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Pacific Northwest
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Borehole Geologic Data for the 216-Z Crib Facilities
A Status of Data Assembled through the Hanford Borehole Geologic Information System (HBGIS)

G. V. Last
R. D. Mackley
D. C. Lanigan

September 2006

Prepared for the U.S. Department of Energy
under Contract DE-AC05-76RL01830

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Abstract

The Pacific Northwest National Laboratory (PNNL) is assembling existing borehole geologic information to aid in determining the distribution and potential movement of contaminants released to the environment and to aid selection of remedial alternatives. This information is being assembled via the Hanford Borehole Geologic Information System (HBGIS), which is being developed as part of the Characterization of Systems Project, managed by PNNL, and the Remediation Decision Support Task of the Groundwater Remediation Project, managed by Fluor Hanford, Inc.

The purpose of this particular study was to assemble the existing borehole geologic data pertaining to sediments underlying the 216-Z Crib Facilities and the Plutonium Finishing Plant Closure Zone. The primary objective for Fiscal Year 2006 was to assemble the data, complete log plots, and interpret the location of major geologic contacts for each major borehole in and around the primary disposal facilities that received carbon tetrachloride. To date, 154 boreholes located within or immediately adjacent to 19 of the 216-Z crib facilities have been incorporated into HBGIS. Borehole geologic information for the remaining three Z-crib facilities is either lacking (e.g. 216-Z-13, -14, and -15), or has been identified as a lesser priority to be incorporated at a later date.

Acknowledgements

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Contents

1.0 Introduction

The U. S. Department of Energy's (DOE) Hanford Site served as a plutonium production facility for over 40 years. During this period, low-level liquid waste from chemical processing operations in the 200 Areas was discharged to the ground by means of surface and subsurface structures, generally referred to as crib facilities. Today, the Hanford Site is engaged in the world's largest environmental cleanup project, with more than 1,700 waste sites[1].

The Pacific Northwest National Laboratory (PNNL) is assisting this cleanup effort by assembling existing borehole geologic information to aid in determining the distribution and potential movement of contaminants released to these waste sites, and to aid selection of remedial alternatives. This work is being conducted in support of the 200-PW-1/3/6 Operable Units and as part of the Characterization of Systems Project managed by PNNL and the Remediation Decision Support Task of the Groundwater Remediation Project managed by Fluor Hanford, Inc.

The purpose of this work is to assemble the existing borehole geologic data pertaining to sediments underlying the 216-Z Crib Facilities and the Plutonium Finishing Plant (PFP) Closure Zone. The primary objective for Fiscal Year 2006 (FY06) was to assemble the data, complete log plots, and interpret the location of major geologic contacts for each major borehole in and around the primary disposal facilities that received carbon tetrachloride. The primary carbon tetrachloride receiving disposal facilities include 216-Z-9, 216-Z-1A, and 216-Z-18. This document presents a summary and status of these efforts through August 2006.

[1] Web Report - DOE Hanford Site, Resources for Reporters, Hanford Site Overview. http://www.hanford.gov/communication/reporter/

2.0 Background

The 216-Z Crib Facilities consist of 22 surface and subsurface structures designed to inject or percolate wastewater into the ground (Table 2.1). The locations of these facilities are shown in Figure 2.1. The 216-Z Crib Facilities received liquid wastes generated in plutonium separation and recovery operations conducted in the main Z-Plant (i.e., the Plutonium Finishing Plant) complex. According to the Waste Information Data System (WIDS)[2] these crib facilities collectively received more than 4.5 billion liters of liquid waste containing more than 168 kg of plutonium and 13,800 curies of other radionuclides. They also received various chemicals, including up to 922,000 kg of carbon tetrachloride (DOE-RL 1992; Fluor Hanford 2004).

Liquid wastes discharged to these crib facilities infiltrate into and react with the underlying vadose zone sediments. In order to characterize and monitor the migration and decay of these contaminants, characterization boreholes and monitoring wells have been installed around the crib facilities. Periodic geophysical logging and sampling of the monitoring wells have been conducted to monitor the condition of the vadose zone and groundwater beneath these facilities. Geologic data, including sediment samples (and their subsequent analyses), collected during the drilling of these boreholes are the subject of this report.

As the cleanup mission at Hanford proceeds, it becomes increasingly important to define the spatial distributions of contaminants and important transport parameters in order to evaluate potential remediation alternatives and to estimate the long-term behavior and risks associated with these contaminants. It is also increasingly important to find better, faster, and cheaper ways of getting this information so that more resources can go to actual cleanup and less is spent on characterization. To this end, PNNL has been developing the Hanford Borehole Geologic Information System (HBGIS) to facilitate access to and integration of existing borehole geologic data that has been spread out across many contractors and media types. The goal is to maximize the use of existing information to enable more efficient, targeted subsurface characterization efforts (Last et al. 2003, 2005).

Table 2.1. List of 216-Z Crib Facilities and the Approximate Number of Boreholes Located in or near the Facility

Site Code(s)	Site ID	Site Type	No. of Nearby Boreholes[a]
216-Z-1 & 2, -1A, and -3	555,566,569	Crib, Drain/Tile Field, and Crib	44[b]
216-Z-4	570	Trench	25
216-Z-5	571	Crib	8
216-Z-6	572	Crib	4
216-Z-7	573	Crib	8
216-Z-8	574	French Drain	7
216-Z-9	575	Trench	24
216-Z-10	556	Injection/Reverse Well	4
216-Z-12	558	Crib	31
216-Z-13	559	French Drain	-
216-Z-14	560	French Drain	-
216-Z-15	561	French Drain	-
216-Z-16	562	Crib	4

[2] Waste Information Disposal System (WIDS). http://apweb02.rl.gov/rapidweb/phmc/cp/WIDS

Site Code(s)	Site ID	Site Type	No. of Nearby Boreholes[a]
216-Z-17	563	Trench	1
216-Z-18	564	Crib	25
216-Z-21	3855	Pond	2
216-Z-1D Upper	567	Ditch	17[c]
216-Z-1D Lower, -11,-19, and -20	567,557,565,568	Ditch, Ditch, Ditch, and Crib	131[d]

[a] Excluding Geoprobe and soil gas type borings.
[b] Sites 216-Z-1 & 2, and -3 are within the 216-Z-1A site (Figure 4.1), and are therefore grouped together here.
[c] Site 216-Z-1D has been separated into lower and upper sites here since the lower (southern) portion of this ditch is in close proximity to three other sites (see below).
[d] The lower (southern) portion of Site 216-Z-1D and sites 216-Z-11, -19, and -20 truncated north of 16th street are grouped together based on their close proximity.

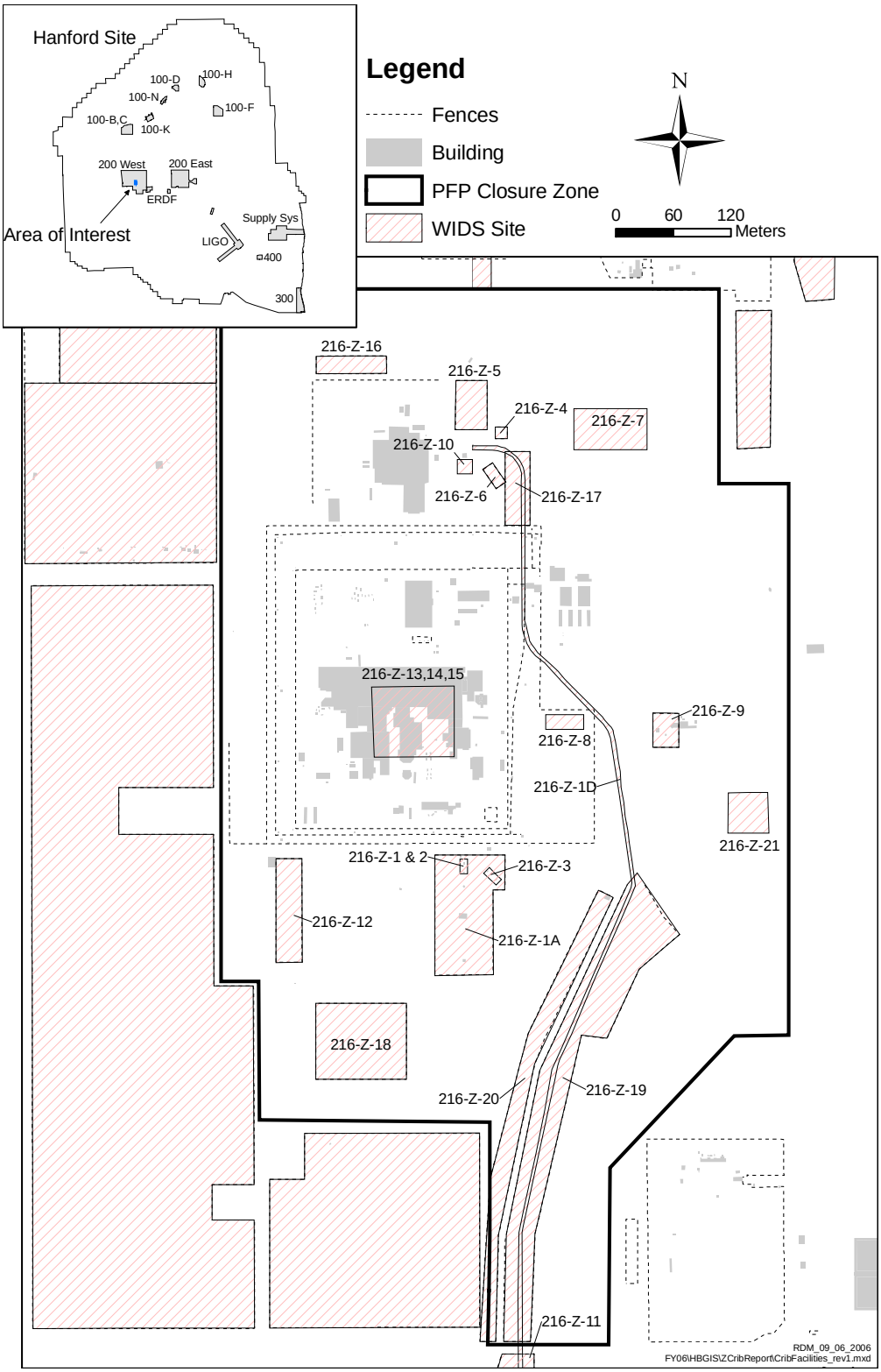

Figure 2.1. Location of 216-Z Crib Facilities

3.0 Data Compilation and Processing

A number of borehole geologic data and information sets are available for Hanford Site boreholes and wells (Horton et. al. 2005). These include driller's logs, geologist's logs, archived samples, physical and chemical analyses of borehole samples (e.g., particle-size, calcium carbonate, and moisture analyses), and geophysical logs (e.g., gross or spectral gamma and neutron-moisture). These data have traditionally been managed in a number of different formats (hardcopy, electronic image files, electronic data formats) and database and information systems. However, borehole geologic data for the 216-Z Crib Facilities are now being made available through HBGIS.[3] HBGIS is currently deployed on an internal PNNL server and is accessible to users within the Hanford Local Area Network (HLAN). First-time users will need to request a user name and password by contacting the website administrator, Rob D. Mackley (rob.mackley@pnl.gov or 509-373-5197). Note that the system has different levels of access, with only selected and trained geologists and their designees having the authority to enter and edit data.

Where possible, HBGIS provides direct linkages to the existing authoritative data sources (e.g., Hanford Well Information System [HWIS], Virtual Library - ROCSAN module) using its secure online web application supported by Microsoft SQL Server as a back-end database (Figure 3.1). For data where no authoritative electronic data source is available (e.g., hard-copy driller's logs, borehole [geologist's] logs, borehole geophysical log data), HBGIS provides the capability to enter, store, and retrieve these data.

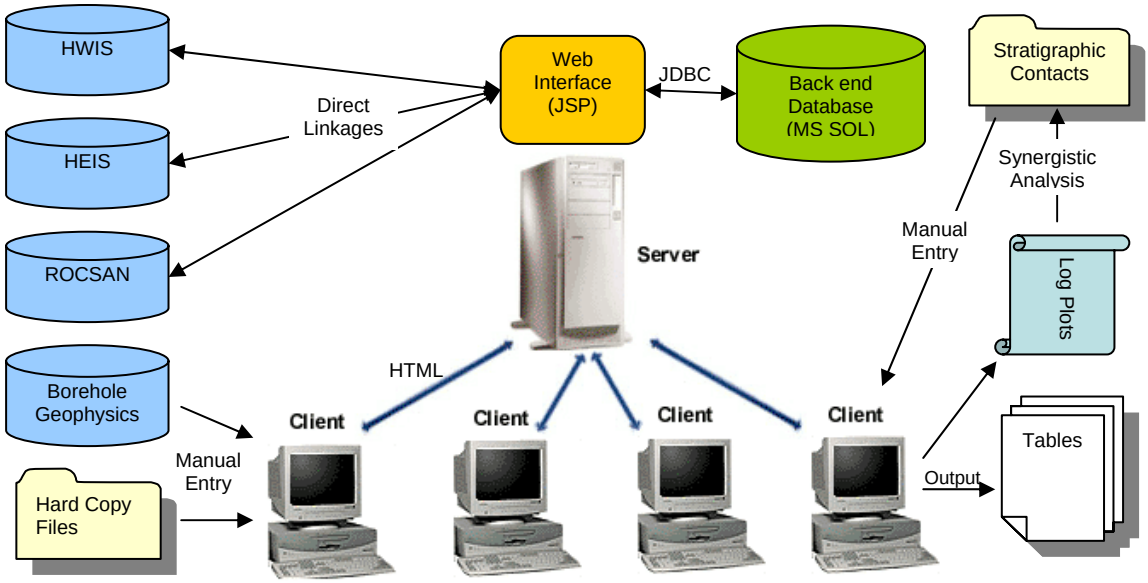

Figure 3.1. HBGIS Data Management

The only new electronic data generated for and stored by HBGIS has been data translated from hard-copy driller's logs and borehole logs. These data were produced using well-defined, detailed procedures (PNL 1995). Borehole geologic data for 216-Z Crib Facilities were entered into HBGIS either directly, using the HBGIS web interface, or indirectly, using loader programs to convert data from older data entry formats (e.g., Microsoft Excel or Access) and then to enter (upload) them into HBGIS.

The HBGIS interface (http://hbgis.emsl.pnl.gov/HBGIS/login.jsp) provides access to borehole geologic data in five general categories (General Well Information; Driller's Log Information; Geologist's Log Information; Geophysical Log Data; and Laboratory Sample Data). HBGIS also enables export and

[3] Hanford Borehole Geologic Information System (HBGIS); located at: http://hbgis.emsl.pnl.gov/HBGIS/login.jsp

plotting of the data sets and provides access to interpreted stratigraphic contact information (if available). Brief descriptions of these data types and capabilities are presented below. A more in depth discussion of HBGIS, the data entry process, and data access/export capabilities can be found in the HBGIS Users Guide (Last et. al. 2005).

3.1 General Well Information

General well information can be accessed in HBGIS. This information includes the borehole/well identification (e.g. Borehole ID, Well Name), its geospatial coordinates (e.g., northing, easting, elevation), and some construction information (e.g., well type, casing stickup) or links to external electronic sources of well-construction information. The primary source of this information is the Hanford Well Information System (HWIS) (http://apweb02.rl.gov/cfroot/rapidweb/phmc/cp/hwisapp/).

The Borehole ID is the primary key that HBGIS uses as the unique identifier for relating boreholes to their associated logs, samples, and other data. It is a unique five-character alphanumeric designation (e.g., A7517) assigned to each borehole. The Borehole ID identifier in HBGIS is synonymous with the Well ID field used in HWIS, but is used in place of the latter since it is a more inclusive term. For example, Cone Penetrometer, Geoprobe, or other types of borings might never be constructed into a well, but have associated borehole geologic data.

3.2 Driller's Log Information

Electronic reproduction and translation of historic (pre-1990) driller's log information is available through HBGIS. Drill log header and depth-discrete information are contained in HBGIS. The drill log header provides information such as the dates the borehole was drilled, and the names of the drillers, the drill rig used, related project number. The depth-discrete information includes description of the drilling and sampling method used, the lithology and interpreted sediment class, and the moisture content recorded at specific depths.

The primary sources of this information are electronic image files (e.g., PDF and RMIS files) of driller's logs and other records accessed through HWIS, and the hard-copy records themselves as obtained from PNNL's Well Log Library (located in Room 2110, Sigma V Building, 3110 Port of Benton Blvd., Richland, Washington).

The image files or hard-copy records were processed using PNNL Procedure DO-6[4] to produce a semi-quantitative electronic data set for entry into HBGIS that can support its synergistic analysis with other borehole geologic data and information. In most cases, these data were manually entered into Microsoft Excel spreadsheets (or a Microsoft Access database) and then uploaded into HBGIS.

3.3 Geologist's Log Information

Geologist's log information consists of electronic reproduction and translation of post-1989 borehole log information. Similar to the driller's log data, HBGIS organizes geologist's log header and depth-discrete information. The Geo Log[5] header information provides information such as the dates the borehole was drilled, the names of the geologists, the drill rig used, related project number, etc. The depth-discrete Geo Log information includes descriptions of the samples collected during drilling, the drilling and sampling method used, sample lithology (including sediment class, particle-size distribution, sorting, mineralogy,

[4] The DO procedures referred to in Section 3 are contained in PNL-MA-567, Procedures for Groundwater Investigations. The referenced procedures were updated in 2006 by GV Last and RD Mackley.
[5] Geologist's log is abbreviated as Geo Log in HBGIS.

moisture content, reaction to HCl, and color) and blow counts/percent recovery. It also provides some information on the amount of casing used at the time of sampling.

The primary sources of this information are electronic image files (e.g. PDF and RMIS files) of borehole logs, field activity reports, and other records accessed through HWIS and the hard-copy records in PNNL's Well Log Library (located in Room 2110, Sigma V Building, 3110 Port of Benton Blvd., Richland, Washington). These image files or hard-copy records were processed using PNNL Procedure DO-7 to produce a semi-quantitative electronic data set for entry into HBGIS that can support its integrated analysis with all other borehole geologic data/information. In most cases these data were manually entered into Microsoft Excel spreadsheets (or a Microsoft Access database), and then uploaded into HBGIS.

3.4 Geophysical Log Information

Geophysical log information is available through the HBGIS interface as well. This information consists of general information such as zero-depth reference (e.g. top of casing vs. ground surface) for logging and electronic source of data, as well as depth-discrete numerical values for a number of different analytes (e.g., moisture, gross gamma ray, ^{40}K, ^{238}U, ^{232}Th) generated using a variety of measurement tools and data processing techniques. The primary sources of this information are the Hanford Geophysical Logging Project Website (http://gj.em.doe.gov/hanf/) and the PNNL Geophysical Log Website (http://boreholelogs.pnl.gov). Secondary data sources are the archived hard-copy analog and/or digital data files stored in the PNNL Well Log Library (located in Room 2110, Sigma V Building, 3110 Port of Benton Blvd., Richland, Washington).

In many cases there are multiple borehole geophysical logs (collected at various time intervals—often many years apart) available for a given borehole or well. The primary intent of HBGIS is to provide contemporaneous data sets for synergistic interpretation of subsurface conditions at the time of drilling. Thus, the primary borehole geophysical logs to be included in HBGIS are those logs collected during or shortly after the time of drilling. In this way, the borehole geophysical data would be as contemporaneous with all other drilling related borehole observations and sample data as possible. However, geophysical logs that are contemporaneous with the drilling of older boreholes are generally not available in electronic form (i.e., they are in hard-copy analog charts), thus, the earliest electronic geophysical log data available has been entered into HBGIS. In most cases these data were manually downloaded from one of the primary data sources, placed in a Microsoft Excel spreadsheet and then uploaded into HBGIS. All geophysical log data, regardless of source, were processed into HBGIS using PNNL Procedure DO-8. Efforts are being initiated to digitize hard-copy analog geophysical logs collected contemporaneous with drilling of some of the older boreholes.

3.5 Laboratory Sample Information

Laboratory sample information includes identifying-information about a given sample (e.g., the sample number, sample interval depths, sampling method, sampling time, etc.), as well as analytical data available for that sample, including the analytical method, the laboratory that conducted the analyses, and the analytical results. At this time, the analytical data available for a given sample is limited to particle size, calcium carbonate, moisture, mineralogy, and bulk rock geochemistry. However, efforts are underway to incorporate other physical property data (e.g., bulk density, hydraulic properties, etc.) as well.

The primary data sources for this information are the ROCSAN module of the Virtual Library (http://vlprod.rl.gov/vlib/app/index.cfm) and the Hanford Environmental Information System (HEIS). Secondary data sources primarily include technical documents (e.g. Last and Rohay 1993). Particle-size data (including calcium-carbonate concentrations) are provided by direct linkage to the Virtual Library.

However, other laboratory data at this time have been manually entered into Excel spreadsheets and then uploaded into HBGIS according to PNNL Procedure DO-9.

3.6 Data Export

The HBGIS interface provides the capability to export borehole geologic data for a given borehole, whether it is stored in existing electronic databases such as the ROCSAN module of the Virtual Library, or stored in the HBGIS back end database.

3.6.1 Export of Tabular Data

The HBGIS interface enables the user to query the available data and export it in a number of formats compatible with Microsoft Excel or other software packages. At this time, these query and table export capabilities are fairly limited, but will be one of the primary areas of focus for future HBGIS enhancements.

3.6.2 Generation of Graphical Log Plots

The HBGIS interface provides direct linkage between the borehole geologic data (either stored in existing databases such as the ROCSAN module of the Virtual Library, or stored in HBGIS itself), and graphical borehole log plotting software (e.g., RockWare LogPlot). The HBGIS interface uses a set of default templates to provide a consistent set of log plots (see Appendix B). However, the HBGIS interface is flexible enough to allow custom data manipulation.

3.7 Interpreted Geologic Contact Information

The HBGIS interface also provides the capability to enter and retrieve interpreted geologic contact information. This capability is designed for the trained geologic professional to capture and store their geologic interpretations for each borehole, constrained to the standardized stratigraphic nomenclature used at the Hanford Site (Bjornstad 2004; DOE-RL 2002; Lindsey 1995; Swanson, et al. 1979).

4.0 Results and Discussion

Borehole geologic data have been compiled and made available through HBGIS for 154 boreholes located within or immediately adjacent to the 216-Z Crib Facilities (Figure 4.1). This includes the major boreholes in and around the primary disposal facilities that received carbon tetrachloride (i.e., 216-Z-9, 216-Z-1A, and 216-Z-18). Appendix A provides a list of these wells, the associated borehole geologic data available for each well and the data currently available through HBGIS. At this time, borehole data are available through HBGIS for 19 of the 22 Z-Crib Facilities. This is primarily due to either the lack of boreholes adjacent to some of the crib facilities (e.g., 216-Z-13, -14, -15), or a lower priority for entering those data into the HBGIS (i.e., initial focus was on crib facilities that received carbon tetrachloride). The association of boreholes to any given crib facility is loosely based on a 20-m buffer around each crib site, as defined in WIDS. This association is provided here only as a means of giving the reader a sense for the number of boreholes available in a given area.

Graphical borehole logs (log plots) were completed for each major borehole in and around the primary disposal facilities that received carbon tetrachloride (i.e., 216-Z-9, 216-Z-1A, and 216-Z-1). These log plots include an interpretation of the location of major geologic contacts. Appendix B provides the graphical borehole logs (and default templates) that summarize the primary borehole geologic data sets available for the major boreholes in and around the primary carbon tetrachloride receiving disposal facilities. Note that geologic contacts are illustrated on these borehole logs based on detailed geological analyses conducted to support modeling of carbon-tetrachloride movement beneath the 216-Z-9 Trench (Oostrom, et al. 2004, 2006), and beneath the 216-Z-1A and 216-Z-18 facilities and/or incorporated into a geologic contacts database (Bjornstad 2004). Table 4.1 provides a list of the pertinent well and borehole information and geologic contacts for the major boreholes in and around the primary carbon tetrachloride receiving facilities.

Future work is expected to complete the assembly and documentation of borehole geologic data for each major borehole in and around all 216-Z Crib Facilities and the Plutonium Finishing Plant (PFP) Closure Zone. This work is expected to culminate in the interpretation and documentation of the stratigraphy beneath these facilities as has been done for other crib facilities (e.g., Fecht et al. 1979a, b).

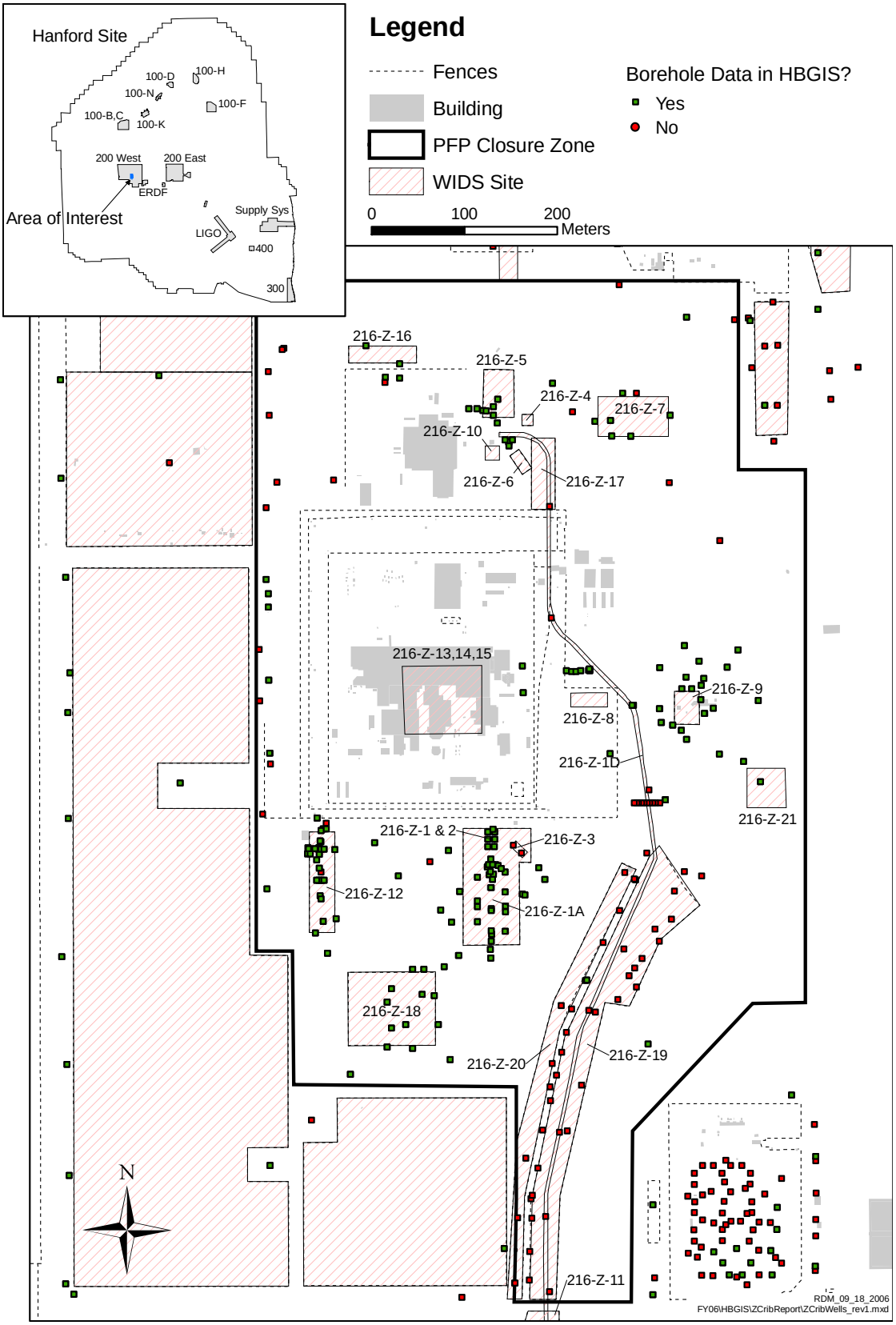

Figure 4.1. Status of Borehole Geologic Data Available Through HBGIS (as of 09/2006).

Table 4.1. Pertinent Well and Borehole Information and Geologic Contact Elevations (in meters above MSL) for Major Boreholes in and Around the Primary Carbon Tetrachloride Disposal Facilities.

Well ID	Well Name	Drill Date	Drill Depth (m)	Casing Stickup		Horizontal Coordinates (NAD83(91))		Vertical Elevation (NAVD88)			Holocene		Hanford Formation						Cold Creek Unit		Ringold Formation				Saddle Mountains Formation
				Stickup from Inspection Logs (m)	Stickup from As Built (m)	Northing (m)	Easting (m)	Top Of Casing (m)	DISC_Z (Brass Cap) (m)	Best Estimate Ground Surface Elevation (m)	Back-fill	Eolian Sand	Upper Sand Unit	Upper Gravelly Unit	Middle Fine Sand Unit	Lower Gravelly Unit	Lower Sandy Unit	Lower Fine Sandy Unit	Silt Unit	Carb-onate Unit	Member of Taylor Flats	Member of Wooded Island, Unit E	Member of Wooded Island, Lower Mud	Member of Wooded Island, Unit A	Elephant Mountain Member
216-Z-1A																									
A7523	299-W18-6	01/15/64	91.4	0.8	0.8	135412.825	566513.075	208.123	No value	207.3	NP	207.4	NP	203.1	190.3	180.2	NP	-	169.6	168.0	NP	161.9	ETD	-	-
A7524	299-W18-7	01/13/64	91.4	0.8	ND	135409.803	566580.971	207.816	207.057	207.1	NP	207.1	-	202.8	192.1	179.9	172.0	NP	166.5	162.9	NP	159.8	ETD	-	-
C4303	299-W18-16	10/20/04	106.1	ND	ND	135425.690	566605.050	208.580	207.887	207.9	207.9	207.3	-	202.4	191.4	182.6	179.9	-	170.1	165.5	NP	162.5	ETD	-	-
A7539	299-W18-56	03/31/49	45.7	ND	ND	135439.422	566543.288	205.468	No value	204.6	204.6	-	-	201.5	191.2	175.9	171.3	-	168.3	164.9	-	160.4	ETD	-	-
A7540	299-W18-57	03/31/49	45.7	ND	ND	135441.881	135441.881	205.569	No value	204.7	204.7	-	-	201.9	191.3	177.5	171.4	-	168.4	163.8	160.8	159.2	ETD	-	-
A7541	299-W18-58	03/31/49	45.7	ND	ND	135396.732	566532.425	204.874	No value	204.0	204.0	-	-	201.2	189.0	173.2	169.2	-	166.2	163.1	-	158.6	ETD	-	-
A7542	299-W18-59	03/25/49	45.7	ND	ND	135396.808	566562.593	205.242	No value	204.3	-	204.3	-	203.1	191.2	175.1	172.3	-	169.3	163.2	NP	160.4	ETD	-	-
A7543	299-W18-60	04/30/49	45.7	ND	ND	135476.905	566543.498	207.373	No value	206.5	206.5	-	-	200.4	193.1	182.4	171.7	-	169.3	167.1	163.2	ETD	-	-	-
A7544	299-W18-61	04/30/49	45.7	ND	ND	135476.924	566551.116	207.318	No value	206.4	206.4	-	-	200.6	192.1	181.4	173.2	-	169.2	165.6	-	164.0	ETD	-	-
A7545	299-W18-62	04/30/49	46.0	ND	ND	135468.982	566543.518	207.214	No value	206.3	206.3	-	-	200.5	192.0	182.8	172.2	-	169.1	165.5	163.0	ETD	-	-	-
A7546	299-W18-63	04/30/49	45.7	ND	ND	135469.001	566551.136	207.221	No value	206.3	206.3	-	-	201.1	190.5	181.3	170.7	-	169.1	165.8	-	161.5	ETD	-	-
A7547	299-W18-64	04/30/49	45.7	ND	ND	135461.363	566543.537	207.211	No value	206.3	206.3	-	201.1	197.5	191.1	179.8	171.6	-	168.5	165.5	163.9	ETD	-	-	-
A7548	299-W18-65	04/30/49	45.7	ND	ND	135461.157	566550.687	207.720	No value	206.8	206.8	-	-	201.6	192.5	181.8	172.7	-	169.6	168.1	-	165.1	ETD	-	-
A7549	299-W18-66	04/30/49	45.7	ND	ND	135366.906	566547.736	205.011	No value	204.1	204.1	-	-	202.3	190.7	175.5	170.6	-	166.0	166.0	-	162.0	ETD	-	-
A7559	299-W18-76	03/28/67	5.9	0.3	ND	135441.910	566544.323	205.655	No value	205.4	205.4	-	202.1	ETD	-	-	-	-	-	-	-	-	-	-	-
A7560	299-W18-77	03/30/67	7.6	0.1	ND	135431.162	566544.972	205.369	No value	205.3	205.3	-	-	202.5	ETD	-	-	-	-	-	-	-	-	-	-
A7561	299-W18-78	03/30/67	5.2	0.2	ND	135441.801	566548.713	205.605	No value	205.4	205.5	-	201.8	ETD	-	-	-	-	-	-	-	-	-	-	-
A7562	299-W18-79	03/30/67	7.0	0.1	ND	135431.644	566549.436	205.370	No value	205.3	205.3	-	202.3	ETD	-	-	-	-	-	-	-	-	-	-	-
A7563	299-W18-80	03/31/67	6.6	0.1	ND	135425.927	566548.767	205.265	No value	205.1	205.2	-	202.1	ETD	-	-	-	-	-	-	-	-	-	-	-
A7564	299-W18-81	04/03/67	12.5	1.0	ND	135434.168	566546.238	206.199	No value	205.2	205.2	-	202.2	196.1	ETD	-	-	-	-	-	-	-	-	-	-
A7568	299-W18-85	08/05/69	45.7	0.9	ND	135343.986	566512.133	208.284	No value	207.4	NP	207.4	-	205.9	191.9	176.2	-	-	167.8	164.0	ETD	-	-	-	-
A7569	299-W18-86	08/21/69	45.7	0.7	0.9	135379.643	566504.409	209.420	No value	208.5	208.5	-	207.0	204.2	190.2	176.8	NP	-	167.4	164.6	ETD	-	-	-	-
A7570	299-W18-87	09/05/69	45.7	0.7	0.7	135341.157	566546.827	207.520	No value	206.8	NP	206.8	-	205.3	188.8	178.1	-	-	169.0	161.4	ETD	-	-	-	-
A7571	299-W18-88	09/19/69	45.7	0.8	0.9	135438.239	566598.682	208.289	No value	207.4	NP	207.5	-	203.5	192.5	182.5	180.0	-	169.1	165.4	ETD	-	-	-	-
A7572	299-W18-89	10/21/69	45.7	0.9	0.9	135456.982	566501.077	208.762	No value	207.8	-	-	207.9	203.6	191.1	178.0	NP	-	169.1	165.5	-	163.7	ETD	-	-
A7632	299-W18-149	04/12/74	28.0	0.6	0.3	135447.523	566547.007	206.099	No value	205.8	205.5	-	201.8	199.4	191.5	181.1	ETD	-	-	-	-	-	-	-	-
A7633	299-W18-150	06/30/73	39.0	0.9	0.9	135370.302	566547.472	205.275	204.979	205.0	205.0	NP	201.0	196.8	190.7	175.7	171.5	NP	168.1	ETD	-	-	-	-	-
A7641	299-W18-158	09/08/77	39.9	0.8	0.6	135428.187	566532.337	206.113	No value	205.5	205.5	-	-	201.7	191.2	176.5	171.7	-	169.8	ETD	-	-	-	-	-
A7642	299-W18-159	01/31/78	39.6	0.3	0.3	135416.930	566547.038	205.574	No value	205.2	205.2	NP	-	202.2	192.8	178.7	173.2	NP	169.0	ETD	-	-	-	-	-
A7645	299-W18-163	02/28/77	49.7	0.8	0.8	135433.972	566562.210	206.097	No value	205.3	205.3	NP	200.8	195.6	191.6	179.0	173.6	-	169.4	166.3	ETD	-	-	-	-
A7646	299-W18-164	02/01/77	46.6	0.9	ND	135359.471	566547.207	207.826	No value	206.9	206.9	-	201.7	195.6	192.3	176.7	171.5	-	168.2	163.6	161.5	ETD	-	-	-
A7647	299-W18-165	03/31/77	41.1	0.9	0.9	135402.403	566532.425	205.970	No value	205.0	205.0	-	201.4	195.6	191.0	175.8	171.5	-	168.2	164.2	ETD	-	-	-	-
A7648	299-W18-166	04/30/77	41.8	0.8	0.8	135380.206	566532.323	205.673	No value	204.8	204.8	NP	201.2	195.1	192.0	172.8	170.1	-	167.7	163.7	ETD	-	-	-	-
A7649	299-W18-167	05/31/77	40.8	1.0	1.0	135412.556	566562.190	206.197	No value	205.2	205.2	NP	-	202.2	192.1	178.1	174.1	0.0	169.8	164.7	ETD	-	-	-	-
A7650	299-W18-168	06/30/77	39.9	1.0	1.0	135391.142	566562.572	205.840	No value	204.8	204.8	NP	201.5	194.3	191.9	174.4	173.8	-	168.3	ETD	-	-	-	-	-
A7651	299-W18-169	09/30/77	40.2	0.9	0.9	135369.787	566562.410	205.830	No value	204.9	204.9	NP	199.4	194.1	189.4	177.5	174.3	-	169.7	ETD	-	-	-	-	-
A7652	299-W18-170	09/21/77	9.1	1.1	ND	135394.261	566547.122	206.028	No value	204.9	204.9	-	201.9	195.8	ETD	-	-	-	-	-	-	-	-	-	-
A7653	299-W18-171	08/09/77	41.5	0.8	0.8	135350.503	566546.525	207.644	No value	206.9	206.9	-	199.6	195.6	191.6	177.3	-	-	169.1	ETD	-	-	-	-	-
A7655	299-W18-173	10/24/77	15.5	1.0	ND	135440.700	566554.641	206.327	No value	205.3	205.3	-	201.4	194.1	191.0	ETD	-	-	-	-	-	-	-	-	-
A7656	299-W18-174	04/27/93	40.1	ND	ND	135437.384	566558.208	205.946	No value	205.0	204.9	NP	200.7	194.6	190.6	179.2	172.5	-	168.5	165.3	ETD	-	-	-	-
A7657	299-W18-175	12/07/77	39.6	0.9	0.9	135392.144	566547.078	205.774	No value	204.9	204.9	NP	NP	201.9	190.6	-	-	-	168.6	ETD	-	-	-	-	-
A7726	299-W18-246	03/23/92	70.1	0.3	ND	135392.613	566492.988	209.327	208.774	208.8	208.8	208.2	NP	205.0	192.3	176.9	NP	NP	168.1	164.4	NP	162.8	ETD	-	-
A7728	299-W18-248	05/26/92	43.0	ND	ND	135408.957	566583.704	207.970	207.189	207.2	207.2	206.9	NP	203.7	193.9	180.8	176.4	-	168.9	165.0	ETD	-	-	-	-
216-Z-18																									
A7526	299-W18-9	12/13/68	67.1	0.9	0.9	135302.121	566472.961	209.111	No value	208.2	NP	NP	208.2	198.5	190.6	175.6	NP	169.8	167.8	163.7	160.1	156.4	ETD	-	-
A4931	216-W18-10	12/11/68	67.1	0.9	ND	135300.687	566485.910	208.870	No value	208.0	NP	208.0	205.5	197.3	189.7	177.5	NP	169.0	166.8	163.8	NP	159.2	ETD	-	-
A7527	299-W18-11	01/04/69	67.1	1.0	1.0	135265.616	566439.603	209.468	No value	208.5	208.5	NP	203.9	197.8	190.2	175.2	ND	169.8	168.2	163.3	161.2	159.7	ETD	-	-
A4936	299-W18-24	08/10/87	73.1	0.7	0.7	135346.316	566370.843	209.697	209.038	209.0	NP	209.0	203.9	197.5	187.7	174.9	NP	NA	168.8	163.6	-	160.6	ETD	-	-
A7565	299-W18-82	ND	44.5	73.1	ND	135216.029	566395.551	209.579	No value	136.4	136.4	-	134.9	129.6	122.1	102.9	-	97.4	95.9	ND	ND	ETD	-	-	-
A7576	299-W18-93	02/08/72	42.7	1.0	ND	135269.393	566454.950	209.349	No value	208.3	-	208.4	204.5	198.4	193.1	174.2	-	170.3	167.5	ETD	-	-	-	-	-
A7577	299-W18-94	02/10/72	24.4	1.0	ND	135244.013	566462.690	209.088	No value	208.1	-	208.1	206.3	197.1	190.1	ETD	-	-	-	-	-	-	-	-	-
A7578	299-W18-95	02/15/72	24.4	1.0	~3	135244.988	566435.266	209.429	No value	208.4	NP	208.4	206.0	197.7	191.3	ETD	-	-	-	-	-	-	-	-	-
A7579	299-W18-96	02/18/72	45.7	0.9	0.9	135293.826	566435.228	209.060	No value	208.2	NP	208.2	206.1	197.5	192.1	176.5	-	169.2	166.5	163.5	ETD	-	-	-	-
A7580	299-W18-97	02/24/72	25.9	0.8	~3	135269.490	566490.243	208.857	No value	208.1	-	208.1	205.4	197.7	191.3	ETD	-	-	-	-	-	-	-	-	-
A7581	299-W18-98	02/29/72	24.4	0.9	~3	135328.927	566462.509	209.118	No value	208.3	-	208.3	206.4	199.1	190.6	ETD	-	-	-	-	-	-	-	-	-
A7582	299-W18-99	03/08/72	41.1	0.9	~3	135331.723	566496.307	208.908	No value	208.0	NP	208.0	205.2	198.8	192.4	176.0	NP	-	167.7	ETD	-	-	-	-	-
A7581	299-W18-247	05/06/92	69.2	ND	ND	135231.658	566503.137	208.679	207.789	207.8	207.8	206.6	204.8	198.7	191.2	173.5	NP	170.2	167.9	163.0	NP	160.3	ETD	-	-
A7729	299-W18-249	07/31/92	44.7	ND	ND	135329.008	566474.500	208.843	208.292	208.3	NP	208.3	206.5	197.3	190.6	177.1	NP	169.6	168.4	164.7	ETD	-	-	-	-

Table 4.1 Continued…

Well ID	Well Name	Drill Date	Drill Depth (m)	Casing Stickup		Horizontal Coordinates (NAD83(91))		Vertical Elevation (NAVD88)			Holocene		Hanford Formation						Cold Creek Unit		Ringold Formation				Saddle Mountains Formation
				Stickup from Inspection Logs (m)	Stickup from As Built (m)	Northing (m)	Easting (m)	Top Of Casing (m)	DISC_Z (Brass Cap) (m)	Best Estimate Ground Surface Elevation (m)	Back-fill	Eolian Sand	Upper Sand Unit	Upper Gravelly Unit	Middle Fine Sand Unit	Lower Gravelly Unit	Lower Sandy Unit	Lower Fine Sandy Unit	Silt Unit	Carb-onate Unit	Member of Taylor Flats	Member of Wooded Island, Unit E	Member of Wooded Island, Lower Mud	Member of Wooded Island, Unit A	Elephant Mountain Member
216-Z-9																									
A4930	299-W15-5	04/12/57	182.6	0.6	0.5	135511.737	566734.978	205.448	No value	204.9	NP	204.9	NP	195.8	186.7	NP	176.9	-	170.8	167.8	-	163.8	73.9	57.7	44.9
A7349	299-W15-6	03/24/59	125.0	0.6	0.9	135654.395	566801.511	202.666	202.079	202.1	NP	202.1	NP	198.4	187.8	NP	181.7	-	172.4	170.1	NP	166.1	ETD	-	-
A5468	299-W15-8	10/06/56	62.8	0.6	0.6	135576.697	566757.688	204.713	No value	204.1	204.1	NP	NP	197.2	188.1	NP	179.1	-	172.1	169.6	NP	167.5	ETD	-	-
A5477	299-W15-9	01/26/59	59.4	0.5	1.0	135631.369	566763.335	202.577	No value	201.6	NP	201.6	NP	198.6	188.8	-	180.0	-	170.5	167.5	NP	166.6	ETD	-	-
B2423	299-W15-32	06/15/95	73.0	0.9	ND	135634.998	566773.428	203.487	202.625	202.6	202.6	-	-	198.4	-	-	181.0	-	170.5	168.5	NP	166.1	ETD	-	-
B2754	299-W15-38	05/17/96	69.9	0.8	ND	135672.902	566812.919	203.691	202.871	202.9	-	202.9	-	194.0	187.3	-	-	-	173.6	-	-	168.7	-	-	-
B2755	299-W15-39	05/23/96	68.0	0.9	ND	135552.967	566819.177	202.129	201.248	201.2	-	-	201.3	197.0	188.2	-	180.8	-	168.9	167.4	-	165.9	-	-	-
C3426	299-W15-46	10/03/03	160.0	0.8	0.6	135586.670	566752.230	204.222	203.472	203.5	203.5	-	-	197.4	188.1	NP	-	-	170.4	168.0	-	166.1	-	-	-
C4184	299-W15-47	02/03/04	88.1	1.0	1.3	135642.370	566776.450	203.705	202.679	202.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C3427	299-W15-48	02/09/06	44.3	ND	0.6	135604.820	566777.040	202.585	202.245	202.2	202.3	-	-	198.1	189.9	NP	-	-	170.6	168.4	-	-	-	-	-
A7383	299-W15-82	10/04/54	30.8	0.7	ND	135610.371	566786.415	202.821	No value	202.2	202.2	-	-	198.0	190.9	NP	180.5	-	ETD	-	-	-	-	-	-
A7384	299-W15-84	10/08/54	61.0	0.4	ND	135609.797	566728.614	205.510	205.117	205.1	NP	205.1	NP	199.3	190.2	NP	178.9	-	170.5	168.2	NP	166.3	ETD	-	-
A7385	299-W15-85	10/12/54	32.3	0.5	ND	135643.711	566757.450	203.438	No value	203.0	203.0	-	-	198.7	189.9	NP	177.1	-	ETD	-	-	-	-	-	-
A7386	299-W15-86	12/14/66	43.9	0.9	0.9	135592.158	566742.842	203.307	No value	202.4	202.4	NP	NP	197.4	188.7	NP	179.5	-	170.4	166.7	NP	165.5	ETD	-	-
A7394	299-W15-95	01/31/59	57.1	0.8	ND	135631.369	566752.760	203.197	202.693	202.7	202.7	NP	NP	199.5	191.4	NP	181.4	-	170.7	168.6	NP	167.3	ETD	-	-
A7400	299-W15-101	01/31/67	15.2	ND	ND	135619.526	566772.951	202.234	No value	201.3	201.3	-	-	197.1	188.4	-	ETD	-	-	-	-	-	-	-	-
A7401	299-W15-102	10/31/69	45.7	1.1	ND	135561.540	566675.176	206.933	No value	205.8	205.8	-	-	201.3	-	-	181.5	-	169.3	166.2	-	165.6	-	-	-
A7500	299-W15-202	03/30/80	53.6	0.8	ND	135650.954	566653.542	205.871	No value	205.0	205.0	-	-	200.8	183.7	-	180.3	-	170.9	169.2	-	166.3	ETD	-	-
A7514	299-W15-216	05/14/92	64.0	1.0	1.0	135560.833	566793.339	203.323	202.714	202.7	202.7	202.4	NP	198.5	188.7	NP	180.2	-	169.7	167.8	NP	166.1	ETD	-	-
A7515	299-W15-217	06/30/92	37.6	ND	ND	135594.894	566730.471	205.826	204.935	204.9	NP	204.9	NP	199.5	188.9	NP	181.5	-	170.5	168.2	ETD	-	-	-	-
A7516	299-W15-218	02/03/93	62.8	ND	ND	135661.168	566771.023	204.744	203.833	203.8	203.8	201.6	NP	198.4	187.8	NP	179.2	-	171.2	168.8	NP	167.3	ETD	-	-
A7517	299-W15-219	04/21/93	64.6	ND	ND	135654.033	566728.897	205.119	204.643	204.6	204.7	202.8	NP	200.7	191.1	NP	180.6	-	171.1	168.2	NP	167.5	ETD	-	-
A7518	299-W15-220	06/01/93	61.3	ND	ND	135618.444	566834.927	202.286	201.508	201.5	201.5	199.8	NP	198.5	188.1	NP	179.9	-	170.1	168.3	NP	166.9	ETD	-	-
A7521	299-W15-223	10/12/93	36.3	ND	0.3	135677.748	566755.386	204.736	204.085	204.1	204.1	203.8	NP	198.2	188.4	NP	180.4	-	170.7	168.0	NP	ETD	-	-	-

NA = Not Applicable
ND = Not Documented
NP = Not Present
'-' = Not Determined
ETD = Exceeds Total Depth

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Appendix A

216-Z Crib Borehole Geologic Data
Available Through
The Hanford Borehole Geologic Information System (HBGIS)

Appendix A: 216-Z Crib Borehole Geologic Data Available Through The Hanford Borehole Geologic Information System (HBGIS)

Well ID	Well Name	Associated WIDS Site(s)[†]	Driller's Log	Geologist's Log	Geophysical Logs	Particle Size and CaCO3	Laboratory Moisture
A7348	299-W15-1	216-Z-5	Yes		Yes	Yes	
A4929	299-W15-4	*	Yes		Yes		
A4930	299-W15-5	216-Z-1D,216-Z-4	Yes			Yes	
A7349	299-W15-6	*	Yes		Yes	Yes	
A5468	299-W15-8	216-Z-9	Yes		Yes	Yes	
A5477	299-W15-9	216-Z-9	Yes		Yes	Yes	
A4916	299-W15-10	216-Z-16	Yes		Yes	Yes	
A5474	299-W15-11	216-Z-16	Yes			Yes	
A4919	299-W15-15	*	Yes	Yes		Yes	
A4920	299-W15-16	*	Yes	Yes		Yes	
A9831	299-W15-25	216-Z-16		Yes			
B2410	299-W15-30	*		Yes			
B2411	299-W15-31	*		Yes			
B2423	299-W15-32	216-Z-9		Yes			
B2643	299-W15-33	216-Z-16		Yes			
B2748	299-W15-34	*		Yes			
B2753	299-W15-37	*		Yes			
B2754	299-W15-38	*		Yes			
B2755	299-W15-39	216-Z-21		Yes			
B8550	299-W15-40	*		Yes			
B8815	299-W15-41	*		Yes			
C3803	299-W15-42	*		Yes			
C3426	299-W15-46	216-Z-9		Yes			
C4184	299-W15-47	216-Z-9		Yes			
C3427	299-W15-48	216-Z-9		Yes			
A7352	299-W15-51	216-Z-1D,216-Z-4,216-Z-6,216-Z-10	Yes				
A7356	299-W15-55	216-Z-1D,216-Z-5	Yes		Yes		
A7359	299-W15-58	216-Z-5	Yes				
A7361	299-W15-60	216-Z-1D,216-Z-4,216-Z-6,216-Z-10	Yes		Yes		
A7362	299-W15-61	*	Yes		Yes		
A7363	299-W15-62	216-Z-7	Yes		Yes		
A7365	299-W15-64	216-Z-7	Yes		Yes		
A7367	299-W15-66	*	Yes				
A7379	299-W15-78	216-Z-7	Yes		Yes		
A7383	299-W15-82	216-Z-9	Yes		Yes	Yes	
C4683	299-W15-83	*		Yes			
A7384	299-W15-84	216-Z-4,216-Z-9	Yes	Yes	Yes	Yes	
A7385	299-W15-85	216-Z-9	Yes		Yes		
A7386	299-W15-86	216-Z-9	Yes		Yes	Yes	
C4684	299-W15-94	*		Yes			
A7394	299-W15-95	216-Z-9	Yes	Yes	Yes	Yes	
A7400	299-W15-101	216-Z-9	Yes				
A7401	299-W15-102	*	Yes				
A7496	299-W15-198	216-Z-9	Yes		Yes	Yes	
A7497	299-W15-199	216-Z-1D,216-Z-8,216-Z-9	Yes	Yes		Yes	
A7500	299-W15-202	216-Z-1D,216-Z-8,216-Z-9	Yes	Yes		Yes	

Well ID	Well Name	Associated WIDS Site(s)[†]	Driller's Log	Geologist's Log	Geophysical Logs	Particle Size and CaCO3	Laboratory Moisture
A7501	299-W15-203	216-Z-1D,216-Z-4,216-Z-9	Yes	Yes		Yes	
A7502	299-W15-204	216-Z-1D,216-Z-17	Yes	Yes			
A7503	299-W15-205	216-Z-1D	Yes	Yes			
A7504	299-W15-206	216-Z-1D,216-Z-4,216-Z-9	Yes	Yes		Yes	
A7506	299-W15-208	216-Z-21	Yes	Yes		Yes	
A7508	299-W15-210	*	Yes		Yes		
A7511	299-W15-213	216-Z-1D,216-Z-8,216-Z-9	Yes		Yes		
A7512	299-W15-214	216-Z-1D,216-Z-8,216-Z-9			Yes		
A7514	299-W15-216	*	Yes	Yes	Yes		Yes
A7515	299-W15-217	216-Z-4,216-Z-9	Yes	Yes	Yes		Yes
A7516	299-W15-218	*		Yes	Yes		Yes
A7517	299-W15-219	216-Z-4	Yes	Yes	Yes		
A7518	299-W15-220	*	Yes	Yes	Yes		Yes
A7521	299-W15-223	*		Yes	Yes		
C3494	299-W15-764	216-Z-9		Yes			
A5481	299-W18-1	*	Yes			Yes	
A5478	299-W18-2	216-Z-12	Yes			Yes	
A5469	299-W18-3	*	Yes			Yes	
A7522	299-W18-4	*	Yes		Yes	Yes	
A5470	299-W18-5	216-Z-12	Yes		Yes	Yes	
A7523	299-W18-6	216-Z-1 & 2,216-Z-1A,216-Z-3,216-Z-18	Yes			Yes	
A7524	299-W18-7	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes		Yes	Yes	
A7525	299-W18-8	216-Z-12	Yes		Yes		
A7526	299-W18-9	216-Z-18	Yes		Yes	Yes	
A4931	299-W18-10	216-Z-18	Yes		Yes	Yes	
A7527	299-W18-11	216-Z-18	Yes				
A7528	299-W18-12	216-Z-18	Yes				
A7529	299-W18-13	216-Z-12	Yes				
A7530	299-W18-14	216-Z-12	Yes				
C4303	299-W18-16	*		Yes	Yes		
A7531	299-W18-18	216-Z-1D,216-Z-19,216-Z-20	Yes		Yes		
A4936	299-W18-24	*		Yes		Yes	
A7539	299-W18-56	216-Z-1 & 2,216-Z-1A,216-Z-3,216-Z-18	Yes	Yes			
A7540	299-W18-57	216-Z-1 & 2,216-Z-1A,216-Z-3,216-Z-18	Yes	Yes		Yes	
A7541	299-W18-58	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes	Yes		Yes	
A7542	299-W18-59	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes	Yes		Yes	
A7543	299-W18-60	216-Z-1 & 2,216-Z-1A,216-Z-3,216-Z-18	Yes	Yes		Yes	
A7544	299-W18-61	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes	Yes		Yes	
A7545	299-W18-62	216-Z-1 & 2,216-Z-1A,216-Z-3,216-Z-18	Yes	Yes		Yes	
A7546	299-W18-63	216-Z-1 & 2,216-Z-1A,216-Z-3,216-Z-18	Yes	Yes			
A7547	299-W18-64	216-Z-1 & 2,216-Z-1A,216-Z-3,216-Z-18	Yes	Yes		Yes	

Well ID	Well Name	Associated WIDS Site(s)[†]	Driller's Log	Geologist's Log	Geophysical Logs	Particle Size and CaCO3	Laboratory Moisture
A7548	299-W18-65	216-Z-1 & 2,216-Z-1A,216-Z-3,216-Z-18	Yes	Yes		Yes	
A7549	299-W18-66	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes	Yes		Yes	
A7552	299-W18-69	216-Z-12	Yes		Yes		
A7553	299-W18-70	216-Z-12	Yes				
A7554	299-W18-71	216-Z-12	Yes				
A7555	299-W18-72	216-Z-12	Yes				
A7556	299-W18-73	216-Z-12	Yes				
A7557	299-W18-74	216-Z-12	Yes				
A7558	299-W18-75	216-Z-12	Yes				
A7559	299-W18-76	216-Z-1 & 2,216-Z-1A,216-Z-3,216-Z-18	Yes				
A7560	299-W18-77	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes				
A7561	299-W18-78	216-Z-1 & 2,216-Z-1A,216-Z-3,216-Z-18	Yes		Yes		
A7562	299-W18-79	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes		Yes		
A7563	299-W18-80	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes				
A7564	299-W18-81	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes		Yes		
A7565	299-W18-82	*			Yes		
A7567	299-W18-84	*	Yes				
A7568	299-W18-85	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes			Yes	
A7569	299-W18-86	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes		Yes	Yes	
A7570	299-W18-87	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes			Yes	
A7571	299-W18-88	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes			Yes	
A7572	299-W18-89	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes			Yes	
A7576	299-W18-93	216-Z-18	Yes				
A7577	299-W18-94	216-Z-18	Yes				
A7578	299-W18-95	216-Z-18	Yes				
A7579	299-W18-96	216-Z-18	Yes	Yes	Yes		
A7580	299-W18-97	216-Z-18	Yes				
A7581	299-W18-98	216-Z-18	Yes		Yes		
A7582	299-W18-99	216-Z-18	Yes				
A7632	299-W18-149	216-Z-1 & 2,216-Z-1A,216-Z-3,216-Z-18	Yes		Yes		
A7633	299-W18-150	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes				
A7634	299-W18-151	216-Z-12	Yes				
A7635	299-W18-152	216-Z-12	Yes			Yes	
A7636	299-W18-153	216-Z-12	Yes		Yes	Yes	
A7637	299-W18-154	216-Z-12	Yes	Yes	Yes		
A7639	299-W18-156	216-Z-12	Yes				
A7640	299-W18-157	216-Z-12	Yes		Yes	Yes	
A7641	299-W18-158	216-Z-1 & 2,216-Z-1A,216-Z-3,216-Z-18	Yes		Yes		
A7642	299-W18-159	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes		Yes		
A7645	299-W18-163	216-Z-1 & 2,216-Z-	Yes				

Well ID	Well Name	Associated WIDS Site(s)†	Driller's Log	Geologist's Log	Geophysical Logs	Particle Size and CaCO3	Laboratory Moisture
		1A,216-Z-3					
A7646	299-W18-164	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes				
A7647	299-W18-165	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes				
A7648	299-W18-166	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes				
A7649	299-W18-167	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes		Yes		
A7650	299-W18-168	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes		Yes		
A7651	299-W18-169	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes		Yes		
A7652	299-W18-170	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes		Yes		
A7653	299-W18-171	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes		Yes		
A7654	299-W18-172	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes				
A7655	299-W18-173	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes		Yes		
A7656	299-W18-174	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes	Yes	Yes		Yes
A7657	299-W18-175	216-Z-1 & 2,216-Z-1A,216-Z-3	Yes		Yes		
A7661	299-W18-179	216-Z-12	Yes		Yes	Yes	
A7662	299-W18-180	216-Z-12	Yes			Yes	
A7663	299-W18-181	216-Z-12	Yes	Yes	Yes	Yes	
A7664	299-W18-182	216-Z-12	Yes	Yes	Yes		
A7666	299-W18-184	216-Z-12	Yes	Yes	Yes		
A7667	299-W18-185	216-Z-12	Yes	Yes	Yes		
A7722	299-W18-242	216-Z-12	Yes				
A7723	299-W18-243	216-Z-12	Yes	Yes			
A7724	299-W18-244	216-Z-12	Yes	Yes			
A7725	299-W18-245	216-Z-12	Yes	Yes			
A7726	299-W18-246	216-Z-18		Yes	Yes		Yes
A7727	299-W18-247	*	Yes	Yes	Yes		
A7728	299-W18-248	216-Z-1 & 2,216-Z-1A,216-Z-3		Yes	Yes		Yes
A7729	299-W18-249	216-Z-18	Yes	Yes	Yes		
A7732	299-W18-252	*	Yes	Yes			

Key:
Yes values indicate these data have been entered into HBGIS (as of 09/2006).
Blank (null) values indicate these data either do not exist or were not easily available for electronic entry into the HBGIS system.
†Associated WIDS Site Code queried from the Q-Map Interface using a 20-m buffer around each of the 22 WIDS Sites (http://www7.rl.gov/cfroot/knowledgenet/qmap/index.cfm). * Values indicate wells that are within the 216-Z-Crib study area, but are more than 20-m from a designated WIDS Site.
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Appendix B

Graphical Borehole Logs for Selected Boreholes West and South of the 216-Z-9 Trench

Appendix B: Graphical Borehole Logs for Selected Boreholes West and South of the 216-Z-9 Trench

These logs are available in PDF files located on the CD attached to the inside back cover of this report.

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