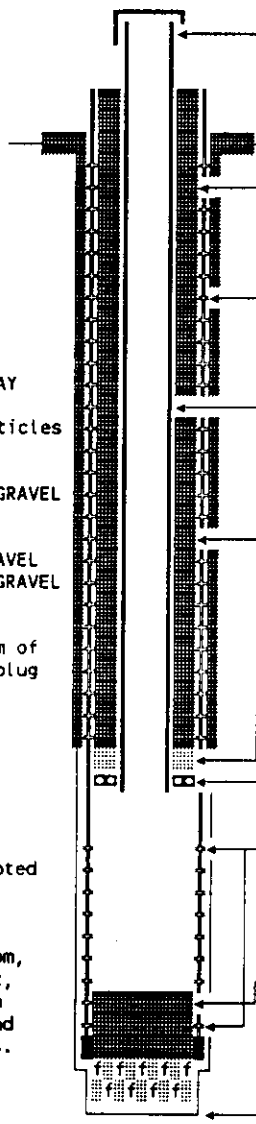
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel Hard tool	WELL NUMBER: 299-E17-5 TEMPORARY WELL NO:
Drilling Fluid Used: Water	Additives Used: Not documented	Hanford Coordinates: N/S N 38,699.1 E/W W 48,559 8
Driller's Name: L. Bach	WA State Lic Nr: Not documented	State Coordinates: N 443,876 E 2,246,666
Drilling Company: Bach Drilling Co.	Company Location: Not documented	Start Card #: Not documented T___ R___ S___
Date Started: 26May65	Date Complete: 14Jul65	Elevation Ground surface: 717.3-ft Estimated

Depth to water: 313-ft Jul65
(Ground surface) 316.2-ft 22Jun93

GENERALIZED STRATIGRAPHY Driller's Log
(Driller's log almost illegible)

0-25: SAND, GRAVEL
25-40: Cse SAND
40-55: SAND, med-fine
55-60: SAND, fine
60-80: SAND, cse
80-95: Fine-cse SAND
95-105: Fine SAND, w/CLAY
105-110: SAND-med-cse
110-115: SAND, fine-med
115-125: (Log illegible-SAND?)
125-140: SAND-fine GRAVEL-some CLAY
145-165: (Log illegible-SAND?)
165-175: SAND-fine-cse w/CLAY particles
175-185: SAND
185-235: SAND, fine W/CLAY lenses
234-265: Cse SAND, pieces basalt GRAVEL
265-275: Basalt GRAVEL W/cse SAND
275-285: GRAVEL, w/CLAY
285-295: Light SANDSTONE, some GRAVEL
295-315: Light SANDSTONE, little GRAVEL
315-335: GRAVEL
336-339: BASALT
(Attempted to plug bottom of hole w/cement and clay plug to stop sand inflow.)



Elevation of reference point: [718.69-ft]
(top of casing)
Height of reference point above ground surface [1.4-ft]
Depth of surface seal [0-288-ft]
Type of surface seal:
Cement grout between 4-in liner and 8-in (perforated) casing

8-in ID carbon steel casing, +ND-~355-ft
Perforated during remediation, 0-288-ft, 2 cuts/rd/ft

4-in ID carbon steel liner, +1.4-293-ft

Hole diameter, 9-in nominal 0-~335-ft

Sand plug, ~290-293-ft

Packer set @ 293-ft

8-in casing perforated, 0-288-ft, 2 cuts/rd/ft (see above) 298-335-ft, cuts not documented

Cement plug, 330-336-ft

Borehole drilled depth: [340-ft]

REMEDIATION:
Apr66 by H. Hatch
Pulled casing back 2-ft. Attempted cement plug. Did not succeed.

Apr79 by J. Evans
Placed cement plug in hole bottom, 330-336-ft. Perforated 0-288-ft, 2 cuts/rd/ft. Set 4-in liner on packer @ 293-ft. Placed sand and 808-gals cement grout in annulus.

Drawing By: RKL/2E17-05.ASB
Date: 03Sep93
Reference: HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-5

WELL DESIGNATION	:	299-E17-5
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 Aggregate Area Management Study
HANFORD COORDINATES	:	N 38,699.1 W 48,559.8 [02Mar88-200E]
LAMBERT COORDINATES	:	N 443,876 E 2,246,666 [HANCONV]
DATE DRILLED	:	Jul65
DEPTH DRILLED (GS)	:	340-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	313-ft, Jul65; 316.2-ft, 22Jun93
CASING DIAMETER	:	8-in, carbon steel, +0.9↔335-ft 4-in, carbon steel, +1.4↔293-ft
ELEV TOP CASING	:	718.69-ft
ELEV GROUND SURFACE	:	717.3-ft, Estimated
PERFORATED INTERVAL	:	0↔288 and 298↔335-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 07Feb90, 4 and 8-in carbon steel casing. 2-ft concrete pad, no posts, capped and locked. ID stamped on brass cap in pad. Not in radiation zone.
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Crib quarterly water level measurements, 07Jan86↔22Jun93
CURRENT USER	:	WHC ES&M w/l monitoring and ES&M RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Electric submersible
MAINTENANCE	:	

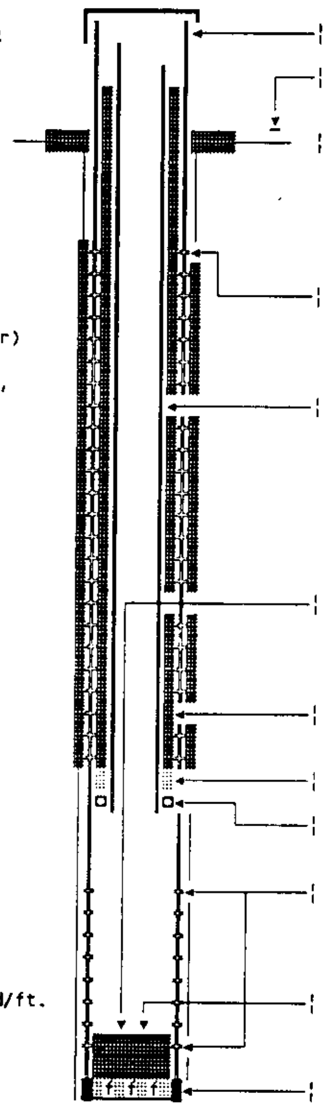
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel Hard tool	WELL NUMBER: 299-E17-9 TEMPORARY WELL NO:
Drilling Fluid Used: Water	Additives Used: Bentonite Clay/cement	Hanford Coordinates: N/S N 39,027.3 E/W W 48,538.0
Driller's Name: D. Bigham	WA State Lic Nr: Not documented	State Coordinates: N 444,204 E 2,246,687
Drilling Company: Hatch Drilling Co	Company Location: Pasco, WA	Start Card #: Not documented T___ R___ S___
Date Started: 11Apr68	Date Complete: 19Jun68	Elevation Ground surface: 715.9-ft Estimated

Depth to water: 315-ft May68
(Ground surface) 314.5-ft 22Jun93

GENERALIZED STRATIGRAPHY — Driller's Log

0–25: SAND
(Hit contamination @ 25-ft, moved rig)
New Hole:
0–31: SAND
(Hit contamination 60,000cm)
31–55: No sample (Contaminated)
60–88: SAND
88–88.5: SILT layer (Perched water)
88.5–275: SAND
(Contamination, 88.5–100, and 115–120-ft)
275–325: SAND & GRAVEL



Elevation of reference point: [717.64-ft]
(top of casing)
Height of reference point above ground surface [1.7-ft]
Depth of surface seal [NA]
None documened

6-in ID carbon steel casing, Perforated during remediation 21–300-ft, 2 cuts/ft/rd

4-in ID carbon steel liner, ~+3.0–305-ft

Depth to bottom, 318.0-ft, 10Aug93

Type of filler: Cement grout

Sand plug assumed

Packer set @ 305-ft [305-ft]

6-in casing perforations,
21–300-ft, 2 cuts/ft/rd (see above)
310–320-ft, 6 cuts/rd/ft

Cement plug, assumed ~320–323-ft

Borehole drilled depth: [325-ft]

REMEDIATION
Apr79 by J. D. Bultena
Cleaned well to 323-ft.
Set cement plug, ~320–323-ft.
Perforated, 21–300-ft, 2 cuts/rd/ft.
Placed 248-gals cement grout in annulus.

Drawing By: RKL/2E17-09.ASB
Date : 03Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-9

WELL DESIGNATION	:	299-E17-9
RCRA FACILITY	:	Not applicable
CERCLA UNIT	:	200 Aggregate Area Management Study
HANFORD COORDINATES	:	N 39,027.3 W 48,538.0 [02Mar88-200E]
LAMBERT COORDINATES	:	N 444,204 E 2,246,687 [HANCONV]
DATE DRILLED	:	Jun68
DEPTH DRILLED (GS)	:	325-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	315-ft, May68; 314.5-ft, 22Jun93
CASING DIAMETER	:	6-in, carbon steel, ~+3.0↔365-ft 4-in, carbon steel, ~+ND↔305-ft
ELEV TOP CASING	:	717.64-ft
ELEV GROUND SURFACE	:	715.9-ft, Estimated
PERFORATED INTERVAL	:	21↔300 and 310↔320-ft
SCREENED INTERVAL	:	Not applicable
COMMENTS	:	FIELD INSPECTION, 10Aug93, 4 and 6-in carbon steel casing. Capped and locked No pad, 4 posts, has brass marker w/identification. In underground radiation zone.
AVAILABLE LOGS	:	Driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Cribs quarterly water level measurement, 17Feb88↔22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring, ES&M RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel Hard tool	WELL NUMBER: 299-E17-14 TEMPORARY WELL NO:
Drilling Fluid Used: 200 W Water Supply	Additives Used: Not documented	Hanford Coordinates: N/S N 38,879.7 E/W W 48,406.2
Driller's Name: L. Watkins	WA State Lic Nr: Not documented	State Coordinates: N 444,058 E 2,246,819
Drilling Company: Kaiser Engineers	Company Location: Hanford	Start Card #: Not documented T___ R___ S___
Date Started: 22Mar88	Date Complete: 19May88	Elevation Ground surface: 719.10-ft (Brass cap)

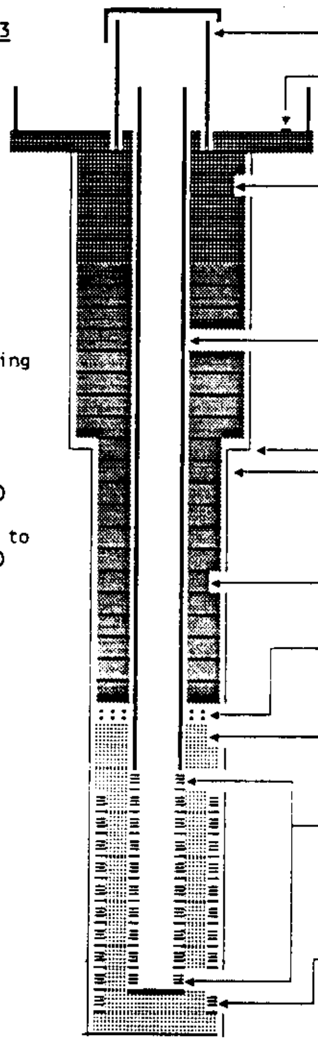
Depth to water: 313.7-ft Jun88
(Ground surface) 317.3-ft 22Jun93

GENERALIZED STRATIGRAPHY

Geologist's Log

Sl=slightly

0–5: Sandy SILT
5–10: Cse–med SAND
10–15: Sl gravelly SAND
15–50: Cse–med SAND
50–55: Sl gravelly SAND
55–65: Cse–med SAND
65–70: Sl gravelly SAND
70–107: SAND
107–109: Silty SAND
109–190: SAND (Some $CaCO_3$ cementing 175–190-ft)
190–195: Sl gravelly SAND
195–240: SAND (Poorly developed CALICHE @ 230-ft)
240–245: Silty SAND (Ammonia vapors from well)
245–250: SAND
250–255: Silty gravelly SAND (Up to 1,000ppm ammonia vapors)
255–265: Gravelly SAND
265–285: SAND (No ammonia)
285–290: Sandy SILT
290–295: Gravelly SAND
295–300: Sl silty gravelly SAND (Positive ammonia)
300–310: Silty sandy GRAVEL
310–315: Sandy GRAVEL
315–320: Silty sandy GRAVEL
320–335: Sandy GRAVEL



Elevation of reference point: [722.18-ft]
(top of casing)

Height of reference point above [3.08-ft]
ground surface

Depth of surface seal [1.5–20-ft]

Type of surface seal:
Cement grout to 20-ft, has 4-ftx4-ftx6-in concrete pad extending 1.5-ft into annulus

4-in ID stainless steel casing, ~+1.9–309.5-ft

Hole diameter,
0–141.7-ft, 11-in nominal
141.7–335-ft, 9-in nominal

Granular bentonite, 20–298-ft

Bentonite pellets, 298–301-ft

Silica sand, 302–335-ft, 10–20-mesh

4-in ID stainless steel screen 309.5–330.1-ft, #20-slot

8-in stainless steel telescoping screen,
311.6–321.5-ft, #30-slot
321.5–331.5-ft, #10-slot

Borehole drilled depth: [335.0-ft]

Drawing By: RKL/2E17-14.ASB
Date : 03Sep93
Reference :

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-14

WELL DESIGNATION	:	299-E17-14
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	216-A-36B Crib
HANFORD COORDINATES	:	N 38,879.7 W 48,406.2 [10Jun88-200E]
LAMBERT COORDINATES	:	N 444,058 E 2,246,819 [HANCONV]
DATE DRILLED	:	May88
DEPTH DRILLED (GS)	:	335.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	313.7-ft, Jun88; 317.3-ft, 22Jun93
CASING DIAMETER	:	4-in stainless steel, ~+1.9↔309.5-ft; 6-in stainless steel, +3.1↔~0.5-ft
ELEV TOP CASING	:	722.18-ft, [10Jun88-200E]
ELEV GROUND SURFACE	:	719.10-ft, Brass cap [10Jun88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	309.5↔330.1-ft, 4-in #20-slot stainless steel; 311.6↔331.5-ft, 8-in telescoping, #10 and 30-slot
COMMENTS	:	FIELD INSPECTION, 06Feb90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 quarterly water level measurement, 31May88↔22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

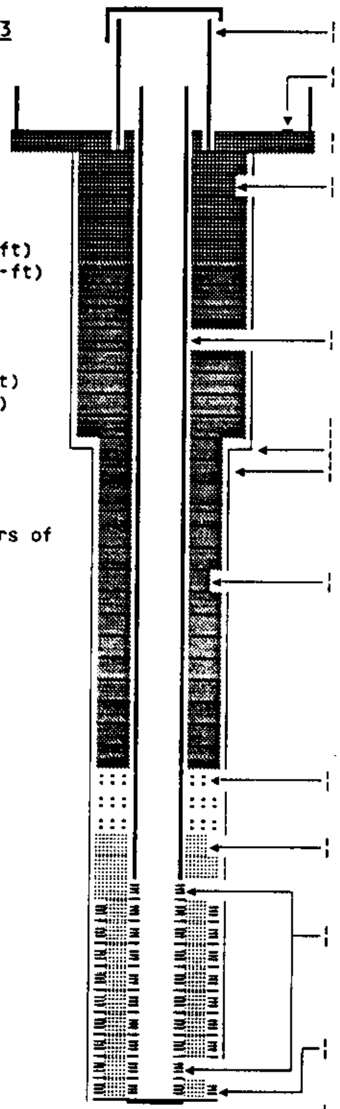
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel Hard tool	WELL NUMBER: 299-E17-15 TEMPORARY WELL NO:
Drilling Fluid Used: 200 W Water Supply	Additives Used: Not documented	Hanford Coordinates: N/S N 38,710.2 E/W W 48,399.6
Driller's Name: C. Wamsley	WA State Lic Nr: Not documented	State Coordinates: N 443,879 E 2,246,826
Drilling Company: Kaiser Engineers	Company Location: Hanford	Start Card #: Not documented T___ R___ S___
Date Started: 17Mar88	Date Complete: 16May88	Elevation Ground surface: 718.70-ft (Brass cap)

Depth to water: 312.8-ft May88
(Ground surface) 317.8-ft 22Jun93

GENERALIZED STRATIGRAPHY Geologist's Log
Sl=slightly

0→10: Silty SAND
10→15: Sl gravelly SAND
15→25: Gravelly SAND
25→100: SAND
(Thin layers SILT, 62→63-ft)
(Faint ammonia smell @ 85-ft)
100→105: Sl gravelly SAND
(Ammonia smell-30ppm)
105→235: SAND
(SILT/vf SAND @ 109-ft)
(1,000ppm ammonia @ 110-ft)
(Ammonia smell to ~150-ft)
235→250: Sl gravelly SAND
250→270: Gravelly SAND
270→280: Sandy GRAVEL
280→285: Gravelly SAND
285→286: Sandy GRAVEL
286→295: Sl gravelly SAND w/layers of Sl gravelly SILT/CLAY
295→300: SAND
300→306: Gravelly SAND
306→325: Sandy GRAVEL
325→330: Gravelly SAND



Drawing By: RKL/2E17-15.ASB
Date : 03Sep93
Reference :

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-15

WELL DESIGNATION	:	299-E17-15
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	216-A-36B Crib
HANFORD COORDINATES	:	N 38,710.2 W 48,399.6 [10Jun88-200E]
LAMBERT COORDINATES	:	N 443,879 E 2,246,826 [HANCONV]
DATE DRILLED	:	May88
DEPTH DRILLED (GS)	:	330.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	312.8-ft, May88; 317.8-ft, 22Jun93
CASING DIAMETER	:	4-in stainless steel, ⁻+0.5↔310.5-ft; 6-in stainless steel, +3.1↔⁻0.5-ft
ELEV TOP CASING	:	721.78-ft, [10Jun88-200E]
ELEV GROUND SURFACE	:	718.70-ft, Brass cap [10Jun88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	310.5↔330.0-ft, 4-in #20-slot stainless steel; 309.5↔329.6-ft, 8-in telescoping, #20-slot
COMMENTS	:	FIELD INSPECTION, 06Feb90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Cribs quarterly water level measurement, 31May88↔22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

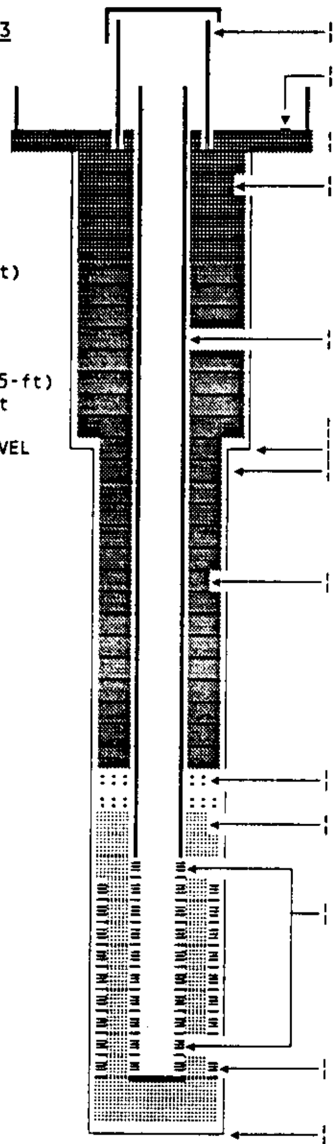
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel Hard tool	WELL NUMBER: 299-E17-16 — TEMPORARY WELL NO:
Drilling Fluid Used: 200 W Water Supply	Additives Used: Not documented	Hanford Coordinates: N/S N 38,476.2 E/W W 48,390.5
Driller's Name: L. Cordon	WA State Lic Nr: Not documented	State Coordinates: N 443,654 E 2,246,836
Drilling Company: Kaiser Engineers	Company Location: Hanford	Start Card #: Not documented T___ R___ S___
Date Started: 10Mar88	Date Complete: 16May88	Elevation Ground surface: 717.78-ft (Brass cap)

Depth to water: 313.0-ft May88
(Ground surface) 316.3-ft 22Jun93

GENERALIZED STRATIGRAPHY — Geologist's Log
Sl=slightly

0-40: SAND w/SILT
(moist, 34-45-ft)
40-85: Cse-med SAND
85-105: SAND w/med-cse PEBBLES
@ 85-ft
(>1,000ppm ammonia @ 90-ft)
105-107: SAND w/SILT layers
107-110: SILT
110-235: SAND
(CaCO3 rich, 160-170-ft)
(CALICHE layering, 200-205-ft)
(SILT layering, 210-220-ft
and 230-235-ft)
235-270: Gravelly SAND-sandy GRAVEL
270-285: SAND
285-286: Gravelly SAND
286-289: SILT
289-295: SAND
295-300: Sl gravelly SAND
300-305: SAND
305-320: Sandy GRAVEL
320-325: Sl gravelly SAND
325-330: SAND
330-335: Sandy GRAVEL
335-337: Gravelly SAND



Elevation of reference point: [720.58-ft]
(top of casing)
Height of reference point above [2.8-ft]
ground surface
Depth of surface seal [1.5-19.5-ft]
Type of surface seal:
Cement grout to 19.5-ft, has
4-ftx4-ftx6-in concrete pad
extending 1.5-ft into annulus

4-in ID stainless steel casing,
+0.5-309.0-ft

Hole diameter,
0-133.0-ft, 11-in nominal
133.0-337.0-ft, 9-in nominal

Granular bentonite,
19.5-300.5-ft, 8-20-mesh

Bentonite pellets,
300.5-305.0-ft

Silica sand pack,
305.0-337.0-ft, 10-20-mesh

4-in ID stainless steel screen,
309.0-330.0-ft, #20-slot
w/10-20-mesh, sand filter pack

8-in stainless steel telescoping screen,
310.0-330.0-ft, #30-slot

Borehole drilled depth: [337.0-ft]

Drawing By: RKL/2E17-16.ASB
Date : 03Sep93
Reference :

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-16

WELL DESIGNATION	:	299-E17-16
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	216-A-36B Crib
HANFORD COORDINATES	:	N 38,476.2 W 48,390.5 [10Jun88-200E]
LAMBERT COORDINATES	:	N 443,654 E 2,246,836 [HANCONV]
DATE DRILLED	:	May88
DEPTH DRILLED (GS)	:	337.0-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	313.0-ft, May88; 316.3-ft, 22Jun93
CASING DIAMETER	:	4-in stainless steel, ¯+0.5↔309.0-ft; 6-in stainless steel, +2.8↔¯0.5-ft
ELEV TOP CASING	:	720.58-ft, [10Jun88-200E]
ELEV GROUND SURFACE	:	717.78-ft, Brass cap [10Jun88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	309.0↔330.0-ft, 4-in #20-slot stainless steel; 310.0↔330.0-ft, 8-in telescoping, #30-slot
COMMENTS	:	FIELD INSPECTION, 20Jan92; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Cribs quarterly water level measurement, 22Jun88↔22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: 200 W Water Supply
Driller's Name: O. Amos
Drilling Company: Kaiser Engineers
Date Started: 16Mar88

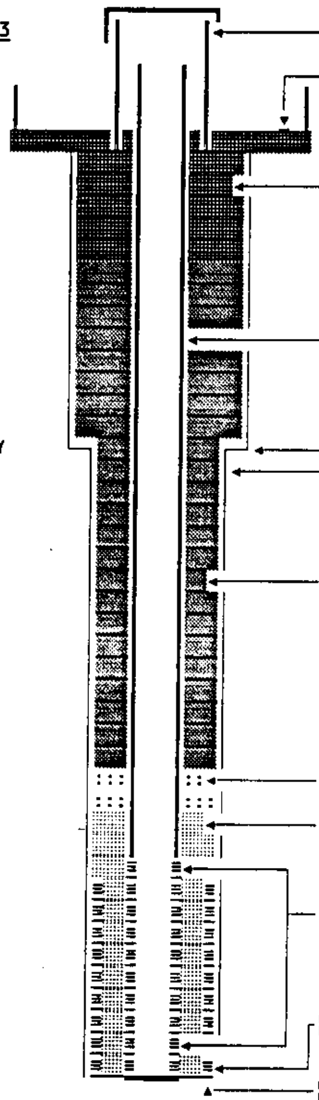
Sample Method: Drive barrel Hard tool
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Hanford
Date Complete: 16May88

WELL NUMBER: 299-E17-17
TEMPORARY WELL NO: ____
Hanford Coordinates: N/S N 38,473.7 E/W W 48,717.3
State Coordinates: N 443,651 E 2,246,509
Start Card #: Not documented T___ R___ S___
Elevation Ground surface: 716.97-ft (Brass cap)

Depth to water: 312.8-ft May88
(Ground surface) 315.1-ft 22Jun93

GENERALIZED STRATIGRAPHY
Geologist's Log
Sl=slightly

0↔10: SAND
10↔15: Sl gravelly SAND
15↔20: Sandy SILT
20↔230: SAND
230↔240: Gravelly SAND
240↔245: Gravelly, silty SAND
245↔250: Gravelly SAND
250↔260: Sl silty gravelly SAND
260↔265: Sl gravelly, silty SAND
265↔270: Gravelly, silty SAND
270↔275: Sl silty, gravelly SAND
275↔280: Silty SAND
280↔285: SAND
285↔290: SAND, w/layers SILT/CLAY
290↔300: SL gravelly SAND
300↔310: Gravelly SAND
310↔330: Sandy GRAVEL
330↔331: SAND



Elevation of reference point: [719.92-ft] (top of casing)
Height of reference point above ground surface [2.95-ft]
Depth of surface seal [0.0↔19.5-ft]
Type of surface seal: Cement grout to 19.5-ft, has 4-ftx4-ftx6-in concrete pad extending into annulus
4-in ID stainless steel casing, +2.0↔309.0-ft
Hole diameter, 0↔143.8-ft, 11-in nominal; 143.8↔331.0-ft, 9-in nominal
Granular bentonite, 19.5↔299.1-ft, 8↔20-mesh
Bentonite pellets, 299.1↔303.9-ft
Silica sand pack, 303.9↔331.4-ft, 10↔20-mesh
4-in ID stainless steel screen, 309.0↔331.4-ft, #20-slot w/10↔20-mesh, sand filter pack
8-in stainless steel telescoping screen, 310.9↔331.4-ft, #10-slot
Borehole drilled depth: [331.4-ft]

Drawing By: RKL/2E17-17.ASB
Date: 03Sep93
Reference: ____

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-17

WELL DESIGNATION	:	299-E17-17
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	216-A-36B Crib
HANFORD COORDINATES	:	N 38,473.7 W 48,717.3 [10Jun88-200E]
LAMBERT COORDINATES	:	N 443,651 E 2,246,509 [HANCONV]
DATE DRILLED	:	May88
DEPTH DRILLED (GS)	:	331.4-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	312.8-ft, May88; 315.1-ft, 22Jun93
CASING DIAMETER	:	4-in stainless steel, ¯+2.0↔309.0-ft; 6-in stainless steel, +2.95↔¯0.5-ft
ELEV TOP CASING	:	719.92-ft, [10Jun88-200E]
ELEV GROUND SURFACE	:	716.97-ft, Brass cap [10Jun88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	309.0↔331.4-ft, 4-in #20-slot stainless steel; 310.9↔331.4-ft, 8-in telescoping, #10-slot
COMMENTS	:	FIELD INSPECTION, 06Feb90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Cribs quarterly water level measurement, 26May88↔22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

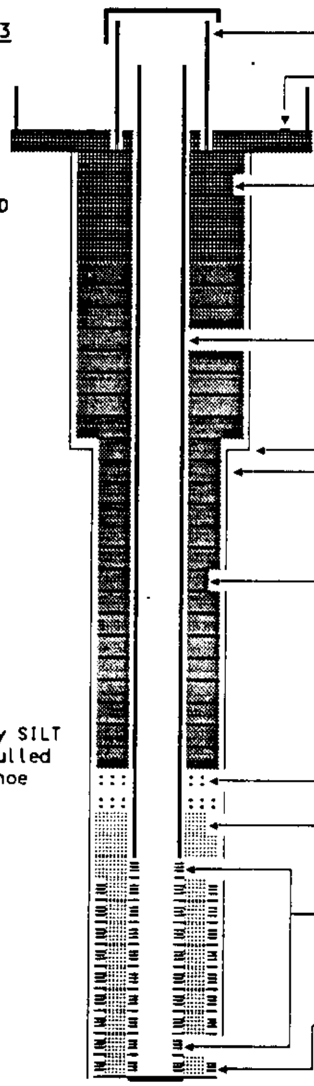
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel Hard tool	WELL NUMBER: 299-E17-18 TEMPORARY WELL NO:
Drilling Fluid Used: 200 W Water Supply	Additives Used: Not documented	Hanford Coordinates: N/S N 38,190.4 E/W W 48,500.7
Driller's Name: L. Cordon	WA State Lic Nr: Not documented	State Coordinates: N 443,367 E 2,246,726
Drilling Company: Kaiser Engineers	Company Location: Hanford	Start Card #: Not documented T___ R___ S___
Date Started: 28Mar88	Date Complete: 16May88	Elevation Ground surface: 717.65-ft (Brass cap)

Depth to water: 311.2-ft May88
(Ground surface) 315.9-ft 23Jun93

GENERALIZED STRATIGRAPHY | Geologist's Log
Sl=slightly

0↔10: Silty SAND
10↔20: Gravelly silty SAND
20↔25: Sl gravelly, sl silty SAND
25↔45: Med↔cse SAND
45↔50: Sl gravelly SAND
50↔55: Cse SAND
55↔60: Sl gravelly SAND
60↔75: Med↔cse SAND
75↔80: Sl silty SAND
80↔95: Med↔cse SAND
95↔100: Sl gravelly SAND
100↔140: Med↔cse SAND
140↔145: Fine↔med SAND
145↔165: Med↔cse SAND
165↔170: Sl silty SAND
170↔185: Med↔cse SAND
185↔200: Sl silty SAND
200↔225: Med↔cse SAND
225↔230: Sl silty SAND
230↔235: Med↔cse SAND
235↔240: Sl gravelly SAND
240↔255: Gravelly SAND
255↔260: Sl gravelly SAND
260↔275: Med↔very cse SAND
275↔280: Sl silty SAND
280↔284: Cse SAND
284↔285: Sl gravelly sandy clayey SILT
285↔289: BOULDERS (Bent casing-pulled casing, installed new shoe and reran casing)
289↔295: Sl silty gravelly SAND
295↔330: Sandy GRAVEL
330↔331.5: Gravelly SAND



Elevation of reference point: [720.65-ft] (top of casing)
Height of reference point above ground surface [3.0-ft]
Depth of surface seal [1.5↔19.0-ft]
Type of surface seal: Cement grout to 19.5-ft, has 4-ftx4-ftx6-in concrete pad extending 1.5-ft into annulus
4-in ID stainless steel casing, +0.5↔308.7-ft
Hole diameter, 0↔156.4-ft, 11-in nominal
156.4↔331.8-ft, 9-in nominal
Granular bentonite 19.0↔296.6-ft, 8↔20-mesh
Bentonite pellets, 296.7↔301.4-ft
Silica sand pack, 301.4↔331.5-ft, 10↔20-mesh
4-in ID stainless steel screen, 308.7↔329.3-ft, #20-slot w/10↔20-mesh, sand filter pack
8-in stainless steel telescoping screen, 311.2↔331.5-ft, #20-slot
Borehole drilled depth: [331.5-ft]

Drawing By: RKL/2E17-18.ASB
Date : 03Sep93
Reference :

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-18

WELL DESIGNATION	:	299-E17-18
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	216-A-36B Crib
HANFORD COORDINATES	:	N 38,190.4 W 48,500.7 [10Jun88-200E]
LAMBERT COORDINATES	:	N 443,367 E 2,246,726 [HANCONV]
DATE DRILLED	:	May88
DEPTH DRILLED (GS)	:	331.4-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	311.2-ft, May88; 315.9-ft, 23Jun93
CASING DIAMETER	:	4-in stainless steel, ⁻+0.5↔308.7-ft; 6-in stainless steel, +3.00↔⁻0.5-ft
ELEV TOP CASING	:	720.65-ft, [10Jun88-200E]
ELEV GROUND SURFACE	:	717.65-ft, Brass cap [10Jun88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	308.7↔329.3-ft, 4-in #20-slot stainless steel; 311.2↔331.5-ft, 8-in telescoping, #20-slot
COMMENTS	:	FIELD INSPECTION, 06Feb90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Cribs quarterly water level measurement, 22Jun88↔23Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

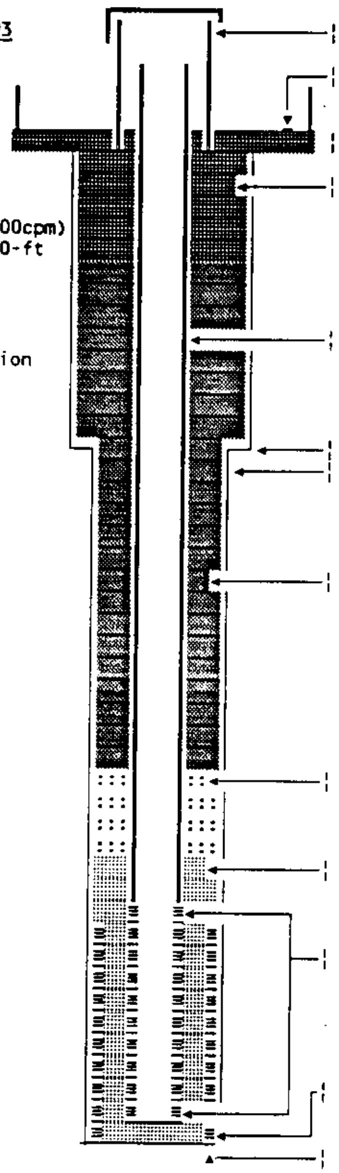
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel Hard tool	WELL NUMBER: 299-E17-19
Drilling Fluid Used: 200 W Water Supply	Additives Used: Not documented	TEMPORARY WELL NO:
Driller's Name: F. Murphy/C. Walmsley	WA State Lic Nr: Not documented	Hanford Coordinates: N/S N 39,147.1 E/W W 48,810.4
Drilling Company: Kaiser Engineers	Company Location: Hanford	State Coordinates: N 444,324 E 2,246,415
Date Started: 02Aug88	Date Complete: 19Sep88	Start Card #: Not documented T___ R___ S___
		Elevation Ground surface: 716.38-ft (Brass cap)

Depth to water: 311.1-ft Oct88
(Ground surface) 315.2-ft 22Jun93

GENERALIZED STRATIGRAPHY
Geologist's Log
Sl=slightly

0–15: Silty SAND
15–20: Sl gravelly SAND
20–70: SAND
(Contamination @58-ft=1,000cpm)
(Nonflammable organics @70-ft also rad contamination)
70–76: Sl gravelly SAND
76–85: SAND
85–100: Sl silty SAND
(Organic & rad contamination @90–190-ft)
100–115: SAND
115–120: Sl gravelly SAND
120–135: SAND
135–140: Sl gravelly SAND
140–255: SAND
255–265: Sl gravelly SAND
265–270: Gravelly SAND
270–275: Sandy GRAVEL
275–290: SAND
290–295: SILT
295–305: Silty SAND
305–315: Silty sandy GRAVEL
315–326.7: Sandy GRAVEL



Drawing By: RKL/2E17-19.ASB
Date : 03Sep93
Reference :

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-19

WELL DESIGNATION	:	299-E17-19
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	216-A-10 Crib
HANFORD COORDINATES	:	N 39,147.1 W 48,810.4 [28Oct88-200E]
LAMBERT COORDINATES	:	N 444,324 E 2,246,415 [HANCONV]
DATE DRILLED	:	Sep88
DEPTH DRILLED (GS)	:	326.7-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	311.1-ft, Oct88; 315.2-ft, 22Jun93
CASING DIAMETER	:	4-in stainless steel, ¯+0.5↔304.0-ft; 6-in stainless steel, +2.95↔¯0.5-ft
ELEV TOP CASING	:	719.33-ft, [28Oct88-200E]
ELEV GROUND SURFACE	:	716.38-ft, Brass cap [28Oct88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	304.0↔324.4-ft, 4-in #10-slot stainless steel; 306.3↔326.6-ft, 8-in telescoping, #20-slot
COMMENTS	:	FIELD INSPECTION, 06Feb90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Cribs quarterly water level measurement, 11Oct88↔22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

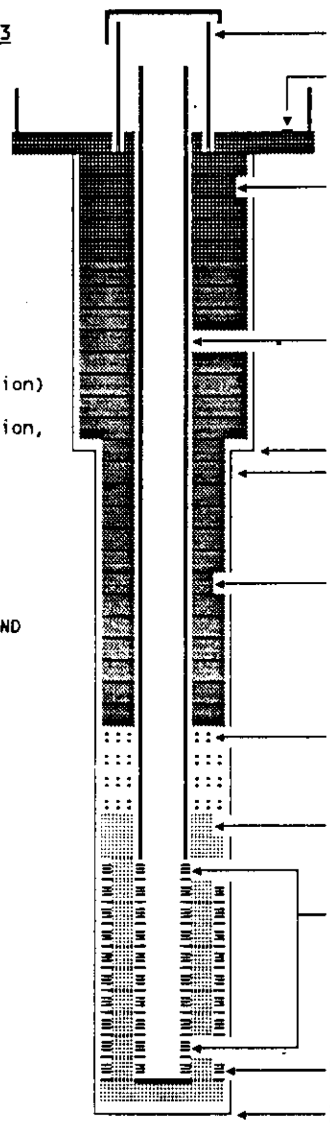
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel Hard tool	WELL NUMBER: 299-E17-20 TEMPORARY WELL NO:
Drilling Fluid Used: 200 W Water Supply	Additives Used: Not documented	Hanford Coordinates: N/S N 39,149.3 E/W W 49,069.9
Driller's Name: L. Cordon	WA State Lic Nr: Not documented	State Coordinates: N 444,325 E 2,246,155
Drilling Company: Kaiser Engineers	Company Location: Hanford	Start Card #: Not documented T___ R___ S___
Date Started: 03Aug88	Date Complete: 25Sep88	Elevation Ground surface: 716.24-ft (Brass cap)

Depth to water: 310.0-ft Oct88
(Ground surface) 314.3-ft 22Jun93

GENERALIZED STRATIGRAPHY Geologist's Log
Sl=slightly

0-10: SILT
10-15: SAND
15-20: Gravelly SAND
20-25: Sl silty sl gravelly SAND
25-40: SAND
40-45: Sl silty sl gravelly SAND
45-50: Sl gravelly sl silty SAND
50-55: Sl silty gravelly SAND
55-60: Gravelly SAND
60-70: Sl gravelly SAND
(Low level rad contamination)
70-155: SAND (silty? ~88-ft)
(Low level rad contamination, 70-90-ft, 115-125-ft; organic vapors @ 135-ft)
155-160: Sl gravelly SAND
160-165: Sl silty SAND
165-225: SAND
225-230: Sl gravelly SAND
230-235: SAND
235-240: Sl silty gravelly SAND
240-245: Sl gravelly sl silty SAND
245-250: Sl silty gravelly SAND
250-255: Gravelly SAND
255-260: Sl gravelly SAND
260-265: Gravelly SAND
265-280: Sandy GRAVEL
280-285: Sl silty gravelly SAND
285-290: Silty SAND
290-295: SILT
295-300: Gravelly silty SAND
300-315: Silt sandy GRAVEL
315-320: Gravelly SAND
320-325: Sl silty gravelly SAND
325-326.5: Gravelly silty SAND



Elevation of reference point: [719.23-ft]
(top of casing)
Height of reference point above [2.99-ft]
ground surface

Depth of surface seal [2.0-19.3-ft]
Type of surface seal:
Cement grout to 19.3-ft, has 4-ftx4-ftx6-in concrete pad extending 2.0-ft into annulus

4-in ID stainless steel casing,
~+1.4-303.6-ft

Hole diameter,
0-184.2-ft, 11-in nominal
184.2-326.5-ft, 9-in nominal

Bentonite crumbles,
19.3-288.8-ft

¼-in bentonite pellets,
288.8-297.9-ft

Silica sand pack,
297.9-326.7-ft, 16-30-mesh

4-in ID stainless steel screen,
303.6-323.6-ft, #10-slot

8-in stainless steel telescoping screen,
303.6-323.8-ft, #20-slot

Borehole drilled depth: [326.7-ft]

Drawing By: RKL/2E17-20.ASB
Date : 03Sep93
Reference :

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E17-20

WELL DESIGNATION :	299-E17-20
CERCLA UNIT :	200 Aggregate Area Management Study
RCRA FACILITY :	216-A-10 Crib
HANFORD COORDINATES :	N 39,149.3 W 49,069.9 [28Oct88-200E]
LAMBERT COORDINATES :	N 444,325 E 2,246,155 [HANCONV]
DATE DRILLED :	Sep88
DEPTH DRILLED (GS) :	326.7-ft
MEASURED DEPTH (GS) :	Not documented
DEPTH TO WATER (GS) :	310.0-ft, Oct88; 314.3-ft, 22Jun93
CASING DIAMETER :	4-in stainless steel, ¯+1.4↔303.6-ft; 6-in stainless steel, +3.0↔¯0.5-ft
ELEV TOP CASING :	719.23-ft, [28Oct88-200E]
ELEV GROUND SURFACE :	716.24-ft, Brass cap [28Oct88-200E]
PERFORATED INTERVAL :	Not applicable
SCREENED INTERVAL :	303.6↔323.6-ft, 4-in #10-slot stainless steel; 303.6↔323.8-ft, 8-in telescoping, #20-slot
COMMENTS :	FIELD INSPECTION, 06Feb90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS :	Geologist, driller
TV SCAN COMMENTS :	Not applicable
DATE EVALUATED :	Not applicable
EVAL RECOMMENDATION :	Not applicable
LISTED USE :	A10/A36 Cribs quarterly water level measurement, 11Oct88↔22Jun93;
CURRENT USER :	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE :	Hydrostar
MAINTENANCE :	

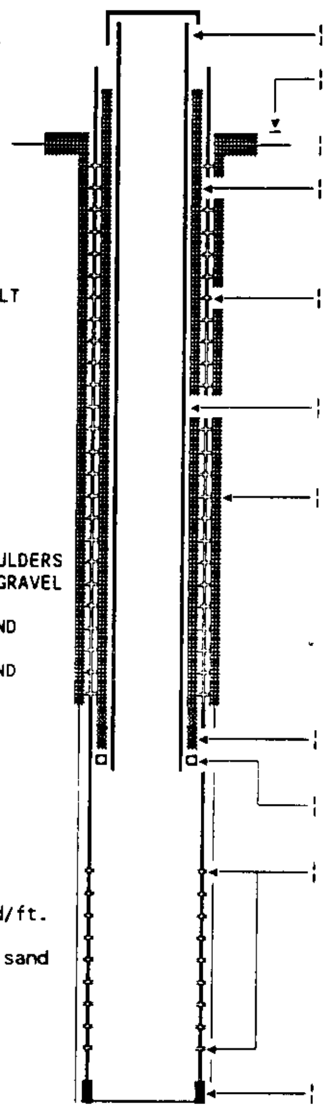
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Hard tool (nom)	WELL NUMBER: 299-E24-2 TEMPORARY WELL NO: 216-A10-4
Drilling Fluid Used: Water	Additives Used: Not documented	Hanford Coordinates: N/S N 39,403.9 E/W W 48,952.6
Driller's Name: P. Rydman	WA State Lic Nr: Not documented	State Coordinates: N 444,580 E 2,246,271
Drilling Company: Not documented	Company Location: Not documented	Start Card #: Not documented T___ R___ S___
Date Started: 30May56	Date Complete: 06Jun56	Elevation Ground surface: 715.4-ft Estimated

Depth to water: 320-ft Jun56
(Ground surface) 313.8-ft 22Jun93

GENERALIZED STRATIGRAPHY   Driller's Log

0-22: SAND and GRAVEL
22-89: Med-cse SAND
66-90: SAND, some GRAVEL
90-114: SAND
114-121: Brown SAND, some SILT
121-132: Med-cse SAND
132-144: Fine brown SAND, some SILT
144-159: Med-cse SAND
159-163: Fine SAND
163-191: Cse SAND
191-207: Med-cse SAND
207-229: Cse SAND
229-233: Med-cse SAND
233-257: Cse SAND
257-262: Cse SAND, some GRAVEL
262-276: Very cse SAND
276-279: Lge GRAVEL, cse SAND
279-289: Brown SAND, some GRAVEL
289-296: SAND and GRAVEL, some BOULDERS
296-307: Med-cse SAND, small amt GRAVEL
307-311: SAND and GRAVEL
311-321: GRAVEL, BOULDERS, and SAND
321-330: GRAVEL, some SAND
330-350: Fine-cse GRAVEL, some SAND



Elevation of reference point: (top of casing) [717.47-ft]
Height of reference point above ground surface [2.1-ft]
Depth of surface seal [0-275-ft]
Type of surface seal: Grout between 6-in liner and 8-in (perforated) casing
8-in carbon steel casing, +ND-350-ft
Perforated during remediation 0-275-ft, 2 cuts/ft/rd
6-in carbon steel liner, +2.1-~278-ft
Hole diameter, 9-in nominal, 0-350-ft
Sand plug, ND-~278-ft
Packer set: @ ~278-ft
8-in casing perforations, 0-275-ft, 2 cuts/rd/ft (see above) 295-348-ft, not documented
Borehole drilled depth: [350-ft]

REMEDIATION:
Jan82, by D. Garcia
Perforated 0-275-ft, 2 cuts/rd/ft.
Set 280-ft of 6-in casing on packer. Placed 10-gals of sand and 418-gals grout.

Drawing By: RKL/2E24-02.ASB
Date : 03Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E24-2

WELL DESIGNATION :	299-E24-2
RCRA FACILITY :	Not applicable
CERCLA UNIT :	200 Aggregate Area Management Study
HANFORD COORDINATES :	N 39,403.91 W 48,952.63 [02Mar88-200E]
LAMBERT COORDINATES :	N 444,580 E 2,246,272 [HANCONV]
DATE DRILLED :	Jun56
DEPTH DRILLED (GS) :	350-ft
MEASURED DEPTH (GS) :	Not documented
DEPTH TO WATER (GS) :	320-ft, Jun56; 313.8-ft, 22Jun93
CASING DIAMETER :	8-in, carbon steel, +ND↔350.0-ft 6-in, carbon steel, +2.1↔~278-ft
ELEV TOP CASING :	717.47-ft, [02Mar88-200E]
ELEV GROUND SURFACE :	715.4-ft, Estimated
PERFORATED INTERVAL :	0↔275 and 295↔348-ft
SCREENED INTERVAL :	Not applicable
COMMENTS :	FIELD INSPECTION, 06Feb90, 6 and 8-in carbon steel casing. 2-ft concrete pad, no posts, capped and locked. ID stamped on brass cap in pad. Not in radiation zone.
AVAILABLE LOGS :	Driller
TV SCAN COMMENTS :	Not applicable
DATE EVALUATED :	Not applicable
EVAL RECOMMENDATION :	Not applicable
LISTED USE :	A10/A36 Cribs quarterly water level measurement, 07Jan86↔22Jun93,
CURRENT USER :	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide monitoring 93
PUMP TYPE :	Electric submersible
MAINTENANCE :	

WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool
Drilling Fluid Used: 200 W Water Supply
Driller's Name: O. Amos
Drilling Company: Kaiser Engineers
Date Started: 05Aug88

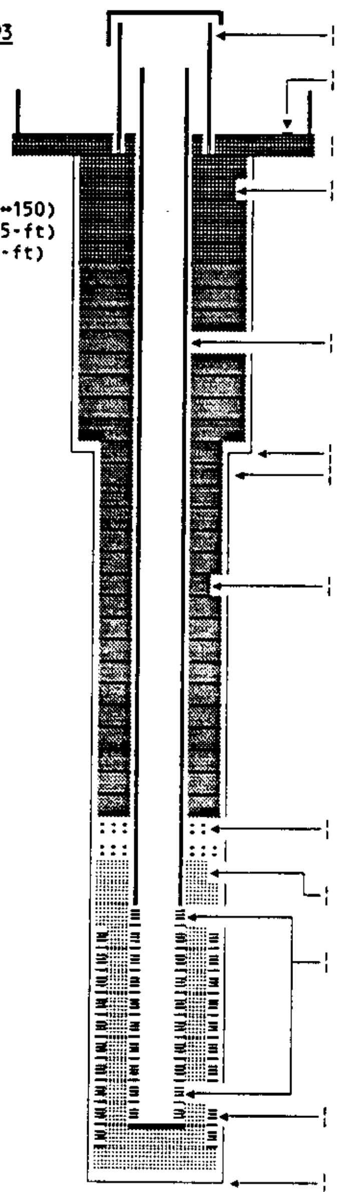
Sample Method: Drive barrel Hard tool
Additives Used: Not documented
WA State Lic Nr: Not documented
Company Location: Hanford
Date Complete: 19Sep88

WELL NUMBER: 299-E24-16
TEMPORARY WELL NO:
Hanford Coordinates: N/S N 39,309.5 E/W W 48,808.6
State Coordinates: N 444,487 E 2,246,415
Start Card #: Not documented T___ R___ S___
Elevation Ground surface: 715.27-ft (Brass cap)

Depth to water: 308.4-ft Oct88
(Ground surface) 313.3-ft 22Jun93

GENERALIZED STRATIGRAPHY
Geologist's Log
Sl=slightly

0→10: Sl gravelly SAND
10→15: Gravelly SAND
15→195: SAND (gravelly 90→95,145→150)
(Rad contamination @56→155-ft)
(Positive organic @65→140-ft)
195→225: Sl gravelly SAND
225→260: SAND
260→270: Sl gravelly SAND
270→280: Gravelly SAND
280→285: Sl silty gravelly SAND
285→290: Sl gravelly sandy SILT with CLAY
290→295: Silty SAND
295→305: Sl gravelly silty SAND
305→310: Silty sandy GRAVEL
310→320: Sandy GRAVEL
320→325: (No sample)
325→329.3: Sandy GRAVEL



Drawing By: RKL/2E24-16.ASB
Date : 03Sep93
Reference :

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E24-16

WELL DESIGNATION	:	299-E24-16
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	216-A-10 Crib
HANFORD COORDINATES	:	N 39,309.5 W 48,808.6 [28Oct88-200E]
LAMBERT COORDINATES	:	N 444,487 E 2,246,415 [HANCONV]
DATE DRILLED	:	Sep88
DEPTH DRILLED (GS)	:	329.3-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	308.4-ft, Oct88; 313.3-ft, 22Jun93
CASING DIAMETER	:	4-in stainless steel, +2.4↔304.4-ft; 6-in stainless steel, +3.00↔-0.5-ft
ELEV TOP CASING	:	718.27-ft, [28Oct88-200E]
ELEV GROUND SURFACE	:	715.27-ft, Brass cap [28Oct88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	304.4↔324.4-ft, 4-in #10-slot stainless steel; 305.9↔326.2-ft, 8-in telescoping, #20-slot
COMMENTS	:	FIELD INSPECTION, 06Feb90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Cribs quarterly water level measurement, 11Oct88↔22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide monitoring 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

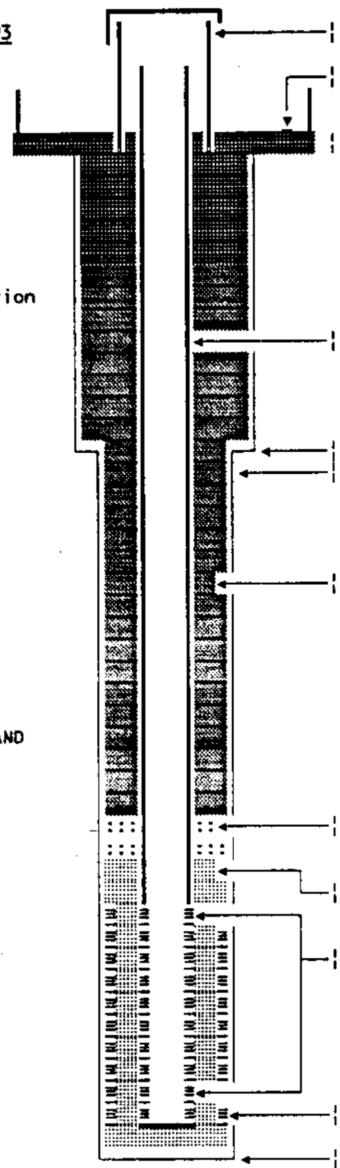
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel Hard tool	WELL NUMBER: 299-E24-17 TEMPORARY WELL NO:
Drilling Fluid Used: 200 W Water Supply	Additives Used: Not documented	Hanford Coordinates: N/S N 39,308.8 E/W W 49,070.4
Driller's Name: L. Watkins	WA State Lic Nr: Not documented	State Coordinates: N 444,485 E 2,246,154
Drilling Company: Kaiser Engineers	Company Location: Hanford	Start Card #: Not documented T___ R___ S___
Date Started: 20Jul88	Date Complete: 19Sep88	Elevation Ground surface: 715.73-ft (Brass cap)

Depth to water: 309.7-ft Aug88
(Ground surface) 314.7-ft 08Mar93

GENERALIZED STRATIGRAPHY
Geologist's Log
Sl=slightly

0-10: SAND
10-15: Sandy GRAVEL
15-20: Silty SAND
20-25: SAND
25-30: Sl gravelly SAND
30-60: SAND
(Low level rad contamination encountered @56-140-ft)
60-65: Sl gravelly SAND
65-90: SAND
90-120: Silty SAND
120-135: Sl silty SAND
135-180: SAND
180-185: Sl gravelly SAND
185-190: Gravelly SAND
190-195: SAND
195-205: Sl gravelly SAND
205-225: SAND
225-235: Gravelly SAND
235-240: Sandy GRAVEL
240-255: Gravelly SAND
255-260: Sandy GRAVEL
260-270: Gravelly SAND
270-275: Sl silty gravelly SAND
275-280: Silty sandy GRAVEL
280-290: Sl silty gravelly SAND
290-295: Sl gravelly sl sitly SAND
295-300: Silty sandy GRAVEL
300-305: Sl silty gravelly SAND
305-310: Silty sandy GRAVEL
315-320: Sandy GRAVEL
320-329.1: Silty sandy GRAVEL



Elevation of reference point: [718.69-ft]
(top of casing)
Height of reference point above ground surface [3.0-ft]

Depth of surface seal [3.1-17.1-ft]
Type of surface seal:
Cement grout to 17.1-ft, has 4-ftx4-ftx6-in concrete pad extending 3.1-ft into annulus

4-i ID stainless steel casing, +0.5-ft-308.8-ft

Hole diameter,
0-71.6-ft, 11-in nominal
71.6-329.1-ft, 9-in nominal

Bentonite crumbles,
17.1-294.9-ft, 8-20-mesh

¼-in bentonite pellets,
294.9-301.9-ft

Silica sand pack,
301.9-329.2-ft, 16-30-mesh

4-in stainless steel screen,
308.8-329.0-ft, #10-slot

8-in stainless steel telescoping screen
308.4-328.9-ft, #20-slot

Borehole drilled depth: [329.2-ft]

Drawing By: RKL/2E24-17.ASB
Date : 03Sep93
Reference :

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E24-17

WELL DESIGNATION	:	299-E24-17
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	216-A-10 Crib
HANFORD COORDINATES	:	N 39,308.8 W 49,070.4 [28Oct88-200E]
LAMBERT COORDINATES	:	N 444,485 E 2,246,154 [HANCONV]
DATE DRILLED	:	Sep88
DEPTH DRILLED (GS)	:	329.2-ft
MEASURED DEPTH (GS)	:	329.3-ft, 11Oct88
DEPTH TO WATER (GS)	:	309.7-ft, Aug88; 314.7-ft, 08Mar93
CASING DIAMETER	:	4-in stainless steel, +0.5↔304.4-ft; 6-in stainless steel, +3.0↔¯0.5-ft
ELEV TOP CASING	:	718.69-ft, [28Oct88-200E]
ELEV GROUND SURFACE	:	715.73-ft, Brass cap [28Oct88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	308.8↔329.0-ft, 4-in #10-slot stainless steel; 308.4↔328.9-ft, 8-in telescoping, #20-slot
COMMENTS	:	FIELD INSPECTION, 06Feb90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Cribs quarterly water level measurement, 11Oct88↔08Mar93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide monitoring 93
PUMP TYPE	:	Hydrostar, intake @ 319-ft (GS)
MAINTENANCE	:	

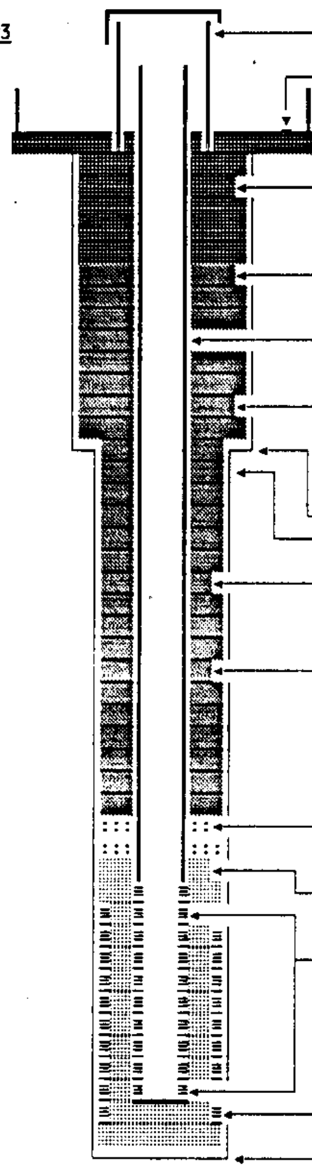
WELL CONSTRUCTION AND COMPLETION SUMMARY

Drilling Method: Cable tool	Sample Method: Drive barrel Hard tool	WELL NUMBER: 299-E24-18 TEMPORARY WELL NO: ____
Drilling Fluid Used: 200 W Water Supply	Additives Used: Not documented	Hanford Coordinates: N/S N 39,330.7 E/W W 50,024.3
Driller's Name: O. Amos	WA State Lic Nr: Not documented	State Coordinates: N 444,504 E 2,245,200
Drilling Company: Kaiser Engineers	Company Location: Hanford	Start Card #: Not documented T___ R___ S___
Date Started: 18Jul88	Date Complete: 19Sep88	Elevation Ground surface: 716.28-ft (Brass cap)

Depth to water: 310.1-ft Aug88
(Ground surface) 315.7-ft 22Jun93

GENERALIZED STRATIGRAPHY   Geologist's Log
Sl=slightly

0↔15: Gravelly SAND
15↔20: Sl gravelly sl silty SAND
20↔25: SAND
25↔30: Sl gravelly SAND
30↔75: SAND
75↔80: Sl gravelly SAND
80↔89: SAND
89↔90: Silty SAND
90↔95: Sl silty SAND
95↔100: Silty SAND
100↔105: SAND
105↔110: Sl silty SAND
110↔120: SAND
120↔125: Sl gravelly SAND
125↔140: SAND
140↔145: Sl gravelly SAND
145↔160: SAND
160↔165: Sl gravelly SAND
165↔175: SAND
175↔180: Sl gravelly SAND
180↔190: SAND
190↔200: Sl gravelly SAND
200↔205: SAND
205↔210: Gravelly SAND
210↔215: Sl gravelly SAND
215↔220: Gravelly SAND
220↔235: Sandy GRAVEL
235↔240: Gravelly SAND
240↔260: SAND
260↔261: Sl gravelly SAND
261↔261.5: SILT and vfSAND
261.5↔265: Sandy GRAVEL/COBBLES
265↔270: (No sample)
270↔285: Gravelly silty SAND
285↔290 Sandy GRAVEL
290↔295: Silty sandy GRAVEL
295↔315: Sandy GRAVEL
315↔320: Silty SAND
320↔330: SAND
330 : Silty sandy GRAVEL



Drawing By: RKL/2E24-18.ASB
Date : 03Sep93
Reference : ____

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E24-18

WELL DESIGNATION	:	299-E24-18
CERCLA UNIT	:	200 Aggregate Area Management Study
RCRA FACILITY	:	216-A-10 Crib
HANFORD COORDINATES	:	N 39,330.7 W 50,024.3 [28Oct88-200E]
LAMBERT COORDINATES	:	N 444,504 E 2,245,200 [HANCONV]
DATE DRILLED	:	Sep88
DEPTH DRILLED (GS)	:	330.0-ft
MEASURED DEPTH (GS)	:	328.0-ft, 14Oct88
DEPTH TO WATER (GS)	:	310.1-ft, 22Aug88 315.7-ft, 22Jun93
CASING DIAMETER	:	4-in stainless steel, +0.5↔306.5-ft; 6-in stainless steel, +3.0↔"0.5-ft
ELEV TOP CASING	:	719.28-ft, [28Oct88-200E]
ELEV GROUND SURFACE	:	716.28-ft, Brass cap [28Oct88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	306.5↔327.5-ft, 4-in #10-slot stainless steel; 308.5↔329.5-ft, 8-in telescoping, #20-slot
COMMENTS	:	FIELD INSPECTION, 06Feb90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone. OTHER:
AVAILABLE LOGS	:	Geologist, driller
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Cribs quarterly water level measurement, 01Jan89↔22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide monitoring 93
PUMP TYPE	:	Hydrostar, intake @ 318.0-ft (GS)
MAINTENANCE	:	

WELL CONSTRUCTION AND COMPLETION SUMMARY

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

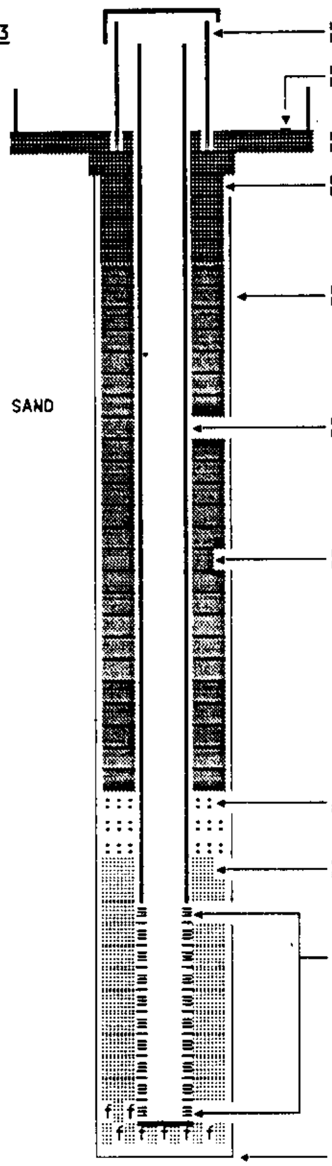
Sample Method: Not documented
Drilling 200E Area
Additives Used: Foam
WA State Lic Nr: 0079
Company Location: Hanford
Date Complete: 05Aug88

WELL NUMBER: 299-E25-36
TEMPORARY WELL NO: ____
Hanford Coordinates: N/S N 39,640.5 E/W W 47,541.0
State Coordinates: N 444,820 E 2,247,682
Start Card #: Not documented T___ R___ S___
Elevation Ground surface: 704.36-ft (Brass cap)

Depth to water: 299.4-ft Aug88
(Ground surface) 302.5-ft 22Jun93

GENERALIZED STRATIGRAPHY
Geologist's Log

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



Elevation of reference point: [707.39-ft]
(top of casing)
Height of reference point above [3.0-ft]
ground surface

Depth of surface seal [3.1–17.8-ft]
Type of surface seal:
Cement grout, 3.1–17.8-ft
4x4-ft x 4-in concrete pad
extends 3.1-ft into annulus

Hole diameter,
3.1–319.0-ft, 9-in nominal

4-in ID T304 stainless steel casing,
+ND–296.7-ft

Bentonite crumbles,
17.8–284.6-ft

Bentonite pellets,
284.6–291.4-ft

Silica sand pack,
291.4–317.0-ft, #20-mesh

4-in stainless steel screen,
296.7–317.6-ft, #20-slot

Borehole drilled depth: [319.0-ft]

Drawing By: RKL/2E25-36.ASB
Date : 08Sep93
Reference : HANFORD WELLS

SUMMARY OF CONSTRUCTION DATA AND FIELD OBSERVATIONS
RESOURCE PROTECTION WELL - 299-E25-36

WELL DESIGNATION	:	299-E25-36
RCRA FACILITY	:	A-10/A-36 Cribs
CERCLA UNIT	:	200 Aggregate Area Management Study
HANFORD COORDINATES	:	N 39,640.5 W 47,541.0 [28Oct88-200E]
LAMBERT COORDINATES	:	N 444,820 E 2,247,682 [HANCONV]
DATE DRILLED	:	Aug88
DEPTH DRILLED (GS)	:	319-ft
MEASURED DEPTH (GS)	:	Not documented
DEPTH TO WATER (GS)	:	299-ft, Sep88; 302.5-ft, 22Jun93
CASING DIAMETER	:	6-in, stainless steel, +3.0↔-0.5-ft; 4-in, stainless steel, +ND↔296.7-ft
ELEV TOP CASING	:	707.39-ft, [28Oct88-200E]
ELEV GROUND SURFACE	:	704.36-ft, Brass cap [28Oct88-200E]
PERFORATED INTERVAL	:	Not applicable
SCREENED INTERVAL	:	296.7↔317.6-ft, 4-in stainless steel, #20-slot
COMMENTS	:	FIELD INSPECTION, 06Feb90; Stainless steel casing. 4-ft by 4-ft concrete pad, 4 posts, 1 removable capped and locked, brass cap in pad with well ID. Not in radiation zone.
AVAILABLE LOGS	:	Geologist
TV SCAN COMMENTS	:	Not applicable
DATE EVALUATED	:	Not applicable
EVAL RECOMMENDATION	:	Not applicable
LISTED USE	:	A10/A36 Cribs quarterly water level measurement, 11Oct88↔22Jun93;
CURRENT USER	:	WHC ES&M w/l monitoring and RCRA sampling, PNL sitewide sampling 93
PUMP TYPE	:	Hydrostar
MAINTENANCE	:	

APPENDIX C

SAMPLING AND ANALYSIS RESULTS - SITE-SPECIFIC PARAMETERS

CONTENTS

GeoDAT Report - 4/11/94

Groundwater Data Report
Site Specific Parameters for 216-A-10

Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
1-Butanol	299-E17-1	11/07/88	H0007TR8	5000.00	U		ppb
		6/19/89	H0007TS3	10000.00	U	3500.00	ppb
		8/15/89	H0007TS8	10000.00	U	3500.00	ppb
		3/08/90	H0007TT2	10000.00	U	3500.00	ppb
		3/03/92	B01HC8	1000.00	U		ppb
		5/18/92	B06MT9		UD		ppb
		10/12/93	B09BD4	13.10	U		ppb
	299-E17-19	11/02/88	H0007VP1	5000.00	U		ppb
		2/15/89	H0007VP5	10000.00	U	3500.00	ppb
		7/14/89	H0007VP9	10000.00	U	3500.00	ppb
		8/14/89	H0007VQ3	10000.00	U	3500.00	ppb
			H0007VQ6	10000.00	U	3500.00	ppb
		1/25/90	H0007VQ7	10000.00	U	3500.00	ppb
		5/15/92	B06MV4		UD		ppb
		10/20/93	B09BD8	13.10	U		ppb
	299-E17-20	11/02/88	H0007WK6	5000.00	U		ppb
		2/15/89	H0007WL0	10000.00	U	3500.00	ppb
		6/16/89	H0007WL4	10000.00	U	3500.00	ppb
			H0007WL7	10000.00	U	3500.00	ppb
		8/15/89	H0007WL8	10000.00	U	3500.00	ppb
		1/25/90	H0007WM2	10000.00	U	3500.00	ppb
		1/20/92	B01PY8	1000.00	U		ppb
		4/20/92	B065G2	1000.00	U		ppb
		10/15/93	B09BH2	13.10	U		ppb
	299-E24-16	11/03/88	H00082Y5	5000.00	U		ppb
		2/14/89	H00082Y9	10000.00	U	3500.00	ppb
			H00082Z2	10000.00	U	3500.00	ppb
		6/19/89	H00082Z3	10000.00	U	3500.00	ppb
		8/14/89	H00082Z7	10000.00	U	3500.00	ppb
		1/22/90	H0008301	10000.00	U	3500.00	ppb
		1/02/92	B01HD8	1000.00	U		ppb
		5/15/92	B06MV9		U		ppb
		10/11/93	B09BF2	13.10	U		ppb
			B09BF3	13.10	U		ppb
	299-E24-17	11/03/88	H0008305	5000.00	U		ppb
		2/13/89	H0008309	10000.00	U	3500.00	ppb
		6/19/89	H0008313	10000.00	U	3500.00	ppb
		8/10/89	H0008317	10000.00	U	3500.00	ppb
		1/23/90	H0008321	10000.00	U	3500.00	ppb
		3/10/92	B01HF3	1000.00	U		ppb
		5/18/92	B06MW4		U		ppb
		10/11/93	B09BG0	13.10	U		ppb
	299-E24-18	11/03/88	H0008330	5000.00	U		ppb

GeoDAT Report - 4/11/94

Groundwater Data Report
Site Specific Parameters for 216-A-10

Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
1-Butanol	299-E24-18	2/14/89	H0008331	10000.00	U	3500.00	ppb
		6/19/89	H0008335	10000.00	U	3500.00	ppb
		8/11/89	H0008339	10000.00	U	3500.00	ppb
		1/22/90	H0008343	10000.00	U	3500.00	ppb
		3/10/92	B01HF8	1000.00	U		ppb
		5/15/92	B06MY5		U		ppb
		10/21/93	B098G4	13.10	U		ppb
	299-E24-2	11/01/88	H00084B3	5000.00	U		ppb
		2/13/89	H00084C0	10000.00	U	3500.00	ppb
		8/14/89	H0008400	10000.00	U	3500.00	ppb
		1/24/90	H0008404	10000.00	U	3500.00	ppb
		3/11/92	B01HG3	1000.00	U		ppb
		5/18/92	B06MW9		U		ppb
		10/20/93	B098C8	13.10	U		ppb
Antimony-125	299-E17-1	8/13/91	B00K78	-3.26	U	7.22	pCi/L
		3/03/92	B01HC8	-12.80	U	16.13	pCi/L
		5/18/92	B06MT9	10.30	U	11.93	pCi/L
		6/04/93	B08LV8	0.00	U	16.52	pCi/L
		10/12/93	B09B04	14.60	U	15.43	pCi/L
	299-E17-19	5/15/92	B06KQ0	-7.79	U	17.95	pCi/L
			B06MV4	7.24	U	15.18	pCi/L
		6/03/93	B08LW3	-13.20	U	16.77	pCi/L
		10/20/93	B09BD8	4.26	U		pCi/L
	299-E17-20	8/14/91	B00K86	-2.58	U	9.75	pCi/L
		1/20/92	B01PY8	-11.60	U	18.10	pCi/L
		4/20/92	B06595	-.17	U	13.20	pCi/L
			B065G2	5.77	U	16.25	pCi/L
		10/26/92	B07H31	-4.71		13.34	pCi/L
		6/03/93	B08LV2	-8.72	U	17.54	pCi/L
		10/15/93	B09BH2	5.25	U	10.52	pCi/L
	299-E24-16	8/20/91	B00K94	-4.70	U	8.13	pCi/L
		1/02/92	B01H08	-1.05	U	17.44	pCi/L
		5/15/92	B06KQ1	-13.20	U	15.36	pCi/L
			B06MV9	1.05	U	9.65	pCi/L
		6/04/93	B08LW8	-6.12	U	18.84	pCi/L
			B08LW9	1.06	U	13.54	pCi/L
		10/11/93	B09BF2	.63	U	14.25	pCi/L
			B09BF3	8.84	U	19.02	pCi/L
	299-E24-17	8/13/91	B00K98	-3.43	U	8.88	pCi/L
		3/10/92	B01HF3	16.30		13.09	pCi/L
		5/18/92	B06MW4	1.67	U	16.77	pCi/L
		6/03/93	B08LX8	-1.85	U	15.67	pCi/L

GeoDAT Report - 4/11/94

Groundwater Data Report
Site Specific Parameters for 216-A-10

Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Antimony-125	299-E24-17	10/11/93	B09BG0	-1.05	U	16.11	pCi/L
	299-E24-18	8/13/91	B00KB2	0.00	U	6.88	pCi/L
		3/10/92	B01HF8	12.60	U	13.31	pCi/L
		5/15/92	B06MY5	-4.66	U	16.13	pCi/L
		6/03/93	B08LY3	-8.17	U	19.10	pCi/L
		10/21/93	B09BG4	-12.90	U		pCi/L
	299-E24-2	3/11/92	B01HG3	-.38	U	17.34	pCi/L
		5/18/92	B06MW9	14.30	U	16.33	pCi/L
		10/20/93	B09BG8	-10.00	U		pCi/L
Beryllium-7	299-E17-1	8/13/91	B00K78	5.35	U	48.64	pCi/L
	299-E17-20	8/14/91	B00K86	53.70		52.72	pCi/L
	299-E24-16	8/20/91	B00K94	6.95	U	41.12	pCi/L
	299-E24-17	8/13/91	B00K98	-17.30	U	61.50	pCi/L
	299-E24-18	8/13/91	B00KB2	-19.60	U	50.12	pCi/L
Cerium/Praseodymium-144	299-E17-1	8/13/91	B00K78	1.95	U	25.26	pCi/L
	299-E17-20	8/14/91	B00K86	-9.42	U	32.92	pCi/L
	299-E24-16	8/20/91	B00K94	10.80	U	25.30	pCi/L
	299-E24-17	8/13/91	B00K98	14.30	U	31.62	pCi/L
	299-E24-18	8/13/91	B00KB2	-10.50	U	25.70	pCi/L
Cesium-134	299-E17-1	8/13/91	B00K78	3.65		2.38	pCi/L
	299-E17-20	8/14/91	B00K86	-.39	U	3.30	pCi/L
	299-E24-16	8/20/91	B00K94	-1.58	U	3.27	pCi/L
	299-E24-17	8/13/91	B00K98	.86	U	2.98	pCi/L
	299-E24-18	8/13/91	B00KB2	-.63	U	2.71	pCi/L
Cesium-137	299-E17-1	8/13/91	B00K78	2.26	U	2.93	pCi/L
		3/03/92	B01HC8	2.79	U	6.45	pCi/L
		5/18/92	B06MT9	-4.65	U	6.32	pCi/L
		6/04/93	B08LV8	-.61	U	5.44	pCi/L
		10/12/93	B09BD4	.47	U	5.80	pCi/L

GeoDAT Report - 4/11/94

Groundwater Data Report
Site Specific Parameters for 216-A-10

Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Cesium-137	299-E17-19	5/15/92	B06KQ0	-6.13	U	7.88	pCi/L
			B06MV4	-1.94	U	5.89	pCi/L
		6/03/93	B08LW3	-1.39	U	6.80	pCi/L
		10/20/93	B09BD8	1.01	U		pCi/L
	299-E17-20	8/14/91	B00K86	.14	U	3.18	pCi/L
		1/20/92	B01PY8	1.55	U	7.21	pCi/L
		4/20/92	B06595	-.61	U	7.70	pCi/L
			B065G2	-2.01	U	6.92	pCi/L
		10/26/92	B07H31	-.95		6.40	pCi/L
		6/03/93	B08LV2	2.56	U	7.06	pCi/L
		10/15/93	B09BH2	-.17	U	4.92	pCi/L
	299-E24-16	8/20/91	B00K94	.89	U	3.23	pCi/L
		1/02/92	B01HD8	-1.21	U	4.69	pCi/L
		5/15/92	B06KQ1	-5.03	U	6.24	pCi/L
			B06MV9	.52	U	6.16	pCi/L
		6/04/93	B08LW8	.64	U	5.69	pCi/L
			B08LW9	2.00	U	5.91	pCi/L
		10/11/93	B09BF2	2.40	U	5.64	pCi/L
			B09BF3	5.03	U	6.49	pCi/L
	299-E24-17	8/13/91	B00K98	-.18	U	2.95	pCi/L
		3/10/92	B01HF3	-5.35	U	6.30	pCi/L
		5/18/92	B06MW4	-1.28	U	6.43	pCi/L
		6/03/93	B08LX8	-2.19	U	7.61	pCi/L
		10/11/93	B09BG0	1.91	U	5.34	pCi/L
	299-E24-18	8/13/91	B00KB2	.22	U	2.82	pCi/L
		3/10/92	B01HF8	5.82	U	5.26	pCi/L
		5/15/92	B06MY5	-.78	U	6.35	pCi/L
		6/03/93	B08LY3	6.77	U	7.12	pCi/L
		10/21/93	B09BG4	3.31	U		pCi/L
	299-E24-2	3/11/92	B01HG3	-1.38	U	6.07	pCi/L
		5/18/92	B06MW9	-.73	U	6.53	pCi/L
		10/20/93	B09BG8	2.69	U		pCi/L
Cobalt-60	299-E17-1	8/13/91	B00K78	-.82	U	2.15	pCi/L
		3/03/92	B01HC8	2.98	U	5.43	pCi/L
		5/18/92	B06MT9	1.16	U	8.00	pCi/L
		6/04/93	B08LV8	7.53		7.01	pCi/L
		10/12/93	B09BD4	2.96	U	5.40	pCi/L
	299-E17-19	5/15/92	B06KQ0	1.86	U	6.44	pCi/L
			B06MV4	.39	U	7.82	pCi/L
		6/03/93	B08LW3	-.59	U	6.73	pCi/L
		10/20/93	B09BD8	2.84	U		pCi/L

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Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Cobalt-60	299-E17-20	8/14/91	B00K86	.24	U	4.76	pCi/L
		1/20/92	B01PY8	5.10	U	6.03	pCi/L
		4/20/92	B06595	.58	U	8.48	pCi/L
			B065G2	-.47	U	3.95	pCi/L
		10/26/92	B07H31	7.14		6.99	pCi/L
		6/03/93	B08LV2	-7.91	U	9.61	pCi/L
		10/15/93	B09BH2	2.19	U	5.40	pCi/L
	299-E24-16	8/20/91	B00K94	1.70	U	3.49	pCi/L
		1/02/92	B01HD8	3.65	U	6.03	pCi/L
		5/15/92	B06KQ1	-.44	U	7.95	pCi/L
			B06MV9	7.16		7.01	pCi/L
		6/04/93	B08LW8	1.86	U	8.73	pCi/L
			B08LW9	2.78	U	5.79	pCi/L
		10/11/93	B09BF2	5.28	U	6.04	pCi/L
			B09BF3	2.78	U	6.68	pCi/L
	299-E24-17	8/13/91	B00K98	.71	U	2.41	pCi/L
		3/10/92	B01HF3	6.92		6.53	pCi/L
		5/18/92	B06MW4	-5.12	U	8.24	pCi/L
		6/03/93	B08LX8	-.47	U	7.08	pCi/L
		10/11/93	B09BG0	-5.68	U	7.13	pCi/L
	299-E24-18	8/13/91	B00KB2	.52	U	2.65	pCi/L
		3/10/92	B01HF8	2.09	U	6.89	pCi/L
		5/15/92	B06MY5	1.17	U	6.23	pCi/L
		6/03/93	B08LY3	5.12	U	6.05	pCi/L
		10/21/93	B09BG4	-3.83	U		pCi/L
	299-E24-2	3/11/92	B01HG3	4.23	U	8.31	pCi/L
		5/18/92	B06MW9	3.26	U	5.44	pCi/L
		10/20/93	B09BG8	.88	U		pCi/L
Dibutyl Phosphate	299-E17-1	11/07/88	H0007TR8	5000.00	U		ppb
		6/19/89	H0007TS3	10000.00	U	3500.00	ppb
		8/15/89	H0007TS8	10000.00	U	3500.00	ppb
		3/08/90	H0007TT2	10000.00	U	3500.00	ppb
	299-E17-19	11/02/88	H0007VP1	5000.00	U		ppb
		2/15/89	H0007VP5	10000.00	U	3500.00	ppb
		7/14/89	H0007VP9	10000.00	U	3500.00	ppb
		8/14/89	H0007VQ3	10000.00	U	3500.00	ppb
			H0007VQ6	10000.00	U	3500.00	ppb
		1/25/90	H0007VQ7	10000.00	U	3500.00	ppb
	299-E17-20	11/02/88	H0007WK6	5000.00	U		ppb
		2/15/89	H0007WL0	10000.00	U	3500.00	ppb

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Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Dibutyl Phosphate	299-E17-20	6/16/89	H0007WL4	10000.00	U	3500.00	ppb
			H0007WL7	10000.00	U	3500.00	ppb
		8/15/89	H0007WL8	10000.00	U	3500.00	ppb
		1/25/90	H0007WM2	10000.00	U	3500.00	ppb
	299-E24-16	11/03/88	H00082Y5	5000.00	U		ppb
		2/14/89	H00082Y9	10000.00	U	3500.00	ppb
			H00082Z2	10000.00	U	3500.00	ppb
		6/19/89	H00082Z3	10000.00	U	3500.00	ppb
		8/14/89	H00082Z7	10000.00	U	3500.00	ppb
		1/22/90	H0008301	10000.00	U	3500.00	ppb
	299-E24-17	11/03/88	H0008305	5000.00	U		ppb
		2/13/89	H0008309	10000.00	U	3500.00	ppb
		6/19/89	H0008313	10000.00	U	3500.00	ppb
		8/10/89	H0008317	10000.00	U	3500.00	ppb
		1/23/90	H0008321	10000.00	U	3500.00	ppb
	299-E24-18	11/03/88	H0008330	5000.00	U		ppb
		2/14/89	H0008331	10000.00	U	3500.00	ppb
		6/19/89	H0008335	10000.00	U	3500.00	ppb
		8/11/89	H0008339	10000.00	U	3500.00	ppb
		1/22/90	H0008343	10000.00	U	3500.00	ppb
	299-E24-2	11/01/88	H0008483	5000.00	U		ppb
		2/13/89	H00084C0	10000.00	U	3500.00	ppb
		8/14/89	H0008400	10000.00	U	3500.00	ppb
		1/24/90	H0008404	10000.00	U	3500.00	ppb
Europium-154	299-E17-1	8/13/91	B00K78	3.59	U	9.87	pCi/L
	299-E17-20	8/14/91	B00K86	-2.53	U	10.75	pCi/L
	299-E24-16	8/20/91	B00K94	-1.59	U	9.80	pCi/L
	299-E24-17	8/13/91	B00K98	9.50		9.01	pCi/L
	299-E24-18	8/13/91	B00K82	1.79	U	6.97	pCi/L
Europium-155	299-E17-1	8/13/91	B00K78	-.37	U	5.91	pCi/L
	299-E17-20	8/14/91	B00K86	.51	U	8.00	pCi/L
	299-E24-16	8/20/91	B00K94	-1.94	U	6.29	pCi/L
	299-E24-17	8/13/91	B00K98	-2.56	U	7.66	pCi/L
	299-E24-18	8/13/91	B00K82	-1.40	U	5.95	pCi/L

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Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Lead-212	299-E24-16	8/20/91	B00K94	9.56		7.72	pCi/L
Monobutyl Phosphate	299-E17-1	11/07/88	H0007TR8	5000.00	U		ppb
		6/19/89	H0007TS3	10000.00	U	3500.00	ppb
		8/15/89	H0007TS8	10000.00	U	3500.00	ppb
		3/08/90	H0007TT2	10000.00	U	3500.00	ppb
	299-E17-19	11/02/88	H0007VP1	5000.00	U		ppb
		2/15/89	H0007VP5	10000.00	U	3500.00	ppb
		7/14/89	H0007VP9	10000.00	U	3500.00	ppb
		8/14/89	H0007VQ3	10000.00	U	3500.00	ppb
			H0007VQ6	10000.00	U	3500.00	ppb
		1/25/90	H0007VQ7	10000.00	U	3500.00	ppb
	299-E17-20	11/02/88	H0007WK6	5000.00	U		ppb
		2/15/89	H0007WL0	10000.00	U	3500.00	ppb
		6/16/89	H0007WL4	10000.00	U	3500.00	ppb
			H0007WL7	10000.00	U	3500.00	ppb
		8/15/89	H0007WL8	10000.00	U	3500.00	ppb
		1/25/90	H0007WM2	10000.00	U	3500.00	ppb
	299-E24-16	11/03/88	H00082Y5	5000.00	U		ppb
		2/14/89	H00082Y9	10000.00	U	3500.00	ppb
			H00082Z2	10000.00	U	3500.00	ppb
		6/19/89	H00082Z3	10000.00	U	3500.00	ppb
		8/14/89	H00082Z7	10000.00	U	3500.00	ppb
		1/22/90	H0008301	10000.00	U	3500.00	ppb
	299-E24-17	11/03/88	H0008305	5000.00	U		ppb
		2/13/89	H0008309	10000.00	U	3500.00	ppb
		6/19/89	H0008313	10000.00	U	3500.00	ppb
		8/10/89	H0008317	10000.00	U	3500.00	ppb
		1/23/90	H0008321	10000.00	U	3500.00	ppb
	299-E24-18	11/03/88	H0008330	5000.00	U		ppb
		2/14/89	H0008331	10000.00	U	3500.00	ppb
		6/19/89	H0008335	10000.00	U	3500.00	ppb
		8/11/89	H0008339	10000.00	U	3500.00	ppb
		1/22/90	H0008343	10000.00	U	3500.00	ppb
	299-E24-2	11/01/88	H0008483	5000.00	U		ppb
		2/13/89	H00084C0	10000.00	U	3500.00	ppb
		8/14/89	H0008400	10000.00	U	3500.00	ppb
		1/24/90	H0008404	10000.00	U	3500.00	ppb
Potassium-40	299-E17-1	8/13/91	B00K78	83.90	R	71.68	pCi/L

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Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Potassium-40	299-E17-20	8/14/91	B00K86	90.80	R	55.48	pCi/L
	299-E24-16	8/20/91	B00K94	165.00	R	61.46	pCi/L
	299-E24-17	8/13/91	B00K98	7.67	UR	54.70	pCi/L
	299-E24-18	8/13/91	B00KB2	130.00	R	65.28	pCi/L
Ruthenium-106	299-E17-1	8/13/91	B00K78	-18.80	U	27.18	pCi/L
		3/03/92	B01HC8	20.00	U	52.38	pCi/L
		5/18/92	B06NT9	-43.10	U	61.26	pCi/L
		6/04/93	B08LV8	16.40	U	45.82	pCi/L
		10/12/93	B09B04	16.20	U	46.58	pCi/L
	299-E17-19	5/15/92	B06KQ0	36.50	U	47.88	pCi/L
			B06MV4	3.93	U	49.04	pCi/L
		6/03/93	B08LW3	-34.10	U	54.76	pCi/L
		10/20/93	B09B08	7.22	U		pCi/L
	299-E17-20	8/14/91	B00K86	5.89	U	36.96	pCi/L
		1/20/92	B01PY8	6.15	U	66.96	pCi/L
		4/20/92	B06595	7.41	U	53.60	pCi/L
			B065G2	-7.09	U	53.06	pCi/L
		10/26/92	B07N31	-18.10		42.64	pCi/L
		6/03/93	B08LV2	-71.00	U	64.72	pCi/L
		10/15/93	B09BH2	-8.02	U	53.84	pCi/L
	299-E24-16	8/20/91	B00K94	-29.40	U	31.86	pCi/L
		1/02/92	B01HD8	-12.40	U	52.96	pCi/L
		5/15/92	B06KQ1	38.50	U	49.82	pCi/L
			B06MV9	-58.70	U	58.28	pCi/L
		6/04/93	B08LW8	68.60	Q	51.14	pCi/L
			B08LW9	-2.97	UQ	59.46	pCi/L
		10/11/93	B09BF2	56.90	Q	40.96	pCi/L
			B09BF3	-13.70	UQ	58.62	pCi/L
	299-E24-17	8/13/91	B00K98	-9.27	U	34.90	pCi/L
		3/10/92	B01HF3	39.00	U	49.30	pCi/L
		5/18/92	B06MW4	-50.10	U	60.16	pCi/L
		6/03/93	B08LX8	-20.20	U	68.74	pCi/L
		10/11/93	B09BG0	7.98	U	47.80	pCi/L
	299-E24-18	8/13/91	B00KB2	2.00	U	25.96	pCi/L
		3/10/92	B01HF8	-38.90	U	53.80	pCi/L
		5/15/92	B06MY5	-16.10	U	55.32	pCi/L
		6/03/93	B08LY3	8.60	U	75.16	pCi/L
		10/21/93	B09BG4	72.20			pCi/L

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Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Ruthenium-106	299-E24-2	3/11/92	B01HG3	-42.80	U	64.64	pCi/L
		5/18/92	B06MW9	27.40	U	46.30	pCi/L
		10/20/93	B098G8	20.60	U		pCi/L
Tetrahydrofuran	299-E17-1	11/07/88	H0007TR8	10.00	U		ppb
		6/19/89	H0007TS3	10.00	U	3.50	ppb
		8/15/89	H0007TS8	10.00	U	3.50	ppb
		3/08/90	H0007TT2	10.00	U	3.50	ppb
		8/13/91	B00K78	10.00	U		ppb
		3/03/92	B01HC8	10.00	U		ppb
		5/18/92	B06MT9		UD		ppb
		10/12/93	B098D4	3.67	U		ppb
	299-E17-19	11/02/88	H0007VP1	10.00	U		ppb
		2/15/89	H0007VP5	10.00	U	3.50	ppb
		7/14/89	H0007VP9	10.00	U	3.50	ppb
		8/14/89	H0007VQ3	10.00	U	3.50	ppb
			H0007VQ6	10.00	U	3.50	ppb
		1/25/90	H0007VQ7	10.00	U	3.50	ppb
		5/15/92	B06MV4		UD		ppb
		10/20/93	B098D8	3.67	U		ppb
	299-E17-20	11/02/88	H0007WK6	10.00	U		ppb
		2/15/89	H0007WL0	10.00	U	3.50	ppb
		6/16/89	H0007WL4	10.00	U	3.50	ppb
			H0007WL7	10.00	U	3.50	ppb
		8/15/89	H0007WL8	10.00	U	3.50	ppb
		1/25/90	H0007WM2	10.00	U	3.50	ppb
		8/14/91	B00K86	10.00	U		ppb
		1/20/92	B01PY8	10.00	U		ppb
		4/20/92	B065G2	10.00	U		ppb
		10/15/93	B098H2	3.67	U		ppb
	299-E24-16	11/03/88	H00082Y5	10.00	U		ppb
		2/14/89	H00082Y9	10.00	U	3.50	ppb
			H00082Z2	10.00	U	3.50	ppb
		6/19/89	H00082Z3	10.00	U	3.50	ppb
		8/14/89	H00082Z7	10.00	U	3.50	ppb
		1/22/90	H0008301	10.00	U	3.50	ppb
		8/20/91	B00K94	10.00	U		ppb
		1/02/92	B01HD8	10.00	U		ppb
		5/15/92	B06MV9		U		ppb
		10/11/93	B098F2	3.67	U		ppb
			B098F3	3.67	U		ppb
	299-E24-17	11/03/88	H0008305	10.00	U		ppb
		2/13/89	H0008309	10.00	U	3.50	ppb
		6/19/89	H0008313	10.00	U	3.50	ppb

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Constituent Name	Well	Sample Date	Sample Number	Result	Quali-fiers	Error	Units
Tetrahydrofuran	299-E24-17	8/10/89	H0008317	10.00	U	3.50	ppb
		1/23/90	H0008321	10.00	U	3.50	ppb
		8/13/91	B00K98	10.00	U		ppb
		3/10/92	B01NF3	10.00	U		ppb
		5/18/92	B06MW4		U		ppb
		10/11/93	B098G0	3.67	U		ppb
	299-E24-18	11/02/88	H0008326	10.00	U		ppb
		2/14/89	H0008331	10.00	U	3.50	ppb
		6/19/89	H0008335	10.00	U	3.50	ppb
		8/11/89	H0008339	10.00	U	3.50	ppb
		1/22/90	H0008343	10.00	U	3.50	ppb
		8/13/91	B00KB2	10.00	U		ppb
		3/10/92	B01NF8	10.00	U		ppb
		5/15/92	B06MY5		U		ppb
		10/21/93	B098G4	3.67	U		ppb
	299-E24-2	11/01/88	H00084B3	10.00	U		ppb
		2/13/89	H00084C0	10.00	U	3.50	ppb
		6/22/89	H00084C5	10.00	U	3.50	ppb
		8/14/89	H0008400	10.00	U	3.50	ppb
		1/24/90	H0008404	10.00	U	3.50	ppb
		3/11/92	B01NG3	10.00	U		ppb
		5/18/92	B06MW9		U		ppb
		10/20/93	B098G8	3.67	U		ppb
Tributyl Phosphate	299-E17-1	10/12/93	B098D4	4.42	U		ppb
	299-E17-19	10/20/93	B098D8	4.42	U		ppb
	299-E17-20	10/15/93	B098H2	4.42	U		ppb
	299-E24-16	10/11/93	B098F2	4.42	U		ppb
			B098F3	4.42	U		ppb
	299-E24-17	10/11/93	B098G0	4.42	U		ppb
	299-E24-18	10/21/93	B098G4	4.42	U		ppb
	299-E24-2	10/20/93	B098G8	4.42	U		ppb
Tritium	299-E17-1	1/21/88	H0007TR7	8050000.00		586000.00	pCi/L
		1/26/89	H0007TS2	5360000.00		391000.00	pCi/L
		6/19/89	H0007TS3	3300000.00		241000.00	pCi/L
			H0007TS7	3410000.00		249000.00	pCi/L
		8/15/89	H0007TS8	3370000.00		245000.00	pCi/L
		3/08/90	H0007TT2	2730000.00		199000.00	pCi/L
		12/18/90	H00070L3	2940000.00		213900.00	pCi/L

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Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Tritium	299-E17-1	8/13/91	B00K78	2870000.00	F	209300.00	pCi/L
		3/03/92	B01HC8	2350000.00		171600.00	pCi/L
		5/18/92	B06MT9	2240000.00	Q	163500.00	pCi/L
		12/22/92	B07SD2	2120000.00		154500.00	pCi/L
		6/04/93	B08LV8	1760000.00		128200.00	pCi/L
		10/12/93	B09BD4	1450000.00		105500.00	pCi/L
	299-E17-19	2/15/89	H0007VP5	261000.00		19100.00	pCi/L
		7/14/89	H0007VP9	2560000.00		186000.00	pCi/L
		8/14/89	H0007VQ3	2620000.00		191000.00	pCi/L
		1/25/90	H0007VQ7	-2.88	U	233.00	pCi/L
		5/15/92	B06MV4	1140000.00	Q	83240.00	pCi/L
		12/21/92	B07SD6	1190000.00		87170.00	pCi/L
		6/03/93	B08LW3	939000.00		68510.00	pCi/L
		10/20/93	B09BD8	983000.00		71710.00	pCi/L
	299-E17-20	2/15/89	H0007WL0	4600000.00		335000.00	pCi/L
		6/16/89	H0007WL4	4590000.00		334000.00	pCi/L
		8/15/89	H0007WL8	4210000.00		307000.00	pCi/L
		1/25/90	H0007WM2	-69.20	U	229.00	pCi/L
		7/24/91	H00071W7	3360000.00		245400.00	pCi/L
		8/14/91	B00K86	3220000.00	F	235400.00	pCi/L
		9/30/91	B00LD3	2950000.00		215200.00	pCi/L
		1/20/92	B01PZ4	2800000.00		203900.00	pCi/L
		4/20/92	B065H3	2490000.00		181400.00	pCi/L
			B065H6	2500000.00		182300.00	pCi/L
		6/26/92	B070Q2	2370000.00		172500.00	pCi/L
		10/26/92	B07JB9	2170000.00		158200.00	pCi/L
		12/15/92	B07SF0	1980000.00		144100.00	pCi/L
		4/08/93	B08D66	1900000.00		138800.00	pCi/L
		6/03/93	B08LZ5	1730000.00		126400.00	pCi/L
		10/15/93	B09BJ4	1690000.00		123100.00	pCi/L
		1/04/94	B09PP9	1370000.00			pCi/L
	299-E24-16	2/14/89	H00082Y9	3050000.00		222000.00	pCi/L
		6/19/89	H00082Z3	2660000.00		194000.00	pCi/L
		8/14/89	H00082Z7	2580000.00		188000.00	pCi/L
		1/22/90	H0008301	2960000.00		215000.00	pCi/L
		8/20/91	B00K94	1570000.00	F	114400.00	pCi/L
		1/02/92	B01HD8	1270000.00	F	93140.00	pCi/L
		5/15/92	B06MV9	1390000.00	Q	101700.00	pCi/L
		12/18/92	B07SF4	1290000.00		94060.00	pCi/L
		6/04/93	B08LW8	1020000.00		74430.00	pCi/L
			B08LW9	1020000.00		74130.00	pCi/L
		10/11/93	B09BF2	1090000.00		79800.00	pCi/L
			B09BF3	1110000.00		81180.00	pCi/L
	299-E24-17	2/13/89	H0008309	2990000.00		218000.00	pCi/L

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Constituent Name	Well	Sample Date	Sample Number	Result	Quali-fiers	Error	Units
Tritium	299-E24-17	6/19/89	H0008313	2490000.00		182000.00	pCi/L
		8/10/89	H0008317	2350000.00		171000.00	pCi/L
		1/23/90	H0008321	2880000.00		210000.00	pCi/L
		8/13/91	B00K98	1550000.00	F	113000.00	pCi/L
		3/10/92	B01HF3	1020000.00		74110.00	pCi/L
		5/18/92	B06MW4	964000.00	Q	70360.00	pCi/L
		12/18/92	B07SG0	1070000.00		78000.00	pCi/L
			B07SG1	1120000.00		81890.00	pCi/L
		6/03/93	B08LX8	818000.00		59680.00	pCi/L
		10/11/93	B09BG0	811000.00		59200.00	pCi/L
	299-E24-18	2/14/89	H0008331	1430000.00		104000.00	pCi/L
		6/19/89	H0008335	1370000.00		99900.00	pCi/L
		8/11/89	H0008339	1430000.00		104000.00	pCi/L
		1/22/90	H0008343	2320000.00		169000.00	pCi/L
		8/13/91	B00KB2	145000.00		10700.00	pCi/L
		3/10/92	B01HF8	161000.00		11850.00	pCi/L
		5/15/92	B06MY5	139000.00	Q	10260.00	pCi/L
		12/21/92	B07SH0	75200.00		5642.00	pCi/L
		6/03/93	B08LY3	58800.00		4420.00	pCi/L
		10/21/93	B09BG4	50300.00			pCi/L
	299-E24-2	1/20/88	H0008498	4630000.00		337000.00	pCi/L
		5/10/88	H0008499	3040000.00		221000.00	pCi/L
		7/26/88	H0008481	2370000.00		173000.00	pCi/L
		10/26/88	H0008482	1990000.00		145000.00	pCi/L
		1/27/89	H0008489	1650000.00		120000.00	pCi/L
		2/13/89	H00084C0	1370000.00		99700.00	pCi/L
		6/22/89	H00084C5	1980000.00		145000.00	pCi/L
			H00084C9	2010000.00		146000.00	pCi/L
		8/14/89	H0008400	2560000.00		186000.00	pCi/L
		1/24/90	H0008404	2100000.00		153000.00	pCi/L
		3/21/91	H0007313	1370000.00		100000.00	pCi/L
		3/11/92	B01HG3	727000.00		53050.00	pCi/L
		5/18/92	B06MW9	795000.00	Q	58050.00	pCi/L
		12/21/92	B07SH4	944000.00		68880.00	pCi/L
		10/20/93	B09BG8	315000.00		23120.00	pCi/L
Uranium	299-E17-1	1/21/88	H0007TR5	2.25		.74	pCi/L
		6/19/89	H0007TS3	2.05		.66	pCi/L
		8/15/89	H0007TS8	2.15		.68	pCi/L
		3/08/90	H0007TT2	4.08		1.28	pCi/L
		12/18/90	H00070L3	2.99		.96	ppb
		8/13/91	B00K78	3.88		1.20	ppb
		3/03/92	B01HC8	3.73		1.15	ppb
		5/18/92	B06MT9	3.61		1.12	ppb
	299-E17-19	2/15/89	H0007VP5	4.55		1.35	pCi/L

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Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Uranium	299-E17-19	7/14/89	H0007VP9	3.40		1.05	pCi/L
		8/14/89	H0007VQ3	3.04		.94	pCi/L
			H0007VQ6	3.90		1.17	pCi/L
		1/25/90	H0007VQ7	2.77		.86	pCi/L
		5/15/92	B06MV4	4.25		1.27	ppb
	299-E17-20	2/15/89	H0007VL0	3.76		1.13	pCi/L
		6/16/89	H0007VL4	3.38		1.03	pCi/L
			H0007VL7	3.65		1.11	pCi/L
		8/15/89	H0007VL8	3.75		1.15	pCi/L
		1/25/90	H0007VM2	2.50		.80	pCi/L
			H0007VM5	2.43		.77	pCi/L
		8/14/91	B00K86	4.58		1.40	ppb
		1/20/92	B01PY8	2.83		.91	ppb
		4/20/92	B065G2	5.26		1.68	ppb
	299-E24-16	2/14/89	H00082Y9	3.44		1.05	pCi/L
			H00082Z2	3.48		1.06	pCi/L
		6/19/89	H00082Z3	3.50		1.07	pCi/L
		8/14/89	H00082Z7	3.00		.93	pCi/L
		1/22/90	H0008301	3.53		1.06	pCi/L
		8/20/91	B00K94	5.91		1.77	ppb
		1/02/92	B01HD8	4.51		1.37	ppb
		5/15/92	B06MV9	5.06		1.53	ppb
	299-E24-17	2/13/89	H0008309	2.96		.91	pCi/L
		6/19/89	H0008313	2.72		.85	pCi/L
		8/10/89	H0008317	2.67		.83	pCi/L
		1/23/90	H0008321	2.02		.64	pCi/L
		8/15/90	H00070Q7	2.91		.94	ppb
		8/13/91	B00K98	5.17		1.56	ppb
		3/10/92	B01HF3	5.50		1.64	ppb
		5/18/92	B06MW4	4.76		1.43	ppb
	299-E24-18	2/14/89	H0008331	3.28		1.00	pCi/L
		6/19/89	H0008335	3.35		1.02	pCi/L
		8/11/89	H0008339	3.37		1.06	pCi/L
		1/22/90	H0008343	20.40		5.60	pCi/L
		8/14/90	H00070P9	4.21		1.31	ppb
		8/13/91	B00K82	9.21		2.67	ppb
		3/10/92	B01HF8	9.55		2.75	ppb
		5/15/92	B06MY5	15.20		4.23	ppb
	299-E24-2	1/20/88	H0008496	5.67		1.74	pCi/L
		7/26/88	H00084B0	2.89		.91	pCi/L
		2/13/89	H00084C0	3.17		.98	pCi/L
		6/22/89	H00084C4	2.43		.77	pCi/L
			H00084C5	2.36		.76	pCi/L

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Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Uranium	299-E24-2	8/14/89	H0008400	3.05		.94	pCi/L
		1/24/90	H0008404	2.94		.89	pCi/L
		4/29/90	H0008408	2.46		.78	pCi/L
		3/11/92	B01HG3	6.58		1.94	ppb
		5/18/92	B06MW9	4.87		1.46	ppb
Zinc-65	299-E17-1	8/13/91	B00K78	4.35	U	7.59	pCi/L
	299-E17-20	8/14/91	B00K86	-2.74	U	8.78	pCi/L
	299-E24-16	8/20/91	B00K94	4.57		3.76	pCi/L
	299-E24-17	8/13/91	B00K98	-7.04	U	10.98	pCi/L
	299-E24-18	8/13/91	B00KB2	-14.30	U	10.01	pCi/L
Zirconium/Niobium-95	299-E17-1	8/13/91	B00K78	5.12	U	12.05	pCi/L
	299-E17-20	8/14/91	B00K86	-.68	U	10.97	pCi/L
	299-E24-16	8/20/91	B00K94	-.70	U	9.33	pCi/L
	299-E24-17	8/13/91	B00K98	-11.40	U	11.95	pCi/L
	299-E24-18	8/13/91	B00KB2	4.29	U	10.80	pCi/L

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Constituent Name	Well	Sample Date	Sample Number	Result	Quali-fiers	Error	Units
Ammonium ion	299-E17-14	6/08/88	H0007V62	110.00			ppb
		9/13/88	H0007V66	50.00	U		ppb
		12/21/88	H0007V70	50.00	U		ppb
		5/15/89	H0007V74	50.00	U	7.03	ppb
		6/26/89	H0007V78	50.00	U	7.03	ppb
			H0007V81	50.00	U	7.03	ppb
		9/27/89	H0007V82	50.00	U	7.03	ppb
		1/23/90	H0007V86	50.00	U	7.03	ppb
		8/28/91	B00KF8	100.00	U		ppb
		5/20/92	B06MN7		U		ppb
		6/02/93	B08LZ9	38.50	U		ppb
		12/08/93	B09MY2	50.00	LQ		ppb
	299-E17-15	5/31/88	H0007V91	50.00	U		ppb
		9/14/88	H0007V95	50.00	U		ppb
		12/21/88	H0007V99	52.00			ppb
		5/17/89	H0007VB3	50.00	U	7.03	ppb
			H0007VB6	50.00	U	7.03	ppb
		7/27/89	H0007VB7	50.00	U	7.03	ppb
		9/21/89	H0007VC1	50.00	U	7.03	ppb
		2/06/90	H0007VC5	50.00	U	7.03	ppb
		9/03/91	B00KG2	100.00	U		ppb
		10/01/91	B00LD2	100.00	U		ppb
		12/19/91	B01FY2	100.00	U		ppb
		4/17/92	B065G8	100.00	U		ppb
		5/20/92	B06MP4		U		ppb
		10/26/92	B07JB7	100.00	U		ppb
		12/15/92	B07SJ2	100.00	U		ppb
		4/09/93	B08D62	100.00	UQ		ppb
			B08D63	100.00	UQ		ppb
		6/02/93	B08LZ3	38.50	U		ppb
		10/11/93	B09BK8	80.00	LQ		ppb
		12/08/93	B09MY6	38.50	UQ		ppb
	299-E17-16	5/25/88	H0007VD0	50.00	U		ppb
		9/14/88	H0007VD4	50.00	U		ppb
		12/21/88	H0007VD8	50.00	U		ppb
			H0007VF1	50.00	U		ppb
		5/15/89	H0007VF2	50.00	U	7.03	ppb
		6/26/89	H0007VF6	50.00	U	7.03	ppb
		9/25/89	H0007VG0	50.00	U	7.03	ppb
		2/06/90	H0007VG4	50.00	U	7.03	ppb
		8/28/91	B00KG6	100.00	U		ppb
		12/19/91	B01FY4	100.00	U		ppb
		5/18/92	B06MQ2		U		ppb
		6/03/93	B08M04	38.50	U		ppb
		12/08/93	B09MZ0	38.50	UQ		ppb

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Constituent Name	Well	Sample Date	Sample Number	Result	Quali-fiers	Error	Units
Ammonium ion	299-E17-17	5/26/88	H0007VG9	50.00	U		ppb
		9/13/88	H0007VH3	50.00	U		ppb
		12/21/88	H0007VH7	67.00			ppb
		5/12/89	H0007VJ1	50.00	U	7.03	ppb
		6/23/89	H0007VJ5	50.00	U	7.03	ppb
		9/21/89	H0007VJ9	50.00	U	7.03	ppb
		1/22/90	H0007VK3	50.00	U	7.03	ppb
			H0007VK6	50.00	U	7.03	ppb
		8/26/91	B00KH0	100.00	U		ppb
		1/02/92	B01FY9	180.00		23.90	ppb
		5/19/92	B06MQ7		U		ppb
		6/03/93	B08M09	100.00		102.00	ppb
		12/08/93	B09MZ4	38.50	UQ		ppb
	299-E17-18	5/25/88	H0007VK8	50.00	U		ppb
		9/13/88	H0007VL2	50.00	U		ppb
		12/21/88	H0007VL6	50.00	U		ppb
		5/19/89	H0007VM0	50.00	U	7.03	ppb
		6/23/89	H0007VM4	50.00	U	7.03	ppb
		9/27/89	H0007VM8	50.00	U	7.03	ppb
			H0007VN1	50.00	U	7.03	ppb
		1/23/90	H0007VN6	50.00	U	7.03	ppb
		8/26/91	B00KH4	100.00	U		ppb
		12/19/91	B01FZ4	100.00	U		ppb
		5/18/92	B06MR2		U		ppb
		6/09/93	B08M14	38.50	U		ppb
		12/13/93	B09MZ8	38.50	UQ		ppb
	299-E17-5	1/19/88	H0007XP7	66.00			ppb
		5/24/88	H0007XQ4	50.00	U		ppb
		9/09/88	H0007XR3	50.00	U		ppb
		12/20/88	H0007XS0	50.00	U		ppb
		5/16/89	H0007XS9	50.00	U	7.03	ppb
		6/22/89	H0007XT3	50.00	U	7.03	ppb
		9/21/89	H0007XT7	50.00	U	7.03	ppb
		1/05/90	H0007XV3	50.00	U	7.03	ppb
		1/19/90	H0007XV4	50.00	U	7.03	ppb
		8/26/91	B00KD6	100.00	U		ppb
		3/02/92	B01FZ9	100.00	U		ppb
			B01G00	100.00	U		ppb
		5/20/92	B06MR7		U		ppb
		6/04/93	B08M19	60.00	L	51.10	ppb
		12/13/93	B09N02	38.50	UQ		ppb
			B09N03	70.00	LQ		ppb
	299-E17-9	1/20/88	H0007ZQ1	50.00	U		ppb
		12/20/88	H0007ZQ9	50.00	U		ppb
		12/28/88	H0007ZR3	50.00	U		ppb

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Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Ammonium ion	299-E17-9	5/16/89	H0007ZR8	50.00	U	7.03	ppb
		6/22/89	H0007ZS2	50.00	U	7.03	ppb
		9/28/89	H0007ZS6	50.00	U	7.03	ppb
		1/05/90	H0007ZT1	50.00	U	7.03	ppb
		1/22/90	H0007ZT2	50.00	U	7.03	ppb
		3/04/92	B01G04	100.00	U		ppb
		9/30/92	B07HD8	100.00	Q	13.30	ppb
		6/03/93	B08M24	38.50	U		ppb
		12/08/93	B09N10	60.00	LQ		ppb
Antimony-125	299-E17-14	8/28/91	B00KF8	7.34	U	8.35	pCi/L
		5/20/92	B06KQ3	-9.71	U	17.59	pCi/L
			B06MN7	2.32	U	13.82	pCi/L
		12/14/92	B07SK0	-2.65		14.76	pCi/L
		6/02/93	B08LZ9	16.50	U	16.59	pCi/L
		12/08/93	B09MY2	-6.87	U		pCi/L
	299-E17-15	9/03/91	B00KG2	0.00	U	7.64	pCi/L
		12/19/91	B01FY2	-17.60	U	17.49	pCi/L
		4/17/92	B06594	-4.17	U	16.44	pCi/L
		5/20/92	B06MP4	15.90		14.31	pCi/L
		12/15/92	B07SJ4	-10.00		14.26	pCi/L
		6/02/93	B08M29	5.21	U	14.26	pCi/L
		12/08/93	B09MY6	6.25	U		pCi/L
	299-E17-16	8/28/91	B00KG6	2.84	U	8.72	pCi/L
		12/19/91	B01FY4	13.30	U	17.84	pCi/L
		5/18/92	B06KQ5	10.10	U	12.46	pCi/L
			B06MQ2	1.27	U	12.98	pCi/L
		12/14/92	B07SK5	4.10		17.32	pCi/L
		6/03/93	B08M04	5.82	U	15.04	pCi/L
		12/08/93	B09MZ0	5.28	U		pCi/L
	299-E17-17	8/26/91	B00KH0	-3.23	U	10.80	pCi/L
		1/02/92	B01FY9	2.23	U	17.46	pCi/L
		5/19/92	B06KQ7	3.82	U	16.44	pCi/L
			B06MQ7	-6.89	U	16.76	pCi/L
		12/15/92	B07SL0	5.20		14.23	pCi/L
		6/03/93	B08M09	-2.04	U	18.35	pCi/L
		12/08/93	B09MZ4	-1.47	U		pCi/L
	299-E17-18	8/26/91	B00KH4	-1.89	U	6.95	pCi/L
		12/19/91	B01FZ4	-4.06	U	15.31	pCi/L
		5/18/92	B06KQ9	1.06	U	13.57	pCi/L
			B06MR2	4.43	U	14.89	pCi/L
		12/14/92	B07SL5	3.46		14.65	pCi/L
		6/09/93	B08M14	5.57	U	15.62	pCi/L
		12/13/93	B09MZ8	-9.16	U		pCi/L

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Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Antimony-125	299-E17-5	8/26/91	B00KD6	7.26		6.82	pCi/L
		3/02/92	B01FZ9	-10.70	U	17.46	pCi/L
			B01G00	-6.93	U	16.99	pCi/L
		5/20/92	B06MR7	-3.96	U	14.51	pCi/L
		12/14/92	B07SM0	5.25		14.11	pCi/L
		6/04/93	B08M19	-1.59	U	13.95	pCi/L
		12/13/93	B09N02	-10.80	U		pCi/L
			B09N03	-5.07	U		pCi/L
	299-E17-9	3/04/92	B01G04	-9.52	U	15.14	pCi/L
		9/30/92	B07H08	-1.05	U	13.09	pCi/L
		12/14/92	B07SM5	-4.71		14.97	pCi/L
		6/03/93	B08M24	15.50		13.49	pCi/L
		12/08/93	B09N10	-.98	U		pCi/L
Benzyl alcohol	299-E17-14	5/15/89	H0007V74	10.00	U	3.50	ppb
		12/08/93	B09MY2	5.16	U		ppb
	299-E17-15	5/17/89	H0007VB3	10.00	U	3.50	ppb
			H0007VB6	10.00	U	3.50	ppb
		12/08/93	B09MY6	5.16	U		ppb
	299-E17-16	5/15/89	H0007VF2	10.00	U	3.50	ppb
		12/08/93	B09MZ0	5.16	U		ppb
	299-E17-17	5/12/89	H0007VJ1	10.00	U	3.50	ppb
		12/08/93	B09MZ4	5.16	U		ppb
	299-E17-18	5/19/89	H0007VM0	10.00	U	3.50	ppb
	299-E17-5	5/16/89	H0007XS9	10.00	U	3.50	ppb
		1/05/90	H0007XV3	10.00	U	3.50	ppb
	299-E17-9	5/16/89	H0007ZR8	10.00	U	3.50	ppb
		1/05/90	H0007ZT1	10.00	U	3.50	ppb
		12/08/93	B09N10	5.16	U		ppb
Beryllium-7	299-E17-14	8/28/91	B00KF8	18.10	U	41.88	pCi/L
	299-E17-15	9/03/91	B00KG2	21.00	U	41.60	pCi/L
	299-E17-16	8/28/91	B00KG6	21.90	U	44.80	pCi/L
	299-E17-17	8/26/91	B00KH0	10.10	U	45.50	pCi/L
	299-E17-18	8/26/91	B00KH4	-15.50	U	45.88	pCi/L

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Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Beryllium-7	299-E17-5	8/26/91	B00KD6	36.10	U	40.06	pCi/L
Cerium/Praseodymium-144	299-E17-14	8/28/91	B00KF8	2.54	U	25.38	pCi/L
	299-E17-15	9/03/91	B00KG2	14.60	U	25.68	pCi/L
	299-E17-16	8/28/91	B00KG6	-9.93	U	32.96	pCi/L
	299-E17-17	8/26/91	B00KH0	.72	U	34.50	pCi/L
	299-E17-18	8/26/91	B00KH4	1.42	U	23.30	pCi/L
	299-E17-5	8/26/91	B00KD6	-6.45	U	25.36	pCi/L
Cesium-134	299-E17-14	8/28/91	B00KF8	-1.07	U	3.57	pCi/L
	299-E17-15	9/03/91	B00KG2	2.26	U	3.14	pCi/L
	299-E17-16	8/28/91	B00KG6	-.77	U	4.07	pCi/L
	299-E17-17	8/26/91	B00KH0	3.54		2.86	pCi/L
	299-E17-18	8/26/91	B00KH4	-.85	U	3.70	pCi/L
	299-E17-5	8/26/91	B00KD6	-.98	U	3.32	pCi/L
Cesium-137	299-E17-14	8/28/91	B00KF8	-1.66	U	3.79	pCi/L
		5/20/92	B06KQ3	-5.10	U	8.30	pCi/L
			B06MN7	3.65	U	7.01	pCi/L
		12/14/92	B07SK0	2.96	U	5.56	pCi/L
		6/02/93	B08LZ9	-2.84	U	6.51	pCi/L
		12/08/93	B09MY2	2.00	U		pCi/L
	299-E17-15	9/03/91	B00KG2	.83	U	3.42	pCi/L
		12/19/91	B01FY2	-3.63	U	6.96	pCi/L
		4/17/92	B06594	3.02	U	6.24	pCi/L
		5/20/92	B06MP4	-3.56	U	5.98	pCi/L
		12/15/92	B07SJ4	.43	U	5.62	pCi/L
		6/02/93	B08M29	2.40	U	5.65	pCi/L
		12/08/93	B09MY6	-4.57	U		pCi/L
	299-E17-16	8/28/91	B00KG6	.82	U	3.77	pCi/L
		12/19/91	B01FY4	4.55	U	8.33	pCi/L
		5/18/92	B06KQ5	4.43	U	5.28	pCi/L
			B06MQ2	.23	U	6.54	pCi/L
		12/14/92	B07SK5	0.00	U	5.72	pCi/L
		6/03/93	B08M04	-2.86	U	7.03	pCi/L
		12/08/93	B09MZ0	-2.35	U		pCi/L

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Cesium-137	299-E17-17	8/26/91	B00KH0	-1.95	U	2.44	pCi/L
		1/02/92	B01FY9	.52	U	7.54	pCi/L
		5/19/92	B06KQ7	-3.02	U	6.71	pCi/L
			B06MQ7	4.94	U	6.13	pCi/L
		12/15/92	B07SL0	-3.02	U	6.61	pCi/L
		6/03/93	B08N09	-5.12	U	7.73	pCi/L
		12/08/93	B09MZ4	-1.21	U		pCi/L
	299-E17-18	8/26/91	B00KH4	.74	U	2.91	pCi/L
		12/19/91	B01FZ4	-2.29	U	6.60	pCi/L
		5/18/92	B06KQ9	.52	U	6.16	pCi/L
			B06MR2	.47	U	5.01	pCi/L
		12/14/92	B07SL5	.47	U	5.80	pCi/L
		6/09/93	B08N14	6.95	U	7.59	pCi/L
		12/13/93	B09MZ8	-3.54	U		pCi/L
	299-E17-5	8/26/91	B00KD6	1.01	U	2.54	pCi/L
		3/02/92	B01FZ9	3.71	U	5.58	pCi/L
			B01G00	-.78	U	6.35	pCi/L
		5/20/92	B06MR7	3.56	U	4.21	pCi/L
		12/14/92	B07SM0	-3.04	U	6.06	pCi/L
		6/04/93	B08N19	2.52	U	6.00	pCi/L
		12/13/93	B09N02	-.27	U		pCi/L
			B09N03	.48	U		pCi/L
	299-E17-9	3/04/92	B01G04	.52	U	6.50	pCi/L
		9/30/92	B07HD8	1.39	U	5.24	pCi/L
		12/14/92	B07SM5	3.48	U	4.80	pCi/L
		6/03/93	B08N24	3.48	U	5.67	pCi/L
		12/08/93	B09N10	3.30	U		pCi/L
Cobalt-60	299-E17-14	8/28/91	B00KF8	8.27		5.09	pCi/L
		5/20/92	B06KQ3	22.90		10.16	pCi/L
			B06MN7	-8.72	U	11.77	pCi/L
		12/14/92	B07SK0	7.94		5.35	pCi/L
		6/02/93	B08LZ9	5.57	U	7.45	pCi/L
		12/08/93	B09MY2	5.29			pCi/L
	299-E17-15	9/03/91	B00KG2	11.60		6.63	pCi/L
		12/19/91	B01FY2	22.00		9.95	pCi/L
		4/17/92	B06594	12.90		10.81	pCi/L
		5/20/92	B06MP4	9.97		9.14	pCi/L
		12/15/92	B07SJ4	15.40		8.82	pCi/L
		6/02/93	B08M29	17.80		7.65	pCi/L
		12/08/93	B09MY6	3.24	U		pCi/L
	299-E17-16	8/28/91	B00KG6	61.10		12.33	pCi/L

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Cobalt-60	299-E17-16	12/19/91	B01FY4	43.10		14.90	pCi/L
		5/18/92	B06KQ5	38.00		19.36	pCi/L
			B06MQ2	41.80		12.94	pCi/L
		12/14/92	B07SK5	92.80		22.98	pCi/L
		6/03/93	B08M04	65.80		19.18	pCi/L
		12/08/93	B09MZ0	24.00			pCi/L
	299-E17-17	8/26/91	B00KH0	.49	U	4.52	pCi/L
		1/02/92	B01FY9	6.25	U	6.28	pCi/L
		5/19/92	B06KQ7	-1.32	U	6.91	pCi/L
			B06MQ7	3.26	U	5.44	pCi/L
		12/15/92	B07SL0	1.03		6.33	pCi/L
		6/03/93	B08M09	-4.19	U	8.43	pCi/L
		12/08/93	B09MZ4	4.49	U		pCi/L
	299-E17-18	8/26/91	B00KH4	1.11	U	4.31	pCi/L
		12/19/91	B01FZ4	0.00	U	8.30	pCi/L
		5/18/92	B06KQ9	3.66	U	6.06	pCi/L
			B06MR2	-1.04	U	6.08	pCi/L
		12/14/92	B07SL5	-2.58		8.09	pCi/L
		6/09/93	B08M14	-.47	U	7.09	pCi/L
		12/13/93	B09MZ8	1.22	U		pCi/L
	299-E17-5	8/26/91	B00KD6	2.81	U	3.03	pCi/L
		3/02/92	B01FZ9	.29	U	5.99	pCi/L
			B01G00	-3.94	U	7.95	pCi/L
		5/20/92	B06MR7	4.53	U	5.87	pCi/L
		12/14/92	B07SM0	4.38		7.65	pCi/L
		6/04/93	B08M19	-2.05	U	9.35	pCi/L
		12/13/93	B09N02	6.47	Q		pCi/L
			B09N03	2.85	UQ		pCi/L
	299-E17-9	3/04/92	B01G04	6.44	U	8.39	pCi/L
		9/30/92	B07N08	3.50	U	3.51	pCi/L
		12/14/92	B07SM5	-1.16		7.17	pCi/L
		6/03/93	B08M24	5.76	U	6.53	pCi/L
		12/08/93	B09N10	-.41	U		pCi/L
Europium-154	299-E17-14	8/28/91	B00KF8	-2.20	U	10.69	pCi/L
	299-E17-15	9/03/91	B00KG2	-4.77	U	7.56	pCi/L
	299-E17-16	8/28/91	B00KG6	-.63	U	12.51	pCi/L
	299-E17-17	8/26/91	B00KH0	.66	U	10.40	pCi/L
	299-E17-18	8/26/91	B00KH4	-3.58	U	7.92	pCi/L

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Europium-154	299-E17-5	8/26/91	B00KD6	-1.76	U	7.80	pCi/L
Europium-155	299-E17-14	8/28/91	B00KF8	1.45	U	5.88	pCi/L
	299-E17-15	9/03/91	B00KG2	3.11	U	5.83	pCi/L
	299-E17-16	8/28/91	B00KG6	-1.24	U	8.43	pCi/L
	299-E17-17	8/26/91	B00KH0	3.47	U	8.36	pCi/L
	299-E17-18	8/26/91	B00KH4	-7.17	U	6.39	pCi/L
	299-E17-5	8/26/91	B00KD6	1.94	U	5.89	pCi/L
Lead-212	299-E17-16	8/28/91	B00KG6	9.76		5.30	pCi/L
Potassium-40	299-E17-14	8/28/91	B00KF8	13.40	UR	64.12	pCi/L
	299-E17-15	9/03/91	B00KG2	186.00	R	65.04	pCi/L
	299-E17-16	8/28/91	B00KG6	37.30	UR	57.56	pCi/L
	299-E17-17	8/26/91	B00KH0	150.00	R	67.88	pCi/L
	299-E17-18	8/26/91	B00KH4	183.00	R	68.92	pCi/L
	299-E17-5	8/26/91	B00KD6	179.00	R	55.82	pCi/L
Ruthenium-106	299-E17-14	8/28/91	B00KF8	-31.40	U	31.84	pCi/L
		5/20/92	B06KQ3	-53.20	U	56.28	pCi/L
			B06MN7	-14.20	U	57.68	pCi/L
		12/14/92	B07SK0	19.80		40.74	pCi/L
		6/02/93	B08L29	-41.10	U	58.18	pCi/L
		12/08/93	B09MY2	-9.44	U		pCi/L
	299-E17-15	9/03/91	B00KG2	9.48	U	29.22	pCi/L
		12/19/91	B01FY2	18.10	U	62.60	pCi/L
		4/17/92	B06594	31.30	U	68.76	pCi/L
		5/20/92	B06MP4	-55.20	U	59.90	pCi/L
		12/15/92	B07SJ4	-51.50		51.52	pCi/L
		6/02/93	B08M29	-1.98	U	59.52	pCi/L
		12/08/93	B09MY6	1.52	U		pCi/L
	299-E17-16	8/28/91	B00KG6	18.10	U	37.82	pCi/L
		12/19/91	B01FY4	-17.10	U	75.60	pCi/L
		5/18/92	B06KQ5	-49.00	U	67.38	pCi/L
			B06MQ2	11.30	U	54.72	pCi/L
		12/14/92	B07SK5	-44.70		69.46	pCi/L

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Ruthenium-106	299-E17-16	6/03/93	B08M04	-3.71	U	55.52	pCi/L
		12/08/93	B09MZ0	6.53	U		pCi/L
	299-E17-17	8/26/91	B00KH0	-26.60	U	46.06	pCi/L
		1/02/92	B01FY9	-41.00	U	64.42	pCi/L
		5/19/92	B06KQ7	14.10	U	44.28	pCi/L
			B06MQ7	24.40	U	68.72	pCi/L
		12/15/92	B07SL0	-21.00		53.08	pCi/L
		6/03/93	B08M09	7.03	U	55.02	pCi/L
		12/08/93	B09MZ4	36.90	U		pCi/L
	299-E17-18	8/26/91	B00KH4	-16.10	U	27.02	pCi/L
		12/19/91	B01FZ4	43.90	U	60.40	pCi/L
		5/18/92	B06KQ9	-8.95	U	50.66	pCi/L
			B06MR2	-55.10	U	59.78	pCi/L
		12/14/92	B07SL5	3.90		48.72	pCi/L
		6/09/93	B08M14	-9.40	U	60.90	pCi/L
		12/13/93	B09MZ8	14.70	U		pCi/L
	299-E17-5	8/26/91	B00KD6	-17.80	U	29.28	pCi/L
		3/02/92	B01FZ9	4.42	U	64.36	pCi/L
			B01G00	8.86	U	65.10	pCi/L
		5/20/92	B06MR7	-47.20	U	60.90	pCi/L
		12/14/92	B07SM0	-78.00		65.86	pCi/L
		6/04/93	B08M19	-54.90	U	59.50	pCi/L
		12/13/93	B09N02	-11.40	U		pCi/L
			B09N03	-2.00	U		pCi/L
	299-E17-9	3/04/92	B01G04	0.00	U	.00	pCi/L
		9/30/92	B07H08	-3.62	U	54.14	pCi/L
		12/14/92	B07SM5	-11.70		46.18	pCi/L
		6/03/93	B08M24	35.00	U	53.86	pCi/L
		12/08/93	B09N10	14.80	U		pCi/L
Tritium	299-E17-14	12/21/88	H0007V70	217000.00		16000.00	pCi/L
		5/15/89	H0007V74	1920000.00		140000.00	pCi/L
		6/26/89	H0007V78	2570000.00		187000.00	pCi/L
			H0007V81	2700000.00		196000.00	pCi/L
		9/27/89	H0007V82	264000.00		19400.00	pCi/L
		1/23/90	H0007V86	2260000.00		165000.00	pCi/L
		8/28/91	B00KF8	2680000.00	F	195700.00	pCi/L
		5/20/92	B06KQ3	2090000.00		152400.00	pCi/L
			B06MN7	2170000.00		158300.00	pCi/L
		12/14/92	B07SK0	1890000.00		137700.00	pCi/L
		6/02/93	B08LZ9	1670000.00		122100.00	pCi/L
		12/08/93	B09MY2	1610000.00			pCi/L
	299-E17-15	12/21/88	H0007V99	247000.00		18200.00	pCi/L

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Tritium	299-E17-15	7/27/89	H0007VB7	236000.00		17300.00	pCi/L
		9/21/89	H0007VC1	1300000.00		94600.00	pCi/L
		2/06/90	H0007VC5	959000.00		70000.00	pCi/L
		9/03/91	B00KG2	1800000.00		131300.00	pCi/L
		10/01/91	B00LD2	291.00	F	218.10	pCi/L
		12/19/91	B01FY2	1890000.00	F	138300.00	pCi/L
		4/17/92	B065G8	1640000.00		119700.00	pCi/L
		5/20/92	B06MP4	1810000.00		131900.00	pCi/L
		10/26/92	B07JB7	1860000.00		135900.00	pCi/L
		12/15/92	B07SJ2	1600000.00		116500.00	pCi/L
		4/09/93	B08D62	1440000.00		105100.00	pCi/L
			B08D63	1430000.00		104200.00	pCi/L
		6/02/93	B08LZ3	1440000.00		105300.00	pCi/L
		10/11/93	B098K8	1350000.00		98690.00	pCi/L
		12/08/93	B09MY6	1370000.00			pCi/L
		1/04/94	B09PP7	1280000.00			pCi/L
	299-E17-16	12/21/88	H0007VD8	35200.00		2770.00	pCi/L
			H0007VF1	36200.00		2850.00	pCi/L
		5/15/89	H0007VF2	54500.00		4090.00	pCi/L
		6/26/89	H0007VF6	42300.00		3230.00	pCi/L
		9/25/89	H0007VG0	27400.00		2160.00	pCi/L
		2/06/90	H0007VG4	29500.00		2320.00	pCi/L
		8/28/91	B00KG6	947000.00		69270.00	pCi/L
		12/19/91	B01FY4	724000.00		52930.00	pCi/L
		5/18/92	B06KQ5	635000.00	Q	46450.00	pCi/L
			B06MQ2	623000.00	Q	45550.00	pCi/L
		12/14/92	B07SK5	655000.00		47850.00	pCi/L
		6/03/93	B08M04	536000.00		39190.00	pCi/L
		12/08/93	B09MZ0	544000.00			pCi/L
	299-E17-17	12/21/88	H0007VH7	630000.00		46100.00	pCi/L
		5/12/89	H0007VJ1	334000.00		24400.00	pCi/L
		6/23/89	H0007VJ5	215000.00		15800.00	pCi/L
		9/21/89	H0007VJ9	201000.00		14800.00	pCi/L
		1/22/90	H0007VK3	700000.00		51100.00	pCi/L
		8/26/91	B00KH0	1100000.00		80150.00	pCi/L
		1/02/92	B01FY9	1100000.00		80310.00	pCi/L
		5/19/92	B06KQ7	1240000.00		90770.00	pCi/L
			B06MQ7	1260000.00		91600.00	pCi/L
		12/15/92	B07SL0	967000.00		70570.00	pCi/L
		6/03/93	B08M09	893000.00		65180.00	pCi/L
		12/08/93	B09MZ4	904000.00			pCi/L
	299-E17-18	12/21/88	H0007VL6	86600.00		6510.00	pCi/L
		5/19/89	H0007VM0	41100.00		3150.00	pCi/L
		6/23/89	H0007VM4	38600.00		2960.00	pCi/L
		9/27/89	H0007VM8	36400.00		2820.00	pCi/L

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Tritium	299-E17-18	9/27/89	H0007VN1	35600.00		2760.00	pCi/L
		1/23/90	H0007VN6	39400.00		3030.00	pCi/L
		8/26/91	B00KH4	476000.00		34890.00	pCi/L
		12/19/91	B01FZ4	705000.00		51610.00	pCi/L
		5/18/92	B06KQ9	517000.00	Q	37840.00	pCi/L
			B06MR2	521000.00	Q	38130.00	pCi/L
		12/14/92	B07SL5	647000.00		47280.00	pCi/L
		6/09/93	B08M14	539000.00		39340.00	pCi/L
	299-E17-5	1/19/88	H0007XP8	4210000.00		306000.00	pCi/L
		2/05/88	H0007XP9	4070000.00		297000.00	pCi/L
		3/07/88	H0007XQ0	3260000.00		238000.00	pCi/L
		4/05/88	H0007XQ1	2020000.00		147000.00	pCi/L
		5/05/88	H0007XQ3	1440000.00		105000.00	pCi/L
		6/07/88	H0007XQ8	1050000.00		76900.00	pCi/L
		7/11/88	H0007XR0	888000.00		64800.00	pCi/L
		8/08/88	H0007XR1	978000.00		71500.00	pCi/L
		9/06/88	H0007XR2	571000.00		41800.00	pCi/L
		10/12/88	H0007XR7	442000.00		32400.00	pCi/L
		11/02/88	H0007XR8	290000.00		21500.00	pCi/L
		12/09/88	H0007XR9	211000.00		15600.00	pCi/L
		12/20/88	H0007XS0	187000.00		13800.00	pCi/L
		1/09/89	H0007XS4	187000.00		13800.00	pCi/L
		2/10/89	H0007XS5	146000.00		10900.00	pCi/L
		3/06/89	H0007XS6	134000.00		10000.00	pCi/L
		5/16/89	H0007XS9	125000.00		9220.00	pCi/L
		6/22/89	H0007XT3	118000.00		8730.00	pCi/L
		9/21/89	H0007XT7	1230000.00		89800.00	pCi/L
		10/03/89	H0007XV2	1260000.00		91900.00	pCi/L
		1/05/90	H0007XV3	1290000.00		94200.00	pCi/L
		1/19/90	H0007XV4	1420000.00		104000.00	pCi/L
		8/26/91	B00XD6	1250000.00	F	91050.00	pCi/L
		3/02/92	B01FZ9	908000.00		66260.00	pCi/L
			B01G00	904000.00		65970.00	pCi/L
		5/20/92	B06MR7	810000.00		59160.00	pCi/L
		12/14/92	B07SM0	788000.00		57520.00	pCi/L
		6/04/93	B08M19	891000.00		65000.00	pCi/L
	299-E17-9	1/20/88	H0007ZQ2	3890000.00		283000.00	pCi/L
		2/05/88	H0007ZQ3	4290000.00		313000.00	pCi/L
		3/07/88	H0007ZQ4	3760000.00		274000.00	pCi/L
		4/05/88	H0007ZQ5	4080000.00		297000.00	pCi/L
		8/08/88	H0007ZQ6				pCi/L
		9/06/88	H0007ZQ7				pCi/L
		12/05/88	H0007ZQ8	4750000.00		346000.00	pCi/L
		12/20/88	H0007ZQ9	4550000.00		331000.00	pCi/L
		1/06/89	H0007ZR4	4650000.00		339000.00	pCi/L
		1/09/89	H0007ZR5	4590000.00		334000.00	pCi/L

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Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Tritium	299-E17-9	2/10/89	H0007ZR6	5200000.00		378000.00	pCi/L
		3/07/89	H0007ZR7	4830000.00		352000.00	pCi/L
		5/16/89	H0007ZR8	3980000.00		290000.00	pCi/L
		6/22/89	H0007ZS2	3950000.00		288000.00	pCi/L
		9/28/89	H0007ZS6	3710000.00		271000.00	pCi/L
		10/03/89	H0007ZT0	3550000.00		259000.00	pCi/L
		1/05/90	H0007ZT1	3180000.00		232000.00	pCi/L
		1/22/90	H0007ZT2	3530000.00		257000.00	pCi/L
		3/04/92	B01G04	3660000.00		266700.00	pCi/L
		9/30/92	B07HD8	4080000.00		297500.00	pCi/L
		12/14/92	B07SM5	3970000.00		289400.00	pCi/L
		6/03/93	B08M24	3540000.00		258000.00	pCi/L
		12/08/93	B09N10	3370000.00			pCi/L
Zinc	299-E17-14	6/08/88	H0007V62	42.00			ppb
		9/13/88	H0007V66	12.00			ppb
		12/21/88	H0007V70	5.00	U		ppb
		5/15/89	H0007V74	6.00		2.69	ppb
		6/26/89	H0007V78	5.00	U	2.55	ppb
			H0007V81	7.00		2.83	ppb
		9/27/89	H0007V82	5.00	U	2.55	ppb
		1/23/90	H0007V86	14.00		3.82	ppb
		8/28/91	B00KF8	10.00	U		ppb
		5/20/92	B06MN7		UD		ppb
		12/14/92	B07SK0	10.00	U		ppb
		6/02/93	B08L29	3.80	LQ	1.19	ppb
		12/08/93	B09MY2	3.44	U		ppb
	299-E17-15	5/31/88	H0007V91	9.00			ppb
		9/14/88	H0007V95	19.00			ppb
		12/21/88	H0007V99	14.00			ppb
		5/17/89	H0007VB3	5.00	U	2.55	ppb
			H0007VB6	5.00	U	2.55	ppb
		7/27/89	H0007VB7	9.00		3.11	ppb
		9/21/89	H0007VC1	18.00		4.41	ppb
		2/06/90	H0007VC5	7.00		2.83	ppb
		9/03/91	B00KG2	10.00	U		ppb
		10/01/91	B00LD2	10.00	U		ppb
		12/19/91	B01FY2	10.00	UQ		ppb
			B01FY3	10.00	UQ		ppb
		4/17/92	B065G8	15.00		1.91	ppb
		5/20/92	B06MP4		UD		ppb
		10/26/92	B07JB7	10.00	U		ppb
		12/15/92	B07SJ2	10.00	U		ppb
		4/09/93	B08D62	10.00	U		ppb
			B08D63	10.00	U		ppb
		6/02/93	B08L23	3.44	UQ		ppb
		10/11/93	B09BK8	6.40	L		ppb

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Site Specific Parameters for 216-A-36B

Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Zinc	299-E17-15	12/08/93	B09MY6	3.44	U		ppb
	299-E17-16	5/25/88	H0007VD0	14.00			ppb
		9/14/88	H0007VD4	25.00			ppb
		12/21/88	H0007VD8	9.00			ppb
			H0007VF1	9.00			ppb
		5/15/89	H0007VF2	13.00		3.68	ppb
		6/26/89	H0007VF6	11.00		3.39	ppb
		9/25/89	H0007VG0	15.00		3.97	ppb
		2/06/90	H0007VG4	7.00		2.83	ppb
		8/28/91	B00KG6	10.00	U		ppb
		12/19/91	B01FY4	10.00	UQ		ppb
			B01FY8	10.00	UQ		ppb
		5/18/92	B06MQ2	30.00	Q	3.83	ppb
		12/14/92	B07SK5	10.00	U		ppb
		6/03/93	B08M04	3.44	UQ		ppb
		12/08/93	B09MZ0	3.20	BL		ppb
	299-E17-17	5/26/88	H0007VG9	9.00			ppb
		9/13/88	H0007VH3	20.00			ppb
		12/21/88	H0007VH7	11.00			ppb
		5/12/89	H0007VJ1	5.00	U	2.55	ppb
		6/23/89	H0007VJ5	5.00	U	2.55	ppb
		9/21/89	H0007VJ9	9.00		3.11	ppb
		1/22/90	H0007VK3	177.00		28.70	ppb
			H0007VK6	137.00		22.60	ppb
		8/26/91	B00KH0	10.00	U		ppb
		1/02/92	B01FY9	10.00	U		ppb
			B01FZ3	10.00	U		ppb
		5/19/92	B06MQ7		UD		ppb
		12/15/92	B07SL0	10.00	U		ppb
		6/03/93	B08M09	3.44	UQ		ppb
		12/08/93	B09MZ4	3.70	BL		ppb
	299-E17-18	5/25/88	H0007VK8	6.00			ppb
		9/13/88	H0007VL2	10.00			ppb
		12/21/88	H0007VL6	5.00			ppb
		5/19/89	H0007VM0	5.00	U	2.55	ppb
		6/23/89	H0007VM4	10.00		3.25	ppb
		9/27/89	H0007VM8	10.00		3.25	ppb
			H0007VN1	5.00		2.55	ppb
		1/23/90	H0007VN6	107.00		18.00	ppb
		8/26/91	B00KH4	10.00	U		ppb
		12/19/91	B01FZ4	10.00	UQ		ppb
			B01FZ8	10.00	UQ		ppb
		5/18/92	B06MR2		UQ		ppb
		12/14/92	B07SL5	10.00	U		ppb
		6/09/93	B08M14	3.44	U		ppb

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Site Specific Parameters for 216-A-36B

Constituent Name	Well	Sample Date	Sample Number		Result	Quali-fiers	Error	Units
Zinc	299-E17-5	1/19/88	H0007XP7		5.00	U		ppb
		5/24/88	H0007XQ4		5.00	U		ppb
		9/09/88	H0007XR3		5.00	U		ppb
		12/20/88	H0007XS0		8.00			ppb
		5/16/89	H0007XS9		8.00		2.97	ppb
		6/22/89	H0007XT3		5.00	U	2.55	ppb
		9/21/89	H0007XT7		12.00		3.53	ppb
		1/05/90	H0007XV3		5.00	U	2.55	ppb
		1/19/90	H0007XV4		5.00		2.55	ppb
		8/26/91	B00KD6		10.00	U		ppb
		3/02/92	B00NJ9		10.00	U		ppb
			B01FZ9		10.00	U		ppb
			B01G00		10.00	U		ppb
			B01G03		10.00	U		ppb
		5/20/92	B06MR7			UD		ppb
		12/14/92	B07SM0		10.00	U		ppb
		6/04/93	B08M19		3.44	U		ppb
	299-E17-9	1/20/88	H0007ZQ1		5.00	U		ppb
		12/20/88	H0007ZQ9		10.00			ppb
		5/16/89	H0007ZR8		7.00		2.83	ppb
		6/22/89	H0007ZS2		19.00		4.56	ppb
		9/28/89	H0007ZS6		9.00		3.11	ppb
		1/05/90	H0007ZT1		5.00	U	2.55	ppb
		1/22/90	H0007ZT2		43.00		8.17	ppb
		3/04/92	B01G04		22.00		2.81	ppb
			B01G08		10.00	U		ppb
		9/30/92	B07H08		10.00		1.27	ppb
		12/14/92	B07SM5		10.00	U		ppb
		6/03/93	B08M24		10.00	Q	3.12	ppb
		12/08/93	B09N10		9.80	BL		ppb
Zinc, filtered	299-E17-14	6/08/88	H0007V62	Y	14.00			ppb
		9/13/88	H0007V66	Y	10.00			ppb
		12/21/88	H0007V70	Y	5.00			ppb
		5/15/89	H0007V74	Y	5.00	U	2.55	ppb
		6/26/89	H0007V78	Y	5.00	U	2.55	ppb
			H0007V81	Y	5.00	U	2.55	ppb
		9/27/89	H0007V82	Y	6.00		2.69	ppb
		1/23/90	H0007V86	Y	10.00		3.25	ppb
		8/28/91	B00KF8F	Y	10.00	U		ppb
		5/20/92	B06MP1	Y		UD		ppb
		12/14/92	B07SK4	Y	10.00	U		ppb
		6/02/93	B08M03	Y	3.44	UQ		ppb
	299-E17-15	5/31/88	H0007V91	Y	6.00			ppb
		9/14/88	H0007V95	Y	11.00			ppb

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Site Specific Parameters for 216-A-36B

Constituent Name	Well	Sample Date	Sample Number		Result	Quali-fiers	Error	Units
Zinc, filtered	299-E17-15	12/21/88	H0007V99	Y	5.00			ppb
		5/17/89	H0007VB3	Y	5.00	U	2.55	ppb
			H0007VB6	Y	5.00	U	2.55	ppb
		7/27/89	H0007VB7	Y	5.00	U	2.55	ppb
		9/21/89	H0007VC1	Y	6.00		2.69	ppb
		2/06/90	H0007VC5	Y	5.00	U	2.55	ppb
		9/03/91	B00KG2F	Y	10.00	U		ppb
		10/01/91	B00LD2F	Y	10.00	U		ppb
		4/17/92	B065H1	Y	10.00	U		ppb
		5/20/92	B06MQ1	Y		UD		ppb
		10/26/92	B07JB8	Y	10.00	U		ppb
		12/15/92	B07SJ3	Y	10.00	U		ppb
		4/09/93	B08D64	Y	10.00	U		ppb
			B08D65	Y	10.00	U		ppb
		6/02/93	B08LZ4	Y	3.44	UQ		ppb
		10/11/93	B09BK9	Y	3.44	U		ppb
	299-E17-16	5/25/88	H0007VD0	Y	5.00	U		ppb
		9/14/88	H0007VD4	Y	19.00			ppb
		12/21/88	H0007VD8	Y	5.00	U		ppb
			H0007VF1	Y	5.00	U		ppb
		5/15/89	H0007VF2	Y	5.00	U	2.55	ppb
		6/26/89	H0007VF6	Y	12.00		3.53	ppb
		9/25/89	H0007VG0	Y	6.00		2.69	ppb
		2/06/90	H0007VG4	Y	5.00	U	2.55	ppb
		8/28/91	B00KG6F	Y	10.00	U		ppb
		5/18/92	B06MQ6	Y		UQ		ppb
		12/14/92	B07SK9	Y	10.00	U		ppb
		6/03/93	B08M08	Y	3.44	UQ		ppb
	299-E17-17	9/13/88	H0007VH3	Y	14.00			ppb
		12/21/88	H0007VH7	Y	9.00			ppb
		5/12/89	H0007VJ1	Y	5.00	U	2.55	ppb
		6/23/89	H0007VJ5	Y	6.00		2.69	ppb
		9/21/89	H0007VJ9	Y	5.00		2.55	ppb
		1/22/90	H0007VK3	Y	5.00	U	2.55	ppb
			H0007VK6	Y	8.00		2.97	ppb
		8/26/91	B00KH0F	Y	10.00	U		ppb
		5/19/92	B06MR1	Y		UD		ppb
		12/15/92	B07SL4	Y	10.00	U		ppb
		6/03/93	B08M13	Y	4.70	LQ	1.47	ppb
	299-E17-18	5/25/88	H0007VK8	Y	5.00	U		ppb
		9/13/88	H0007VL2	Y	8.00			ppb
		12/21/88	H0007VL6	Y	5.00	U		ppb
		5/19/89	H0007VM0	Y	5.00	U	2.55	ppb
		6/23/89	H0007VM4	Y	5.00	U	2.55	ppb
		9/27/89	H0007VM8	Y	5.00	U	2.55	ppb

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Site Specific Parameters for 216-A-36B

Constituent Name	Well	Sample Date	Sample Number		Result	Quali-fiers	Error	Units
Zinc, filtered	299-E17-18	9/27/89	H0007VN1	Y	6.00		2.69	ppb
		1/23/90	H0007VN6	Y	6.00		2.69	ppb
		8/26/91	B00KH4F	Y	10.00	U		ppb
		5/18/92	B06MR6	Y		UQ		ppb
		12/14/92	B07SL9	Y	10.00	U		ppb
		6/09/93	B08M18	Y	3.44	U		ppb
	299-E17-5	1/19/88	H0007XP7	Y	5.00	U		ppb
		5/24/88	H0007XQ4	Y	5.00	U		ppb
		9/09/88	H0007XR3	Y	5.00	U		ppb
		12/20/88	H0007XS0	Y	5.00	U		ppb
		5/16/89	H0007XS9	Y	5.00	U	2.55	ppb
		6/22/89	H0007XT3	Y	5.00	U	2.55	ppb
		9/21/89	H0007XT7	Y	8.00		2.97	ppb
		1/05/90	H0007XV3	Y	5.00	U	2.55	ppb
		1/19/90	H0007XV4	Y	5.00	U	2.55	ppb
		8/26/91	B00KD6F	Y	10.00	U		ppb
		5/20/92	B06MS1	Y	19.00	D	2.42	ppb
		12/14/92	B07SM4	Y	10.00	U		ppb
		6/04/93	B08M23	Y	3.44	U		ppb
	299-E17-9	1/20/88	H0007ZQ1	Y	5.00	U		ppb
		12/20/88	H0007ZQ9	Y	5.00	U		ppb
		12/28/88	H0007ZR3	Y	14.00			ppb
		5/16/89	H0007ZR8	Y	9.00		3.11	ppb
		6/22/89	H0007ZS2	Y	5.00		2.55	ppb
		9/28/89	H0007ZS6	Y	14.00		3.82	ppb
		1/05/90	H0007ZT1	Y	5.00	U	2.55	ppb
		1/22/90	H0007ZT2	Y	6.00		2.69	ppb
		9/30/92	B07HF2	Y	10.00	U		ppb
		12/14/92	B07SM9	Y	10.00	U		ppb
		6/03/93	B08M28	Y	3.44	UQ		ppb
Zinc-65	299-E17-14	8/28/91	B00KF8		-5.30	U	9.24	pCi/L
	299-E17-15	9/03/91	B00KG2		5.95	U	7.82	pCi/L
	299-E17-16	8/28/91	B00KG6		-3.24	U	11.14	pCi/L
	299-E17-17	8/26/91	B00KH0		-1.39	U	8.96	pCi/L
	299-E17-18	8/26/91	B00KH4		-5.06	U	7.92	pCi/L
	299-E17-5	8/26/91	B00KD6		2.24	U	6.17	pCi/L
Zirconium/Niobium-95	299-E17-14	8/28/91	B00KF8		5.87	U	8.64	pCi/L
	299-E17-15	9/03/91	B00KG2		4.11	U	8.47	pCi/L

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Site Specific Parameters for 216-A-36B

Constituent Name	Well	Sample Date	Sample Number	Result	Qualifiers	Error	Units
Zirconium/Niobium-95	299-E17-16	8/28/91	B00KG6	-.90	U	11.81	pCi/L
	299-E17-17	8/26/91	B00KH0	7.40	U	11.70	pCi/L
	299-E17-18	8/26/91	B00KH4	-18.90	U	10.66	pCi/L
	299-E17-5	8/26/91	B00KD6	5.89	U	8.11	pCi/L

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APPENDIX D

MONITORING WELL SELECTION FOR THE 216-A-10 AND 216-A-36B NETWORKS

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APPENDIX D

MONITORING WELL SELECTION FOR THE 216-A-10 AND 216-A-36B NETWORKS

Monitoring Design Approach for RCRA Monitoring

The Monitoring Efficiency Model (MEMO), Version 1.1 (Golder Associates, September 1992) was used to design and evaluate the groundwater monitoring networks for both the 216-A-10 and 216-A-36B cribs. MEMO is an analytical model that can estimate the monitoring efficiency of a given array of monitoring wells for a given set of waste management unit characteristics and groundwater transport parameters. A description of the theory and operation of the MEMO is included in the User's Manual (Golder Associates, September 1992) and is available from WHC and commercial sources.

The MEMO model is useful for determining acceptable monitoring network configurations, assuming that individual groundwater monitoring wells are properly constructed and are completed with the screened portion in the uppermost aquifer. For the purposes of this GWMP, a monitoring network was judged to be acceptable if the monitoring efficiency is at least 90% as estimated with the MEMO model. Monitoring efficiency, as defined in the model, is the ratio of the area from which a release would be detected to the total potential source area.

The approach used at both crib sites was to first determine if additional monitoring wells would potentially be required. This was determined by evaluating the existing network (Figure 1) to determine if it 1) was compliant with RCRA interim-status requirements, i.e., included at least one upgradient well and three downgradient wells and 2) had a monitoring efficiency of at least 90% as estimated with the MEMO model. It was determined that the existing groundwater monitoring network included the requisite upgradient and downgradient monitoring wells and the monitoring efficiency exceeded 90%. Thus, additional wells are not required.

Next, subsets of existing monitoring wells were evaluated with the MEMO model to determine if the network would satisfy the minimum monitoring efficiency requirement of 90%. The wells chosen for MEMO evaluation are shown in Figures 1 and 2.

Modeling Parameters

The approach to selecting input parameters was based on two assumptions: 1) the characteristics of tritium (tritiated water) are assumed representative of contaminants from the cribs and 2) that whenever practical the more conservative assumption (in selecting input parameters) are to be used.

MEMO requires X-Y coordinate input for wells, source areas, buffer zones and hydraulic gradient zone. The coordinates for these features are provided in Table 1 and their locations are illustrated in the figures included in Attachment 1 of this Appendix. These coordinates correspond to a modified version of the Hanford Site coordinates. The east-west coordinates for the Hanford Site required modification because they increase in value toward the west (left) whereas MEMO requires x values that increase toward the right (Figure 1). The MEMO model requires estimating the "buffer zone" distance. The buffer zone was set at 500 ft as recommended for remote sites (Wilson et al. 1992, pg. 967).

Table 2 presents the transport parameter values required by MEMO. The evaluation is not time critical, i.e., the exercise is not to determine when contamination would be detected but if it would be detected, so the advection time was set at 10 years.

The dilution contour interval used in the model is conservative and consisted of taking the contract required quantification limit (CRQL) divided by the drinking water standard (DWS) for tritium (DOE-RL 1993f). The longitudinal and transverse dispersivity values were those used in the MEMO modeling for the nearby 216-A-29 ditch (Kasza and Goodwin 1991). As recommended by the model instructions, the default value of 0.0 was used for the molecular diffusion coefficient for a conservative approach. Width of the source was conservatively set equal to the width of the cribs (50 ft). The first order decay constant was set to 0.0 which is the same value used for MEMO modeling at the nearby 216-A-29 ditch (Kasza and Goodwin 1991).

Average contaminant velocity is assumed to be that of the average groundwater velocity (i.e., the retardation factor is equal to 1.0). This is a conservative assumption and is realistic for tritiated water. The groundwater flow velocity is estimated to be 0.8 ft/d (WHC 1988, pg. 4.7-11). This estimate is consistent with that estimated using Darcy's Law and hydraulic gradient of 0.0002, hydraulic conductivity of 1,000 ft/d and porosity of 0.25 (WHC 1988).

Gradient direction, as a single model input, has a significant effect on the estimated monitoring efficiency. For monitoring networks at both cribs, the sensitivity of monitoring efficiency to gradient direction was estimated for three gradient directions: east, southeast, and south.

Modeling Results

The output from the MEMO model includes 1) a MEMO data file which presents the input parameters, coordinates, and model results (output) in a tabular format, and 2) a simple map plot of the source locations, monitoring well locations, and an indication of source grid locations that resulted in an undetected leak, if one occurred. The MEMO data files and map plots for each of the flow directions considered for each crib are provided in Attachment 1 to this Appendix.

The monitoring wells identified on Figures 1 and 2 are those proposed for the revised groundwater monitoring network. Monitoring efficiency for the 216-A-10 Crib network, as estimated with the MEMO model, was at least 96% (southeast gradient direction) and were 100% for the other two assumed gradient directions, using the network shown on Figure 1. Monitoring efficiency for the 216-A-36B Crib network, as estimated with the MEMO model, was at least 99% (east gradient direction) and were 100% for the other gradient directions, using the network shown on Figure 2.

Table 1 Coordinates For MEMO Models

216-A-10 CRIB

WELL NETWORK COORDINATES

HANFORD WELL ID	MEMO WELL ID	HANFORD N	HANFORD W	MEMO X	MEMO Y
299-E17-1	1	39053	48942	51058	39053
299-E24-2		39404	48953	51047	39404
299-E17-19	2	39147	48810	51190	39147
299-E17-20		39149	49070	50930	39149
299-E24-16	3	39310	48809	51191	39310
299-E24-17		39309	49070	50930	39309
299-E24-18	4	39331	50024	49976	39331
299-E25-36	5	39641	47541	52459	39641

SOURCE AREA COORDINATES

X	Y	HANFORD W
51032	39395	48968
51093	39395	48907
51093	39062	48907
51032	39062	48968

BUFFER ZONE AND GRADIENT ZONE COORDINATES

X	Y	HANFORD W
50532	39895	49500
51593	39895	48500
51593	38562	48500
50532	38562	49500

216-A-36B CRIB

WELL NETWORK COORDINATES

WELL ID	MEMO WELL ID	HANFORD N	HANFORD W	MEMO X	MEMO Y
299-E17-5		38699	48560	51440	38699
299-E17-9		39027	48538	51462	39027
299-E17-14	1	38880	48406	51594	38880
299-E17-15	2	38710	48400	51600	38710
299-E17-16	3	38476	48390	51610	38476
299-E17-17	4	38474	48717	51283	38474
299-E17-18	5	38190	48501	51499	38190
299-E24-18	6	39331	50024	49976	39331
299-E25-36	7	39641	47541	52459	39641

SOURCE AREA COORDINATES

X	Y	HANFORD W
51450	38993	48550
51500	38993	48500
51500	38475	48500
51450	38475	48550

BUFFER ZONE AND GRADIENT ZONE COORDINATES

X	Y	HANFORD W
50950	39950	49000
52000	39493	48000
52000	37975	48000
50950	37975	49000

NOTES:

1 WELL COORDINATES FROM WELL CONSTRUCTION DIAGRAMS, APPENDIX B
2 SOURCE AREA , BUFFER ZONE AND GRADIENT ZONE COORDINATES SCALED FROM FIGURE 8-1 DOE-RL-93-56-2
3 SIZE OF BUFFER ZONE AS RECOMMENDED BY WILSON ET. AL. 1992
4 MEMO WELL IDs CORRESPOND TO THOSE SHOWN IN FIGURE 1 OF THIS APPENDIX

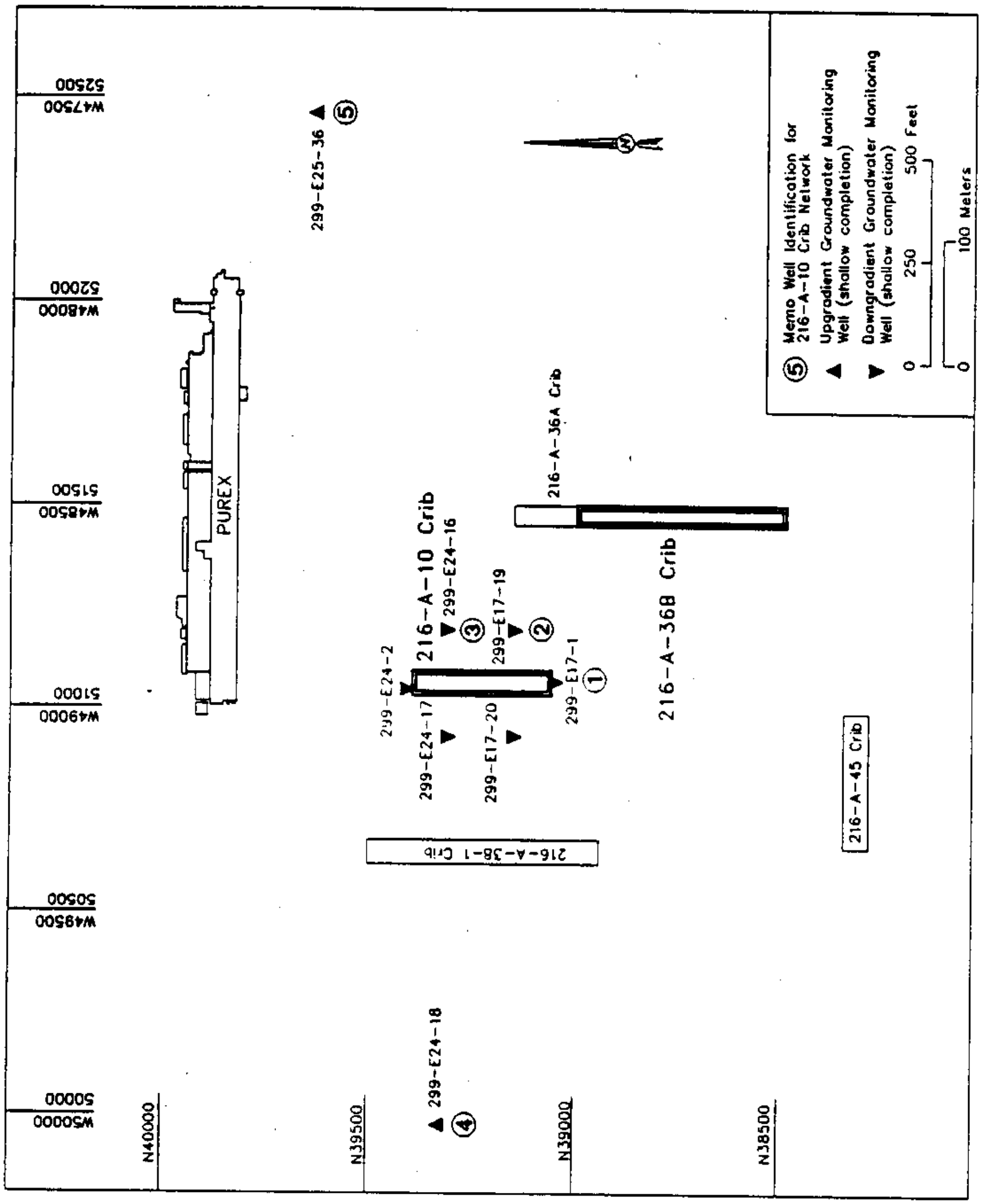
WHC-TO-A94-102\WELDAT.WQ1\23-Apr-94

Table 2. Transport Parameters.

Parameter	Type of units	Value[a]
Advection time	time	3650 days
Hydraulic gradient direction	degrees counterclockwise from x-axis	0^0 - 315^0 - 270^0 ($S45^0E$ +/- 45^0)
Dilution contour levels	unitless	0.025 CRQL/DWS for Tritium[b]
Longitudinal Dispersivity	length	70 ft [c]
Transverse Dispersivity	length	10 ft [c]
Molecular diffusion coefficient	$length^2$/time	0
Width of line source	length	50 ft [d]
First-order decay constant	$length^1$	0
Average contaminant velocity	length/time	0.8 ft/d [e]

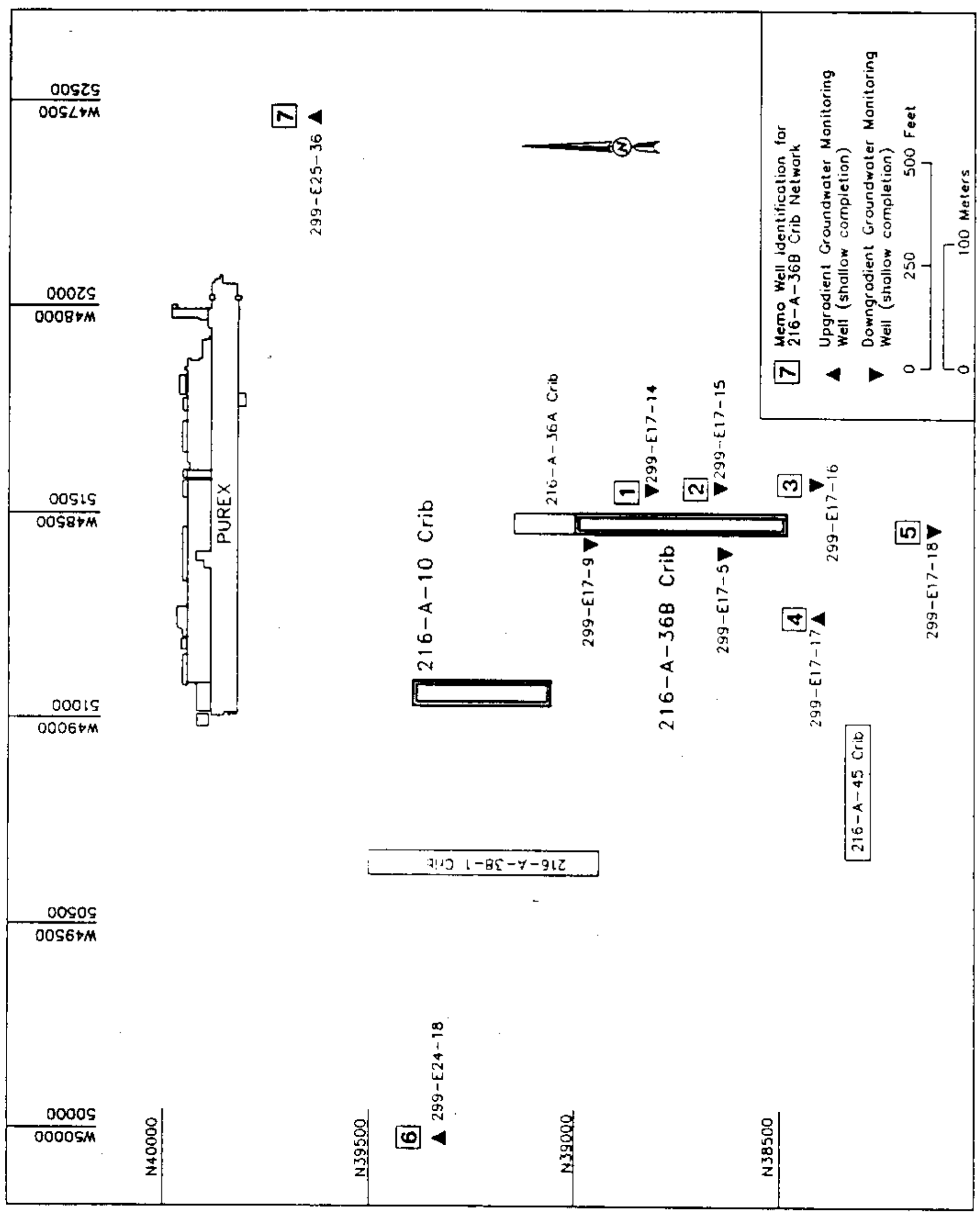
[a] All Units in feet and days unless indicated otherwise
[b] CRQL Contract Required Quantification Limit for tritium = 500 pCi/L
DWS Drinking Water Standard for tritium = 20,000 pCi/L
[c] From DOE-RL 1993e
[d] Based on crib construction details described in WIDs (Appendix A)
[e] From DOE-RL 1994

Figure 1. Monitoring Network and Memo Well Identification for 216-A-10 Crib Network



Modified from: WHC 1993

Figure 2. Monitoring Network and Memo Well Identification for 216-A-36B Crib Network



Modified from: WHC 1993

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ATTACHMENT 1

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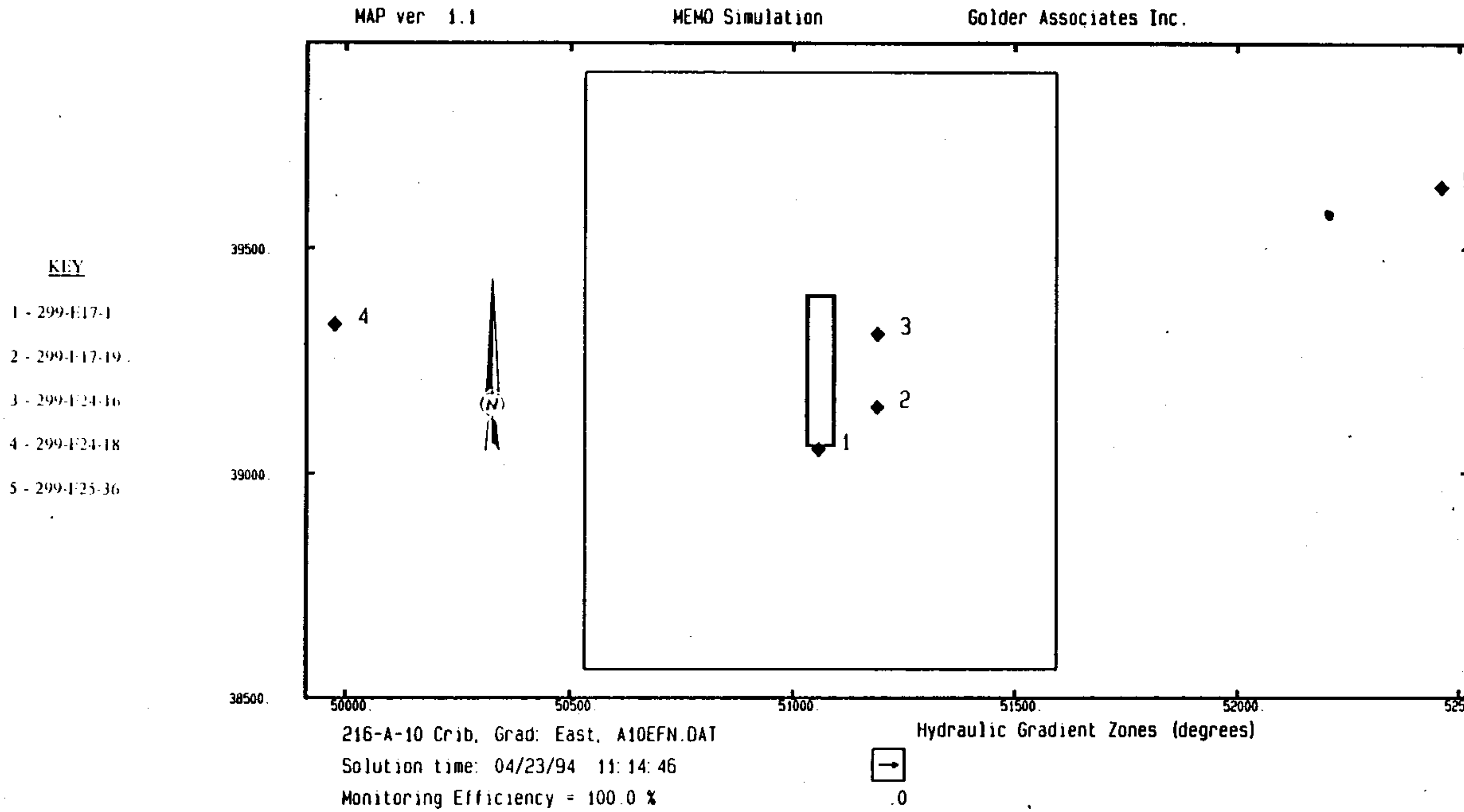
```
+++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                ++
++                                      ++
++     Monitoring Analysis Package      ++
++        MAP Version   1.1             ++
++                                      ++
++       GOLDER ASSOCIATES INC.         ++
++                                      ++
++    Run on 04/23/94 at 14:10:00       ++
+++++++++++++++++++++++++++++++++++++++++


-----------------------------------------
< 216-A-10 Crib, Grad: East, A10EFN.DAT  >
-----------------------------------------


 *   SCALE FACTOR
       1.000000
 *   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
   51032.000000    39062.000000        14.252370
          5          24
 *   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
   1         51032.00        39395.00         1
   2         51093.00        39395.00         1
   3         51093.00        39062.00         1
   4         51032.00        39062.00         1
 *   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     50.000000
 *   INPUT BUFFER ZONE COORDINATES (#,x,y)
   1         50532.00        39895.00
   2         51593.00        39895.00
   3         51593.00        38562.00
   4         50532.00        38562.00
 *   MONITORING WELL COORDINATES (#,x,y)
   1         51058.00        39053.00
   2         51190.00        39147.00
   3         51191.00        39310.00
   4         49976.00        39331.00
   5         52459.00        39641.00
 *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source width,lmb,cvel)
   2.500000E-02       70.000000       10.000000     0.000000E+00
      50.000000    0.000000E+00    8.000000E-01
 *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
   1         50532.00        39895.00         1            .00
   2         51593.00        39895.00         1            .00
   3         51593.00        38562.00         1            .00
   4         50532.00        38562.00         1            .00
 *   SOLUTION RESULTS
 Maximum advection time =      3650.000000
 Accuracy of solution =    1.000000E-04
 Solution basis = buffer zone/advection time
 Total # of source points =          116
 # of undetected leaks =           0
Monitoring efficiency =100.0 %.
 *   END OF MAP FILE
```

216-A-10 CRIB - EAST FLOW



```
++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File              ++
++                                    ++
++     Monitoring Analysis Package    ++
++        MAP Version   1.1           ++
++                                    ++
++       GOLDER ASSOCIATES INC.       ++
++                                    ++
++    Run on 04/23/94 at 10:53:13     ++
++++++++++++++++++++++++++++++++++++++++


----------------------------------------
< 216-A-10 Crib, Grad: SE, A10SEFN.DAT   >
----------------------------------------


 *   SCALE FACTOR
      1.000000
 *   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
   51032.000000    39062.000000       14.252370
         5           24
 *   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
   1        51032.00        39395.00          1
   2        51093.00        39395.00          1
   3        51093.00        39062.00          1
   4        51032.00        39062.00          1
 *   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     50.000000
 *   INPUT BUFFER ZONE COORDINATES (#,x,y)
   1        50532.00        39895.00
   2        51593.00        39895.00
   3        51593.00        38562.00
   4        50532.00        38562.00
 *   MONITORING WELL COORDINATES (#,x,y)
   1        51058.00        39053.00
   2        51190.00        39147.00
   3        51191.00        39310.00
   4        49976.00        39331.00
   5        52459.00        39641.00
 *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source width,lmb,cvel)
  2.500000E-02       70.000000        10.000000     0.000000E+00
    50.000000     0.000000E+00     8.000000E-01
 *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
   1        50532.00        39895.00          1          315.00
   2        51593.00        39895.00          1          315.00
   3        51593.00        38562.00          1          315.00
   4        50532.00        38562.00          1          315.00
 *   SOLUTION RESULTS
 Maximum advection time =      3650.000000
 Accuracy of solution =     1.000000E-04
 Solution basis = buffer zone/advection time
 Total # of source points =         116
 # of undetected leaks =          4
Monitoring efficiency = 96.6 %.
 *   END OF MAP FILE
```

216-A-10 CRIB - SOUTHEAST FLOW

KEY

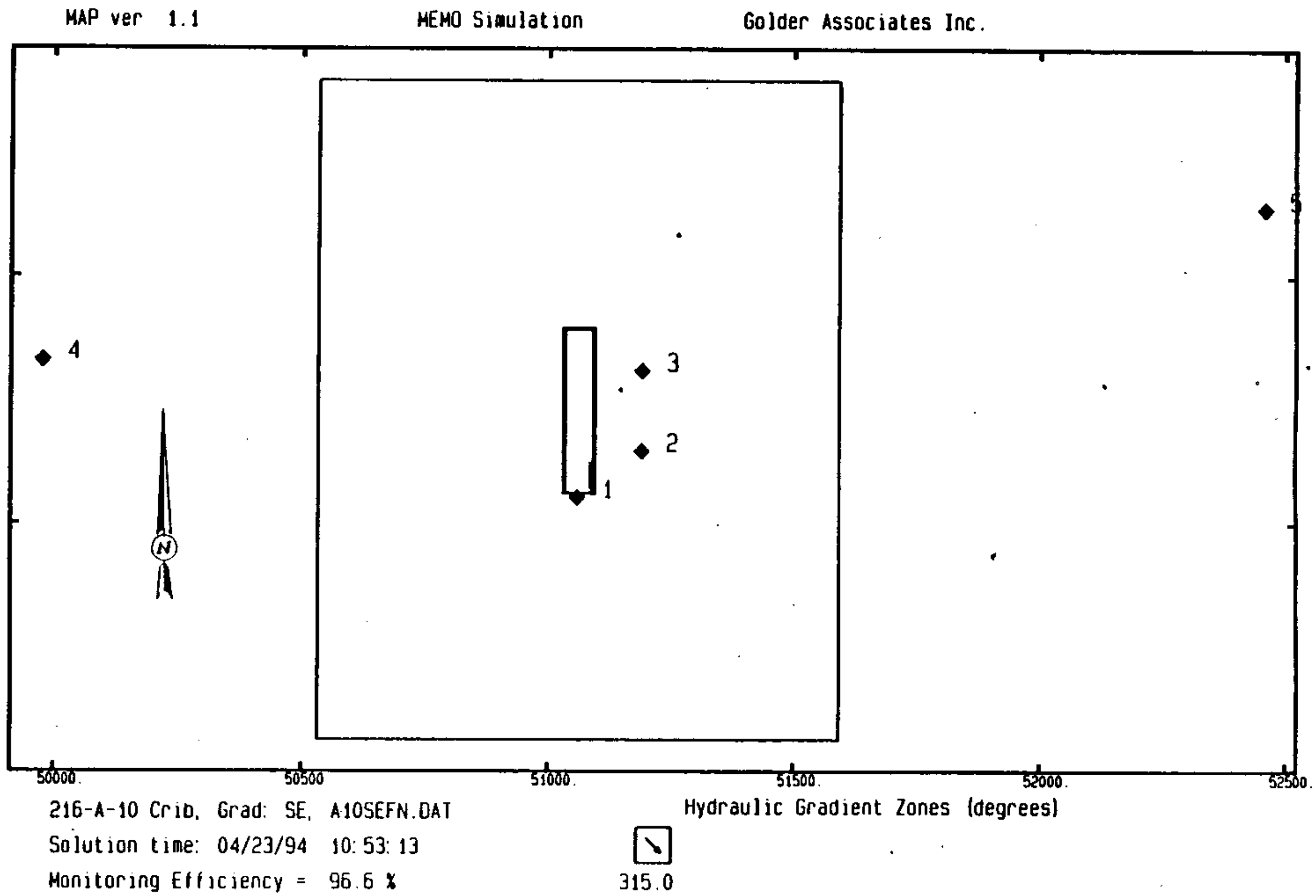
1 - 299-E17-1

2 - 299-E17-19

3 - 299-E24-16

4 - 299-E24-18

5 - 299-E25-36



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+++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File                 ++
++                                       ++
++     Monitoring Analysis Package       ++
++        MAP Version    1.1             ++
++                                       ++
++       GOLDER ASSOCIATES INC.          ++
++                                       ++
++    Run on 04/23/94 at 11:04:28        ++
+++++++++++++++++++++++++++++++++++++++++++


-------------------------------------------
< 216-A-10 Crib, Grad: South, A10SFN.DAT  >
-------------------------------------------


 *   SCALE FACTOR
      1.000000
 *   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
   51032.000000    39062.000000        14.252370
          5           24
 *   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
   1        51032.00       39395.00          1
   2        51093.00       39395.00          1
   3        51093.00       39062.00          1
   4        51032.00       39062.00          1
 *   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     50.000000
 *   INPUT BUFFER ZONE COORDINATES (#,x,y)
   1        50532.00       39895.00
   2        51593.00       39895.00
   3        51593.00       38562.00
   4        50532.00       38562.00
 *   MONITORING WELL COORDINATES (#,x,y)
   1        51058.00       39053.00
   2        51190.00       39147.00
   3        51191.00       39310.00
   4        49976.00       39331.00
   5        52459.00       39641.00
 *   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source width,lmb,cvel)
   2.500000E-02       70.000000       10.000000    0.000000E+00
     50.000000    0.000000E+00    8.000000E-01
 *   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
   1        50532.00       39895.00          1          270.00
   2        51593.00       39895.00          1          270.00
   3        51593.00       38562.00          1          270.00
   4        50532.00       38562.00          1          270.00
 *   SOLUTION RESULTS
 Maximum advection time =      3650.000000
 Accuracy of solution =    1.000000E-04
 Solution basis = buffer zone/advection time
 Total # of source points =          116
 # of undetected leaks =           0
Monitoring efficiency =100.0 %.
 *   END OF MAP FILE
```

216-A-10 CRIB - SOUTH FLOW

KEY

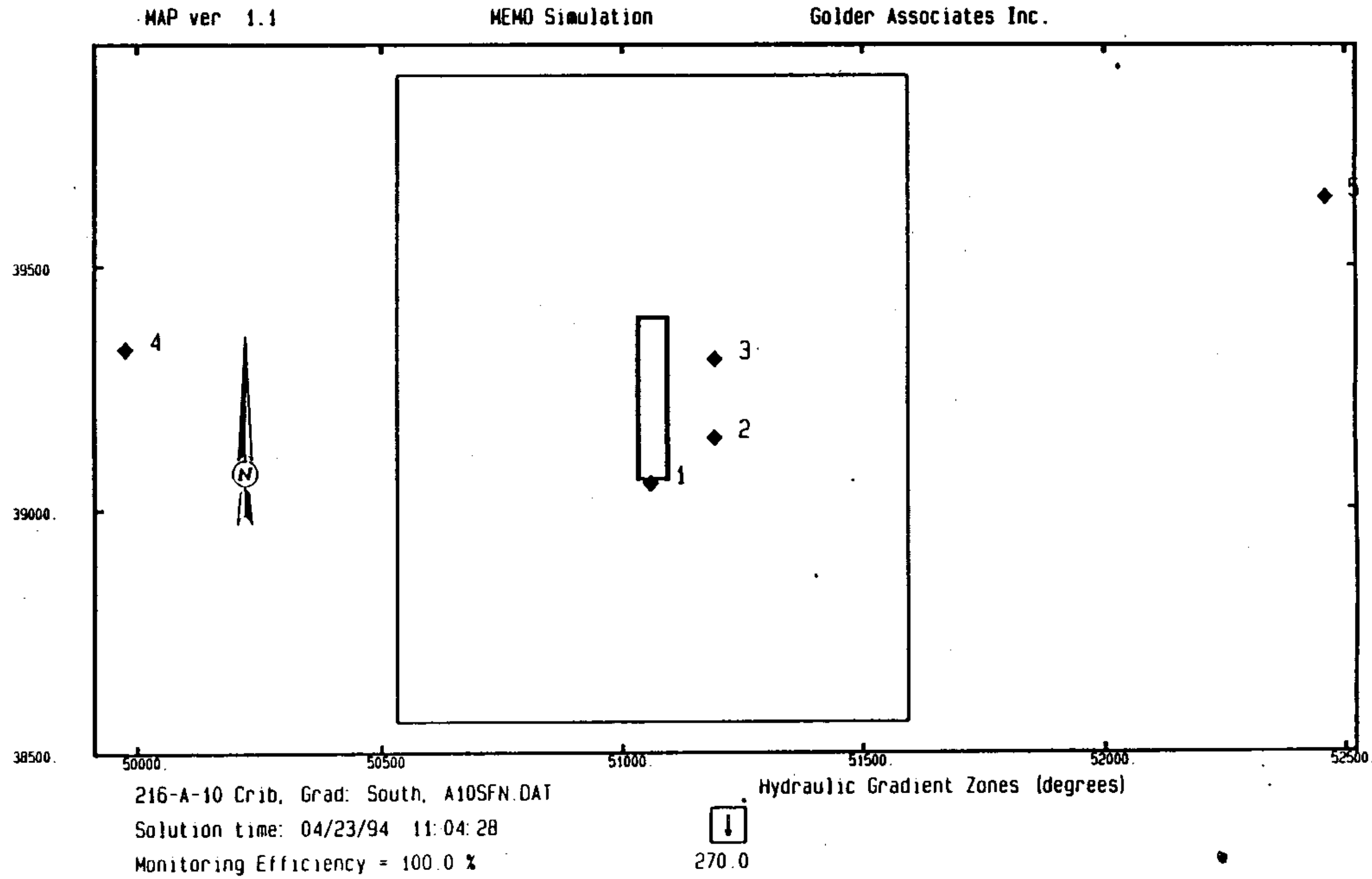
1 - 299-E17-1

2 - 299-E17-19

3 - 299-E24-16

4 - 299-E24-18

5 - 299-E25-36



```
++++++++++++++++++++++++++++++++++++++++++
++        MEMO Data File               ++
++                                      ++
++     Monitoring Analysis Package      ++
++        MAP Version   1.1             ++
++                                      ++
++       GOLDER ASSOCIATES INC.         ++
++                                      ++
++    Run on 04/23/94 at 11:37:10       ++
++++++++++++++++++++++++++++++++++++++++++


-------------------------------------------
< 216-A-36B Crib, Grad: East, A36BEFN.DAT >
-------------------------------------------


*   SCALE FACTOR
    1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  51450.000000    38475.000000       16.093480
       4           33
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1        51450.00       38993.00          1
  2        51500.00       38993.00          1
  3        51500.00       38475.00          1
  4        51450.00       38475.00          1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
    50.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1        50950.00       39493.00
  2        52000.00       39493.00
  3        52000.00       37975.00
  4        50950.00       37975.00
*   MONITORING WELL COORDINATES (#,x,y)
  1        51594.00       38880.00
  2        51600.00       38710.00
  3        51610.00       38476.00
  4        51283.00       38474.00
  5        51499.00       38190.00
  6        49976.00       39331.00
  7        52459.00       39641.00
*   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source width,lmb,cvel)
  2.500000E-02        70.000000       10.000000    0.000000E+00
    50.000000    0.000000E+00    8.000000E-01
*   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
  1        50950.00       39493.00          1             .00
  2        52000.00       39493.00          1             .00
  3        52000.00       37975.00          1             .00
  4        50950.00       37975.00          1             .00
*   SOLUTION RESULTS
 Maximum advection time =     3650.000000
 Accuracy of solution =    1.000000E-04
 Solution basis = buffer zone/advection time
 Total # of source points =          129
 # of undetected leaks =           1
Monitoring efficiency = 99.2 %.
 *   END OF MAP FILE
```

216-A-36B CRIB - EAST FLOW

KEY

1 - 299-E17-14

2 - 299-E17-15

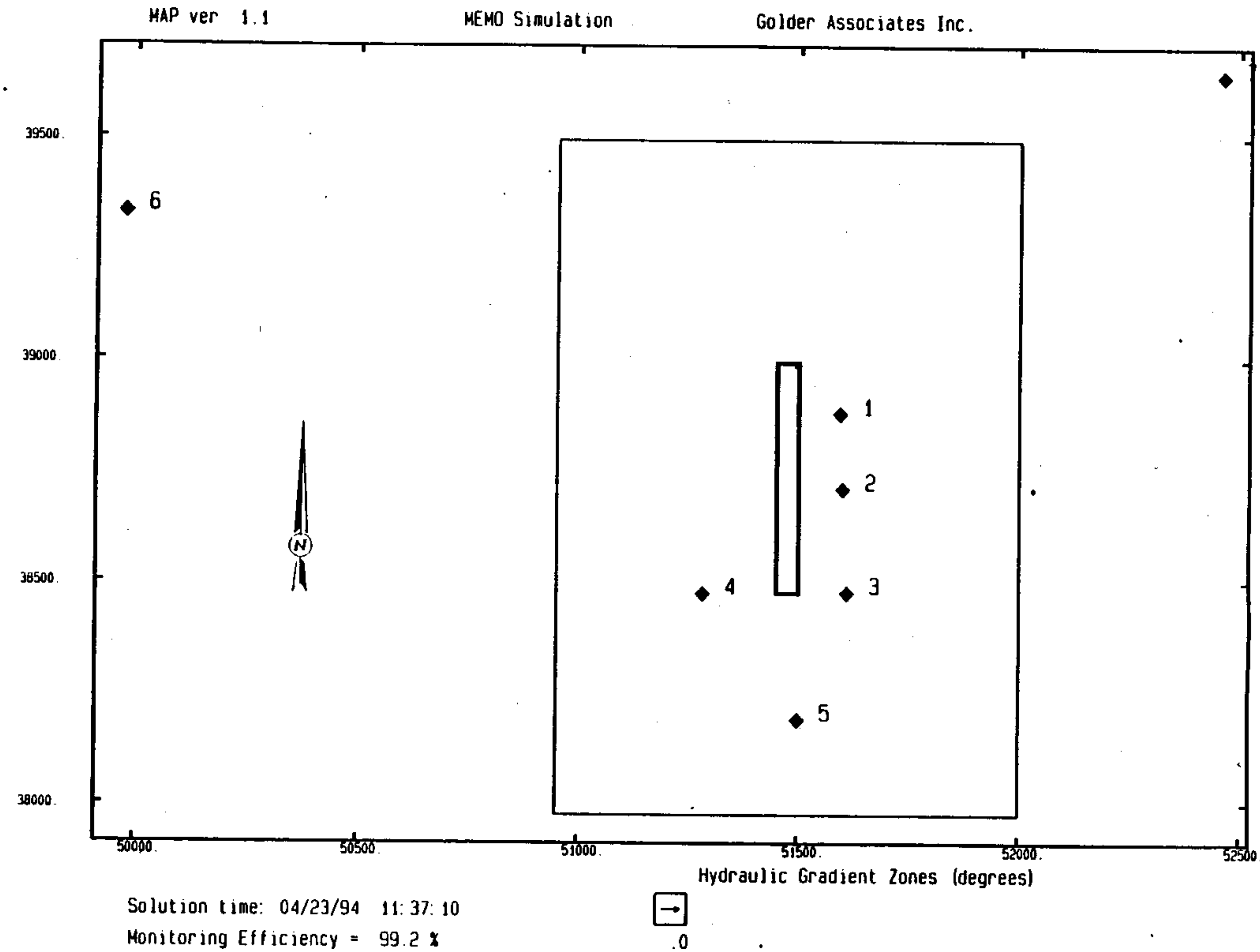
3 - 299-E17-16

4 - 299-E17-17

5 - 299-E17-18

6 - 299-E24-18

7 - 299-E25-36



Solution time: 04/23/94 11:37:10

Monitoring Efficiency = 99.2 %

```
++++++++++++++++++++++++++++++++++++++++++
++       MEMO Data File                 ++
++                                      ++
++     Monitoring Analysis Package      ++
++        MAP Version   1.1             ++
++                                      ++
++       GOLDER ASSOCIATES INC.         ++
++                                      ++
++    Run on 04/23/94 at 11:44:33       ++
++++++++++++++++++++++++++++++++++++++++++


------------------------------------------
< 216-A-36B Crib, Grad: SE, A36BSEFN.DAT  >
------------------------------------------


*   SCALE FACTOR
     1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  51450.000000    38475.000000       16.093480
        4           33
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1        51450.00       38993.00         1
  2        51500.00       38993.00         1
  3        51500.00       38475.00         1
  4        51450.00       38475.00         1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
   50.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1        50950.00       39493.00
  2        52000.00       39493.00
  3        52000.00       37975.00
  4        50950.00       37975.00
*   MONITORING WELL COORDINATES (#,x,y)
  1        51594.00       38880.00
  2        51600.00       38710.00
  3        51610.00       38476.00
  4        51283.00       38474.00
  5        51499.00       38190.00
  6        49976.00       39331.00
  7        52459.00       39641.00
*   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source width,lmb,cvel)
  2.500000E-02      70.000000       10.000000     0.000000E+00
   50.000000    0.000000E+00    8.000000E-01
*   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
  1        50950.00       39493.00         1          315.00
  2        52000.00       39493.00         1          315.00
  3        52000.00       37975.00         1          315.00
  4        50950.00       37975.00         1          315.00
*   SOLUTION RESULTS
 Maximum advection time =     3650.000000
 Accuracy of solution =    1.000000E-04
 Solution basis = buffer zone/advection time
 Total # of source points =        129
 # of undetected leaks =         0
Monitoring efficiency =100.0 %.
*   END OF MAP FILE
```

216-A-36B CRIB - SOUTHEAST FLOW

MAP ver 1.1 MEMO Simulation Golder Associates Inc.

KEY.

1 - 299-E17-14

2 - 299-E17-15

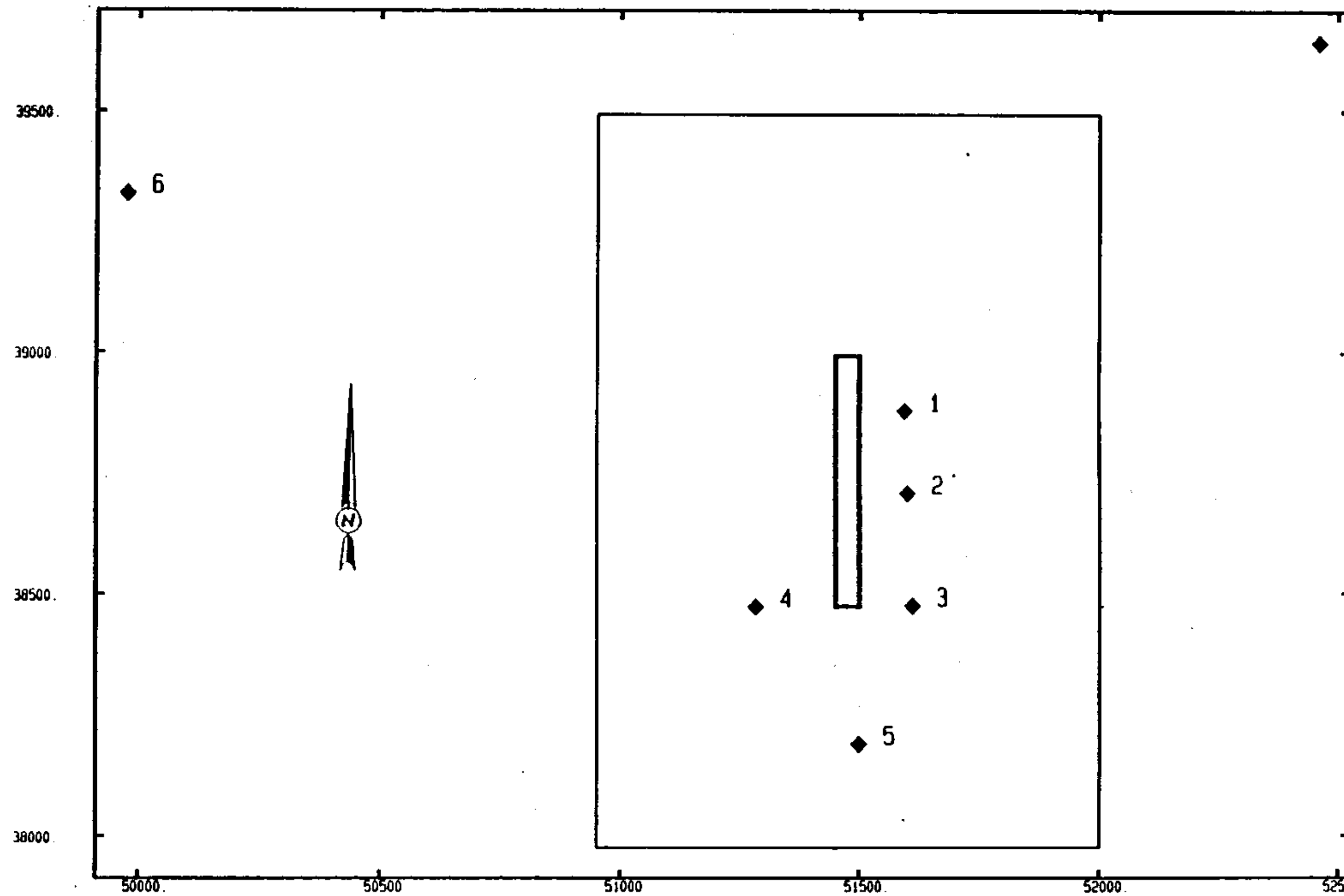
3 - 299-E17-16

4 - 299-E17-17

5 - 299-E17-18

6 - 299-E24-18

7 - 299-E25-36



216-A-36B Crib, Grad: East, A36BEFN.DAT

Solution time: 04/23/94 11:44:33

Monitoring Efficiency = 100.0 %

Hydraulic Gradient Zones (degrees)

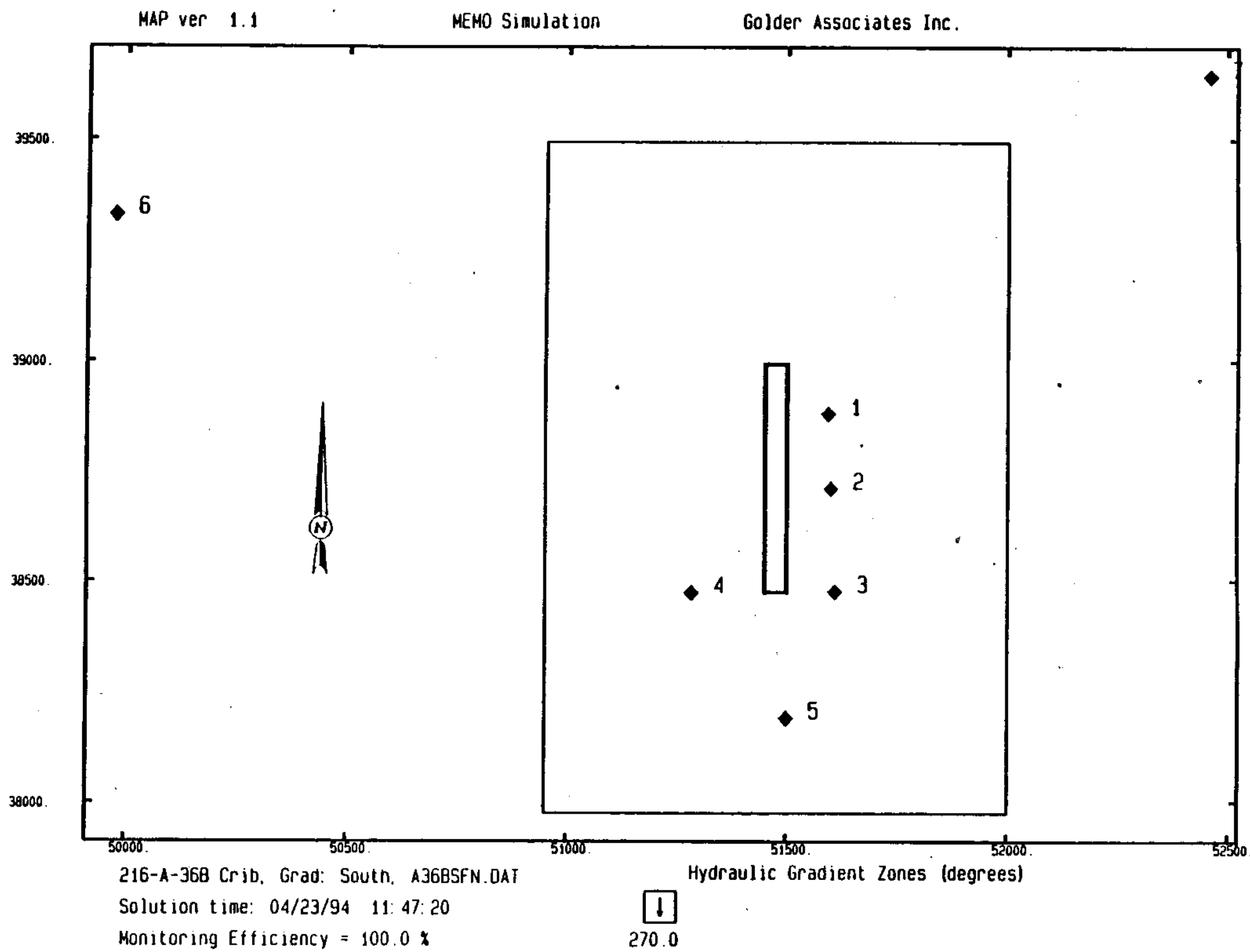
315.0

```
++++++++++++++++++++++++++++++++++++++++++++
++          MEMO Data File                ++
++                                        ++
++     Monitoring Analysis Package        ++
++         MAP Version   1.1              ++
++                                        ++
++        GOLDER ASSOCIATES INC.          ++
++                                        ++
++    Run on 04/23/94 at 11:47:20         ++
++++++++++++++++++++++++++++++++++++++++++++


--------------------------------------------
< 216-A-36B Crib, Grad: South, A36BSFN.DAT>
--------------------------------------------


*   SCALE FACTOR
      1.000000
*   SOURCE GRID PARAMETERS (x0,y0,grid spacing,max x incr,max y incr)
  51450.000000    38475.000000       16.093480
        4           33
*   POTENTIAL SOURCE AREA COORDINATES (#,x,y,unit#)
  1        51450.00        38993.00          1
  2        51500.00        38993.00          1
  3        51500.00        38475.00          1
  4        51450.00        38475.00          1
*   ARRAY SPACING FOR BUFFER ZONE COORDINATES (max. spacing)
     50.000000
*   INPUT BUFFER ZONE COORDINATES (#,x,y)
  1        50950.00        39493.00
  2        52000.00        39493.00
  3        52000.00        37975.00
  4        50950.00        37975.00
*   MONITORING WELL COORDINATES (#,x,y)
  1        51594.00        38880.00
  2        51600.00        38710.00
  3        51610.00        38476.00
  4        51283.00        38474.00
  5        51499.00        38190.00
  6        49976.00        39331.00
  7        52459.00        39641.00
*   CONTAM. TRAN. PARAMETERS (CD/C0,ldisp,tdisp,diffc,source width,lmb,cvel)
  2.500000E-02       70.000000        10.000000     0.000000E+00
     50.000000    0.000000E+00    8.000000E-01
*   GRADIENT ZONE COORDINATES (#,x,y,unit#,angle)
  1        50950.00        39493.00          1          270.00
  2        52000.00        39493.00          1          270.00
  3        52000.00        37975.00          1          270.00
  4        50950.00        37975.00          1          270.00
*   SOLUTION RESULTS
Maximum advection time =      3650.000000
Accuracy of solution =    1.000000E-04
Solution basis = buffer zone/advection time
Total # of source points =          129
# of undetected leaks =          0
Monitoring efficiency =100.0 %.
*   END OF MAP FILE
```

216-A-36B CRIB - SOUTH FLOW



KEY

1 - 299-E17-14
2 - 299-E17-15
3 - 299-E17-16
4 - 299-E17-17
5 - 299-E17-18
6 - 299-E24-18
7 - 299-E25-36