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Borehole Completion and Conceptual Hydrogeologic Model for the IFRC Well Field, 300 Area, Hanford Site

Integrated Field Research Challenge Project

BN Bjornstad
JA Horner
VR Vermeul
DC Lanigan
PD Thorne

April 2009

Pacific Northwest
NATIONAL LABORATORY

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Pacific Northwest National Laboratory
Richland, Washington 99352

Abstract

A tight cluster of 35 new wells was installed over a former waste site, the South Process Pond (316-1 waste site), in the Hanford Site 300 Area in summer 2008. This report documents the details of the drilling, sampling, and well construction for the new array and presents a summary of the site hydrogeology based on the results of drilling and preliminary geophysical logging.

Acknowledgments

Acknowledged is the work of well-site geologists Joe Fritts and Sean Sexton, Gram, Inc. We also thank the Fluor Federal Services drilling and support staff, including Chris Wright, Dorman Blankenship, Paul Lodder, and Les Walker. Rick McCain and Alan Pearson from Stoller Hanford were instrumental in the timely collection of downhole geophysical logs. Finally, we extend our appreciation for the support of others on the Pacific Northwest National Laboratory scientific team, including John Zachara, Mark Freshley, Vince Vermeul, Mark Rockhold, Andy Ward, Jim Fredrickson, Alan Konopka, Jim McKinley, Chris Strickland, and Dean Moore.

Acronyms and Abbreviations

bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
DOE	U.S. Department of Energy
DOE-RL	DOE Richland Operations Office
ERT	electrical-resistivity tomography
ft	foot, feet
gal	gallon(s)
gpm	gallons per minute
ID	inside diameter
IFRC	Integrated Field Research Challenge
in.	inch(es)
K_d	distribution coefficient; measurement of sorbtive capacity of a specific chemical constituent
m	meter(s)
mi	mile(s)
NMLS	neutron-moisture logging system
OD	outside diameter
PNNL	Pacific Northwest National Laboratory
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act of 1976
SGLS	spectral-gamma logging system

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1.0 Introduction

Pacific Northwest National Laboratory (PNNL) is leading a field study at the Hanford Site in Richland, Washington, to identify new approaches and strategies to help resolve questions about the movement of subsurface contaminants. The field study is part of the U.S. Department of Energy (DOE) Integrated Field-Scale Subsurface Research Challenge (IRFC), a new program that commits multi-investigator teams to performing large, benchmark-type experiments on formidable field-scale science issues. The field sites will provide capabilities to collect, permit, and ship environmental samples of different types to other program investigators and provide site access to those interested in testing specific concepts or technologies/techniques relevant to the study of subsurface contaminant fate and transport.

The program is managed by the Environmental Remediation Sciences Division, DOE Office of Biological and Environmental Research. Researchers will perform state-of-science field experiments at these sites to resolve the geochemical, hydrophysical, and microbiological factors that control the migration of contaminant uranium through the vadose zone (water-unsaturated sediments below the soil and above groundwater) and groundwater.

The Hanford field study involves the development, characterization, and instrumentation of a vadose zone and saturated zone field site. Researchers are evaluating hypotheses related to a uranium plume that resulted from nuclear fuel fabrication at the Hanford Site from 1943 to 1975.

The research site in the Hanford 300 Area is adjacent to the Columbia River, enabling studies of how the fluctuations in river stage influence contaminant dissipation from the aquifer and discharge to the river. The 300 Area is near the southern boundary of the Hanford Site north of Richland, allowing full access by a diverse and accomplished scientific team involving participants from PNNL, universities, and other laboratories.

In summer 2008, an array of 35 new monitoring wells was installed over the South Process Pond (316-1 waste site), a former waste site in the 300 Area. This report documents the details of the drilling, sampling, and well construction for the new array and presents a summary of the site hydrogeology based on the results of drilling and preliminary geophysical logging.

Section 2 provides historical and other background details about the site of the new well array. Section 3 presents a summary of the methodologies and equipment employed in the steps needed to develop the IFRC 300 Area well field: drilling, geologic sampling, geophysical logging, well construction, and well development. In Section 4, the hydrogeology of the IFRC research site is characterized. Sources cited in the text are provided in Section 5.

Raw data and construction details for each well are provided in a series of appendices:

- Appendix A – Compilation Borehole Summary Logs
- Appendix B – Well-Site Geologist Logs
- Appendix C – Sample Inventory Sheets
- Appendix D – Field Activity Reports
- Appendix E – Well Development and Testing Data Sheets
- Appendix F – Well Summary Sheets
- Appendix G – Downhole Geophysical Logs
- Appendix H – Survey Reports
- Appendix I – Chip Tray Photographs.

2.0 Background

The 300 Area lies in the southeastern corner of the DOE Hanford Site (Figure 2.1). The site is immediately adjacent to the Columbia River and thus enables studies of how the river stage affects contaminant dissipation from the aquifer and discharge to the river.

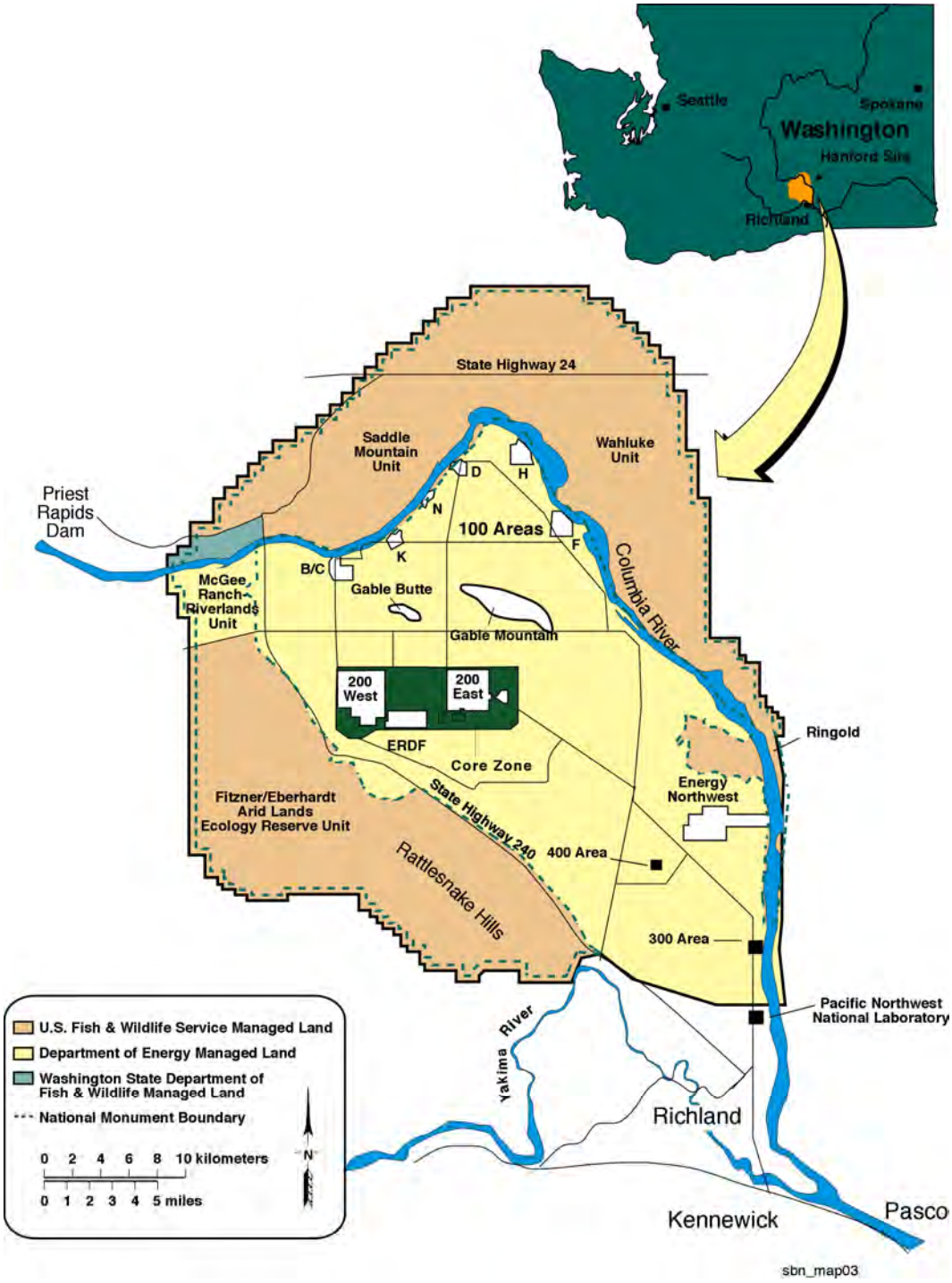

Figure 2.1. The 300 Area is located in the southeastern portion of the Hanford Site.

A tight cluster of 35 new wells was installed over a former waste site (South Process Pond [316-1]) in the Hanford Site 300 Area in 2008. The wells were drilled to characterize the subsurface and test new approaches and strategies leading to understanding and remediation of a persistent uranium contaminant plume in groundwater beneath the 300 Area (Figure 2.2).

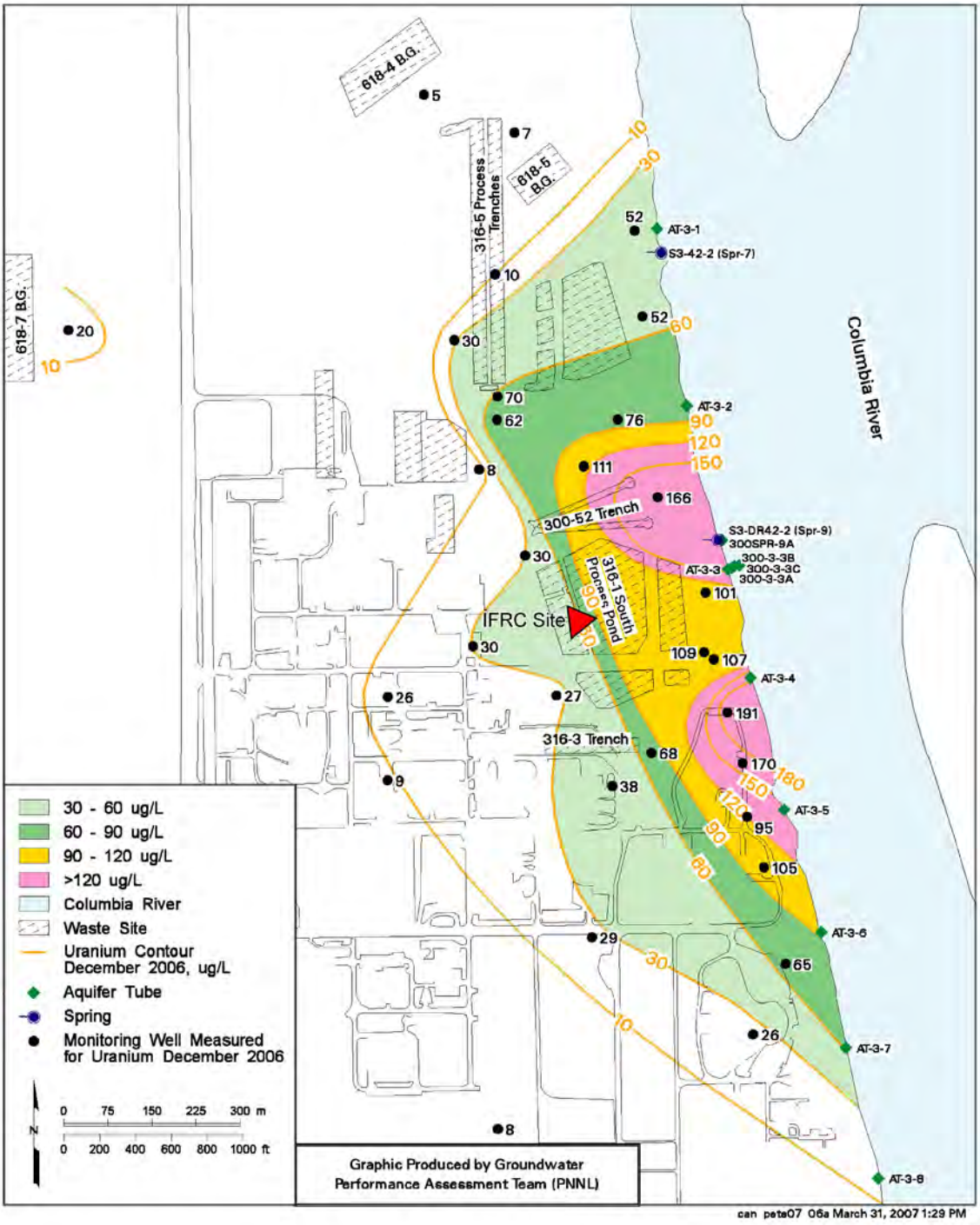

Figure 2.2. Uranium plume in groundwater beneath the Hanford Site 300 Area in December 2006. The IFRC well field is represented by the triangle in the southwestern corner of the South Process Pond, a remediated waste site.

Large volumes of process waste were disposed of at the 300 Area process ponds, including the since-remediated South Process Pond, over which the IFRC site is located. The process ponds were used for waste disposal between 1943 and 1975. Process waste later was diverted to the 300 Area process trenches from 1975 through 1994. After the ponds were drained, the near-surface contaminated sediments were excavated from the waste-disposal ponds and trenches between 1995 and 2004 as a source-control measure to minimize additional groundwater contamination.[1] The excavated ponds and trenches subsequently were backfilled and the land surface regraded to a natural state.

Groundwater wells have been installed in the 300 Area since the early 1940s for both subsurface characterization and groundwater monitoring. This monitoring network has been expanded sequentially in response to the growing size and concerns regarding the uranium contaminant plume and attendant investigations under the Resource Conservation and Recovery Act of 1976 (RCRA) and Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (Lindberg and Bond 1979; Schalla et al. 1988; Swanson et al. 1992). Pump testing and other hydrologic investigations have been ongoing. The results of the monitoring programs and decisions made are summarized in Peterson et al. (2005).

A groundwater uranium plume has existed beneath the 300 Area since the early operations of the process ponds; the highest uranium concentrations were observed from the early 1950s to the late 1980s (Peterson et al. 2008). These concentrations decreased rapidly after disposal activities ceased in the early 1990s, and groundwater uranium concentrations have slowly decreased since then. The plume resulted from liquid process waste infiltrating through the 4- to 10-m-thick vadose zone beneath the disposal facilities. Despite source-term removal and elimination of other leak sources, the general shape of the contaminated groundwater plume has not changed significantly over the last 10 years. The plume occasionally experienced sizable water table fluctuations during pre-dam Columbia River flooding and, to a lesser extent, during present-day dam-controlled river stage fluctuations that appear to be redistributing dissolved uranium into uncontaminated capillary-fringe and deep vadose-zone sediments.

In 2003, after remediation but prior to backfilling and regrading, four deep pits (two each from beneath the North and South process ponds) were excavated with a backhoe to a depth of 10 to 20 ft to the water table (Bjornstad 2004). One of these pits (SPP#2) was excavated at the southwestern corner of the IFRC well field (Figure 2.3). A profile of the sedimentary materials of the Hanford formation exposed and sampled at that time is shown in Figure 2.4.

[1] See http://ifchanford.pnl.gov/history.

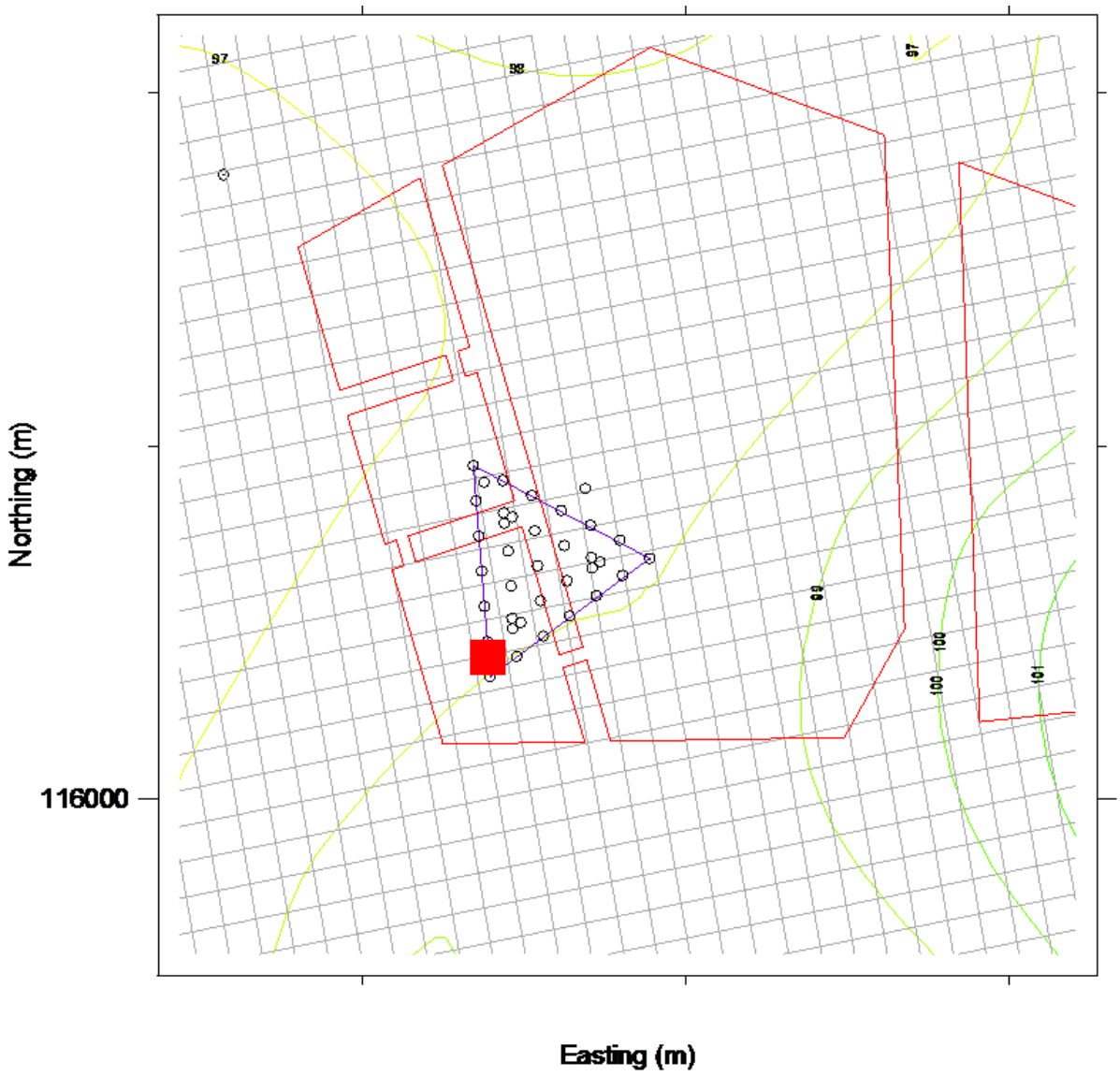

Figure 2.3. IFRC well field location in relation to the former South Process Pond (red outline). Grid spacing is 10 m. The red square is the approximate location of backhoe pit SPP#2 excavated at the base of the remediated South Process Pond in April 2003 (see Figure 2.4).

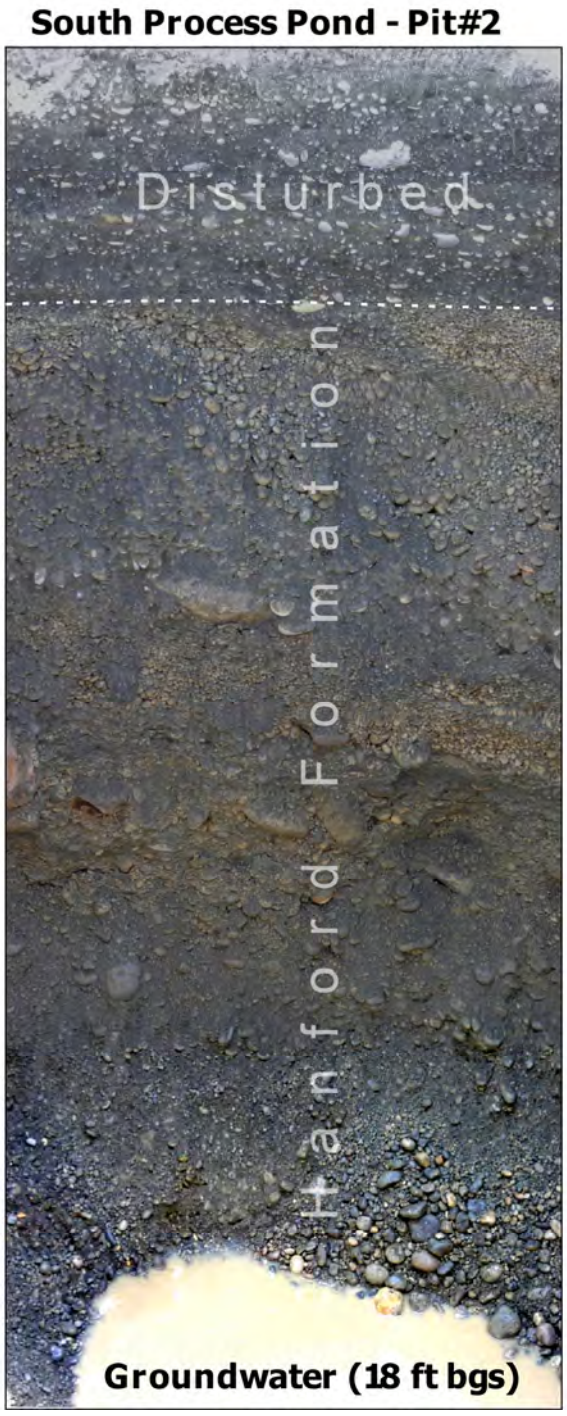

Figure 2.4. Vadose-zone backhoe pit SPP#2 excavated beneath the IFRC site in 2003. The uppermost 4 ft of the profile lack primary sedimentary structure, apparently destroyed from movement of heavy equipment over the site during remediation. Photo from Bjornstad (2004).

In 1996, a CERCLA interim remedy of monitored natural attenuation was selected for the 300 Area uranium plume based on equilibrium K_d-based reactive transport modeling. The modeling analysis implied that natural processes of groundwater flushing and desorption would lower uranium concentrations below the drinking water standards within 10 years. Subsequent monitoring has demonstrated that groundwater uranium concentrations are not decreasing as projected and persist above the drinking water standards throughout much of the 300 Area. Because of the ineffectiveness of monitored natural attenuation and regulatory mandates, the DOE Richland Operations Office initiated a Phase III Feasibility Study for the 300-FF-5 operable unit in 2005. The feasibility study included a limited field investigation to define the depth-discrete distribution and concentration of uranium in the aquifer and capillary fringe, as well as the nature of the hydrologic boundary between the Hanford and Ringold formations (Williams et al. 2007). Sonic drilling was used to recover continuous and intact large-diameter sediment cores from four limited field investigation boreholes in 2006. One of these wells (399-2-5) comprises the eastern corner of the IFRC well field. Well 399-2-5 was drilled with a cable-tool rig during an investigation of volatile organic compounds in 2007 (Peterson et al. 2008).

Groundwater levels are highly variable at the IFRC site due to seasonal and diurnal fluctuations in the Columbia River, located just east of the site. The normal high water level in late spring and early summer is about 25 ft below ground surface (bgs). The normal low water level is about 35 ft bgs, usually in late fall to early winter. Superimposed on these seasonal variations are daily fluctuations of several feet or more that can occur from fluctuating discharge from Priest Rapids Dam, situated 50 mi upstream. The base of the unconfined aquifer, defined by a fine-grained stratum at the top of the Ringold Formation, varies from 50 to 60 ft beneath the IFRC site. Therefore, depending on the season, the thickness of the unconfined aquifer ranges from 15 to 35 ft beneath the IFRC site.

3.0 IFRC 300 Area Wells

All 35 wells installed over a portion of the former South Process Pond within the 300 Area (Figure 3.1) are contained within a triangle 60 m on a side (Figure 3.2). The size, shape, and orientation of the well array were designed to take advantage of changes in the groundwater flow fields identified in Zachara et al. (2008). Prior to the start of drilling, a plan for drilling, sampling, and well installation (Bjornstad and Horner 2008) and drilling specifications (Bjornstad and Vermeul 2008) were prepared. Information gathered during drilling, sampling, geophysical logging, and well construction (Figure 3.3) is summarized in Table 3.1.



Figure 3.1. IFRC well field (circled) within the 300 Area, looking southeast. Photo: Bob Peterson (PNNL).

Field characterization data are summarized and compiled for each well in Appendix A. An example of a compilation summary log is shown in Figure 3.4. The raw data for each well, used to create the summary compilation logs in Appendix A, are documented in Appendices B through I.

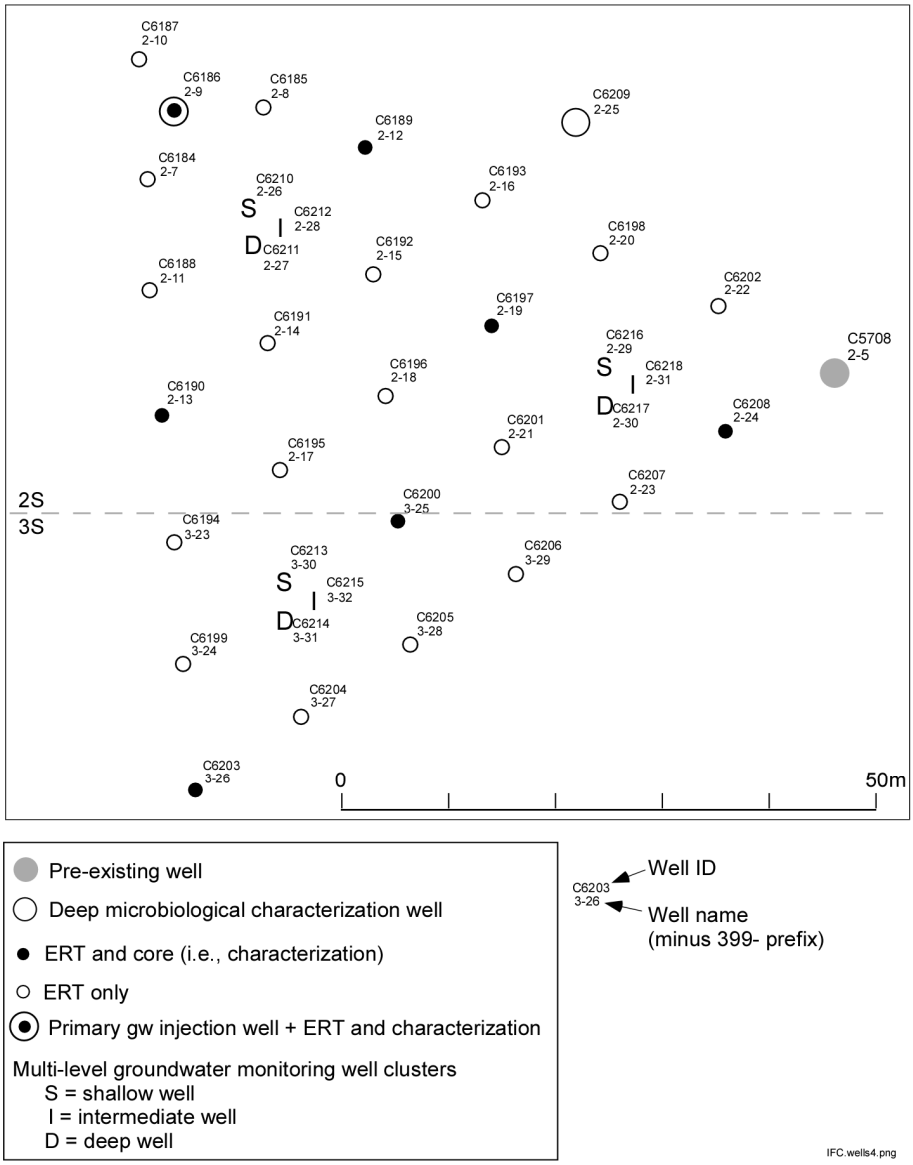

Figure 3.2. The triangular IFRC well array. Wells installed with special electrical-resistivity tomography and thermistor sensors are designated as ERT wells. See Table 3.1 and appendices for details on drilling and well construction.

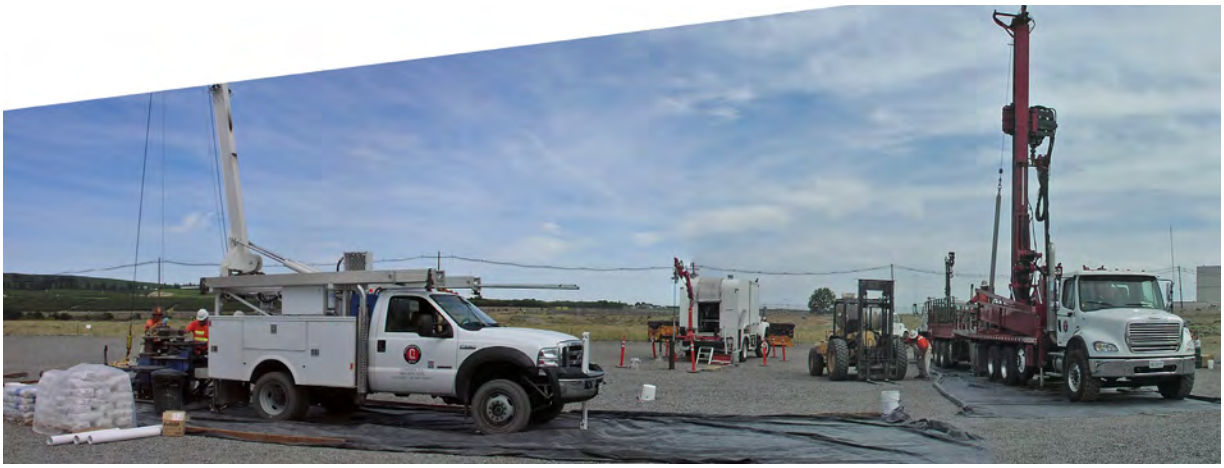

Figure 3.3. Drilling (right), geophysical logging (center), well construction (left), and well development were performed simultaneously at the IFRC site.

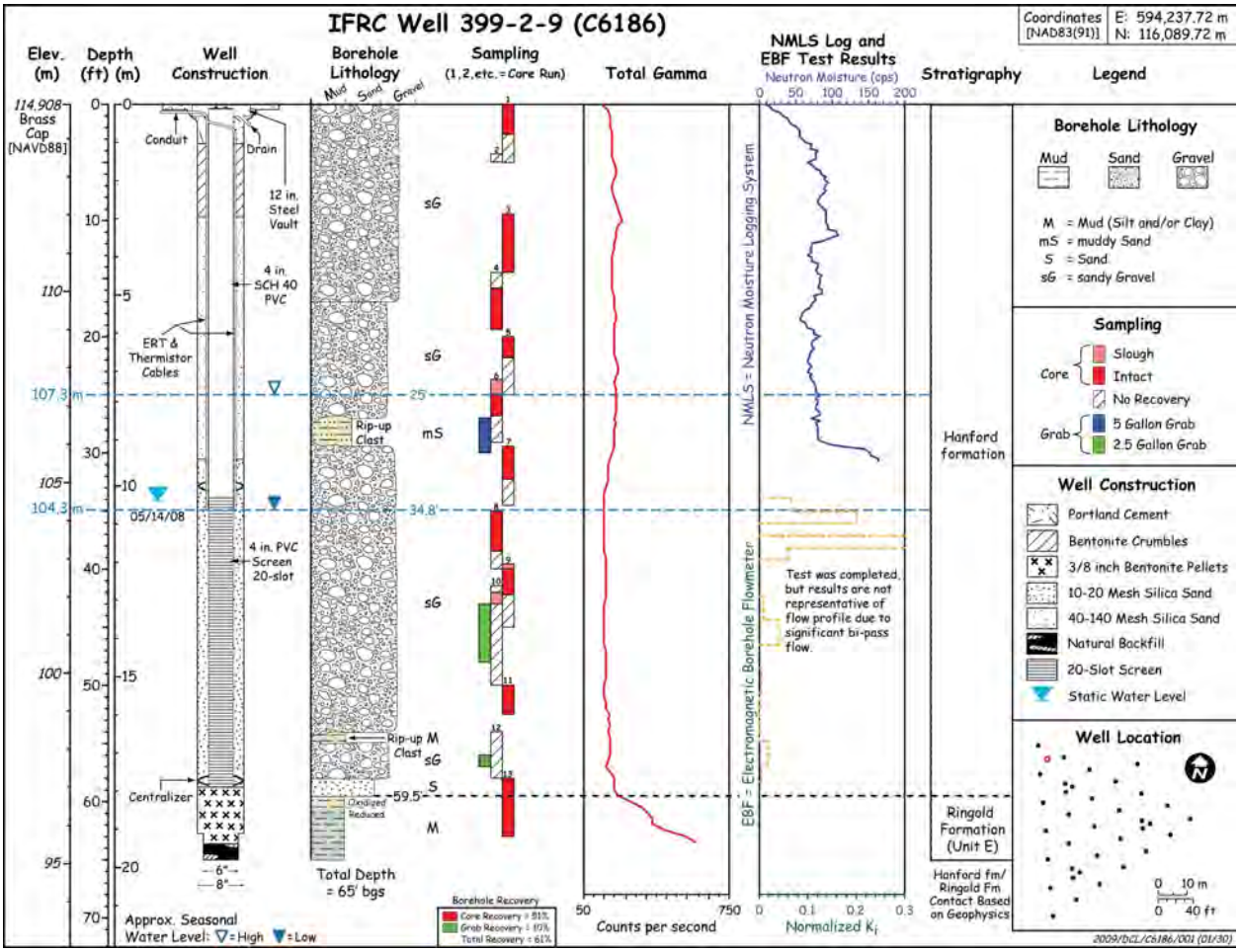

Figure 3.4. Sample compilation summary log for well 399-2-9 (C6186). See Appendix A for summary logs of all 35 new wells.

Table 3.1. Drilling, sampling, geophysical logging, and well construction information for IFRC wells

														% Recovery			Hanford/Ringold Contact Depth (ft)	
Well Name	Well ID	Function	Samples	Drilling Order	Start Drilling	End Drilling	Geophysical Logging	Total Depth (ft)	Length Screen (ft)	Top Screen Depth (ft)	Bottom Screen Depth (ft)	Bottom End Cap (ft)	Instrument Depth (ft)	Core	Grab	Total	Geologist Log	Gamma Log
399-2-7	C6184	ERT/ electrodes	Buckets	20	27-Jun	27-Jun	28–29-Jun	62.0	25	31	56	56.3	33.5	-----	75	75	55.5	53.5
399-2-8	C6185	ERT/ electrodes	Buckets	23	7-Jul	8-Jul	10-Jul	60.0	25	31	56	56.3	33.5	-----	80	80	52.5	52.5
399-2-9	C6186	ERT/electrodes characterization GW injection	Intact Lexan core	1	12-May	13-May	Complete	65.0	25	33.5	58.5	58.8	58.5 (?)	52.5	9.5	62	59.5	59.5
399-2-10[(a)]	C6187	ERT/ electrodes	Buckets	31	17-Jul	17-Jul	18-Jul	65.0	25	34.7	59.6	59.9	33.5/58/5	-----	81.5	81.5	56	59
399-2-11	C6188	ERT/ electrodes	Buckets	30	16-Jul	17-Jul	21-Jul	65.0	25	31	56	56.3	33.5	-----	78.5	78.5	55.5	55.5
399-2-12	C6189	ERT/electrodes characterization	Intact Lexan core	11	17-Jun	18-Jun	23-Jun	65.0	25	31	56	56.3	33.5	65.9	9.4	75.3	52	53
399-2-13[(b)]	C6190	ERT/electrodes characterization	Intact Lexan core	4	22-May	22-May	Complete	62.6	25	31.2	56.2	56.5	33.7	44.5	6.5	50.8	54	55.5
399-2-14[(c)]	C6191	ERT/ electrodes	Buckets	9	13-Jun	16-Jun	7-Jun	58.5	25	30.7	55.7	56.0	33.2	-----	93	93	52?	54.5
399-2-15	C6192	ERT/ electrodes	Buckets	17	25-Jun	25-Jun	28-Jun	61.0	25	31	56	56.3	33.5	-----	88.5	88.5	55	55
399-2-16	C6193	ERT/ electrodes	Buckets	15	24-Jun	24-Jun	27-Jun	62.0	25	31	56	56.3	33.5	-----	79.8	79.8	54	54
399-2-17	C6195	ERT/ electrodes	Buckets	8	12-Jun	13-Jun	19-Jun	63.0	25	31.2	56.2	56.5	33.7	-----	74.5	74.5	56.5	55.5
399-2-18[(d)]	C6196	ERT/ electrodes	Buckets	6	3-Jun	11-Jun	14-Jun	65.0	25	33	58	58.3	33.5	-----	95.5	95.5	57	57
399-2-19[(e)]	C6197	ERT/electrodes characterization	Intact Lexan core	3	20-May	20-May	Complete	60.8	25	31.3	56.3	56.6	33.8	66.5	0	66.5	57	54
399-2-20	C6198	ERT/ electrodes	Buckets	16	25-Jun	25-Jun	27-Jun	62.0	25	31	56	56.3	33.5	-----	80.6	80.6	55	55.5
399-2-21	C6201	ERT/ electrodes	Buckets	7	12-Jun	12-Jun	16-Jun	61.7	25	31.1	56.1	56.4	33.6	-----	79.4	79.4	55	55
399-2-22	C6202	ERT/ electrodes	Buckets	29	14-Jul	16-Jul	17-Jul	65.0	25.1	33.4	58.5	58.8	34.1	-----	72.3	72.3	56	58
399-2-23	C6207	ERT/ electrodes	Buckets	24	8-Jul	8-Jul	10-Jul	60.0	25	31	56	56.3	33.5	-----	78.3	78.3	55	55.5
399-2-24	C6208	ERT/electrodes characterization	Intact Lexan core	5	23-May	2-Jun	Complete	65.2	25	33	58	58.3	33.5	35	45.5	80.5	58	58
399-3-23	C6194	ERT/ electrodes	Buckets	28	10-Jul	10-Jul	13-Jul	65.0	25	31	56	56.3	33.5	-----	63.1	63.1	52.5	53.5
399-3-24	C6199	ERT/ electrodes	Buckets	27	9-Jul	10-Jul	12-Jul	65.0	25	31	56	56.3	33.5	-----	90	90	52.5	52.5
399-2-25	C6209	Deep microbiological characterization GW monitoring	Intact core and buckets	34	22-Jul	25-Jul	27-Jul	171.0	60	62	122	124.9	N/A	N/A	N/A	N/A	53	58
399-3-25	C6200	ERT/electrodes characterization	Intact Lexan core	10	16-Jun	17-Jun	20-Jun	65.0	25	31.6	56.6	56.9	33.1	63.8	7.7	71.5	57.5	57
399-2-26	C6210	Shallow GW monitoring	Buckets	14	23-Jun	24-Jun	26-Jun	62.0	5	30	35	59.4	N/A	-----	77.4	77.4	57	58

Table 3.1. (contd)

Well Name	Well ID	Function	Samples	Drilling Order	Start Drilling	End Drilling	Geophysical Logging	Total Depth (ft)	Length Screen (ft)	Top Screen Depth (ft)	Bottom Screen Depth (ft)	Bottom End Cap (ft)	Instrument Depth (ft)	% Recovery			Hanford/Ringold Contact Depth (ft)	
														Core	Grab	Total	Geologist Log	Gamma Log
399-3-26[f]	C6203	ERT/electrodes characterization	Intact Lexan core	2	14-May	15-May	Complete	66.0	20	32	52	52.3	33.5	51.5	16.5	68	52	52
399-2-27	C6211	Deep GW monitoring ERT/electrodes	Buckets	32	17-Jul	18-Jul	None	63.5	2	54.7	56.7	59.1	58.5	-----	67.7	67.7	57.5	-----
399-2-28	C6212	Intermediate GW monitoring	Buckets	21	27-Jun	30-Jun	None	65.0	2	42	44	56.3	N/A	-----	80	80	56.5	-----
399-3-27	C6204	ERT/ electrodes	Buckets	26	9-Jul	9-Jul	11-Jul	62.0	25	31	56	56.3	33.5	-----	84.7	84.7	50.5	50.5
399-2-29	C6216	Shallow GW monitoring	Buckets	18	26-Jun	26-Jun	None	61.5	5	29.7	34.7	55	N/A	-----	82.9	82.9	55.5	-----
399-3-28	C6205	ERT/ electrodes	Buckets	25	8-Jul	9-Jul	10-Jul	64.5	25	31	56	56.4	33.5	-----	79.8	79.8	55.5	56.5
399-2-30	C6217	Deep GW monitoring ERT/electrodes	Buckets	35	24-Jul	25-Jul	None	64.0	2	54	56	58.9	58.5	-----	95.3	95.3	55.5	-----
399-3-29	C6206	ERT/ electrodes	Buckets	22	30-Jun	30-Jun	3-Jul	64.0	25	31	56	56.3	33.5	-----	83.6	83.6	53	52.5
399-2-31	C6218	Intermediate GW monitoring	Buckets	12	19-Jun	20-Jun	24-Jun	63.0	2	42	44	56.4	N/A	-----	80.2	80.2	55.5	55.5
399-3-30	C6213	Shallow GW monitoring	Buckets	19	26-Jun	27-Jun	None	61.5	5	30	35	55.3	N/A	-----	82.1	82.1	55.5	
399-3-31[g]	C6214	Deep GW monitoring ERT/electrodes	Buckets	13	20-Jun	23-Jun	25-Jun	63.0	2	53.2	55.2	59.6	33.6/58.6	-----	76.2	76.2	55.5	55.5
399-3-32	C6215	Intermediate GW monitoring	Buckets	33	18-Jul	18-Jul	None	63.0	2	42.2	44.2	56.6	N/A	-----	54	54	56	-----

(a) Borehole was deepened to 67.5 ft (casing to 65 ft) to enable geophysical logging.
(b) Shallow refusal; offset hole 1 m east.
(c) Redrill out bottom of hole.
(d) Bottom bentonite seal bridged; redrill bottom.
(e) Tagline lost; redrill hole.
(f) Unintentionally drilled an extra 10 ft during final cleanout.
(g) No recovery 45–55 ft.
N/A = not applicable.

3.1 Drilling

The IFRC well field consists of 36 evenly distributed wells (Figure 3.2). The electrical-resistivity tomography (ERT) wells were spaced 10 m apart. At three locations, a tighter three-well cluster also was installed to monitor shallow, intermediate, and deep levels within the unconfined aquifer. All of the wells were drilled using the resonant sonic drilling method (Figure 3.5). One of the wells (399-2-5) at the eastern corner of the well field was a pre-existing well, drilled with the cable-tool method in 2007 to a depth of 131 ft (6 ft into the Ringold lower mud unit) as part of a volatile organic compound investigation (Peterson et al. 2008). Only a single deep well (399-2-25), a new microbiological characterization well, was drilled to the top of basalt bedrock at 171 ft depth. The remaining 34 wells were drilled to depths of 50–60 ft into the top of a fine-grained subunit of the Ringold Formation at the base of the unconfined aquifer. Drilling of the first new well (399-2-9) began on May 12, 2008. Drilling ended with well 399-2-25 on July 25, 2008 (Table 3.1). The total drilled footage for the 35 new wells was 2318 ft.



Figure 3.5. A resonant sonic drill rig was used to drill the 35 new IFRC boreholes.

A single string of 7-5/8-in.-0D (6-7/8-in.-ID) carbon steel casing was used to maintain an open borehole in the 34 shallow boreholes. During drilling, boreholes were advanced by vibrating a 6-in. core barrel into the formation to obtain intact core material below the bottom of the casing. Next, the casing was advanced, via sonic vibration, over the cored interval, and the hole was cleaned out to the bottom of the casing before the next core sample was collected. In a single deep well (399-2-25), three strings of telescoping casing were used to preclude aquifer intercommunication between the unconfined and deeper aquifers. Drilling details and other documentation for each of the new wells are provided in Appendices A, B, and D.

3.2 Sampling

More than 1100 geologic samples were collected for physical, chemical, or microbiological analysis from the 35 new IFRC wells (Table 3.2; Appendix C). Seven borings were preselected as characterization holes in which an attempt was made to collect continuous, intact (Lexan-lined) core via 5-ft-long split spoons (Figure 3.6 and Figure 3.7). Lexan core was collected also at selected intervals within the single deep borehole (399-2-25). Up to five core samples (1 ft long by 3-3/4 in. in diameter) were collected with each core run. The ends of the Lexan liners were geologically logged and photographed before the core ends were capped and sealed.

Table 3.2. Geologic samples by borehole

		No. of Sample Intervals				
Well Name	Well ID	Bulk Grab[a]	Lexan Core[b]	Smear-Zone Grab[c]	Microbiology	Total Samples
399-2-07	C6184	19		1	3	23
399-2-08	C6185	19		1	2	22
399-2-09	C6186	2	35	2		39
399-2-10	C6187	21		1	1	23
399-2-11	C6188	17		1	1	19
399-2-12	C6189	4	45	1	1	51
399-2-13	C6190	3	28	1		32
399-2-14	C6191	40		1	1	42
399-2-15	C6192	22		1	1	24
399-2-16	C6193	22		1	6	29
399-2-17	C6195	31		1	1	33
399-2-18	C6196	46		1		47
399-2-19	C6197		41	1		42
399-2-20	C6198	22		1	3	26
399-2-21	C6201	32		1	1	34
399-2-22	C6202	19			2	21
399-2-23	C6207	17		1	4	22
399-2-24	C6208	18	30	2	1	51
399-2-25	C6209	70	42	1	15	128
399-2-26	C6210	23		1	3	27
399-2-27	C6211	19		1	1	21
399-2-28	C6212	27			3	30

Shallow characterization wells.
Deep characterization well.
(a) Collected in 2-gal plastic buckets.
(b) Collected in Lexan liners, 1 ft long x 3-3/4 in. OD.
(c) Collected in 5-gal plastic buckets.

Table 3.2. (contd)

Well Name	Well ID	No. of Sample Intervals				Total Samples
		Bulk Grab[a]	Lexan Core[b]	Smear-Zone Grab[c]	Microbiology	
399-2-29	C6216	21		1	3	25
399-2-30	C6217	30	5	1	1	37
399-2-31	C6218	27		1	1	29
399-3-23	C6194	22		1	3	26
399-3-24	C6199	18			3	21
399-3-25	C6200	2	43	2	1	48
399-3-26	C6203	2	31			33
399-3-27	C6204	18		1	5	24
399-3-28	C6205	22		1	5	28
399-3-29	C6206	23		1	3	27
399-3-30	C6213	23		1	3	27
399-3-31	C6214	26		1	1	28
399-3-32	C6215	25		1	1	27
Total No. of Samples		752	300	34	80	1166

Shallow characterization wells.
Deep characterization well.
(a) Collected in 2-gal plastic buckets.
(b) Collected in Lexan liners, 1 ft long x 3-3/4 in. OD.
(c) Collected in 5-gal plastic buckets.

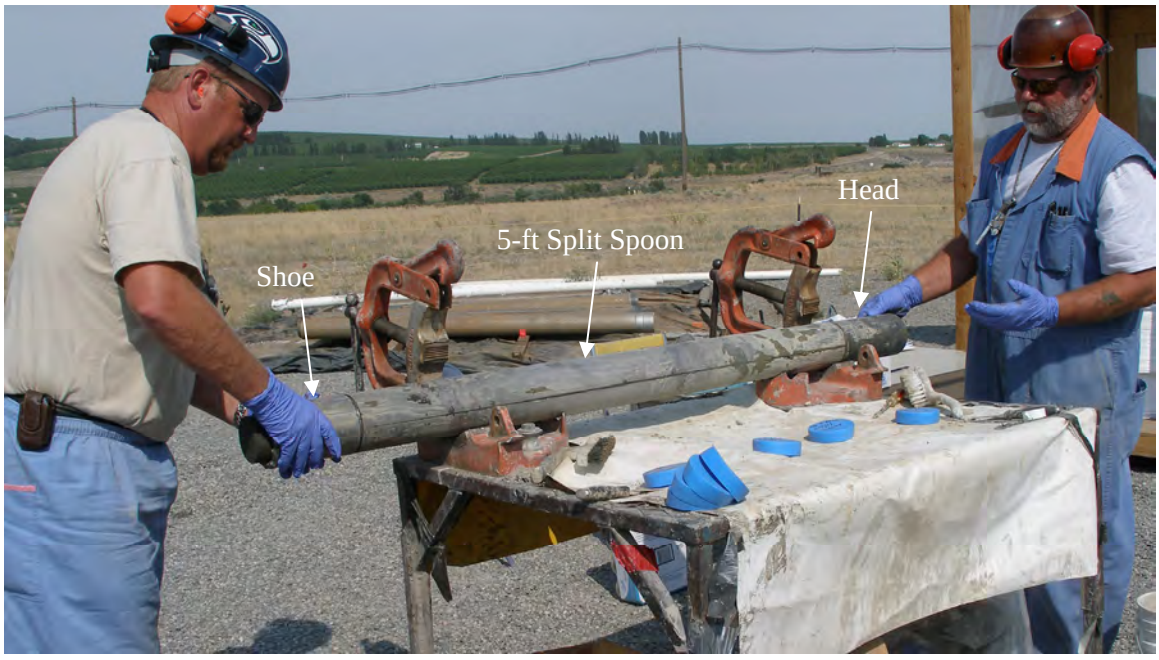

Figure 3.6. Sediment-filled split-spoon sampler. Notice cohesive Ringold Formation core protruding from shoe. Sediment core naturally expanded upon release of highly compressive drilling stresses.



Figure 3.7. Capped Lexan-lined cores were collected after the split-spoon sampler was opened.

In the remaining 27 shallow boreholes, bulk core samples were collected by emptying core runs directly from the core barrel into plastic sleeves approximately 2 ft long (Figure 3.8, left). After the plastic sleeves were sliced open, the sediment inside was geologically logged and photographed before it was transferred into 2-gal buckets (Figure 3.8, right).



Figure 3.8. Bulk core and grab samples were collected from all IFRC wells not sampled via split spoon. Sediment core (left) was extruded via sonic vibration out of the core barrel into a knotted plastic sleeve. For grab-sample collection (right), core was transferred from the plastic sleeve into labeled 2-gal plastic buckets. Each bucket held 2 to 3 ft of core.

An additional 34 special bulk grab samples were collected in 5-gal containers from the smear zone (zone of water table fluctuation between 25 to 35 ft depth) for most of the new IFRC wells (Table 3.2). All samples were carefully labeled, inventoried, and transferred to temporary storage onsite (Figure 3.9) or directly to PNNL laboratories.



Figure 3.9. Samples were stored temporarily within a locked seatainer on site. All samples were carefully labeled upon collection and later inventoried.

The more than 1100 samples collected included 300 intact Lexan-lined core samples and 752 bulk grab samples (Table 3.2). Sample recovery was fair to excellent. Core recovery in the seven characterization boreholes, which attempted to collect continuous, intact core samples inside the segmented Lexan-lined split spoon, generally ranged from 50% to 70%. In one borehole (399-2-24), core recovery was a poor 35% because the loose Hanford formation material kept falling out of the bottom of the split spoon upon retrieval. Core recovery improved significantly for the Hanford formation after a core catcher (Figure 3.10) was placed at the bottom of the split spoon.

Recovery of bulk grab samples that were emptied directly from the core barrel into plastic sleeves proved more successful (50–95%) when compared to split-spoon sampling. Core recovery using this method, albeit not preserving the primary fabric and structure, provided good-quality samples believed to be representative of the formation, both texturally and geochemically. Core recovery always improved upon encountering the cohesive and compact fine-grained sediments of the Ringold Formation in each of the holes, irrespective of sampling method. Sample inventory sheets for each of the new IFRC wells are located in Appendix C.



Figure 3.10. A plastic core catcher helped to keep loose Hanford formation sediments from falling out of the split spoon during core sampling.

3.3 Geophysical Logging

Downhole geophysical logging was performed on 29 of the 35 new wells (Table 3.1). Immediately after drilling to total depth and prior to well construction, logging occurred with the spectral-gamma logging system (SGLS) and neutron-moisture logging system (NMLS) geophysical logging tools (Figure 3.11). The NMLS was employed for only the vadose-zone portion, while the SGLS probe was used over the entire length of the logged boreholes. The single deep microbiology characterization borehole was logged three times, once for each temporary casing string (0–60, 60–120, and 120–167 ft). Of the nine multilevel groundwater-monitoring wells, only one borehole in each of the three-well clusters was logged with the SGLS and NMLS (Table 3.1). The decision to log only a single well in each cluster was made to save time and expense and reduce redundancy for boreholes that lay in proximity to each other.

Geophysical logs are a useful indicator of vadose-zone moisture as well as lithology and grain-size distribution of the suprabasalt sediments. Downhole geophysical logs for all new IFRC wells are located in Appendix G.



Figure 3.11. Downhole geophysical logging was accomplished through the temporary 7-5/8-in. (OD) steel casing via Stoller's spectral-gamma logging system.

3.4 Well Construction

All new wells were completed with 4-in.polyvinyl chloride (PVC) casing and 20-slot screens (see Appendices A and F). The 25 shallow wells not designated as groundwater monitoring wells were constructed with 25-ft well screens over the saturated interval of the Hanford formation. A single exception was well 399-3-26, which was installed with a shorter 20-ft screen. The three multilevel groundwater monitoring clusters each had 2-ft screens installed at the bottom and middle portions of the unconfined aquifer and 5-ft screens installed at the top of the unconfined aquifer. The deep microbiology characterization well (399-2-25) had a single 60-ft screen completed over the semiconfined Ringold Formation (Unit E) aquifer.

Special ERT electrodes in addition to thermistors were installed on the outside of the PVC to the bottom of the screen (Figure 3.12) in 28 of the 35 new wells. Excluded were the 6 shallow and 6 intermediate-depth groundwater monitoring wells (Table 3.1) and the deep microbiology characterization well (399-2-25).

During construction, the annulus of each of the 28 wells was filled with 10-20 mesh silica sand to within 2 ft of the top and bottom of the well screen (Figure 3.13). Above this was placed finer 40-140 mesh sand to within 10 ft of the surface. These specific materials were selected because an annulus filled with permeable sand is needed to maximize the functionality of the ERT and temperature sensors within the well. A coarser sand (10-20 mesh) was used across the screened interval to keep the sand from passing through the screen. Around the casing above the screen, a finer sand (40-140 mesh) that more effectively retains vadose zone moisture was used. See Figure 3.14 for a comparison of these two different sand sizes. Filter-pack sand was not placed in the annulus within 10 ft of the surface.

However, a waiver was granted by the Washington State Department of Ecology allowing for a less than the 18-ft surface seal stipulated in WAC 173-160, “Minimum Standards for Construction and Maintenance of Wells.”



Figure 3.12. ERT electrode and thermistor sensors and cables were affixed at regular intervals down the outside of the 4-in. PVC screen and casing. A centralizer (shown) placed at the top and bottom of the screen kept the screen centered within the well and prevented it from coming into direct contact with the formation.



Figure 3.13. Silica sand was added to the well annulus between the 4-in. PVC well casing and 6-7/8-in. (ID) temporary steel casing during well construction. Hydraulic casing jacks, located in center, were used to back pull the temporary casing during well construction.



Figure 3.14. Comparison between coarser 10-20 mesh silica sand (left), used around 20-slot well screens, and the finer 40-140 mesh sand placed in the annular space above the screen

Electrical-resistivity tomography and thermistor sensors were installed also around the outside of the deep groundwater monitoring wells. In these wells, 10-20 mesh silica sand was placed within 2 ft above and below the 2-ft well screen. Then a 5-ft bentonite seal was emplaced (via tremie pipe) above the screen before 40-140 mesh silica sand was installed to 10 ft bgs. The other six groundwater monitoring wells were installed as conventional wells with a continuous bentonite seal from near-surface to within 2 ft of the top of the screen. The sand was surged periodically during placement to settle and compress the sand pack, to eliminate the formation of any voids during installation.

Only one new well (the deep microbiology characterization well, 399-2-25) was completed above ground; the remaining 34 wells were installed as surface-mount completions (Figure 3.15). These consisted of a metal well vault encased into a 6-in.-thick cement pad at the surface. Removal of the metal well-vault cover permits access to the PVC well inside near ground level. A diagonal drain hole from the bottom of the well vault through the cement pad was installed to allow any excess condensation, rain, or snowmelt to drain out into the formation instead of collecting in the vault and possibly down the well. A 2-in. PVC conduit passing laterally through a side hole in the well vault to the outside of the surface cement pad was also installed to allow passage of the ERT and thermistor cables out of the well without interfering with closure of the protective vault cover. The compilation borehole summary logs (Appendix A) provide a graphic summary of the well construction details provided in Appendix F.

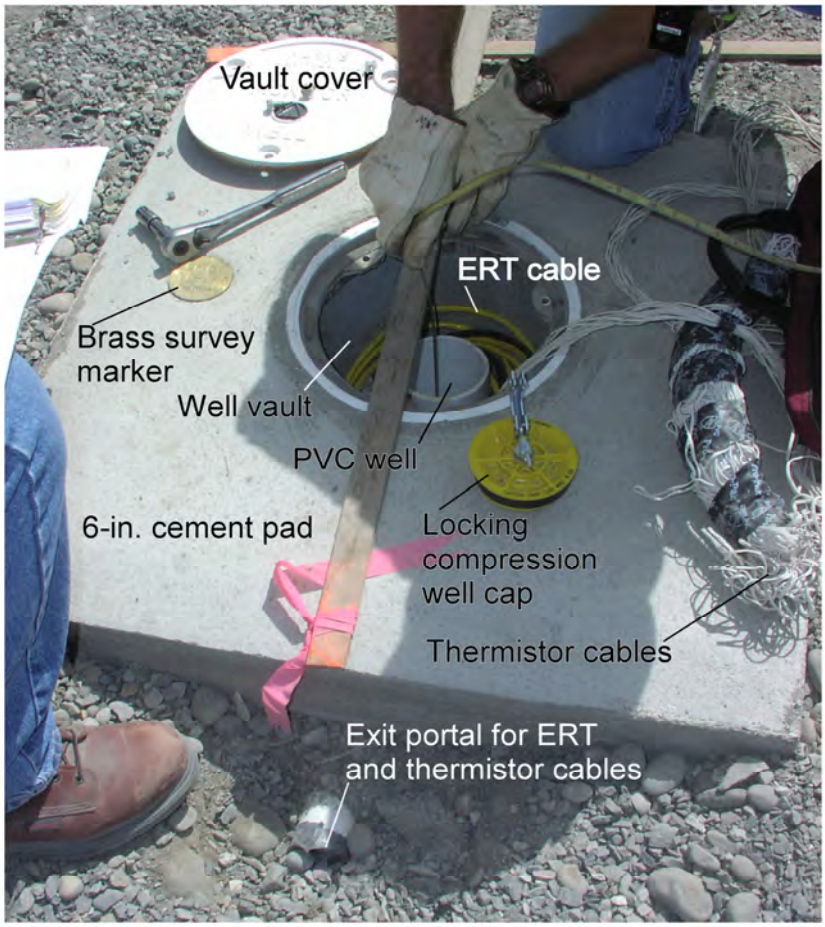

Figure 3.15. All but one of the new IFRC wells was completed at ground level to allow for easier and safer movement of vehicles and equipment across the crowded well field.

3.5 Well Development

After drilling and well installation, it was important to 1) flush out impurities in the well and sand pack, 2) replace the stagnant drilling slurry within the well with fresh formation groundwater, and 3) evaluate the hydraulic properties and integrity of the well. During well development, between 540 and 3700 gal of purge water were pumped from each well at rates from 20 to 90 gpm (Table 3.3). Purge water was pumped into a temporary storage tank (Figure 3.16), and transported to modu-tanks at the Purgewater Storage and Treatment Facility for evaporative storage and treatment.

Drawdown and recovery of water within the wells were monitored during development. In the first few wells, transducers were placed in one or more adjacent observation wells to detect any drawdown during pumping. This practice was discontinued when it became clear that no drawdown was likely because of the extremely high transmissivity of the Hanford formation.

In the 25 ERT wells, pumping was performed twice, at two separate points within the longer 25-ft well screens. With one exception (399-2-9), the upper part of the screened interval was pumped and developed first before the pump was lowered approximately 10 ft to the lower part of the screen. Pumping in the groundwater monitoring wells, on the other hand, was performed at only a single stage because of shorter screen lengths. More details on well development are presented in Appendix E.

Figure 3.17, a panoramic view of the IFRC wells during completion, illustrates the high density of the wells.



Figure 3.16. Water was pumped out of 4-in. PVC wells into a storage tank during well development.

Table 3.3. Well development data for the 35 IFRC wells

		First Pumping				Second Pumping				
Well	Screen Depth (ft)	Pump Intake Depth (ft)	Duration (min)	Rate (gpm)	Turbidity (NTU)	Pump Intake Depth (ft)	Duration (min)	Rate (gpm)	Turbidity (NTU)	Total Volume Pumped (gal)
399-2-07	31–56	40	30	50	1.16	50	15	86	2.66	2551
399-2-08	31–56	40	30	50	1.63	50	19	86	3.72	2849
399-2-09	33.5–58.5	50.9	38	30–60	4.89	40.9	27	60	6.79	3120
399-2-10	34.7–59.7	41	28	45.5	2.73	51	22	85.5	1.58	3281
399-2-11	31–56	41.3	33	50	6.64	51.3	41	87	6.29	3500
399-2-12	31–56	40	30	50–55	3.38	50	17	85	7.15	2834
399-2-13	31.2–56.2	39.6	24	49–53	2.57	49.6	29	60–80	3.34	3115
399-2-14	30.7–55.7	40	31	50–55	1.77	50	19	82–85	1.67	3146
399-2-15	31–56	40	30	50–55	3.42	50	19	86	3.49	3246
399-2-16	31–56	40	30	50	3.97	50	17	86	7.57	2864
399-2-17	31.2–56.2	40	31	50–55	1.96	50	19	86	2.41	3146
399-2-18	33–58	40	25	73	5.12	50	18	74	2.45	3157
399-2-19	31.3–56.3	42	31	50–64	5.02	53.7	23	50	4.14	2840
399-2-20	31–56	40	30	50	3.43	50	16	84	5.52	2839
399-2-21	31.1–56.1	40	20	50	0.98	50	13	74	5.20	3025
399-2-22	33.4–58.5	40.2	26	47	1.43	50.2	13	47	5.40	2209
399-2-23	31–56	40	30	50	2.41	50	18	86	4.49	2884
399-2-24	33–58	40.6	25	50	5.10	50.6	52	75–80	3.61	2860
399-3-23	31–56	41.5	32	50	1.38	51.5	16	68	3.46	3744
399-3-24	31–56	41.3	36	50	3.41	51.3	10	87	7.08	2500
399-3-25	31.6–56.6	40	34	50	2.85	50	15	85	3.95	2952
399-3-26	32–52	39.7	31	55–60	4.94	48.7	30	45–50	3.52	3280
399-3-27	31.4–56.4	40	30	50	1.13	50	16	84	0.97	2837
399-3-28	31.6–56.6	41	32	50	2.97	51	21	87	6.98	3500
399-3-29	31–56	40	26	50	1.79	50	10	84	2.79	2190
Shallow Groundwater Monitoring Wells										
399-2-26	30–35	41.5	41	30	1.82	– –	– –	– –	– –	1200
399-2-29	30–35	41	40	50	0.71	– –	– –	– –	– –	1877
399-3-30	30–35	40	31	20	3.78	– –	– –	– –	– –	656
Intermediate Groundwater Monitoring Wells										
399-2-28	42–44	43	35	20	12.30	– –	– –	– –	– –	627
399-2-31	42–44	40	53	20	5.02	– –	– –	– –	– –	768
399-3-32	42.2–44.2	41	29	18.5	7.99	– –	– –	– –	– –	537

Table 3.3. (contd)

Well	Screen Depth (ft)	First Pumping				Second Pumping				Total Volume Pumped (gal)
		Pump Intake Depth (ft)	Duration (min)	Rate (gpm)	Turbidity (NTU)	Pump Intake Depth (ft)	Duration (min)	Rate (gpm)	Turbidity (NTU)	
Deep Groundwater Monitoring Wells										
399-2-27	54.7–56.7	51	31	22.5–43	8.36	– –	– –	– –	– –	1543
399-2-30	54.4–56.4	50	35	26	1.44	– –	– –	– –	– –	1170
399-3-31	53.2–55.2	50	35	55	0.42	– –	– –	– –	– –	2080
Deep Microbiology Characterization Well										
399-2-25	31.6–56.6	70	57	20	16.20	– –	– –	– –	– –	1078



Figure 3.17. The high density of IFRC wells in various stages of completion

4.0 Hydrogeology

Sediments overlying basalt bedrock at the IFRC site belong to three geologic units: 1) backfill materials, 2) the Hanford formation, and 3) the Ringold Formation. The structure and relationships of these stratigraphic units, from oldest to youngest, are shown in Figure 4.1. The water table lies within the Hanford formation everywhere within the IFRC site (Figure 4.1). The locations of cross sections A-A' and B-B' are noted in Figure 4.2. More detailed cross sections (C through F) within the IFRC site are shown in Figure 4.3 through 4.6.

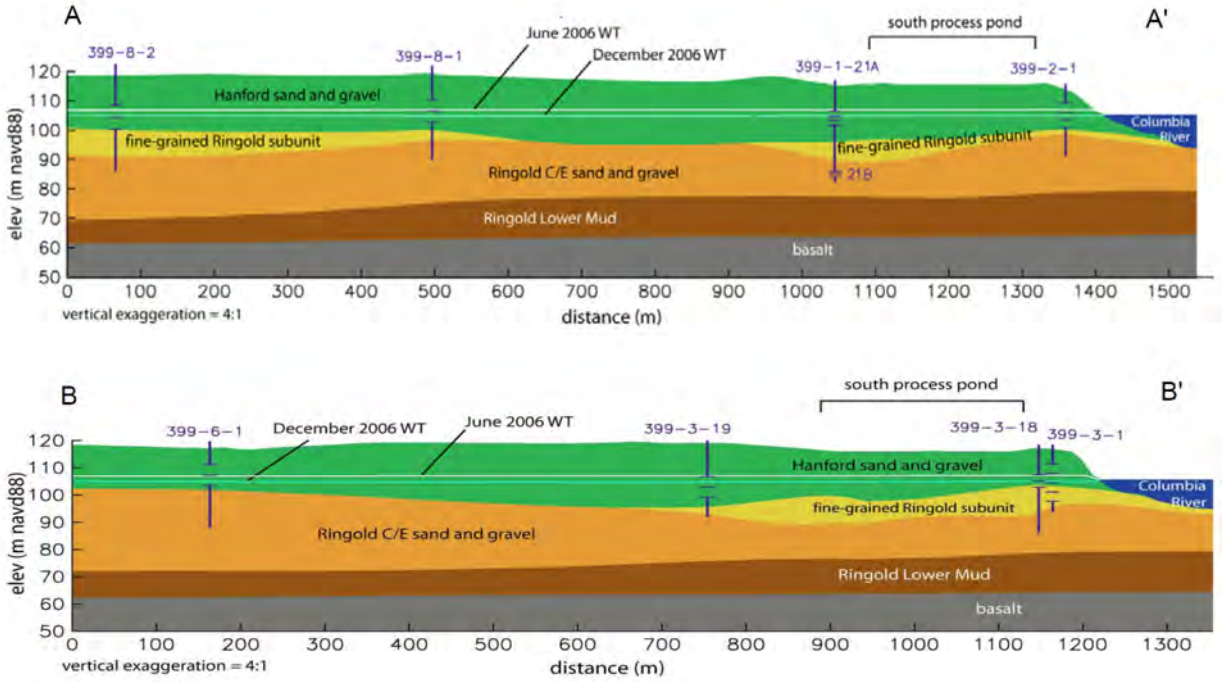

Figure 4.1. Cross sections through the 300 Area showing major hydrostratigraphic units (modified from Williams et al. 2008)

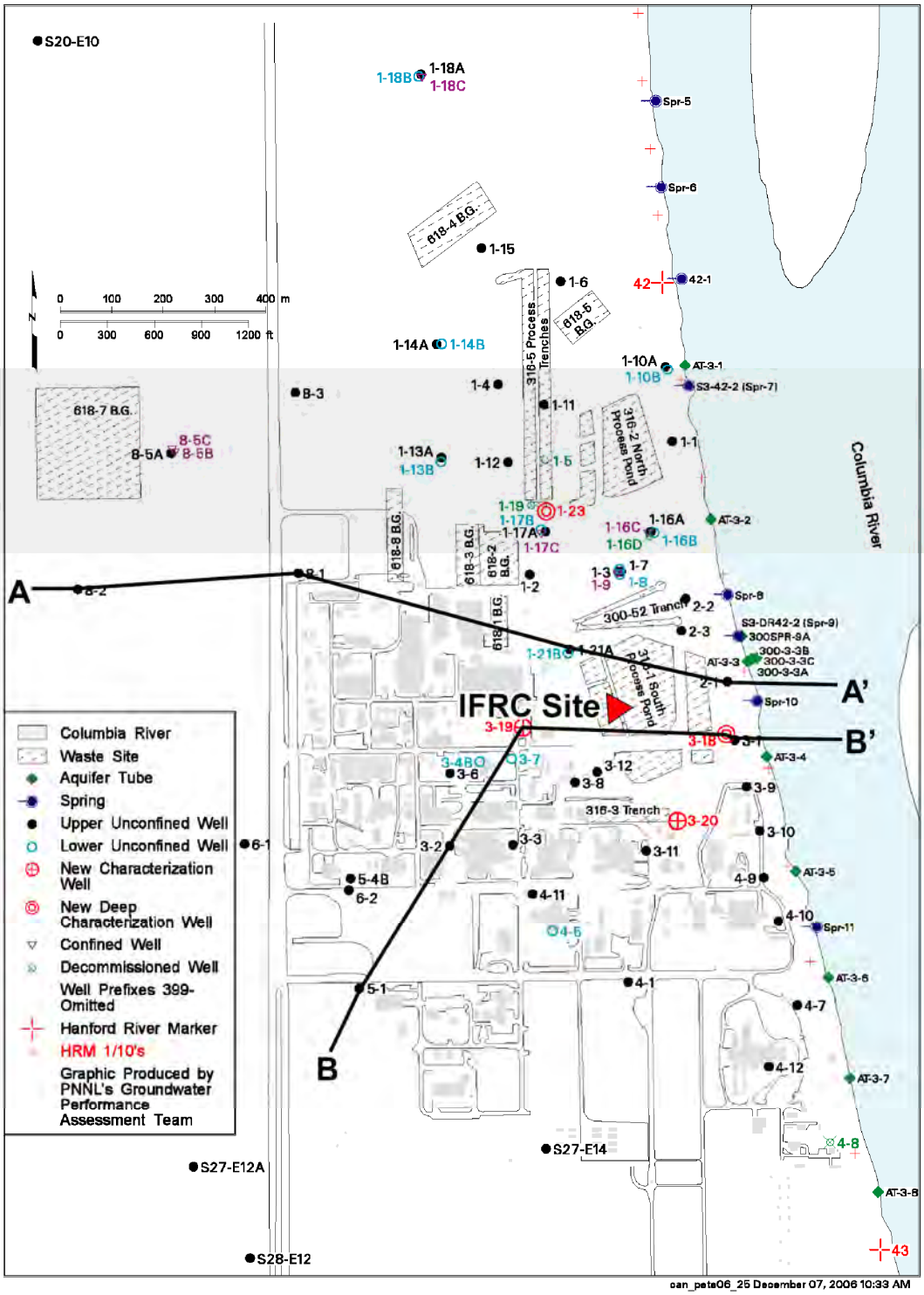

Figure 4.2. Cross section locations

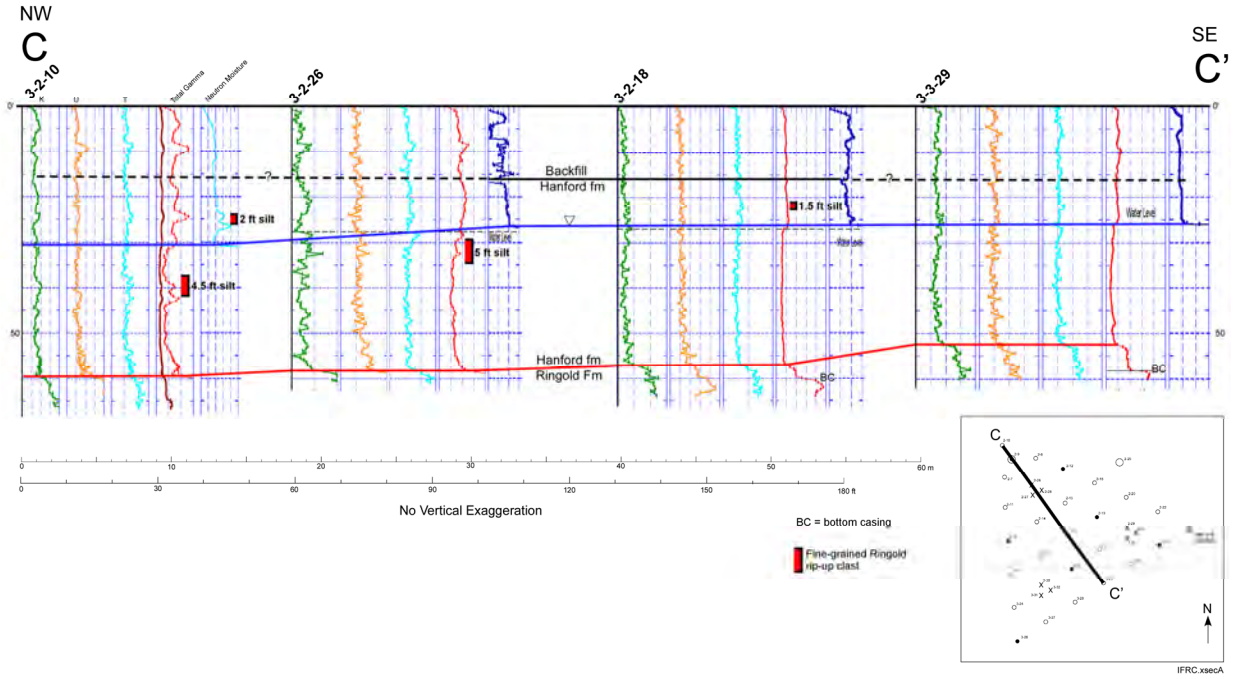

Figure 4.3. Hydrogeologic cross section C-C' based on geophysical logs

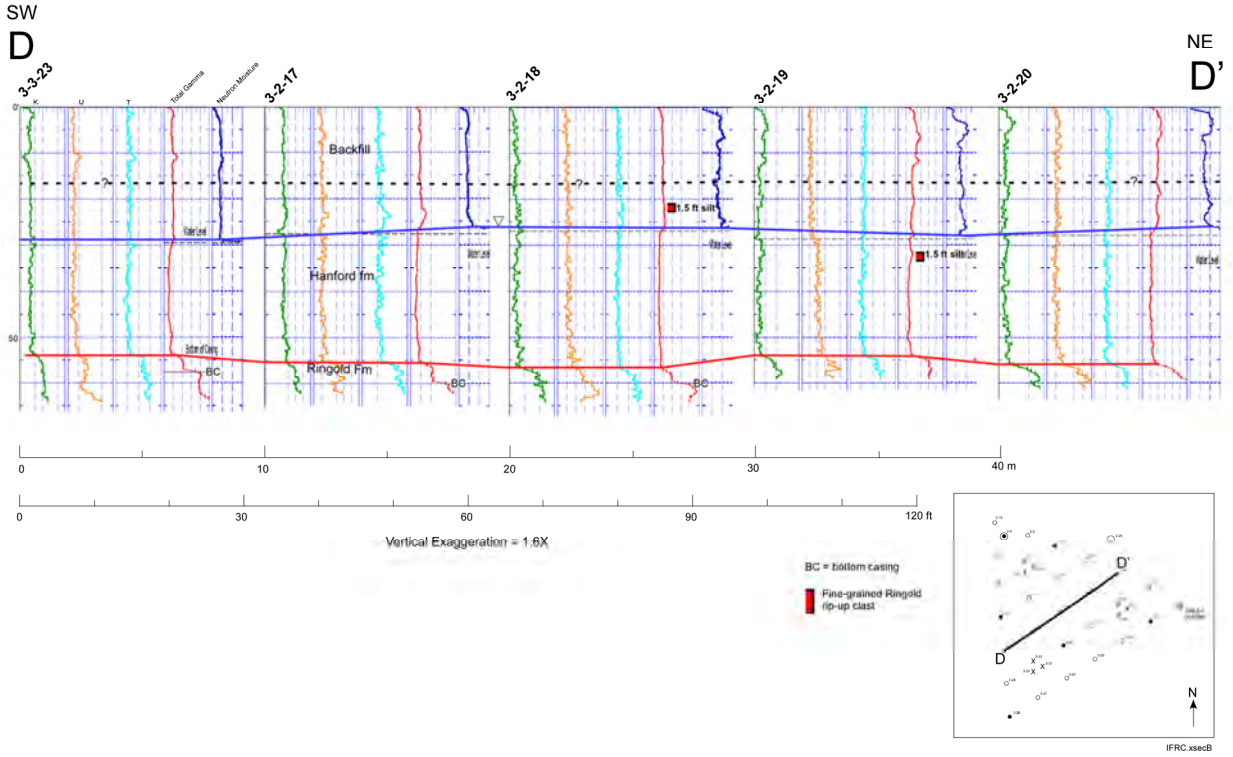

Figure 4.4. Hydrogeologic cross section D-D' based on geophysical logs

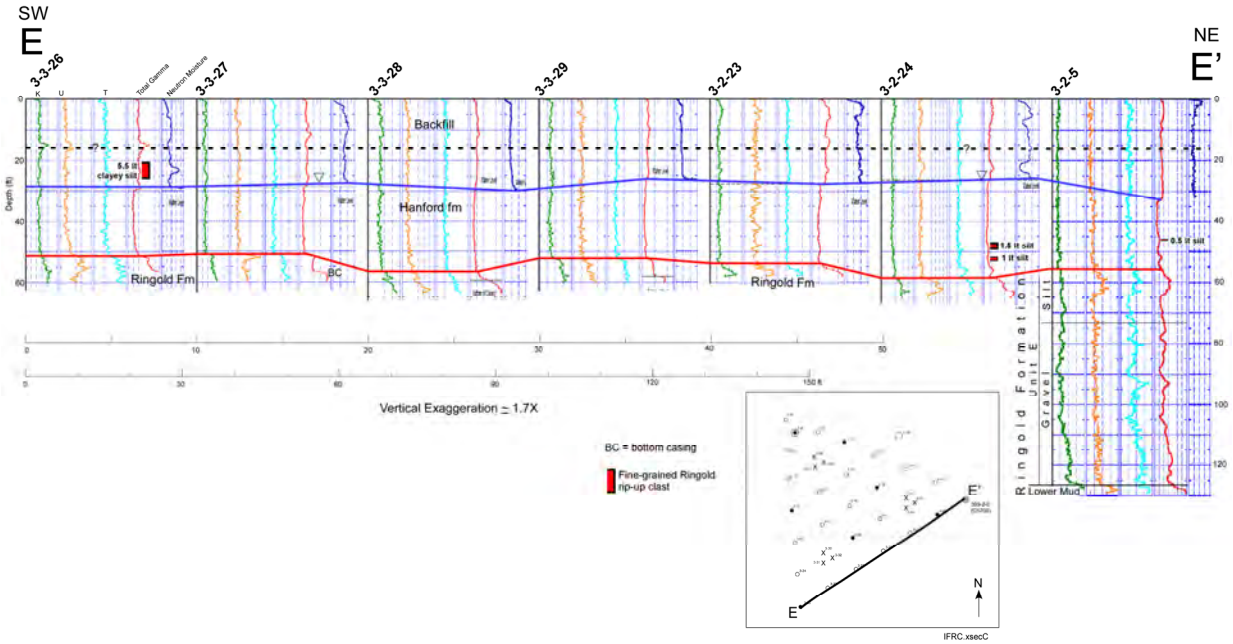

Figure 4.5. Hydrogeologic cross section E-E' based on geophysical logs

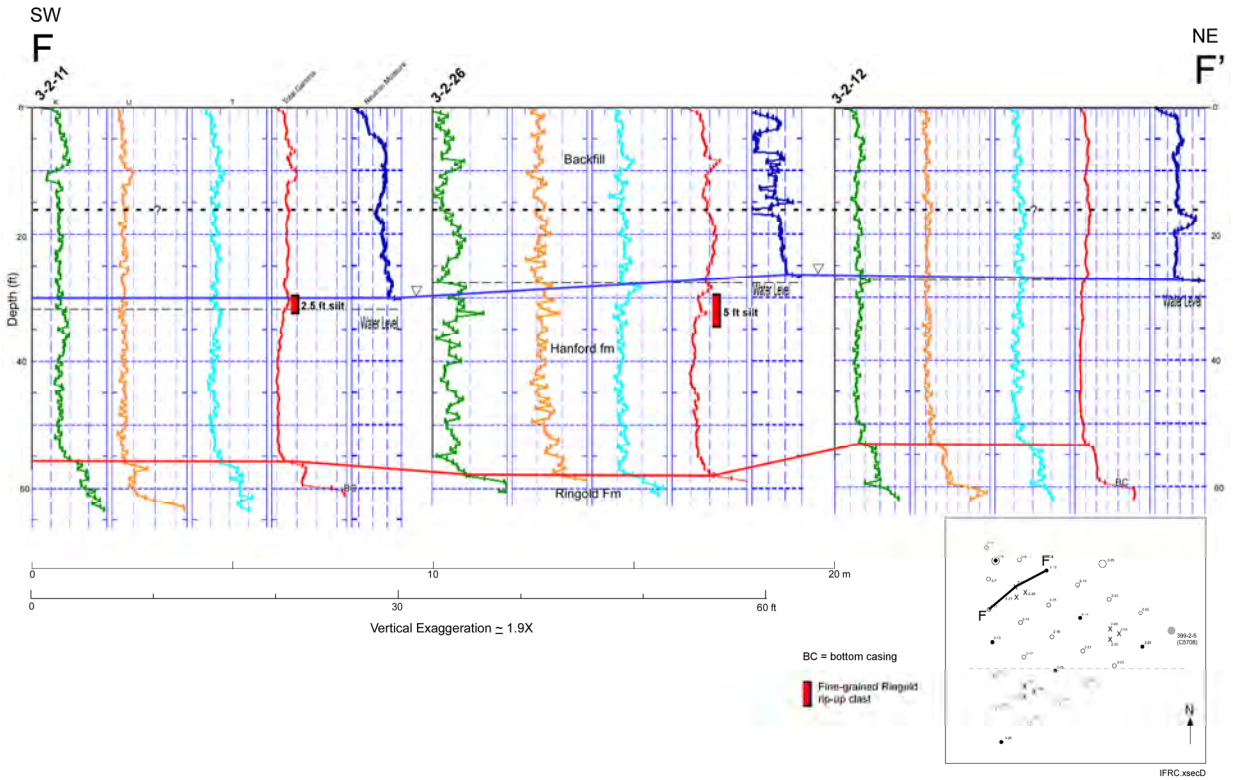

Figure 4.6. Hydrogeologic cross section F-F' based on geophysical logs

The stratigraphy and lithology of the suprabasalt sediments at the IFRC site are represented in Figure 4.7 for the single deep well (399-2-25) at this location. Close-up photographic images of the different units are presented in Appendix I within small chip tray samples collected for each well.

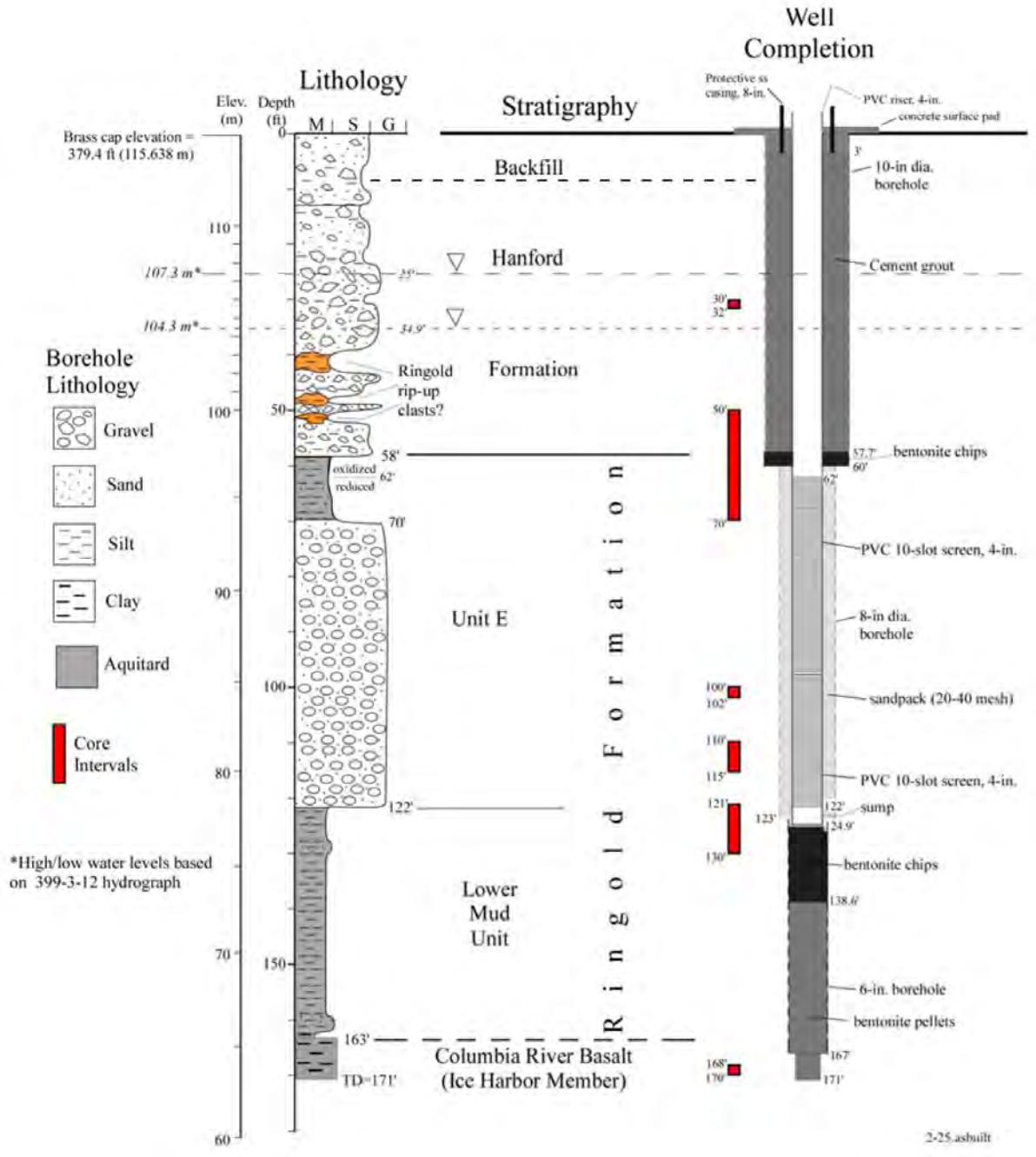

Figure 4.7. Stratigraphy and lithology represented in deep microbiology characterization well 399-2-25 (C6209). See also Compilation Borehole Summary Log in Appendix A.

4.1 Columbia River Basalt

Basalt bedrock lies approximately 160 ft deep beneath the IFRC site. The uppermost basalt flow in this area is the Ice Harbor Member, dated at 8.5 million years before present (DOE 1988). Near the top of the basalt, drilling slowed significantly through a hard, dense clay zone containing vesicular basalt fragments (Figure 4.8) before refusal was ultimately encountered at 170 ft bgs. The clay appears to be an alteration product due to an extended period of weathering of the basalt flow top prior to burial by the Ringold Formation. The color of the highly weathered basalt ranged from black through gray and green with occasional reddish iron-oxide stringers.



Figure 4.8. Core segment, weathered basalt of the Ice Harbor Member, from the bottom of well 399-2-25. The 1-ft-long Lexan-lined core consists of irregular fragments of black vesicular basalt in a highly weathered and green-gray mottled alteration-clay matrix. Light-colored material effervesces in contact with dilute hydrochloric acid, indicating the presence of calcium carbonate.

4.2 Ringold Formation

The Ringold Formation ranges in age from late Miocene to Pliocene (8.5 to 3.4 million years) and consists of mostly fluvial-lacustrine sediments laid down during tectonic downwarping and infilling of the Pasco Basin, one of many synclinal basins of the Yakima Fold Belt (DOE 1988).

Immediately overlying the weathered basalt surface are roughly 40 ft of dark-colored, fine-grained sediments (Figure 4.9) of the Ringold lower mud unit. These sediments are predominantly compact and cohesive, massive to weakly laminated, gray to gleyed-green and blue deposits that vary in grain size among clay, silt, and fine sand. Occasionally, dark fibrous fragments of decomposed wood were found preserved in the Ringold lower mud unit (Figure 4.10). This organic matter, in combination with the fine texture and structure of these deposits, indicates a fluvial-overbank and crevasse-splay origin.

Overlying the Ringold lower mud unit is coarser, gravel-dominated sediment, about 50 ft thick, belonging to the Ringold Formation (Unit E). This conglomerate unit, approximately 4.8 to 6.7 million years old (Lindsey 1995), is a compacted bimodal mixture of well-rounded and polished clast-supported pebbles and cobbles compacted within a matrix of fine to medium sand (Figure 4.11); variable amounts of silt or clay may occur within the matrix. Within each of the two modes, sediment sorting is moderate to good, with few particles from medium-sand to fine-pebble size. Sand grains within the matrix are predominantly felsic (i.e., composed principally of quartz, feldspar, and mica). Individual pebble and cobble-size clasts, especially those composed of basalt, often display clay skins and weathering (alteration) rinds. Colors within this unit are dark gray to black, indicating this unit is undergoing chemical reduction at the IFRC site. This sedimentary facies represents deposition within a high-energy, shallow, braided-stream (fluvial) environment (Lindsey 1995).



Figure 4.9. The Ringold lower mud unit at 160-ft depth in well 399-2-25 is predominantly a compact, homogeneous, dark greenish-gray, weakly stratified, fine sandy silt.

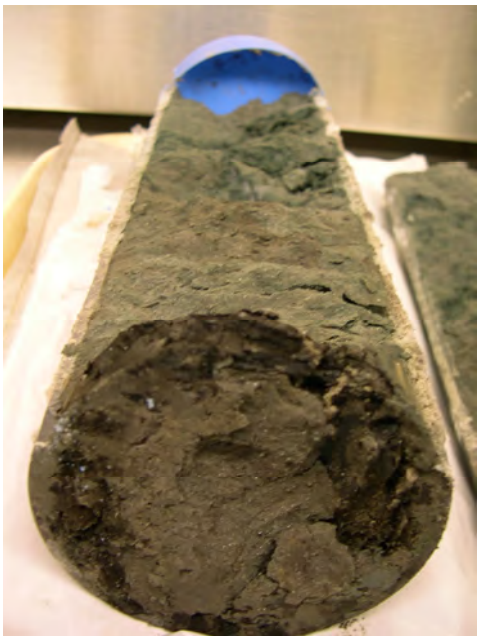

Figure 4.10. Dark fibrous wood fragments in laminated, micaceous, fine sandy silt of the Ringold lower mud unit at 129-ft depth, well 399-2-25

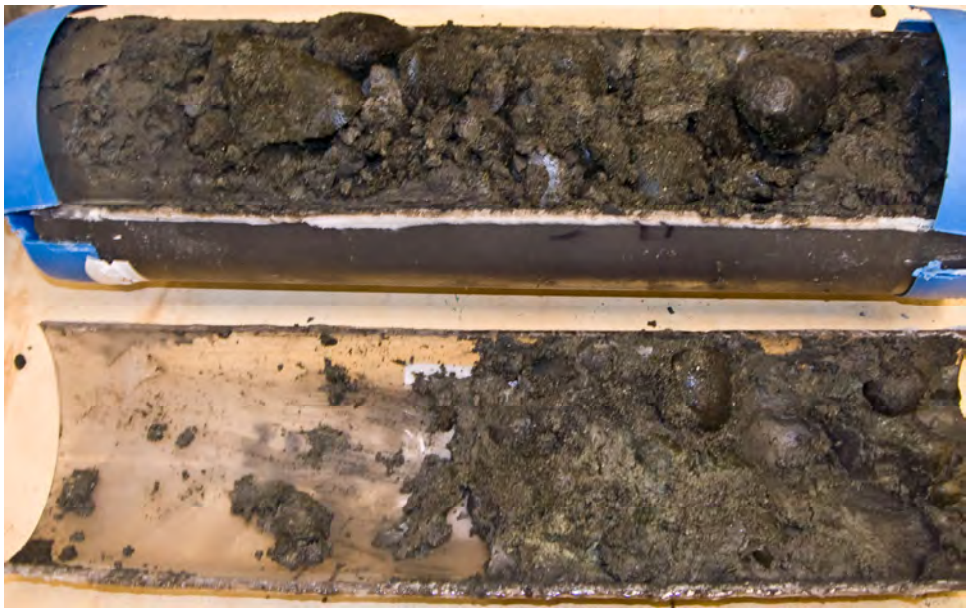

Figure 4.11. Ringold Formation Unit E. Silty sandy gravel of Ringold Unit E from the 110-ft depth in well 399-2-25.

Ringold Unit E gravel-dominated sediments are well exposed at the surface along the base of an erosional escarpment of the Ringold Formation along the White Bluffs (Figure 4.12). These exposures conveniently reveal the two-dimensional stratigraphic and structural characteristics of the sediments that cannot be observed in one-dimensional boreholes.



Figure 4.12. Ringold Formation Unit E conglomerate (member of Wooded Island [Lindsey 1995]) exposed near river level along the White Bluffs within 1 mile of the IFRC. Left: In the outcrop, these clast-supported, bimodal deposits may be crudely stratified and weakly imbricated, with occasional lenses of well-sorted fine- to medium-grained sand. Right: Light-colored pebble- to cobble-size clasts are mostly quartzite, granite, and gneiss; dark clasts are dominantly basalt, andesite, and volcanic porphyry (Campbell 1983). Note quarter for scale. Unlike the IFRC site, the Ringold Unit E in these outcrops has undergone chemical oxidation as indicated by a pervasive yellow-to brown iron-oxide stain, which coats all sedimentary particles. The vertical nature of the exposures signifies the semiconsolidated nature of these compacted and cemented sediments.

Overlying the Ringold Unit E is another fine-grained subunit of the Ringold Formation, up to 12 ft thick within the IFRC. This unit consists of a cohesive and compact, well-sorted fine sand grading upward into silty sand to silt (Figure 4.13). This is also known as the "fine-grained Ringold subunit" identified in previous reports (Williams et al. 2008; Peterson et al. 2008). Away from the IFRC site, the fine-grained Ringold subunit is locally absent or overlain by more of the Ringold Unit E gravel-dominated sediments, suggesting these fine-grained strata represent a discontinuous lens, stratigraphically equivalent to Ringold Unit E, within the 300 Area.

All but the top of these fine-grained strata show dark, chemically reduced shades of gray, green, and blue. At the top of the unit, however, is a rapid color change to shades of yellow, orange, or brown silt, up to 8 ft thick (Figure 4.14). The color boundary does not appear to occur along a textural or structural boundary because the sediments above and below the boundary appear to be lithologically the same (Figure 4.13, right). For this reason, it appears the color contrast is the result of oxidation along the boundary with the highly permeable and transmissive flood deposits (Hanford formation) that lie directly above.



Figure 4.13. Fine-grained strata at the top of the Ringold Formation. Left: core samples collected from 59.5- to 65-ft depth in reduced silts and fine sands of the Ringold Formation in well 399-2-25. Top of the core is to the upper right. Right: Sharp contact exists between oxidized pale-brown (left) and reduced dark greenish-gray (right) silt layers in well 399-3-30 at the 57-ft depth. Top of the core is to the left.

A map of the top of the reduced zone within the Ringold fine-grained unit is shown in Figure 4.15. The fact that the surface of the oxidized-reduced boundary conforms with the Hanford–Ringold contact suggests a diffusion front of more oxygenated groundwater permeates down into the low-permeability Ringold Formation from the highly transmissive Hanford formation. The oxidized zone at the top of the Ringold Formation (Figure 4.14) is generally about 2–5 ft thick, except to the north where it is up to 8 ft thick.

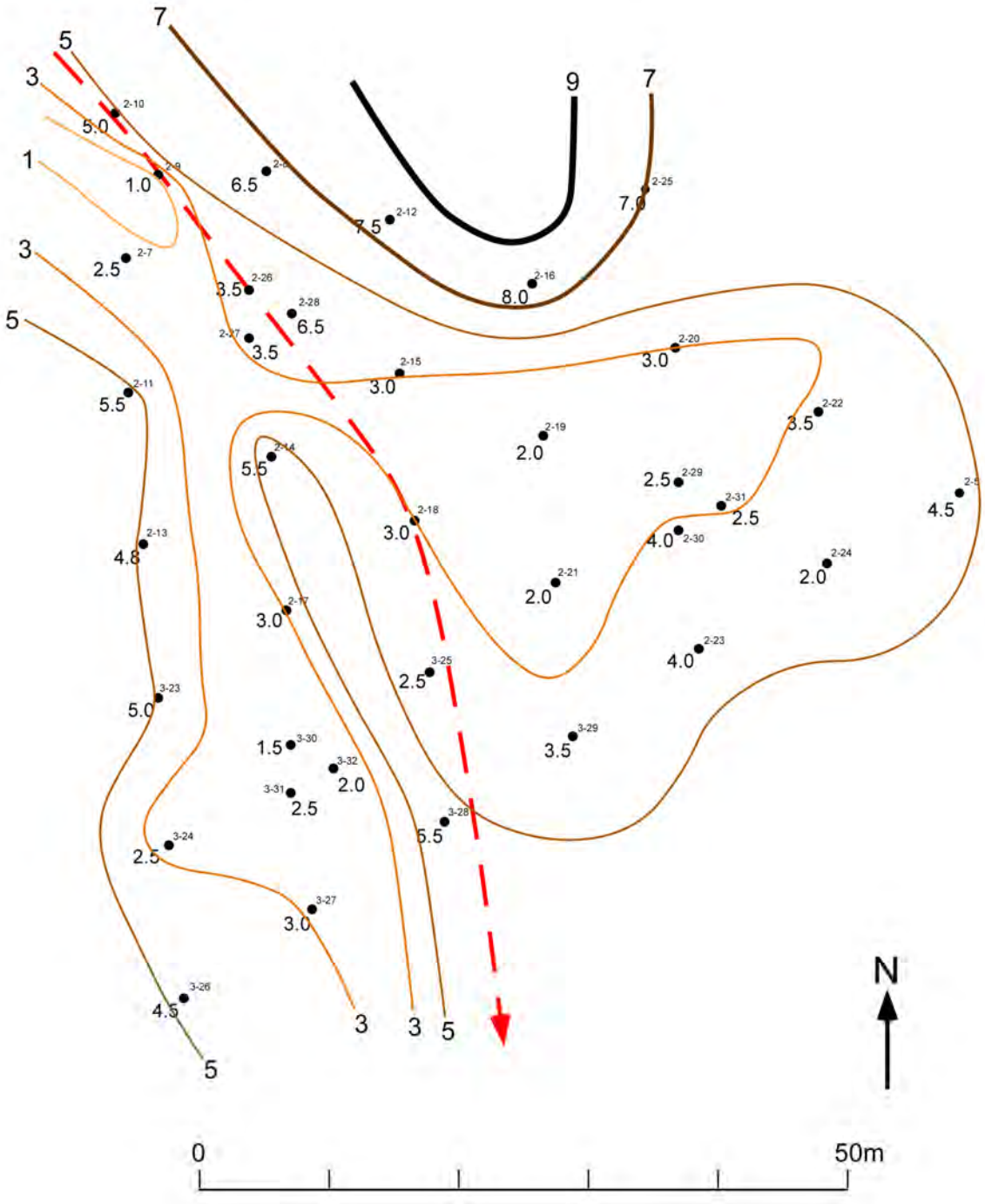

Figure 4.14. Isopach map showing the thickness of the oxidized zone atop the Ringold fine-grained unit beneath the IFRC site. The oxidized zone is thinnest parallel to, but not directly over, the paleochannel eroded into the top of the Ringold Formation (dashed arrow).

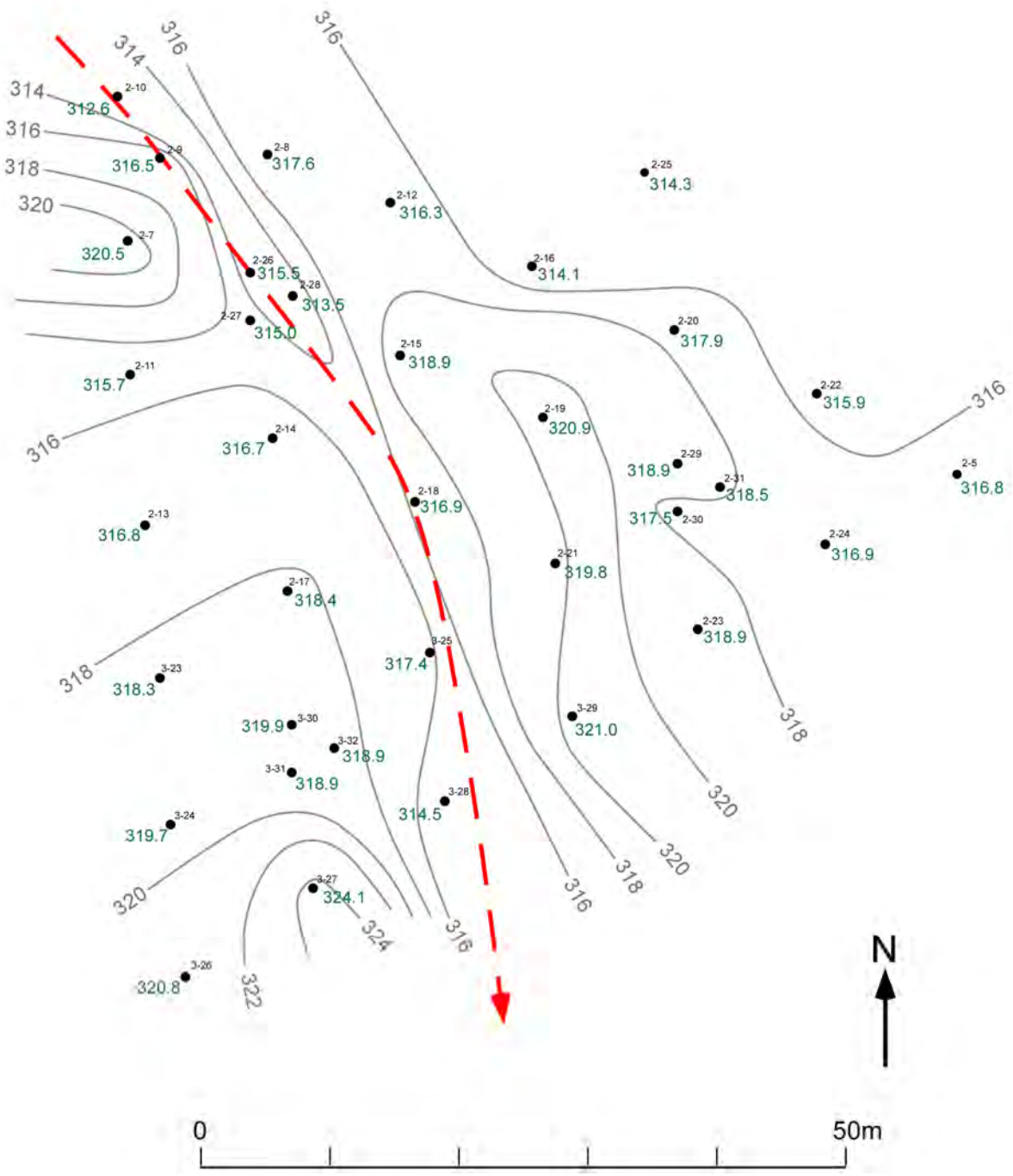

Figure 4.15. Structure contour map of the top of the reduced zone in the Ringold fine-grained unit. The top of the reduced zone generally conforms with a paleochannel (dashed line) eroded into the Ringold Formation.

4.3 Hanford Formation

Overlying the Ringold Formation beneath the IFRC site are up to 50 ft of heterogeneous sand and gravel with variable amounts of silt and clay of the Hanford formation. The Hanford formation encompasses all the sediments deposited during Pleistocene-age cataclysmic floods. Most Ice Age floods originated from periodic outbursts of glacial Lake Missoula, although some floods may have originated from other sources as well (Bjornstad 2006).

Repeated cataclysmic floods stripped away large volumes of Palouse loess, carved deep coulees into the underlying basalt bedrock, and created the Channeled Scabland of eastern Washington. All floodwater converged upon the Pasco Basin before being funneled through a single narrow outlet at Wallula Gap in the southeastern Pasco Basin. Floodwaters ponded temporarily behind this hydraulic constriction and formed Lake Lewis, which locally resulted in thick accumulations of flood deposits upstream within the Pasco Basin. As many as 100 separate flood events may have occurred during the last glaciation, although the exact frequency and number of floods is debatable. However, because no significant discontinuities have been observed within the Hanford formation sequence beneath the IFRC site (see Figure 2.4), it is possible that the entire sequence may have been deposited during the last Ice Age flood about 15,000 calendar years before present.

Each cataclysmic flood transported massive amounts of sediment, all within a period of a week or less. In the turbid column of floodwater was a stratified mixture of sediments being transported by the floods (Figure 4.16). At the base of the flow, along the sediment–water interface, floodwaters carried everything, from large boulders that bounced and rolled along the bottom to finer-grained particles (sand to clay), as tractive bedload. Above the zone of traction, however, only the small particles of sand, silt, and clay were entrained within the highly turbulent floodwaters.

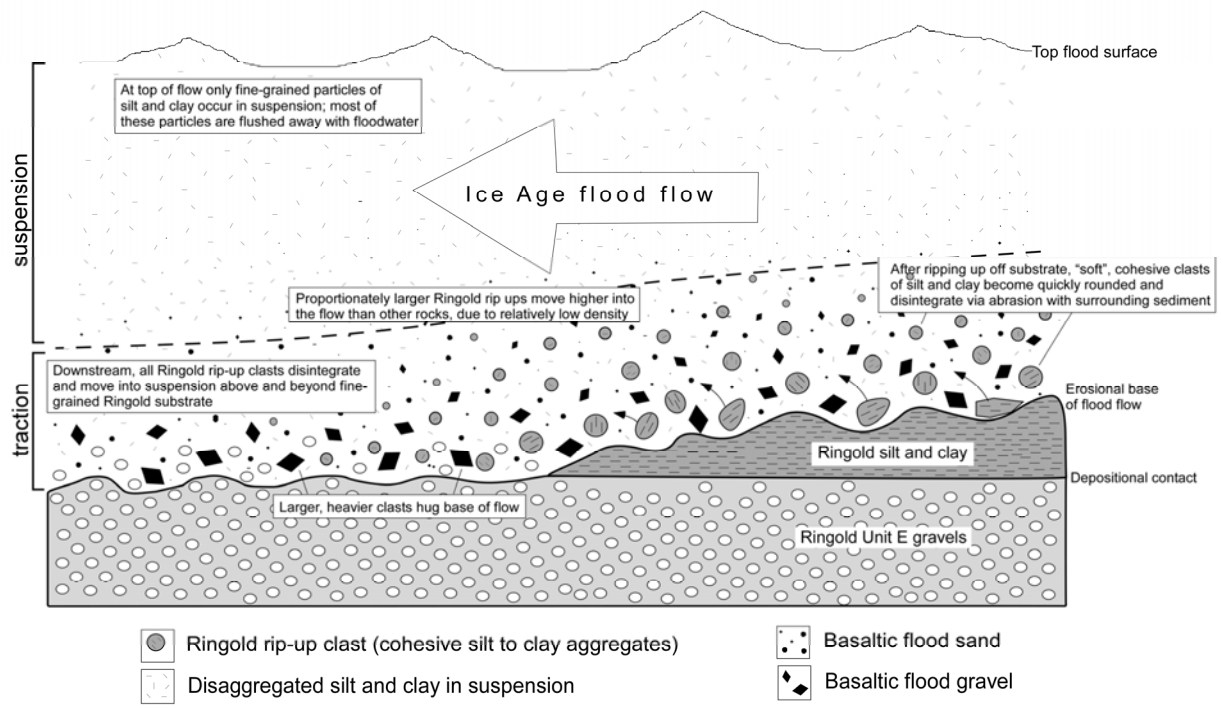

Figure 4.16. Model for sediment transport and stratification during an Ice Age flood

The Hanford formation in the 300 Area consists predominantly of unconsolidated sediments that cover a wide range in grain size, from boulder-size gravel at one end of the grain-size spectrum to clay at the other end. A poorly sorted mixture, dominated by gravel, with lesser amounts of sand and silt is the dominant lithology for the Hanford formation within the 300 Area (Figure 4.17).



Figure 4.17. Typical appearance of gravel-dominated facies of the Hanford formation within the 300 Area. The sediment is loose, composed of brownish-gray, clast-supported, poorly sorted, silty, sandy, pebble-cobble gravel. Clasts are mostly subangular to subrounded basalt; other clasts include granitics, gneiss, and quartzite as well as other volcanics. Some of the larger clasts were broken apart during sonic drilling, whereas most smaller clasts are unbroken, an indication that the sonic drilling method produces relatively representative samples for characterization. This grab sample was collected from the 20- to 22-ft depth in borehole 399-3-31.

The concentration of basalt rock fragments is much higher in the Hanford formation compared to the underlying Ringold Formation. This is especially true of the sand-sized fraction, which in the Hanford formation consists of up to 70–80% basalt compared to the sand fraction of the Ringold Formation, which typically consists of only 5–15% dark mafic grains. The reason for this is the Ice Age floods, which eroded the basalts underlying the Channeled Scabland of the Columbia Plateau. The Ringold Formation, on the other hand, is derived from mostly metamorphic and plutonic rocks eroded from the margins of the Columbia Plateau and transported to the Pasco Basin via the Columbia River.

Three facies exist for the Hanford formation in the Pasco Basin: 1) gravel-dominated, 2) sand-dominated, and 3) interbedded sand- and silt-dominated (DOE 2002). The gravel-dominated facies were deposited in the central portion of the basin adjacent to the present Columbia River, at lower elevations and where the energy during flooding was the greatest. The interbedded sand- and silt-dominated facies lie around the margins of the basin and in slackwater areas. The sand-dominated facies, which is the most voluminous facies at the Hanford Site, was deposited in the large area between the other two. The 300 Area, which lies at a low elevation adjacent to the Columbia River, received the full brunt of high-energy

floodwaters and therefore is composed exclusively of gravel-dominated facies of the Hanford formation. High-energy flood flows are indicated where a train of braided, anastamosing flood channels developed along the center of the basin (Figure 4.18).

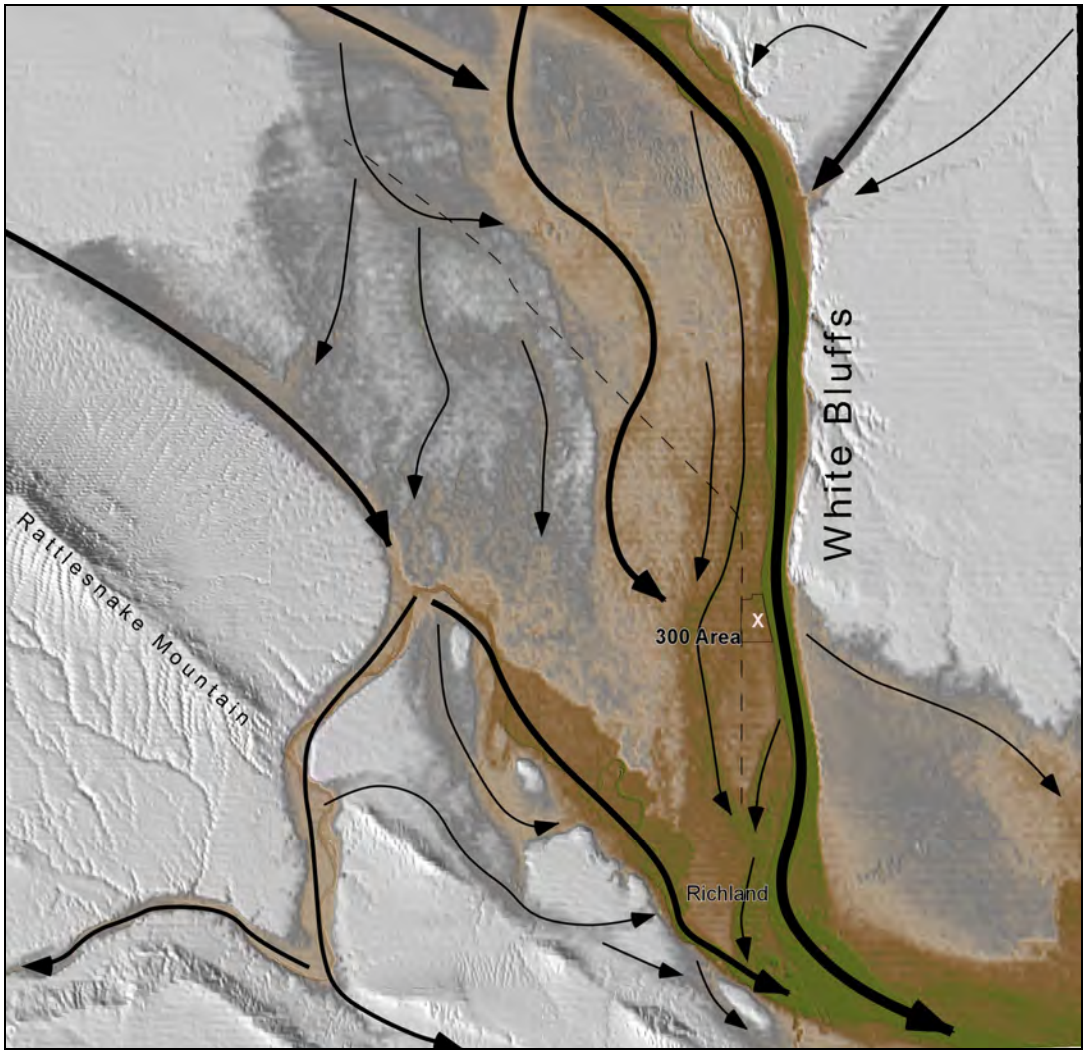

Figure 4.18. Network of interconnected braided channels created by the last cataclysmic Ice Age floods (arrows). During flooding, up to 900 ft of water submerged this entire landscape, except for the highest ridges like Rattlesnake Mountain. Channels were partially to totally backfilled with Hanford formation sediments during flooding. The IFRC site is marked with an X.

Flood deposits of the Hanford formation in the 300 Area are relatively heterogeneous and anisotropic. Some weak bedding and stratification were apparent in excavated pit exposures. However, because of the complex hydrodynamics involved in cataclysmic flooding, individual beds do not appear to extend very far laterally. For example, in Figure 4.19, most beds are discontinuous across the width of the trench.

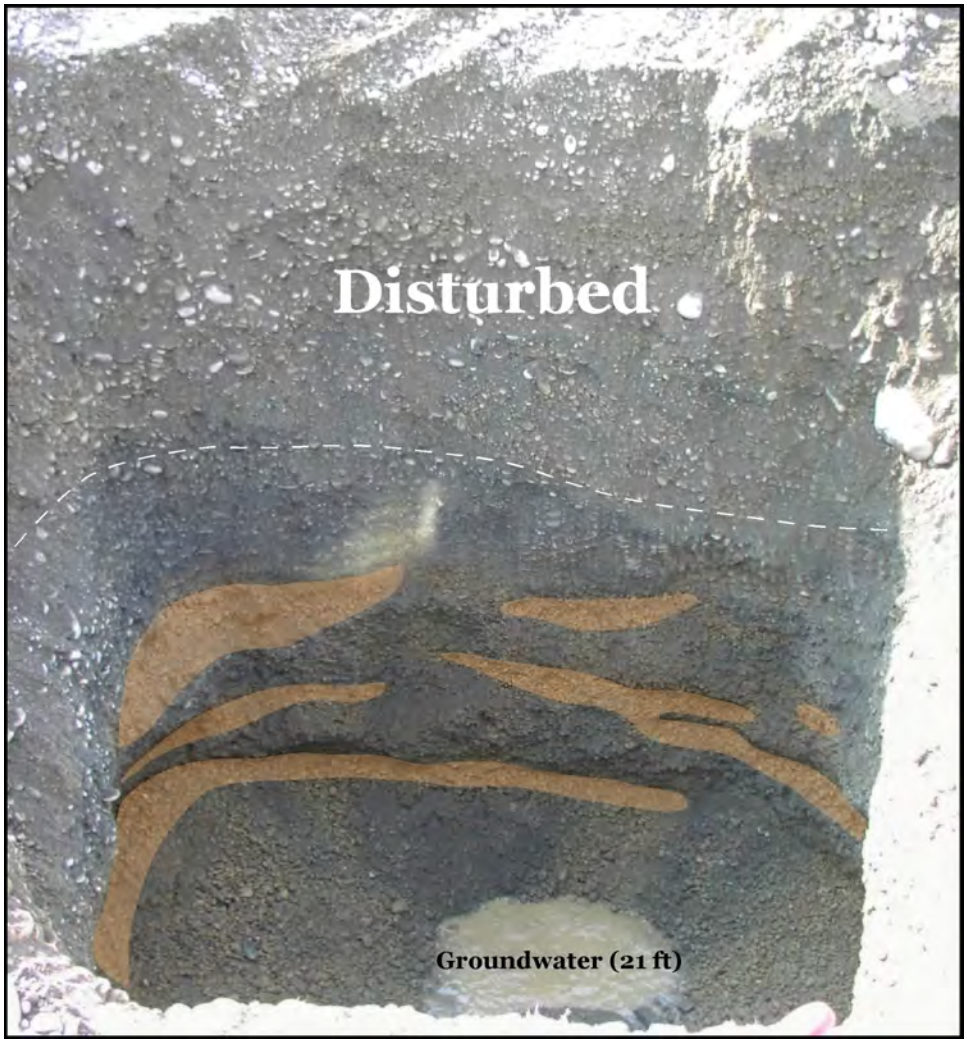

Figure 4.19. Profile of vadose-zone pit excavated in the east side of the South Process Pond (SSP#1) in 2003. Higher concentrations of oxidized, yellow-brown Ringold silt and clay matrix fill occur within subhorizontal layers (highlighted by artificial coloring). Matrix fill in nonhighlighted areas consists of predominantly higher-permeability basaltic sand with little or no fines.

Discordant clastic dikes (Fecht et al. 1999), which are common to the sand- and interbedded sand- to silt-dominated facies of the Hanford formation, rarely occur in the gravel-dominated facies, including the 300 Area.

A well-defined unconformity exists along the sharp contact between the coarse-grained Hanford and fine-grained Ringold formations. During the main onslaught, floodwaters scoured the Ringold Formation and eroded the surface before backfilling channels with coarse flood deposits during the waning stages of flooding (Figure 4.18). The topography on the top of the Ringold Formation is illustrated in Figure 4.20. The low area that runs diagonally across the IFRC site is interpreted as a channel eroded into the Ringold Formation during Ice Age flooding. The channel is filled with highly permeable Hanford formation sediments and underlain by low-permeability, silty sediments of the Ringold Formation. Therefore, it is a likely place for channelized flow of groundwater to occur.

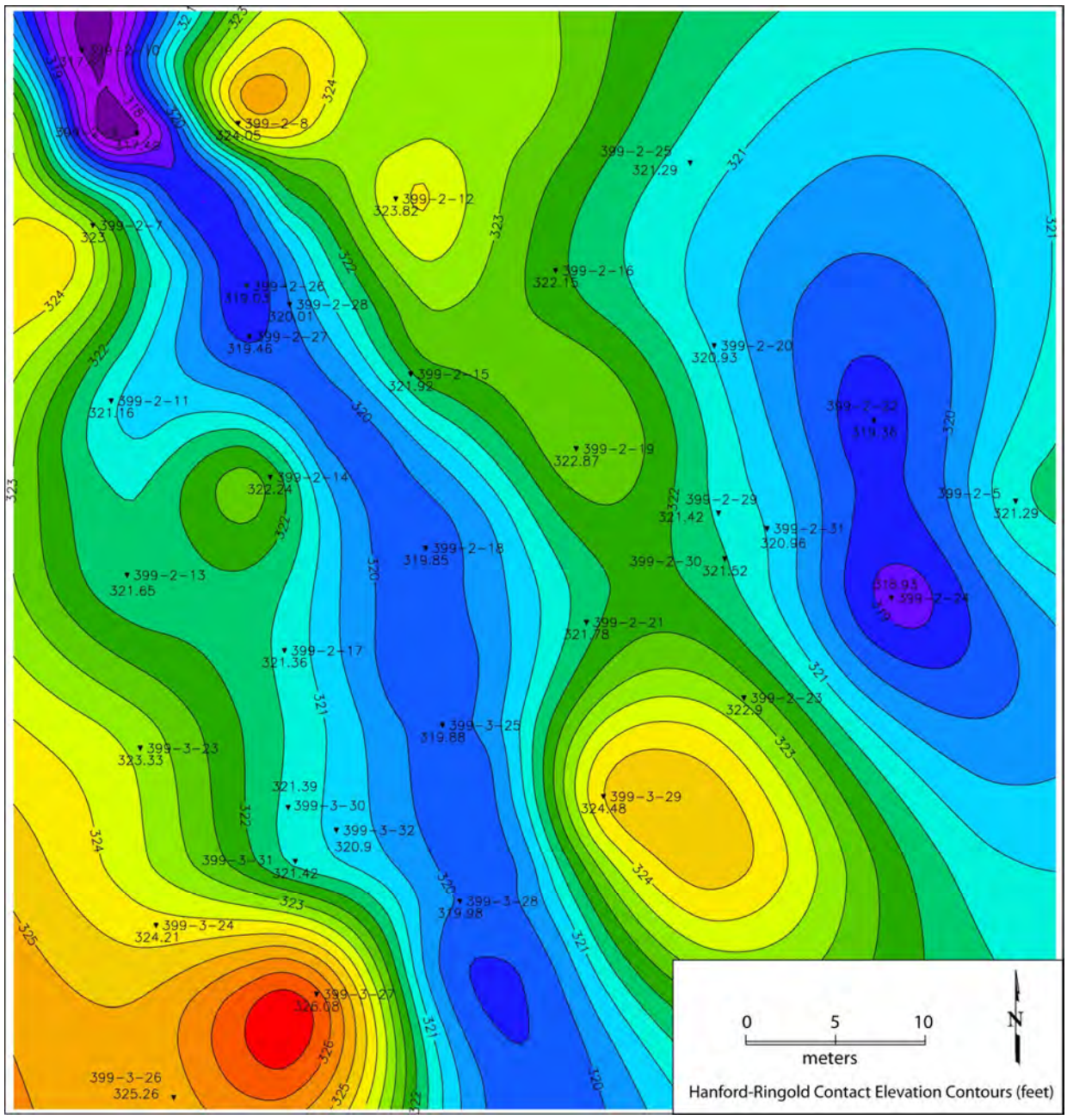

Figure 4.20. Structure-contour map illustrating the uneven, eroded surface of the Ringold Formation. A flood paleochannel appears to run midway, from northwest to southeast through the IFRC site. The channel is flanked with higher-elevation erosional remnants of the Ringold Formation.

In Figure 4.21 and Figure 4.22 are several images showing the sharp contact between the dark, coarse-grained Hanford formation and oxidized brownish silt at the top of the Ringold Formation.



Figure 4.21. Hanford–Ringold formations contact. Left: Contact lies between coarse basaltic sand and gravel in right-hand core and next core, composed of oxidized Ringold Formation silt at the 57-ft depth (well 399-2-25). Right: Loose, basaltic sand and gravel of the Hanford formation (foreground) overlie oxidized (middle) and reduced (background) greenish-gray silt of the Ringold Formation (well 399-3-28).



Figure 4.22. Sharp contact at the top of the Ringold Formation silt-dominated sediment in well 399-2-23 (left) and 399-2-14 (right). Notice the loose gravel in right-hand photo has little or no matrix.

Within the Hanford formation, loose, clast-supported, muddy sandy gravel is the predominant sediment type (see Figures 4.17 and 4.23). Lenses of matrix-supported gravelly sand occur sporadically. (The terms *mud* and *muddy* are used to describe undifferentiated silt- to clay-size particles.) The maximum size of gravels from the vadose zone observed in excavations within the South Process Pond (Bjornstad 2004) was boulders up to several feet in diameter (Figure 2.4). Roundness on basalt gravel clasts is usually immature (subangular to subrounded) because of relatively recent erosion, transport, and rapid burial of the locally derived basaltic detritus. Gravel clasts of other compositions (quartzite, granite, gneiss, and volcanic porphyries) are commonly more rounded as a result of reworking by the floods of older fluvial deposits (e.g., Ringold and Ellensburg formations).

The matrix filling between gravel clasts is highly variable. The matrix may be filled or partially filled with sand, silt, or clay, or may be absent altogether, creating an openwork fabric (Figure 4.23).



Figure 4.23. Gravel-dominated facies with openwork fabric within the Hanford formation. Left: Grab sample of loose, basaltic, pebble gravel was collected for microbiological characterization. Right: Clean, matrix-free pebble gravel on the right transitions to sandy, matrix-filled gravel to the left.

Occasionally the matrix fill consists of almost pure yellowish silt or clayey silt, apparently derived from reworked Ringold mud (Figure 4.24). Typically, however, silt and clay are not a major component of high-energy, gravel-dominated flood deposits (DOE 2002; Bjornstad 2006). This is because the fine particles of silt and clay tended to remain in suspension during the short-duration (week or less) high-energy Ice Age flood events. Floodwaters never slowed down enough for the fine particles to settle out of suspension before all the water flushed out of the basin. Coarser particles of sand and gravel, on the other hand, could settle out and were deposited during flooding because of their larger size and higher density.



Figure 4.24. Flood gravels with fine-grained, reworked Ringold Formation matrix in the Hanford formation. Left: Matrix of olive to yellow Ringold Formation silt may be derived from erosion beneath the IFRC site or upstream off the White Bluffs. Grab sample from well 399-2-14, 18- to 19.5-ft depth. Right: The matrix surrounding clast-supported gravel in this core consists of a mottled mixture of multi-genetic brown Ringold Formation silt and dark gray basaltic sand (well 399-2-25, 52-ft depth).

The IFRC site is different from most other locations, however, because it lies close to at least two sources of fine-grained Ringold Formation silt and clay. One source is directly beneath the site, and the other is the White Bluffs erosional escarpment immediately upstream (Figure 4.25). Thus, it appears that significant amounts of fine-grained Ringold Formation silt and clay were incorporated into flood deposits as Ringold rip-up clasts before the clasts had a chance to totally disaggregate and move into suspension with the floodwater (see Figure 4.18). Once in suspension, however, most fine particles of silt and clay were flushed out of the basin along with the ocean-bound floodwater.



Figure 4.25. Aerial view, looking northeast, toward the IFRC site. The White Bluffs are an erosional escarpment that exposes hundreds of feet of Pliocene-age, fine-grained sediments of the Ringold Formation. Ice Age floods flowed from the upper left and upper right. Photo: Bob Peterson (PNNL).

4.3.1 Ringold Formation Rip-Up Clasts

Unique to the flood deposits are rounded rip-up clasts of semiconsolidated, fine-grained Ringold Formation (Figure 4.26 and Figure 4.27). These include clasts of calcium-carbonate-cemented caliche as well as clasts of compacted mud, originally deposited during Ringold time in either floodplain-overbank or lake environments (Figure 4.28). These same types of sediment are exposed in the Ringold Formation within the White Bluffs immediately across the river as well as upstream of the 300 Area. Generally, Ringold rip-up clasts are larger than adjacent clasts (see Figure 4.18), reflecting their short transport distance and lower bulk density in contrast to lithified clasts. The rounded nature of rip-up clasts indicates they were transported as detrital “grains,” along with other materials, during flooding. In about half of the new wells (17 of 35) at the IRFC site, fine-grained rip-up clasts were encountered during drilling (see Appendix A).



Figure 4.26. Rounded rip-up clasts removed from a backhoe excavation in 2003 within SPP#2 at the south end of the IFRC site (see Figures 2.3 and 2.4). These boulder-sized clasts, composed of cohesive Ringold Formation silt and clay, were ripped off the White Bluffs escarpment just upstream of, or from beneath, the 300 Area during a cataclysmic Ice Age flood.



Figure 4.27. Interiors of two fine-grained Ringold Formation rip-up clasts removed by backhoe from beneath the South Process Pond in 2003. On the left is a well-laminated silt, originally deposited in a lake that filled the Pasco Basin between 3 to 5 million years ago. On the right is an olive-yellow silt with relict plant and animal traces from a Ringold Formation paleosol. Both sediment types are exposed in exposures of Ringold Formation in the White Bluffs, upstream of the 300 Area.

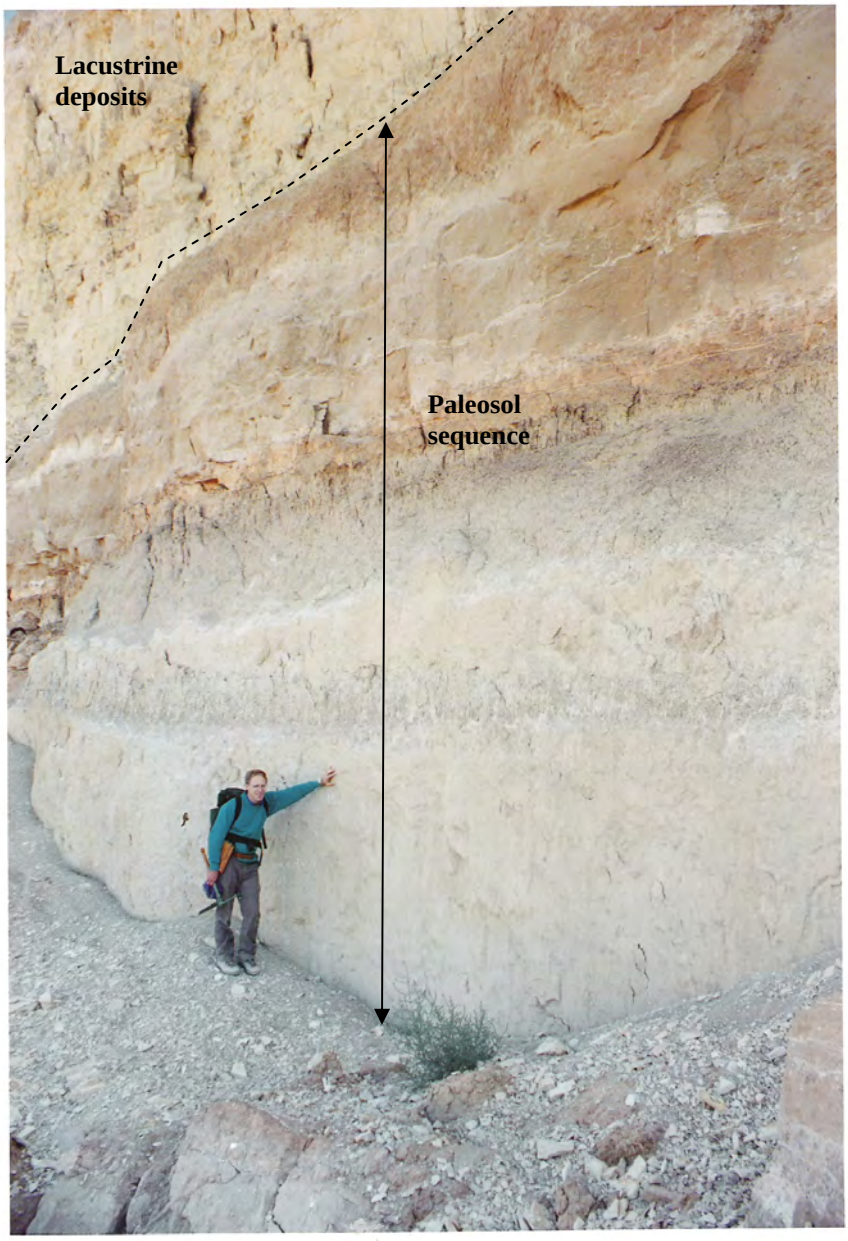

Figure 4.28. Olive to brown and yellow fine-grained upper Ringold Formation deposits (member of Savage Island) exposed upriver along the White Bluffs within a mile of the 300 Area. Here a thick paleosol sequence is overlain by laminated lacustrine (lake) deposits. Deposits like these are a probable source for the many reworked Ringold clasts observed within the Hanford formation in the 300 Area.

Two other examples of rip-up clasts identified in new IFRC wells are shown in Figure 4.29 and Figure 4.30.



Figure 4.29. Loose, basaltic pebbly sand overlies the top of a semiconsolidated Ringold Formation rip-up clast within the Hanford formation at 30- to 33-ft depth, well 399-2-14. This rip-up clast is similar to the oxidized silt of the Ringold Formation that directly underlies the IFRC site.



Figure 4.30. Portion of a 5.5-ft-thick semiconsolidated Ringold Formation rip-up clast, composed of cohesive clayey silt, in well 399-3-26 from 21- to 22-ft depth. The inclined lamination in this vertical drill core indicates this sediment was not deposited in situ but rotated in transit and redeposited during an Ice Age flood.

Because some contaminants (including uranium) may have an affinity for mud-sized particles, the character and distribution of concentrated fine-grained material in the subsurface has special relevance. Although clast-supported pebble- to boulder-size gravel is the dominant sediment size in the 300 Area, the matrix between gravel clasts varies significantly between relatively permeable gray to black basaltic

sand (Figure 4.27) and relatively impermeable brownish mud (see Figure 4.24). The sediment color is an indication of the type of matrix present. The color most often associated with coarse-grained facies of the Hanford formation is dark gray to black, due to a composition of mostly unweathered basaltic rock fragments eroded off the Channeled Scabland during Pleistocene flooding.

However, the character of the flood sediment is different in the 300 Area and unlike most other flood deposits, for it does have more concentrated fines in the form of rip-up clasts as well as beds with fine-grained, brown, matrix-filling Ringold Formation materials (Figure 4.24). The brown color, derived from the Ringold Formation, is the result of a much longer period of weathering—over many millions of years—compared to the Hanford formation, which is only about 15,000 years old. As mentioned, the fine-grained Ringold matrix is unusual for the Hanford formation and probably the result of the 300 Area being directly across the river and just downstream of an abundant supply of Ringold detritus during Ice Age flooding (see Figure 4.25). It is possible that some of the brown fine-grained intervals may be associated with concentrations of Ringold rip-up clasts that disintegrated during or soon after deposition by the floods. Rip-up clasts are relatively unconsolidated and, not surprisingly, do not survive flood transport far from their source (see Figure 4.16), which explains why they are not observed far inland of the 300 Area and the Columbia River.

4.4 Man-Made Backfill

The contact between backfill and Hanford formation is difficult to discern based on drill cuttings or geophysical logs because the texture of the sediments is essentially the same (compare Figure 4.32 with Figure 4.17). The contact is apparent, however, based on photographs of several backhoe pits excavated in 2003 (see examples in Figures 2.4 and 4.19). Disturbed sediments appear relatively homogeneous with no visible structure; this is in contrast to the in situ Hanford formation, which shows sedimentary fabric in the form of layering, stratification, and clast imbrication.

Based on these photographs, the zone of anthropogenic disturbance extends below the bottom of the process pond excavation. Movement of heavy equipment and other disturbances at the base of the excavated ponds caused disturbance for up to several meters below these excavations. Thus, there may be only a few meters of undisturbed Hanford formation sediments within the vadose zone along the western side of the IFRC site.

The 300 Area process ponds were used for the disposal of uranium-contaminated wastes between 1943 and 1975. Contaminated soils were selectively removed from beneath the ponds from 1994 to 2005. The configuration of the uneven bottom of the process ponds at the end of remediation is shown in Figure 4.31. After remediation, excavations were backfilled with locally derived gravel-dominated sediments of the Hanford formation. Following backfilling, the surface was brought up to a common elevation of about 115 m (377 ft).

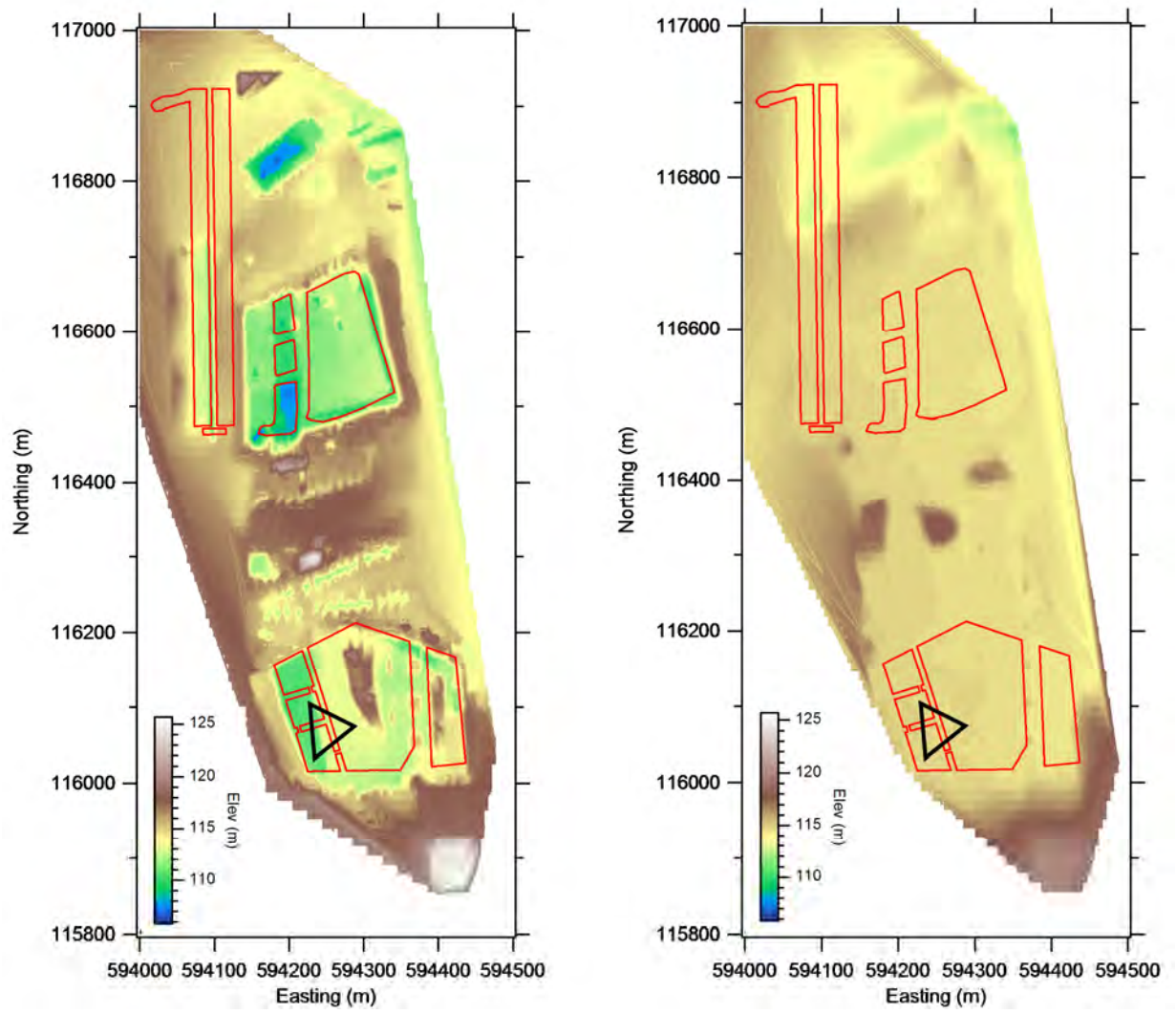

Figure 4.31. Surface topography in the vicinity of the 300 Area process ponds and trenches. Left: topography after remedial excavation and prior to emplacement of backfill. Right: surface as it exists today after remediation and backfilling. Triangle shows the location of the IFRC well field over the southwestern corner of the South Process Pond. Elevation of the land surface over the former South Process Pond today is about an even 115 m (377 ft).

Backfill materials consist of grayish-brown, poorly sorted, homogeneous mixtures of loose basaltic gravel and sand with lesser amounts of silt (Figure 4.32), derived from excavated and mixed, gravel-dominated facies of the Hanford formation. Figure 4.31 (left) shows the South Process Pond was not excavated to a constant depth. Therefore, the thickness of the backfill varies across the IFRC site. For example, the depth of remedial excavation went to approximately 110-m elevation on the west side in contrast to only about 113 m on the east side of the IFRC site. This translates to a backfill thickness of about 5 m (~16 ft) on the western side and approximately 2 m (~7 ft) along the eastern side of the IFRC site.



Figure 4.32. Backfill materials from 2- to 5-ft depth in well 399-2-11. This material is very similar to that of the Hanford formation from which it is derived. However, backfill sediments are likely more isotropic than the Hanford formation because the sedimentary fabric (horizontal to subhorizontal layering and stratification) was destroyed during excavation and backfilling.

5.0 References

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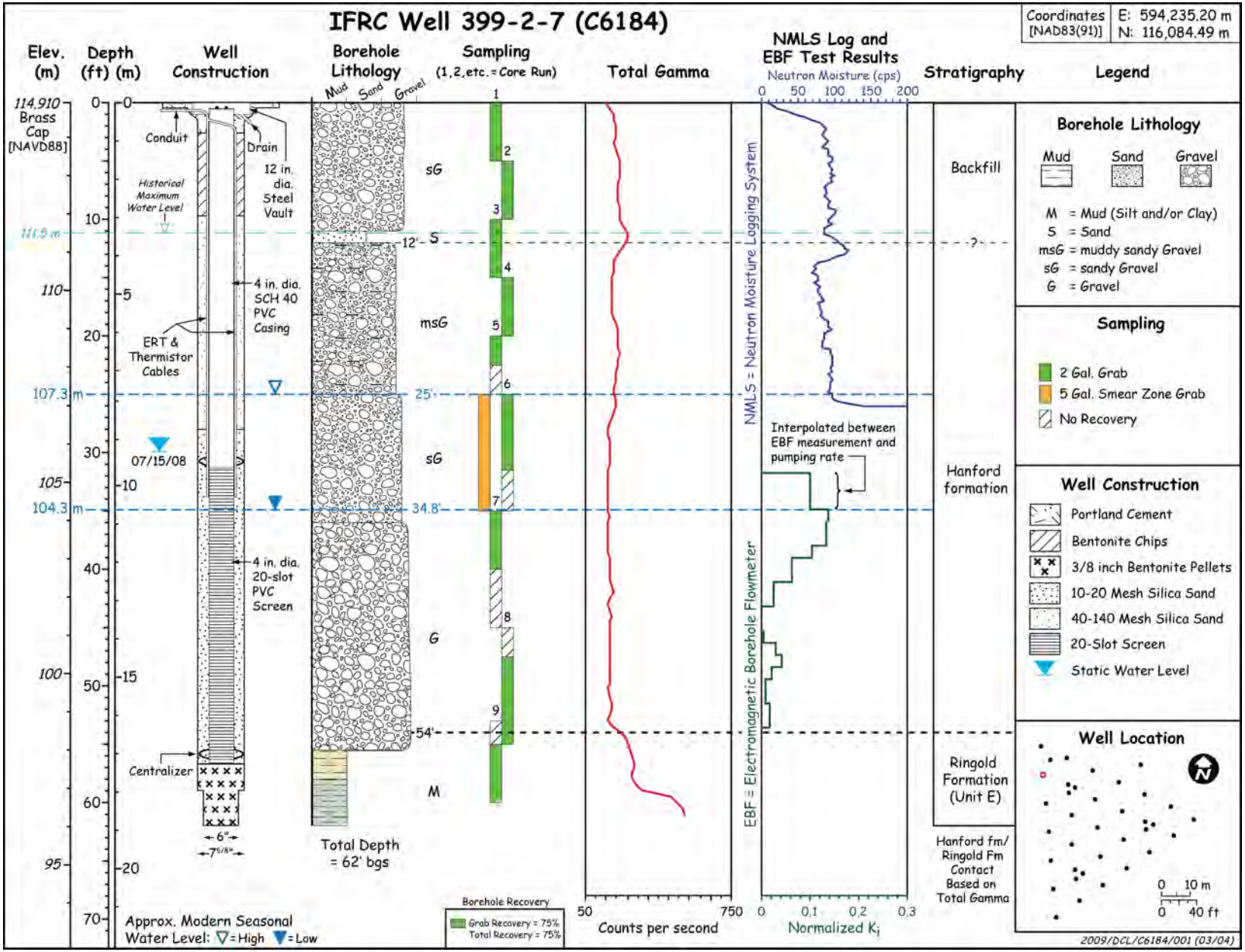
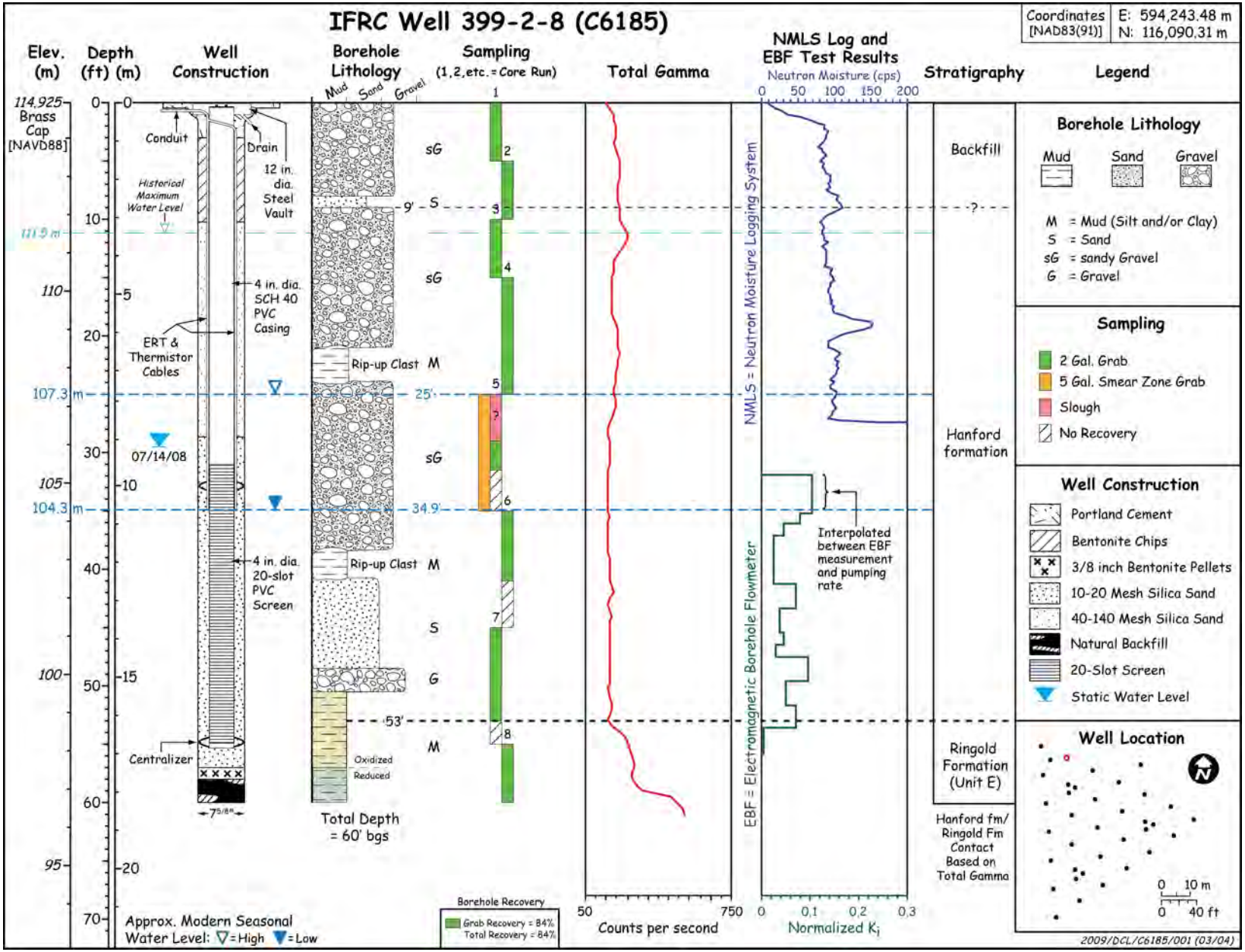
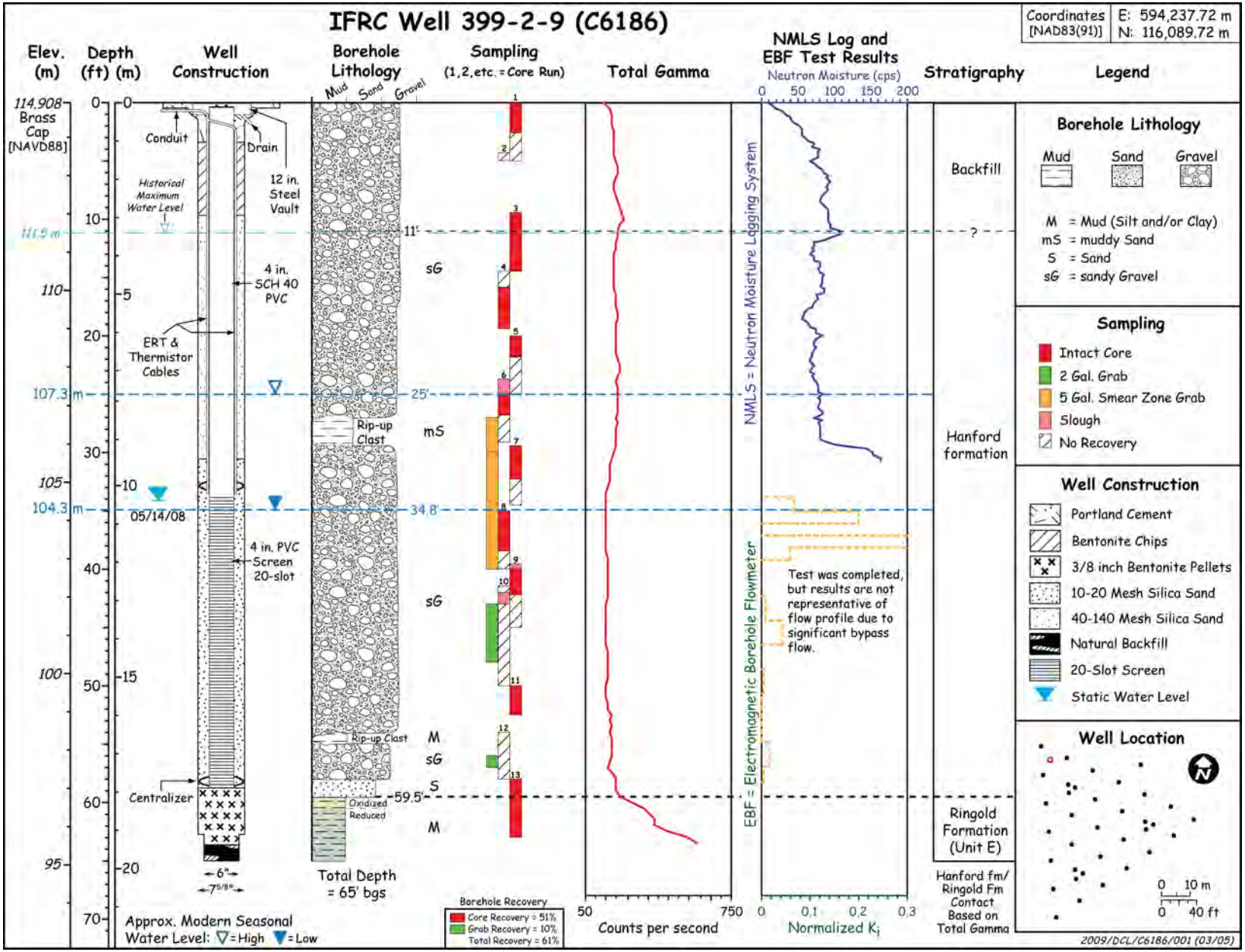
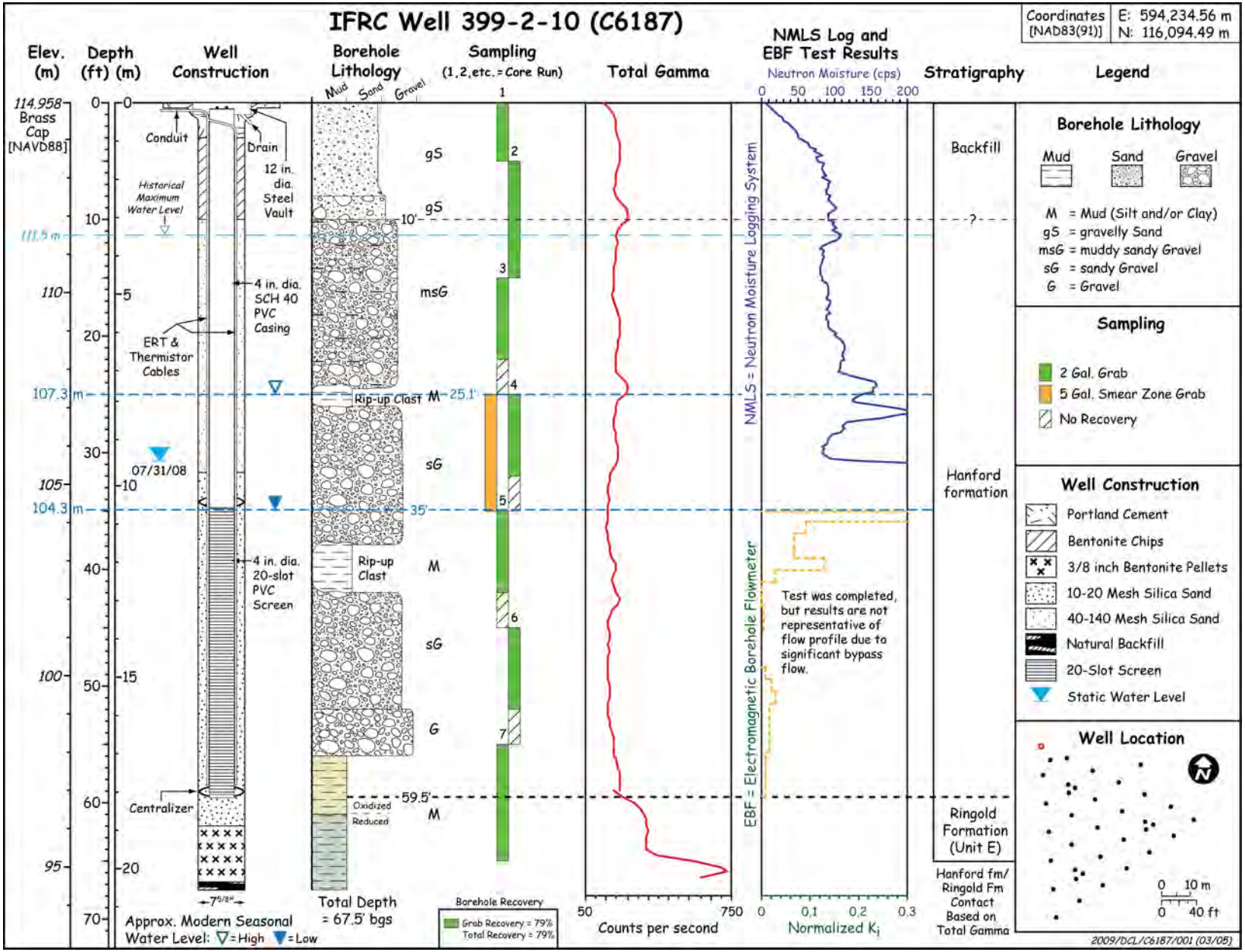
Appendix A

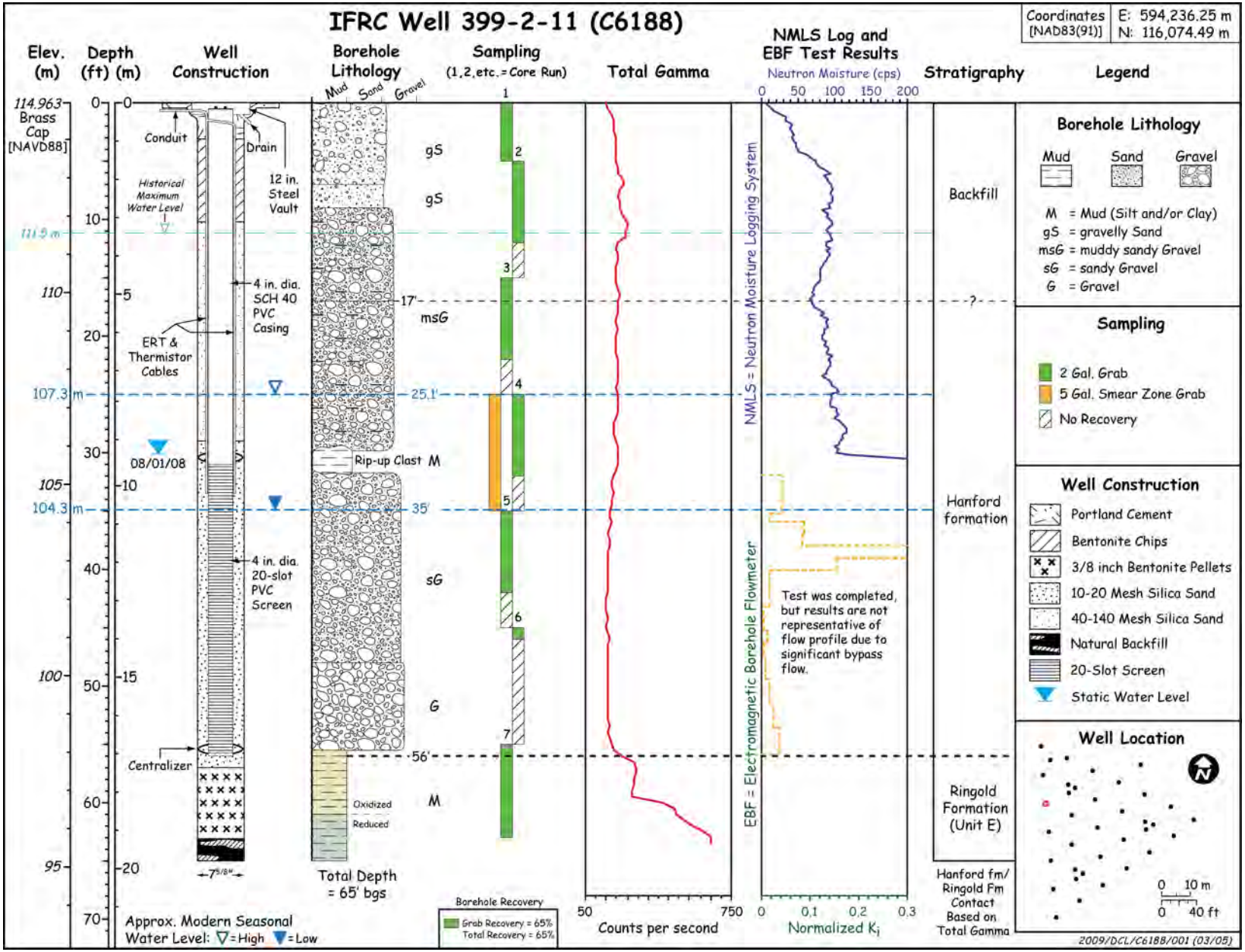
Compilation Borehole Summary Logs

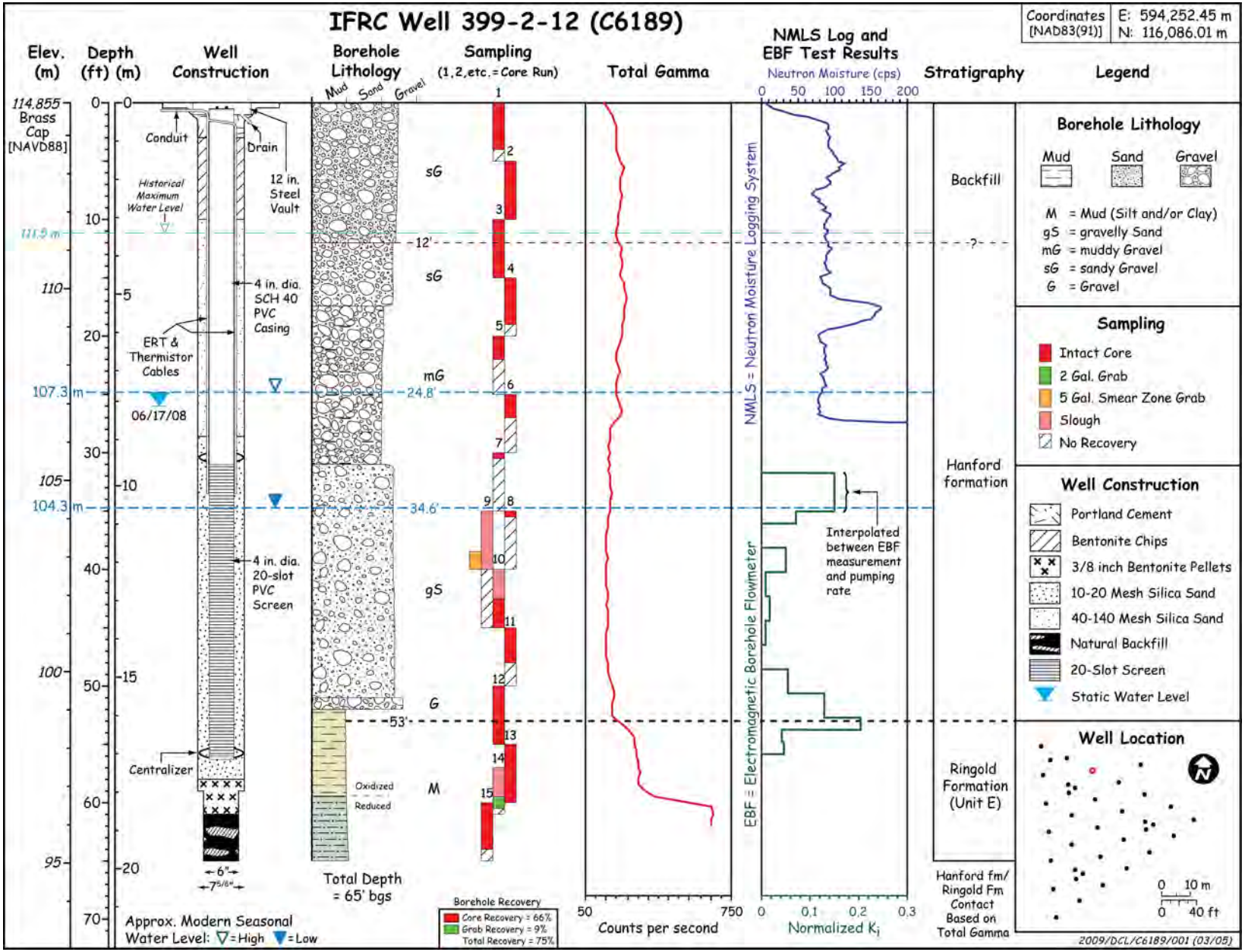

IFRC Well 399-2-7 (C6184)
Coordinates [NAD83(91)]
E: 594,235.20 m
N: 116,084.49 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Mud
Sand
Gravel
Sampling (1,2,etc.= Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.910 Brass Cap [NAVD88]
Conduit
Drain
12 in. dia. Steel Vault
Historical Maximum Water Level
111.9 m
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
107.3 m
07/15/08
104.3 m
4 in. dia. 20-slot PVC Screen
Centralizer
6"
7 5/8"
Total Depth = 62' bgs
sG
S
msG
sG
G
M
12'
25'
34.8'
54'
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Interpolated between EBF measurement and pumping rate
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Recovery
Grab Recovery = 75%
Total Recovery = 75%
Counts per second
Normalized K_i
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Lithology
M = Mud (Silt and/or Clay)
S = Sand
msG = muddy sandy Gravel
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6184/001 (03/04)

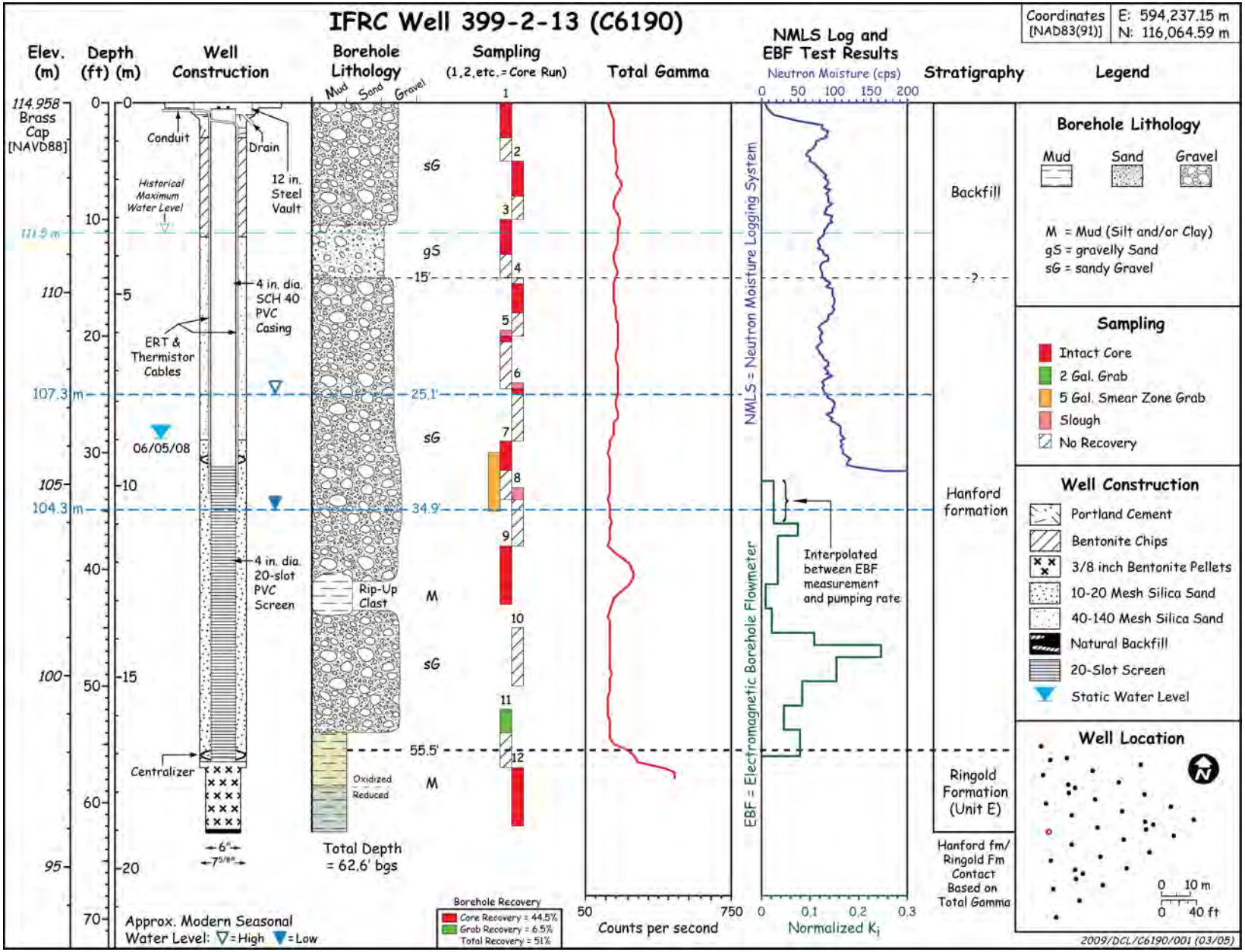

IFRC Well 399-2-8 (C6185)
Coordinates [NAD83(91)]
E: 594,243.48 m
N: 116,090.31 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.= Core Run)
Total Gamma
NMLS Log and EBF Test Results
Stratigraphy
Legend
114.925 Brass Cap [NAVD88]
Conduit
Drain
12 in. dia. Steel Vault
Historical Maximum Water Level
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
07/14/08
4 in. dia. 20-slot PVC Screen
Centralizer
7 5/8"
Rip-up Clast
Oxidized
Reduced
Total Depth = 60' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 84%
Total Recovery = 84%
Counts per second
Neutron Moisture (cps)
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Normalized Kj
Interpolated between EBF measurement and pumping rate
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
S = Sand
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
Slough
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6185/001 (03/04)

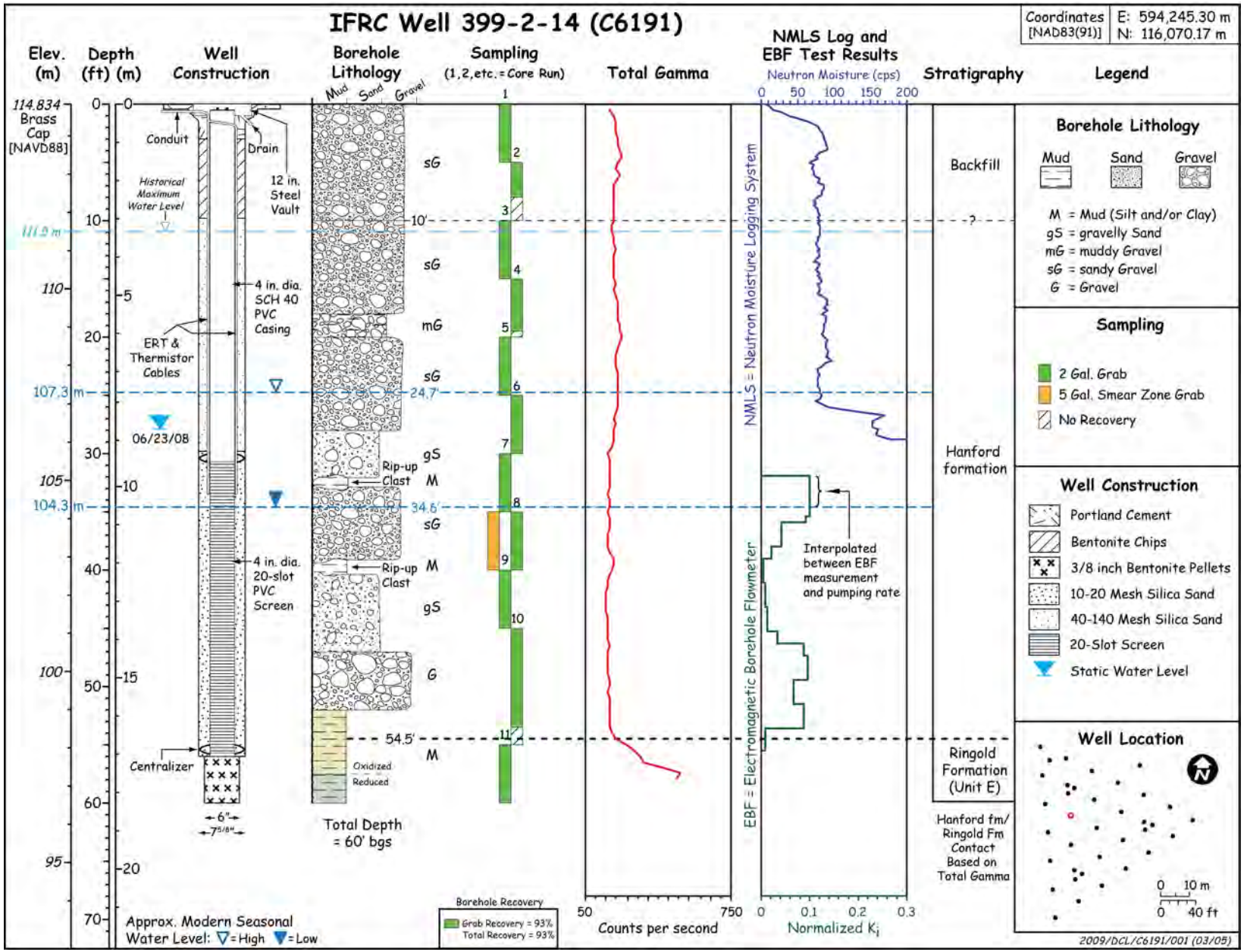

IFRC Well 399-2-9 (C6186)
Coordinates [NAD83(91)]
E: 594,237.72 m
N: 116,089.72 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc. = Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.908 Brass Cap [NAVD88]
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. SCH 40 PVC
ERT & Thermistor Cables
05/14/08
4 in. PVC Screen 20-slot
Centralizer
6"
7 5/8"
Rip-up Clast
Oxidized Reduced
Total Depth = 65' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Core Recovery = 51%
Grab Recovery = 10%
Total Recovery = 61%
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Test was completed, but results are not representative of flow profile due to significant bypass flow.
Normalized Ki
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
mS = muddy Sand
S = Sand
sG = sandy Gravel
Sampling
Intact Core
2 Gal. Grab
5 Gal. Smear Zone Grab
Slough
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6186/001 (03/05)

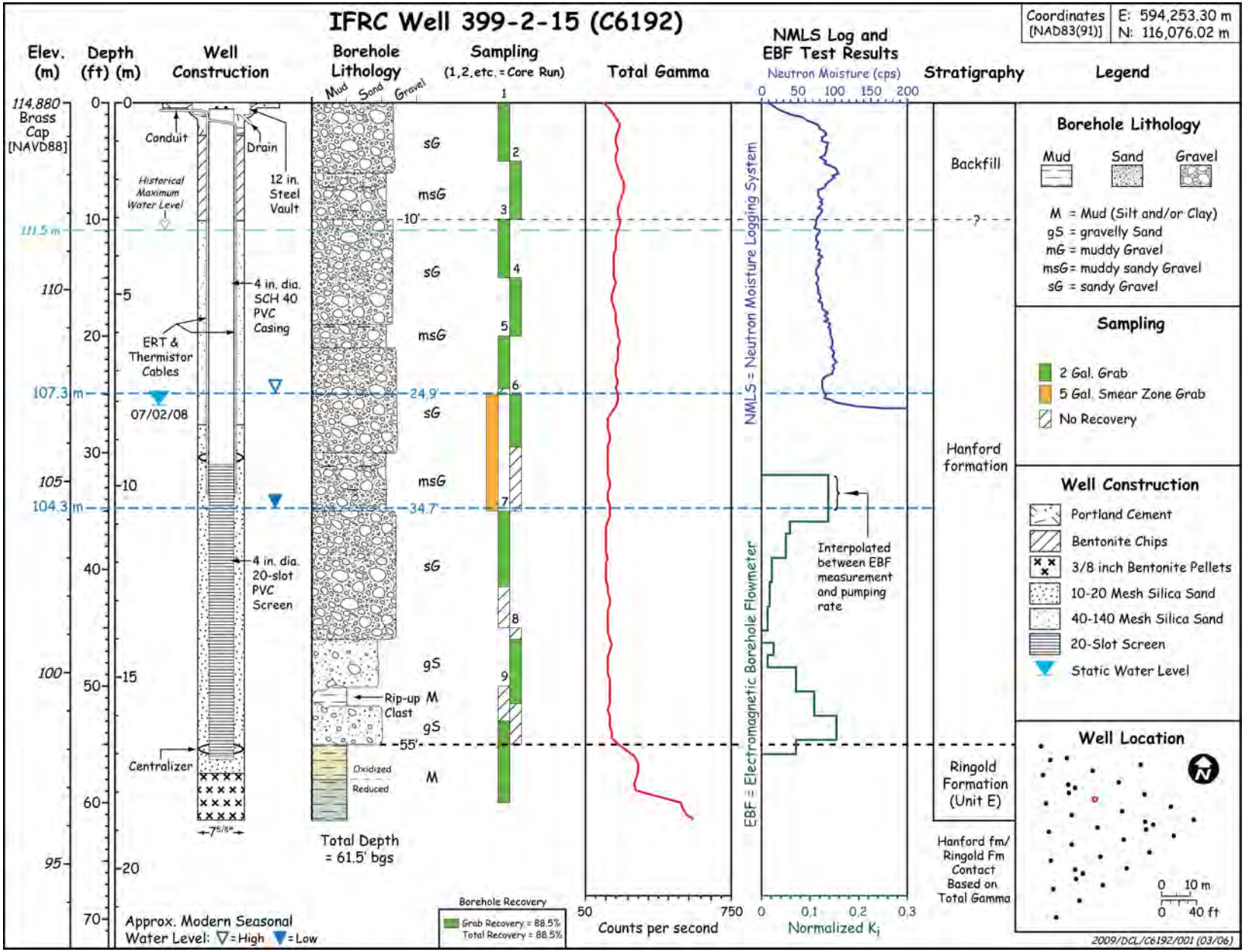

IFRC Well 399-2-10 (C6187)
Coordinates [NAD83(91)]
E: 594,234.56 m
N: 116,094.49 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc. = Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.958 Brass Cap [NAVD88]
111.5 m
107.3 m
104.3 m
Conduit
Drain
12 in. dia. Steel Vault
Historical Maximum Water Level
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
07/31/08
4 in. dia. 20-slot PVC Screen
Centralizer
Rip-up Clast
Oxidized
Reduced
gS
msG
sG
G
M
10'
25.1'
35'
59.5'
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Test was completed, but results are not representative of flow profile due to significant bypass flow.
Counts per second
Normalized K_i
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Total Depth = 67.5' bgs
Borehole Recovery
Grab Recovery = 79%
Total Recovery = 79%
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
msG = muddy sandy Gravel
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6187/001 (03/05)

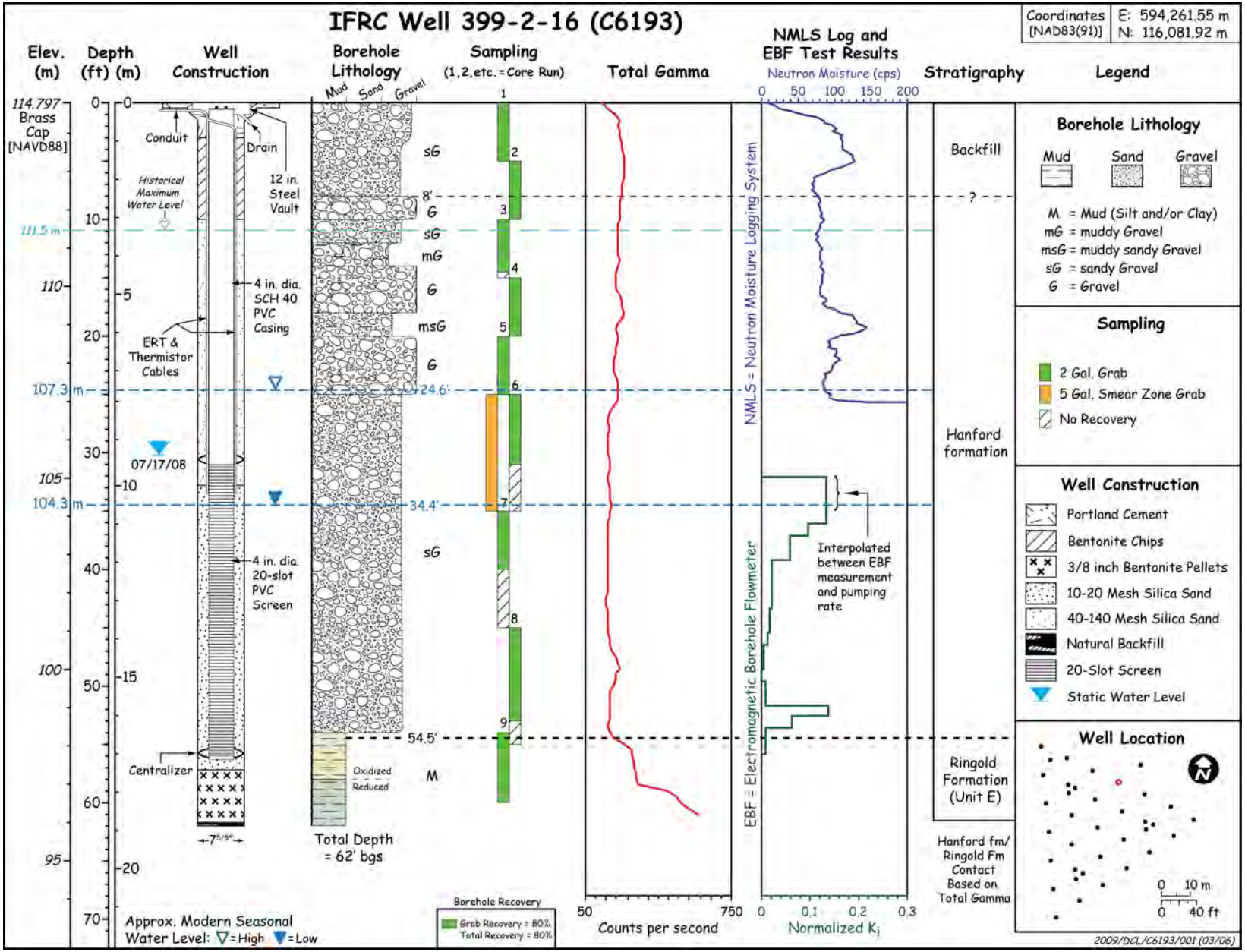

IFRC Well 399-2-11 (C6188)
Coordinates [NAD83(91)]
E: 594,236.25 m
N: 116,074.49 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.963 Brass Cap [NAVD88]
111.9 m
110
107.3 m
105
104.3 m
100
95
Conduit
Drain
12 in. Steel Vault
Historical Maximum Water Level
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
08/01/08
4 in. dia. 20-slot PVC Screen
Centralizer
7⅝"
Mud
Sand
Gravel
gS
gS
17'
msG
Rip-up Clast
M
25.1'
35'
sG
G
56'
M
Oxidized
Reduced
Total Depth = 65' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 65%
Total Recovery = 65%
50
750
Counts per second
0
50
100
150
200
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Test was completed, but results are not representative of flow profile due to significant bypass flow.
0
0,1
0,2
0,3
Normalized K_i
Backfill
?
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
msG = muddy sandy Gravel
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6188/001 (03/05)

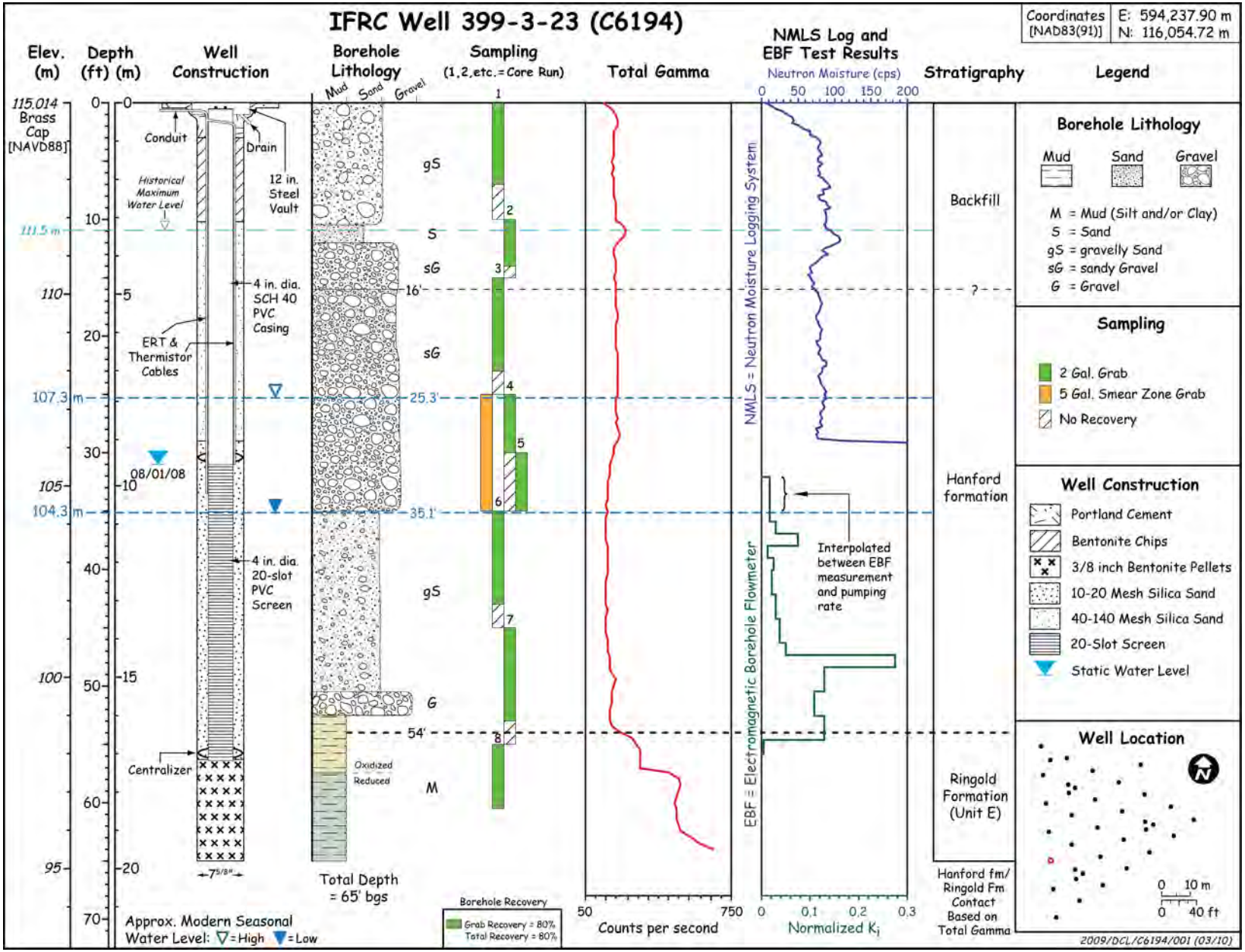

IFRC Well 399-2-12 (C6189)
Coordinates [NAD83(91)]
E: 594,252.45 m
N: 116,086.01 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.855 Brass Cap [NAVD88]
Conduit
Drain
12 in. Steel Vault
Historical Maximum Water Level
111.9 m
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
107.3 m
06/17/08
4 in. dia. 20-slot PVC Screen
104.3 m
Centralizer
6"
7 5/8"
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Mud
Sand
Gravel
sG
sG
mG
gS
G
M
12'
24.8'
34.6'
53'
Oxidized
Reduced
Total Depth = 65' bgs
Borehole Recovery
Core Recovery = 66%
Grab Recovery = 9%
Total Recovery = 75%
50
750
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Interpolated between EBF measurement and pumping rate
0
0,1
0,2
0,3
Normalized Kj
Backfill
?
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
mG = muddy Gravel
sG = sandy Gravel
G = Gravel
Sampling
Intact Core
2 Gal. Grab
5 Gal. Smear Zone Grab
Slough
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6189/001 (03/05)

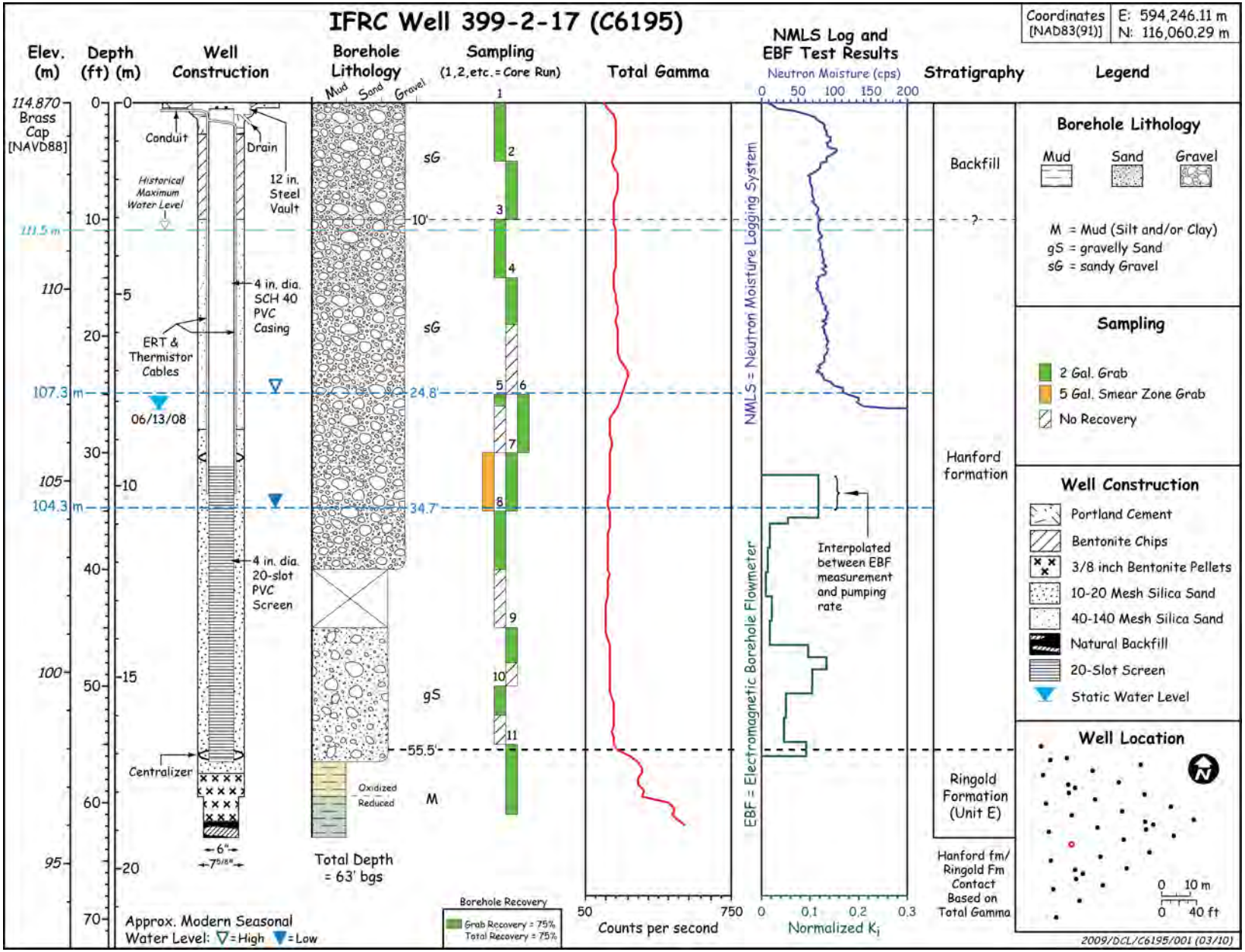

IFRC Well 399-2-13 (C6190)
Coordinates [NAD83(91)]
E: 594,237.15 m
N: 116,064.59 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.958 Brass Cap [NAVD88]
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
06/05/08
4 in. dia. 20-slot PVC Screen
Centralizer
6"
7 5/8"
Mud
Sand
Gravel
Rip-Up Clast
Oxidized
Reduced
Total Depth = 62.6' bgs
sG
gS
sG
M
sG
M
15'
25.1'
34.9'
55.5'
111.5 m
107.3 m
104.3 m
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Interpolated between EBF measurement and pumping rate
Counts per second
Normalized K_i
Borehole Recovery
Core Recovery = 44.5%
Grab Recovery = 6.5%
Total Recovery = 51%
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
sG = sandy Gravel
Sampling
Intact Core
2 Gal. Grab
5 Gal. Smear Zone Grab
Slough
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6190/001 (03/05)

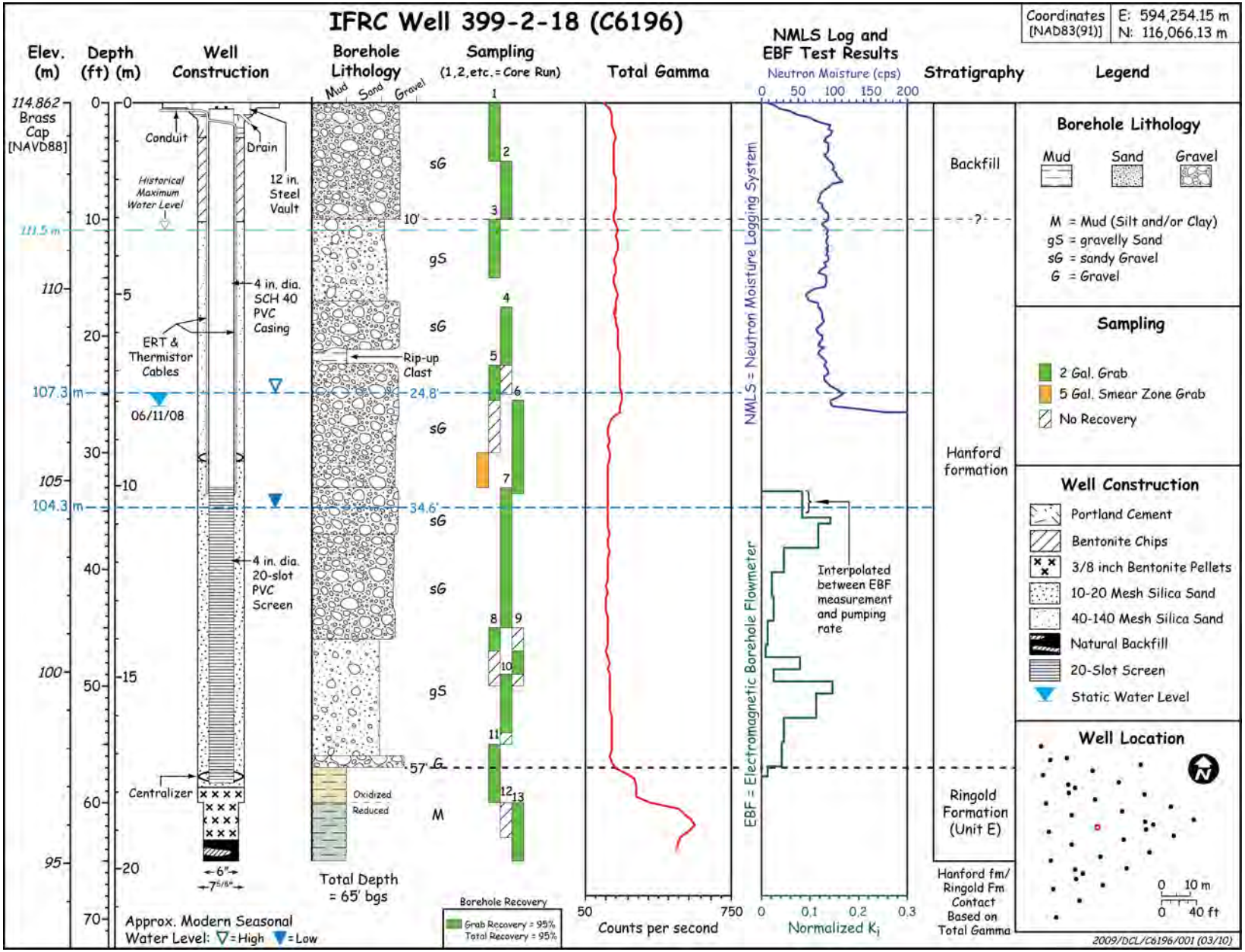

IFRC Well 399-2-14 (C6191)
Coordinates [NAD83(91)]
E: 594,245.30 m
N: 116,070.17 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.834 Brass Cap [NAVD88]
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
06/23/08
4 in. dia. 20-slot PVC Screen
Centralizer
6"
7 5/8"
Mud
Sand
Gravel
sG
mG
gS
M
G
Rip-up Clast
Oxidized
Reduced
Total Depth = 60' bgs
10'
24.7'
34.6'
54.5'
111.9 m
107.3 m
104.3 m
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 93%
Total Recovery = 93%
50
750
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
0 50 100 150 200
0 0.1 0.2 0.3
Normalized K_i
Interpolated between EBF measurement and pumping rate
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
mG = muddy Gravel
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
20-Slot Screen
Static Water Level
Well Location
N
0 10 m
0 40 ft
2009/DCL/C6191/001 (03/05)

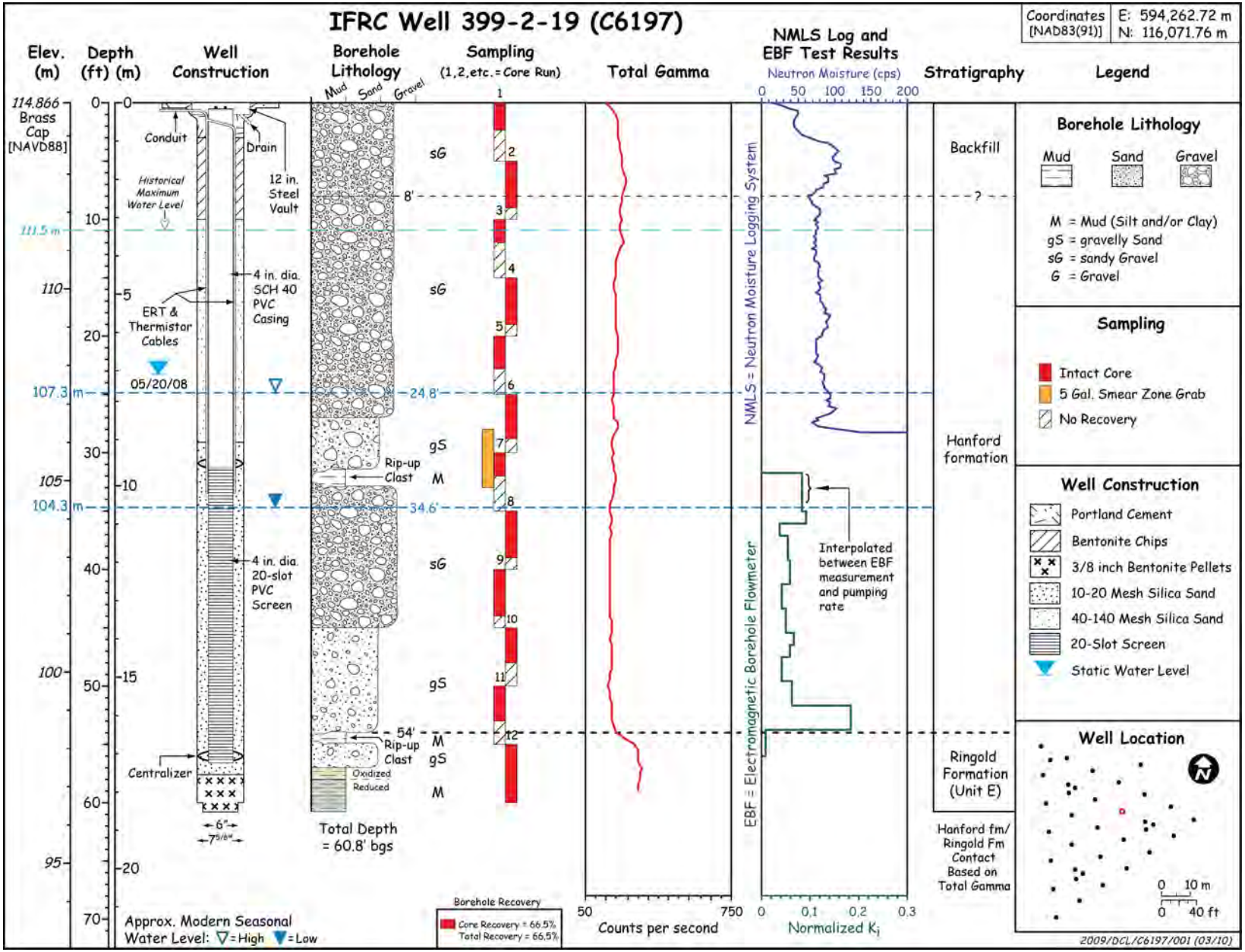

IFRC Well 399-2-15 (C6192)
Coordinates [NAD83(91)]
E: 594,253.30 m
N: 116,076.02 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc. = Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.880 Brass Cap [NAVD88]
111.5 m
107.3 m
104.3 m
Conduit
Drain
12 in. Steel Vault
Historical Maximum Water Level
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
07/02/08
4 in. dia. 20-slot PVC Screen
Centralizer
7 5/8"
Mud
Sand
Gravel
sG
msG
gS
M
10'
24.9'
34.7'
55'
Rip-up Clast
Oxidized
Reduced
Total Depth = 61.5' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 88.5%
Total Recovery = 88.5%
50
750
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
0 50 100 150 200
0 0,1 0,2 0,3
Normalized K_i
Interpolated between EBF measurement and pumping rate
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
?
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
mG = muddy Gravel
msG = muddy sandy Gravel
sG = sandy Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
20-Slot Screen
Static Water Level
Well Location
N
0 10 m
0 40 ft
2009/DCL/C6192/001 (03/06)

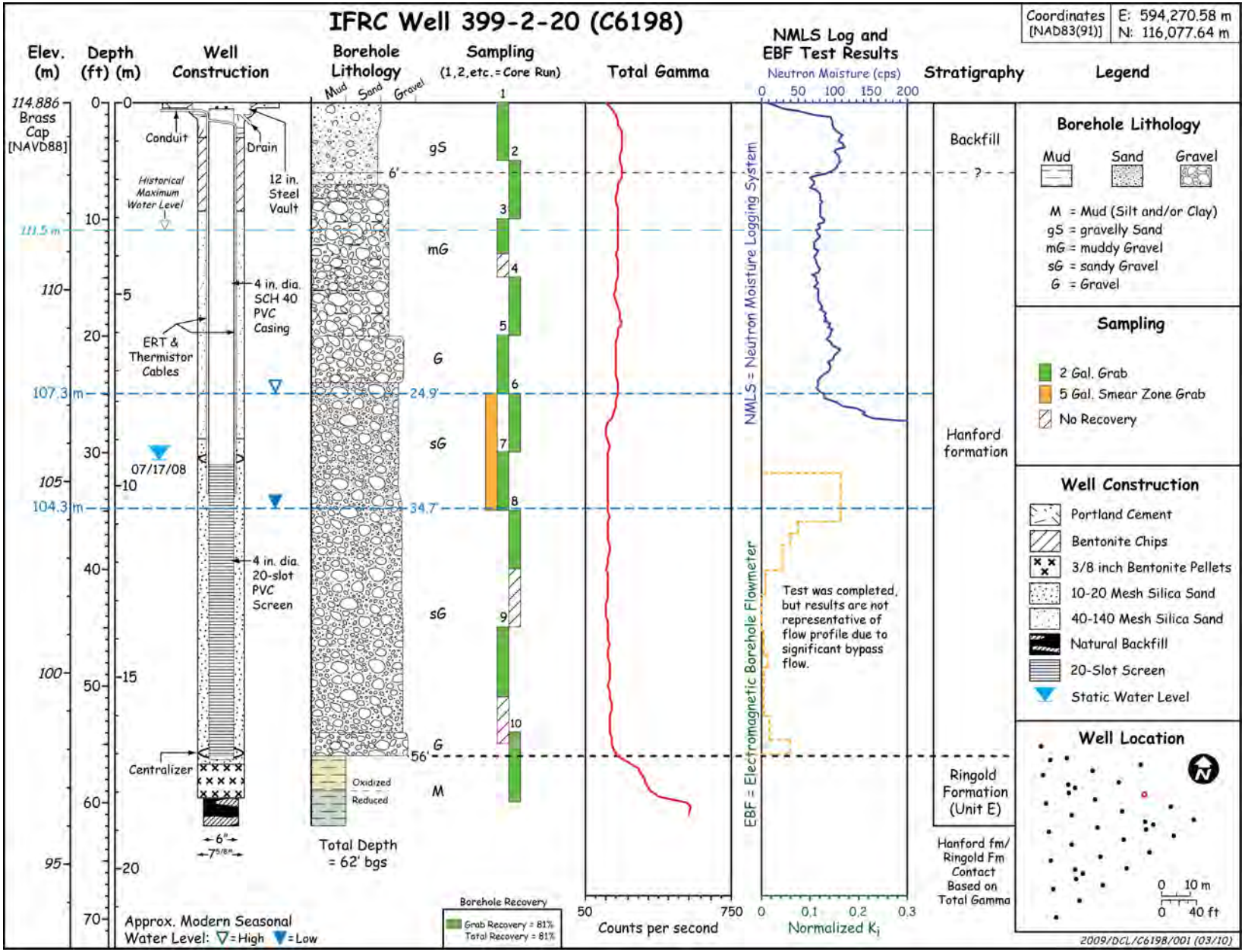

IFRC Well 399-2-16 (C6193)
Coordinates [NAD83(91)]
E: 594,261.55 m
N: 116,081.92 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc. = Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.797 Brass Cap [NAVD88]
111.5 m
110
107.3 m
105
104.3 m
100
95
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
07/17/08
4 in. dia. 20-slot PVC Screen
Centralizer
7 5/8"
Mud
Sand
Gravel
sG
8'
G
sG
mG
G
msG
G
24.6'
34.4'
sG
54.5'
M
Oxidized
Reduced
Total Depth = 62' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 80%
Total Recovery = 80%
50
750
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
0 50 100 150 200
Interpolated between EBF measurement and pumping rate
0 0.1 0.2 0.3
Normalized K_i
Backfill
?
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
mG = muddy Gravel
msG = muddy sandy Gravel
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
N
0 10 m
0 40 ft
2009/DCL/C6193/001 (03/06)

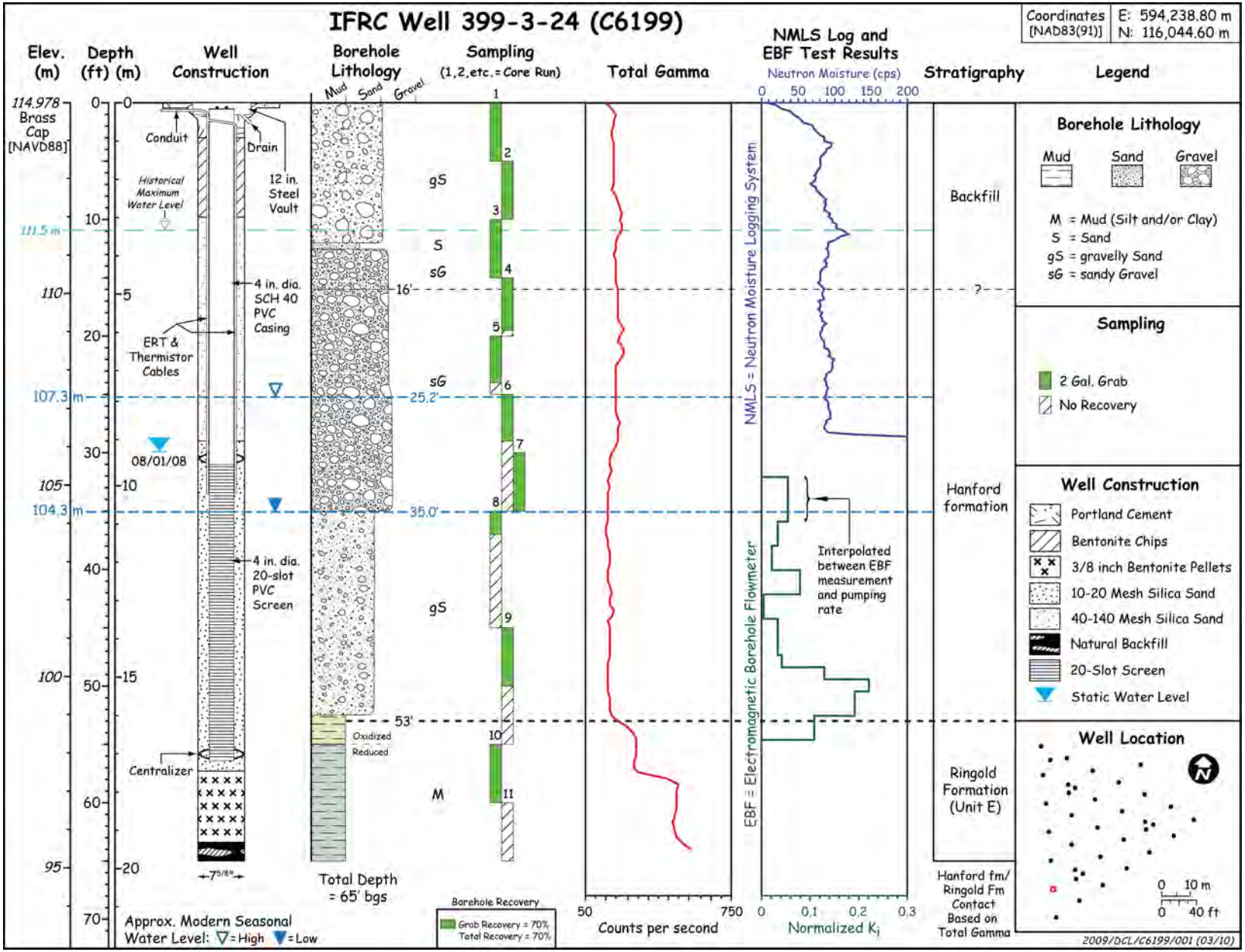

IFRC Well 399-3-23 (C6194)
Coordinates [NAD83(91)]
E: 594,237.90 m
N: 116,054.72 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.= Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
115.014 Brass Cap [NAVD88]
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
08/01/08
4 in. dia. 20-slot PVC Screen
Centralizer
7 5/8"
Mud
Sand
Gravel
gS
S
sG
sG
gS
G
M
16'
25.3'
35.1'
54'
Oxidized
Reduced
Total Depth = 65' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 80%
Total Recovery = 80%
50
750
Counts per second
0
50
100
150
200
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Interpolated between EBF measurement and pumping rate
0
0,1
0,2
0,3
Normalized K_i
Backfill
?
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
S = Sand
gS = gravelly Sand
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
20-Slot Screen
Static Water Level
Well Location
N
0 10 m
0 40 ft
2009/DCL/C6194/001 (03/10)

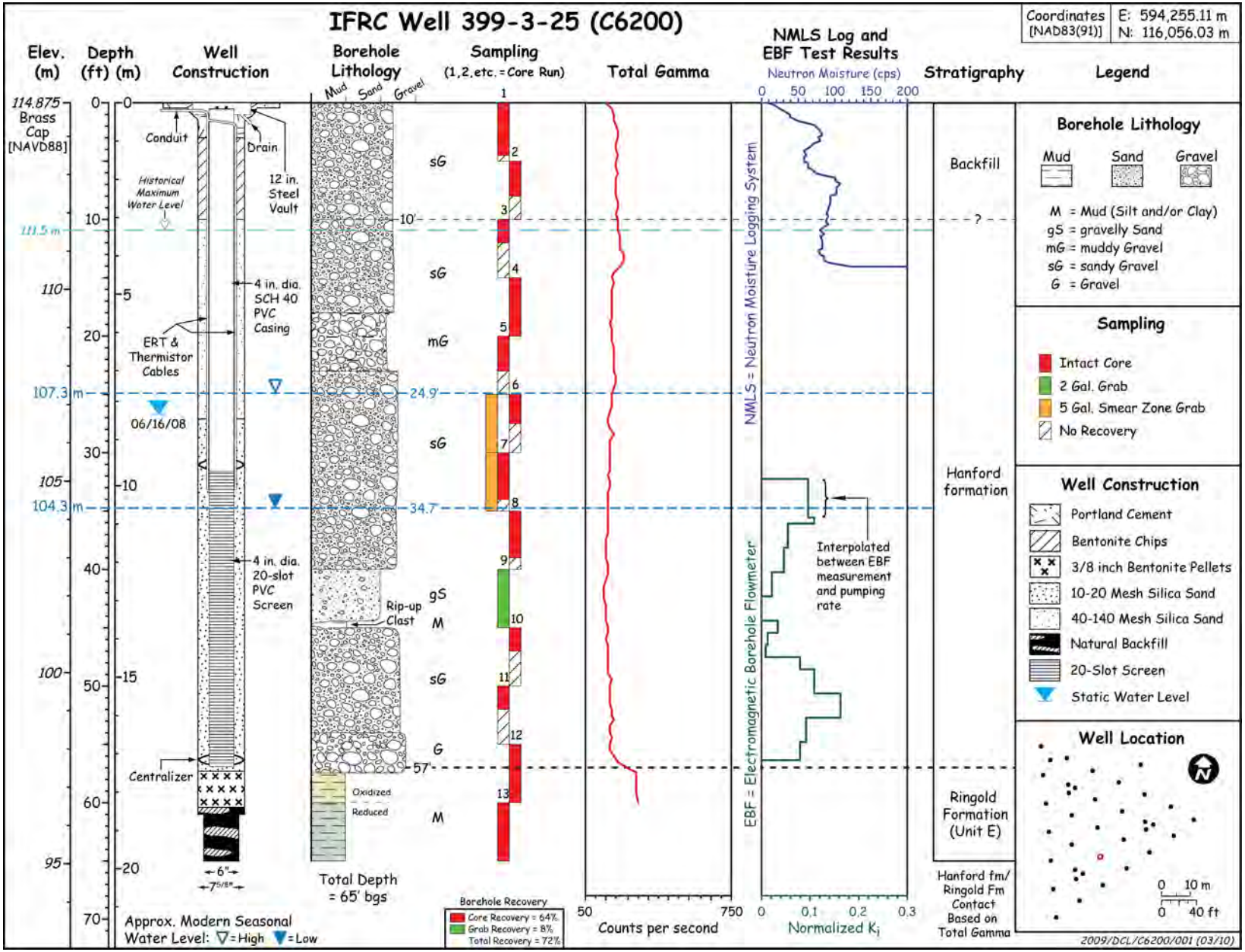

IFRC Well 399-2-17 (C6195)
Coordinates [NAD83(91)]
E: 594,246.11 m
N: 116,060.29 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Stratigraphy
Legend
114.870 Brass Cap [NAVD88]
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
06/13/08
4 in. dia. 20-slot PVC Screen
Centralizer
6"
7 5/8"
Mud
Sand
Gravel
sG
gS
M
Oxidized
Reduced
Total Depth = 63' bgs
111.5 m
107.3 m
104.3 m
10'
24.8'
34.7'
55.5'
Neutron Moisture (cps)
0 50 100 150 200
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Interpolated between EBF measurement and pumping rate
50 750
Counts per second
0 0.1 0.2 0.3
Normalized Ki
Backfill
?
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 75%
Total Recovery = 75%
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
sG = sandy Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
N
0 10 m
0 40 ft
2009/DCL/C6195/001 (03/10)

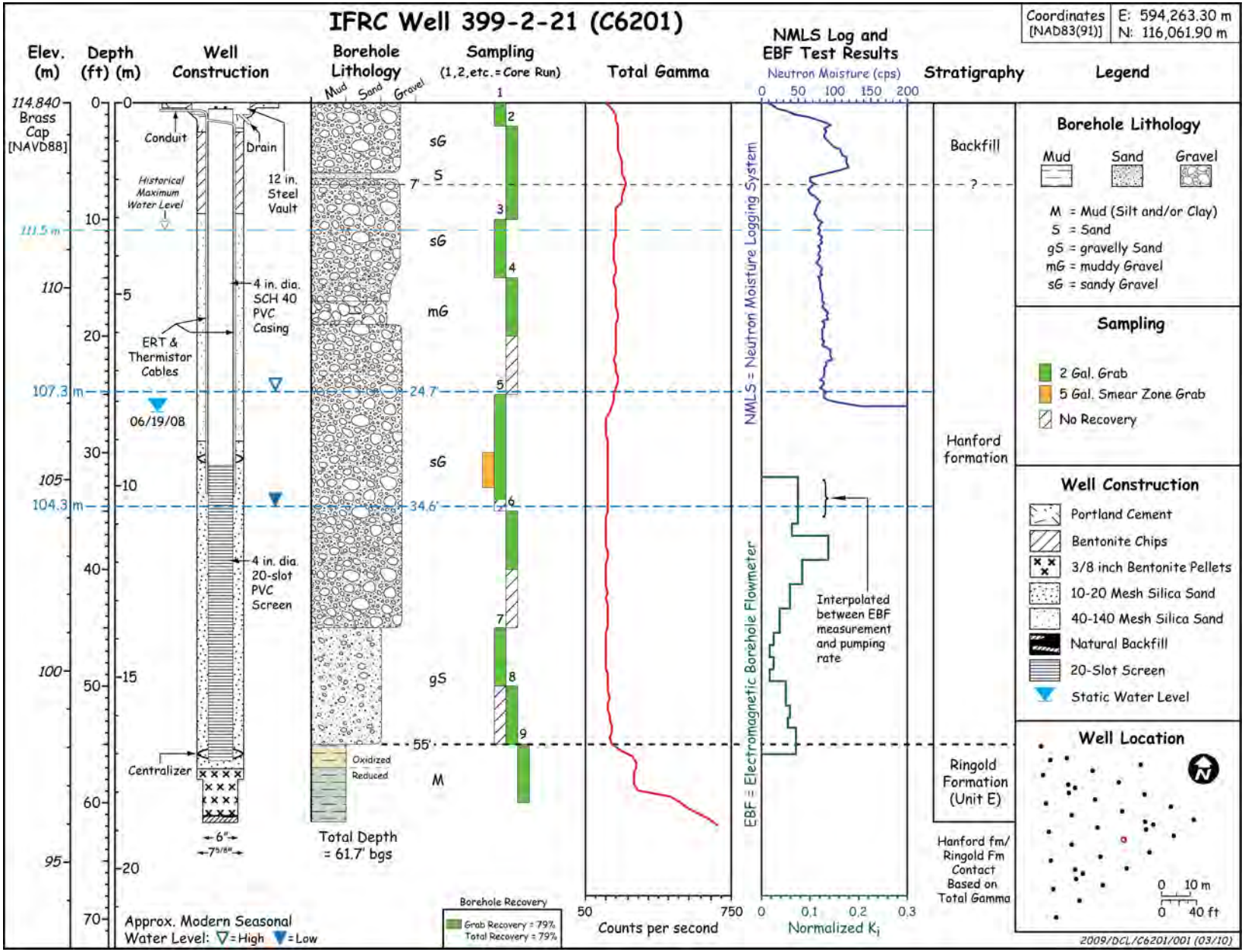

IFRC Well 399-2-18 (C6196)
Coordinates [NAD83(91)]
E: 594,254.15 m
N: 116,066.13 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.= Core Run)
Total Gamma
NMLS Log and EBF Test Results
Stratigraphy
Legend
114.862 Brass Cap [NAVD88]
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
06/11/08
Rip-up Clast
4 in. dia. 20-slot PVC Screen
Centralizer
6"
7 5/8"
Oxidized
Reduced
Total Depth = 65' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 95%
Total Recovery = 95%
Counts per second
Neutron Moisture (cps)
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Interpolated between EBF measurement and pumping rate
Normalized Kᵢ
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6196/001 (03/10)

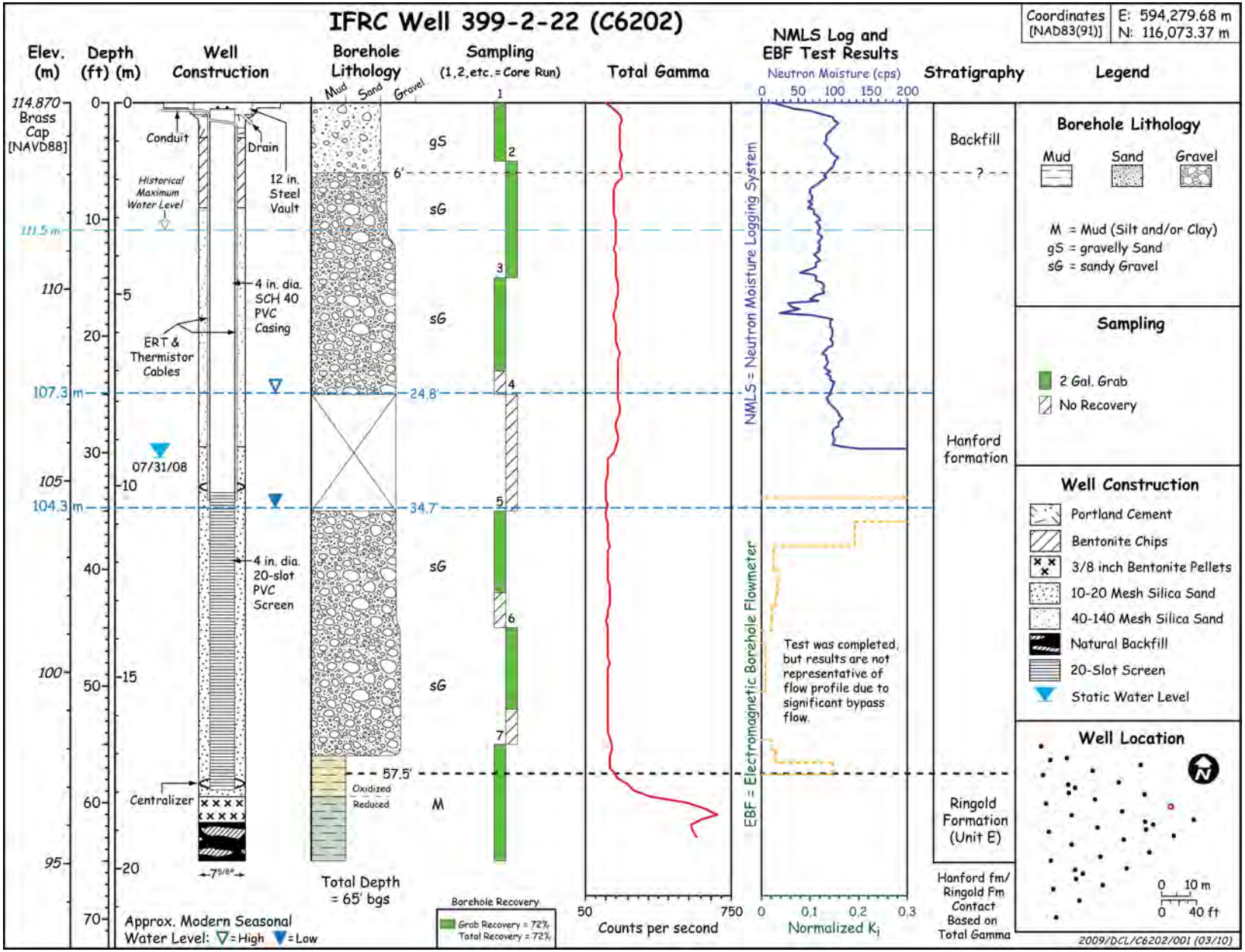

IFRC Well 399-2-19 (C6197)
Coordinates [NAD83(91)]
E: 594,262.72 m
N: 116,071.76 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Stratigraphy
Legend
114.866 Brass Cap [NAVD88]
Conduit
Drain
12 in. Steel Vault
Historical Maximum Water Level
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
05/20/08
4 in. dia. 20-slot PVC Screen
Centralizer
6"
7 5/8"
Mud
Sand
Gravel
sG
gS
M
Rip-up Clast
Oxidized
Reduced
Total Depth = 60.8' bgs
8'
24.8'
34.6'
54'
111.5 m
107.3 m
104.3 m
Neutron Moisture (cps)
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Interpolated between EBF measurement and pumping rate
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Core Recovery = 66.5%
Total Recovery = 66.5%
Counts per second
Normalized Ki
Borehole Lithology
M = Mud (Silt and/or Clay)
gS = gravelly Sand
sG = sandy Gravel
G = Gravel
Sampling
Intact Core
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6197/001 (03/10)

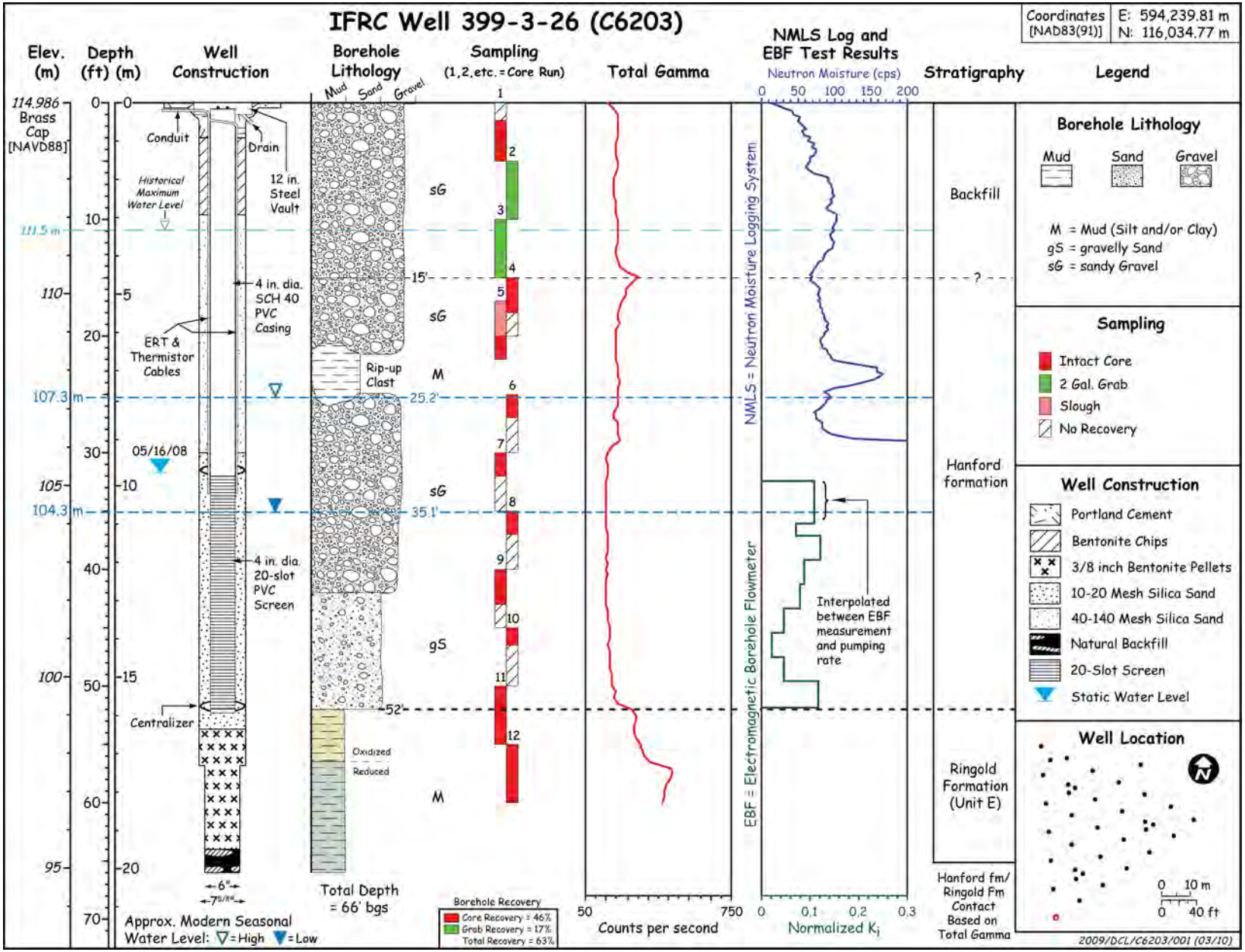

IFRC Well 399-2-20 (C6198)
Coordinates [NAD83(91)]
E: 594,270.58 m
N: 116,077.64 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.886 Brass Cap [NAVD88]
111.5 m
107.3 m
104.3 m
Conduit
Drain
12 in. Steel Vault
Historical Maximum Water Level
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
07/17/08
4 in. dia. 20-slot PVC Screen
Centralizer
6"
7 5/8"
Mud
Sand
Gravel
gS
mG
G
sG
sG
G
M
6'
24.9'
34.7'
56'
Oxidized
Reduced
Total Depth = 62' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 81%
Total Recovery = 81%
50
750
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
0 50 100 150 200
0 0,1 0,2 0,3
Normalized K_i
Test was completed, but results are not representative of flow profile due to significant bypass flow.
Backfill
?
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
mG = muddy Gravel
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
N
0 10 m
0 40 ft
2009/DCL/C6198/001 (03/10)

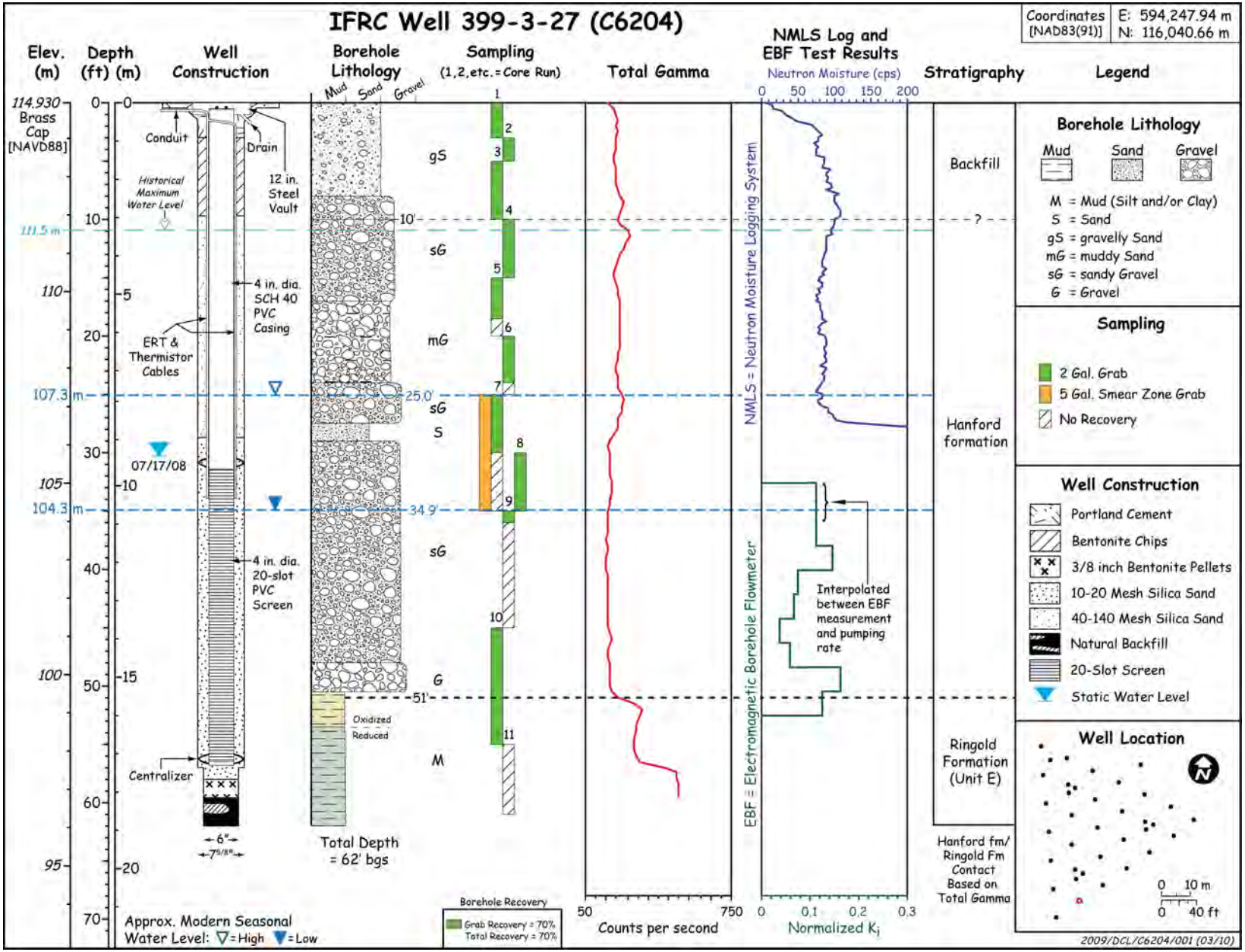

IFRC Well 399-3-24 (C6199)
Coordinates [NAD83(91)]
E: 594,238.80 m
N: 116,044.60 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.978 Brass Cap [NAVD88]
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
08/01/08
4 in. dia. 20-slot PVC Screen
Centralizer
7 5/8"
Mud
Sand
Gravel
gS
S
sG
gS
M
16'
25.2'
35.0'
53'
Oxidized
Reduced
Total Depth = 65' bgs
111.5 m
107.3 m
104.3 m
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 70%
Total Recovery = 70%
50
750
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Interpolated between EBF measurement and pumping rate
0
0,1
0,2
0,3
Normalized Ki
Backfill
?
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
S = Sand
gS = gravelly Sand
sG = sandy Gravel
Sampling
2 Gal. Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6199/001 (03/10)

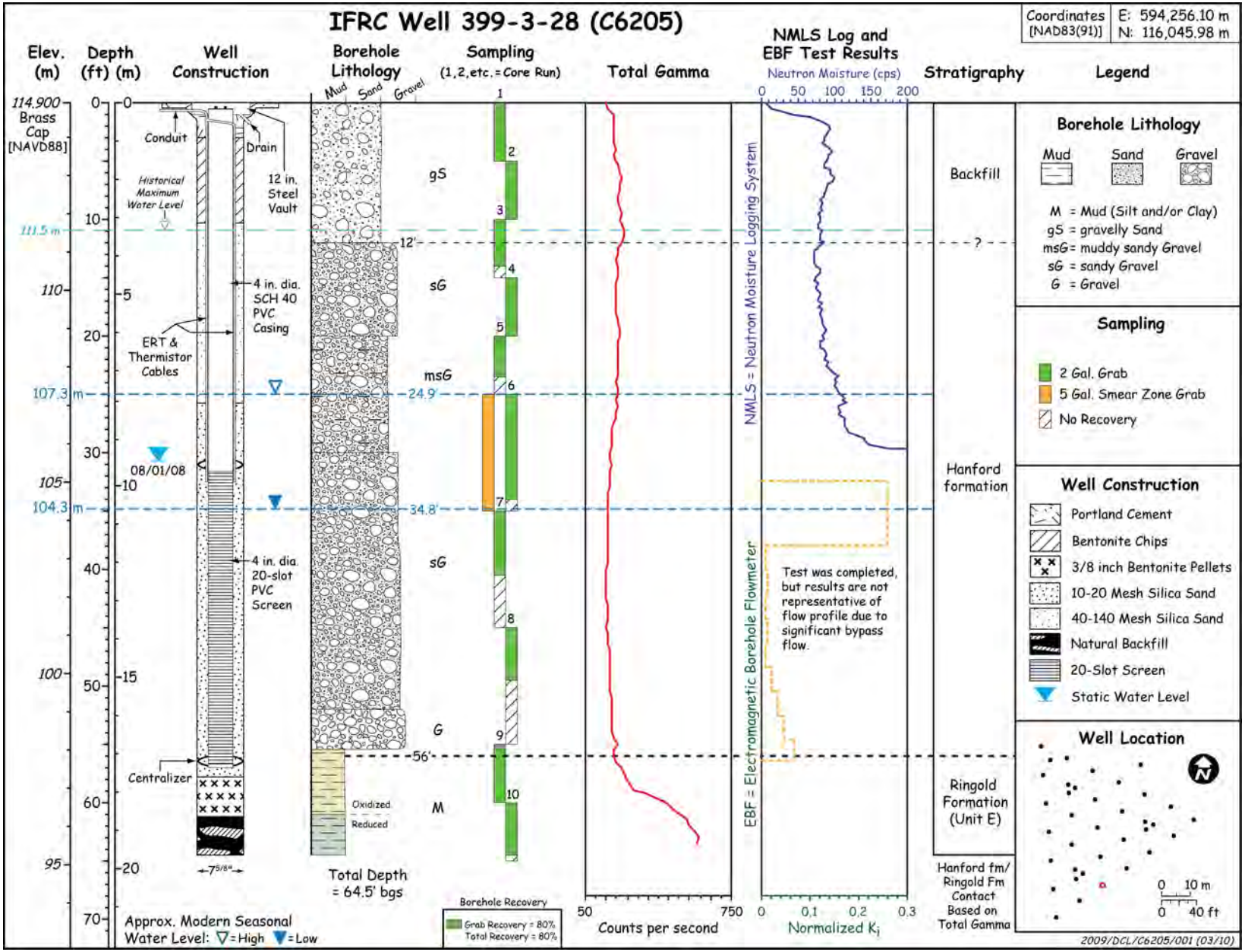

IFRC Well 399-3-25 (C6200)
Coordinates [NAD83(91)]
E: 594,255.11 m
N: 116,056.03 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc. = Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.875 Brass Cap [NAVD88]
111.5 m
107.3 m
104.3 m
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
06/16/08
4 in. dia. 20-slot PVC Screen
Centralizer
6"
7 5/8"
Mud
Sand
Gravel
sG
mG
gS
M
G
10'
24.9'
34.7'
57'
Rip-up Clast
Oxidized
Reduced
Total Depth = 65' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Core Recovery = 64%
Grab Recovery = 8%
Total Recovery = 72%
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Normalized K_i
Interpolated between EBF measurement and pumping rate
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
mG = muddy Gravel
sG = sandy Gravel
G = Gravel
Sampling
Intact Core
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6200/001 (03/10)

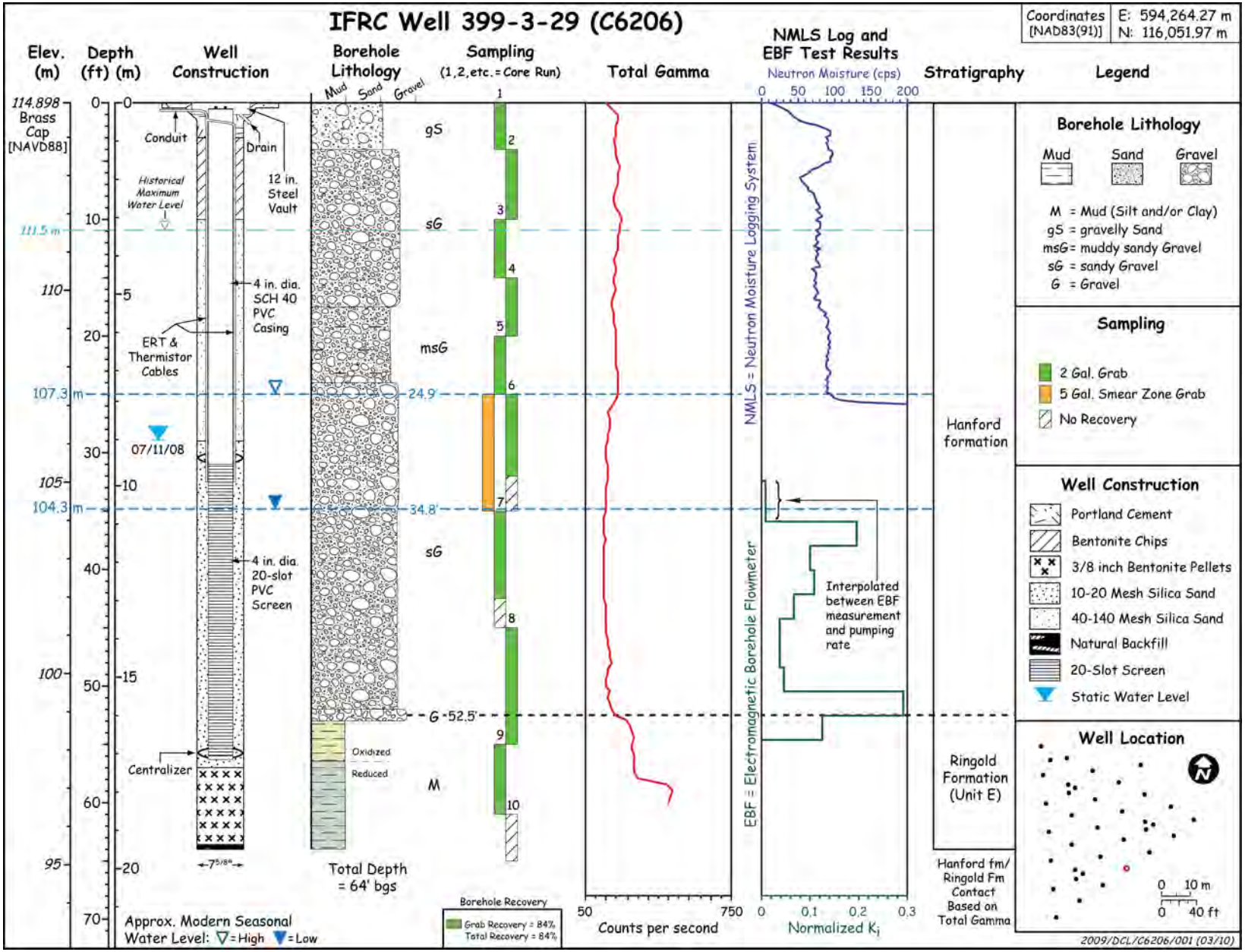

IFRC Well 399-2-21 (C6201)
Coordinates [NAD83(91)]
E: 594,263.30 m
N: 116,061.90 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.840 Brass Cap [NAVD88]
111.5 m
107.3 m
104.3 m
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
06/19/08
4 in. dia. 20-slot PVC Screen
Centralizer
6"
7 5/8"
Mud
Sand
Gravel
sG
S
sG
mG
sG
gS
M
7'
24.7'
34.6'
55'
Oxidized
Reduced
Total Depth = 61.7' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 79%
Total Recovery = 79%
50
750
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Interpolated between EBF measurement and pumping rate
0
0,1
0,2
0,3
Normalized K_i
Backfill
?
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
S = Sand
gS = gravelly Sand
mG = muddy Gravel
sG = sandy Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6201/001 (03/10)

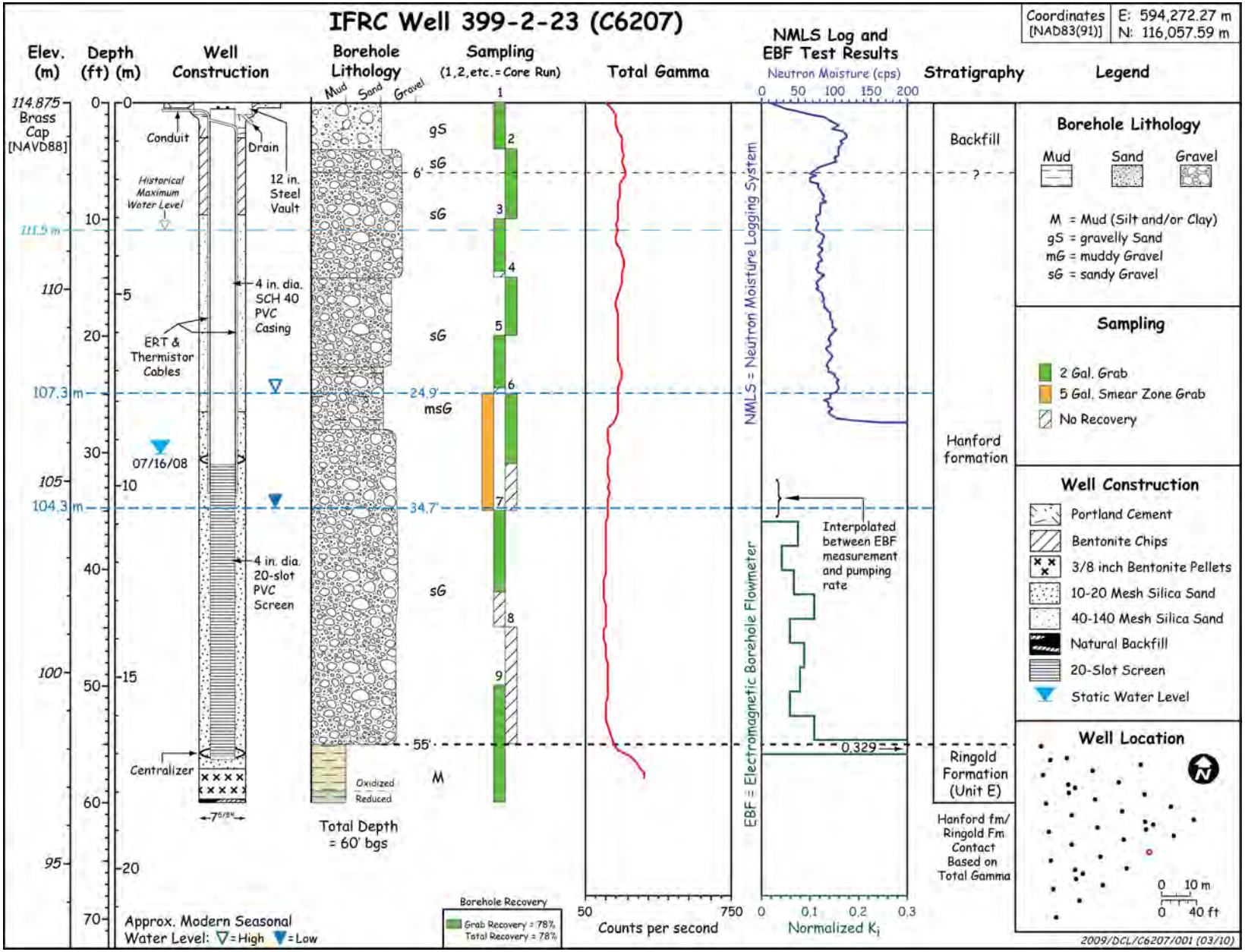

IFRC Well 399-2-22 (C6202)
Coordinates [NAD83(91)]
E: 594,279.68 m
N: 116,073.37 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.870 Brass Cap [NAVD88]
111.5 m
107.3 m
104.3 m
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
07/31/08
4 in. dia. 20-slot PVC Screen
Centralizer
7 5/8"
Mud
Sand
Gravel
gS
sG
M
6'
24.8'
34.7'
57.5'
Oxidized
Reduced
Total Depth = 65' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 72%
Total Recovery = 72%
50
750
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Test was completed, but results are not representative of flow profile due to significant bypass flow.
0
0,1
0,2
0,3
Normalized K_i
Backfill
?
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
sG = sandy Gravel
Sampling
2 Gal. Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
N
0 10 m
0 40 ft
2009/DCL/C6202/001 (03/10)

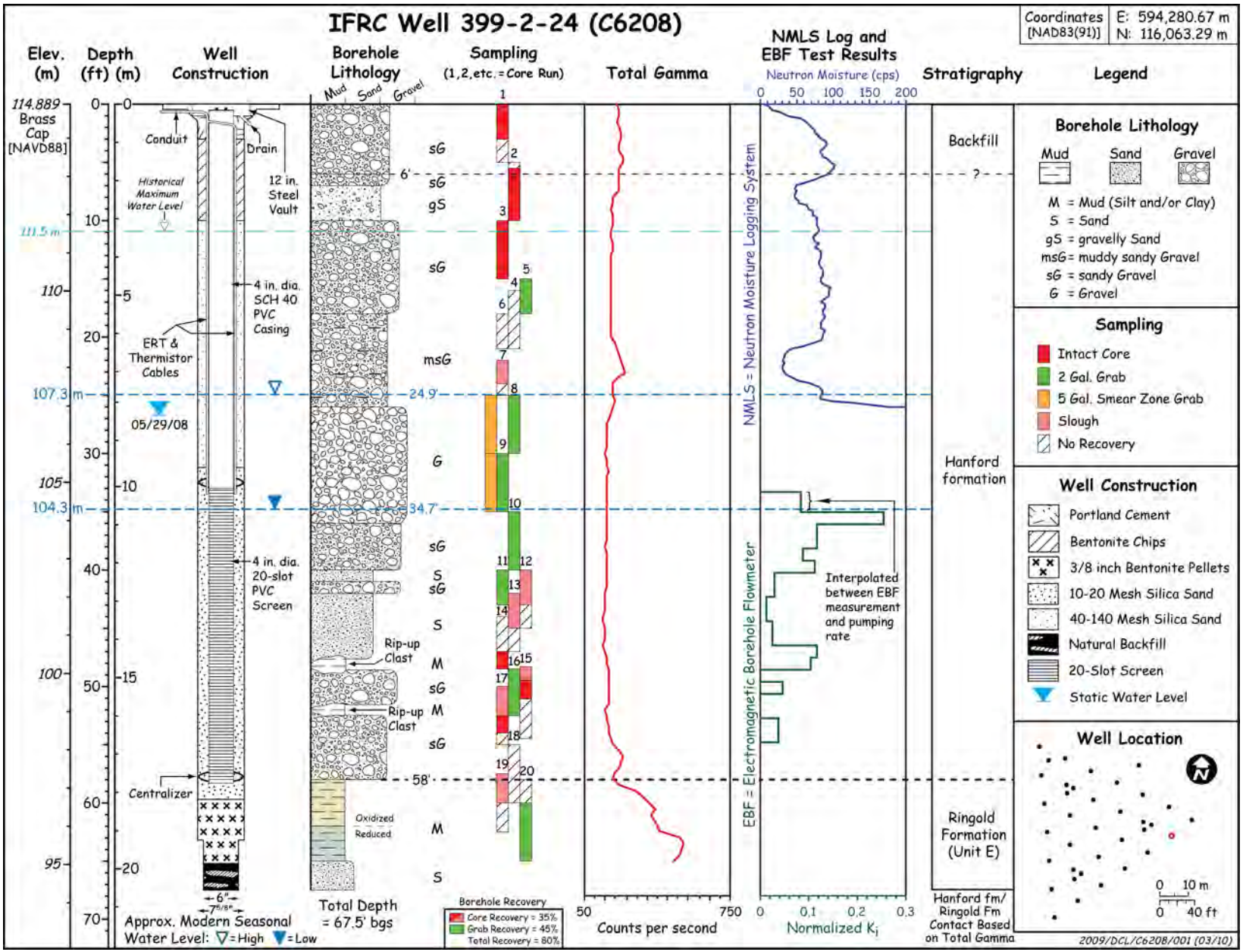

IFRC Well 399-3-26 (C6203)
Coordinates [NAD83(91)]
E: 594,239.81 m
N: 116,034.77 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.986 Brass Cap [NAVD88]
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
Rip-up Clast
05/16/08
4 in. dia. 20-slot PVC Screen
Centralizer
Oxidized
Reduced
Total Depth = 66' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
111.5 m
107.3 m
104.3 m
15'
25.2'
35.1'
52'
sG
M
gS
Borehole Recovery
Core Recovery = 46%
Grab Recovery = 17%
Total Recovery = 63%
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Interpolated between EBF measurement and pumping rate
Normalized Kj
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
sG = sandy Gravel
Sampling
Intact Core
2 Gal. Grab
Slough
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6203/001 (03/10)

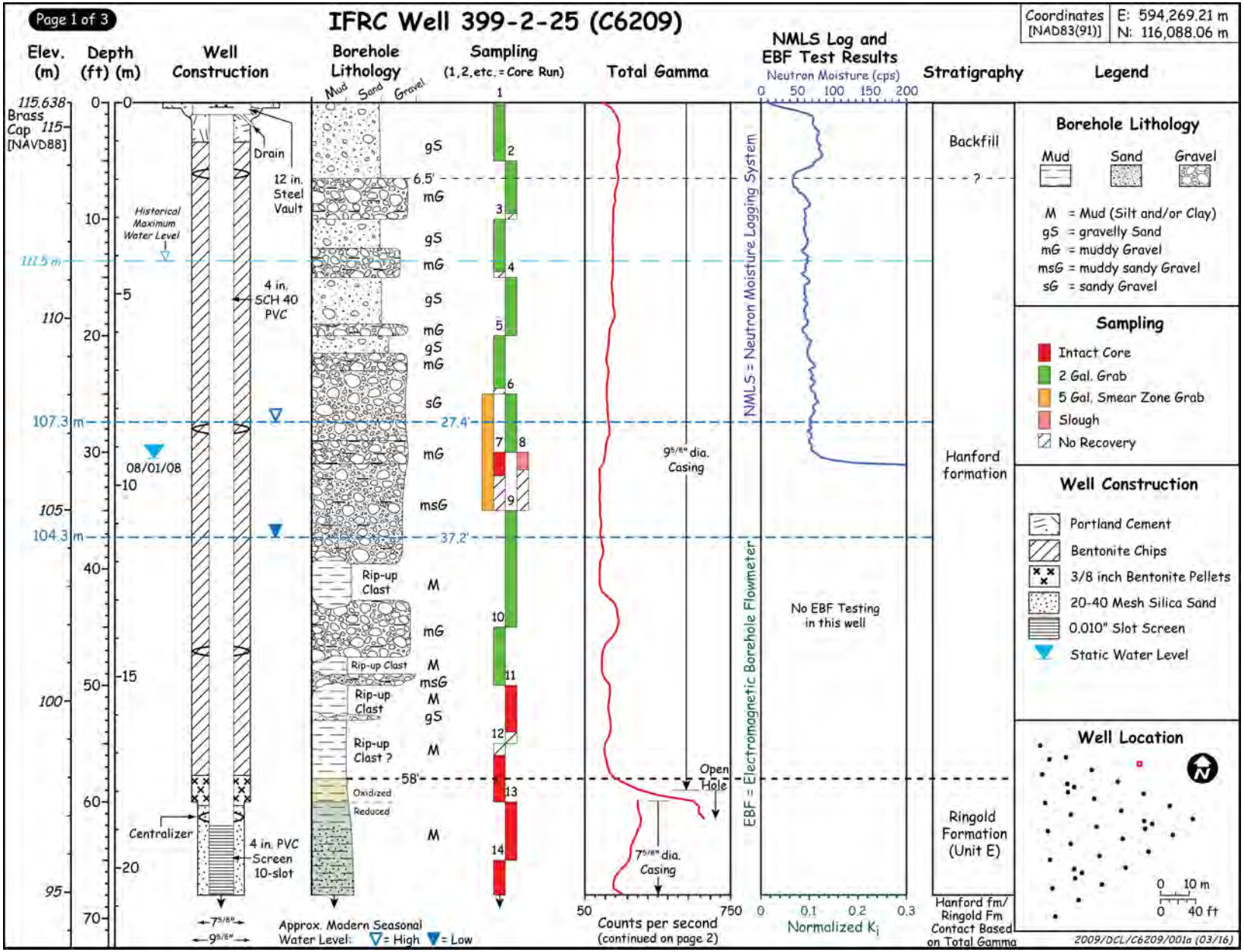

IFRC Well 399-3-27 (C6204)
Coordinates [NAD83(91)]
E: 594,247.94 m
N: 116,040.66 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.930 Brass Cap [NAVD88]
111.5 m
107.3 m
104.3 m
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
07/17/08
4 in. dia. 20-slot PVC Screen
Centralizer
6"
7 5/8"
Mud
Sand
Gravel
gS
sG
mG
S
G
M
10'
25.0'
34.9'
51'
Oxidized
Reduced
Total Depth = 62' bgs
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Interpolated between EBF measurement and pumping rate
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 70%
Total Recovery = 70%
Counts per second
Normalized K_i
Borehole Lithology
M = Mud (Silt and/or Clay)
S = Sand
gS = gravelly Sand
mG = muddy Sand
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6204/001 (03/10)

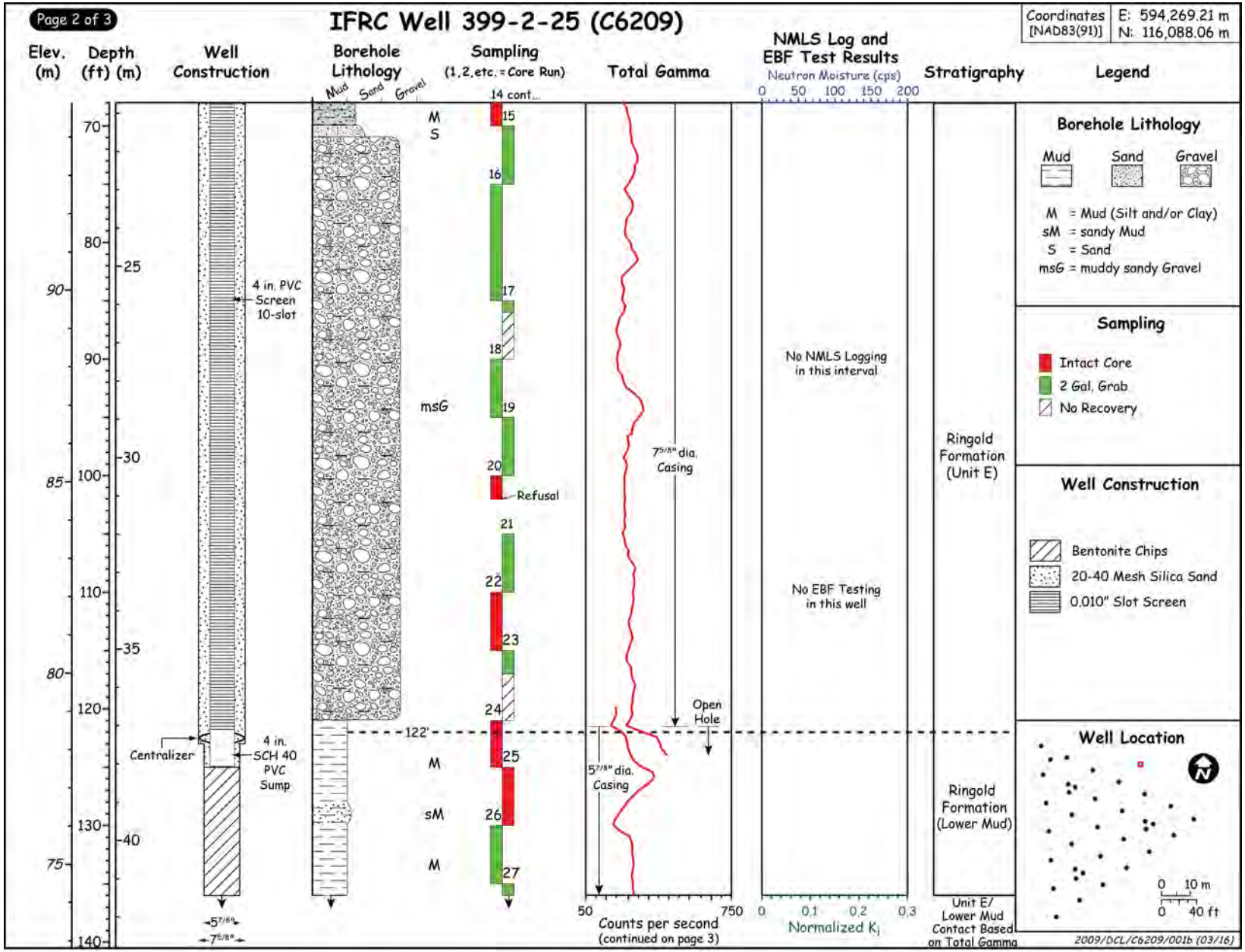

IFRC Well 399-3-28 (C6205)
Coordinates [NAD83(91)]
E: 594,256.10 m
N: 116,045.98 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.900 Brass Cap [NAVD88]
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
08/01/08
4 in. dia. 20-slot PVC Screen
Centralizer
7 5/8"
Mud
Sand
Gravel
gS
sG
msG
sG
G
M
Oxidized
Reduced
12'
24.9'
34.8'
56'
111.5 m
107.3 m
104.3 m
Total Depth = 64.5' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 80%
Total Recovery = 80%
50
750
Counts per second
0 50 100 150 200
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Test was completed, but results are not representative of flow profile due to significant bypass flow.
0 0,1 0,2 0,3
Normalized K_i
Backfill
?
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
msG = muddy sandy Gravel
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
N
0 10 m
0 40 ft
2009/DCL/C6205/001 (03/10)

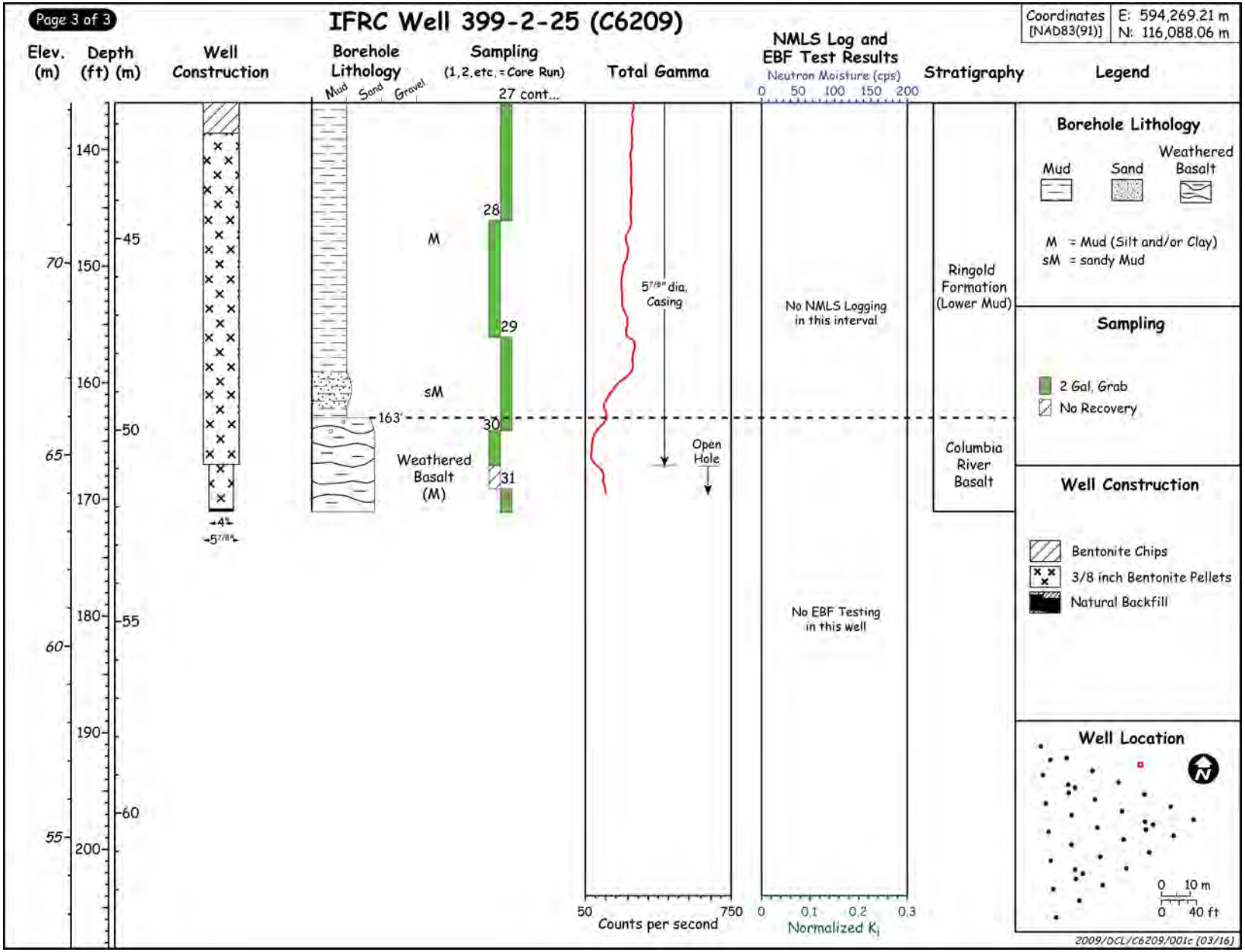

IFRC Well 399-3-29 (C6206)
Coordinates [NAD83(91)]
E: 594,264.27 m
N: 116,051.97 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.898 Brass Cap [NAVD88]
111.5 m
107.3 m
104.3 m
24.9'
34.8'
52.5'
Conduit
Drain
12 in. Steel Vault
Historical Maximum Water Level
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
07/11/08
4 in. dia. 20-slot PVC Screen
Centralizer
7 5/8"
Mud
Sand
Gravel
gS
sG
msG
sG
G
M
Oxidized
Reduced
Total Depth = 64' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 84%
Total Recovery = 84%
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Interpolated between EBF measurement and pumping rate
Normalized Ki
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
msG = muddy sandy Gravel
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6206/001 (03/10)

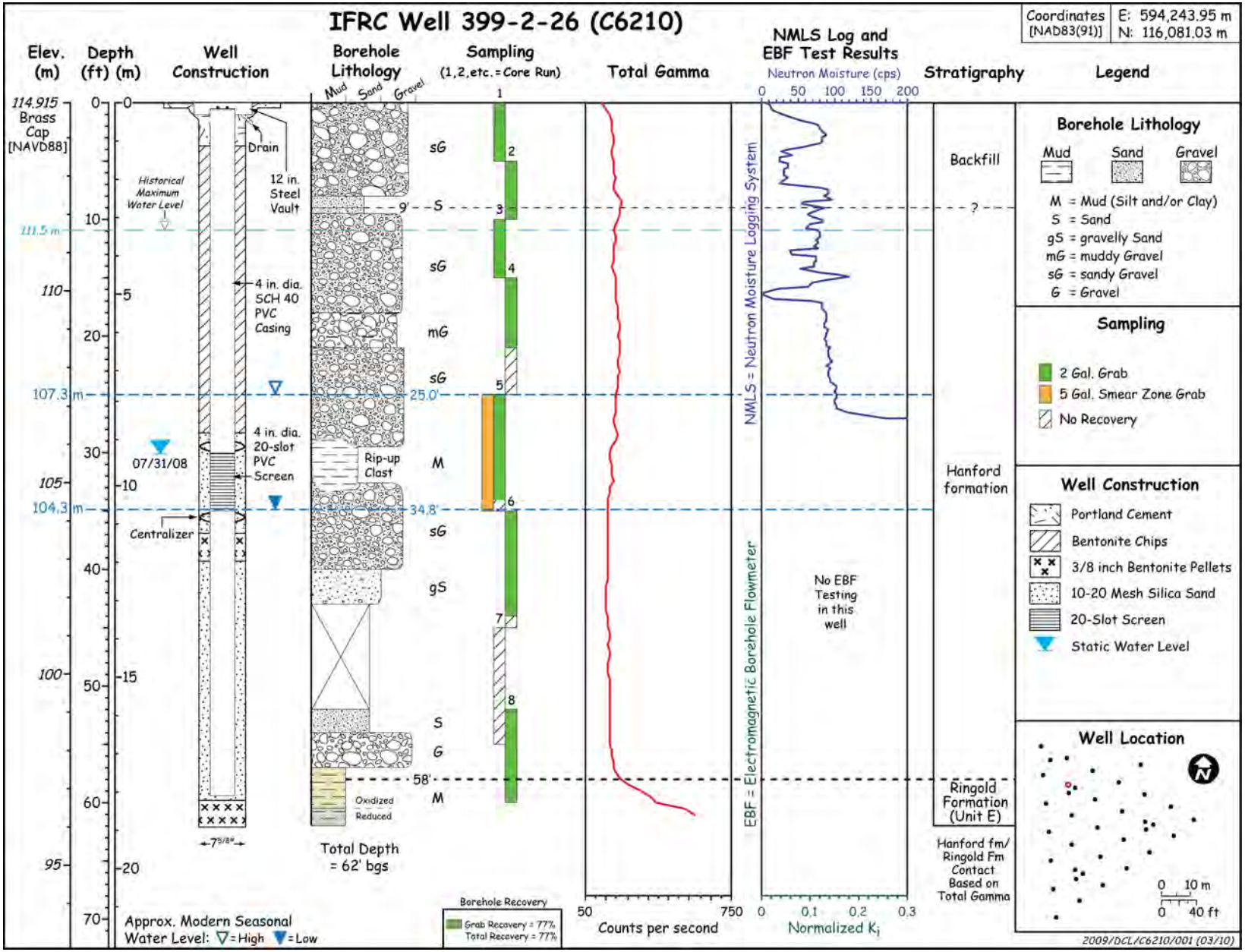

IFRC Well 399-2-23 (C6207)
Coordinates [NAD83(91)]
E: 594,272.27 m
N: 116,057.59 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.875 Brass Cap [NAVD88]
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
07/16/08
4 in. dia. 20-slot PVC Screen
Centralizer
Mud
Sand
Gravel
gS
sG
msG
M
6'
24.9'
34.7'
55'
Oxidized
Reduced
Total Depth = 60' bgs
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Interpolated between EBF measurement and pumping rate
0.329
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Counts per second
Normalized K_i
Borehole Recovery
Grab Recovery = 78%
Total Recovery = 78%
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
mG = muddy Gravel
sG = sandy Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6207/001 (03/10)

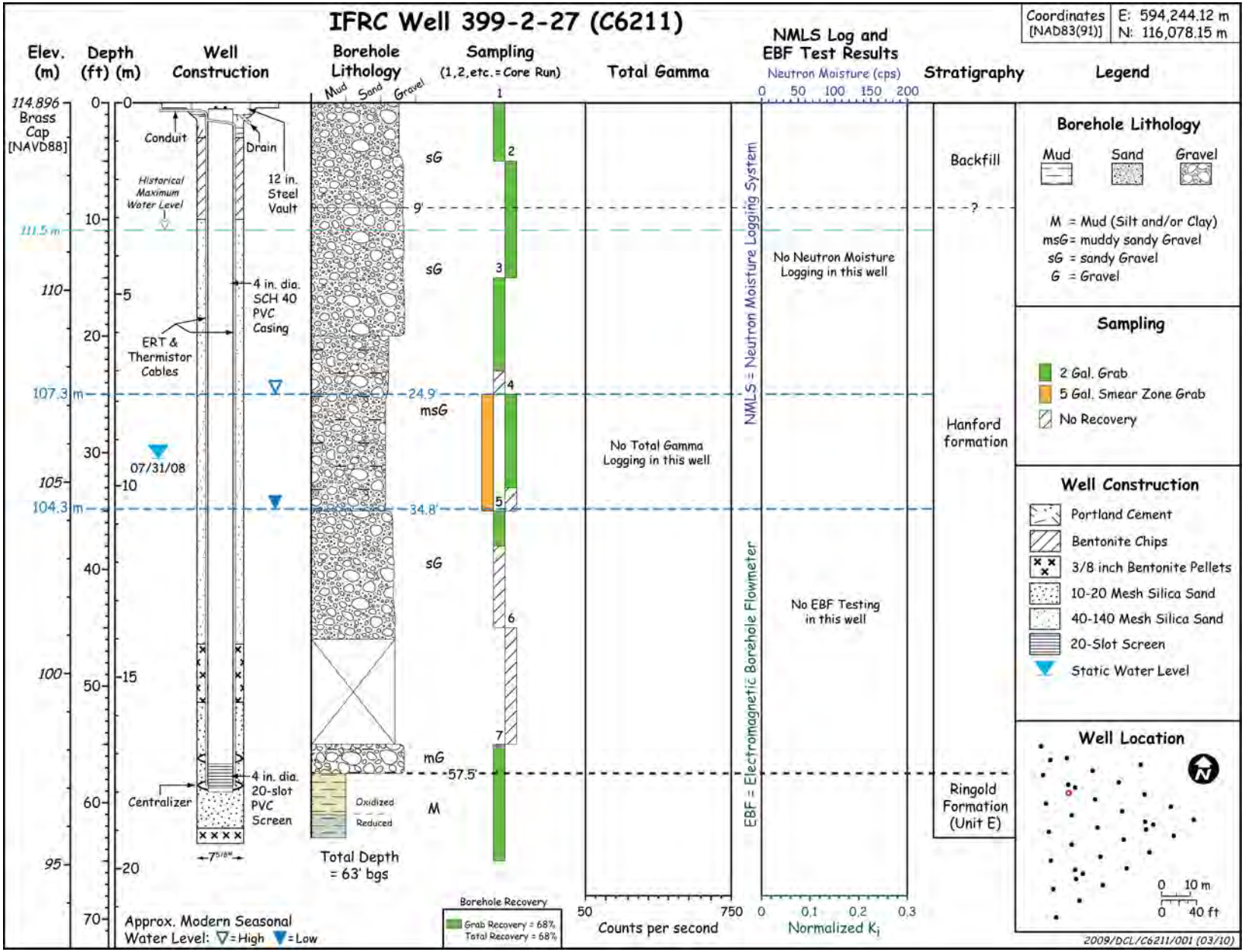

IFRC Well 399-2-24 (C6208)
Coordinates [NAD83(91)]
E: 594,280.67 m
N: 116,063.29 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.889 Brass Cap [NAVD88]
111.5 m
107.3 m
104.3 m
Conduit
Drain
12 in. Steel Vault
Historical Maximum Water Level
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
05/29/08
4 in. dia. 20-slot PVC Screen
Centralizer
Rip-up Clast
Rip-up Clast
Oxidized
Reduced
6"
7"/8"
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Total Depth = 67.5' bgs
6'
24.9'
34.7'
58'
sG
gS
msG
G
S
M
Borehole Recovery
Core Recovery = 35%
Grab Recovery = 45%
Total Recovery = 80%
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Interpolated between EBF measurement and pumping rate
Normalized Ki
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
S = Sand
gS = gravelly Sand
msG = muddy sandy Gravel
sG = sandy Gravel
G = Gravel
Sampling
Intact Core
2 Gal. Grab
5 Gal. Smear Zone Grab
Slough
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6208/001 (03/10)

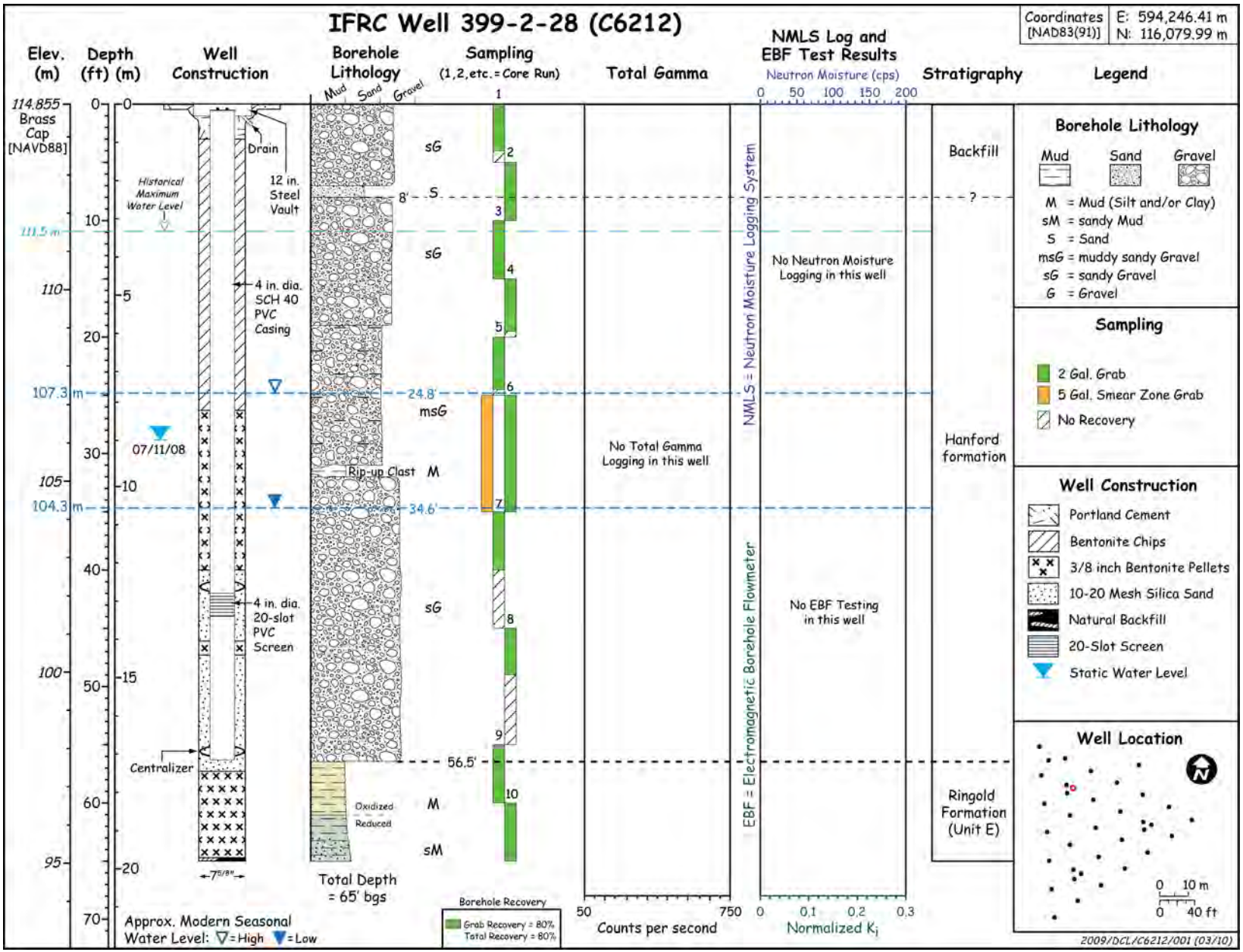

Page 1 of 3
IFRC Well 399-2-25 (C6209)
Coordinates [NAD83(91)]
E: 594,269.21 m
N: 116,088.06 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
115.638 Brass Cap [NAVD88]
Drain
12 in. Steel Vault
Historical Maximum Water Level
4 in. SCH 40 PVC
08/01/08
Centralizer
4 in. PVC Screen 10-slot
7 5/8" dia. Casing
9 5/8" dia. Casing
Open Hole
Mud
Sand
Gravel
gS
mG
msG
sG
M
Rip-up Clast
Rip-up Clast ?
Oxidized
Reduced
6.5'
27.4'
37.2'
58'
111.5 m
107.3 m
104.3 m
Approx. Modern Seasonal Water Level: ▽ = High ▼ = Low
Counts per second
(continued on page 2)
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
No EBF Testing in this well
Normalized K_i
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
mG = muddy Gravel
msG = muddy sandy Gravel
sG = sandy Gravel
Sampling
Intact Core
2 Gal. Grab
5 Gal. Smear Zone Grab
Slough
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
20-40 Mesh Silica Sand
0.010" Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6209/001a (03/16)

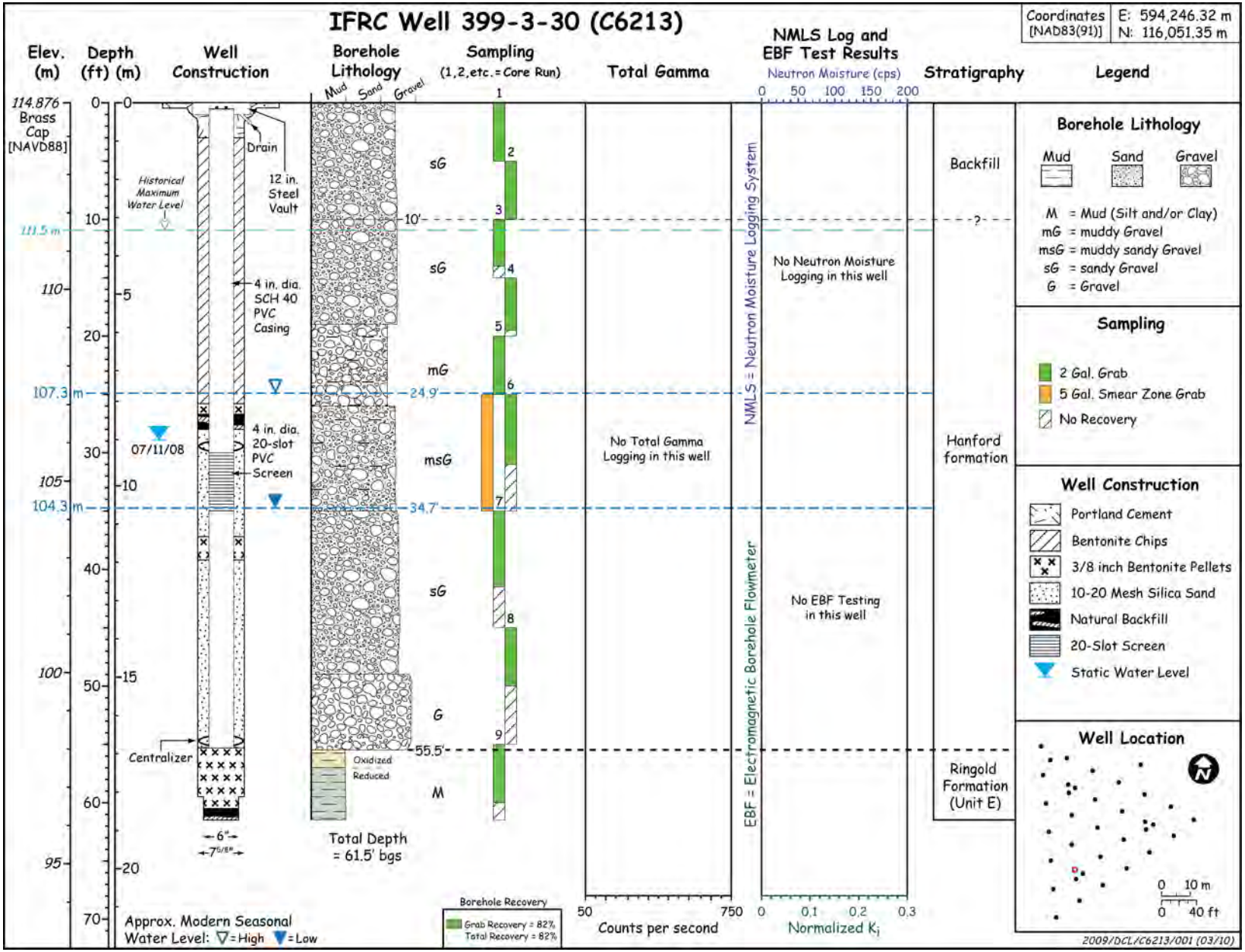

Page 2 of 3
IFRC Well 399-2-25 (C6209)
Coordinates [NAD83(91)]
E: 594,269.21 m
N: 116,088.06 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Mud
Sand
Gravel
Sampling (1,2,etc. = Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
0 50 100 150 200
Stratigraphy
Legend
14 cont...
15
16
17
18
19
20
Refusal
21
22
23
24
25
26
27
M
S
msG
sM
M
122'
4 in. PVC Screen 10-slot
4 in. SCH 40 PVC Sump
Centralizer
5 7/8" dia.
7 5/8" dia.
7 5/8" dia. Casing
5 7/8" dia. Casing
Open Hole
No NMLS Logging in this interval
No EBF Testing in this well
Ringold Formation (Unit E)
Ringold Formation (Lower Mud)
Unit E/ Lower Mud Contact Based on Total Gamma
50
750
Counts per second
(continued on page 3)
0 0.1 0.2 0.3
Normalized K_i
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
sM = sandy Mud
S = Sand
msG = muddy sandy Gravel
Sampling
Intact Core
2 Gal. Grab
No Recovery
Well Construction
Bentonite Chips
20-40 Mesh Silica Sand
0.010" Slot Screen
Well Location
N
0 10 m
0 40 ft
2009/DCL/C6209/001b (03/16)

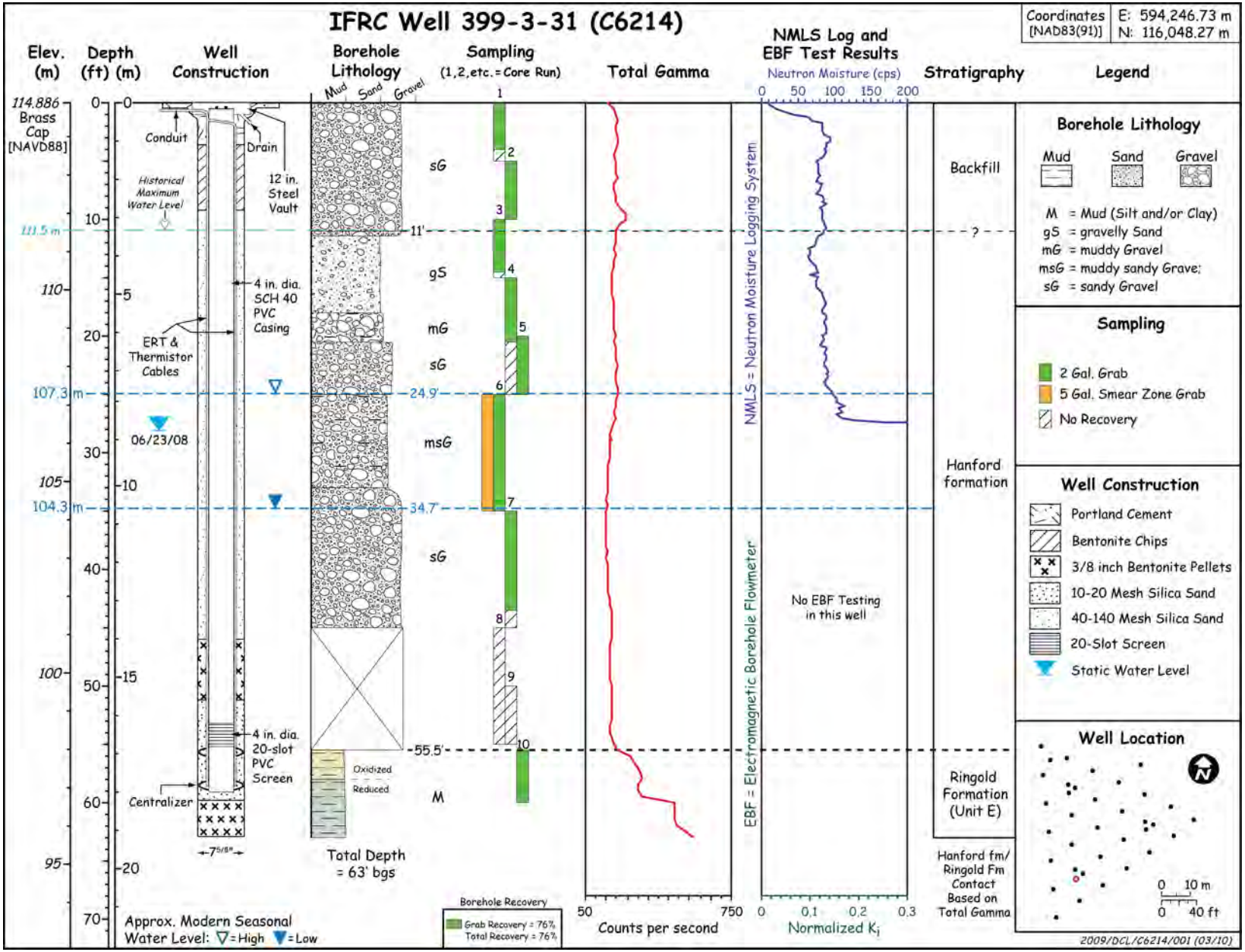

Page 3 of 3
IFRC Well 399-2-25 (C6209)
Coordinates [NAD83(91)]
E: 594,269.21 m
N: 116,088.06 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Mud
Sand
Gravel
Sampling (1,2,etc. = Core Run)
27 cont...
28
29
30
31
M
sM
163'
Weathered Basalt (M)
Total Gamma
5 7/8" dia. Casing
Open Hole
Counts per second
50
750
NMLS Log and EBF Test Results
Neutron Moisture (cps)
0
50
100
150
200
No NMLS Logging in this interval
No EBF Testing in this well
Normalized K_i
0
0.1
0.2
0.3
Stratigraphy
Ringold Formation (Lower Mud)
Columbia River Basalt
Legend
Borehole Lithology
Mud
Sand
Weathered Basalt
M = Mud (Silt and/or Clay)
sM = sandy Mud
Sampling
2 Gal. Grab
No Recovery
Well Construction
Bentonite Chips
3/8 inch Bentonite Pellets
Natural Backfill
Well Location
N
0 10 m
0 40 ft
2009/DCL/C6209/001c (03/16)

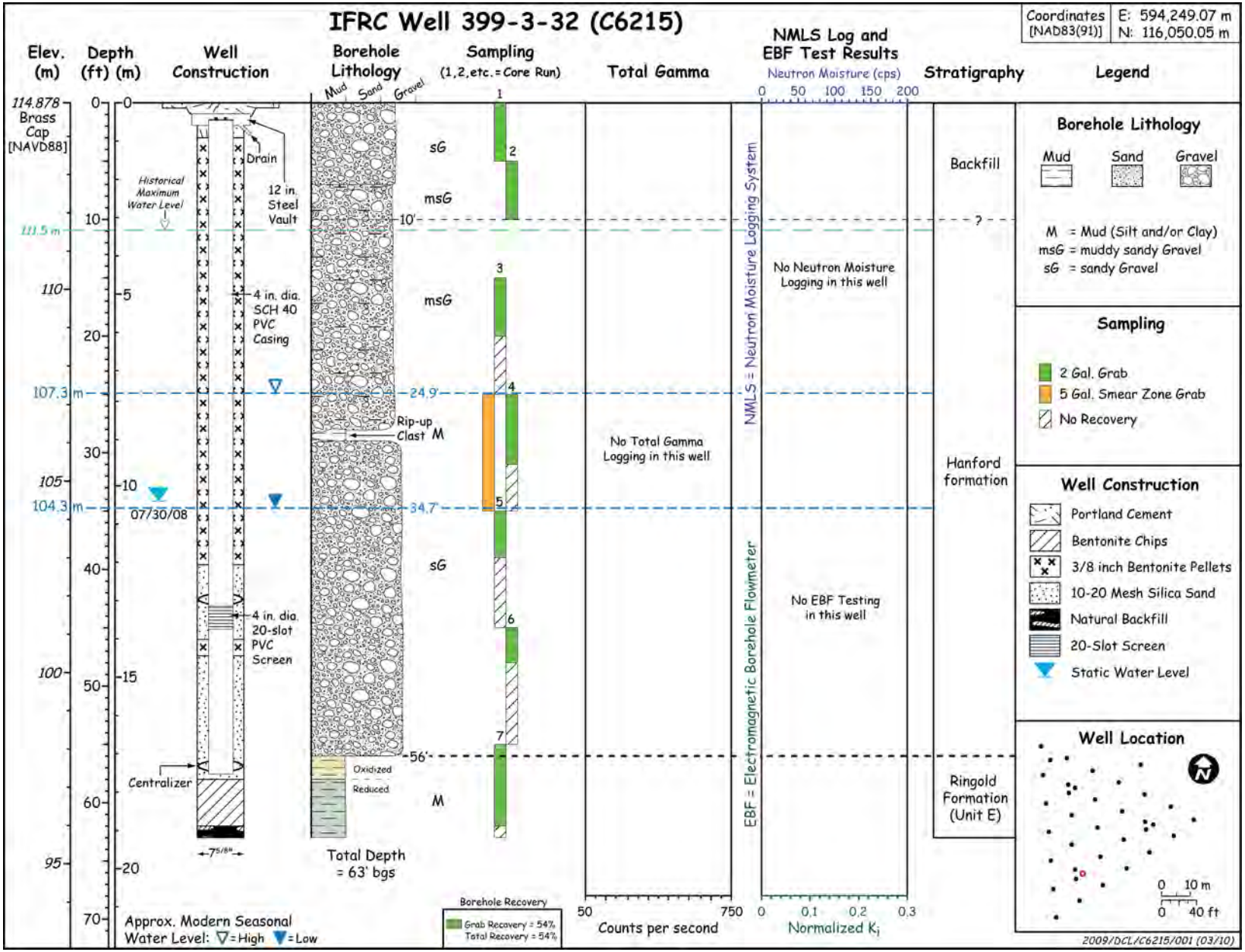

IFRC Well 399-2-26 (C6210)
Coordinates [NAD83(91)]
E: 594,243.95 m
N: 116,081.03 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.915 Brass Cap [NAVD88]
111.5 m
107.3 m
104.3 m
Historical Maximum Water Level
Drain
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
4 in. dia. 20-slot PVC Screen
07/31/08
Centralizer
Rip-up Clast
Oxidized
Reduced
7 5/8"
Total Depth = 62' bgs
sG
S
sG
mG
sG
M
sG
gS
S
G
M
9'
25.0'
34.8'
58'
Backfill
?
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
No EBF Testing in this well
Counts per second
Normalized Ki
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 77%
Total Recovery = 77%
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
S = Sand
gS = gravelly Sand
mG = muddy Gravel
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6210/001 (03/10)

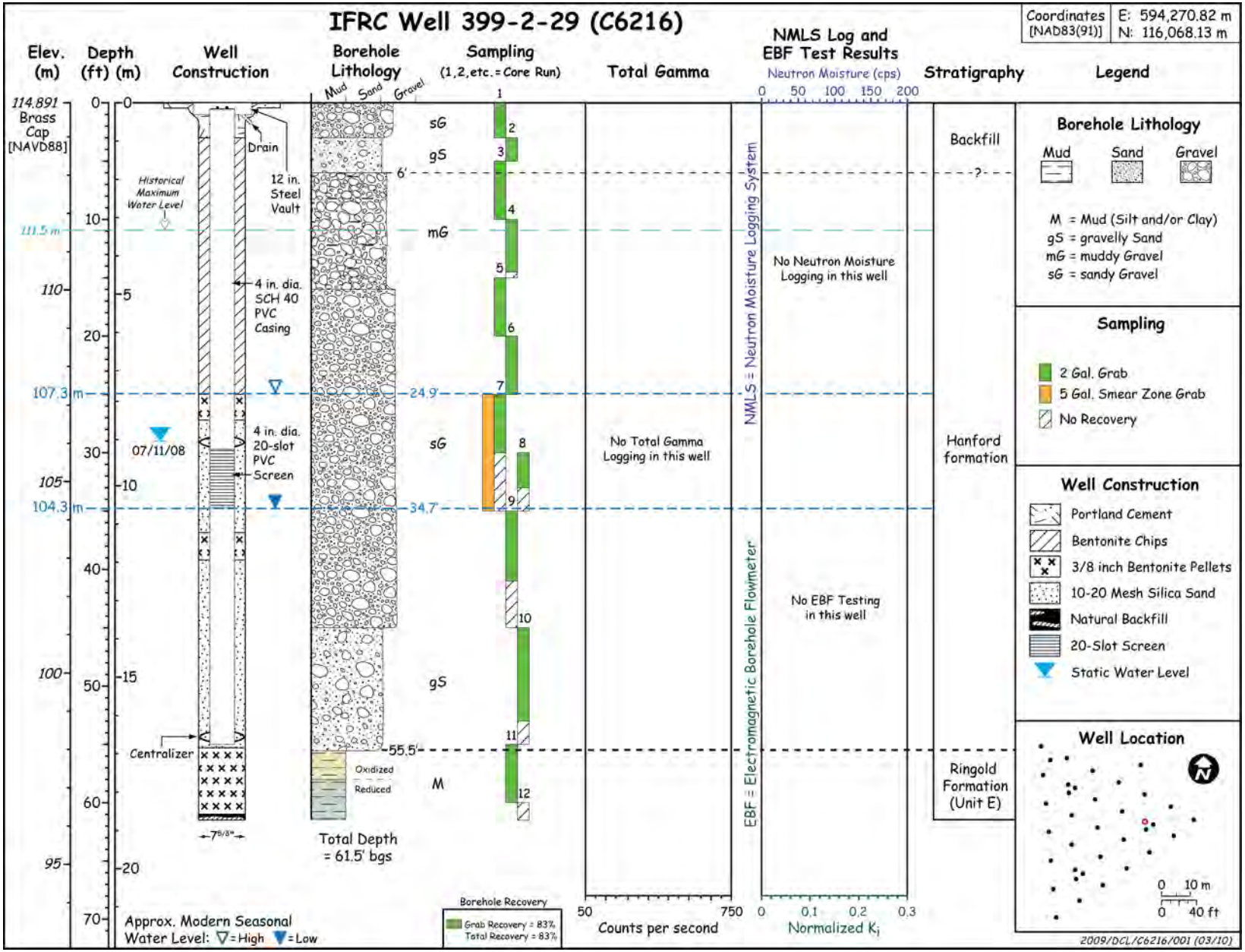

IFRC Well 399-2-27 (C6211)
Coordinates [NAD83(91)]
E: 594,244.12 m
N: 116,078.15 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.896 Brass Cap [NAVD88]
111.5 m
107.3 m
104.3 m
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
07/31/08
4 in. dia. 20-slot PVC Screen
Centralizer
7 5/8"
Mud
Sand
Gravel
sG
msG
mG
M
9'
24.9'
34.8'
57.5'
Oxidized
Reduced
Total Depth = 63' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 68%
Total Recovery = 68%
No Total Gamma Logging in this well
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
No Neutron Moisture Logging in this well
No EBF Testing in this well
Normalized K_i
Backfill
Hanford formation
Ringold Formation (Unit E)
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
msG = muddy sandy Gravel
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6211/001 (03/10)

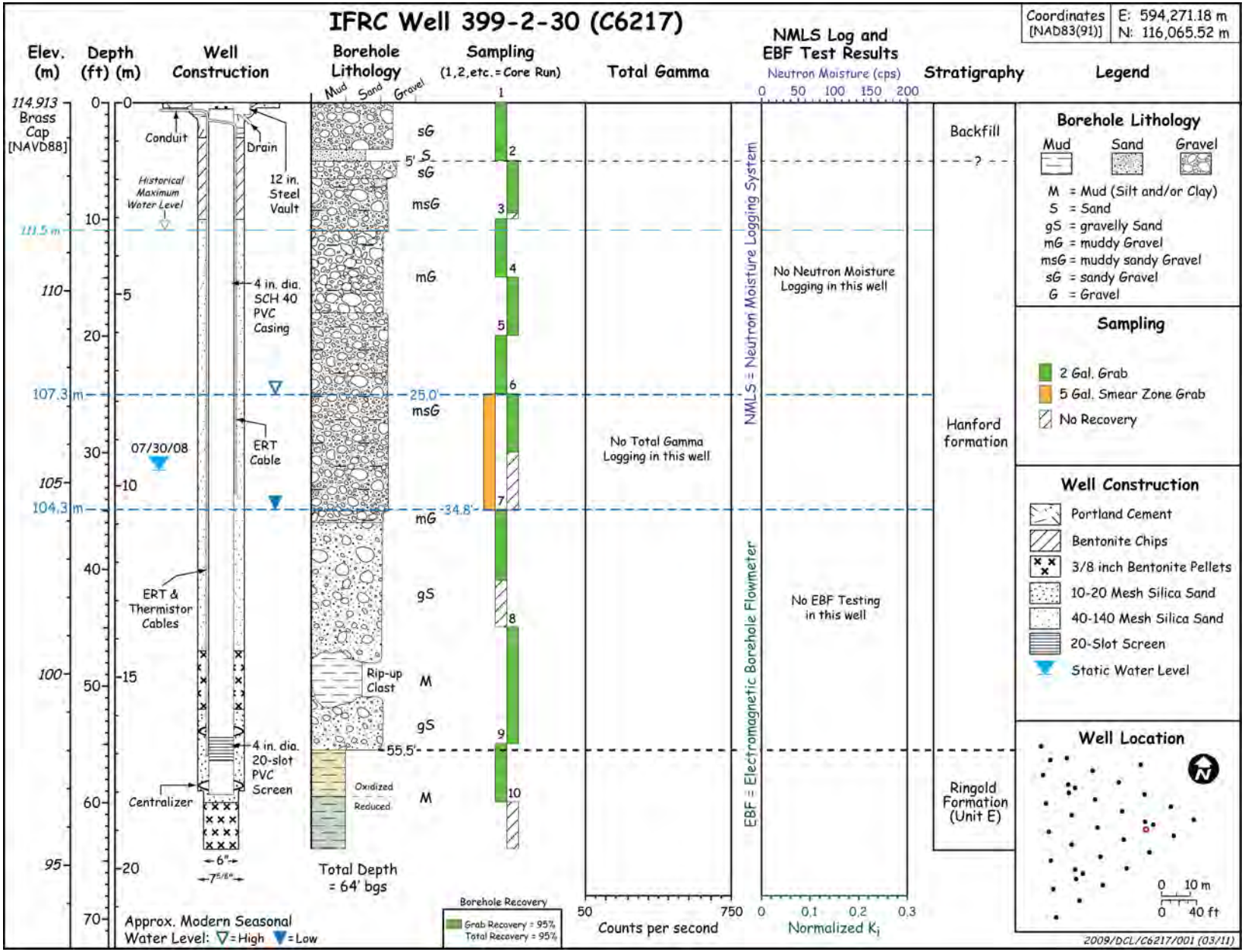

IFRC Well 399-2-28 (C6212)
Coordinates [NAD83(91)]
E: 594,246.41 m
N: 116,079.99 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.855 Brass Cap [NAVD88]
Historical Maximum Water Level
Drain
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
4 in. dia. 20-slot PVC Screen
Centralizer
7 5/8"
07/11/08
Rip-up Clast
Oxidized
Reduced
Total Depth = 65' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
sG
S
msG
M
sM
8'
24.8'
34.6'
56.5'
No Total Gamma Logging in this well
No Neutron Moisture Logging in this well
No EBF Testing in this well
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Counts per second
Normalized Ki
Backfill
Hanford formation
Ringold Formation (Unit E)
Borehole Recovery
Grab Recovery = 80%
Total Recovery = 80%
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
sM = sandy Mud
S = Sand
msG = muddy sandy Gravel
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6212/001 (03/10)

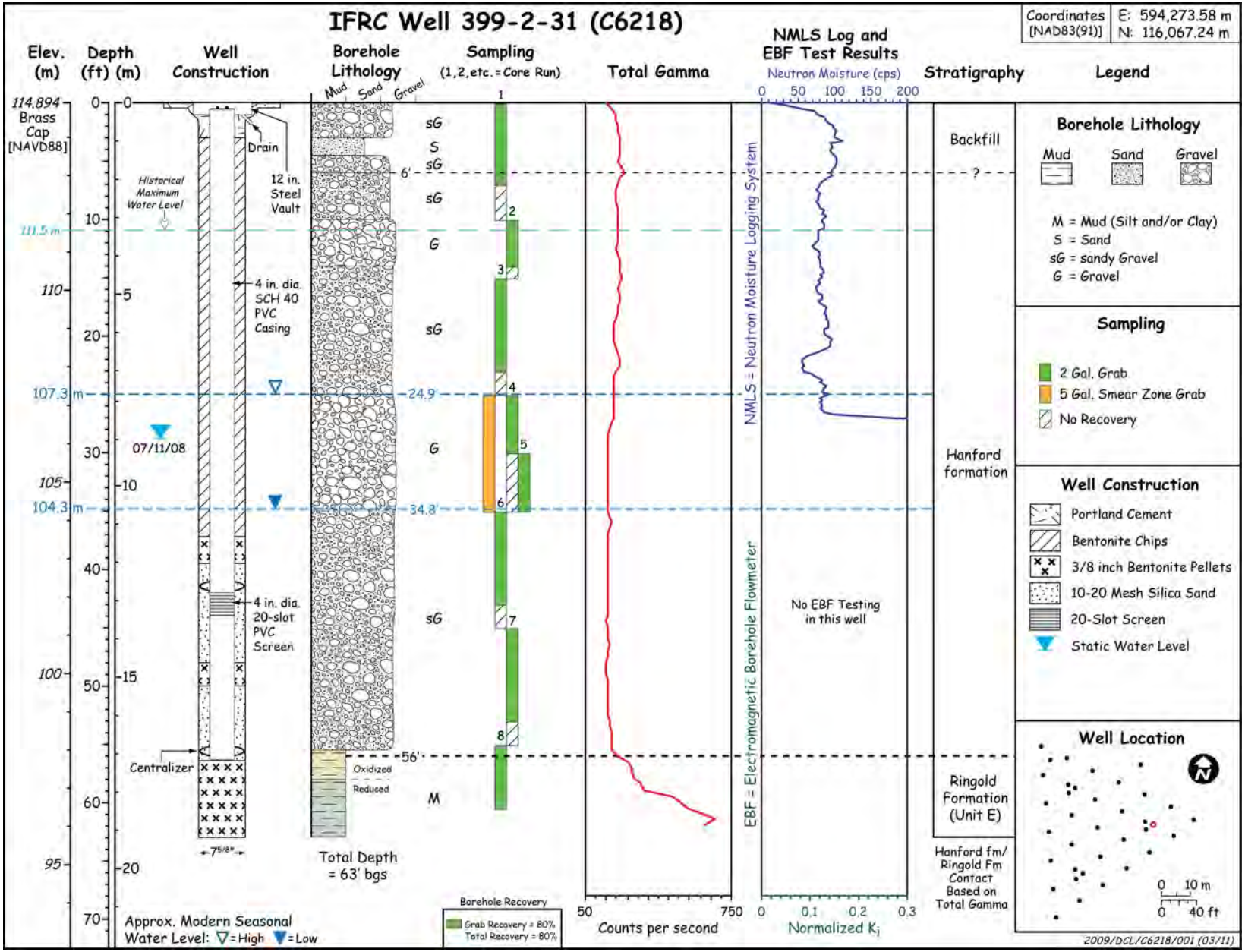

IFRC Well 399-3-30 (C6213)
Coordinates [NAD83(91)]
E: 594,246.32 m
N: 116,051.35 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.876 Brass Cap [NAVD88]
111.5 m
107.3 m
104.3 m
Historical Maximum Water Level
Drain
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
4 in. dia. 20-slot PVC Screen
07/11/08
Centralizer
6"
7 5/8"
Oxidized
Reduced
Total Depth = 61.5' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
sG
mG
msG
G
M
10'
24.9'
34.7'
55.5'
No Total Gamma Logging in this well
No Neutron Moisture Logging in this well
No EBF Testing in this well
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Counts per second
Normalized K_i
Backfill
Hanford formation
Ringold Formation (Unit E)
Borehole Recovery
Grab Recovery = 82%
Total Recovery = 82%
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
mG = muddy Gravel
msG = muddy sandy Gravel
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6213/001 (03/10)


IFRC Well 399-3-31 (C6214)
Coordinates [NAD83(91)]
E: 594,246.73 m
N: 116,048.27 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.886 Brass Cap [NAVD88]
111.5 m
110
107.3 m
105
104.3 m
100
95
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT & Thermistor Cables
06/23/08
4 in. dia. 20-slot PVC Screen
Centralizer
7 5/8"
Mud
Sand
Gravel
sG
gS
mG
sG
msG
sG
M
11'
24.9'
34.7'
55.5'
Oxidized
Reduced
Total Depth = 63' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 76%
Total Recovery = 76%
50
750
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
No EBF Testing in this well
0 0,1 0,2 0,3
Normalized K_i
Backfill
?
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud Sand Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
mG = muddy Gravel
msG = muddy sandy Gravel
sG = sandy Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6214/001 (03/10)


IFRC Well 399-3-32 (C6215)
Coordinates [NAD83(91)]
E: 594,249.07 m
N: 116,050.05 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.878 Brass Cap [NAVD88]
111.5 m
107.3 m
104.3 m
Historical Maximum Water Level
Drain
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
4 in. dia. 20-slot PVC Screen
Centralizer
07/30/08
Rip-up Clast M
Oxidized
Reduced
sG
msG
M
10'
24.9'
34.7'
56'
Total Depth = 63' bgs
No Total Gamma Logging in this well
No Neutron Moisture Logging in this well
No EBF Testing in this well
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
Backfill
Hanford formation
Ringold Formation (Unit E)
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 54%
Total Recovery = 54%
Counts per second
Normalized K_i
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
msG = muddy sandy Gravel
sG = sandy Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6215/001 (03/10)


IFRC Well 399-2-29 (C6216)
Coordinates [NAD83(91)]
E: 594,270.82 m
N: 116,068.13 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.891 Brass Cap [NAVD88]
Historical Maximum Water Level
Drain
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
4 in. dia. 20-slot PVC Screen
07/11/08
Centralizer
7 5/8"
Mud
Sand
Gravel
sG
gS
mG
sG
gS
M
6'
24.9'
34.7'
55.5'
Oxidized
Reduced
Total Depth = 61.5' bgs
No Total Gamma Logging in this well
Counts per second
NMLS = Neutron Moisture Logging System
No Neutron Moisture Logging in this well
EBF = Electromagnetic Borehole Flowmeter
No EBF Testing in this well
Normalized Ki
Backfill
Hanford formation
Ringold Formation (Unit E)
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
gS = gravelly Sand
mG = muddy Gravel
sG = sandy Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
Natural Backfill
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 83%
Total Recovery = 83%
2009/DCL/C6216/001 (03/10)


IFRC Well 399-2-30 (C6217)
Coordinates [NAD83(91)]
E: 594,271.18 m
N: 116,065.52 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.913 Brass Cap [NAVD88]
Conduit
Drain
Historical Maximum Water Level
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
ERT Cable
07/30/08
ERT & Thermistor Cables
Centralizer
4 in. dia. 20-slot PVC Screen
6"
7 5/8"
Mud
Sand
Gravel
sG
S
msG
mG
gS
M
Rip-up Clast
Oxidized
Reduced
5'
25.0'
34.8'
55.5'
Total Depth = 64' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 95%
Total Recovery = 95%
No Total Gamma Logging in this well
Counts per second
NMLS = Neutron Moisture Logging System
No Neutron Moisture Logging in this well
EBF = Electromagnetic Borehole Flowmeter
No EBF Testing in this well
Normalized K_i
Backfill
Hanford formation
Ringold Formation (Unit E)
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
S = Sand
gS = gravelly Sand
mG = muddy Gravel
msG = muddy sandy Gravel
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
40-140 Mesh Silica Sand
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6217/001 (03/11)


IFRC Well 399-2-31 (C6218)
Coordinates [NAD83(91)]
E: 594,273.58 m
N: 116,067.24 m
Elev. (m)
Depth (ft) (m)
Well Construction
Borehole Lithology
Sampling (1,2,etc.=Core Run)
Total Gamma
NMLS Log and EBF Test Results
Neutron Moisture (cps)
Stratigraphy
Legend
114.894 Brass Cap [NAVD88]
111.5 m
107.3 m
104.3 m
Historical Maximum Water Level
07/11/08
Drain
12 in. Steel Vault
4 in. dia. SCH 40 PVC Casing
4 in. dia. 20-slot PVC Screen
Centralizer
7 5/8"
Mud
Sand
Gravel
sG
S
G
M
6'
24.9'
34.8'
56'
Oxidized
Reduced
Total Depth = 63' bgs
Approx. Modern Seasonal Water Level: ▽=High ▼=Low
Borehole Recovery
Grab Recovery = 80%
Total Recovery = 80%
Counts per second
NMLS = Neutron Moisture Logging System
EBF = Electromagnetic Borehole Flowmeter
No EBF Testing in this well
Normalized K_i
Backfill
Hanford formation
Ringold Formation (Unit E)
Hanford fm/ Ringold Fm Contact Based on Total Gamma
Borehole Lithology
Mud
Sand
Gravel
M = Mud (Silt and/or Clay)
S = Sand
sG = sandy Gravel
G = Gravel
Sampling
2 Gal. Grab
5 Gal. Smear Zone Grab
No Recovery
Well Construction
Portland Cement
Bentonite Chips
3/8 inch Bentonite Pellets
10-20 Mesh Silica Sand
20-Slot Screen
Static Water Level
Well Location
0 10 m
0 40 ft
2009/DCL/C6218/001 (03/11)

Appendix B

Well-Site Geologist Logs

BOREHOLE LOG

Page 1 of 2

Date: 6/27/06

Well ID: C6184 | Well Name: 399-2-7 | Location: 300-FF-5

Project: PNNL 300 Area IFC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic drilling method w/ 6" Drive barrel (DB)
	DB			0-0.5 gravel drill pad	
				0.5-6 sandy gravel (SG)	Advance DB 0-5', recover 0-5' collect 2 GS at 0920
				60% gravel 1-3", 40% sand, gravel subangular, 10% fragmented	
5				Sand Fine to cs, subangular,	
				70% mafic, 30% felsic, mod rxn to HCl, UN consolidated 10YR 4/2, dk grayish brn	
	DB			6-10 sandy gravel (SG) 65% gravel, 35% sand gravel 0.5-3", subangular, 10% fragmented,	Advance DB 5-10' recover 5-10' collect 2 GS at 0925
				sand cs to vcs, subangular,	
10				75% mafic, 25% felsic, UNconsolidated, 10YR 3/2, dk grayish brn, moist,	Advance DB 10-15, recover 10-15' collect 2 GS at 0935.
	DB			10-11 Sandy gravel (SG) 65% gravel, 35% sand, gravel 0.5-2.5", subangular, 10% fragmented, sand cs to vcs, subangular, 75% mafic, 25% felsic, UNconsolidated, 10YR 3/2 v. dark grayish brn, moist,	
15					
	DB				Advance DB 15-20 recover 15-20' collect 2 GS at 0950 6/27/06
20				11-12 sand (S) medium sand, subangular, no rxn to HCl, moist, UNconsolidated,	Advance DB 15-25 recover 20-22.5' collect 1 GS at 1005
	DB			12-25 silty sandy gravel (mSG) 80% gravel, 15% sand, 5% silt, gravel 80% 1-3" subangular, 10% fragmented	
25				sand med to cs, UNconsolidated, 10YR 5/1 gray, moist, no rxn to HCl, ~~10YR 3/2 v. dark grayish brn~~ 6/27/06	Advance DB 25-35, recover 25-31.5' collect 3 GS at 1040
	DB			75% mafic, 25% felsic	
30				25-36 sandy gravel (SG) 85% gravel, 15% sand, gravel 80% 1-2", subangular, 10% fragmented,	
				sand med to cs, subangular	
35				10YR 3/2 v. dark grayish brn - UNconsolidated, no rxn to HCl, 80% mafic, 20% felsic.	Advance DB 35-45, recover 35-40' collect 2 GS at 1120
	DB				

Reported By: Jafit | Reviewed By: L. D. Walker

Title: Geologist | Title: Geologist

Signature: [signature] Date: 6/27/06 | Signature: [signature] Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2

Date: 6/27/06

Well ID: C6184 | Well Name: 399-2-7 | Location: 300-FF-5

Project: PNNL 300 Area IFC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40				36-55 gravel, (C) =5% VCS sand, Gravel 0.5-4", sub-rounded, unconsolidated, No rxn to HCl, 80% mafic, 20% felsic, black,	Sonic drilling method w/ 6" drive barrel (OB)
45					Advance OB 45-55 recovered 7.5-55 collect 365 at 1250
50	B			55-58 silt (M) oxidized 2.5Y 5/3 light olive brn, no rxn to HCl.	
55	B			~~6/26/06~~ ~~55-55~~ 58-62 silt (M) reduced, 2.5Y 5/1 gray	Advance OB 55-60 recovered 7' collect 265 at 1300.
60					Total Depth 62 Ft.
65					

Reported By: Jeffries | Reviewed By: L.J. Walker

Title: Geologist | Title: Geologist

Signature: [signature] | Date: 6/27/06 | Signature: [signature] | Date: 7/7/06

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 7/7/08

Well ID: C6185	Well Name: 399-2-8	Location: 300-FF-5
Project: PNNL Characterization 300 Area IEC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0				0-0.5' gravel drillpad	Sonic drilling method w/ 6" Drive barrel (DB)
	D B			0.5-8 sandy gravel (SG), 60% gravel, 40% sand, gravel subangular, 1-4", sand 70% fine, subangular, no rxn to HCl, 10YR 5/2 grayish brn, unconsolidated, 75% mafic, 25% felsic.	Advance DB 0-5', recover 0-5 & collect 2GS at 0815.
5	D B			8-9' sand (S) medium sand, subangular, ~~st~~ M 7/7 slightly consolidated, NO rxn to HCl, sl. moist, 10YR 4/1 dark grayish brown.	Advance DB 5-10' - recover 5-10 & collect 2GS at 0820
10	D B			9-21.5 sandy gravel (SG) trace silt, 65% gravel, 35% sand, gravel 75% 1-1.5", sand 75% fine, subangular, unconsolidated, dry, no rxn to HCl, 10YR 5/2 grayish brown. 75% mafic, 25% felsic.	Advance DB 10-15, recover 10-15 & collect 2GS at 0920
15				Note: sample 15-21 F grained - suspect it had been ground-up working the borehole.	Advance DB - 15-25 recover 15-25 & collect 4GS at 1235
20	D B			21.5 ≈ 24.5 silt (M) rip-up clast? moist, no rxn to acid 2.5' 5/2 grayish brn.	
25	D B			24.5-38 sandy gravel (SG) 80% gravel - 0.5-2.5", subangular, sand cs. to v cs, subangular, no rxn to acid, 80% mafic, 20% felsic, unconsolidated, wet ≈ black.	Advance DB 25-31.5 & collect 2GS at 1535.
30					7/8/08
					Advance DB 35-45 - recover 35-41 & collect 2GS at 0720
35	D B				

Reported By: Joe Fitt		Reviewed By: L. D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 7/7/08	Signature: [signature]	Date: 7/10/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 7/8/08

Well ID: 6185 | Well Name: 399-2-8 | Location: 300-FF-5
Project: PNNL Characterization 300 IFC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	D			38-41 silt (m) rig-up clast 2.5Y5/3 light olive brown, moist no rxn to acid, consolidated	Sonic Drilling method w/ 6" DB
45	D			41-48.5 sand (s) coarse to v coarse subangular sand, no rxn to acid, 95% mafic, 15% felsic black unconsolidated	Advance DB 45-55', recover 45-53', collect 3 GS at 0740
50	D			48.5-50.5 gravel (G) 1-to 3" subrounded to subangular, no rxn to acid 80% mafic, 20% felsic & black unconsolidated.	Advance DB 55-60
55	D			50.5-57 silt (m) oxidized 2.5Y5/3 light olive brown,	recover 55-62', collect 2 GS at 0750
60	D			57-60 silt (m) reduced 2.5Y 4/1 dark gray.	
				Total Depth 60'	

Reported By: Joe Fritts | Reviewed By: C.D. Walker
Title: Geologist | Title: Geologist
Signature: [signature] Date: 7/9/08 | Signature: [signature] Date: 7/10/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2

Date: 5/12-5/13/08

Well ID: C6196 | Well Name: 399-2-9 | Location: NW corner of site

Project: 300-FF-5 OU | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0				5/12/08	
	X			0-.7' gravel drillpad	Sonic drilling 7 5/8"
				0.7-4.25' sandy gravel (SG) 70%	OD casing.
	SS			gravel, cobble to 5" subrounded	Core #1 0-5Ft, recovery
				poorly consolidated, mod rxn to HCl,	0-2.5Ft. Four liners
5				60% mafic, 40% Felsic. Sand is	2-9-C-0.0-0.5 (1105)
				Fine to vcs, subangular 80% felsic	2-9-C-0.5-1.5
				20% mafic. Overall 30% fragments,	2-9-C-1.5-2.5
				10YR 5/2 grayish brown. Dry.	Core #2 9.4-14.4
				4.2-10.0' - ∅ recovery SS. - used clean out	2-9-C-9.4-10.4
	X			5.0-9.0 sandy gravel (SG) 70% gravel	2-9-C-10.4-11.4 (1310)
10				to 4", subrounded, poorly consolidated,	2-9-C-11.4-12.4
	SS			mod rxn to HCL, 70% mafic,	2-9-C-12.4-13.4
				30% Felsic, sand is med to cs,	2-9-C-13.4-14.4
				subrounded, 75% Felsic, 25% mafic,	Core # 3 14.4-19.4
				moist, Overall 25% fragments	(1330)
15				9.0-17.0 sandy gravel (SG) 70%	2-9-C-15.9-16.4
	SS			subrounded gravel to 2.5",	2-9-C-16.4-17.4
				70% mafic, 30% felsic, sand is	2-9-C-17.4-18.4
				med to vcs, subangular, 80%	2-9-C-18.4-19.4
				Felsic, 20% mafic, unconsolidated,	
20	X			mod rxn to HCL, 25% fragments,	Core #4 20-25.
				mottled brown in places, ash?	recovered 20-21.9.
				black coating on rocks and in	2-9-C-20-21.9 (at 1505)
	SS			matrix, moist. 10YR 5/6 grayish brn	Core #5 23.7-28.7
				17.0-27 sandy gravel (SG) 75%	23.7-24.7 5/14/08
25	X			65% subrounded gravel to 2",	2-9-C-23.7-24.7 (1520)
				70% mafic, 30% Felsic, med to	2-9-C-24.7-25.7
	SS			vcs sand, poorly consolidated,	2-9-C-25.7-26.7
				sand is ≈ 75% felsic, 25% mafic	Core #6 29.4-34.4 (0820)
				moist, 10YR 4/2 dark grayish brn	rec' 29.4-32.2
30	X			27-29.4 silty sand (mS) - ≈ 75% sand,	2-9-C-29.4-30.2
				25% silt. Sand is ≈ 85% fine to med	2-9-C-30.2-31.2
	SS			sand, 15% cs, subangular, unconsolidated,	2-9-C-31.2-32.2
				No rxn to HCL, ≈ 80% felsic, 20% mafic,	Core #7 35-40' (0835)
35				10YR 3/3 dk brn, Sl. moist.	rec' 35-38.3
	X			29.4-40 sandy gravel (SG) - 80% gravel,	2-9-C-35-35.3
				20% sand. Gravel to 5", subrounded,	2-9-C-35.3-36.3
				90% mafic, 10% Felsic, coarse sand,	2-9-C-36.3-37.3
	SS			subangular, 20% mafic, 30% felsic -	2-9-C-37.3-38.3

Reported By: Jen Fritts | Reviewed By: L.D. Walker

Title: Geologist | Title: Geologist

Signature: [signature] | Date: 5/13/08 | Signature: [signature] | Date: 5/21/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2

Date: 5/13/08

Well ID: C6186 | Well Name: 399-2-9 | Location: NW corner of site

Project: 300-FF-5-OU | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40				Continued ... unconsolidated, ~10% fragmented, NO rxn to HCL - saturated Basalt	Core #8 39.7-45 rec'd 39.7-42.2 (0935) 2-9-C-39.7-40.2
				40 - 54.8 sandy gravel (sG) ~80% gravel, 20% sand, Gravel to 5" subrounded, 85% mafic, 15% felsic, coarse sand, subangular, same comp. as gravel, Unconsolidated, NO rxn to HCL saturated	2-9-C-40.2-41.2 2-9-C-41.2-42.2
	SS				Core #9 41.5-50'
45	Drive Barrel				Rec'd 42-43' (1050) 2-9-C-42-43 #10
					Barrel ^4 1.4-50' rec'd 45-50' (1125)
50				54.0-54.8 silt(m) NO rxn to HCL, moist 10YR5/3 brown	2-9-C-45-50 Core #11 45-50-55' 2-9-C-50-50.5
	SS			54.8-58 sandy gravel (sG) ~80% gravel, 20% sand gravel to 2" subrounded, 80% mafic, 20% felsic, coarse to v cs sand, subangular, same comp as gravel, uncon solidated, NO rxn to HCL.	2-9-C-50.5-51.5 2-9-C-51.5-52.5 Core #12 54-58 - drive barrel. collect grab sample
55				58-59.5 Sand (S) Coarse, to v coarse sand, subangular, NO rxn to HCl, unconsolidated, 85% mafic, 15% felsic, black	2-9-C-56-57 at 1200
	SS			59.5-60.5 clayey silt(m) NO rxn to HCL, 10YR5/3 brown moist. oxidized.	Core #13 58-68 collect 5 known liner at 1330 2-9-C-58-59 2-9-C-59-60
60				60.5-65 Silt(m) NO rxn to HCL 2.5Y5/1 gray, reduced	2-9-C-60-61 2-9-C-61-62 2-9-C-62-63
65				Total Depth = 65 FT bgs	
				Indicates where core or grab sample was collected.	

Reported By: Jeffrey Hs | Reviewed By: L.D. Walker

Title: Geologist | Title: Geologist

Signature: | Date: 5/13/08 | Signature: | Date: 5/21/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 7/17/08

Well ID: C6187 | Well Name: 399-2-10 | Location: 300-FF-5

Project: PNNL 300 Area IFC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic drilling method up 6" drive barrel CDB
	D	B		0-0.5' gravel drill pad	
				0.5-8 gravelly sand (gS) 60% sand, 40% gravel, sand is Fine to cs, subangular, gravel 1-2.5" with 80% 1-2" subangular, 20% Fragmented. 10YR5/2 grayish brn, mod rxn to HCl, unconsolidated, 75% mafic, 25% felsic	Advance OB 0-5' recover 0-5' + collect 2GS at 0940.
5					
	D	B		8-10 gravelly sand (gS) 85% sand 15% gravel sand Fine to med, subangular, unconsolidated, stray rxn to HCl, gravel 0.5-1.5" block, och? 75% mafic, 25% felsic	Advance OB 5-15, recover 5-15 + collect 4GS at 0950
10					
				10-16 silty sandy gravel (msG) 70% gravel, 20% sand, 10% silt gravel 0.5-1.5", sand Fine to cs, subangular, gravel 15% frag. s1 rxn to HCl unconsolidated 10YR5/3 brown, 75% mafic, 25% felsic	Advance OB 15-25, recover 15-22 + collect 3GS at 1035.
15	D	B			
				16-24 silty sandy gravel (msG) 75% gravel, 20% sand, 10% silt gravel 80% 2-3", subangular, 15% Frag, sand med to cs, mod rxn to HCl, unconsolidated 80% mafic, 20% felsic 10YR 5/2 grayish brown, silt (rig-up dust?) at bottom of run - color 2.5Y 5/4 light olive brown	Advance OB 25-35 recover 25-32 + collect 3GS at 1120.
20					
25					
	D	B			
30				24-26 silt (m) rig-up dust no rxn to HCl, well consolidated 2.5Y5/4 light olive brown	
				26-37.5 sandy gravel (sG) 80% gravel, 20% sand, gravel 80% 1-2" subrounded, 15% fragmented, sand cs to vcs, subangular, unconsolidated, 85% mafic, 15% felsic, no rxn to HCl.	Advance OB 35-45, recover 35-42 + collect 3 GS at 1225
35					
	D	B			

Reported By: Jon Fitts | Reviewed By: C.D. Walker

Title: Geologist | Title: Geologist

Signature: [signature] | Date: 7/17/08 | Signature: [signature] | Date: 7/18/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 7/17/08

Well ID: C6187	Well Name: 399-2-10	Location: 300-FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	D B			37.5-42 silt (m) rip-up clast? 2.5Y 5/4 light olive brown	Sonic drilling method w/6" DB
				42-52 sandy gravel (SG) 75% gravel, 25% sand, gravel largely 1-2" but driller reports larger-may of dropped out. subangular, sand cs to vcs, subangular, unconsolidated, gravel < 10% frag, 85% mafic, 15% felsic, no rxn to HCL, - black	Advance DB 45-55 - recovers 45-52 & collect 2 GS at 1245
45	D B				
50				52-56 gravel (G) 2.5-5", largely, subrounded, 15% fragmented, 80% mafic, 20% felsic, unconsolidated	Advance DB 55-65 recover, recover 55-65 & collect 4 GS at 1300
55				56-61 silt (m) oxidized, no rxn to HCL 2.5Y 5/4, light olive brown,	
60	D B			61-65 silt (m) reduced, no rxn to HCl,	
65					Total Depth 65'

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature] for J. Fritts	Date: 7/17/08	Signature: [signature]	Date: 7/18/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2

Date: 7/14/6 - 7/16/08

Well ID: C6188	Well Name: 399-2-11	Location: 300-FF-5	
Project: PNNL Characterization 300 Area		Reference Measuring Point: ground surface	

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	IFC Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic drilling with 6" Drive barrel (DB)
	D B			0-0.5' gravel drill pad	
				0.5 - 7 gravelly sand (gS) 60% sand, 40% gravel, sand subangular, fine to vs, gravel 80% 1-2.5" subrounded 15% fragmented, 10YR5/3 brown no rxn to HCl, unconsolidated 75% mafic, 25% felsic,	Advance DB 0-5' - recover 0-5' & collect 2 GS at 1035.
5	D B			7-9 gravelly sand (gS) 70% sand, 30% gravel, sand fine to v. cs, subangular, gravel 80% 1", unconsolidated, sl rxn to HCl, gravel, <10% fragmented, moist, black (ash?), 75% mafic,	Advance DB 5-15' - recovers 5-12' & collect 3 GS at 1045.
10					
15	D B			9 - 29.5 silty sandy gravel (msG) 60% gravel, 30% sand, 10% silt. gravel 80% 1", subangular to subrounded, sand med to cs, subangular, unconsolidated, no rxn to HCl, silt matrix 2.5Y5/3 light olive brn.	25% felsic. Advance DB 15-25, recover 15-22 & collect 3 GS at 1125
20					
25	D B				Advance DB 25-35 - recover 25-32 & collect 2 GS at 1300
30				29.5 - 32 silt, ~10% fine sand (M) no rxn to acid, 2.5Y5/4 light olive brown.	
35	D B			32 - 48 sandy gravel (sG) = 75% gravel, 25% sand. gravel 80% 1-2", subrounded, 15% fragmented, sand v cs, subangular, unconsolidated, no rxn to acid, 85% mafic, 15% felsic.	Advance DB 35-45, recover 35-42 & collect GS at 1315

Reported By: Jaefritts		Reviewed By: L. D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 7/17/08	Signature: [signature]	Date: 7/18/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: ~~7/14~~ 7/16 7/16/08

Well ID: C6188	Well Name: 399-2-11	Location: 300-FF-5
Project: PNNL Characterization 300 Area IFC		Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	D B				Sonic drilling method w/6" DB
45				48 - 55.5 gravel (g) trace sand, gravel 1-2.5" (80% ds) subrounded, 20% Frag, 85% mafic, 15% felsic, w/ black, no rxn to HCl, unconsolidated	Advance DB 45-55, recover 1.5' - collect 1 GS at 0700
50	D B				
55				55.5-61 silt(m) oxidized, no rxn to HCl, consolidated, 2.5Y 5/4 light olive brn.	Advance DB 55-63 recover 55-63 & collect 4 GS at 0720
60	D B			61 - 65 silt(m) reduced no rxn to HCl, consolidated, 2.5Y 4/1 dark gray	Total Depth 65'
65					

Reported By: Joe Fritts		Reviewed By: L. D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 7/17/08	Signature: [signature]	Date: 7/18/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 6/17-6/18/08

Well ID: C6189 | Well Name: 399-2-12 | Location: 300-FF-5
Project: PNNL 300 Area IFC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic drilling method
	S	S		0-0.5' gravel drillpad	4" split spoon (SS) &
				0.5-12 sandy gravel (sG) ≈ 70%	6" drive hard (DB)
				gravel, 30% sand. Gravel to 4",	Advance DB 0-5'
				subangular, sand fine to v.c.s.,	SS 0-5' - recover 6/17/08
5				subangular, unconsolidated,	0-4 and collect 4 rxn
	S	S		dry, 10YR6/2 light brownish gray	liner (LL) at 1350
				70% mafic, 30% fels., dry.	
				81 rxn to HCl ≈ 25% fragmental	Advance SS 5-10' -
				12-17.5 sandy gravel, (sG) ≈ 55%	recover 5-10' &
10				gravel, 45% sand. Gravel to 4",	collect 5 LL at 1405
				subangular. Sand largely v fine to fine,	
	S	S		subangular, unconsolidated to sl.	Advance SS 10-15 -
				consolidated, dry, sl rxn to HCl,	recover 10-15 & collect
				10YR5/1 gray, ≈ 20% fragmental,	5LL at 1440
15				17.5-21 silty gravel (gM) ≈ 65% gravel	Advance SS 15-20
	S	S		gravel to 3", subangular, ≈ 20% frag-	recover 15-19 & collect
				mental, 2.5Y5/3 light olive bin, moist,	4LL at 1500
					Advance SS 20-25,
20				21-31 silty gravel (gM) 55% gravel,	recover 20-22
	S	S		45% silt gravel to 4", subrounded,	and collect 2LL at 1555
				≈ 10% fragmental, 10YR4/1 dark	6/18/08
				gray, moist moderately consolidated,	Advance SS 25-30 -
				no rxn to HCl, 75% mafic, 25% fels.	recover 25-27.1 & collect
25					3LL at 0700
	S	S			
				ON 6/17/08	
				31-41	Advance SS 30-35 -
30	S	S		gravelly sand (gS) ≈ 55% sand, 45%	recover 30-30.6 & collect
				gravel. Sand coarse to v. coarse,	1LL at 0740
				subangular, gravel to 2" subangular,	Advance DB 30-35 -
				90% mafic, 10% fels, unconsolidated,	0% recovery
35				black, no rxn to HCl, wet	
	S	S		≈ 15% fragmented, blacks.	Advance SS 35-40 recover
					35.5 & collect 1LL
					at 0905. Advance DB 35-45
40					& collect 3 GS at 0935.

Reported By: Joe Fitz | Reviewed By: L.D. Walker
Title: Geologist | Title: Geologist
Signature: [signature] Date: 6/17/08 | Signature: [signature] Date: 6/26/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 6/17-6/18/08

Well ID: C6189 | Well Name: 399-2-12 | Location: 300-FF-5

Project: PNNL 300 Area IFC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	S	S		41-51 gravelly sand (g S) = 55% sand, 45% gravel sand is fine to coarse, subangular, subangular gravel to 2.5" = 90% mafic, 10% felsic, unconsolidated, No rxn to HCl, blocks	Sonic drill method 4" split spoon, 6" drive barrel. Advance SS 40-40.5 recover 40-42.6 collect 3 LL at 0820.
45	S	S			Advance SS 45-50 recover 45-48 collect 3 LL at 0915
50	S	S		51-52 gravel (G) Gravel to 3", subrounded (80% in 1-3") unconsolidated. 52-59.5 silt (M) 2.5Y 4/3 olive brn, No rxn to HCl. 59.5-65 sandy silt (SM) 30% sand 10YR 4/1 dark gray, No rxn to HCl. sand v fine to fine, subangular	Advance SS 50-55 recover 50-55 collect 5 LL at 0930
55	S	S			Advance SS 55-60 recover 55-60 collect 5 LL at 1000
60	S	S			Advance DB
65				Total Depth 66 FT	

Reported By: Joe Fitz | Reviewed By: L.S. Walker

Title: Geologist | Title: Geologist

Signature: | Date: 6/18/08 | Signature: | Date: 6/26/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2

Date: 5/22/08

Well ID: C6190 | Well Name: 399-2-13 | Location: 300-FF-5

Project: PNNL 300 Area IFC | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0	S1	S		0-0.5' gravel drill pad	Sonic Drilling - 7 5/8"
				0.5-10.5' sandy gravel (sG)	OD casing - 4" SS
				60% gravel, 40% sand, gravel	
				to 3", subrounded, sand Fine	SS 0-5ft - recover
				to v cs, subangular, both	0-3' and collect 3
5	S2	S		70% mafic, 30% Felsic. sl rxn	lexan liners at 0800
				to HCl, Unconsolidated, 35%	
				Fragmented. Dry	SS 5-10ft - recover
					5-8' & collect 3
					lexan liners at 0815
				10.5-15 gravelly sand (gS) 65% sand,	
10	S3	S		35% gravel gravel to 1", subangular,	SS-10-15 recover
				sand med to vcs, subangular,	10-13-collect 3 lexan
				unconsolidated, no rxn to HCl,	liners at 1025.
				both = 80% mafic, 20% felsic,	
				black, wet due to added	SS 15-20 recover
15	S4	S		water on drilled borehole.	15.5-18 - collect
				30% Fragmented	3 lexan liners at 1035
				15-21 sandy gravel (sG) 65%	
				gravel, 35% sand. Gravel to	SS 19.5-24.5
20	S5	S		2.5", subrounded. sand med to	recover 19.5-20.5
				v&s, subangular, 75% mafic,	collect 1 lexan liner
				25% Felsic For both, unconsolidated,	at 1050
				No rxn to HCl 25% fragmented	
				black	
25	S6	S		21-30 sandy gravel (sG) = 65%	SS 24-25 recover
				gravel, 35% sand, gravel sub	24-25 & collect
				rounded to 2.5" sand Fine to	1 lexan liner at 1135
				v cs, subangular, 75% mafic,	
				25% Felsic, No rxn to HCl,	
30	S7	S		unconsolidated, 20% fragmented	SS 29-34 recover
				black	29-31.5 & collect
				30-37 sandy gravel (sG) = 70%	3 lexan liners at 1251
				gravel, 30% sand. gravel subrounded	
	S8	S		to 5" - sand med to V cs, subangular	SS 33-38 - recover
35				75% mafic, 25% felsic, NO RXN	33-34 & collect 1
				to HCl, unconsolidated, 25% fragmented	lexan liner at 1400
				black	
	S9	S			

Reported By: Joe Fritz | Reviewed By: L.D. Walker

Title: Geologist | Title: Geologist

Signature: [signature] | Date: 5/22/08 | Signature: [signature] | Date: 5/23/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 5/22/08

Well ID: C6190 | Well Name: 399-2-13 | Location: 300-FF-5

Project: PNNL 300 Area IFC | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	S	S		37-40 sandy gravel (sG) 65% gravel, 35% sand - gravel to 1.5", subrounded, sand med to v. cs, subangular, 75% mafic, 25% felsic, black, No rxn to HCl, unconsolidated	SS 38-43 recov 38-43 & collect 5 Lexan liners at 1400
45	SS 45-50 ∅ recovery			40-44 silt (m) No rxn to HCl,	SS 45-40-∅ recovery
				44-54 sandy gravel (sG) 75% gravel, 25% sand, Gravel to 2", subrounded, cs to vcs sand, unconsolidated, 75% mafic, 25% felsic, unconsolidated	
50				No rxn to HCl	SS 52-57. recovered 52-57 ~~collect 5 lexan liners at 1520.~~ 5/14/08
55	S	S		54-58.8 silt (m) moist, No rxn to HCl 10YR 5/3, brown, oxidized	collect grabs 52-54, 55-56 and 56-57 at 1520
					SS 57-62
				58.8-62.6 silt (m) No rxn to HCl, moist, 2.5Y 5/1 gray reduced	recov 57-62 & collect 5 lexan liners at 1550
60	S	S			
				TD 62.6'	

Reported By: Joe Fitts | Reviewed By: L.D. Walker

Title: Geologist | Title: Geologist

Signature: [signature] | Date: 5/22/08 | Signature: [signature] | Date: 5/23/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 6/13/08

Well ID: C6191 | Well Name: 399-2-14 | Location: 300-FF-5-04
Project: PNNL 300 Area IFC | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic drilling method, 6" Drive Barrel (DB)
	Drive barrel			0-0.5' gravel drill pad	
				0.5-11 Sandy gravel (SG)	
				65% gravel, 35% sand - gravel to 4", subangular, sand fine to vcs, 75% matic, 25% felsic, unconsolidated, sl. moist, 10YR 4/2 dark grayish brown, ≥20% fragmented	Advance DB 0-5' - collect 4 GS at 1245
5					
	Drive barrel				Advance DB 5-10' - collect GS at at 1255
10				11-18 Sandy gravel (SG) 70% gravel, 30% sand, gravel to 4", subangular, ≥20% fragmented. Sand cs to vcs, 75% matic, 25% felsic unconsolidated moist, slrxn to HCl 10YR 4/2	Advance DB 10-15' and recover 10-15' collect 4 GS at 1710
15	Drive barrel				dark grayish brn
				18-20 silty gravel (mG)	Advance DB 15-20 and
				gravel to 3", subangular, poorly consolidated, ~15% fragmented, 2.5Y 6/4 lt. yellowish brown matrix supported moist 75% matic, 25% felsic	recover 15-19.5' - collect 3 GS at 1320
20	Drive Barrel			20-28 Sandy silty gravel (SG) 70% gravel 30% sand (gravel to 4" med to 11/3/08 cs. sand, 10YR 4/2 brn, moist, 15% fragments, no rxn to HCl, 75% matic, 25% felsic unconsolidated.	Advance DB 20-25 - recover 20-25 & collect 5 GS at 1330.
25					
	Drive Barrel			28-32 gravelly sand (GS) 65% sand 35% gravel. sand subangular, cs to vcs. gravel to 3", subangular, ~blocky, unconsolidated, wet at 26'. 80% matic 20% felsic	Advanced DB 25-30 - recover 25-30 & collect 5 GS at 1355.
30	Drive Barrel			-rip-up clast (silt) at 30'.	Advance DB 30-35 - recover 30-35 and collect 4 GS at 1445
				32-33 silt (m)	
35				33-37 Sandy gravel (SG) ~70% gravel to 4" subangular, cs to vcs sand, subangular, unconsolidated, blocky, 85% matic, 15% felsic	

Reported By: Joe Fritz | Reviewed By: L.D. Walker
Title: Geologist | Title: Geologist
Signature: [signature] Date: 6/16/08 | Signature: [signature] Date: 6/26/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 6/13 - 6/16/08

Well ID: C6191	Well Name: 399-2-14	Location: 300-FF-5-OU
Project: PNNL 300 Area IFC		Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	Drive Barrel			39-40.5 silt(m)	Sonic drilling method 6" Drive Barrel.
				40.5-47 gravelly sand (gS) 65% sand, 35% gravel-gravel to 3", subangular, sand cs to v cs. unconsolidated, No rxn to HCL, 85% mafic, 15% felsic, black	Advance DB 35-45', recover 35-45' and collect 6 GS at 1510.
45	Drive Barrel			47-52 gravel (G) <10% sand, Gravel 1" to 5", subrounded, sand cs, subangular to subrounded. unconsolidated, No rxn to HCL, 85% mafic, 15% felsic, black	Advance DB 45-55 recover 45-53.5 & collect 4 GS at 1540.
50					6/16/08
				52-57.5 silt(m) 2.5Y 6/3 lt. yellowish brn, oxidized	Advance DB 55-60 recover 55-60 & collect 3 GS at 0710
55	Drive Barrel			60 6/16/08 57.5-~~58.5~~ silt(m) 2.5Y 6/1, gray, reduced.	
60				Final Total Depth 58.5'	

Reported By: Jac Fritt		Reviewed By: L. D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/16/08	Signature: [signature]	Date: 6/26/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 6/25/06

Well ID: C6192	Well Name: 399-2-15	Location: 300-FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0	D B			0-0.5' gravel drill pad	Sonic drilling 6" Drive barrel (DB)
				0.5-6' sandy gravel (SG) 75% gravel, 25% sand, gravel 70% 0.5-2", 80% sand med to cs subangular, unconsolidated, No rxn to HCL 10% fragmented moist, 10YR 4/3 brown, 75% mafic, 25% felsic	Advance DB 0-5', recover 0-5 & collect 2 GS at 1240
5	D B				Advance DB 5-10', recover 5-10 & collect 2 GS at 1250
10	D B			6'-10' silty sandy gravel (mSG) 75% gravel, 25% silt/sand, 80% gravel 1-3", subangular, sand fine to cs, sl. consolidated, moist, 80% mafic, 20% felsic matrix 2.5Y 5/3 lt. olive brn.	Advance DB 10-15, recover 10-15 & collect 2 GS at 1305
15	D B			10-19 sandy gravel (SG) 75% gravel, 25% sand, 80% 1" gravel, sand fine to cs, dry, subangular, 10% fragmented. sl rxn to HCL, 10YR 5/4, yellowish brn, unconsolidated. 70% mafic, 30% felsic	Advance DB 15-20, recover 15-20 & collect 2 GS at 1315
20	D B			19-21 silty gravel (mG) 80% gravel, 75% G 1-2". moist, sl. subrounded consolidated No rxn to HCL 2.5Y 5/3 light olive brn, matrix 10% fragmented	Advance DB 20-25 recover 20-24.5 & collect 2 GS at 1335
25	D B			21-25 silty sandy gravel (mSG) 70% gravel, 30% silt/sand, gravel 1-3" sand fine to cs, sl. consolidated, moist, 2.5Y 5/3 light olive brn, No rxn to HCL, 75% mafic, 25% felsic, 10% fragmented	Advance DB 25-35, recover 25-29.5 & collect 2 GS at 1345
30	D B				Advance DB 30-35 recover 30-35 & collect 2 GS at 1415
35	D B			25-30 sandy gravel (SG) 65% gravel, 35% sand Gravel 1-3", subrounded, ≈ 20% fragmented	Advance DB 35-45, recover 35-41.5 & collect 3 GS at 1500

Reported By: Joe Fritts		Reviewed By: L. D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/25/06	Signature: [signature]	Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 6/25/08

Well ID: C6192	Well Name: 399-2-15	Location: 300-FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	D B			25 - 30 continued .. Sand CS to VCS, subangular, 85% mafic, 15% felsic, wet, unconsolidated, NO rxn to HCL, black	sonic drilling w/ 6" DB
45				30-35 silty sandy gravel (MSG) 60% gravel, 1-3", 30% sand fine to CS, 10% silt. sl. consolidated, subangular, 10YR 4/2 dark grayish brn, 80% ~~fels~~ mafic, 20% felsic, 10% fragmented	Advance DB 45-55 recover 46-51.5 & collect 2 GS at 1515
50	D B			35-46 sandy gravel (SG) 75% gravel, 25% sand, 80% gravel 0.5-3", subrounded, sand is CS, subangular, 85% mafic, 15% felsic, unconsolidated, unconsolidated, <5% fragmented black, no rxn to HCL	Advance DB 50-60 recover 52-60 & collect 3 GS at 1530
55	D B				
60				46-50 gravelly sand (GS) 90% sand, 10% gravel, sand CS to VCS, subangular, 3-5" gravel. unconsolidated, No rxn to HCL, subangular, black, 90% mafic, 10% felsic.	Total Depth 61.5 Ft
65				50-52 silt (M) - rip-up clast? No rxn to HCL 10YR 4/3 dark grayish brn. 6/25/08	
				52-55 ~~sand~~ gravelly sand, 75% sand, 25% gravel, sand CS to VCS, subangular, gravel 1-3", subrounded, 90% mafic, 10% felsic, black, no rxn to HCL	
				55-58 silt (M) oxidized, 2.5Y 5/3 light olive brown	
				58-61.5 silt (M) reduced 2.5Y 5/1 gray.	

Reported By: Jeffritt		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/25/08	Signature: [signature]	Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 6/27/08

Well ID: C6193 | Well Name: 399-2-16 | Location: 300-FF-5
Project: PNNL 300 Area IFC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic drilling method with 6" drive barrel (DB)
	DB			0-0.5' gravel drillpad	
				0.5-3.0 sandy gravel (SG) 60% gravel, 40% sand, 80% gravel 2-6", subangular, 20% Fragmented, sand 80% Fine, subangular, dry, Sl. to no rxn to HCl, 75% mafic, 25% Felsic, unconsolidated	Advance DB 0-5'. recover 0-5' & collect 2 GS at 1045. Advance DB 5-10 & collect 2 GS at 1055
5	DB			3.0-8.0 sandy gravel (SG) ~~75% gravel, 25% sand~~ PM 6/24/08 55% gravel, 45% sand, 80% gravel 2-4", subangular, 15% Fragmented sand 80% Fine, subangular, dry, No rxn to HCl, unconsolidated, 75% mafic, 25% felsic	
10	DB			8-10' gravel (G) 80% gravel is 2-3", trace silt moist	Advance DB 10-15 recover 10-14.5 & collect 2 GS at 1105
	DB			10-12 sandy gravel SG 70% gravel, 30% sand, gravel 80% 1-2", sand 80% Fine to med, subangular, dry, 75% mafic, 25% felsic, unconsolidated	
15	DB			12-14 silty gravel (mG) gravel ~90% subangular 1-3" 15% Fragmented, 80% mafic, 20% felsic, moist, sl. consolidated, No rxn to HCl	Advance DB 15-20 recover 15-20 & collect 2 GS at 1120
	DB			14-18 sandy gravel (SG) 80% gravel, 20% sand, 80% gravel 1-1.5", to 6", sand Fine to medium, subangular, 80% mafic, 20% felsic, dry, unconsolidated.	Advance DB 20-25 recover 20-25 & collect 2 GS at 1125
20	DB			18-20 silty gravel (mG) 70% gravel, 30% silt, gravel to 2", subangular, sl. consolidated, moist 20% Fragmented, No rxn to HCl	Advance DB 25-35 recover 25-31 & collect 3 GS at 1300.
25	DB			20-25' gravel (G) <10% silt & Fine sand, 80% 2-3" gravel, subangular, unconsolidated, moist 20% Fragmented, 75% mafic, 25% felsic, No rxn to HCl	Advance DB 35-45 recover 35-40 collect 2 GS at 1345
30					
35	DB				

Reported By: Joe Fritts | Reviewed By: L.D. Walker
Title: Geologist | Title: Geologist
Signature: [signature] Date: 6/27/08 | Signature: [signature] Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 6/24 - 6/24/08

Well ID: C6193 | Well Name: 399-2-16 | Location: 300-FF-5

Project: PNNL 300 Area IFC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40				25-35 sandy gravel (GS) 75% gravel, 25% sand, gravel 80% 1"-2.5", sand fine to cs, 25% Fragmented unconsolidated 80% mafic, 20% felsic, wet at 29 ft.	Sonic drilling, method 6" drive barrel (OB)
45				35-45 sandy gravel (SG) 85% gravel, 15% sand 80% of gravel is 1", 75% is cs. 15% Fragmented, unconsolidated 85% mafic, 15% felsic, black, no rxn to HCl	Advance OB 45-55 recover 45-53 ft collect 4 GS at 1405
50	D	Q			
				45-54 sandy gravel (SG) 85% gravel, 15% sand, gravel is 80% 2.5-3.5", sand is 80% cs, 15% Fragmented, unconsolidated no rxn to HCl, 80% mafic, 20% felsic, black	Advance OB 54-60, recover 54-60 ft collect 3 GS at 1435
55	D	Q			
60				62 @ 6/24/08 54-58 silt (m) oxidized 2.5Y5/3 light olive brown 58-62 silt (m) reduced 2.5Y5/1 gray. No HCl rxn.	
65				Total Depth 62 Ft	

Reported By: Joe Fitts | Reviewed By: L. D. Walker

Title: Geologist | Title: Geologist

Signature: [signature] Date: 6/24/08 | Signature: [signature] Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: Start: 6/12/08 Finish: 6/13/08

Well ID: C6195	Well Name: 399-2-17	Location: 300-FF-5 OU
Project: 300 Area IFC		Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic drilling
	Drive Barrel			0-0.5: gravel pad	method 7 5/8" OD casing
				0.5-20: sandy Gravel; 70% gravel,	
				30% sand; gravels up to 4" max	6" core barrel 0-5', recover
				sub-rounded, predom. ~~mafic felsic~~ sms mafic	0-5' @ 1424
5				sand fine to medium grained;	
	Drive Barrel			Slight rxn to HCl	6" core barrel 5-10', recover
				↳ increase in sand p %, silt%	5-10' @ 1435
				@ 18'; seds become wet at this	
				depth; 50% gravel, 40% sand, 10% silt	6" core barrel 10-15', recover
10					10-15' @ 1452
	Drive Barrel			20-30: sandy Gravel (sG); 60% ←	sample mixed w/slough
				gravel, 30% sand, <10% silt;	but best representation
				gravel predom. ~~felsic~~ mafic sms, sub-rnded;	of lithology at this
				sands fine to medium; samples	depth, graphic log p.
15				damp, would be more wet if ←	inferred
	Drive Barrel			not mixed with slough material	6" core barrel 15-25' recovery
					15-19' @ 1503
				30-35: sandy Gravel (sG); 70% gravel, 25%	
				sand, ~5% silt; gravel fraction predom.	6" core barrel 25-30' recover
20				~~felsic~~ sms mafic up to 4" diameter; mix quartzite &	25-26' @ 1528
				dacites, lithics sub-rounded to rounded	
				sand fraction fine to medium, same	6" core barrel 25-30' recovery
				felsic/mafic % as gravels, sub-angular	25-30' @ 1554
	#2			(wet)	
25	#1 DB	26.3 ▽		35-40: sandy Gravel (sG); 75% gravel	Samples from 25-30'
				20% sand ~5% silt; gravel fraction	dry, most likely
				80% mafic w/quartzite & dacite	slough from above
				pebbles, cobbles to 4" max, sub-rnded	25' bgs
				sand fine to medium 50/50 mafic	DB #1 - 1' recov.
30				felsic, sub-angular to sub-rnded	DB #2 - 6' recovery, partial
				(wet)	slough mix
	Drive Barrel				6" barrel 35-45, recover
					35-40', 2 samples @ 0845
35					DTW = 26.3' bgs
	Drive Barrel				06/13/2008

Reported By: S. Sexton		Reviewed By: L. D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/13/08	Signature: [signature]	Date: 6/26/08

A-6003-642 (03/03)

BOREHOLE LOG

Start: 6/13/08
Date: Finish: 6/13/08

Well ID: C6195 | Well Name: 399-2-17 | Location: 300-FF-5 OU

Project: 300 Area IFC | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	No recovery			45-48: gravelly Sand (gS); sands 100% gravel 40%; sand 70% mafic 30% felsic, medium grain to coarse, sub-rnded to sub-angular; gravel 70% mafic 30% felsic, cobbles to 3" max sub-rounded to rounded; wet	Sonic drill method 7 5/8" OD temp. casing No recovery 40-45
45	Drive Barrel				6" drive barrel 45-50' recovery 45-48'; 2 samples taken @ 0915
				50-56.5: gravelly Sand (gS); sand 60% gravel 40%; sand 70% mafic 30% felsic, medium to coarse, sub-rounded to sub-angular; gravel 70% mafic 30% felsic, cobbles to 3" max, sub-round to round; wet	6" barrel 50-55' recover 50-52.5, 1 sample taken @ 0930
50					
				56.5-63: silt (M); contact between oxidized clay & reduced clay @ 59.5' ~~brown~~ oxidized, lt. yellowish brown (2.5Y 6/3); reduced clay is gray (2.5Y 5/1); no rxn to HCl	6" barrel 55-61' recover 55-61'; 3 samples taken @ 1015
55	Drive Barrel				
60				TD = 63.0' bgs on 06/13/08	
65					
70					

Reported By: S. Sexton | Reviewed By: L.S. Walker

Title: Geologist | Title: Geologist

Signature: S. Sexton | Date: 06/13/08 | Signature: L.S. Walker | Date: 6/26/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 6/3-6/11/08

Well ID: C6196 | Well Name: 399-2-18 | Location: 300-FF-5-04

Project: PNNL 300-IFC | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0	Split Spoon Sample (DB)			0-0.5' gravel drill pad	Sonic drilling, 7 5/8" OD casing, 6" drive barrel (DB)
				0.5-10 sandy gravel (SG) 65% gravel, 35% sand gravel to 3.5", subangular, sand Fine to v. cs, subangular, 75% mafic, 25% felsic, unconsolidated, moist, <1% fragmented, No rxn to HCl, 10YR5/3 brown	6" DB 0-5' - collect 2 GS at 1445
5					6" DB 5-10' - collect 4 GS at 1525
	Drive Barrel			Note: ash color ~ 8.5-9.5 - on a SG	
					6' DB 10-15 - collect 3
10				10-12 gravelly sand (gS) 60% sand, 40% gravel, sand = 80% Fine to medium, subangular, gravel to 3" subangular, = 70% mafic, 30% Felsic, sl rxn to HCl, 10YR5/3 brown, sl. moist, sl. consolidated,	GS at 0715 6/11/08
15				12-17 gravelly sand (gS) = 60% sand, 40% gravel, sand Fine to v cs, subangular, gravel to 4.5", subangular = 70% mafic, 30% Felsic, sl rxn to HCl 10YR5/3 brown, sl. moist, unconsolidated	6" DB 12.5-25 recover 12.5-22.5 & collect 4 GS at 0800
20	Drive Barrel				6" DB 22.5-30, recover 22.5-25.5 & collect 2 GS at 0810.
				17-21 sandy gravel (SG) = 80% gravel, 20% sand, gravel to 5", subrounded sand med to v. cs, subangular, unconsolidated, =20% fragmented, NO rxn to HCl, matrix 10YR5/2 grayish brn. 70% mafic, 30% felsic	
25				21-22.5 silt (M) No rxn to HCl, 2.5Y5/4 light olive brn	6" DB 25.5-33.5 - recover 25.5-33.5 & collect 5 GS at 0825
30	Drive Barrel			22.5-27.5 sandy gravel (SG) = 90% gravel, 10% sand Gravel to 5", subrounded, sand cs to v cs unconsolidated No rxn to HCl, wet at 25' 10YR4/2 dark grayish brn. =15% fragmented =75% mafic, 25% felsic	6" DB 33-45 - recover all and collect 12 GS at 0950.
35	Drive Barrel			27.5-33 sandy gravel (SG) = 90% gravel, 20% sand, gravel to 5" subrounded, sand med to v cs, subangular, unconsolidated	

Reported By: J. Griffith | Reviewed By: L.D. Walker

Title: Geologist | Title: Geologist

Signature: [signature] Date: 6/11/08 | Signature: [signature] Date: 6-26-08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 6/3 - 6/11/08

Well ID: C6196	Well Name: 399-2-18	Location: 300-FF-5-OU
Project: PNNL 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	Drive Barrel			... 27.5 - 33 No rxn to HCL, 80% mafic, 20% felsic, wet, ≈20% fragmented	Sonic drilling, 7 5/8" casing, 6" Drive barrel
				33 - 37 SG ≈ 90% gravel, 10% sand, gravel to 5", sand cs to v cs. unconsolidated ≈15% fragmented, NO rxn to HCL, subrounded black. ≈ 70% mafic, 30% felsic	
45				37-44 sandy gravel (SG) ≈70% gravel, 30% sand, gravel to 2", subrounded, sand med to v cs, unconsolidated, ≈75% mafic, 25% felsic, wet, black	6" DB 45-50 & 45-55 - collect 2 GS from 48-49 at 1130.
50	Drive Barrel			44-46 S gravel (SG) ≈ 85% gravel, 15% sand, gravel subrounded, to 4" sand subangular, med to v cs ≈ 80% mafic, 20% felsic.	6" DB 49-55 & recover 49-54 - collect 5 GS at 1255.
55	Drive Barrel			46-56 gravelly sand (GS) ≈ 70% sand, 30% gravel. Sand is coarse, to v cs, subangular, gravel to 2", subangular, ≈75% mafic 25% felsic, No rxn to HCL, 10YR 5/1 dark gray, unconsolidated.	6" DB 55-60 & recover 55-60 - collect 5 GS at 1305
60	Drive Barrel			56-57 Gravel (G) <10% sand Gravel to 3", subrounded, 80% mafic, 20% felsic, unconsolidated	6" DB 60-63, ∅ recovery. 6" DB 60-65 - recover 60-65 & collect 2 GS at 1410.
65				57-60 silt (M) 2.5Y 6/3 lt. yellowish brn, oxidized	
				60-65 silt (M) 2.5Y 5/1 gray, reduced	
				Total Depth 65 ft bgs	

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/11/08	Signature: [signature]	Date: 6/26/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 5/20/08

Well ID: C6197	Well Name: 399-2-19	Location: 300-FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0	S S			0-0.6' gravel drill pad	Sonic - 7 5/8" OD temp
				0.6'-10' sandy gravel (sG)	casing - 4"x5'
				65% gravel, 35% sand. Gravel	log split spoon
				to 3", subrounded, sand fine	6" drive barrel.
				to v. coarse, subangular,	
5	S S			Both 60% mafic, 40% felsic	SS 0-5' - recover
				35% fragmented, poorly	0-2.3' - collect 3
				consolidated, mod rxn to HCL.	lexan liners at 0705
				Dry	SS 5-10' - recover
					5-9' - collect 4
10	S S			10-15.0 sandy gravel (sG)	lexan liners at 0720
				65% gravel, 35% sand	SS 10-15' - recover
				gravel to 3", subrounded, sand	11-12' - collect 1
				fine to v cs, subangular,	lexan liner at 0735
				70% mafic, 30% felsic,	
15	S S			sl to mod rxn to HCL,	SS 15-20' - recover
				moist, poorly consolidated	15-19' - collect 4
					lexan liners at 0825
				15-20 sandy gravel (sG)	
20	S S			≈55% gravel, 45% sand, gravel	SS 20-25' recover
				to 1", subrounded, sand	20-23.8 - collect 4
				med to v cs, subangular,	lexan liners at 0915
				≈75% mafic, 25% felsic,	
				no rxn to HCL, poorly consolidated,	SS 25-30' recover
				moist	25-28.8 collect
25	S S			20-27 sandy gravel (sG), ≈65%	4 liners at 1015
				gravel, 30% sand, gravel to 2",	
				subrounded, sand med to v coarse,	SS 30-35' - recover
				subangular, ≈80% mafic, 20% felsic	30-32', collect 2
30	S S			unconsolidated, no rxn to HCL,	liners at 1100
				≈20% fragmented, wet	
				27-31.5 gravelly sand (sG) ≈75%	
				sand, 25% gravel. sand is	
				med to v coarse, subangular	SS 35-40' - recover
35	S S			≈80% mafic, 20% felsic, unconsolidated,	35-39, collect
				wet, black, gravel to 5" -	4 liners at 1235
				subrounded 80% mafic, 20% felsic	
				31.5-33 silt (M) no rxn to	
				HCL, moist, 10YR 5/3 brown	

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 5/20/08	Signature: [signature]	Date: 5/22/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 5/20/08

Well ID: C6197	Well Name: 399-2-19	Location: 300-FF-5
Project:		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	S S			33-45 sandy gravel. (sG) ≈65% gravel, 35% sand, gravel to 2", subrounded, 15% frag. sand coarse, subangular - 85% mafic, 15% felsic, unconsolidated wet, no rxn to HCL, black.	SS 40-45 - recover 40-44' - collect 4 liners at 1255
45	S S			45-54 gravelly sand (gS) 80% sand, 20% gravel. sand is coarse to v coarse, subangular, 90% mafic, 10% felsic, periodic gravel to 1.5", subrounded, unconsolidated, 60% fragmented, black, no rxn to HCL.	SS 45-50 - recover 45-48 - collect 4 liners at 1345.
50	S S			54-55 silt (m) no rxn to HCL, moist 10YR5/3 brown, 2.5/20/08	SS 50-55' - recover 50-53' - collect 3 liners at 1415.
55	S S			55-~~60 silt (m)~~ 57 gravelly sand (gS) 80% sand, 20% gravel.	SS 55-60 recover 55-60 - collect 5 liners at 1500 liner 59-60 damaged
60				57-58 silt (m) No rxn to HCL, moist, 10YR5/3, brown, oxidized.	
				58-60.8 silt (m) No rxn to HCL, moist, 2.5Y5/1 gray, reduced.	
65				Total Depth 60.8'	
70					
75					

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 5/20/08	Signature: [signature]	Date: 5/22/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 6/25/06

Well ID: C6198	Well Name: 399-2-20	Location: 300-FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
					Sonic drilling with
0	D B			0-0.5' - gravel drill pad	6" Drive barrel (DB)
				0.5-2' gravelly sand (gS) 60%	
				sand, 40% gravel. Sand is 80%	Advance DB 0-5',
				medium, subangular, gravel is	recover 0-5 & collect
				80% ≈2", subangular, unconsolidated	2GS at 0705
5				dry, ~5% fragmented, no rxn to	
				HCL, 10YR 4/3 brown.	Advance DB 5-10',
	D B				recover 5-10 & collect
				2'-7' gravelly sand (gS) 80% sand,	2GS at 0715
				20% gravel. sand is 8% medium	
10	D B			gravel is 80% ≈1" unconsolidated,	Advance DB 10-15,
				sl. moist, no rxn to HCL, 10YR 4/3,	recover 10-13 & collect
				brown, 75% mafic, 25% felsic	1GS at 0725
				7-15 silty gravel (mG) 90%	
				gravel, subrounded, 80% gravel	
15				is 1", unconsolidated, no rxn to	Advance DB 15-20
				HCL 80% mafic, 20% felsic matrix	recover 15-20 &
	D B			2.5Y, light olive brn, 10% fragmented,	collect 3GS at
				15-20 silty gravel (mG) 90%	0730
20				gravel, subrounded, 80% of	
				gravel is 2-3", no rxn to HCL,	
				80% mafic, 20% felsic, 20% fragmented	
	D B			matrix 2.5Y light olive brn, unconsolidated	
				20% fragmented	Advance DB 20-25,
25				20-24 gravel (G) <10% silt/sand	recover 20-25 & collect
				80% gravel 1-3", 85% mafic,	3GS at 0750
				15% felsic, subrounded, 20%	
	D B			fragmented, no rxn to HCL, un-	Advance DB 25-35,
				consolidated, ~~10YR~~ 6/25 or 10YR 5/2	recover 25-30 & collect
				grayish brn.	2GS at 0825
30				24-35 sandy gravel ~~sand~~ (sG) 75%	
				gravel, 25% sand, gravel 80%	Advance DB 30-35
	D B			1-3", subangular, 30% fragmented,	recover 30-35 &
				sand 80% cs to vcs, subangular,	collect 1GS at 0855
35				unconsolidated, 10YR 5/2 grayish	
				brn. No rxn to HCL, 80% mafic, 20%	Advance DB 35-45,
	D B			felsic, wet at ≈26'	recover 35-40 &
					collect 2GS at 0905

Reported By: Jay Fritts		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/25/06	Signature: [signature]	Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 6/25/08

Well ID: C6198	Well Name: 399-2-20	Location: 700 - FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40				25-54 sandy gravel (SG) 80% gravel, 20% sand, gravel 80% 1-2.5" sand cs., subrounded to subangular, 20% fragmented 85% mafic, 15% felsic, black unconsolidated, NO rxn to HCL,	sonic drilling with 6" drive barrel (DB Advance DB 45-55 recover 45-51 & collect 3 GS at 0925
45	D B				
50				54-56 gravel (G) gravel 1-3", subrounded, 80% mafic, 20% felsic, unconsolidated No rxn to HCL, 10% fragmented	Advance DB 54-60 recover 54-60 & collect 3 GS at 0935.
55	D B			56-59 silt (M) No rxn to HCL 2.5Y 5/3 light olive brn, moist v. well consolidated	
60				59-62 silt (M) 2.5Y 5/1 gray no rxn to HCL v. well consolidated.	Total Depth 62'

Reported By: Joe Fritts		Reviewed By: L. D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/25/08	Signature: [signature]	Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG 6/12/08

Page 1 of 2
Date: 6/12/08

Well ID: C6201	Well Name: 399-2-2X1	Location: 300-FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Groundsurface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0	Drive barrel			0-0.5' gravel drill pad	Sonic drill method w/ 7 5/8" casing
				0.5-6 sandy gravel (sG) 75% gravel, 25% sand, gravel to 3.5", subangular, sand med to vcs, unconsolidated, dry, mod rxn to HCL, 10YR 4/3 brn, ≈25% fragmented 75% mafic, 25% felsic	6" x 10' drive barrel (DB) 6" DB 0-2', 0-2' recovery & collect 1 GS at 0710.
5	Drive barrel			6-6.5' sand (S) med to cs, subangular, sl. consolidated, mod rxn to HCL, 10YR 4/3 brown	6" DB 2-10', 2-10' recovery & collect 5 GS at 0720.
10	Drive Barrel			6.5-15 sandy gravel (sG) 75% gravel to 3.5", 25% sand gravel subangular, sand med to vcs subangular unconsolidated, ≈10% fragmented, sl to mod rxn to HCL, ≈70% mafic, 30% felsic, 10YR 4/3 brown	6" DB 10-15, recover 10-15 & collect 3 GS at 0755
15	Drive Barrel			15-17 sandy gravel (sG) ≈60% gravel - 40% sand. Gravel 80% 1-2", 20% 2-3.5", sand fine to vcs, subangular, unconsolidated, No rxn to HCL, 10YR 4/3, brown. 70% mafic, 30% felsic, moist	6" DB 15-25 recover 15-20 & collect 4 GS at 0810
20				17-19 silty gravel (mG), trace sand. 85% gravel to 3", subrounded. 15% silt, 70% mafic, 30% felsic, moist to wet. 10YR 4/3 brn, unconsolidated	6" DB 25-35' - recover 25-34 & collect 6 GS at 0855
25	Drive Barrel			19-35 sandy gravel (sG) ≈75% gravel to 3.5", 25% sand. gravel subangular, sand cs, subangular, ≈70% mafic, 30% felsic, sl rxn to HCL, wet at 26.5 Ft. 10YR 4/2, dark grayish brown.	6" DB 35-45', recover 35-40' - collect 5 GS at 1010.
30				35-45 sandy gravel (sG) 60% gravel 40% sand. Gravel to 2" subrounded to subangular. vcs sand, subangular, 70% mafic, 30% felsic unconsolidated, - black.	
35	Drive barrel				

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/12/08	Signature: [signature]	Date: 6/26/08

A-6003-642 (03/03)

BOREHOLE LOG

pk 6/12/08

Date: 6/12/08

Well ID: C6201	Well Name: 399-2-24	Location: 300-FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40				gravelly sand g(s) pk 6/12/08	Sonic drill method, w 7 5/8" casing, 6" DB
				45-55 ~~Sandy gravel (sG)~~, ≈60% sand, 40% gravel, cs, subangular sand, subangular gravel to 2", unconsolidated, no rxn to HCl - ≈80% mafic, 20% felsic, ≈10% fragmented, wet. block	DB 45-55 and recover 45-50 - collect 4GS at 1045.
45	Drive barrel				
50					DB 55-60 recover 55-60 - collect 4GS at 1120 including ~~50-60 a~~ 50-55' - a slough sample.
55	Drive Barrel			55-57 silt (m) 2.5Y 6/3 lt. yellowish brn oxidized	
				57-60 silt (m) 2.5Y 6/1 gray reduced. 61.7' pk 6/12/08	
60					
				Total Depth 61.7 Ft. bgs	
65					

Reported By: Joe Fritts		Reviewed By: L. D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/12/08	Signature: [signature]	Date: 6/26/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 7/14/08 - 7/16/08

Well ID: C6202	Well Name: 399-2-22	Location: 300-F-5
Project: PNNL Characterization		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	300 Area IFC Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0				0-0.5' gravel drillpad	sonic drilling with 6" Drive barrel (DB)
	DB			0.5-6' gravelly sand (gS) 80% ~~sand~~ sand, 20% gravel, 80% fine to med sand, subangular, gravel 3-5", subrounded, moist, 10YR 4/3 dark brown, unconsolidated, no rxn to acid, 70% mafic, 30% felsic	Advance DB 0-5', recover 0-5 & collect 2GS at 1030
5					
10	DB			6'-12' sandy gravel (SG), trace silt 65% gravel, 35% sand, gravel 80% 1", subrounded, sand fine to med, subangular, sl. consolidated, mod rxn to HCL, <5% frag, 10YR 4/3 brown	Advance DB 5-15' - recover 5-15' & collect 4GS at 1035
15				12-25 sandy gravel (SG) 80% gravel, 20% sand, gravel is 80% 1-2" subrounded, 15% frag, sand is fine to med, subangular, unconsolidated, no rxn to HCL, 75% mafic, 25% felsic, 10YR 5/2 grayish brn.	75% mafic, 25% felsic
20	DB				Advance DB 15-25, recover 15-23 & collect 4GS at 1415
25			No recovery		Advance DB 25-35, recover Ø -
30	Ø recovery				
35	DB				

Reported By: Jeff Ill		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 7/14/08	Signature: [signature]	Date: 7/18/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 7/14/08 – 7/16/08

Well ID: C6202	Well Name: 399-2-22	Location: 300-FF-5	
Project: PNNL Characterization 300 Area IFC		Reference Measuring Point: Ground surface	

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	D B			35 – 45 Sandy gravel (sG) 80% gravel, 20% sand gravel 80% 1-5", subrounded, 25% fragmented, sand v cs to cs, subangular, unconsolidated, no rxn to HCl, 85% mafic, 15% felsic, ~ black.	Sonic drilling method w/ 6" DB. Advance DB 35-45 recover 35-42 & collect 2 GS at 1530
45					
50	D B			45 – 56 Sandy gravel (sG) 75% gravel, 25% sand. 75% gravel is 2-4", subangular, sand cs to v cs, subangular, no rxn to HCl, unconsolidated ~ black, 85% mafic, 15% felsic gravel 15% frag.	Advance DB 45-55, recover 45-52 & collect 3 GS at 0730
55				56-59.5 silt(m) oxidized no rxn to HCl, 2.5Y5/4 lt. olive brn. well consolidated, sl. moist	Advance DB 55-65, recover 55-65 & collect 4 GS at 0800
60	D B			59.5-65 silt(m) reduced no rxn to HCl, 2.5Y5/1 gray, well consolidated, sl. moist.	
65				Total Depth 65 Ft.	

Reported By: Jan Fritts		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 7/16/08	Signature: [signature]	Date: 7/18/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 7/8 to 8

Well ID: C6207 | Well Name: 399-2-23 | Location: 300-FF-5

Project: PNNL characterization 300 Area TFC | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					SONIC drilling method w/6" drive barrel (OB)
	D	B		0-0.5 gravel driftpad	
				0.5-4 gravelly sand (gS) 60% sand, 40% gravel. Sand Fine to vcs, subangular, gravel 80% 1-3" unconsolidated, ~~NO rxn~~ ~~to HCl~~ 7.5YR 5/1 rxn to HCl 10YR 5/2 grayish brn, 75% matic, 25% felsic sl. moist.	Advance OB 0-4' recover 0-4' & collect 2 GS at 0940
5	D	B		4-15 sandy gravel (SG) ~30% gravel, 10% sand. gravel 80% 1-2", subrounded, sand Fine to vcs, subangular, 80% matic, 20% felsic, unconsolidated, NO rxn to HCl. 10YR 5/2 grayish brown dry	Advance OB 4-10 recover 4-10 & collect 2 GS at 0955
10	D	B			Advance OB 10-15 recover 10-14.5 & collect 2 GS at 1010
15	D	B		15-22.5 sandy gravel (SG) ~70% gravel, 30% sand. gravel ~75% 1" subangular, sand Fine to vcs, subangular, unconsolidated, NO rxn to acid 10YR 5/1 gray, dry ~80% matic, 20% felsic	Advance OB 15-20 recover 15-20 & collect 2 GS at 1020
20	D	B			Advance OB 20-25 recover 20-24.5 & collect 2 GS at 1045
25	D	B		22.5-28 silty sandy gravel (msG) 70% gravel, 20% sand, 10% silt. gravel 1-2" subangular, sand cs to vcs, subangular sl. consolidated, moist, 80% matic 20% felsic 10YR 5/2 grayish brn.	Advance OB 25-35 recover 25-31 & collect 2 GS at 1055
30				28-40.0 sandy gravel (SG) 80% gravel, 20% sand. gravel 80% 1-2", subangular, sand cs subangular unconsolidated, NO rxn to HCl, 80% matic, 20% felsic, 10YR 5/2 grayish brn, wet.	
35	D	B		→~40.0' bgs, g. size dec. to mfn to v. cs still wet, but black (5YR 2.5/1). (see pg. 2)	Advance OB 35-45 recover 35-42 & collect 2 GS at 1135

Reported By:	Joe Fitzer/T. Buswell	Reviewed By:	L.d. Walker
Title:	Geologist	Title:	Geologist
Signature:	Joe Fitzer/T. Buswell	Date: 7/8/08	Signature: L.d. Walker	Date: 7/14/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 7/8/08

Well ID: C6207 | Well Name: 399-2-23 | Location: 300 - FF-5

Project: RNWL Characterization 200 Area TEC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	(DB)			(see pg. 1)	Sonic Drilling method w 6" drive barrel
				40.0-55.0' bgs - Sandy gravel (SG) ~75% mfn to vcrs, sub-rnd to sub-ang g's, ~25% crs. to v.crs s., 90% mst, 10% wet, loose, no rxn w/HCl; black (5YR 2.5/1).	DB
45				55.0-59.0' bgs - silt (m) ~90% m, ≤10% vfn s., comp, damp, 10YR 5/3, brn, slt rxn w/HCl	Advance DB 45-55, ∅ recovery
50				59.0-60.0' bgs - silt (m) ~90% m, ≤10% vfn s., comp, damp, GLEY2 4/1 (dk greenish gray), no rxn w/HCl @ 7/8/08	Advance DB 50-60 recovery 50-60' collect 3 GS at 1315
55	DB				
60			T.D.		TD = 60.0' bgs

Reported By: Jeffries/T. Buswell | Reviewed By: L.D. Walker

Title: Geologist | Title: Geologist

Signature: Jeffries/Tom Buswell | Date: 7/8/08 | Signature: L.D. Walker | Date: 7/14/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2

Date: 5/23-6/2/08

Well ID: C6208 | Well Name: 399-2-24 | Location: 300 - FF-5-OU

Project: PNNL IFC, 300 Area | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic drilling, 7 5/8" OD casing, 4" SS and 6" drive barrel
	S	S		0-0.5', gravel drill pad	
				0.5-7.0 Sandy gravel (sG) 60% gravel, 40% sand, gravel to 1.5", subangular, sand Fine to cs, subangular, 65% mafic, 35% felsic, sl rxn to HCl, unconsolidated, dry, ~10% fragmented	Drive SS 0-5', recover 0-3' & collect 3 lexan liners at 0710
5					
	S	S		10YR 5/3 brown gravelly sand (gS) ~70% sand, 30% gravel sand fine to vcs, ~80% fine, subrounded, gravel to 1.5", subrounded, no rxn to HCl, unconsolidated, 10YR 4/2 dark grayish brown, dry 70% mafic, 30% felsic ~25% fragmented	Drive SS 5-10', recover 5.5-10' & collect 5 lexan liners at 0725
10					
	S	S			Drive SS 10-15', recover 10-15 & collect 5 lexan liners at 0830
15					
	gr	ab		10-18 sand gravel (sG) ~65% gravel, 35% sand. Gravel to 5" subrounded, sand fine to v. cs, subangular. ~75% mafic, 25% felsic, no rxn to HCl, unconsolidated, ~30% fragmented, dry. 10YR 5/3 brn.	Drive 6" drive barrel, 15-16' collect 1 grab sample at 0815.
20					
	S	S			Drive SS 22-25' and recover 22-24' collect 2 lexan liners at 1030.
25				18-26 silty sandy gravel (msG) 50% gravel, 30% sand, 20% silt. Gravel is to 5" cobbles, subangular, 30% fragmented. Sand is Fine to vcs subangular, both ~70% mafic, 30% felsic, 10YR 4/2 drk gray brn w/ 10YR 6/6 brownish yellow silt matrix No rxn to HCl, moist to dry - unconsolidated	Drive 6" OD 25-30, collect 1 grab sample at 1245 (0' recovery w/ SS 25-30)
30					
	gr	ab		26-36 Gravel (G) 90% gravel, 10% sand. Gravel is to 4.5", subrounded, 20% fragmented, 85% mafic, 15% felsic, Sand is med to cs, subangular, unconsolidated, black wet, no rxn to HCl.	Drive 6" OD 30-35, collect 3 grab samples at 0805. Note: several attempts w/ SS failed. Push OD 35-40 collect 4 grab samples at 1310
35					
	gr	ab			

Reported By: Joe Smith | Reviewed By: L.D. Walker

Title: Geologist | Title: Geologist

Signature: [signature] Date: 5/30/08 | Signature: [signature] Date: 6/5/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 5/23 - 6/2/08

Well ID: C6209 | Well Name: 399-2-24 | Location: 300 - FF - 5 - OU

Project: PNNL IFC, 300 Area | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40				36 - 40 sandy gravel (SG) ± 80% gravel, 20% sand, Gravel Fine to 4.5" subrounded, sand coarse, ± 80% mafic, 20% felsic, unconsolidated, >20% fragmented. No rxn to HCl. ± black, wet	SONIC drilling 7 5/8" OD casing, 4" SS x 6" OB Push OB 40-43 and collect 4 grab sample at 1405.
45	gr ab				
	SS	4/4		40 - 41 sand (S) coarse to v cs sand, subangular, 90% mafic, 10% felsic, black, poorly consolidated, wet. No rxn to HCl	Push OB 40-43 - collect 4 grab samples at 1405
50	gr ab			41-42 sand, gravel (SG) ± 80% gravel, 20% sand, gravel to 4.5", subangular to subrounded 90% mafic, 20% felsic, wet, black, poorly consolidated, No rxn to HCl	Push SS 40-45 & collect 3 lexan liner 40-43 (40-43 recovery) Flawed in cutter last sample.
55	SS			42-42.5 sand (S) Coarse to v cs, subangular, 90% mafic, 10% felsic, black, poorly consolidated, wet, No rxn to HCl	Push SS 42-47 - recovery 42-45 & collect 3 lexan liners at 1605 - 6/2/08
60	SS			42.5 - 49 silt (M) moist no rxn to HCl, 2.5Y 6/3 lt yellowish brn	Push 6" OB 43.5-48.5
	grab			49 - 51.5 sandy gravel 80% gravel, 20% sand, Gravel to 4" subangular, sand cs to v cs subangular. 85% mafic, 15% felsic, unconsolidated, no rxn to HCl, wet, 20% frag	collect GS 47-48.5 at 0855 Push SS 48.3-53.3 & recover 48.3-50.1 and collect 2 liners at 0835
65				51.5 - 52.5 silt (M) moist, NO rxn to HCl, 2.5Y 6/3 lt yellowish brn, not sure it is in place.	Advance OB 48.5-52.5 collect 3 GS at 1100
				52.5 - 58 ? sandy gravel (SG) ~85% gravel. 25% sand, gravel to 2" subrounded sand, cs to v cs, subangular, wet, black, 15% frag No rxn to HCl	Advance SS 50-55 - recover 50-54 & collect 4 liners at 1305. SS 55-60 - 0 recovery SS 57.5-62.5 - recovers 57.5-60 & collect 3 lexan liners at 1500
		Total Depth 67.5 ft		~58-60 silt (M) moist, NO rxn to HCl, 2.5Y 6/3 lt. yellowish brn. oxidized	DB 58.5-65 - collect GS 60-65 at 1630.
				60-65 silt (M) moist, no rxn to HCl, 2.5Y 5/1 gray reduced	
				65-67.5 sand (S) medium, subangular.	

Reported By: Geologist | Reviewed By: L.D. Walker

Title: Geologist | Title: Geologist

Signature: [signature] Date: 6/2/08 | Signature: [signature] Date: 6/5/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 07/22/08

Well ID: C6209 | Well Name: 399-2-25 | Location: 300-FF-5 OU

Project: 300 Areas TFF | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
					Sonic drilling w/6" db, 9 5/8" casing
0	D B			0-0.5: gravel drill pad	
				0.5-6.5: gravelly Sand (gS); sand 80% gravel 15-20 silt ~5%; sand med.-fine, gravel pebbles to 6" boulders, felsic, very slight amount of silt; unconsolidated no rxn HCl	advance db 0-5, recover 5' 3 GS @ 0722
5	D B				
	D B			6.5-10: silty Gravel (mG); gravel 90%, silt 10%; gravel dom. felsic, sub rounded 1-5" unconsolidated, poorly sorted, no rxn HCl	advance db 5-10 recover 4.5; 4 GS @ 0730
10	D B				advance db 10-15 recover 10-14.5 3 GS @ 0857
	N R			10-12.5: gravelly Sand (gS) sand 80% gravel 15-20%, v. slight silt; sand med-fine, gravel pebbles to cobbles; poorly sorted, no rxn HCl	
15	D B				advance 15-20, recov. 15-20 3 GS @ 0906
				12.5-15: silty Gravel (mG) gravel 90% silt 10%; gravel: felsic dom. subrounded 1-4", poorly sorted no rxn HCl	advance 20-25, recov. 20-24.5 3 GS @ 0915
20	D B				
	N R			15-19: gravelly Sand (gS): see above	
25	D B			19-20: silty Gravel (mG); see above	
	S S#1	S S#2		20-23: gravelly Sand (gS): 70% sand 30% gravel; sand med-fine gravel subangular to subrnded no rxn HCl	advance db 25-30 recover 25-30 3 GS @ 1032
30	N R	N R		23.5-23.0: silty Gravel (mG): see above	4" split-spoon 30-35 advance SS 30-35
	D B			23-29: sandy Gravel (sG): gravel 70% sand 30%; gravels sub-angular to subrnded 1-6"; sand med-fine	recover 30-32' 3 ss 1 exan liners @ 1046
35					

Reported By: S. Sexton | Reviewed By: Joe Fitts

Title: Geologist | Title: Geologist

Signature: [signature] | Date: 07/22/08 | Signature: [signature] | Date: 8/13/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 07/22/2008

Well ID: C6209 | Well Name: 399-2-25 | Location: 300-FF-5 OU

Project: 300 Areas IFC | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
					See pg. 1
40	D	B		29-31: silty Gravel (m G): gravel 90% silt 10%; gravel dom felsic sub-rnded 1-3"; poorly sorted, v. slight cementation; no rxn HCl	advance second ss 30-35 recover 30-31.5 2 LL taken @ 1311
45	D	B		31-39: silty sandy Gravel (ms G): gravel 70% sand 15% silt 15%; gravel subangular to subrnded sand med-fine; poorly sorted, unconsolidated	advance db 35-45, recover 35-45 5 GS @ 1346
50	S	S		39-43.5: silt (M): rip-up clast, oxidized, brown	advance db 45-50, recover 45-50 3 GS @ 1420
	N	R		43.5-45: silty Gravel (m G): gravel 80% silt 20%; mafic gravels 1-4" sub-rnded to rnded (70% mafic 30% felsic); slight cementation	advance ss 50-55, recover 50-54, 4 LL @ 1439
55	S	S		45-47.5: silty Gravel (m G): gravel 60% silt 40%; gravel mostly mafic rnded (70% mafic 30% felsic) 1-3"; silt brown, oxidized	advance ss 55-60, recover 55-60, 4 LL @ 1514
60	S	S		47.5-49: silt (M): oxidized	advance ss 60-65, recover 60-65, 5 LL
	S	S		49-49.5: sandy Gravel (s G): gravel 60% sand 40%; gravel mostly mafic rnded 1-3"; sand med-crse, 80% mafic 20% felsic	@ ~~1617~~ 1559 SMS 7-22-08 advance ss 65-70, recover 65-70, 5 LL
65	S	S		49.5-50: silty sandy Gravel (ms G): gravel 60% sand 20% silt 20%; gravel 60/40 mafic felsic rnded	@ 1612
70	D	B		50-52.5: silt (M): oxidized, brown	advance db 70-75, recover 70-75, 4 GS @ 1115
	D	B		52.5-53: gravelly Sand (g S): mafic sand w/ ~30% gravel	
75	D	B		53-60: silt (M) oxidized, brown	
				60-62.5: silt (M) reduced	
				62.5-70: silt (M) reduced, black, high sand content (40-50%), lots of mica present;	advance db 75-85 recover 75-85, 4 GS @ 1257

Reported By: S. Sexton | Reviewed By: Joe Fritz

Title: Geologist | Title: Geologist

Signature: [signature] | Date: 07/22/08 | Signature: [signature] | Date: 8/13/08

A-6003-642 (03/03)

BOREHOLE LOG

Start: 07/23/08 Date: Finish 07/24/08

Well ID: C6209 | Well Name: 399-2-25 | Location: 300-FF-5 OU

Project: 300 Areas IFC | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
80	D B				See pg. 1
				70-71: Sand (S): salt and pepper ~~Hanford~~ sand; med grained, 70% felsic (qtz) 30% mafic minerals, wet. (possible slough material)	while advancing db & casing 75-85, drilling very slow through cemented gravels, using 20 gpm water to wash fines away from annulus
85	D B			71-75: silty sandy Gravel (msG): 70% gravel 20% sand 10% silt; gravel 70% mafic 30% felsic, rnd. to sub-rnd 1-3" max; sand 70% felsic (qtz) 30% mafic; cementation due to silt content	
	N R				advance 85-90, recover 85-86, 1 GS @ 1543
90	D B			75-121: silty sandy Gravel (msG): 60% gravel 30% sand 10% silt; gravel mostly mafic (80%) sub-rnd to sub-ang. 1-3" max; sand predom. felsic qtz (70-80%), med. to crse grain; some cementation, poorly sorted; no rxn HCl ↳ increase in silt % to ~20% (60% gravel, 20% sand, 20% silt) at ~90' bgs; could be higher % silt as addition of water washed some fines away	advance 90-95 recover 90-95, 4 GS @ 0640 copious water (~200 gal) used during 90-95' run
95	D B				advance ~~SS 100~~ 7-24-08 db 95-100 recover 95-100 3 GS @ 0724
100	S S				advance SS 100-102, recover 2' 2 LL @ 0810
	D B				advance db 102-105, collect 3 GS @ 0837
105	D B				advance db 105-110 recover 105-110 4 GS @ 0904
110	S S				advance 110-115, recover 110-115 @ 0925 5 LL taken
115	D B				advance db 115-121 recover 115-117 1 GS @ 1037
	N R				

Reported By: S. Sexton | Reviewed By: Jim Fritz

Title: Geologist | Title: Geologist

Signature: S. Sexton | Date: 09/24/08 | Signature: Jim Fritz | Date: 8/13/09

A-6003-642 (03/03)

BOREHOLE LOG

Date: Start: 07/24/08 Finish: 07/25/08

Well ID: C6209	Well Name: 399-2-25	Location: 300-FF-5 OU
Project: 300 Area IFC		Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
120	N R				See pg 1
	S S			121-128: silt (M) reduced: grayish green/blue; 70% silt 30% sand; sand v. fine grained moldable sand; some gravels rnd-sub rnd, both felsic + mafic 1" max	advance ss 121-125 recover 121-125 5 LL @ 1242
125	S S			128-130: sandy silt (sM): oxidized brown grading to black; carbonous material (wood fibers) present at 129' bgs, causing oxidization; sand grains very fine, pliable; both silt layers well consolidated, no rxn HCl	advance ss 125-130, recover 125-130, 5 LL @ 1306
130	D B			130-159: Silt (M): reduced sandy silt, sand content ~40%, v. fine felsic sands; visible striations in sample; dark gray 2.5Y 4/1; micas visible (1% of sample is made up of micas)	advance 130-135, recover 130-135, 4 GS @ 1223
135	D B				advance 135-145, recover 135-145, 5 GS @ 1249
140				159-162: sandy Silt (sM): noticeable sand lenses in sections of sample; sands med-fine, 100% qtz grains, sub-ang to sub-rnd; also present are thin beds of mica, <1mm thick; ~~see geologist's sketch on pg 4-5~~ SMS 7-25-08; dark gray 2.5Y 4/1	
145	D B				advance db 145-155 recover 145-155, 5 GS @ 1315
150					
155	D B				advance db 155-163, recover 155-163, 5 GS @ 1337

Reported By: S. Sexton		Reviewed By: Joe Fritts	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 07/25/08	Signature: [signature]	Date: 8/13/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 07/25/08

Well ID: C6209	Well Name: 399-2-25	Location: 300-FF-5 OU
Project: 300 Area IFC		Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
160	D B				See pg. 1
				162-163: silt: clayey silt, dark gray 2.5Y 4/1; dry, massive, easily breaks apart into layers, but no visible layering strata, brittle	advance db 163-168, recover 163-166 2 GS @ 1438
165	D B				
	N R			163-168: rubbly clay: black clay, grayish-green GLEY 1 5/2 mottling inside; very consolidated, possibly very weathered basalt, no vesicles seen; vesicular basalt fragment found ~163 ft., 2-3" thick, possible basalt boulder	advance ss 168-170, recover 3; 3 LL @ 1514
	S S				
170					
175					= highly weathered basalt, mostly resembling clay
				168-170: see above.	
				TD = 171' bgs	
180					

Reported By: S. Sexton		Reviewed By: Joe Fritts	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 07/25/08	Signature: [signature]	Date: 8/13/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 6/23 to 6/24/08

Well ID: C6210 | Well Name: 399-2-26 | Location: 300 FF -5
Project: PNNL 300 Area IFC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
					Sonic Drill method
0				0-0.5' gravel drill pad	6" Nine barrel (DB)
	D	B		0.5-8' sandy gravel (sG) 60% gravel, 40% sand, Gravel 80% 2-4" w/ cobbles to 6" - subrounded to subangular, sand 80% Fine to med, subangular, unconsolidated, dry, ~10% fragmented, 80% 80% mafic, 20% felsic, dry.	Advance DB 0-5', recover 0-5 & collect 2 GS at 1510
5	D	B			Advance DB 5-10', recover 5-10' & collect 4 GS at 1515
				8-9.5' sand (S) medium sand, subangular, no rxn to HCl	
10	D	B		sl. consolidated, 10YR5/3 brown, dry	slimout
				9.5-15 sandy gravel (sG) 60% gravel, 40% sand, gravel 1-4", subangular, sand Fine to v cs, subangular, 80% mafic, 20% felsic,	Advance DB 10-15, recover 10-15 & collect 2 GS at 1540
15	D	B		unconsolidated, 10YR4/2 brown ~10% Fragmented,	Advance DB 15-25, recover 15-21 & collect 3 GS at 1550
				18-21 silty gravel (mG) ~80% gravel 1-3", sub angular 15% fragmented, sl. consolidated, matrix 2.5Y5/2 grayish brn	
20				21-29 sandy gravel (sG) ~65% gravel, 35% sand gravel 1-4", subrounded, ~20% fragmented, sand 80% Fine to med, sub- angular, no rxn to HCl, 10YR5/2 grayish brown, sl. moist., poorly consolidated.	
25	D	B		29-34 silt (m) ~10% fine gravel, 2.5Y light olive brown, no rxn to HCl, well consolidated moist	Advance DB 25-35', recover 25-34 & collect 4 GS at 0720
30				34-40 sandy gravel (sG) 75% gravel, 85% sand, gravel 50% to 3", sand cs to v cs, both subangular, no rxn to HCl, Unconsolidated, 85% mafic, 15% felsic, black	
35	D	B			Advance DB 35-45, collect 35-43 & collect 4 GS at 0805

Reported By: Joe Fitz
Title: Geologist
Signature: [signature] Date: 6/24/08

Reviewed By: L.D. Walker
Title: Geologist
Signature: [signature] Date: 7/7/08

BOREHOLE LOG

Date: 6/23-6/24/08

Well ID: C6210	Well Name: 399-2-26	Location: 300 - FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	D B			40 - 43 gravelly sand (gs) 70% cs sand, 30% gravel. Sand cs, subangular, gravel to 1.5", subangular, no rxn to HCL, unconsolidated, 80% mafic, 20% felsic, black,	sonic drilling method with 6" Drive barrel (DB)
45				43-52 - Ø recovery	Advance DB 45-55 - Ø recovery
50				52-54 Sand (S)	Advance DB 52-60, recover 52-60 & collect 3 GS at 0830
55	D B			54-57 Gravel (G) gravel 1-4", subangular to subrounded, 15% fragmented, 80% ~~fel~~ 1/4/08 mafic, 20% mafic, unconsolidated, black	
60	D B			57-60.5 silt (m) oxidized 2.5Y 5/3 light olive brown, No rxn to HCL,	Advance DB 60-62, recover 60-62 & collect 1 GS at 0905
65				60.5-62 silt (m) reduced, 2.5Y 4/1 dark gray, No rxn to acid,	
				- Total Depth 62 Ft. -	

Reported By: Jantritt		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/24/08	Signature: LD Walker	Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 7/17 - 7/18/07

Well ID: C6211 | Well Name: 399-2-27 | Location: 300 - PP 5
Project: PNNL 300 Area IFC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0	D	11		0-0.5' gravel drill pad	sonic drilling method with 6" Drive barrel (DB)
				0.5-5 Sandy Gravel (sG) 65% gravel 35% sand, gravel 75% 2-4" subrounded sand medium, subangular gravel to 6", 10YR 4/2 brown Dry, unconsolidated, 75% mafic, 25% felsic	Advance DB 0-5'. recover 0-5 ft, collect 2 GS at 1450
5					
10	D	R		5-20 Sandy gravel (sG) 80% gravel, 20% sand, gravel is 90% 1-2" up to 6" subrounded, 20% fragmented sand is fine to vs, subangular, unconsolidated, mod rxn to HCl, 10YR 5/3 brown Dry. 75% mafic, 25% felsic	Advance DB 5-15'. recover 5-15 & collect 4 GS at 1500
15					Advance DB 15-25, recover 15-23 & collect 3 GS at 1525
20	D	B		20-~~25~~25 silty sandy gravel (msG) 80% gravel, 20% sand, 10% silt 80% of gravel is 1-1.5" subangular, sand mix fine to vcs, sl rxn to HCl, unconsolidated 10YR 6/4 light yellowish brn. 80% mafic, 20% felsic.	
25					advance db 25-35
	D	B		25-35: silty sandy Gravel (msG): mafic gravels to 3" max some larger felsic cobbles, Gravel 60%, sand 30% silt 10% unconsolidated: sands 50/50 mafic/felsic composition	recover 25-33, 4 samples taken @0733
30					
35	D	B		35-45: sandy Gravel (sG)	advance 35-45 recover 35-37, 1 sample @0750

Reported By: Jae Fritz / S Sexton | Reviewed By: DC Weekes
Title: Geologist | Title: Geologist
Signature: [signature] | Date: 7/17/07 | Signature: [signature] | Date: 8/12/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 07/18/2008

Well ID: C6211 | Well Name: 399-2-27 | Location: 300-FF-5 OU

Project: 300 Areas IFC | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40					sonic drill method 6" db
					advance db 35-45
45				45-55: No Recovery	recover 35-37, 1 sample @ 0750
					advance 45-55 no recovery
50					
55				55-57.5: silty Gravel (mG) mafic gravels w/ ~10% silt	advance 55-65
				57.5-61: silt (M); brown (10YR 5/3) oxidized	recover 55-65, 5 samples @ 0825
				61-63: silt (M); reduced, dark bluish gray (5GY 2 4/1 10B)	
60	D	B			TD = 63.5' bgs on 07/18/2008
65					

Reported By: S. Sexton | Title: Geologist | Signature: [signature] | Date: 07/18/08

Reviewed By: D C Weekes | Title: Geologist | Signature: D C Weekes | Date: 8/12/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 6/27-6/30/08

Well ID: C6212	Well Name: 399-2-28	Location: 300-FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
					sonic drilling with
0	D B			0-0.5' gravel drillpad	6" Drive barrel (DB)
				0.5-7' sandy gravel (SG) 75% gravel, 25% sand, gravel 1-3", subangular, sand fine to cs, subangular, no rxn to HCL unconsolidated, 10% frag, 10YR 5/3 brown 70% mafic, 30% felsic	Advance DB 0-5'. recover 0-4 & collect 2 GS at 1420
5	D B				
				7-8 sand (S) medium sand, sl moist, subangular, unconsolidated	Advance DB 5-10' recover 5-10' & collect 2 GS at 1430
10	D B			8-12 sandy gravel (SG) 75% gravel, 25% sand gravel 1-2.5", subangular, sand fine to cs, subangular, no rxn to HCL, unconsolidated, 10% frag 10YR 5/3 brown, 70% mafic, 30% felsic	Advance DB 10-15' recover 10-15 & collect 2 GS at 1445
15	D B				Advance DB 15-20 recover 15-19.5 & collect 2 GS at 1455
20				12-19 sandy gravel (SG) 75% gravel, 25% sand. gravel is 80% 1-1.5", sand fine to vcs, subangular, 5% fragmented 80% mafic, 20% felsic 10YR 5/3 brn, mod rxn to HCL, unconsolidated.	Advance DB 20-25 & recover 20-24.5, collect 2 GS at 1515
25	D B			19-31 silty sandy gravel (MSG) 75% gravel, 10% silt, 15% sand. gravel to 2", subangular, no rxn to HCL. 85% mafic, 15% felsic, sl. consolidated, matrix 2.5Y 5/3 light olive brn.	Advance DB 25-35 recover 25-35 & collect 5 GS at 1550 6/30/08
30				31-32 silt (M) rip up-clast 2.5Y 5/2 grayish brn, no rxn to HCL	Advance DB 35-45 recover 35-40 & take 2 GS at 0807
35	D B			32-35 sandy gravel (SG) 80% gravel, 20% sand, 60% gravel is 0.5-1" subangular, 10% fragmented, up to 4" ~~20% s~~ & sand is cs, . . .	

Reported By: Joe Fritts 6/27	Reviewed By: L.D. Walker
Title: Geologist	Title: Geologist
Signature: [signature] Date: 6/30/08	Signature: [signature] Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 6/10/08

Well ID: C6212	Well Name: 399-2-28	Location: 300-FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	D B			32 - 35 unconsolidated, 85% mafic 15% felsic, No rxn to HCl, black	Sonic Drilling with 6" Drive barrel
				35-40: sandy gravel (sG); poorly sorted, unconsolidated; 60% gravel, 30% sand w/ <10% silt very slight silt content; gravel predom. mafic up to 6" cobbles, sand 70% mafic, 50% felsic, coarse grained; overall color: black	6" DB to 35-45', recover 35-40 & take 2 GS @ 0809
45	D B				
50				40-50: sandy gravel (sG); poorly sorted, unconsolidated; 70% gravel 30% sand; mafic gravels up to 6"; mafic sands, 80% mafic cs sand	Advance DB 45-55 recover 45-48, 2 GS @ 0848
55	D B				
				50 - 56.5: sandy gravel (sG) see above	Advance DB 55-60, recover 55-60, 5 samples @ 0859
60	D B			56.5-63 : silt (M); consolidated silts, brown ; reduced layer at 61' color change to greenish-blue	DB 60-65, recover 60-65, 3 samples @ 0912
65				63-65: ~~silt (M)~~ SMS ~~silty~~ sandy silt (sM) color change to dark gray	
				— Total Depth 65 ft —	

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/30/08	Signature: [signature]	Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 6/26/08

Well ID: C6216	Well Name: 399-2-29	Location: 300-FF-5
Project: PNNL Project 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic drilling method
	D B			0-0.5' gravel drillpad	6" Drive barrel (DB
	D B			0.5-3' sandy gravel (SG) 70% gravel, 30% sand, gravel 80% 1-3", subangular, 20% fragmented. Sand is 70% med, other fine to cs, dry, sl rxn to HCL, 10YR 4/3 ~~brown~~ 6/20 or brown, unconsolidated. 75% mafic, 25% felsic dry	Advance DB 0-3', recover 0-3' & collect 1GS at 0805
5	D B			3-6' gravelly sand (gS) 65% sand, 35% gravel, sand medium, subangular, gravel is 0.5-1.5", 10% fragmented, No rxn to HCL, unconsolidated, 10YR 4/3 brown 70% mafic, 25% felsic dry	Advance DB 3-5', recover 3-5 & collect 1GS at 0815
10	D B			6-16' silty gravel (mG) 90% gravel, 10% silt, 80% of gravel is 1"; to 2" unconsolidated No rxn to HCL, 10% fragmented 80% mafic, 20% felsic, matrix 2.5Y 5/3 light olive brown	Advance DB 5-10', recover 5-10 & collect 2GS at 0818.
15	D B				Advance DB 10-15, recover 10-14.5 & collect 2GS at 0830
20	D B			16-31 sandy gravel (SG) 80% gravel, 15% sand, trace silt, gravel is 85% 1", sand fine to cs, 5% fragmented, 80% mafic, 20% felsic 10YR 5/3 brown, sl. rxn to HCL, unconsolidated, moist at 25'	Advance DB 15-20, recover 15-20 & collect 2GS at 0840
25	D B				Advance DB 20-25, recover 20-25 & collect 2GS at 0905
30	D B			31-45 sandy gravel (SG) 80% gravel, 20% sand, trace silt. gravel is 85% 0.5 to 1.5", sand cs to vcs, subangular, 15% fragmented, unconsolidated 10YR 4/2 dk. grayish brn, No rxn to HCL	Advance DB 25-35, recover 25-30 & collect 2GS at 0940
35	D B				Advance DB 30-35 (clean-out) & recover 30-33, collect 1GS at 1015
					Advance DB 35-45, recover 35-41 & collect 3GS at 1095

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/26/08	Signature: LD Walker	Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 6/26/08

Well ID: C6216 | Well Name: 399-2-29 | Location: 300-FF-5
Project: PNNL Project 300 Area IFC | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	D				Sonic drilling method 6" drive barrel
				48 – 55.5 gravelly sand (gS) 65% sand, 35% gravel, Sand is 60% cs to vcs, gravel is 1-4", 70% = 1-4.5", subangular, 70% fragmented, 85% mafic, 15% felsic, Unconsolidated NO Rxn to HCl	Advance DB 45-55, recovered 45-53.2 collect 36S at 1105
45					
	D				
50				55.5 – 58 SiLt(M) 2.5Y 5/3 light olive brown, no rxn to acid oxidized	
55					Advance DB 55-60, recovered 7', collect 26S at 1120.
	D			58 – 61.5 SiLt(M) 2.5Y 5/1 gray, no rxn to acid, reduced	
60					
				Total Depth 61.5'	
65					

Reported By: Joe Fritz | Reviewed By: C.D. Walker
Title: Geologist | Title: Geologist
Signature: [signature] Date: 6/26/08 | Signature: [signature] Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Start/Date: 7/24/2008

Well ID: C6217 | Well Name: 399-2-30 | Location: 300-FF-5 OU

Project: 300 Areas IFC | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic drilling w/ 6" db
	D	B		0-0.5: gravel drill pad	
				0.5-4: Sandy Gravel (sG): gravel 60% sand 40%; gravel predom felsic granites sub angular; sand medium grain brown, mod. rxn HCl	advance db 0-5', recover 0-5 4 GS @ 1503
5				4-5: Sand (S): med. grain, brown, dom. felsic; mod. rxn HCl; some small pebbles (<5%)	advance db 5-10, recover 5-10 5 GS @ 1509
	D	B		5-6.5: Sandy Gravel (sG): gravel 80% sand 20%; gravel mostly felsic (70%) sub-rnd; sand med grain mostly felsic (70% qtz); slight rxn HCl	advance db 10-15, recover 10-15, 3 GS @ 1530
10					
	D	B		6.5-11: silty sandy Gravel (msG): gravel 70% sand 20% silt 10%; gravel mostly felsic, sub-rnd 1-2"; sand med, mostly qtz; some consolidation	advance db 15-20, recover 15-20, 4 GS @ 1536
15					
	D	B			
20				11-18: silty Gravel (mG): gravel 80% silt 20%; gravel felsic (70%) sub-rnd 1-3" max	advance db 20-25 recover 20-25, 3 GS @ 1600
	D	B			
25				18-20: silty sandy Gravel (msG): gravel 80% sand 10% silt 10%; gravel 50/50 mafic/felsic, sub-rnd to sub-ang. 1-3"; sand med. predom. felsic (qtz); slight rxn HCl; damp	advance db 25-35, recover 25-30, 3 GS @ 0654
	D	B			
30				20-35: silty sandy Gravel (msG): gravel 80% sand 10% silt 10%; gravel 50/50 mafic/felsic, 1-5" max sub-rnd to sub-ang.; sand med grain, 80-90% felsic (qtz); no rxn HCl; 10YR 3/2 v. dark grayish brown	using ~80 gal H_2O to wash casing over drive barrel
	D	B			
35					
	D	B			

Reported By: S. Sexton | Reviewed By: Joe Fritz

Title: Geologist | Title: Geologist

Signature: [signature] | Date: 7/25/08 | Signature: [signature] | Date: 8/13/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 07/25/08

Well ID: C6217 | Well Name: 399-2-30 | Location: 300-FF-5 OU

Project: 300 Area IFC | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	D B				See pg. 1
	N R			35-36: silty Gravel (m G): gravel 90% silt 10%; gravel 60% mafic 40% felsic 1-3" sub-rnd, uncon-solidated, dark overall color, wet.	advance db 35-45 recover 35-41, 3 GS @ 0735
45	D B			36-47: gravelly Sand (g S): Sand 60% gravel 40%; sand coarse to v. coarse, 50/50 felsic/mafic, similar lithography to gravels; gravel dom. mafic (60%) pebbles to small cobbles, sub-rnded; dark color overall, wet;	advance db 45-55 recover 45-55, 6 GS @ 0754
50					
55	D B			47-52: Silt (M): oxidized, brown 10YR 5/3; some very coarse sand & small ~~pebble~~ pebbles coated top of layer	advance ss 55-60 recover 55-60, 5 LL @ 0825
60	D B			52-55.5: gravelly Sand (g S): sand 60% gravel 40%; very coarse sand predom. mafic & dark felsic grains (70%) 30% qtz, grains sub-angular, gravels sub-rnd, mostly mafic (70%) range from ~0.5" to 3" max;	
65				55.5-59.5: silt (M): oxidized, brown 10YR 5/3	
				59.5-64: silt (M): reduced, dark greenish gray GLEY2 4/1 10BG	
70				TD = 64.0 on	07/25/2008
75					

Reported By: S. Sexton | Reviewed By: Joe Fritz

Title: Geologist | Title: Geologist

Signature: [signature] | Date: 07/25/08 | Signature: [signature] | Date: 8/13/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 6/19-6/20/07

Well ID: C6218 | Well Name: 399-2-31 | Location: 300 - FF-5

Project: PNNL 300 Area IFC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
					Sonic drilling, 6" Dia barrel (DB)
0	Drive Barrel			0-0.5 gravel drill pad	Advance DB 0-10', recover 0-7' and collect 4 GS at 1345
				0.5-3 sandy gravel (sG) 60% gravel, 40% sand, gravel to 3.5", subangular, sand fine to vcs, subangular, non rxn to HCl, unconsolidated, 75% mafic, 25% felsic, 10YR 5/3 brown, dry, ~15% fragmented	
5				3-4.5 sand (S) medium, subangular sand, no rxn to HCl, 10YR 5/2, dark grayish brown, unconsolidated, 75% mafic, 25% felsic	
				4.5-10 sandy gravel (sG) 65% gravel, 35% sand, gravel subangular to 3" sands fine to v.c.s, subangular, 10YR 5/3 brown, dry, 70% mafic, 30% felsic, non rxn to HCl	
10	Drive Barrel				Advance DB 10-15', recover 10-14 & collect 2 GS at 1410
				10-14 gravel (G) 1 to 2" subrounded to subangular, 70% mafic, 30% felsic, dry, no rxn to HCl. 10YR 5/3 brown	Advance DB 15-25 recover 15-23 & collect 5 GS at 1510
15				14-25 sandy gravel (sG) 70% gravel, 30% sand, gravel to 3.5", sand fine to vcs, 75% mafic, 25% felsic, both subangular, unconsolidated, no rxn to HCl, dry 10YR 5/2 grayish brown	
20	Drive Barrel			wet at ~ 26'	Advance DB 25-35 recover 25-30' collect 2 GS at 0735
				25-35 Gravel (G) <10% sand gravel 80% 1-2", subrounded, ~75% mafic, 25% felsic, 10% fragmented, unconsolidated, 10YR 4/2 dark grayish brown	
25	Drive Barrel				Advance DB 30-35 (clean-out) recover 30-35 & collect 2 GS at 0800
				35-44 sandy gravel (sG) ~80% / 20% gravel/sand. Gravel 80% 1-2", subangular, sand vcs, subangular, unconsolidated, no rxn to HCl, black, 15% fragmented	
30	Drive Barrel				
35	Drive Barrel				

Reported By: Jae Fritz | Reviewed By: L. D. Walker

Title: Geologist | Title: Geologist

Signature: [signature] Date: 6/20/07 | Signature: [signature] Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 6/20/08

Well ID: C6214 | Well Name: 399-2-31 | Location: 300-FF-5
Project: PNNL 300 Area IFC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40					Sonic drill method 6" drive barrel (DB)
45	Drive Barrel			44 - 55.5 sandy gravel (GW) 65% gravel 35% sand, 80% gravel 1-1.5" subangular, sand v. cs, subangular unconsolidated, 85% mafic, 15% felsic, No rxn to HCl, Black.	Advance DB 45-55 recover 45-53 and collect 4GS at 0740
50	Drive Barrel				Advance DB 55-60.5 recover 55-60.5 & collect 4GW at 1050
55	Drive Barrel			55.5 - 58 Silt(M) 2.5Y 4/1 dk olive brown, No rxn to HCl oxidized	
60				58 - 63 Silt(M) 2.5Y 5/1 gray, No rxn to HCl, reduced	
65				Total Depth 63 Ft.	

Reported By: Jon Fritz
Title: Geologist
Signature: [signature] Date: 6/20/08

Reviewed By: L.D. Walker
Title: Geologist
Signature: [signature] Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2

Date: 7/10/08

Well ID: C6174 | Well Name: 399-3-23 | Location: 300-FF-5

Project: PNNL Characterization | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0	D	B		0-0.5' gravel drillpad	Sonic drilling method w/ 6" Dia Barrel (OB)
				0.5-10.5 gravelly sand (gS) 80% sand 20% gravel. Sand Fine to cs, subangular, gravel 1-3", subangular, unconsolidated, no rxn to acid 75% mafic, 25% felsic, 10YR5/3 brown	Advance OB 0-5' recovery 0-5' & collect 2 GS at 1200
5	D	B			Advance OB 5-10' recover 5-10' collect 2 GS at 1205
10	D	O		10.5-12 sand (S) medium, subangular, black, ash? No rxn to HCl.	Advance OB 10-15' recover 8-10-15' & collect 2 GS at 1220
				12-16 sandy gravel (sG) 80% gravel 20% sand gravel 1-3" subangular, 15% fragments, sand Fine to cs, subangular, No rxn to acid, 75% mafic, 25% felsic, 10YR5/3 b/w. unconsolidated.	
15	D	B			Advance OB 15-20 recover 15-17.5 & collect 1 GS at 1230
				16-22 sandy gravel, trace silt (sG) 60% gravel, 40% sand gravel 1-3" subangular, 10% Frag, sand subangular, Fine to cs, unconsolidated, No rxn to HCl. 80% mafic, 20% felsic	
20	D	B			Advance OB 20-25, recover 20-24 & collect 2 GS at 1300
				22-35 sandy gravel (sG) trace silt 80% gravel, 20% sand, 80% of gravel is 0.5-1" subangular, 20% Frag, sand med-vcs, unconsolidated, No rxn to HCl. 80% mafic, 20% felsic	
25	D	B			Advance OB 25-35, recover 25-29 & collect 2 GS at 1310.
30	D	B			Advance OB 25-35 (clean out) recover 5' & collect 1 GS at 1340.
				35-50.5 gravelly sand (gS) 65% sand, 35% gravel, sand is cs to vcs, subangular gravel is 80% 0.5-1" subangular, unconsolidated, No rxn to HCl, 85% mafic, 15% felsic, = black	
35	D	B			

Reported By: Justin, | Reviewed By: L.D. Walker

Title: Geologist | Title: Geologist

Signature: | Date: 7/10/08 | Signature: | Date: 7/14/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 7/10/08

Well ID: C6194 | Well Name: 399-3-23 | Location: 300-FF-5

Project: PNNL Characterization | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	A				Sonic Drilling w/ 6" OB
				35-50.5 gravelly sand (gS) 65% sand, 35% gravel, sand is CS to vcs, subangular, gravel is 80% 0.5-1" subangular, unconsolidated, No rxn to HCl, 85% mafic, 15% felsic, w/ basalt	Advance OB 35-45, recover 35-41.5 & collect 3 GS at 1355.
45					
	B				Advance OB 45-55 recover 47-54 & collect 4 GS at 1425
50				50.5-52.5 gravel (g) 80% is 1-2" subrounded to subangular 25% fragments, 80% mafic, 20% felsic, unconsolidated, No rxn to HCl	
				52.5-57.5 silt(m) oxidized No rxn to HCl, 2.5Y5/3 light olive brown	Advance OB 55-60 recover, 55-61 & collect 3 GS at 1440
55				57.5-65 silt(m) reduced No rxn to HCl, 2.5Y5/1 gray.	
	A				
60					
65				Total Depth 65'	

Reported By: J. Griffith | Reviewed By: L.D. Walker

Title: Geologist | Title: Geologist

Signature: [signature] Date: 7/10/08 | Signature: [signature] Date: 7/14/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 7/9/08 - 7/10/08

Well ID: C6199 | Well Name: 399-3-24 | Location: 300-FF-5

Project: PNNL Characterization | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic drilling Method with 6" Dia barrel (OB)
	D	B		0-0.5' gravel drill pad.	
				0.5'-12' gravelly sand (gS) 60% sand, 40% gravel, sand fine to cs, subangular, gravel 80% 1-2", 15% fragmented, unconsolidated, matrix supported, reaction to HCl: 10YR 5/3 brown, dry	Advance OB 0-5' & collect 2 GS at 1525 - recovered 0-5'
5	D	A			Advance OB 5-10' recover 5-10' & collect 2 GS at 1535
10				12-12.5 sand (S) v fine to medium, osh - blank, moist, unconsolidated, strong rxn to HCl.	Advance OB 10-15, recover 10-15' & collect 2 GS at 1545
	D	B		12.5-15 sandy gravel (sG), trace silt, 65% gravel, 35% sand, gravel 80% 1-1.5", subangular, 10% fragmented, unconsolidated, sand v fine to med, strong rxn to HCl, dry. 80% matic, 20% felsic. 10YR 5/3 brown.	7/9/08 7/10/08 Advance OB 15-20, recover 15-19.5' & collect 2 GS at 0800
15					
20	D	B		15-25 sandy gravel (sG) trace silt, 65% gravel, 35% sand gravel 80% 1-1.5", subangular, <10% fragmented, sand fine to v cs subangular, No rxn to HCl, 80% matic, 20% felsic, moist, 10YR 5/3 brown	Advance OB 20-25 recover 20-24' & collect 2 GS at 0825
25	D	B			Advance OB 25-35, recover 25-29' & collect 2 GS at 0840
30	D	D		25-35 sandy gravel (sG) 75% gravel, 25% sand. gravel 80% 1-2", subangular, 10% fragmented, sand cs subangular, unconsolidated, No rxn to HCl, 80% matic, 20% felsic, 10YR 5/3 brown.	Advance OB 25-35 (clean-out) recover ~4' & collect 1 GS at 0900
35	D	B			Advance OB 35-45' recover 2' & collect 1 GS at 0920.

Reported By: Joe Fitts | Title: Geologist | Signature: [signature] | Date: 7/10/08

Reviewed By: L. S. Walker | Title: Geologist | Signature: [signature] | Date: 7/14/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 7/10/08

Well ID: C6199 | Well Name: 399-3-24 | Location: 300-FF-5
Project: PNNL Project | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40					Sonic drilling method w/ 6" OB
				35 – 52.5? gravelly sands (SP) 70% sand, 30% gravel, sand cs to vcs, subangular. gravel 10% 0.5 – 1.5" subrounded to subangular, <10% fines, unconsolidated NO RXN to acid in bucket, Note: only ~2' recovery 35 – 52.5, wet.	Advance OB 45-55 recover 5' unable to determine exact depth – collect GS at 0935 (silt → soe estimate at 52.5)
45					
50	OB				
				52.5 – 55 silt (ML) oxidized NO RXN to HCl, 2.5Y 5/2 light olive brown.	Advance OB 55-60, recover 54-60 collect 3 GS at 0950.
55	OB			55 – 65 silt (ML) reduced NO RXN to HCl, 2.5Y 5/1 gray.	
60					Total Depth 65 Ft
65					

Reported By: Joe Fritts | Reviewed By: L.S. Walker
Title: Geologist | Title: Geologist
Signature: [signature] | Date: 7/10/08 | Signature: [signature] | Date: 7/14/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 6/16 - 6/17/08

Well ID: C6200	Well Name: 399-3-25	Location: 300-FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Groundsurface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0	S S			0-0.5' gravel drillpad	Sonic drilling with 4"x5' splitspoon (SS) & 6" drive barrel (DB
				0.5-18 sandy gravel (SG) 60% gravel, 40% sand gravel to 3", subangular, sand fine to v. cs, subangular, 70% mafic, 30% felsic, 10% fragmented, dry, 10YR5/3 brown poorly consolidated, No rxn to HCL.	Advance SS 0-5' - recover 0-4.5 & collect 5 GS at 0910
5	S S				OP 6/16/08 lexan liners Advance SS 5-10, recover 5-8' and collect 3 lexan liners at 0930
10	S S				Advance SS 10-15, recover 10-12 & collect 3 LL at 1000
15	S S			18-23 silty gravel (MG) ≈80% gravel to 3", subrounded to subangular, ≈10% fragmented dry matrix 2.5Y 6/4 lt. yellowish brn poorly consolidated No rxn to HCL	Advance SS 15-20 recover 15-20 & collect 5 LL at 1010
20	S S			23-31 Sandy gravel (SG) ≈75% gravel, 25% sand, gravel to 4", subangular, Sand fine to v. cs, subangular - ≈75% mafic, 25% felsic, 10YR4/2 dark grayish brn, moist to wet at ≈26.5, poorly consolidated No rxn to HCL	Advance SS 20-25 & recover 20-23 - collect 3 LL at 1110
25	S S				Advance SS 25-30, recover 25-27.4 & collect 3 LL at 1120
30	S S			31-40 sandy gravel (SG) ≈75% gravel, 25% sand Gravel to 2", subrounded, sand cs to v. cs, subangular, poorly consolidated, wet, No rxn to HCL ~ black. 80% mafic, 20% felsic	Advance SS 30-35, recover 30-34 & collect 4 LL at 1250
35	S S				Advance SS 35-40 & recover 35-38.8 - collect 4 LL at 1335

Reported By: Joe Fritts		Reviewed By: L. D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/17/08	Signature: [signature]	Date: 6/26/08

A-6003-642 (03/03)

BOREHOLE LOG

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Date: 6/16 - 6/17/08

Well ID: C6200 | Well Name: 399-3-25 | Location: 300-FF-5

Project: PNNL 300 Area IFC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	G	S		40-44.5 gravelly sand (gS) 70% sand 30% gravel, sand cs to vcs, subangular, gravel to 1.5", subangular, 85% mafic, 15% felsic, black, unconsolidated, black, no rxn to HCl.	sonic drilling method with 4" SS, 6" OB. Advance SS 40-45 - recovery. Advance OB 40-45 - recover 40-45 & collect 2 GS at 1455.
45	S	S		44.5-46 silt (m) 10YR 5/3 brown,	Advance SS 45-50 recover 45-46.8 and collect 2 SS at 1505.
50	S	S		45-57 sandy gravel (sG) 80% gravel, 20% sand gravel to 3.5", subangular, 20% cs to vcs sand, subangular, 75% mafic, 25% felsic,	Advance SS 50-55 recover 50-52 & collect 2 LL at 1530 6/17/08
55	S	S		57-54 sandy gravel (sG) 80% gravel, 20% sand (gravel to 4", subangular, gravel cs to vcs, subangular, 75% mafic, 25% felsic. wet.	Advance SS 55-60, recover SS-60 & collect 5 LL at 1010
60	S	S		54-57.5 Gravel (G) ~10% sand gravel to 3" subangular, sand cs, subangular, 70% fragments 90% mafic, 10% felsic, no rxn to HCl. unconsolidated	Advance SS 60-65 recover 60-65 & collect 5LL at 1110.
65				57.5-60 silt (m) 2.5Y 6/3 lt. yellowish brown, oxidized	
				60-65 silt (m) 2.5Y 5/1 gray - reduced	
				Total Depth 65 Ft	

Reported By: Joe Fitts | Reviewed By: L.D. Walker

Title: Geologist | Title: Geologist

Signature: [signature] Date: 6/17/08 | Signature: [signature] Date: 6/26/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 5/14 - 5/15/08

Well ID: C6203	Well Name: 399-3-26	Location: 300-FF-5-OU/SW corner of site
Project: 300-FF-5-OU 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0	SS			0-0.5' gravel drill pad	Sonic drilling 4" SS and 6" drive barrel.
				0.5-20.5 sandy gravel (sG)	5/14/08
				65% gravel, 35% sand. Gravel to 5", subrounded, ≈ 70% mafic, 30% felsic, Sand fine to v.cs, subangular, 75% felsic, 25% mafic mod rxn to HCl, unconsolidated. ≈ 20% fragmented	SS 0-5', 1.5-5' recovery - 3 lexan liners, 0745
5	Drive barrel				6" barrel 5-10' - collect (1) grab sample (0810)
10	Drive barrel				6" barrel 10-15' collect (2) grab samples (0820)
					SS 15-20' recovery 15.2-18 ft - collect 3 lexan liners (0905)
15	SS				SS 17-22 recovery 17-22 w/ 21-22 not collected. Collected 3 lexan liner sample (0915)
20				20.5-26.0 clayey silt. well consolidated. lamination structures No rxn to HCl, 2.5Y 5/3 lt olive brn with 2.5Y 6/6 olive brn areas (oxidation)	SS 25-30 recovery 25-26.8 - collect 3 lexan liner sample at (1055)
25	SS				SS 30-35 recovered 30-32 - 2 lexan sample at 1110.
30	SS			26-35 (sG) sandy gravel. ≈ 60% gravel, 40% sand. Cobbles to 6", subrounded, 75% mafic, 25% felsic. Sand coarse to v coarse, 70% mafic, 30% felsic, subangular. 25% fragmented overall. unconsolidated, black	5/15/08 SS 35-40 recovered 35-36.8' - collect 2 lexan liners at 0810
35	SS			35-36 sandy gravel (sG) ≈ 60% fine gravel, subrounded to subangular, 85% mafic, 15% felsic, sand is v. coarse, 85% mafic, 15% felsic..	

Reported By: Joe Fritz		Reviewed By: L. D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 5/14/08	Signature: [signature]	Date: 5/21/08

A-6003-642 (03/03)

BOREHOLE LOG

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Date: 5/15/08

Well ID: C6203 | Well Name: 399-3-26 | Location: 300-FF-5-04/SW corner

Project: 300-FF-5-04 300 Area IFC | Reference Measuring Point: Ground surface of site

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40				... subangular, unconsolidated, no rxn to HCl. wet, black.	SS 40-45' - recovered 40-43 - collect 3 lexan liners at 0825
	SS			36-42 sandy gravel (SG) ~ 80% gravel, 20% sand. Gravel is subrounded, to 2.5"	
45				sandy is med to v coarse subrounded, both 85% mafic, 15% felsic wet, Black,	SS 45-50' - recovered 45-47.4 collect 3 lexan liners at 0925
	SS			no rxn to HCl, Unconsolidated 42-52 gravelly sand, 70% sand, 30% gravel sand is	SS 50-55' - recovered 50-55 - collect 5 lexan liners at 0945'
50				med to VCS subangular, 85% mafic, 15% felsic. gravel is	
	SS			fine subangular, same composition overall 10% fragmented,	SS 55-60 recovered 55-60 => 59-60' liner ruined - collect 4 lexan liners 55-59' at 1025
55				unconsolidated, black, wet.	
	SS			pocketed gravel to 2" 52'-56.5 silt (M) micas	
				visible @ 5Y 4/3 olive brown, No structure, moist, oxidized.	
60				no rxn to HCl	
				56.5-60 silt (M) micas, 2.5Y 5/1 gray, moist, reduced	
				No rxn to HCl.	
65					
				Total Depth = 66ft.	

Reported By: Jug Foth | Reviewed By: DC Weekes

Title: Geologist | Title: Geologist

Signature: [signature] Date: 5/15/08 | Signature: DC Weekes Date: 6/12/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 7/7/08

Well ID: C6204	Well Name: 399-3-27	Location: 300-FF-5
Project: BNNL Characterization		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0	D B			0-0.5' - gravel drillpad	Sonic drilling method with 6" Drive barrel (DB)
	D B			0.5-8' gravelly sand (gS) 70% sand, 30% gravel. 80% of ~~grav~~ 7/9/08 sand is fine, subangular, gravel 0.5-3". Unconsolidated, No rxn to acid, 65% mafic, 35% felsic dry, 10YR5/3 brown	Advance DB 0-3' recover 0-3' & collect 1GS at 1025
5	D B				Advance DB 3-5' recover 3-5 & collect 1GS at 1030
10	D B			8-17 sandy gravel (sG) 60% gravel, 40% sand, gravel 80% 1-3", subangular, 2.5% fragmented, sand fine to vcs, subangular, unconsolidated dry, 10YR 5/4 yellowish brn 80% mafic, 20% felsic dry. sl to mod rxn to HCL	Advance 5-10' recover 5-10' & collect 2GS at 1040
15	D B				Advance DB 10-15 recover 10-15 & collect 2GS at 1100
20	D B			17-24 silty gravel (mG) 90% gravel, 10% silt, gravel is 80% 1-1.5", subangular, 25% fragmented, No rxn ~~[illegible]~~ 7/9/08 to HCL, unconsolidated, 90% mafic, 10% felsic, unconsolidated matrix (silt) 2.5Y5/3 light olive brown.	Advance DB 15-20, recover 15-18.5 & collect 2GS at 1105
25	D B				Advance DB 20-25, recover 20-24 & collect 2 GS at 1215
30	D B			24-27.5 sandy gravel (sG) 70% gravel, 30% sand, gravel 70% 1-5", subangular, 20% fragmented, sand med to vcs, subangular 85% mafic, 15% felsic, black No rxn to HCL, unconsolidated	Advance DB 25-35' recover 25-30' & collect 2GS at 1230
35	D B			27.5-29 sand (S) med to cs, subangular, No rxn to acid, subangular, unconsolidated	Advance DB 30-35' recover 30-35 & collect 1GS at 1235 (clean-out)
	D B				Advance DB 35-45 recover 1' & collect 1GS at 1320

Reported By: Joe Fritz		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 7/9/08	Signature: [signature]	Date: 7/14/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 7/9/08

Well ID: 6204 | Well Name: 399-3-27 | Location: 300-FF-5
Project: PNNL Characterization | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40					Sonic drilling method w/ 6" OB
				29-48 sandy gravel(SG) 20% gravel 30% sand 75% of gravel 1-1.5", subangular, sand cs to vcs, subangular, unconsolidated, 10% fragments no rxn to HCl.	
45				10YR 4/2 dark grayish brn. wet	Advance OB 45-55 recover 45-55 collect 4 GS at 1340.
				Note: 1' recovery 35-45'	
50	A	B		48-50.5 gravel(G) 1-3" subrounded 85% mafic 15% felsic, unconsolidated no rxn to HCl, black.	
55				50.5-53.5 silt(m) oxidized 2.5Y 5/3 light olive brown.	
				53.5-62 silt(m) reduced 2.5Y 5/1 gray.	
60					
65				Total Depth 62'	

Reported By: Jaeris | Reviewed By: L.D. Walker
Title: Geologist | Title: Geologist
Signature: [signature] Date: 7/9/08 | Signature: [signature] Date: 7/14/08

A-6003-642 (03/03)

BOREHOLE LOG

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Date: 7/8/08 - start -7/9/08

Well ID: C6205 | Well Name: 399-3-28 | Location: 300-FF-5

Project: PNNL Characterization 300 Area FFS | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0	DB			0-0.5' bgs - gravel drill pad.	Sonic drilling method w/ 6" drive barrel (DB).
				0.5-5.0' bgs - gravelly sand (GS) ~70% v.fn to v.crs s., 30% vfn to crs g., 85% maf, 15% fels; g=sub-md to subang, damp, slt rxn w/ HCl, 10YR 2/2 (v. dk brn)	Advance DB 0-5', 0-5' recover, collect 2 GS at 1445
5	DB				Advance DB 5-10' recov 5-10' & collect 2 GS at 1450
10	DB			5.0-12.0 'bgs - gravelly sand (GS) ~60% vfn to v.crs s., 30% v.fn to crs g (sub-md to ang), ≤10% m, moist, loose, 7.5YR 2.5/1 (95% maf, 5% fels), slt rxn w/ HCl, 10YR 2/1 (Black).	Advance DB 10-15, recover 10-14 & collect 2 GS at 1535
15	DB			12.0-20 'bgs - Sandy, gravel (sG) ~75% v.fn pebbs to lg. cobbs, 25% v.fn to crs s. (sub-md - to sub-ang), 70% maf, 30% fels, dry, med rxn w/ HCl, 2.5Y 6/1 (gray) → ~16.0' bgs, g-size decto vfn pebbs to sm cobbs.	Advance DB 15-20', collect 3 GS at 1545 - recover 15-20' 7/9/08
20	DB				Advance DB 20-25, recover 20-23.5 & collect 2 GS at 0900
25	DB			20-30 silty, sandy, gravel (msG) 80% gravel, 20% sand, 10% silt, gravel 80% 1-1.5" subangular 15% fragmented, sand crs-vcrs, subangular, unconsolidated, no rxn to HCl, silt matrix 2.5Y 5/3 light olive brown, 85% matic, 15% felsic	Advance DB 25-35 recover 25-34 & collect 4 GS at 0710
30	DB			30-38 sandy gravel (sG) 60% gravel, 40% sand, gravel 80% 1-2" subangular, 20% fragmented, sand crs to v crs, subangular, unconsolidated, no rxn to HCl, black, 85% matic, 15% felsic.	
35	DB				Advance DB 35-45 recover 35-40.5 & collect 2 GS at 0800

Reported By: T. Buswell / Joe Fitts | Reviewed By: L.S. Wacker

Title: Geologist / Geologist | Title: Geologist

Signature: Teresa Buswell / JF | Date: 7/9/08 | Signature: LS Wacker | Date: 7/14/08

A-6003-642 (03/03)

BOREHOLE LOG

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Date: 7/9/08

Well ID: C6205 | Well Name: 399-3-28 | Location: 300-FF 5

Project: PNNL Characterization 300 Area TEC | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	D				Sonic Drilling Method w/ 6" DB
				30 to 52 sandy gravel (sG) 70% gravel 30% sand. gravel 80% 0.5 - 2" subrounded to subangular, 10% fragmented, sand cs to u cs, subangular, unconsolidated, no Rx to HCl, 85% mafic, 15% felsic, black.	
45	D	B			Advance DB 45-55, recover 45-49.5 ft collect 1 GS at 0815
50				52 - 55.5 gravel (G) gravel 80% 1 to 3" subrounded to subangular, 85% mafic, 15% felsic, black, unconsolidated, 20% fragmented.	
55	D	B		55.5 - 61 silt (M) oxidized 2.5Y 5/3 light olive brown, no Rx to acid	Advance DB 55-60 recover 55-60 ft collect 2 GS at 0815
60	D	B		61 - 64.5 silt (M) 2.5Y 5/1 gray, reduced, no Rx to HCl.	Advance DB 60-65 recover 60-65 ft collect 2 GS at 0835
65					Total Depth 64.5'

Reported By: T. Buswell / Jeff Fills | Reviewed By: L.D. Walker

Title: Geologist / Geologist | Title: Geologist

Signature: Jean Buswell / Jeff Fills | Date: 7/9/08 | Signature: L.D. Walker | Date: 7/14/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 6/30 7/1/08

Well ID: C6206	Well Name: 399-3-29	Location: 300-FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0	D B			0-0.5' gravel, drill pad	Drilling SONIC method 6" DB.
				0.5-4' gravelly sand (gS) 65% sand, 35% gravel, 80% sand fine to med, subangular, 65% mafic, 35% felsic, gravel, 75% 2-3" 10% fragmented, mod rxn to HCl, unconsolidated, 10YR 5/2 grayish brown, dry	Advance DB 0-4', recover 0-4' & collect 2 GS at 1125
5	D B			4-12 sandy gravel (sG) 80% gravel, 20% sand, gravel 80% 2-3", subangular, 20% fragmented, sand med to vcs, 6/20 subangular, 70% mafic, 30% ~~mafic~~ felsic 10YR 5/2 grayish brown, dry, no rxn to HCl	Advance DB 4-10 recover 4-10 & collect 3 GS at 1130
10	D B			12-17.5 sandy gravel, trace silt (sG) gravel 80% 1-2", subangular 25% fragmented, sand fine to vcs, subangular, 80% mafic, 20% felsic. No rxn to HCl, unconsolidated, 10YR 5/2 grayish brn.	Advance DB 10-15, recover 10-15 & collect 2 GS at 1250.
15	D B			17.5-24 silty sandy gravel (sG) 70% gravel, 20% sand, 10% silt. Gravel 80% 1-2", subangular, 25% fragmented, sand 80% med - v.c.s. No rxn to HCl, unconsolidated, matrix 2.5Y 5/3 light olive brown.	Advance DB 15-20 recover 15-20 & collect 2 GS at 1300
20	D B			24-35 sandy gravel (sG) 80% gravel, 20% sand gravel 80% 1-2.5", subrounded, 15% fragmented, sand cs, subangular, 80% mafic, 20% felsic, unconsolidated, wet at ≈ 26 Ft, black.	Advance DB 20-25 recover 20-25 & collect 2 GS at 1345
25	D B				Advance DB 25-35 recover 25-32 & collect 2 GS at 1430
30					
35	D B				Advance DB 35-45 recover 35-42.5 & collect 3 GS at 1530

Reported By: [signature] Joe Fritts	Reviewed By: L.D. Walker
Title: Geologist	Title: Geologist
Signature: [signature] Date: 7/1/08	Signature: [signature] Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 6/30 - 7/1/08

Well ID: C6206	Well Name: 399-3-29	Location: 300-FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	D B			35-52 sandy gravel, (sh) 75% gravel, 25% sand, 80% gravel - .25" - 1" subangular, <10% fragmented, sand cs to v cs, subangular, 85% mafic, 15% felsic, unconsolidated, No rxn to HCl, black	Drilling sonic method with 6" Drive barrel (DB)
45					Advance DB 45-55 recover 45-55 & collect 4GS at 1550
50	D B			52-53 gravel (g) 2-4" gravel, subangular to sub rounded, 80% mafic, 20% felsic, 5% fragmented, ~ black	7/1/08
55	D B			53-56.5 silt (m) oxidized 2.5Y 5/3 light olive brown, no rxn to acid	Advance DB 55-60 recover 55-61 & collect 3GS at 0705. (recovered 10', but sampled 55-61)
60				56.5-64 silt (m) reduced 10YR 5/1 gray, no rxn to acid	
				Total Depth 64'	
65					

Reported By: Joe Fitts		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 7/1/08	Signature: [signature]	Date: 7/7/08

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BOREHOLE LOG

Page 1 of 2
Date: 6/26-6/27/08

Well ID: C6213	Well Name: 399-3-30	Location: 300-Ft-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0	D B			0.0-0.5 gravel drillpad	Sonic drilling with 6" Drive barrel (DB)
				0.5-7 sandy gravel (SG) 65% gravel, 35% sand, gravel 80% 2-3", sand 80% med to cs. subrounded, 80% mafic, 20% felsic, unconsolidated	Advance DB 0-5', recover 0-5 & collect 2GS at 1325
5	D B			sl rxn to HCL 10YR 5/3 brown, 10% Fragmented. dry	
				7-19 sandy gravel (SG) 75% gravel, 25% sand. 80% gravel 1-2" & some as large as 5", 80% sand Fine to cs, 20% fragmented, 80% mafic, 20% felsic, 10YR 5/3 brown dry	Advance DB 5-10', recover 5-10 & collect 3GS at 1330
10	D B				Advance DB 10-15 recover 10-14 & collect 2GS at 1345
15	D B			19-22 silty gravel (mG) 85% gravel, 15% silt, gravel 1-2", unconsolidated, 2.5Y 5/3 light olive brown, No rxn to acid, 80% mafic, 20% felsic	Advance DB 15-20, recover 15-19.5 & collect 2GS at 1355
20	D B			22-26 silty gravel mG) 80% gravel, 20% silt, trace sand gravel 3-5", subangular, 30% Fragmented, poorly consolidated, No rxn to HCl, 10YR 5/3 brown moist.	Advance DB 20-25, recover 20-25 & collect 2GS at 1415
25	D B			26-35 silt sandy gravel (mSG) 70% gravel, 25% sand, 5% silt, gravel 1-3.5", subangular, 25% fragmented, sand med to vcs subangular, 80% mafic, 20% felsic, No rxn to acid, sl. consolidated, 10YR 4/2 dark grayish brown.	Advance DB 25-35, recover 25-31 & collect 3GS at 1455
30	D B				Advance DB 25-35 (clean-out) - recovered 27-35 & collect 2GS at 1520
35	D B				Advance DB 35-45 recover 35-41.5 & collect 3GS at 1545

Reported By: Joe Fritz		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/26/08	Signature: [signature]	Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Date: 6/16-17/23/08

Well ID: C6213 | Well Name: 399-3-30 | Location: 300-FF-5

Project: PNNL 300 Area IFC | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	D A				Sonic Drilling w/ 6" Dia no barrel (DB)
				35-49 sandy gravel (sw) 20% gravel, 30% sand gravel 80% 1-2", sand cs to vcs, subangular, poorly consolidated, No rxn to HCl, 85% mafic, 15% felsic black, gravel 5% fragmented	
45	D B				Advance DB 45-55, recover 45-50 collect 2 GS at 0710
				49-55.5 Gravel (G) ~75% 1-2" other to 4" subrounded, 80% mafic, 20% felsic, unconsolidated, black	
50					
55	D B			55.5-57 silt (m) 2.5Y light olive brn, oxidized, No rxn to acid.	Advance DB 55-60 recover 5' collect 2 GS at 0720
				57-61.5 silt (m) 2.5Y 5/1 gray, reduced, No rxn to acid.	
60					
				Total Depth: 61.5'	
65					

Reported By: Joe Fritz | Reviewed By: L.D. Walker

Title: Geologist | Title: Geologist

Signature: [signature] Date: 6/16/08 | Signature: [signature] Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

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Date: 6/20/08 - 6/23/08

Well ID: C6214	Well Name: 399-3-31	Location: 300-FF-5
Project: PNNL 300 Area IFC		Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0				0-0.5' gravel drill pad	Sonic drill method 6" drive barrel (DB)
	D B			0.5 - 11.5 sandy gravel (SG) 60% gravel, 40% sand. Gravel 80% 1-4", subangular 25% fragmented, sand v fine to med, subangular, med rxn to HCL, unconsolidated, 10YR 5/4 yellowish brn. Dry	Advance DB 0-5', recover 0-4 & collect 2 GS at 1455
5	D B				Advance DB 5-10' recover 5-10' and collect 3 GS at 1510
10	D B			11.5 - 18 gravelly sand (gS) 65% sand, 35% gravel. Sand fine to cs, subangular, gravel ≈80% 0.5-1", some to 3", subangular, unconsolidated, no rxn to HCL, ≈15% fragmented, 10YR 5/2 grayish brown. Dry, 75% mafic, 25% felsic	Advance DB 10-15', recover 4.5' & collect 4 GS at 1535.
15	D B			18-20.5 silty gravel (mG) ≈80% gravel, 1-4", subangular, ≈15% fragmented, 80% mafic, 20% felsic moist, matrix 2.5Y 5/2 grayish brn sl consolidated	Advance DB 15-25', recover 15-20.5 & collect 3 GS at 1545
20	D B			20.5 - 25 sandy gravel (SG) 60% gravel, 40% sand. 80% of gravel, 0.5-1", some to 4", sand fine to cs, subangular, sl moist unconsolidated, 80% mafic, 20% felsic	Advance DB 20-25, recover 5' & collect 3 GS at 1600.
25	D B			silty sandy gravel (mSG) 25-33 70% gravel, 20% sand, 10% silt. gravel 1-4", subangular, sand cs to vcs, subangular, ≈10% fragmented, wet 10YR 4/1 dark gray poorly ~~consolid~~ 6/23/08 consolidated no rxn to HCL. 80% mafic, 20% felsic	Advance DB 25-35 & collect 4 GS at 0810 - recovered 25-35.
30	D B			33 - 45 sandy gravel (SG) 70% gravel, 30% sand, gravel 1-4", subangular, sand cs to vcs, subangular 80% mafic, 20% felsic, unconsolidated, wet. 10YR 4/1 dark gray	Advance DB 35-45 - recover 35-43.5 & collect 4 GS at 0830
35	D B				

Reported By: Jay Fritts		Reviewed By: L.D. Walker	
Title: Geologist		Title: Geologist	
Signature: [signature]	Date: 6/23/08	Signature: [signature]	Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 6/23/08

Well ID: C6214 | Well Name: 379-3-31 | Location: 300-FF-5
Project: PNNL 300 Area IFC | Reference Measuring Point: Ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	D B			33-45' sandy Gravel (GW)	Sonic drill method - 6" drive barrel (DB)
					Advance DB 45-55, ∅ recovery - No samples
45				45-55.5 No recovery	Advance DB 55-60 ∅ recovery, No samples
			No recovery		
50					
					DB 6/23/08 Advance core to 61'
55	D B			55.5-58 silt (m) 2.5Y 5/3 light olive brn., oxidized, No rxn to acid	55.5-61' recover 55.5-61 & collect 3 GS at 1020
				58-63 silt (m) 2.5Y 4/1 dark gray, reduced, No rxn to acid.	
60					
				Total Depth 63 Ft	

Reported By: Jay Fitts | Reviewed By: L.D. Walker
Title: Geologist | Title: Geologist
Signature: [signature] | Date: 6/23/08 | Signature: [signature] | Date: 7/7/08

A-6003-642 (03/03)

BOREHOLE LOG

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Date: 07/18/2008

Well ID: C6215 | Well Name: 399-3-32 | Location: 300-FF-5 OU

Project: 300 Areas IFC | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					6" drive barrel (db)
	D	B		0-0.5: gravel drill pad	Sonic drilling method
				0.5-5: Sandy Gravel (SG)	
				Gravel 60% sand 40%;	advance db 0-5'
				gravel 1-3" mostly felsic material,	recover 5' 3 samples
5				sand medium grained; dry	@ 1004
				unconsolidated, brown (10YR 4/2)	
				no rxn HCl	
	D	B		5-7: sandy Gravel (SG)	advance 5-10', recover
					5-10, 3 samples @ 1030
10				7-9: silty sandy Gravel (mSG);	
	D	B		gravel 60% sand 30% silt 10%;	
				gravels felsic 1-4" angular to	
				subrounded; sand fine-med; slight	
15				rxn to HCl	
				9-20: silty sandy Gravel (mSG)	advance db 15-25
				gravel 65% sand 25% silt 10%	recover 15-20 3
				gravels to 6" sand med; 75%	samples @ 1048
20	D	B		felsic 25% mafic; dry, unconsolidated	
				25-28: silty sandy Gravel (mSG)	advance 25-35'
					recover 25-31, 5
					samples @ 1128
25					
				28-29: silt (M), rip-up clast,	
				brown (10YR 5/3)	
				29-39: sandy Gravel (SG)	advance db 35-45'
30	D	B			recover 35-39, 4
					samples @ 1311
35	D	B			

Reported By: S. Sexton | Reviewed By: J. Griffith

Title: Geologist | Title: Geologist

Signature: [signature] | Date: 07/18/08 | Signature: [signature] | Date: 8/13/09

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BOREHOLE LOG

Page 2 of 2
Date: 07/18/08

Well ID: C6215 | Well Name: 399-3-32 | Location: 300-FF-5 OU
Project: 300 Areas TFC | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	D B				advance db 45-55
45				45-56: sandy Gravel (SG): gravels 70% felsic 30% mafic, cobbles up to 8" rounded to sub-rounded; sand 65% mafic 35% felsic medium to coarse grained; wet, unconsolidated + poorly sorted	recover 45-48 2 samples @ 1327
50	D B				
55				56-58: silt (M); oxidized, brown (10YR 5/3)	advanced db 55-63 recover 55-62, 5 GS taken @ 1348
60	D B			58-63: silt (M); reduced dark bluish gray (GLEY 2 4/1 10B)	TD = 63' 07/18/2008
65					

Reported By: S. Sexton | Reviewed By: Joe Fitts
Title: Geologist | Title: Geologist
Signature: S. Sexton | Date: 07/18/08 | Signature: Joe Fitts | Date: 8/13/08

A-6003-642 (03/03)

Appendix C

Sample Inventory Sheets

Sample Summary

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Date 6/27 to 6/27/01

Well ID: C6184 Well Name: 399-2-7 Geologist: Jaffi, H.

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
0			G	2-7-6-0-2.5		Advance DB 0-5'. recover 0-5' & collect 2 GS at 0920
			G	2-7-6-2.5-5		
5						Advance DB 5-10' - recover 5-10 & collect 2GS at 0925
			G	2-7-6-5-7.5		
			G	2-7-6-7.5-10		
10			G	2-7-6-10-12.5		p 6/27/01 Advance DB 10-~~15~~ 15, recover 10-15 & collect 2 GS at 0935
			G	2-7-6-12.5-15		
15			G	2-7-6-15-17.5		Advance DB 15-20, recover 15-20 & collect 2 GS at 0950
			G	2-7-6-17.5-20		
20			G	2-7-6-20-22.5		Advance DB 20-25, recover 20-22.5 & collect 1 GS at 1005
25			G	2-7-6-25-27		Advance DB 25-35 recover 25-31.5 & collect 3 GS at 1040
			G	2-7-6-27-30		
30			G	2-7-6-30-31.5		
35			G	2-7-6-35-37.5		Advance DB 35-45 - recover 35-40 & collect 2 GS at 1120
			G	2-7-6-37.5-40		

Sample Summary

Page 2 of 2

Date 6/27 to 6/27/01

Well ID: C6184 Well Name: 399-2-7 Geologist: JaeF, HS

Depth (ft)	Lithologic Log M	S	G	Sample Graphic	Type	ID	Mass	Comments
40								
45								
								Advance DB 45-55- recover 45-52.5 on 6/27/01 47.5-55 & collect 3 GS at 1250
					G	2-7-6-47.5-50 2		
					G	2-7-6-50-52.5		
50								
					G	2-7-6-52.5 55		
55					G	2-7-6-55-58		Advance DB 55-60- collect 2 GS at 1300 (recovered 7')
					G	2-7-6-58-60		
60								Total Depth 62 FT

Sample Summary

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Date 7/7/08 to 7/8/08

Well ID: C6185 | Well Name: 399-2-8 | Geologist: Jon Fritz

Depth (ft)	Lithologic Log (M S G)	Graphic	Sample Type	Sample ID	Mass	Comments
0			G	2-8-G-0-2.5		Advance DB 0-5', recover 0-5' & collect 2 GS at 0815
			G	2-8-G-2.5-5		
5			G	2-8-G-5-7.5		Advance DB 5-10' recover 5-10' & collect 2 GS at 0820
10			G	2-8-G-7.5-10		Advance DB 10-15, recover 10-15 and collect 2 GS at 0920
			G	2-8-G-10-12.5		
			G	2-8-G-12.5-15		
15			G	2-8-G-15-17.5		Advance DB 15-25, recover 15-25 & collect 4 GS at 1235.
			G	2-8-G-17.5-20		
20			G	2-8-G-20-22.5		
			G	2-8-G-22.5-25		
25			G	2-8-G-25-29		Advance DB 25-35 - recover 25-31.5 & collect 2 GS at 1535 Note 25-29 suspect slough.
30			G	2-8-G-29-31.5		7/8/08
35			G	2-8-G-35-38		Advance DB 35-45, recover 35-41 & collect 2 GS at 0720
40			G	2-8-G-38-41		

Sample Summary

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Date 7/8/09 to 7/9/09

Well ID: C6185 | Well Name: 399-2-8 | Geologist: Jae Frits

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
40						
45			G	2-8-6-45-48.5		Advance DB 45-55, recover 45-51 & collect >KS at 0740
50			G	2-8-6-48.5-50.5		
			G	2-8-6-50.5-53		
55						Advance DB 55-60, recover 55-62 (swelling) & collect 2 GSN at 0750
			G	2-8-6-55-57		
			G	2-8-6-57-60		
60						Total Depth 60'

Sample Summary

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Date 5/12/08 to 5/13/08

Well ID: C6186 | Well Name: 399-2-9 | Geologist: Jeff Hs

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
						All depths Ft bgs, 5/12/08
0			C	2-9-C-0-0.5		Core #1 pushed 0-5'
			C	2-9-C-0.5-1.5		shoe plugged @ ~2.5'
			C	2-9-C-1.5-2.5		sampled at 1105 - core in lexan liners
5						All liners 4"
			C	2-9-C-9.4-10.4		Core #2 pushed 9.4-14.4
10			C	2-9-C-10.4-11.4		sampled at 1310 - core in
			C	2-9-C-11.4-12.4		lexan liners. (1310)
			C	2-9-C-12.4-13.4		
			C	2-9-C-13.4-14.4		
						Core #3 pushed 14.4-19.4
15			C	2-9-C-15.9-16.4		rcc 15.4-19.4 & sampled core
			C	2-9-C-16.4-17.4		in lexan liners at 1330
			C	2-9-C-17.4-18.4		
			C	2-9-C-18.4-19.4		Core #4 pushed 20-25
						rcc, 20-21.9 - sampled cor
20			C	2-9-C-20-21.9		in lexan liners at 1501
			C	2-9-C-23.7-24.7		Core #5 pushed 23.7-28.7
			C	2-9-C-24.7-25.7		recovered 23.7-26.7 and
			C	2-9-C-25.7-26.7		sampled in lexan liners at 1520
25						- 5/13/08 -
			C	2-9-C-29.4-30.2		Core #6 pushed 29.4-34.4
			C	2-9-C-30.2-31.2		recovered 29.4-32.2 0820
			C	2-9-C-31.2-32.2		
30						
			C	2-9-C-35-35.3		Core #7 pushed 35-40'
			C	2-9-C-35.3-36.3		recovered 35-38.3' 0835
			C	2-9-C-36.3-37.3		
			C	2-9-C-37.3-38.3		Core #8 pushed 39.7-45
						recovered 39.7-42.2 0935
35			C	2-9-C-39.7-40.2		
			C	2-9-C-40.2-41.2		
			C	2-9-C-41.2-42.2		
40						

Sample Summary

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Date 5/13 to 5/13/09

Well ID: C6186 | Well Name: 399-2-9 | Geologist: Jeff. H

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
40						Core # 9 pushed 41.4-50 ft.
			C	2-9-C-42-43		collect only 1 ft sample - collect 1 ft 42-43 Ft. (0950)
45						Barrel #10 pushed 41.4-50'
						collect GS 45-50 (1050)
			G	2-9-G-45-50		
						Core #11 push 50-55
						recovered 50-52.5' (1125)
50						
			C	2-9-C-50-50.5		Barrel #12 push 54-58'
			C	2-9-C-50.5-51.5		collect sample 56-57 (1300)
			C	2-9-C-51.5-52.5		
55						Core #13 push 58-63
			G	2-9-G-56-57		100% recovery - collect
				M 5/13/09		5 samples at 1330
			C	~~58~~ 2-9-C-59	-59	
			C	2-9-C-59-60		
			C	2-9-C-60-61		
60			C	2-9-C-61-62		
			C	2-9-C-62-63		
65				Total Depth		65 Ft bgs

Sample Summary

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Date 7/17/08 to 7/17/08

Well ID: C6187 | Well Name: 397-2-10 | Geologist: Jae Fitts

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
0						
						Advance DB 0-5' - recover 0-5 & collect 2 GS at 0940
			G	2-10-6-0-5	2.5	
				2.5-5	7/17/08	
5			G	2-10-6-5-10		
			G	2-10-6-5-7		Advance DB, 5-15 - recover 5-15 & collect 4 GS at 0950
10			G	2-10-6-7-9		
			G	2-10-6-9-12		
			G	2-10-6-12-15		
15						Advance DB 15-25 - recover 15-22 & collect 3 GS at 1035
			G	2-10-6-15-17		
			G	2-10-6-17-20		
20			G	2-10-6-20-22		
						Advance DB 25-35 - recover 25-32 & collect 3 GS at 1120
25			G	2-10-6-25-26		
			G	2-10-6-26-29		
30			G	2-10-628-32		
						Advance DB 35-45 - recover 35-42 & collect 3 GS at 1225.
35			G	2-10-6-35-37.5		
			G	2-10-6-37.5-39		

Sample Summary

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Date 7/17/08 to 7/17/08

Well ID: C6187 | Well Name: 399-2-10 | Geologist: Joe Fritts

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Sample Type	Sample ID	Sample Mass	Comments
40			G	2-10-G-39-42		
45			G	2-10-G-45-48.5		Advance DB & casing 45-55 recover 45-52 & collect 2 GS at 1245
50			G	2-10-G-48.5-52		
55			G	2-10-G-55-56		Advance DB 55-65, recover 55-65 & collect 4 GS at 1300
			G	2-10-G-56-59		
60			G	2-10-G-59-61		
			G	2-10-G-61-65		
65						Total Depth 65 FT

Sample Summary

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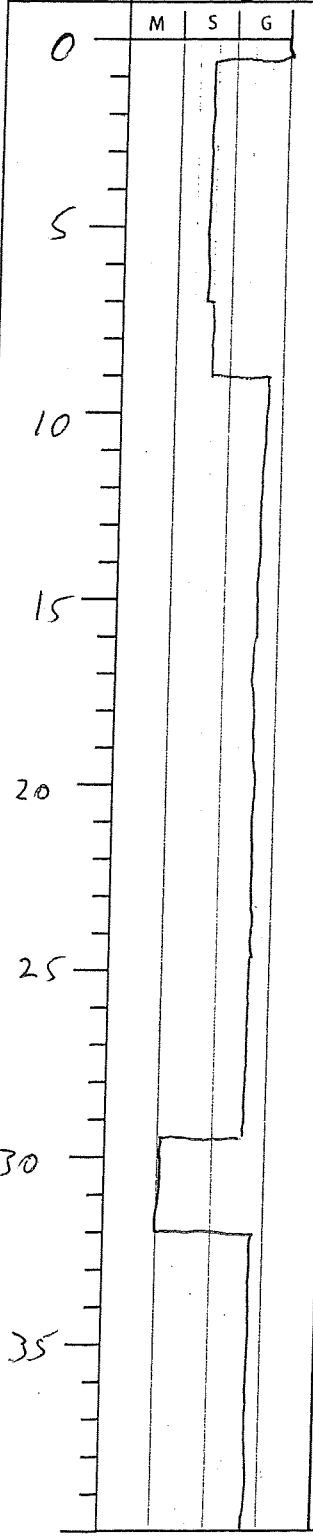
Date 7/10/08 to 7/17/08

Well ID: C6188 | Well Name: 399-2-11 | Geologist: Joe Fitz



Graphic	Type	ID	Mass	Comments
	G	2-11-G-0-2.5		Advance DB 0-5' - recover 0-5 & collect 2 GS at 1035.
	G	2-11-G-2.5-5		
	G	2-11-G-5-7		Advance DB 5-15' - recover 5-12' - collect 3 GS at 1045
	G	2-11-G-7-9		
	G	2-11-G-9-12		
	G	2-11-G-15-18		Advance DB 15-25 - recover 15-22 & collect 3 GS at 1125
	G	2-11-G-18-20		
	G	2-11-G-20-22		
	G	2-11-G-25-29.5		Advance DB 25-35' - recover 25-32 & collect GS at 1300
	G	2-11-G-29.5-32		
	G	2-11-G-35-38.5		Advance DB 35-45' - recover 35-42 & collect 2 GS at 1315

Sample Summary

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Date 7/16/08 to 7/17/08

Well ID: C6188 | Well Name: 399-2-11 | Geologist: Joe Fitz

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Sample Type	Sample ID	Mass	Comments
40			G	2-11-G-395-42		
						7/17/08
45						Advance DB 45-55, recover 1.5 & collect 1 GS at 0700 - depth interval hard to identify
			G	2-11-G-45-55		
50						
						Advance DB 55-63, recover 55-63 & collect 4 GS at 0720
55			G	2-11-G-55-57		
			G	2-11-G-57-59		
60			G	2-11-G-59-61		
			G	2-11-G-61-63		
						Total Depth 65 FT.
65						

Sample Summary

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Date 6/17/08 to 6/18/08

Well ID: C6189 | Well Name: 399-2-12 | Geologist: Joe Fritts

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
0			C	2-12-~~C-1-1~~ C-0-1		Advance split spoon (SS)
			C	2-12-C-1-2		0-5' - recover 0-4' and
			C	2-12-C-2-3		collect 4 lexan liners (LL) at 1350
			C	2-12-C-3-4		
5						
			C	2-12-C-5-6		Advance SS 5-10' recover
			C	2-12-C-6-7		5-10 & collect 5LL at 1405
			C	2-12-C-7-8		
			C	2-12-C-8-9		
			C	2-12-C-9-10		
10			C	2-12-C-10-11		Advance SS 10-15 - recover
			C	2-12-C-11-12		10-15 & collect 5LL at 1440
			C	2-12-C-12-13		
			C	2-12-C-13-14		
15			C	2-12-C-14-15		Advance SS 15-20 recover
			C	2-12-C-15-16		15-19 & collect 4LL at
			C	2-12-C-16-17		1500
			C	2-12-C-17-18		
			C	2-12-C-18-19		
20						Advance SS 20-25, recover
			C	2-12-C-20-21		20-22' and collect 2
			C	2-12-C-21-22		LL at 1355
						6/18/08
						Advance SS 25-30 recover 25-
25			C	2-12-C-25-25.4		27.1 & collect 3LL at 0700
			C	2-12-C-25.4-26.4		
			C	2-12-C-26.4-27.1		
30			C	2-12-C-30-30.6		Advance SS 30-35 - recover 30-30.6
						& collect 1LL at 0740.
						Advance DB 30-35 - Ø recovery
35			C	2-12-G-35-35.5		Advance SS 35-40 - recover
			G	2-12-G-35-37		35-35.5 & collect 1 LL at 0805
			G	2-12-G-37-38.5		Advance SS 35-45 - recover
			G	2-12-G-38.5-40		35-40 & collect 3 GS at 0835
40						

Sample Summary

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Date 6/17 to 6/19/08

Well ID: C6189 | Well Name: 399-2-12 | Geologist: Joe Fitts

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
40			C	2-12-C-40-40.6		Advance SS 40-45 & recover
			C	2-12-C-40.6-41.6		40-42.6 - collect 3 LL at 0920
			C	2-12-C-41.6-42.6		
45						Advance SS 45-50 & recover
			C	2-12-C-45-46		45-49 - collect 3 LL at 0915
			C	2-12-C-46-47		
			C	2-12-C-47-48		
50						
			C	2-12-C-50-51		Advance SS 50-55 - recover
			C	2-12-C-51-52		50-55 & collect 5 LL at 0930
			C	2-12-C-52-53		
			C	2-12-C-53-54		
			C	2-12-C-54-55		
55			C	2-12-C-55-56		Advance SS 55-60 - recover
			C	2-12-C-56-57		55-60 & collect 5 LL at
			C	2-12-C-57-58		1000
			C	2-12-C-58-59		6/19/08
			C	2-12-C-59-60		Advance ~~SS~~ OB 57-61
60			C	2-12-C-59.5-60.5	.5	recover 57-60.5 & collect 1 GS
			C	2-12-C-60-61		at 1055.
			C	2-12-C-61-62		Advance SS 60-65 - recover
			C	2-12-C-62-63		60-65 & collect 5 LL at 1055 -
			C	2-12-C-63-64		(64-65' LL damaged)
65						~~Total~~ Depth 65 FT

Sample Summary

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Date 5/21 to 5/24/03

Well ID: C6190 | Well Name: 399-2-13 | Geologist: Jay Frith

Depth (ft)	Lithologic Log (M S G)	Graphic	Type	ID	Mass	Comments
0			C	2-13-C-0-1		SS 0-5 Ft - recover
			C	2-13-C-1-2		0-3' & collect 3 lexon
			C	2-13-C-2-3		liners at 0800
5			C	2-13-C-5-6		SS 5-10 Ft - recover
			C	2-13-C-6-7		5-8' & collect 3 lexon
			C	2-13-C-7-8		liners at 0815
10			C	2-13-C-10-11		SS 10-15 - recover
			C	2-13-C-11-12		10-13' and collect 3 lexon
			C	2-13-C-12-13		liner at 1025.
15						SS 15-20, recover 15.5-18,
			C	2-13-C-15.5-16		and collect 3 lexon liners
			C	2-13-C-16-17		at 1035
			C	2-13-C-17-18		
20						SS 19.5-24.5 recover 19.5-
			C	2-13-C-19.5-20.5		20.5 and collect 1 lexon
						liner at 1050
25			C	2-13-C-24-25		SS 24-29, recover 24-25
						and collect 1 lexon liner at
						1135.
30			C	2-13-C-29-29.5		SS 29-34 - recover 29-
			C	2-13-C-29.5-30.5		31.5 and collect 3 lexon liners
			C	2-13-C-30.5-31.5		at 1255
						SS 33-38, recover 33-34
			C	2-13-C-33-34		and collect 1 liner at 1400
35						SS 38-43 - recover 38-43
						and collect 5 liners at 1415.
			C	2-13-C-38-39		
			C	2-13-C-39-40		
40			C	2-13-C-40-41		

Sample Summary

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Date 6/13 to 6/16/08

Well ID: C6191 | Well Name: 399-2-14 | Geologist: Joe Fritz

Depth (ft)	Lithologic Log (M S G)	Graphic	Sample Type	ID	Mass	Comments
						06/13 Sonic ~~5/8"~~ SMS 6-17 6" core
0			G	2-14-G-0-1.5		advance drive barrel (db) 0-5'
			G	2-14-G-1.5-3		recover 0-5', 4 samples collected
			G	2-14-G-3-4		@ 1245
			G	2-14-G-4-5		
5						
			G	2-14-G-5-6.5		advance db 5-10' recovery 5-8'
			G	2-14-G-6.5-8		2 samples taken @ 1255
10			G	2-14-G-10-11		advance db 10-15' recover 10-
			G	2-14-G-11-12		15' 4 grab samples @ 1310
			G	2-14-G-12-13.5		
			G	2-14-G-13.5-15		
15			G	2-14-G-15-16.5		advance db 15-20 recover 15-
			G	2-14-G-16.5-18		19.5, 3 samples @ 1320
			G	2-14-G-18-19.5		
20			G	2-14-G-20-21		advance db 20-25' recover 20
			G	2-14-G-21-22		-25' 5 samples @ 1330
			G	2-14-G-22-23		
			G	2-14-G-23-24		
			G	2-14-G-24-25		
25			G	2-14-G-25-26		advance db 25-30' recover 25-
			G	2-14-G-26-27		30' 5 samples @ 1355
			G	2-14-G-27-28		
			G	2-14-G-28-29		
30			G	2-14-G-29-30		
			G	2-14-G-30-32		advance db 30-35 recover 30-
			G	2-14-G-32-33		35' 4 grab samples @ 1445
			G	2-14-G-33-34		
35			G	2-14-G-34-35		advance db 35-45' recover
			G	2-14-G-35-36		35-45' 6 samples @ 1510
			G	2-14-G-36-37.5		
			G	2-14-G-37.5-39		
			G	2-14-G-39-40.5		
40						

Sample Summary

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Date 06/13 to 6/16/08

Well ID: C6191 | Well Name: 399-2-14 | Geologist: JeFritt

Depth (ft)	Lithologic Log (M S G)	Graphic	Sample Type	Sample ID	Sample Mass	Comments
40						06/13 Sonic 6" core barrel
			G	2-14-G-40.5-42.5		(see pg. 1)
			G	2-14-G-42.5-45		
45			G	2-14-G-45-47		advance drive barrel (DB)
			G	2-14-G-47-49		45-55' recover 45-53.5' 4
			G	2-14-G-49-52		samples collected @ 1540
			G	2-14-G-52-53.5		
50						
						Advance DB 55-60 and
						recover 55-60 - collect 3
						GS at 0710.
55			G	2-14-G-55-56		
			G	2-14-G-56-58		
			G	2-14-G-58-60		
60				DB to 60'		
				Final TD	58.5'	

Sample Summary

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Date 6/25 to 6/25/08

Well ID: C6142 | Well Name: 399-2-15 | Geologist: Joe Fitz

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	Sample ID	Mass	Comments
0			G	2-15-6-0-2.5		Advance DB 0-5', recover 0-5 & collect 2 GS at 1240
			G	2-15-6-2.5-5		
5						Advance DB 5-10' recover
			G	2-15-6-5-7.5		5-10' & collect 2 GS at 1250
			G	2-15-6-7.5-10		
10			G	2-15-6-10-12.5		Advance DB 10-15, recover
			G	2-15-6-12.5-15		10-15 & collect 2 GS at 1305
						Advance DB 15-20, recover
15			G	2-15-6-15-17.5		15-20 & collect 2 GS at 1315
			G	2-15-6-17.5-20		
20			G	2-15-6-20-22		Advance DB 20-25, recover 20-24.5 - collect 2 GS at 1335
			G	2-15-6-22-24.5		
25			G	2-15-6-25-27		Advance DB 25-35, recover 25-29.5 & collect 2 GS at 1345
			G	2-15-6-27-29.5		
30			G	2-15-6-30-32.5		Advance DB 30-35, recover 30-35 & collect 2 GS at 1415.
			G	2-15-6-32.5-35		
35			G	2-15-6-35-36.5		Advance DB 35-45 recover 35-41.5' & collect 3 GS at 1520
			G	2-15-6-36.5-39		
40						

Sample Summary

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Date 6/25 to 6/27/08

Well ID: C6192 | Well Name: 399-2-15 | Geologist: Joe Fritz

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
40			G	2-15-G-39-41.5		
45			G	2-15-G-46-50		Advance DB 45-55, recover 46-51.5 - collect 2 GS at 1515
50			G	2-15-G-50-51.5		
			G	2-15-G-52-55		Advance DB 50-60, recover 52-60' - collect 2 GS at 1530
55			G	2-15-G-55-58		
			G	2-15-G-58-60		Total Depth 61.5 ft.
60						

Sample Summary

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Date 6/24 to 6/24/09

Well ID: C6193 Well Name: 399-2-16 Geologist: Joe Fitz

Depth (ft)	Lithologic Log M	S	G	Sample Graphic	Type	ID	Mass	Comments
0								Advance DB 0-5'- recover 0-5' & collect 2 GS at 1045
					G	2-16-G-0-2.5		
5					G	2-16-G-2.5-5		Advance DB 5-10'- recover 5-10' & collect 2 GS at 1055
10					G	2-16-G-5-7.5		Advance DB 10-15'- recover 10-14.5' & collect 2 GS at 1105
					G	2-16-G-7.5-10		
					G	2-16-G-10-12.5		
15					G	2-16-G-12.5-14.5		Advance DB 15-20 - recover 15-20 & collect 2 GS at 1120
					G	2-16-G-15-18		
					G	2-16-G-18-20		
20					G	2-16-G-20-23		Advance DB 20-25 - recover 20-25 & collect 2 GS at 1125
					G	2-16-G-23-25		
25					G	2-16-G-25-27		Advance DB 25-35'- recover 25-31 & collect 3 GS at 1300
					G	2-16-G-27-29		
30					G	2-16-G-29-31		
								Advance DB 35-45'- recover 35-40 & collect 2 GS at 1345
35					G	2-16-G-35-37.5		
					G	2-16-G-37.5-40		

Sample Summary

Page 2 of 2

Date 6/24 to 6/24/08

Well ID: C6193 | Well Name: 399-2-16 | Geologist: Joe Fritz

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Sample Type	Sample ID	Sample Mass	Comments
40						
45			G	2-16-G-45-47		Advance DB 45-55, recover 45-53 & collect 4 GS at 1405.
			G	2-16-G-47-49.5		
50			G	2-16-G-49.5-51		
			G	2-16-G-51-53		Advance DB 54-60, recover 54-60 & collect 3 GS at 1435.
55			G	2-16-G-54-56		
			G	2-16-G-56-58		
60			G	2-16-G-58-60		Total Depth 62 Ft.

Sample Summary

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Date 06/12/08 to 06/13/08

Well ID: C6195 | Well Name: 399-2-17 | Geologist: Sean Sexton

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
0						06/12/08
			6	2-17-6-0-1.5		drove core barrel 0-5' recovered
			6	2-17-6-1.5-2.5		0-5'; 4 grab samples taken
			6	2-17-6-2.5-3.5		@ 1424
			6	2-17-6-3.5-5		
5			6	2-17-6-5-7		core barrel 5-10', recovered 5-10,
			6	2-17-6-7-8.5		3 samples @ 1435
			6	2-17-6-8.5-10		
			6	2-17-6-10-11.5		core barrel 10-15, recover 10-15,
			6	2-17-6-11.5-13		4 samples @ 1452
10			6	2-17-6-13-14		
			6	2-17-6-14-15		
			6	2-17-6-15-16		Drove db to 15-25, no recov.
			6	2-17-6-16-17.5		19-25, 3 samples @ 1503
			6	2-17-6-17.5-19		
15			6	2-17-6-25-26*		Sample possible slough material
			6	2-17-6-26-27		from above 25'
			6	2-17-6-27-28		Samples mixed w/slough but
			6	2-17-6-28-29		best representation of depth
			6	2-17-6-29-30		
20			6	2-17-6-25-26*		*sample depths doubled intentionally
						*core barrel 25-30' recover 25-26
						1 sample collected @ 1528
						core barrel 25-30, recover 25-
25						30, 5 samples @ 1554
						6/13/2008 6" drive barrel
						advance db 30-35, recover
30						30-35, 3 samples @ 0735
			6	2-17-6-30-32		
			6	2-17-6-32-33.5		
			6	2-17-6-33.5-35		
35						Advance db 35-45, recover
			6	2-17-6-35-37.5		35-40, 2 samples @ 0845
			6	2-17-6-37.5-40		
40						

Sample Summary

Page 2 of 2

Date 6/12/08 to 6/13/08

Well ID: C6195 | Well Name: 399-2-17 | Geologist: Sean Sexton

Depth (ft)	Lithologic Log (M / S / G)	Sample: Graphic	Type	ID	Mass	Comments
40						No recovery 40-45'
45			b	2-17-6-45-46.5		advance DB 45-50, recover
			b	2-17-6-46.5-48		45-48, 2 grab samples @ 0915
50			b	2-17-6-50-52.5		advance DB 50-55, recover 50-52.5, 1 sample @ 0930
55			b	2-17-6-55-56.5		advance DB 55-61, recover
			b	2-17-6-56.5-59.5		55-61, 3 samples ~~0945~~ 1015 sm/s 6-13-08
			G	2-17-6-59.5-61		
60						
						Total Depth 63 Ft.
65						

Sample Summary

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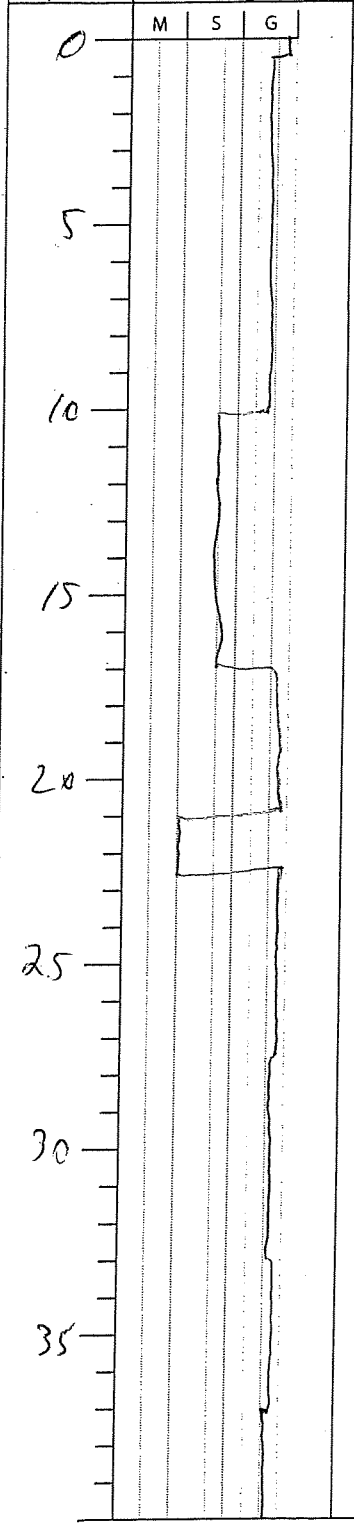
Date 6/3 to 6/11/08

Well ID: C6196 | Well Name: 399-2-18 | Geologist: J Fritz



Graphic	Type	ID	Mass	Comments
				6/3/08
	G	2-18-G-0-2.5		6" DB 0-5' collect (2)
	G	2-18-G-2.5-5		GS at 1445
	G	2-18-G-5-6.5		6" DB 5-10' collect (4)
	G	2-18-G-6.5-8		GS at 1525
	G	2-18-G-8-9		
	G	2-18-G-9-10		
				6/4/08
	G	2-18-G-10-12		6" DB 10-15' collect 3 GS
	G	2-18-G-12-14		at 0715
	G	2-18-G-14-15		
				6/11/08
				6" DB 17.5-25 collect
	G	2-18-G-17.5-19		4 GS at 0800 - recover
	G	2-18-G-19-20		12.5-22.5
	G	2-18-G-20-21		
	G	2-18-G-21-22.5		
				6" DB 22.5-30 and recover
	G	2-18-G-22.5-23.5		22.5-25.5 collect 2 GS
	G	2-18-G-23.5-25.5		at 0810
	G	2-18-G-25.5-27.5		6" DB 28.5-33.5 and recover
	G	2-18-G-27.5-29		25.5-33.5 collect 5 GS at
	G	2-18-G-29-30.5		0825
	G	2-18-G-30.5-32		
	G	2-18-G-32-33.5		
				6" DB 33-45Ft recover
				33-45 and collect 12 GS
	G	2-18-G-33-34		33-45
	G	2-18-G-34-35		
	G	2-18-G-35-36		
	G	2-18-G-36-37		
	G	2-18-G-37-38		
	G	2-18-G-38-39		
	G	2-18-G-39-40		

Sample Summary

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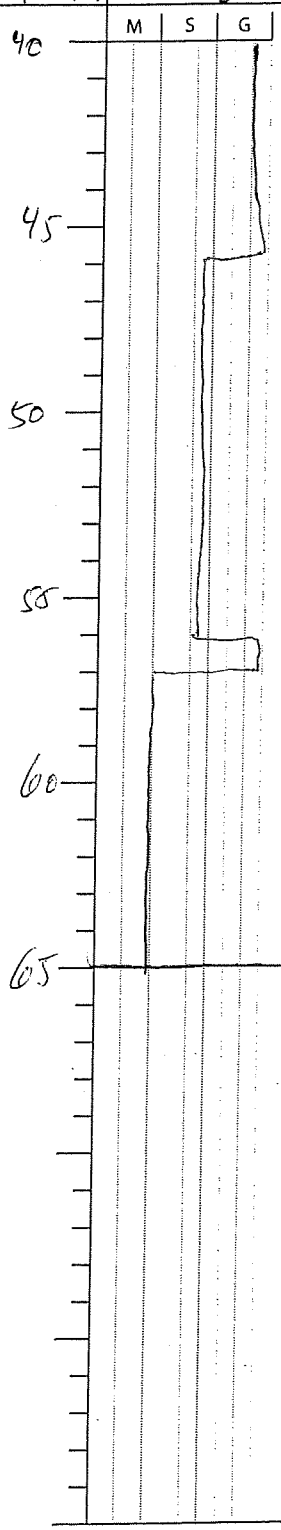
Date 6/3 to 6/11/08

Well ID: C6196 | Well Name: 399-2-18 | Geologist: Joe Fitz



Graphic	Type	ID	Mass	Comments
	G	2-18-G-40-41		
	G	2-18-G-41-42		
	G	2-18-G-42-43		Drive barrel 45-50 &
	G	2-18-G-43-44		collect GS 45-47 at 1130
	G	2-18-G-44-45		Drive barrel 45-50 & collect
	G	2-18-G-45-47		GS 47-49 at 1130.
				Heavy sand makes depths
	G	2-18-G-47-49		suspect.
	G	2-18-G-49-50		Drive Barrel 49-55 - recover
	G	2-18-G-50-51		47-54 & collect 5 GS at
	G	2-18-G-51-52		at 1255
	G	2-18-G-52-53		
	G	2-18-G-53-54		
				Drive barrel 55-60 - recover
	G	2-18-G-55-56		55-60 & collect 5 GS at 1305
	G	2-18-G-56-57		
	G	2-18-G-57-58		Drive barrel 60-63 - 0 recovery
	G	2-18-G-58-59		Drive barrel 60-65 - recover
	G	2-18-G-59-60		60-65 and collect 2 GS at
				1610.
	G	2-18-G-60-62		
	G	2-18-G-62-65		
		Total Depth 65 FT		

Sample Summary

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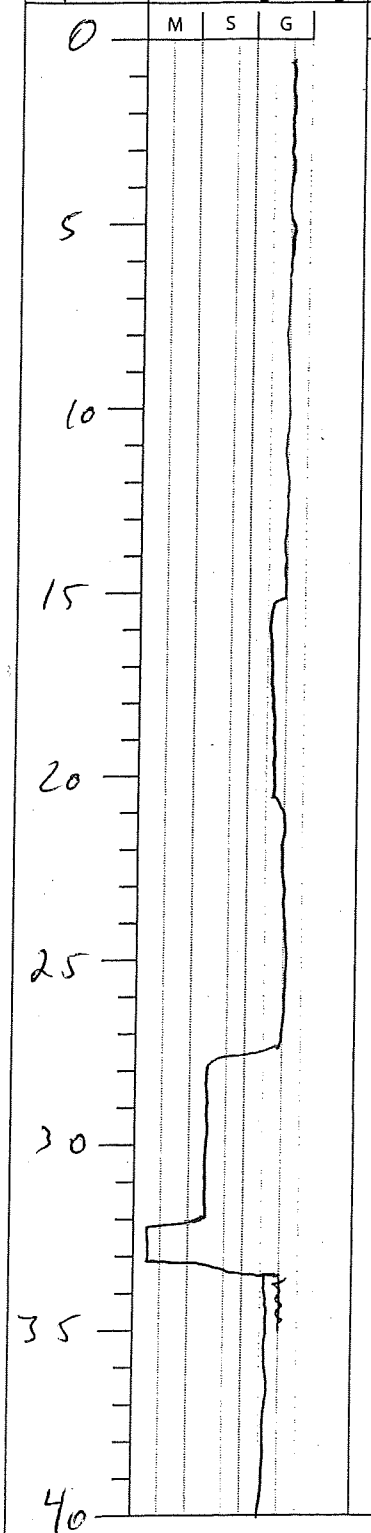
Date 5/20 to 5/20/08

Well ID: C6197 | Well Name: 397-2-19 | Geologist: Joe Fr, N.



Graphic	Type	ID	Mass	Comments
	C	2-19-C-0-0.3		Drive SS 0-5' -
	C	2-19-C-0.3-1.3		recover 0-2.3Ft - collect
	C	2-19-C-1.3-2.3		3 Lexan liners at 0705
	C	2-19-C-5-6		Drive SS 5-10' - recover
	C	2-19-C-6-7		5-9' - collect 4 Lexan
	C	2-19-C-7-8		liners at 0720
	C	2-19-C-8-9		
	C	2-19-C-11-12		Drive SS 10-15' - recover
				11-12' - collect 1 Lexan
				liner at 0735
	C	2-19-C-15-16		Drive SS 15-20' recover
	C	2-19-C-16-17		15-19' - collect 4 Lexan
	C	2-19-C-17-18		liners at 0825
	C	2-19-C-18-19		
	C	2-19-C-20-20.8		Drive SS 20-25, recover
	C	2-19-C-20.8-21.8		20-23.8' - collect 4 liners
	C	2-19-C-21.8-22.8		
	C	2-19-C-22.8-23.8		
	C	2-19-C-25-26		Drive SS 25-30 - recover
	C	2-19-C-26-27		25-28.8 - collect 4
	C	2-19-C-27-28		liners at 1015
	C	2-19-C-28-28.8		
	C	2-19-C-30-31		Drive SS 30-35 - recover
	C	2-19-C-31-32		30-32, collect 2 liners
				at 1100.
	C	2-19-C-35-36		Drive SS 35-40 recover
	C	2-19-C-36-37		35-39 - collect 2 liner
	C	2-19-C-37-38		at 1235
	C	2-19-C-39-39		

Sample Summary

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Date 5/20/09 to 5/20/09

Well ID: C6197 Well Name: 399-2-19 Geologist: J Fr. H.

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
40			C	2-19-C-40-41		Drive SS 40-45 - recover
			C	2-19-C-41-42		40-44, collect 4 liners
			C	2-19-C-42-43		at 1258
			C	2-19-C-43-44		
45			C	2-19-C-45-46		Drive SS 45-50 - recover
			C	2-19-C-46-47		45-48, collect 3 liners
			C	2-19-C-47-48		at 1345
50			C	2-19-C-50-51		Drive SS 50-55 recover
			C	2-19-C-51-52		50-53' collect 3 liners
			C	2-19-C-52-53		at 1415
						Drive SS 55-60 recover
55			C	2-19-C-55-56		55-60 collect 5 liners
			C	2-19-C-56-57		at 1500
			C	2-19-C-57-58		
			C	2-19-C-58-59		
60			C	2-19-C-59-60		
				Total Depth	60.8'	5/20/09

Sample Summary

Page 1 of 2

Date 6/25 to 6/25/08

Well ID: C6198 Well Name: 399-2-20 Geologist: Jeff Smits

Depth (ft)	Lithologic Log (M / S / G)	Sample: Graphic	Type	ID	Mass	Comments
0			G	2-20-G-0-2.5		Advance drive barrel 0-5' - recover 0-5 & collect 2 GS at 0705
			G	2-20-G-2.5-5		
5			G	2-20-G-5-7.5		Advance DB 5-10' - recover 5-10' & collect 2 GS at 0715
			G	2-20-G-7.5-10		
10			G	2-20-G-10-13		Advance DB 10-15, recover 10-13 & collect 1 GS at 0725
15			G	2-20-G-15-17		Advance DB 15-20 recover 15-20 & collect 3 GS at 0730
			G	2-20-G-17-19		
			G	2-20-G-19_20		
20			G	2-20-G-20-21		Advance DB 20-25 - recover 20-25 & collect 3 GS at 0950
			G	2-20-G-21-23		
			G	2-20-G-23-25		
25			G	2-20-G-25-27.5		Advance DB 25-35 - recover 25-30 & collect 2 GS at 0825
			G	2-20-G-27.5-30		
30			G	2-20-G-30-35		Advance DB 30-35 - recover 30-35 & collect 1 GS at 0855
35			G	2-20-G-35-37.5		Advance DB 35-40 - recover 35'-40' & collect 2 GS at 0905
			G	2-20-G-37.5-40		

Sample Summary

Page 2 of 2

Date 6/25 to 6/25/08

Well ID: C6198 | Well Name: 399-2-20 | Geologist: Jo Fitts

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Sample Type	Sample ID	Mass	Comments
40						
45			G	2-20-G-45-47		Advance DB 45-55, recover 45-51 & collect 3 GS at 0925.
			G	2-20-G-47-49		
50			G	2-20-G-49-51		Advance DB 54-60' recover 54-60 & collect 3 GS at 0935.
55			G	2-20-G-54-56		
			G	2-20-G-56-58		
			G	2-20-G-59-60		
60						
						Total Depth 62'

Sample Summary

Page 1 of 2

Date 6/12 to 6/12/08

Well ID: C6201 | Well Name: 399-2-2 ~~X~~ | Geologist: Joe Fritts

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
0			G	2-21-G-0-2		Advance DB (6") 0-2',
			G	2-21-G-2-3.5		recover 0-2 & collect
						GS at 0710
			G	2-21-G-3.5-5		
5			G	2-21-G-5-6.5		Advance DB 2-10', recover
						2-10 & collect 5 GS
			G	2-21-G-6.5-8		at 0720
			G	2-21-G-8-10		
10						Advance DB 10-15' - recover
			G	2-21-G-10-12		10-15 & collect 3 GS at 0755
			G	2-21-G-12-13.5		
			G	2-21-G-13.5-15		
15						Advance DB 15-25' - recover
			G	2-21-G-15-16		15-20 & collect 4 GS at 0810
			G	2-21-G-16-17		
			G	2-21-G-17-18		
			G	2-21-G-18-20		
20						Advance DB 25-35' - recover
						25-34 & collect 6 GS at
						0855
25			G	2-21-G-25-26.5		
			G	2-21-G-26.5-28		
			G	2-21-G-28-29.5		
			G	2-21-G-29.5-31		
30			G	2-21-G-31-32.5		
			G	2-21-G-32.5-34		
35						Advance DB 35-45' ~~& col~~ 6/12/08
			G	2-21-G-35-36		recover 35-40' - collect 5 GS
			G	2-21-G-36-37		at 1010
			G	2-21-G-37-38		
			G	2-21-G-38-39		
40			G	2-21-G-39-40		

Sample Summary

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Date 6/12 to 6/12/08

Well ID: C6201 | Well Name: 399-2-28 | Geologist: Joe Fritt

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Sample Type	Sample ID	Sample Mass	Comments
40						
45			G	2-21-G-45-46		Advance DB 45-55 - recover
			G	2-21-G-46-47.5		45-50 & collect 4 GS
			G	2-21-G-47.5-48.5		at 1045
			G	2-21-G-48.5-50		
50						
55			G	2-21-G-50-~~60~~ 55		Advance DB 55-60 - recover
			G	2-21-G-55-57		55-60 & collect 4 GS at
			G	2-21-G-57-58.5		1120. Used slough at top
			G	2-21-G-58.5-60		of DB for 50-55 GS
60						
						Total Depth 61.7 Ft
65						

Sample Summary

Page 1 of 2

Date 7/14/08 to 7/16/08

Well ID: C 6202 | Well Name: 397-2-22 | Geologist: Joe F. H.

Depth (ft)	Lithologic Log (M S G)	Graphic	Type	ID	Mass	Comments
0						Advance DB 0-5'
			G	2-22-6-0-2.5		recover 0-5 & collect 2 GS at 1025
			G	2-22-6-2.5-5		
5			G	2-22-6-5-7		
			G	2-22-6-7-9		Advance DB 5-15 - recover 5-15 & collect 4 GS at 1035
10			G	2-22-6-9-12		
			G	2-22-6-12-15		7/15/08
15			G	2-22-6-15-17		Advance DB 15-25
			G	2-22-6-17-19		recover 15-23 & collect 4 GS at 1415.
20			G	2-22-6-19-21		
			G	2-22-6-21-23		
						Advance DB 25-35,
25						∅ recovery -
30						
35			G	2-22-6-35-38.5		Advance DB 35-45
						recover 35-42 & collect 2 GS at 1530

Sample Summary

Page 2 of 3

Date 7/14/08 to 7/16/08

Well ID: C6202 | Well Name: 399-2-22 | Geologist: Joe Fitz

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Sample Type	Sample ID	Mass	Comments
40			G	2-22-G-38.5-42		7/16/08
						Advance DB 45-55 - recover 45-52 & collect SGS at 0730
45			G	2-22-G-45-47		
			G	2-22-G-47-49		
50			G	2-22-G-49.52		
						Advance DB 55-65 - recover 55-65 & collect 4 GS at 0800
55			G	2-22-G-55-56		
			G	2-22-G-56-59.5		
60			G	2-22-G-59.5-62		
			G	2-22-G-62-65		
65						Total Depth 65'

Sample Summary

Page 1 of 2

Date 7/8 to 7/8/08

Well ID: C6207 Well Name: 399 2-23 Geologist: Jeff H.

Depth (ft)	Lithologic Log (M / S / G)	Sample: Graphic	Type	ID	Mass	Comments
0			G	2-23-G-0-2		Advance DP 0-4'- split 3/4 cs recover 0-4', collect 2 GS at 0940
			G	2-23-G-2-4		
5			G	2-23-G-4-7		Advance DP 4-10' recover 4-10 & collect 2 GS at 0955
			G	2-23-G-7-10		
10			G	2-23-G-10-13		Advance DP 10-15, recover 10-14.5 & collect 2 GS at 1010
			G	2-23-G-13-14.5		
15			G	2-23-G-15-17.5		Advance DP 15-20 recover 15-20 & collect 2 GS at 1020.
			G	2-23-G-17.5-20		
20			G	2-23-G-20-22.5		Advance DP 20-25, recover 20-24.5 & collect 2 GS at 1045
			G	2-23-G-22.5-24.5		
25			G	2-23-G-25-28		Advance DP 25-35, recover 25-31 & collect 2 GS at 1055.
			G	2-23-G-28-31		
30						Advance DP 35-45, recover 35-42 & collect 2 GS at 1135
35			G	2-23-G-35-38.5		

Sample Summary

Page 2 of 2

Date 7/8 to 7/8/08

Well ID: C6207 | Well Name: 399-2-23 | Geologist: Tessa Buswell

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
40			G	2-23-G-38.5 #2		
45						Advance DB 45-55, no recovery.
50			G	2-23-G-50-55		
						Advance DB 50-60, recover 50-60, collect 3 GS @ 1315.
55			G	2-23-G-55-59		
				59-60 (2)		
60			G	2-23-G-~~55-59~~	7/8/08	
						Total Depth 60 Ft.

Sample Summary

Page 1 of 2

Date 5/23 to 6/2/08

Well ID: C6208 | Well Name: 399-2-24 | Geologist: Joe Fritz

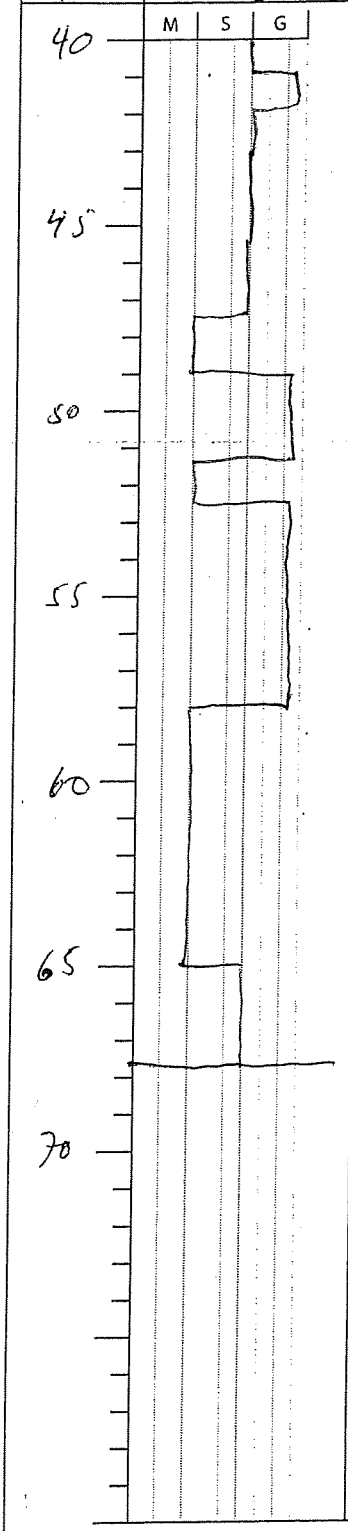
Depth (ft)	Lithologic Log (M S G)	Graphic	Type	ID	Mass	Comments
0						5/23/08
			C	2-24-C-0-1		Drive SS 0-5' - recov
			C	2-24-C-1-2		0-5' - collect 3 lexan
			C	2-24-C-2-3		liners at 0710.
5			C	2-24-C-5.5-6		Drive SS 5-10' - recover
			C	2-24-C-6-7		5.5-10' - collect 5 lexan
			C	2-24-C-7-8		liners at 0725.
			C	2-24-C-8-9		
			C	2-24-C-9-10		5/28/08
10			C	2-24-C-10-11		Drive SS 10-15' - recover
			C	2-24-C-11-12		5-10' - collect 5 lexan liners
			C	2-24-C-12-13		at 0830
			C	2-24-C-13-14		
			C	2-24-C-14-15		5/29/08
15						Replace OB
			G	2-24-G-15-18		Drive ~~SS~~ 15-18' - recover
						1 grab sample. depth material
						is from is estimated - backhoe
						has been worked much.
20						
			C	2-24-C-22-23		Drive SS 22-25 and recover
			C	2-24-C-23-24		23-24 - collect 2 lexan liners
25						at 1030.
			G	2-24-G-25-30		Drive SS 25-30 - ∅ recovery
						Drive 6" OB 25-30 + collect 1
						2 gal grab at 1245
30						5/30/08
			G	2-24-G-30-32		Drive Drive barrel, collect 3
			G	2-24-G-32-33.5		grab samples at 0805
			G	2-24-G-33.5-35		(30-35)
35						Push Drive barrel 35-40,
			G	2-24-G-35-36.5		collect 4 grab samples at 1310
			G	2-24-G-36.5-38		Push OB ~~up~~ 5/30/08
			G	2-24-G-38-39		
			G	2-24-G-39-40		
40						

Sample Summary

Page 2 of 2

Date 5/23 to 6/2/08

Well ID: C6208 | Well Name: 399-2-24 | Geologist: Griffith



Graphic	Type	ID	Mass	Comments
	G	2-24-G-40-40.8		Push OB (6") 40-43 at collect 4 grab samples at 1405-
	G	2-24-G-40.8-41.5		
	G	2-24-G-41.5-42.3		
	G	2-24-G-42.3-43		
	S	2-24-C-40-41		Sand flowing into borehole - top at 40 - push SS 40-45 - recover 40-43 & collect
	S	2-24-S-41-42		
	S	2-24-S-42-43		3 Lexan liners at 1520
	S	2-24-S-42-43		
	S	2-24-S-43-44		push SS 42-47 and
	S	2-24-S-44-45		collect 3 Lexan liners at 1605 - 42-48 recovery
	G	2-24-G-47-48.5	6/2/08	push 6" OB 43.5-48.5, collect
	G	2-24-G-48.3-49.1		grab 47-48.5 at 0855 - above
	C	2-24-C-49.1-50.1		that was clean-out *
	G	2-24-G-48.5-50		push 6" OB 48.5-52.5 - collect
	G	2-24-G-50-51.5		3 grabs at 1100 From 48.5-52.5
	G	2-24-G-51.5-52.5		
				SS 50-55' and recover
	C	2-24-C-50-51		50-54' - Collect 4 Lexan liners
	C	2-24-C-51-52		at 1305
	C	2-24-C-52-53		SS 55-60' - recover 6" slough
	C	2-24-C-53-54		SS 57.5-62.5 - recover 57.5-60'
	C	2-24-C-57.5-58		and collect 3 Lexan liners at 1500.
	C	2-24-C-58-59		
	C	2-24-C-59-60		Drive Barrel 58.5-65' and collect
				grab sample 60-65 at 1630.
	G	2-24-G-60-65		
				* SS 48.3-53.3 - recover 48.3 -
				50.1 and collect 2 Lexan liners at
				0935.
				Total Depth 67.5'

Sample Summary

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Date 07/22 to 07/25

Well ID: C6209 | Well Name: 399-2-25 | Geologist: S. Sexton

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
0			G	2-25-1G1-0-1.5		Sonic drilling w/ 6" db
						advance db 0-5, recover
			G	2-25-1G1-1.5-3		0-5 3 GS @ 0722
5			G	2-25-1G1-3-5		
			G	2-25-1G1-5-6		advance db 5-10, recover
			G	2-25-1G1-6-7		0-9.5, 4 GS @ 0730
			G	2-25-1G1-7-8		
			G	2-25-1G1-8-9.5		
10						
			G	2-25-1G1-10-12		advance db 10-15, recover 10-14.5 3 GS @ 0857
			G	2-25-1G1-12-13.5		
			G	2-25-1G1-13.5-14.5		
15						
			G	2-25-1G1-15-17.5		advance db 15-20, recover 15-20 3 GS @ 0906
			G	2-25-1G1-17.5-19		
20			G	2-25-1G1-19-20		
			G	2-25-1G1-20-21.5		advance db 20-25, recover
			G	2-25-1G1-21.5-23		20-24.5, 3 GS @ 0915
			G	2-25-1G1-23-24.5		
25						
			G	2-25-1G1-25-26.5		advance db 25-30, recover 25-30, 3 GS @ 1032
			G	2-25-1G1-26.5-28		
30			G	2-25-1G1-28-30		advance 4" split-spoon 30-35 recover 2' (30-32) 3 LL @ 1046
			GC	2-25-1C1-30		advance ss 30-35, recover 30-31.5
			GC	2-25-1C1-31		2 LL @ 1311
			GC	2-25-1C1-32		
35			GC	2-25-1C1-31		advance 6" db 35-45, recover
			GC	2-25-1C1-31.5		35-45, 5 GS @ 1346
			G	2-25-1G1-35-36.5		
			G	2-25-1G1-36.5-38		
			G	2-25-1G1-38-39.5		

Sample Summary

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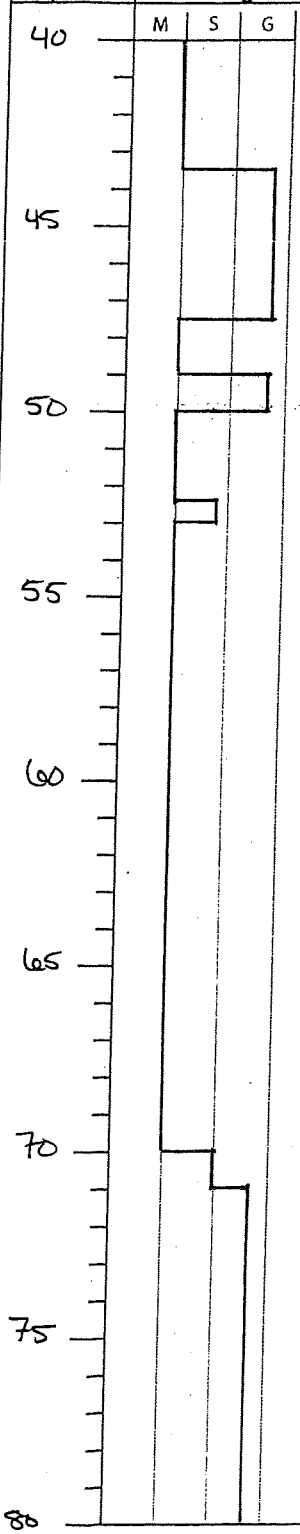
Date 07/22/08 to 07/25

Well ID: C6209 | Well Name: 399-2-25 | Geologist: S. Sexton



Graphic	Type	ID	Mass	Comments
	G	2-25-1G1-39.5-43.5		Sonic drilling w/ 6" db or 4" ss
	G	2-25-1G1-43.5-45		
	G	2-25-1G1-45-46		advance db 45-50, recover 45-
	G	2-25-1G1-46-47.5		50, 3 GS @ 1420
	G	2-25-1G1-47.5-50		
	C	2-25-1C1-50-50.5		advance ss 50-55, recover 50
	C	2-25-1C1-50.5-51.5		-54, 4 LL @ 1439
	C	2-25-1C1-51.5-52.5		
	C	2-25-1C1-52.5-53.5		
	C	2-25-1C1-56-57		advance ss ~~55-60~~ 55-60, recover ~~55~~ 56 BMS 7-22-08
	C	2-25-1C1-57-58		60, 4 LL @ 1514
	C	2-25-1C1-58-59		
	C	2-25-1C1-59-60		
	C	2-25-1C1-60-61		advance ~~casing~~ BMS 7-22-08 ss 60-65, recover
	C	2-25-1C1-61-62		60-65, 5 LL @ 1559
	C	2-25-1C1-62-63		
	C	2-25-1C1-63-64		
	C	2-25-1C1-64-65		
	C	2-25-1C1-65-66		advance ss 65-70, recover 65-
	C	2-25-1C1-66-67		70, 5 LL @ 1612
	C	2-25-1C1-67-68		
	C	2-25-1C1-68-69		
	C	2-25-1C1-69-70		07/23 ↓
	G	2-25-1G1-70-71		advance db 70-75, recover 70
	G	2-25-1G1-71-72.5		-75, 4 GS @ 1115
	G	2-25-1G1-72.5-74		
	G	2-25-1G1-74-75		
	G	2-25-1G1-75-77		advance db 75-85, recover 75-
	G	2-25-1G1-77-80		85, 4 GS @ 1257

Sample Summary

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Date 07/22 to 07/25

Well ID: C6209 | Well Name: 399-2-25 | Geologist: S. Sexton

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
80			G	2-25-1G1-80-82.5		sonic drilling w/ 6" db or 4" ss
			G	2-25-1G1-82.5-85		
85						
			G	2-25-1G1-85-86		advance db 85-90, recover 85-86
						1 GS @ 1543
						07/24 ↓
90			G	2-25-1G1-90-91.5		advance db 90-95 recover 90-
			G	2-25-1G1-91.5-93		95 4 GS @ 0646
			G	2-25-1G1-93-94		
			G	2-25-1G1-94-95		
95			G	2-25-1G1-95-96.5		advance db 95-100, recover 95-
			G	2-25-1G1-96.5-98		100 3 GS @ 0724
			G	2-25-1G1-98-100		
100			C	2-25-1G1-100-101		advance ss 100-102 recover 100-102
			C	2-25-1G1-101-102		2 LL @ 0810
105			G	2-25-1G1-105-106		advance db 105-110, recover
			G	2-25-1G1-106-107.5		105-110 4 GS @ 0904
			G	2-25-1G1-107.5-109		
			G/G	2-25-1G1-109-110		
110			G/C	2-25-1G1-110-111		advance ss 110-115, recover
			G/C	2-25-1G1-111-112		110-115 5 LL @ 0925
			G/C	2-25-1G1-112-113		
			G/C	2-25-1G1-113-114		
			G/C	2-25-1G1-114-115		
115			G	2-25-1G1-115-117		advance 115-121 (db), recover
						115-117 1 GS @ 1037

Sample Summary

Page SS 3-4 of 5

Date 07/22 to 07/25

Well ID: C6209 | Well Name: 399-2-25 | Geologist: S. Sexton

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
120			C	2-25-C-120-121		Sonic drilling w/ 6" db or 4" ss
			C	2-25-C-121-122		advance ss 121-125, recover
			C	2-25-C-122-123		121-125, 5 LL @ 1242
			C	2-25-C-123-124		
			C	2-25-C-124-125		
125			C	2-25-C-125-126		advance ss 125-130, recover
			C	2-25-C-126-127		125-130, 5 LL @ 1306
			C	2-25-C-127-128		
			C	2-25-C-128-129		
			C	2-25-C-129-130		07/25: 4" db or 4" ss ↓
130			G	2-25-G-130-131		advance db 130-135, recover
			G	2-25-G-131-132.5		130-135, 4 GS @ 1223
			G	2-25-G-132.5-133.5		
			G	2-25-G-133.5-135		
135			G	2-25-G-135-137		advance db 135-145, recover
						135-145, 5 GS @ 1249
			G	2-25-G-137-139		
140			G	2-25-G-139-141		
			G	2-25-G-141-143		
			G	2-25-G-143-145		
145			G	2-25-G-145-147		advance db 145-155, recover
						145-155 5 GS @ 1315
			G	2-25-G-147-149		
150			G	2-25-G-149-151		
			G	2-25-G-151-153		
			G	2-25-G-153-155		
155			G	2-25-G-155-156		advance db 155-163, recover
			G	2-25-G-156-158		155-163, 5 GS @ 1337
			G	2-25-G-158-160		
160						

Sample Summary

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Date 07/22 to 07/25

Well ID: C6209 | Well Name: 399-2-25 | Geologist: S. Sexton

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
160						Sonic drilling w/ 4" dlb or 4" ss
			G	2-25-161-160-161		
			G	2-25-161-161-162		
			G	2-25-161-163-164.5		advance 163-168, recover 163-166, 2 GS @ 1438
165			G	2-25-161-164.5-166		
			C	2-25-161-167-168		advance ss 168-170, recover 168-170, 3 LL @ 1514
			C	2-25-161-168-169		
170			C	2-25-161-169-170		
						Total Depth 171'
175						

Sample Summary

Page 1 of 2

Date 6/23 to 6/24/08

Well ID: C6210 | Well Name: 399-2-26 | Geologist: Joe Fitts

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	Sample ID	Mass	Comments
						6/23/08
0			G	2-26-G-0-2.5		Advance DB 0-5', recover 0-5' and collect 2 GS at 1510.
			G	2-26-G-2.5-5		
5			G	2-26-G-5-6.5		Advance DB 5-10' and recover 5-10'- collect 4 GS at 1515.
			G	2-26-G-6.5-8		
			G	2-26-G-8-9.5		
10			G	2-26-G-9.5-10		
			G	2-26-G-10-12.5		Advance DB 10-15, recover 10-15 and collect 2 GS at 1540
			G	2-26-G-12.5-15		
15			G	2-26-G-15-16		Advance DB 15-25 recover 15-21 & collect 3 GS at 1550
			G	2-26-G-16-18		
20			G	2-26-G-18-21		6/24/08
						Advance DB 25-35' - recover 25-34 & collect 4 GS at 0720
25			G	2-26-G-25-27		
			G	2-26-G-27-30		
30			G	2-26-G-30-32		
			G	2-26-G-32-34		
						Advance DB 35-45' - recover 35-47' and collect 4 GS at 0805.
35			G	2-26-G-35-37		
			G	2-26-G-37-39		

Sample Summary

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Date 6/23 to 6/24/09

Well ID: C6210 | Well Name: 399-2-26 | Geologist: Jay Fritz

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
40						
			G	2-26-G-39-41		
			G	2-26-G-41-43		
45						Advance OB 45-55-0 recovery
						Advance OB 52-60' - recover 52-60 & collect 3 GrSat 0830
50						
			G	2-26-G-52-54		
			G	226-G-54-57		
55						
						Advance OB 60-62, recover 60-62 & collect 1 GrSat 0905.
			G	2-26-57-60		
60						
			G	2-26-60-62		
						Total Depth 62'
65						

Sample Summary

Page 1 of 2

Date 7/17 to 7/18/01

Well ID: C621 | Well Name: 399-2-27 | Geologist: Joe Fitz

Depth (ft)	Lithologic Log M	S	G	Graphic	Sample Type	ID	Mass	Comments
0					G	2-27-G-00-2.5		Advance DB 0-5' - recover 0-5' & collect 2 GS at 1450
					G	2-27-G-2.5-5		
5					G	2-27-G-5-8		Advance DB 5-15 recover 5-15 & collect 4 GS at 1500
					G	2-27-G-8-11		
10					G	2-27-G-11-13		
					G	2-27-G-13-15		
15					G	2-27-G-15-17		Advance DB 15-25 recover 15-23 & collect 3 GS at 1525
					G	2-27-G-17-20		
20					G	2-27-G-20-23		
								7/18/01
25					G	2-27-(G)-25-27		advance db 25-35, recover 25-33, 4 samples @ 0733
					G	2-27-(G)-27-29		
30					G	2-27-(G)-29-31		
					G	2-27-(G)-31-33		
35					G	2-27-(G)-35-37		advance 35-45 recover 35-37 1 GS @ 0750

Sample Summary

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Date 7/17 to 07/18/08

Well ID: C6211 | Well Name: 399-2-27 | Geologist: Sean Sexton

Depth (ft)	Lithologic Log (M / S / G)	Sample: Graphic	Type	ID	Mass	Comments
40						
45			G			no recovery 45-55'
50						
55			G	2-27-161 55-57		advance db 55-65' recover 55-65' 5 samples @ 0825
			G	2-27-161-57-59		
60			G	2-27-161-59-61		
			G	2-27-161-61-63		
			G	2-27-161-63-65		
65						

Sample Summary

Page 1 of 2

Date 6/27 to 6/30/08

Well ID: C6212 | Well Name: 394-2-28 | Geologist: Joe Fitz

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
0			G	2-28-G-0-2		
						Advance DB 0-5', recover
			G	2-28-G-2-4		0-4' & collect 2 GS at
						1420
5						
			G	2-28-G-5-7.5		Advance DB 5-10', recover
						5-10' & collect 2 GS at 1430
			G	2-28-G-7.5-10		
10						
			G	2-28-G-10-12.5		Advance DB 10-15' recover
						10-14.5 & collect 2 GS at
			G	2-28-G-12.5-15		1445
15						
			G	2-28-G-15-17		Advance DB 15-20 recover
						15-19.5 & collect 2 GS
			G	2-28-G-17-19.5		at 1455
20						
			G	2-28-G-20-23		Advance DB 20-25 - recover
						20-24.5 & collect 2 GS.
			G	2-28-G-23-24.5		at 1515.
25						
			G	2-28-G-25-27		Advance DB 25-35.
						recover 25-35 & collect
			G	2-28-G-27-29		5 GS at 1550
			G	2-28-G-29-31		
30						
			G	2-28-G-31-35		
			G	2-28-G-35-35		6/30/08
35						Advance DB 35-45, recover
			G	2-28-16-35-37.5		35-40, take 2 GS @ 0804
			G	2-28-16-37.5-40		

Sample Summary

Page 2 of 2

Date 6/27 to 6/30/08

Well ID: C6212 | Well Name: 399-2-22 | Geologist: Joe Fitz

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
40						Sonic Drilling w/6" drive barrel (DB)
						DB 45-55', recover 45-49
						2 samples @ 0848
45			G	2-28-16I-45-47		
			G	2-28-16I-47-49		
50						
55			G	2-28-16I-55-56		DB 55-60, recover 55-60,
			G	2-28-16I-56-57		5 GS taken @ 0859
			G	2-28-16I-57-58		
			G	2-28-16I-58-59		
			G	2-28-16I-59-60		
60			G	2-28-16I-60-61		DB 60-65, recover 60-65,
			G	2-28-16I-61-63		3 samples taken @ 0917
			G	2-28-16I-63-65		
65						
						-Total Depth 65 ft-

Sample Summary

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Date 6/16 to 6/26/09

Well ID: C6216 | Well Name: 399-7-29 | Geologist: Joe Fritz

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
0			G	2-29-G-0-3'		Advance DB 0-3' recover 0-3' & collect 1 GS at 0805
			G	2-29-G-3-5		Advance DB 3-5. recover 3-5 & collect 1 GS at 0815
5			G	2-29-G-5-7.5		
			G	2-29-G-7.5-10		Advance DB 5-10' - recover 5-10 & collect 2 GS at 0818
10			G	2-29-G-10-12		Advance DB 10-15 recover 10-14.5 & collect 2 GS at 0830.
			G	2-29-G-12-14.5		
15			G	2-29-G-15-17.5		Advance DB 15-20 recover 15-20 & collect 2 GS at 0840.
			G	2-29-G-17.5-20		
20			G	2-29-G-20-22.5		Advance DB 20-25 recover 20-25 & collect 2 GS at 0905
			G	2-29-G-22.5-25		
25			G	2-29-G-25-27.5		Advance DB 25-35. recover 25-30 & collect 2 GS at 0940
			G	2-29-G-27.5-30		
30						Advance DB 30-35 (cleanout) & recover 30-33 - collect 1 GS at 1015.
			G	2-29-G-30-33		
35						Advance DB 35-45, recover 35-41 & collect 3 GS at 1045
			G	2-29-G-35-37		
			G	2-29-G-37-39		

Sample Summary

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Date 6/26 to 6/26/08

Well ID: C6216 | Well Name: 399-2-29 | Geologist: Jeff Fitts

Depth (ft)	Lithologic Log M	S	G	Graphic	Sample Type	Sample ID	Mass	Comments
40					G	2-29-G-39-41		
45					G	2-29-G-45-47.5		Advance DB 45-55 & recover 45-53', collect 3 GS at 1105
					G	2-29-G-47.5-50		
50					G	2-29-G-50-53		
55					G	2-29-G-55.5-58		Advance DB 55-60, recover 2' and collect 2 GS at 1120
					G	2-29-G-58-60		
60								Total Depth 61.5'

Sample Summary

Page 1 of 2

Date 07/24 to 7/25/08

Well ID: C6217 | Well Name: 399-2-30 | Geologist: S. Sexton

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
0						Sonic drilling w/ 6" db
			G	2-30-1G1-0-1		advance db 0-5, recover 0-5,
			G	2-30-1G1-1-2		4 GS @ 1503
			G	2-30-1G1-2-3		
			G	2-30-1G1-3-5		
5						
			G	2-30-1G1-5-6		advance 5-10, recover 5-9.5'
			G	2-30-1G1-6-7		4 GS @ 1509
			G	2-30-1G1-7-8.5		
			G	2-30-1G1-8.5-10		
10						
			G	2-30-1G1-10-11		advance 10-15, recover 10-15,
			G	2-30-1G1-11-13.5		3 GS @ 1530
			G	2-30-1G1-13.5-15		
15						
			G	2-30-1G1-15-16.5		advance 15-20, recover 15-20,
			G	2-30-1G1-16.5-18		4 GS @ 1536
			G	2-30-1G1-18-19		
			G	2-30-1G1-19-20		
20			G	2-30-1G1-20-21		advance 20-25, recover 20-25,
			G	2-30-1G1-21-23		3 GS @ 1600
			G	2-30-1G1-23-25		07/25 ~~07/24~~ ↓ SMS 7-25-08
25			G	2-30-1G1-25-26.5		advance db 25-35, recover 25-30, 3 GS @ 0654
			G	2-30-1G1-26.5-28		
30			G	2-30-1G1-28-30		
35						
			G	2-30-1G1-35-37		advance db 35-45, recover 35-41, 3 GS @ 0735
			G	2-30-1G1-37-39		
			G	2-30-1G1-39-41		
40						

Sample Summary

Page 2 of 2

Date 07/24 to 07/25

Well ID: C6217 | Well Name: 399-2-30 | Geologist: S. Sexton

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Sample Type	Sample ID	Mass	Comments
40						Sonic drilling w/ 6" dia or 4" ss
45			G	2-30-1G1-45-47		advance 45-55 recover 45-55
			G	2-30-1G1-47-48		6 GS @ 0754
			G	2-30-1G1-48-49		
			G	2-30-1G1-49-50		
50			G	2-30-1G1-50-52		
			G	2-30-1G1-52-55		
55			GC	2-30-1C1-55-56		advance SS 55-60, recover
			GC	2-30-1C1-56-57		55-60, 5 LL @ 0825
			GC	2-30-1C1-57-58		
			GC	2-30-1C1-58-59		
			GC	2-30-1C1-59-60		
60						
						Total Depth 64 Ft.
65						

Sample Summary

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Date 6/19 to 6/20/08

Well ID: C6218 | Well Name: 399-2-31 | Geologist: Joe Fritts

Depth (ft)	Lithologic Log (M S G)	Graphic	Sample Type	Sample ID	Mass	Comments
						6/19/08
0			G	2-31-G-0-2		Advance DB 0-10' - recover
			G	2-31-G-2-3.5		0-7' & collect 4 GS at
			G	2-31-G-3.5-5		1345
			G	2-31-G-5-7		
5						Advance DB 10-15' - recover
						10-14 & collect 2 GS
						at 1410
10			G	2-31-G-10-12		
			G	2-31-G-12-14		
15			G	2-31-G-15-16		Advance DB 15-25' - recover
			G	2-31-G-16-18		15-23 & collect 5 GS at
				2		1510
			G	2-31-G-18-19.5		
20			G	2-31-G-19.5-21		
			G	2-31-G-21-23		6/20/08
25			G	2-31-G-25-27.5		Advance DB 25-35, recover
			G	2-31-G-27.5-30		25-30 & collect 2 GS at
						0735
30			G	2-31-G-30-32.5		Advance DB 30-35 (cleanout)
			G	2-31-G-32.5-35		recover 30-35 & collect 2
						GS at 0800
						45 JR 6/20/08
35			G	2-31G-35-37		Advance DB 35-45, recover
						35-45 & collect 4 GS
			G	2-31-G-37-39		at 0820

Sample Summary

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Date 6/19 to 6/20/08

Well ID: C6218 Well Name: 399-2-31 Geologist: Joe Fritz

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	Sample ID	Mass	Comments
40						6/20/08 cont'd.
			G	2-31-G-39-41		Advance OB 35-45, recover 35-43 & collect 4 GS at 0820.
			G	2-31-G-41-43		
45			G	2-31-G-45-47		Advance OB 45-55 - recover 45-53 & collect 4 GS at 0940
			G	2-31-G-47-49		
50			G	2-31-G-49-51		
			G	2-31-G-51-53		
						Advance OB 55-60.5 & collect 4 GS at 1050 (recover 55-60.5)
55			G	2-31-G-55-56.5		
			G	2-31-G-56.5-58		
			G	2-31-G-58-59.5		
			G	2-31-G-59.5-60.5		
60				Total Depth		63'
65						

Sample Summary

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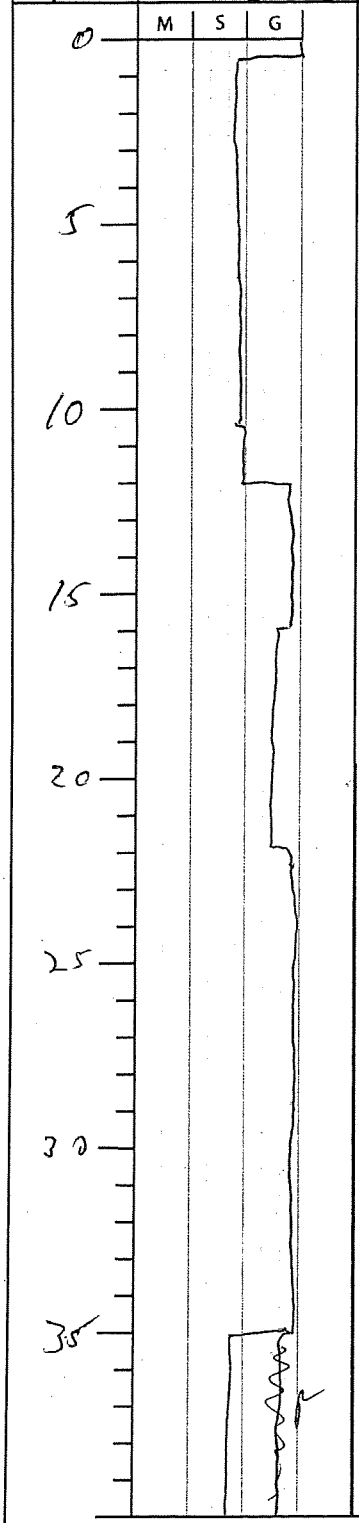
Date 7/10/09 to 7/10/09

Well ID: C6194 | Well Name: 319-J-23 | Geologist: Joe Fitz



Graphic	Type	ID	Mass	Comments
	G	J-23-6-0-2.5	5	Advance DB 0-5' - recover 0-5' & collect 2 GS at 1200
	G	J-23-6-2.5-5		
	G	J-23-6-5-7.5		Advance DB 5-10' recover 5'-10' & collect 2 GS at 1205
	G	J-23-6-7.5-10		
	G	J-23-6-10-12.5	5	Advance DB 10-15' recover 10-15' & collect 2 GS at 1220.
	G	J-23-6-12.5-15		
	G	J-23-6-15-17.5		Advance DB 15-20' recover 15-17.5' & collect 1 GS at 1230
	G	J-23-6-20-22		Advance DB 20-25' recover 20-24' & collect 2 GS at 1300
	G	J-23-6-22-24		
	G	J-23-6-25-27		Advance DB 25-35' recover 25-29' & collect 2 GS at 1310
	G	J-23-6-27-29		
	G	J-23-6-30-35		Advance DB 25-35' (clean-out) recover 5' & collect 1 GS at 1340
	G	J-23-6-35-37		Advance DB 35-45' recover 35-41.5' & collect 3 GS at 1355
	G	J-23-6-37-39.5	5	

Sample Summary

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Date 7/10/08 to 7/10/08

Well ID: C6194 | Well Name: 399-3-23 | Geologist: Joe Fritts

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Sample Type	Sample ID	Sample Mass	Comments
40			G	3-23-G-39.5-41.5		
						Advance DB 35-45 - recover 35-41.5 & collect 3 GS at 1355
45						
						Advance DB 45-55 - recover ≈ 47-54 & collect 4GS at 1425
			G	3-23-G-47-49		
50			G	3-23-G-49-50.5		
			G	3-23-G-50.5-52.5		
			G	3-23-G-52.5-54		
55			G	3-23-G-55-57.5		Advance DB 55-60 - recover 55-61 & collect 3 GS at 1440
			G	3-23-G-57.5-59.5		
60			G	3-23-G-59.5-61		
						Total Depth 65 Ft.
65						

Sample Summary

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Date 7/9/08 to 7/10/08

Well ID: C6199 | Well Name: 399-3-24 | Geologist: Joe Fitz

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
0			~~G~~	~~0-2 7/9/08~~		
			G	3-24-6-0-2.5		Advance DB 0-5', recover 0-5' & collect 2 GS at 1525
5			G	3-24-6-2.5-5		
			G	3-24-6-5-7.5		Advance DB 5-10' recover 5-10' & collect 2 GS at 1535
			G	3-24-6-7.5-10		
10			G	3-24-6-10-12.5		Advance DB 10-15, recover 10-15 & collect 2 GS at 1545
			G	3-24-6-12.5-15		
						7/10/08
15						Advance ~~DB 15-0~~ DB 15-20'
			G	3-24-6-15-17		recover 15-19.5 & collect 2 GS at 0800
			G	3-24-6-17-19.5		
20			G	3-24-6-20-22		Advance DB 20-25, recover 20-24 & collect 2 GS at 0825
			G	3-24-6-22-24		
25			G	3-24-6-25-27		Advance DB 25-35 recover 25-29 & collect 2 GS at 0840
			G	3-24-6-27-29		
30						Advance DB 25-35 (clean-out) recover ~ 4' & collect ~~at 5~~ 7/10/08 a GS at 0900
			G	3-24-6-30-35		
35						Advance DB 35-45' recover 2' & collect 1 GS at 0922
				7/10/08		
			G	3-24-6-~~30-35~~ -35-45		
40						

Sample Summary

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Date 7/10/08 to 7/10/08

Well ID: C6199 | Well Name: 399-3-24 | Geologist: Jaeger, A.

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Sample Type	Sample ID	Mass	Comments
40						
45						Advance DB 45-55 - recover 5' - wash to determine depth - collect 1 GS at 0935 (silt - so estimate silt at 53')
			G	3-24-G-45-55		
50						
						Advance DB 55-60 - recover 57-60' & collect 3 GS at 0950
55			G	3-24-G-54-56		
			G	3-24-G-56-58		
			G	3-24-G-58-60		
60						
						Total Depth 65'
65						

Sample Summary

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Date 06/16 to 6/17/08

Well ID: C6200 | Well Name: 399-3-25 | Geologist: SEAN SEXTON

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
0			C	3-25-/c/-0-1		06/16/08 Sonic 4" core barrel w/ lexan liners
			C	3-25-/c/-1-2		advance 4" core barrel 0-5'
			C	3-25-/c/-2-3		recover 0-4.5', 5 samples taken
			C	3-25-/c/-3-4		@ 0910
5			C	3-25-/c/-4-4.5		
			C	3-25-/c/-5-6		advance core 5-10', recover
			C	3-25-/c/-6-7		5-8', 3 samples @ 0930
			C	3-25-/c/-7-8		
10						
			C	3-25-/c/-10-11		advance split spoon 10-15'
			C	3-25-/c/-11-12		recover 10-12', 2 samples
						taken @ 1000
15			C	3-25-/c/-15-16		advance split spoon 15-20'
			C	3-25-/c/-16-17		recover 15-20, 5 samples
			C	3-25-/c/-17-18		taken @ 1010
			C	3-25-/c/-18-19		
			C	3-25-/c/-19-20		
20						
			C	3-25-/c/-20-21		advance s.s. 20-25', recover
			C	3-25-/c/-21-22		20-23' 3 samples @ 1110
			C	3-25-/c/-22-23		
25			C	3-25-/c/-25-25.7		advance s.s. 25-30', recover
			C	3-25-/c/-25.7-26.7		25-27.4' 3 samples @ ~~1112~~ 1120
			C	3-25-/c/-26.7-27.4		
30			C	3-25-/c/-30-31		advance split spoon 30-35'
			C	3-25-/c/-31-32		recover 30-34' 4 samples
			C	3-25-/c/-32-33		taken @ 1250
			C	3-25-/c/-33-34		
						Advance SS 35-40 - recover
35			C	3-25-C-35-36		35-38.8 & collect 4 LL at
			C	3-25-C-36-37		1335.
			C	3-25-C-37-38		
			C	3-25-C-38-38.8		
40						

Sample Summary

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Date 6/16 to 6/17/08

Well ID: C6200 | Well Name: 399-3-25 | Geologist: S Sexton, J Fritz

Depth (ft)	Lithologic Log (M S G)	Graphic	Type	ID	Mass	Comments
40						06/16/08 Sonic drill method 4" split spoon(ss) 6" drive barrel(db)
			G	3-25-/G/-40-42.5		
			G	3-25-/G/-42.5-45		advance db 40-45', recover 40-45', 2 grab samples @ 1455
45						
			C	3-25-/C/-45-45.8		advance ss 45-50', recover
			C	3-25-/C/-45.8-46.8		45-46.8, 2 core samples @ 1505
50						
			C	3-25-/C/-50-51		advance split spoon 50-55,
			C	3-25-/C/-51-52		recover 50-52', 2 samples taken @ 1530
						6/17/08
55			C	3-25-C-55-56		Advance SS 55-60 recover
			C	3-25-C-56-57		55-60 & collect SLL at
			C	3-25-C-57-58		1010.
			C	3-25-C-58-59		
			C	3-25-C-59-60		
60			C	3-25-C-60-61		Advance SS 60-65 recover
			C	3-25-C-61-62		60-65 & collect SLL at 1110
			C	3-25-C-62-63		
			C	3-25-C-63-64		
			C	3-25-C-64-65		
65						Total Depth 65 ft.

Sample Summary

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Date 5/14/08 to 5/15/08

Well ID: C6203 | Well Name: 399-3-26 | Geologist: Joe Fitts

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
0						5/14/08
						Sonic drilling - 4" SS and 6" dive barrel.
			C	3-26-C-1.5-2		
			C	3-26-C-2-3		SS 0-5' - recovery 1.5-5'
			C	3-26-C-3-4		4 sample lexon liners (0745)
			C	3-26-C-4-5		
5						6" barrel 5-10' collect 2 gal sample
			G	3-26-G-5-10		(0810) - 1 sample - grab.
						6" barrel 10-15' collect (2) 2 gallon
						grab sample (0820)
10						
			G	3-26-G-10-12.5		
			G	3-26-G-12.5-15		
						4" SS 15-20' - recovered
						15.2-18 ft. (0905)
15			C	3-26-C-15.2-16		
			C	3-26-C-16-17		4" SS 17-22 recovered
			C	3-26-C-17-18		17-22 - lost 21-22 (silt-liner
						gone). (0915)
			C	3-26-C-17-19		17-19 likely some sloughing
20			C	3-26-C-19-20		
			C	3-26-C-20-21		4" SS 25-30 ft. recovered
						25-26.8 (1055) collect 2
			C	3-26-C-25-25.8		lexon liner sampler
			C	3-26-C-25.8-26.8		
25						
						4" SS 30-35 recovered
						30-32' (1110)
30			C	3-26-C-30-31		collect 2 lexon liner samplers.
			C	3-26-C-31-32		
						5/15/08
						4" SS 35-40 - recovered
			C	3-26-C-35-35.8		35-36.8', collect 2
35			C	3-26-C-35.8-36.8		lexon liners at 0810
40						

Sample Summary

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Date 5/15 to 5/15/09

Well ID: C6203 | Well Name: 399-3-26 | Geologist: Joe Fritz

Depth (ft)	Lithologic Log (M S G)	Graphic	Type	ID	Mass	Comments
40						5/15/09
			C	3-26-C-40-41		4" SS 40-45' - Recovered
			C	3-26-C-41-42		40-43', collect 3 Lexan
			C	3-26-C-42-43		liners at 0825
45						4" SS 45-50 Recovered
			C	3-26-C-45-45.4		45-47.4, collect 3 Lexan
			C	3-26-C-45.4-46.4		liners at 0925
			C	3-26-C-46.4-47.4		
						4" SS 50-55ft - recovered
50						50-55ft, collect 5 Lexan
			C	3-26-C-50-51		liners at 0945
			C	3-26-C-51-52		
			C	3-26-C-52-53		
			C	3-26-C-53-54		4" SS, 55-60' recovered
55			C	3-26-C-54-55		55-60', but 59-60' core
			C	3-26-C-55-56		ruined by bent over liner -
			C	3-26-C-56-57		collect 4 Lexan liners at 1025
			C	3-26-C-57-58		
			C	3-26-C-58-59		
60						
65				Total Depth 66 ft		

Sample Summary

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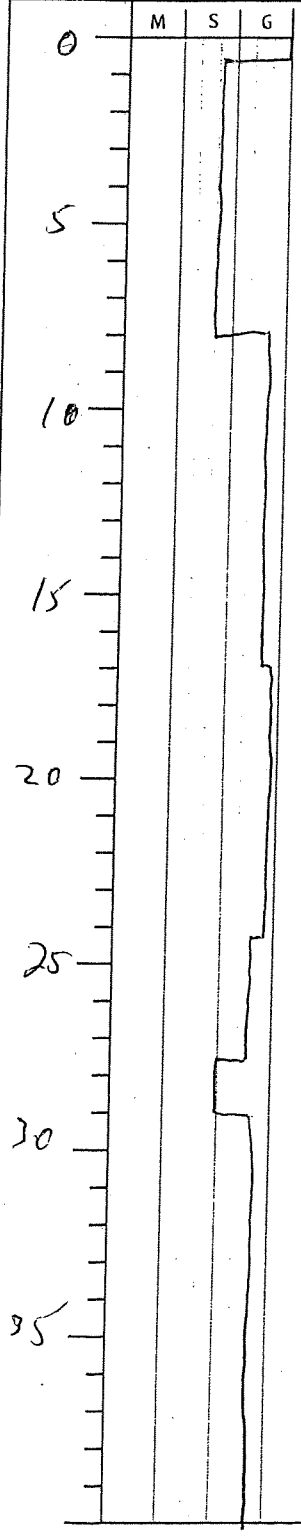
Date 7/9/08 to 7/9/08

Well ID: C6204 | Well Name: 399-3-27 | Geologist: Jae Frith



Depth (ft)	Lithologic Log (M S G)	Graphic	Sample Type	Sample ID	Mass	Comments
0						
			G	3-27-G-0-3'		Advance DB 0-3', recover 0-3', & collect 1GS at 1025
			G	3-27-G-3-5		
5			G	3-27-G-5-7.5		Advance DB 3-5' - recover 3-5' & collect 1GS at 1030
			G	3-27-G-7.5-10		Advance DB 5-10' - recover 5-10' & collect 2GS at 1040
10			G	3-27-G-10-13		
			G	3-27-G-13-15		Advance DB 10-15, recover 10-15 & collect 2GS at 1100
15			G	3-27-G-15-16.5		Advance DB 15-20, recover 15-18.5 & collect 2GS at 1105
			G	3-27-G-16.5-18.5		
20			G	3-27-G-20-22		Advance DB 20-25 recover 20-24 & collect 2GS at 1215
			G	3-27-G-22-24		
25			G	3-27-G-25-27.5		Advance DB 25-35' - recover 25-30' - collect 2GS at 1230.
			G	3-27-G-27.5-30		
30			G	3-27-G-30-35		Advance DB 30-35' - recover 30-35 & collect 1GS (of clean-out) at 1235.
35			G	3-27-G-35-45		Advance DB 35-45 recover 1' & collect 1GS at 1320.

Sample Summary

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Date 7/9/08 to 7/9/08

Well ID: C6204 | Well Name: 399-3-27 | Geologist: Joe Fritz

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Sample Type	Sample ID	Mass	Comments
40						
45			G	3-27-G-45-48		Advance DB 45-55' recover 45-55 & collect 4GS at 1340
			G	3-27-G-48-50.5		
50			G	3-27-G-50.5-53.5		
			G	3-27-G-53.5-55		
55						
60						Total Depth 62'
65						

Sample Summary

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Date 7/8/08 to 7/9/08

Well ID: C6205 | Well Name: 399-3-28 | Geologist: T. Buswell

Depth (ft)	Lithologic Log (M S G)	Graphic	Type	ID	Mass	Comments
0						Advance DB 0-5' bgs, 0-5' recov.
			G	3-28-G-0-2.5		collect 2 GS @ 1445
			G	3-28-G-2.5-5		
5			G	3-28-G-5-8.5		Advance DB 5-10' bgs, 5-10' recovery, collect 2 GS @ 1450.
			G	3-28-G-8.5-10		
10			G	3-28-G-10-12		Advance DB 10-15' bgs, 10-14' recovery, collect 2 GS @ 1535.
			G	3-28-G-12-14		
15			G	3-28-G-15-16.5		
			G	3-28-G-16.5-18		Advance DB 15-20' bgs, 15-20' recovery, collect 3 GS @ 1545.
			G	3-28-G-18-20		
20			G	3-28-G-20-21.5		7/9/08
			G	3-28-G-21.5-23.5		Advance DB 20-25, recover 20-22.5 & collect 2 GS at 0700
25			G	3-28-G-25-28		
			G	3-28-G-28-30		Advance DB 25-35 recover 25-34 + collect 4 GS at 0710
30			G	3-28-G-30-32		
			G	3-28-G-32-34		
35			G	3-28-G-35-38		Advance DB 35-45, recover 35-40.5 & collect 2 GS at 0800
			G	3-28-G-38-40.5		

Sample Summary

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Date 7/8/08 to 7/9/08

Well ID: C6205 Well Name: 399-3-28 Geologist: T. Buswell

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	Sample ID	Mass	Comments
40						Advance DB 45-55, recover 45-49.5 & collect 1 GS at 0815
45			G	3-28-6-45-49.5		
50						Advance DB 55-60, recover 55-60 & collect 2 GS at 0815.
55			G	3-28-6-55-55.5		
			G	3-28-6-55.5-60		
60			G	3-28-6-60-62.5		Advance DB 60-65, recover 60-65 & collect 2 GS at 0815
			G	3-28-6-62.5-65		Total Depth 64.5'
65						

Sample Summary

Page 1 of 2

Date 6/30 to 7/1/08

Well ID: C6206 | Well Name: 399-3-29 | Geologist: Jaeff H

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
0			G	3-29-G-0-2		Advance Drive barrel (DB) 0-4 recover 0-4 & collect 2 GS at 1125
			G	3-29-G-2-4		
5			G	3-29-G-4-6		Advance DB 4-10, recover 4-10 & collect 3 GS at 1130
			G	3-29-G-6-8		
			G	3-29-G-8-10		
10						Advance DB 10-15 recover 10-15 & collect 2 GS at 1250
			G	3-29-G-10-13		
			G	3-29-G-13-15		
15						Advance DB 15-20, recover 15-20 & collect 2 GS at 1300
			G	3-29-G-15-17.5		
			G	3-29-G-17.5-20		
20			G	3-29-G-20-22.5		Advance DB 20-25 recover 20-25 & collect 2 GS at 1345
			G	3-29-G-22.5-25		
25			G	3-29-G-25-29		Advance DB 25-33, recover 25-32 & collect 2 GS at 1430 Top 2' slough.
			G	3-29-G-29-32		
30						
35			G	3-29-G-35-37.5		Advance DB 35-45 recover 35-42.5 & collect 3 GS at 1530
			G	3-29-G-37.5-40		

Sample Summary

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Date 6/30 to 7/1/08

Well ID: C6206 | Well Name: 399-3-29 | Geologist: Dan Smith

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
40			G	3-29-6-40-42.5		
45			G	3-29-6-45-47.5		Advance OB 45-55 recover 45-55 & collect 4 GS at 1550
			G	3-29-6-47.5-50		
50			G	3-29-6-50-52.5		
			G	3-29-6-52.5-55		— 7/1/08 —
55			G	3-29-6-55-56.5		Advance OB 55-60 recover 55-61 & collect 3 GS at 0705. (Note - actually recovered 60' - but sampled 55-61)
			G	3-29-6-56.5-59		
60			G	3-29-6-59-61		
65						Total Depth 64FT

Sample Summary

Page 1 of 2

Date 6/26 to 6/27/08

Well ID: C6213 | Well Name: 399-3-30 | Geologist: Joe Fritz

Depth (ft)	Lithologic Log (M S G)	Graphic	Type	Sample ID	Mass	Comments
0			G	3-30-G-0-2.5		Advance DB 0-5' - recover 0-5' & collect 2 GS at 1325
			G	3-30-G-2.5-5		
5			G	3-30-G-5-6.5		Advance DB 5-10', recover 5-10' & collect 3 GS at 1330
			G	3-30-G-6.5-8		
			G	3-30-G-8-10		
10			G	3-30-G-10-12		Advance DB 10-15, recover 10-14 & collect 2 GS at 1345,
			G	3-30-G-12-14		
15			G	3-30-G-15-17		Advance DB 15-20, recover 15-19.5 & collect 2 GS at 1355
			G	3-30-G-17-19.5		
20			G	3-30-G-20-22.5		Advance DB 20-25 - recover 20-25 & collect 2 GS at 1415
			G	3-30-G-22.5-25		
25			G	3-30-G-25-27		Advance DB 25-35, recover 25-31, collect 3 GS at 1455
			G	3-30-G-27-29		
			G	3-30-G-29-31		
30			G	3-30-G-30-32.5		Advance DB 25-35 (drive out) - collect 2 GS - recover 27-35, collect 2 GS at 1520
			G	3-30-G-32.5-35		
35			G	3-30-G-35-37		Advance DB 35-45' collect 3 GS at 1545
			G	3-30-G-37-39		

Sample Summary

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Date 6/26 to 6/27/08

Well ID: C6213 Well Name: 399-3-30 Geologist: Jeff Fritz

Depth (ft)	Lithologic Log M	S	G	Graphic	Sample Type	ID	Mass	Comments
40					G	3-30-G-39-41.5		6/27/08
45					G	3-30-G-45-47.5		Advance DB 45-55 recover 45-50 collect 2 GS at 0710
					G	3-30-G-47.5-50		
50								
55					G	3-30-G-55.5-57		Advance DB 55-60 - recover 8' - collect 2 GS at 0720
					G	3-30-G-57-60		
60								Total Depth 61.5'
65								

Sample Summary

Page 1 of 2

Date 6/20 to 6/23/08

Well ID: C6214 Well Name: 399-3-31 Geologist: Duff, Hs

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
						6/20/08
0			G	3-31-G-0-2		Advance DB 0-5', recover 0-4 & collect 2 GS at 1485
			G	3-31-G-2-4		
5			G	3-31-G-5-6		Advance DB 5-10', recover 5-10' & collect 3 GS at 1510
			G	3-31-G-6-8		
			G	3-31-G-8-10		Advance DB 10-15', recover 4.8' & collect 4 GS at 1535
10			G	3-31-G-10-11.5		
			G	3-31-G-11.5-12.5		
			G	3-31-G-12.5-13.5		
			G	3-31-G-13.5-14.5		
15			G	3-31-G-15-17		Advance DB 15-25, recover 5.5 & collect 3 GS at 1545
			G	3-31-G-17-19		
			G	3-31-G-19-20.5		
20			G	3-31-G-20-22		Advance DB 20-25, recover 5' and collect 3 GS at 1600
			G	3-31-G-22-24		
			G	3-31-G-24-25		6/23/08
25			G	3-31-G-25-27		Advance DB 25-35 recover 25-35 & collect 4 GS at 0810
			G	3-31-G-27-29		
30			G	3-31-G-29-33		
			G	3-31-G-33-35		
35			G	3-31-G-35-37		Advance DB 35-45 - recover 35-43.5 & collect 4 GS at 0930.
			G	3-31-G-37-39		
40						

Sample Summary

Page 2 of 2

Date 6/20 to 6/23/08

Well ID: C6714 | Well Name: 399-3-31 | Geologist: Jaeflis

Depth (ft)	Lithologic Log			Sample				Comments
	M	S	G	Graphic	Type	ID	Mass	
40					G	3-31-6-39-40.5		
					G	3-31-6-40.5-42.5		Advance DB 45-55' - ϕ recovery
45								
		ϕ recovery						
50								Advance DB 50-55 - ϕ recovery
								Advance DB 55.5-61 - recovery 55.5-61 & collect IGS at 1030'
55					G	3-31-6-55.5-57.5		
					G	3-31-6-52.5-59.5		
					G	3-31-6-59.5-61		
60								
						Total Depth 63'		
65								

Sample Summary

Page 1 of 2

Date 07/18/08 to 07/18/08

Well ID: C6215 | Well Name: 399-3-32 | Geologist: S. Sexton

Depth (ft)	Lithologic Log (M / S / G)	Sample: Graphic	Type	ID	Mass	Comments
0						(6" drive barrel (db)
			G	3-32-16I-0-1		
			G	3-32-16I-1-3		advance db 0-5' recover 0-5
			G	3-32-16I-3-5		3 GS taken @ 1004
5			G	3-32-16I-5-7		advance db 5-10 recover 5-10
			G	3-32-16I-7-9		3 GS @ 1030
			G	3-32-16I-9-10		
10						
15			G	3-32-16I-15-16		advance 15-25 recover 15-20'
			G	3-32-16I-16-17		3 GS @ 1048
			G	3-32-16I-17-20		
20						
25			G	3-32-16I-25-26		advance db 25-35' recover
			G	3-32-16I-26-28		25-31 5 GS @ 1128
			G	3-32-16I-28-29		
			G	3-32-16I-29-30		
30			G	3-32-16I-30-31		
35						advance 35-45' recover
			G	3-32-16I-35-36		35-39 4 GS @ 1311
			G	3-32-16I-36-37		
			G	3-32-16I-37-38		
			G	3-32-16I-38-39		

Sample Summary

Page 2 of 2

Date 07/18/08 to 07/18/08

Well ID: C6215 | Well Name: 399-3-32 | Geologist: S. Sexton

Depth (ft)	Lithologic Log (M / S / G)	Graphic	Type	ID	Mass	Comments
40			~~G~~			
			~~G~~			
45			G	3-32-IG1-45-46.5		advance db 45-55' recover
			G	3-32-IG1-46.5-48		45-48, 2 GS @ 1327
50						
55			G	3-32-IG1-55-56		advance db 55-63' recover
			G	3-32-IG1-56-57		55-62, 5 samples
			G	3-32-IG1-57-58		
			G	3-32-IG1-58-60		
			G	3-32-IG1-60-62		
60						
						Total Depth 63 ft
65						

Appendix D

Field Activity Reports

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 2

Date: 6/27/08

Purpose: PNNL Project 300 Area IFC | Location: 300-FF-5

Well ID: C6184 | Well Name: 399-2-7

Drilling Co.: WDC Driller Bill Zamora | Rig No.: 179 | Rig Make/Mod.: Super Sonic

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8" 6 7/8	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic RS400	Drill Pipe O.D. 6 7/8	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives N/A	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	6/27/08 gpm	Casing Hammer
Type:	Sonic	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic N/A	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Joe Fitz

Name/Title: GRAM Inc / Geologist

Signature: [signature]

Date: 6/27/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 6/27/08

Well Name: 399-2-7	Well ID: C6184
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 0900	Time 1330	Time 4.5
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 62 / 59	Hole Depth/Csg 62 / 59

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0900	0915	Set up on location - pipe cleaned
0915		Start drilling with Drive barrel (DB)
		Advance DB 0-5' - recover 0-5 & collect 2 GS at 0920
		Advance DB 5-10 recover 5-10 & collect 2 GS at 0925
	0930	Add shoe & 10' casing (10.7) and advance to 5'
0930		Advance DB to 10' - clean out
		Advance DB 10-15 - recover 10-15', collect 2 GS at 0935
	0945	Add 10' casing (20.7) advance to 15'
0945	0950	Advance DB 15-20 - recover 15-20 & collect 2 GS at 0950
0950		Clean out to 20' - Advance DB 20-25 - recover 20-22.5
	1015	& collect 1 GS at 1005
1015		Advance DB 25-35 - recover 25-31.5 & collect 3 GS
	1045	at 1040. Add 10' casing (30.7) and advance to 25'
1045		change out hopper. Add 10' casing (40.7) - advance casing
	1105	& DB 25-35' - clean out -
1105		Advance DB 35-45 with 10' casing (50.7) -
	1140	recover 35-40 & collect 2 GS at 1120
1140	1210	1210 Lunch
1210		Advance DB & casing 45'-55 - recover 45-52.5
		collect 3 GS at 1250.
		Advance DB 55-60 - recover 7' - collect 2 GS at 1300
		Gravel to 55.5, silt 55.5-57 brn, 57-58 gray.
	1220	Casing to 59', DB to 62 - Total Depth. PM Hole, detect
1220	1330	Move off hole

Reported By: Joe Fritts		Reviewed By: L. D. Walker	
Title: Geologist	Date: 6/27/08	Title: Geologist	Date: 7/7/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/08/2008

Well Name: 399-2-7 | Well ID: C6184

Location: 300-FF-5 OU | Report No.: 2

Start	Finish	Total
Time 1545	Time 1630	Time 0.75 hrs
Hole Depth/Csg 62 / 60	Hole Depth/Csg 57 / 56.5	Hole Depth/Csg 5.0 / 3.5

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: #1: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1545	1605	Setup rig & jacks on hole; DTB = 62.0' bgs
1605		add bentonite pellets & backpull casing to top
	1630	of bentonite

Not Used by 07/08/2008

Reported By: S. Sexton | Reviewed By: Joe Fitts

Title: Geologist | Date: 07/08/08 | Title: Geologist | Date: 8/15/08

Signature: [signature] | Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/09/2008

Well Name: 399-2-7 | Well ID: C6184

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 0600	Time 1030	Time 4.5 hrs
Hole Depth/Csg 60 / 56.5	Hole Depth/Csg Ø / Ø	Hole Depth/Csg 60 / 56.5

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: #1: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD w/ BTR, Drillers; clear 65° no wind
0630		Setup rig on borehole, prep to continue completion
	0705	activities
0705		trip-in perm. casing (0.3 + 10 + 10 + 5) = 25.3' + 10 + 10 + 10 +
		10 + 40.0 casing = 65.3' total; bottom set @ 56.3' bgs, ERTs
	0726	& thermistors @ 53.5' bgs; ERT string #15 used
0726		begin completion, see log pgs 1-2; BCT check @ 1008, all
	1014	readings ≤ bkgrnd
1014		all casing removed from borehole @ 1014, move rig to
	1030	hole C6206

Not Used in 07/09/2008

Reported By: S. Sexton		Reviewed By: Joe Fitts	
Title: Geologist	Date: 07/09/08	Title: Geologist	Date: 8/15/08
Signature: S. Sexton		Signature: Joe Fitts	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 07/15/2008

Well Name: 399-2-7 | Well ID: C6184

Location: 300-FF-5 OU | Report No.: 4

Start	Finish	Total
Time 0600	Time 1000	Time 4.0 hrs
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD w/ BTR, Drillers, RCT; p. cloudy, light wind, 60°
0630		setup rig on well, prep for development; field
		calibrations for instruments:

	known	reading	w/in 10%
turb.(NTUs):	482	480	Y
turb.:	50.9	51.2	Y
turb.:	4.45	4.79	Y
pH:	7.00	7.17	Y
pH:	10.00	10.67	Y
cond.(µS):	1413	1416	Y

0730		bail well, prep to trip-in pump; trip-in pump @ 0741
		Pump: Grundfos 75 S-50 8-stage Motor: Franklin-
	0807	Electric 5hp; xD @ 38.7' bgs
0807		Test #1: pump on @: 0808 rate: 50.0 intake: 40.0

	turb.(NTU)	pH	D/O (mg/L)	cond.(µS)	temp(°C)	xD
0810	299	7.57	8.51	481	18.0	8.775
0813	30.4	7.55	8.87	480	17.7	8.760
0817	8.91	7.56	8.95	479	17.4	8.754
0822	3.87	7.55	8.94	480	17.4	8.754
0827	2.25	7.56	8.98	480	17.4	8.748
0831	1.82	7.55	9.00	480	17.3	8.751
0833	1.40	7.55	9.02	480	17.3	8.748
0837	1.16	7.56	9.01	480	17.4	8.734

0838	0855	pump shut off; begin recovery

Reported By: S. Sexton | Reviewed By: Joe Faith

Title: Geologist | Date: 07/15/08 | Title: Geologist | Date: 8/15/08

Signature: S. M. Sexton | Signature: Joe Faith

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 07/15/2008

Well Name: 399-2-7 | Well ID: C6184

Location: 300-FF-5 OU | Continuation of Report No.: 4

Test # 2 : pump on @ : 0857 rate: 86 intake: 50.0

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		turb. / pH / cond. / D/o / temp. / xD
0855		
0859		3.22 / 7.63 / 478 / 8.93 / 17.5 / 15,911
0901		30.5 / 7.66 / 476 / 9.10 / 17.2 / 15,905
0903		11.8 / 7.67 / 474 / 9.15 / 17.2 / 15,907
0905		6.55 / 7.68 / 475 / 9.18 / 17.2 / 15,898
0907		4.97 / 7.67 / 474 / 9.17 / 17.2 / 15,898
0909		3.46 / 7.69 / 475 / 9.18 / 17.2 / 15,895
0911	0912	2.66 / 7.69 / 475 / 9.21 / 17.5 / 15,892
0912	0937	pump shut off, begin recovery test on Sun Direct WDK4
0937	0950	recovery test complete; tower down rig + move off well
0950	1000	finish pw + move to C6207

Not Used

07/15/2008

Reported By: S. Sexton

Title: Geologist Date: 07/15/08

Signature: S. M. Sexton

Reviewed By: Joe Fitts

Title: Geologist Date: 8/15/08

Signature: Joe Fitts

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-7	C6184	300-FF-5 ou	07/15/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	29.85' bgs
End of Job	29.7' bgs

DEPTH TO BOTTOM:

Start of Job	56.6' bgs
End of Job	56.56' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40.0 / 50.0
Starting Turbidity	299 / 322

Pump Start	Stop	Flow Rate
0808	0838	50
0857	6912	86

Total Pumped	1380 / 1471
Final Turbidity	1.16 / 2.66
XD SN/Range (PSI)	5217 / 20

PART 3

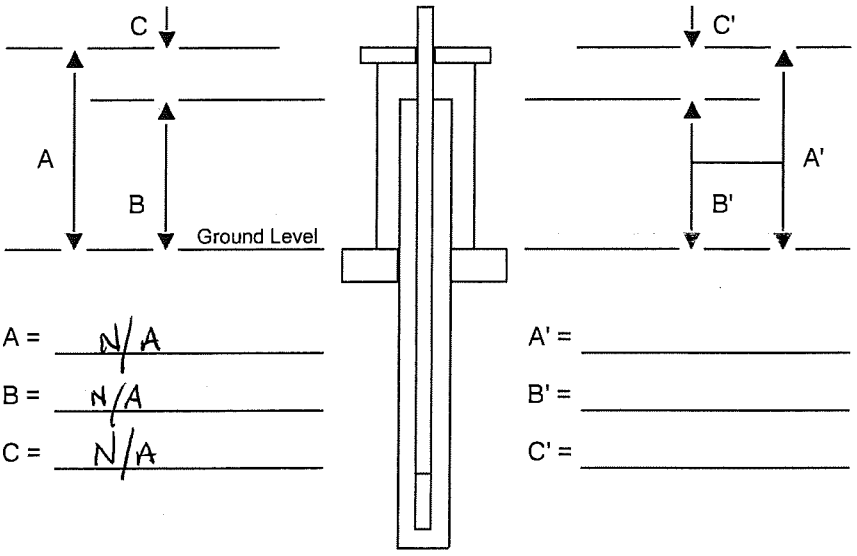
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/15/2008

Current Measurements Date:



A = N/A
B = N/A
C = N/A

A' =
B' =
C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 45638

Test #1

xDi: 8.813

xDf: 8.835

meter: 47018

Test #2: recorded on SunDried WD3

xDi: 16.042

xDf: 16.023

final meter: 48189

Prepared by (print name): S. Sexton	Signature:	Date: 07/15/2008
Reviewed by (print name): Jan Fitz	Signature:	Date: 8/15/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-8	C6185	300-FF-5 ou	07/14/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	29.5 bgs
End of Job	29.5 bgs

DEPTH TO BOTTOM:

Start of Job	56.4 bgs
End of Job	56.4 bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40 / 50
Starting Turbidity	764 / 105

Pump Start	Stop	Flow Rate
0819	0849	50
0907	0926	86

Total Pumped	1316 / 1533
Final Turbidity	1.63 / 3.72
XD SN/Range (PSI)	5217 / 20.0

PART 3

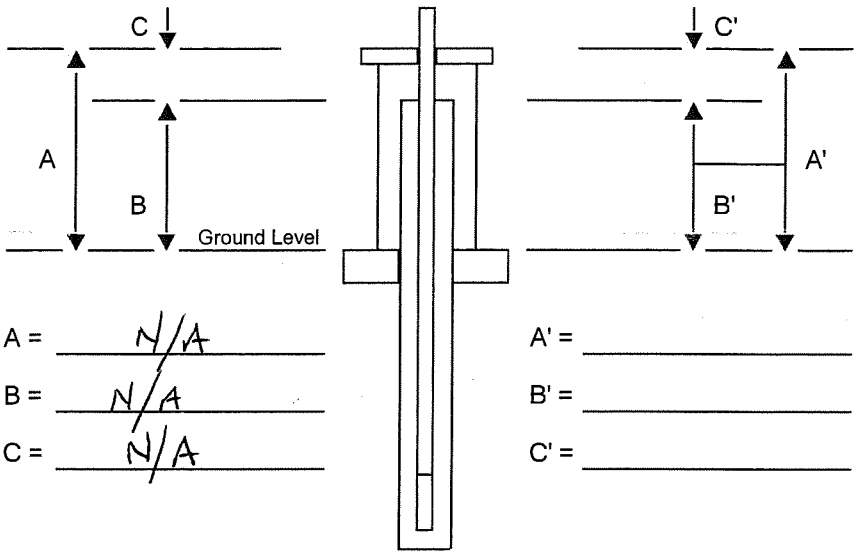
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	N/A
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/14/08

Current Measurements Date:



A = N/A

B = N/A

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 42789

Test #1

xDi: 8.971

xDf: 8.962

Test #2 meter: 44105

xDi: 12.279

xDf: 12.282

final meter: SMS 7-14-08 ~~44038~~ 45038

Prepared by (print name):	Signature:	Date:
S. Sexton		07/14/2008
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz		8/6/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 2

Date: 7/7/08

Purpose: PNNL characterization 300 Area FC | Location: 300-FF-5

Well ID: C6185 | Well Name: 399-2-8

Drilling Co.: WDC Drill Brian Marbach | Rig No.: 139 | Rig Make/Mod.: Super Sonic

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8 / 6 3/4	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic 2	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic RS 400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives Not used	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm 7/7/08	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic N/A	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Joe Fitz

Name/Title: CHPRC Inc, Geologist

Signature:

Date: 7/7/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 2 of 2

Date: 7/7/08

Well Name: 399-2-8	Well ID: C6185
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 0600	Time 1600	Time 10
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 35 / 35	Hole Depth/Csg 35 / 35

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size: 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0640	Attend POD with BTR, RCT, Drill Crew.
0640		To site, do inspections, rig maintenance. Weather
	0805	clear, 70°.
0805		NCOs & drillers ready, begin drilling from Ø ft, using
		6" core barrel; advance db 0-5' - recover 0-5' & collect
		2 GS at 0815.
	0830	Advance DB 5-10', recover 5-10' & collect 2 GS at 0830.
0830		Add shoe & casing (10.7) advance to 5' - clean out to 10
	0920	Advance DB 10-15, recover 10-15 & collect 2 GS at 0920
0920		Add 10' casing (20.7) - advance/clean out to 15' -
	1020	0950 - AM RCT ck, <Bkg. cleaned out to 15'
1020	1115	Advance DB 15-25' - will pull after lunch
1115		Recover 15-25 & collect 4 GS at 1235.
	1240	Add 10' - ~~(20.7')~~ pm 7/7/08 (30.7) - advance to 25' pm 7/7/08
1240	1300	cleaning out to 25 Ft. AM IH ck, ~~<detect~~ bkg.
1300	1400	Stop for helper to complete crane trainging.
1400	1450	Slow work cleaning out to 25 Ft -
1450		Trade out the hopper. PM/Daily IH ck, <detect
	1520	Add 10' casing (40.7) advance DB & casing 25-35 Ft
1520		Recover 6.5' - 25-31.5' and collect 2 GS at 1535
	1600	Crew working on hydraulic wrenches - to office
		[signature] not used 7/7/08

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 7/7/8	Title: Geologist	Date: 7/10/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7/8/08

Well Name: 399-2-8 | Well ID: C6185

Location: 300-FF-5 | Report No.: 2

Start	Finish	Total
Time 0600	Time 0830	Time 2.5
Hole Depth/Csg 35 / 35	Hole Depth/Csg 60 / 56	Hole Depth/Csg 25 / 21

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with Drill crew, BTR, RCT.
0630		To site, clear ± 60°. will resume - clean out
	0655	to 35' - Crew doing equipment warm-up.
0655		Resume - Add 2 (5') casing - (50.7) - advance
		Add'l water - advance 35-45', recover 35-41' - collect
	0720	2 GS at 0720. silt at 38, rig-up?
0720		Add 10' casing (2 x 5') (60.7) - advance casing &
		OB 45-55', recover 45-53. & collect 3 GS
		at 0740.
		Advance OB 55-60 - 7' recovery due to sand/silt
	0800	collect 2 GS at 0750.
0800		Casing to 56 FD measured at 57'
	0830	Pull off hole.

Reported By: Jeff Hs | Reviewed By: L.D. Walker

Title: Geologist | Date: 7/8/08 | Title: Geologist | Date: 7/10/08

Signature: [signature] | Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/10/2008

Well Name: 399-2-8 | Well ID: C6185

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 1030	Time 1500	Time 4.5 hrs
Hole Depth/Csg 58.0 / 56.5	Hole Depth/Csg 0 / 0	Hole Depth/Csg 58.0 / 56.5

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 ____ Rod Size: #1: 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1030	1127	setup jacks and rig on hole, prep for completion
1127		add bentonite to depth & backpull casing above bent.;
	1144	bentonite to 57.0' bgs
1144		trip-in screen & casing (0.3 + 10+10+5) = 25.3' screen
	1158	+ 10+10+10+10 = 40.0' casing + 25.3 = 65.3' total;
1158		attach ERTs & thermistors to screen & casing; ERT
		string #18, both @ 2.5' below top of screen;
	1214	bottom of screen @ 56.3' bgs, sensors @ 33.5' bgs
1214	1444	begin completion, see completion log pgs 1-2;
1444		All temporary casing removed from hole; tower down
		rig & move off borehole; drillers to work on surface
	1500	completion

Not Used

Reported By: S. Sexton	Reviewed By: Joe Fritz
Title: Geologist / Date: 07/10/2008	Title: Geologist / Date: 8/6/08
Signature:	Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 07/14/2008

Well Name: 399-2-8 | Well ID: C6185

Location: 300-FF-5 OU | Report No.: 4

Start	Finish	Total
Time 0600	Time 1000	Time 4.0 hrs
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD w/ BTR, Drillers; clear 62° no wind
0630		checking on purgewater trucks, deciding which hole
	0700	to set up on
0700		setup on well, prep for development; DTW=29.5' bgs
	0752	DTB=56.4' bgs
0752		Field calibrations:
		known / reading / w/in 10%
		pH 7.00 / 7.12 / Y
		pH 10.00 / 10.41 / Y
		~~Turb.~~ (NTU) 482 / 480 / Y
		turb. 50.9 / 50.8 / Y
		turb. 4.45 / 4.49 / Y
	0806	cond. (µS) 1413 / 1419 / Y
0806		pump: Grundfos 75 S-50 8-stage motor: Franklin
		Electric 5 hp; intake @ 40 ft. bgs, using xD 5217
		on Hermit: Gandalf 3K-45812
		Test #1: pump on @: 0819 rate: 50 gpm SunDried WDI

	Turb. (NTU)	pH	D/O (mg/L)	cond. (µS)	temp (°C)	xD
0820	7.64	7.59	8.37	480	18.0	8.786
0824	18.6	7.57	8.71	476	17.6	8.828
0826	7.29	7.57	8.89	475	17.4	8.828
0832	4.28	7.57	8.95	476	17.5	8.828
0838	2.25	7.57	8.93	476	17.5	8.822
0845	1.63	7.56	8.91	476	17.6	8.828

Reported By: S. Sexton | Title: Geologist | Date: 07/14/08 | Signature: [signature]

Reviewed By: Joe Fritz | Title: Geologist | Date: 8/6/08 | Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 07/14/2008

Well Name: 399-2-8 | Well ID: C6185

Location: 300-FF-5 OU | Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
0849	0907	begin recovery;
0907		Test #2: pump on @: 0907 rate: 8G intake: 50.0' bgs
		turb. pH DO cond. temp xD
0909		105 7.76 8.95 480 17.7 12,226
0912		16.4 7.85 9.14 478 17.5 12,226
0914		10.3 7.91 9.16 478 17.4 12,220
0918		6.26 7.95 9.16 477 17.4 12,223
0920		5.18 8.04 9.18 477 17.5 12,214
0924	0926	3.72 8.09 9.23 478 17.5 12,214
0926	0936	Begin recovery test on Sun Dried WD2
0936	1000	trip-out pump & move rig to next well

Not Used 07/14/08

Reported By: S. Sexton

Title: Geologist Date: 07/14/08

Signature: S. Sexton

Reviewed By: Joe Fritz

Title: Geologist Date: 8/6/08

Signature: Joe Fritz

A-6003-652 (04/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 5/12/08

Purpose: Characterization 300 Area TFC | Location: 300-FF-5 04

Well ID: C6186 | Well Name: 379-2-9

Drilling Co.: Blue Star / WDC mike wilkerson | Rig No.: 139 | Rig Make/Mod.: Sugy Sonic 2

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8" OD, 6 3/8" ID	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Supersonic 2	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic RS400*	Drill Pipe O.D. N	Model
Planned / Actual	Geoprobe	Tool Joint Size 4	Bit Size
Set At: 1628	Other:	Additives	Type
Shoe OD/ID	* Built by Gus Pech		Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic N	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic 2	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water
5/14/08 measured
34.10 ft bgs

Reported By: Joe Fralick

Name/Title: Geologist, GRAM Inc

Signature: [signature]

Date: 5/12/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 5/12/08

Well Name: 399-2-9	Well ID: C6186
Location: 300-FF-5 OU	Report No.: 1

Start	Finish	Total
Time 0600	Time 1630	Time 10.5
Hole Depth/Csg 0 / 0	Hole Depth/Csg 28.7 / 30	Hole Depth/Csg 28.7 / 30

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD casing. 6 7/8" ID

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600		Attend Initial POD with BTR, drill crew, PNNL
	0645	staff. Some training remains.
0645		To site. Prepare to start. Weather partly
		cloudy and cool. Completing set-up.
	0730	Crew leaves to get Fit-test
0730	1000	Crew returns
1000		Rig is Supersonic 2 RS 400 Rig #139. Pipe trunk
		directly behind rig.
		Casing is 7 5/8" OD, shoe is , 6 7/8" ID
		Spoon: 5.2' long, with shoe is 5.75" long
	1030	3 3/4" ID, 4 1/2" OD spoon or core barrel.
1030	1055	1055 - start drilling, collect core/SS 0-2.5'
1055		SS with shoe is 5'10", 10.0' drill rod -
		so 15.8' long - lower to 4.2' - advance to
		5.2 - refusal - take off SS - try a core barrel
	1135	to get thru cobble. - Am RCTck < Bkg
1135		Advance core barrel 4.2 - 10 Ft. = 1 Ft of returns -
		sandy gravel - cobbles to 5", unsure of where it
	1200	came from
1200	1230	Lunch
1230		Plan is to advance 7 5/8" to 10' - clean out with
	1250	Core barrel - tag it at 9.3 Ft after clean out
1250		20' drill rod on - advance with 4" SS,
	1300	4" SS 9.3 to 14.4 Ft

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 5/12/08	Title: Geologist	Date: 5/21/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 5/12/08

Well Name: 399-2-9 | Well ID: C6186

Location: 300-FF-5 OU | Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1300		SS 9.4-14.4 collect 5 samples in Lexan liners
		at 1310.
		SS 14.4-19.4 collect 5 sample in Lexan liners
	1330	at 1330
1330		casing cleaned out to 220 FT.
		1345 - shut down for inspections - crane etc.
		1420 - PM RCT ck, < Bkgs.
	1445	Resume
1445		4" SS DN - Advance SS 20-25' - Recovered
		20-21.9'. 5 ea. 2 liners taped up together
	1510	one sample at 1505. Hole tagged at 23.7.
1510		Run SS 23.7-28.7. ~~Tag at 27.4~~ 5/12/08
		rerun SS 23.7-28.7. Tag at 27.4
	1520	collect 3 samples at 1520
1520		Trip in to clean out. While cleaning out,
		the upper spindle just below the head sheared
	1545	off - 1545 - stop
1545		Crew pulled drill rod with barrel - take rig
		off hole - will take to Blue Star yard to fix.
	1630	Geologist to office

Not used

5/12/08

Reported By: Joe Fitz		Reviewed By: L.D. Walker	
Title: Geologist	Date: 5/14/08	Title: Geologist	Date: 5/21/08
Signature:		Signature:	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 5/13/08

Well Name: 399-2-9 | Well ID: C6186

Location: 300-FF-5-04 | Report No.: 2

Start	Finish	Total
Time 0600	Time 1530	Time 9.5
Hole Depth/Csg 28.7 / 30.0	Hole Depth/Csg 65 / 62.8	Hole Depth/Csg 36.3 / 32.8

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1 | Rod Size: 7 3/8" OD casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600		Attend POD with STR, drill crew, RCT. Rig
	0635	is repaired and back on site
0635		To site - setting up rig to resume
		Take notice that we want a bucket sample (gray)
		28-33' - just above water table. Measured casing and
		drillrod. - casing moves up and down - currently
	0745	at ± 29 ft. We will clean out to 30 ft.
0745		Clean out w/ 6" CB, collect bucket from ±
		27-30. Tag at 29.4 ft.
		Try in w/ 4" SS 29.4 - 34.4 push - recovered
		29.4-32.2. collect 3 sample 0820
		0830 - Am RCT < 0 kcg.
		pushed 35-40 ft - collect sample 35-38.3 (3.3' recovery)
		at 0835 - wet gravel.
	0850	Add 10.0 ft casing (40.68) - push to 40 ft.
0850	0915	Clean out w/ 6" barrel. - tag at 39.65
0915		Push SS 39.7 - 45 - recovered 39.7 - 42.2 -
	0940	collect 3 samples at 0935 - tag at 41.4 - gravel caving
0940		Push SS 41.4 - 50' - recovered 1 ft - call. ± 42-43.
		collect sample at 0950. Crew will obtain a catcher
	1000	for next hole.
1000		Add 10.00 (50.68) - push to 50 ft (casing)
		Push barrel (6") to 50 ft - collect GS 45-50 out
	1050	of drive barrel (1050) Tag at 46.3 - will add water to wash out.

Reported By: Joe Fritz | Reviewed By: L.S. Walker

Title: Geologist | Date: 5/13/08 | Title: Geologist | Date: 5/21/08

Signature: | Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 5/13/08

Well Name: 399-2-9 | Well ID: C6886

Location: 300-FF-5 OU | Continuation of Report No.: 2

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1050		Adding water - moving casing up and down - cleared
	1110	it to 49.8 ft - via tag.
1110		Push 4" S5 49.8-50. Recd 50-52.5
	1130	collect 3 samples at 1125 - lunch
1130	1230	Lunch & discuss plan
1230		Add 10.0' casing (60.80' ow) Advance to 59 Ft.
		6" Barrel to ≈ 54' - Advance to 58 Ft - recovery 54-58
	1300	1300 - sample 56-57
1300		Advance 6" barrel 58 to 63 Ft. - 5' recovery -
	1330	collect 5 samples at 1330.
1330		Clay at 59.5 - discuss how deep we need
		to go - will add 5' and go to ≈ 63'
		Add 5.02' (65.7) - Advance casing to 62.8 ft -
	1430	Tag bottom at 65 Ft. Clay/silt - to 65 ft.
1430		Added a total of ≈ 100 gallons water to this
		borehole during drilling
	1530	DTW 34.10 Ft bgs. To office

Not used

J Fritz 5/13/08

Reported By: Jon Fritz		Reviewed By: L.D. Walker	
Title: Geologist	Date: 5/13/08	Title: Geologist	Date: 5/21/08
Signature: Jon Fritz		Signature: L.D. Walker	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 05/20/2008

Well Name: 399-2-9 | Well ID: C6186

Location: 300-FF-5 OU | Report No.: 23 amsl 6-09-08

Start	Finish	Total
Time 0730	Time 1700	Time 9.5 hrs
Hole Depth/Csg 63.7 / 62.8	Hole Depth/Csg 32.3 / 34.1	Hole Depth/Csg 31.4 / 28.7

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 _____ Rod Size:
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0730		Geo to site, drillers work on prep. for backpull/
	0750	construction;
0750		bentonite was not delivered, waiting for bentonite to
		be dropped @ site; DTB = 63.7' bgs DTW = 30.28 bgs
	1650	bentonite pellets delivered @ 0935;
1650		begin construction
1039		add cap + screen to string = 9.98 + 0.31 = 10.29;
		transmitters will be taped to outside of pvc casing @
	1057	2' intervals;
1057	1105	add 10.01' to string (screen)
1105	1114	add 4.98' to string screen = 24.77' screen + 0.31' cap = 25.28' tot.
1114	1150	add 10.01' pvc casing to string = 35.29' total
1150	1156	add 10.00' to string 45.29' total
1156	1205	add 10.02' to string = 55.31'
1205	1230	Lunch
1230	1235	resume trip-in perm. pvc casing
1235	1250	add 5.0' pvc casing = 60.31' total
1250	1647	resume completion activities, see completion log pgs 1&2
1647	1700	Geo finishes paperwork & departs for office

Not Used @ 5/20/2008

Reported By: S. Sexton

Title: Geologist | Date: 05/20/08

Signature: L. M. Sexton

Reviewed By: Joe Fritz

Title: Geologist | Date: 8/5/08

Signature: Joe Fritz

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 05/22/2008

Well Name: 399-2-9 | Well ID: C6186

Location: 300-FF-5-04 | Report No.: ~~3~~ 4 SMS 6-09-08

Start	Finish	Total
Time 0600	Time 0930	Time 3.5 hrs
Hole Depth/Csg 32.3 / 34.1	Hole Depth/Csg 3.4 / ø	Hole Depth/Csg 28.9 / 34.1

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 ____ Rod Size: 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0620	POD @ 300 Area; p. cloudy, 50°, no wind
0620		Set completion rig on hole, prep to continue well
	0642	completion;
0642	0653	Tag bottom: 35.05-6.65=~~32.4~~ Tag water: 35.44-6.65 stk=28.79'
0653	0812	Begin completion activities, see well completion pgs 2-3
0812		all temp casing removed from hole; tower down rig,
	0930	move casing jacks, prep to pour cement;
0930	→	off hole to C6203, waiting for PNNL to finish, will
		cement later today.

Not Used 05/22/2008

Reported By: S. Sexton	Reviewed By: Joe Fitts
Title: Geologist Date: 05/22/08	Title: Geologist Date: 8/5/08
Signature: S. M. Sexton	Signature: Joe Fitts

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 5/23/08

Well Name: 399-2-9 | Well ID: C6186

Location: 300 Area | Report No.: 5

Start	Finish	Total
Time 0930	Time 1000	Time 0.5 hrs
Hole Depth/Csg 3.4 / Ø	Hole Depth/Csg 1.5 / Ø	Hole Depth/Csg -1.9 / Ø

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ See Report No. 1 | Rod Size: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0930		Drillers set up and began mixing/pouring Portland heat cement for surface completion.
		→ note: POD @ 0600; poured Portland cement @ C6203 (see FAR notes).
	1000	→ Poured cement to ~1.5' bgs.
1000		Geo. Leave site.

not used. 5/23/08

Reported By: T. Buswell | Reviewed By: Joe Fritz

Title: Geologist | Date: 5/23/08 | Title: Geologist | Date: 8/5/09

Signature: T. Buswell | Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 3

Date: 6/4/08

Well Name: 399-2-9	Well ID: 16186
Location: 300-FF-5	Report No.: 6

Start	Finish	Total
Time 0600	Time 1630	Time 10.5
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size: 4" ID PVC
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD @ 300 area
0630	0650	Move to site - discuss plans w/ driller
0650		Driller leaves site to get supplies/Geo. doesn't have notes on previous wells
		Geo. departs to retrieve notes
0730		Geo back onsite - fills out paper work
0750		Calibrate Field Parameters Kit #7
		Turbidity: 4.45 NTU Std reads 4.37 → Good
		50.4 ~~43.6~~ 6/4/08 NTU Std reads 50.5 → Good
		482 ~~555~~ NTU Std reads 482 → Good
		pH: 10.00 pH Std reads 10.10 → Good
		7.00 pH Std reads 7.04 → Good
		conductivity: 143 µS Std reads 1423 µS → Good
1000		Driller on site - setup rig - Stickup 1.4'
		DTW: 27.51' TOC
1046		Driller bailing out sediment
1109		Start surging w/ dual surge blocks
1136		Resume bailing
1155		DTB: 60.25' - 1.4' stickup = 58.85' bgs
1219		Pump info: Motor Franklin Electric 5 HP
		S/N: 0648-02-0345
		Model: 2243035202 5HP HZ: 6.0
		Volts: 230 PH1 Amp 23.0
		RPM: 3450 SF Max Amp 27.5
		3 wire submersible pump

Reported By: J. Throolin / J Fritts		Reviewed By: Joe Fritts	
Title: Geologist	Date: 6/4/08	Title: Geologist	Date: 8/5/08
Signature: [signature]		Signature: [signature]	

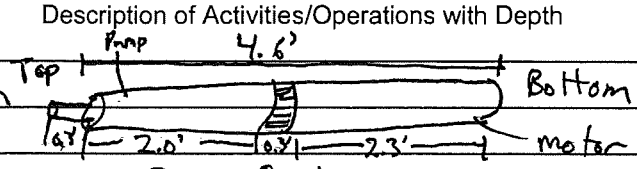
A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 6/4/08

Well Name: 399-2-9	Well ID: C6186
Location: 300-FF-5	Continuation of Report No.: 6

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		Pump diagram 
		Pump 75-S 50 Grundfos 8 stage
1230		Turn over to Joe Fritts
		~ 2.4' from coupling to intake
		TD 59.5' - 5' = 53.5' - 2.4 = 51.1' of drop pipe -
	1240	crew to obtain Flowmeter & check valve for pump
1240		using 1½" x 10' galvanized drop pipe. XD taped just
		above pump, by coupling (2.5' above intake)
		XD # 5217, well has ≈ 1.5' s/u -
		5 x 10' = 50' drop pipe DTW 27.5'
		+.24' 2.4 pump intake 50.9 - 27.5 = 23.4'
		-1.5 1.5 s/u above XD
		50.9'
		1425 - pump at 50.9' bgs, XD reads 22.758
		C6190 (well to north) DTW 26.4' bgs) -
		XD 10.143'
		1500 - start test/pump Poison Ivy WP1
		Flowmeter started 154 gallons
	1503	1503 - 30 gpm
		See page 3 for rest of data.
		not used [signature] 6/4/08

Reported By: J. Throolin / J Fritts		Reviewed By: DC Weekes	
Title: Geologist	Date: 6/4/08	Title: Geologist	Date: 8/12/08
Signature: [signature] [signature]		Signature: David C. Weekes	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 3 of 3

Date: 6/4/08

Well Name: 399-2-9 | Well ID: C6186

Location: 300-FF-5 | Continuation of Report No.: 6

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		5217 . Flowmeter Poison Ivy WD 1 5218
	Time	XD gpm gal pH Ec T NTU DO XD
start	1500	22.758 00 0 10.143
	1505	22.729 30 150 7.61 0.340 18.6 45.7 8.31 10.142
	1512	increase to 40 gpm
	1514	350
	1515	22.736 40 350 8.71 0.424 16.6 11.4 8.44 10.133
	1523	Increase to 50 gpm
	1525	22.742 7.64 0.375 18.3 9.42 8.34 10.140
	1528	Increase to 60 gpm 1050 gals on meter 6/4/08
	1535	22.751 60 1850 7.71 0.374 18.3 6.79 8.41 10.147
	1538	- stop pump - start test Poison Ivy WD2
	1541	22.763
	1543	- stop Poison Ivy WD2 - pull pump up 10' - 40.9' bgs
		1525 gals on flow mtr.
	1554	12.959 start Poison Ivy WD3 / pump 10.156
	1555	Started 60 gpm 10
	1600	12.788 60 1930 7.65 0.376 18.4 17.8 8.30 10.132
	1610	12.787 60 2520 7.51 0.381 18.4 4.89 8.47 10.161
	1620	12.783 3120 10.163
	1621	stop test Poison Ivy WD3 turn off pump.
		start Poison Ivy WD4
	1630	- leave pump in hole.
		to office
		Night work 6/4/08

Reported By: Joe Fitts		Reviewed By: DC Weekes	
Title: Geologist	Date: 6/4/08	Title: Geologist	Date: 8/12/08
Signature:		Signature:	

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-9	C6186	300-FF-5	6/4/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ☒ No | Does the well have a cement pad? ○ Yes ☒ No

PART 1

STATIC WATER LEVEL:

Start of Job	27.51
End of Job	Not measured

DEPTH TO BOTTOM:

Start of Job	58.85
End of Job	Not measured

PART 2

WELL DEVELOPMENT DATA

Pump Model	Grundfos 75-S-50
Intake Depth	50.9 & 40.9 Fbgs
Starting Turbidity	>200

Pump Start	Stop	Flow Rate
1500	1538	30-60gpm
1554	1621	60gpm

Total Pumped	3120 gallons
Final Turbidity	4.89
XD SN/Range (PSI)	20

PART 3

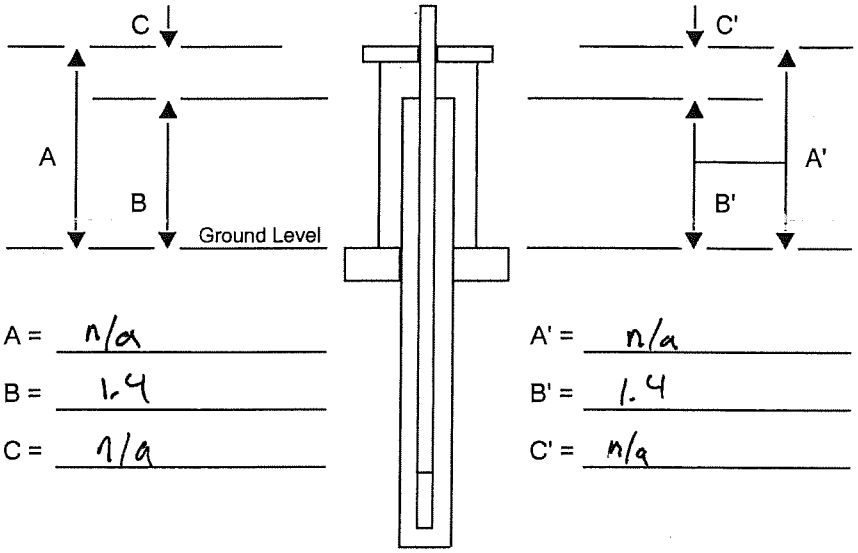
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	N/A
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Current Measurements Date:



A =	n/a	A' =	n/a
B =	1.4	B' =	1.4
C =	n/a	C' =	n/a

Are there any reference marks on the casing strings? ○ Yes ○ No

PART 5

COMMENTS:

- Gallons pumped record w/ flow meter, rate checked periodically
- Note- well will be completed as a surface completion - therefore the S/u will change.

Data Logger Information: Pump at 50.9 Fbgs:
Poison Ivy WD1 - drawdown
Poison Ivy WD2 - recovery
Pump at 40.9 Fbgs
Poison Ivy WD3 - drawdown
Poison Ivy WD4 - recovery

Prepared by (print name): Jan Fitz	Signature:	Date: 6/4/08
Reviewed by (print name): DC Weekes	Signature: DC Weekes	Date: 8/12/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Date: 7/17/08

Purpose: PNNL 300 Area IFC	Location: 300-FF-5
Well ID: C6187	Well Name: 399-2-10
Drilling Co.: WDC / Mike Wilkerson	Rig No.: 139 — Rig Make/Mod.: Super Sonic

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic RS400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID 7 5/8 / 6 7/8			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

W/A [illegible] 7/17/08

Drig. Co.	Rig No.:	Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

W/A 7/17/08

Comments/Remarks:

Estimated Depth to Water

Reported By: Jae Fritts

Name/Title: GRAM Inc. Geologist

Signature: [signature]

Date: 7/17/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 7/17/08

Well Name: 399-2-10	Well ID: C6187
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 0800	Time 1400	Time 6
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 65 / 60	Hole Depth/Csg 65 / 60

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD casing.

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0800		cleaning pipe, rigging up. Put new jaws
	0930	on wrench.
0930		start drilling with 6" Drive barrel (DB)
		Advance DB 0-5' - recover 0-5 & collect 2 GS at 0940
		Advance DB 5-15 - recover 5-15 & collect GS at 0950
		Add shoe & 10' casing (10.7) and advance to 5'.
	1000	Add 10' (20.7) and clean out to 15'
1000		RCT ck, < bkg. - still cleaning out to 15'
		Trouble keeping hole open - cleaning out - give OK to
	1025	add small amt. water. - cleaned out
1025		Advance DB 15-25 - recover 15-22 & collect 3
		GS at 1035.
		Add 10' casing - advance to 25' - tough cleaning out hole again -
	1055	change out the hopper
1055		Add 10' casing (40.7) - advance DB & casing 25-35' -
	1145	recover 25-32 & collect 3 GS at 1120. Add 10' (50.7)
1145	1215	Lunch -
1215		Casing & DB advanced 35-45 recovered 35-42 & collect
		3 GS at 1225. Add 10' casing (60.7) - advance DB &
	1250	casing 45-55. - recover 7' & collect 2 GS at 1245
1250		Advance DB 55-65' - recover 55-65 & collect 4 GS at 1300
		silt at 56'. - casing to 60' - clean out to 65 - Not staying
	1335	open. - decide to go w/ rathole - borehole at 60'.
1335		Move off, clean pipe. RCT ck, < Bkg.

Reported By: Joe Fritz		Reviewed By: L.D. Walker	
Title: Geologist	Date: 7/17/08	Title: Geologist	Date: 7/18/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/28/2008

Well Name: 399-2-10	Well ID: C6187
Location: 300-FF-5 OU	Report No.: 2

Start	Finish	Total
Time 0600	Time 0830	Time 2.5 hrs
Hole Depth/Csg 65 / 60	Hole Depth/Csg 67.5 / 65	Hole Depth/Csg 2.5 / 5.0

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size: #1: 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD w/ BTR, Drillers, RCT; clear, calm 62°
0630	0718	setup rig over hole, will deepen 5 ft.
0718	0747	clean out, borehole to 65 ft bgs
0747		add ~~5'~~ 10' casing & push to ~65' bgs; remove 5' 65'
	0753	total on string;
0753	0812	clean out borehole to 67.5' = TD
0812	0830	moving rig off borehole to clean out C6211

Not Used 07/28/2008

Reported By: S. Sexton	Reviewed By: Joe Fritts
Title: Geologist Date: 07/28/08	Title: Geologist Date: 8/15/08
Signature: [signature]	Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7/30/08

Well Name: 399-2-10 | Well ID: C6187

Location: 300-FF-5 | Report No.: 3

Start	Finish	Total
Time 0600	Time 1345	Time 7 hrs 45 min
Hole Depth/Csg 66.8 / 65.0	Hole Depth/Csg 0 / 0	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 ____ Rod Size 8" Temp casing

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0620	POD meeting
0620	0700	Setup over borehole; wait For well design
0700		Measure out ~~casing~~ JWT 7/30/08 PVC; (0.4' end cap + 24.9' screen + 20.0' blank + 20.0' blank + ~~5.0 blank~~ JWT 7/30/08 = 65.3')
0725		Backfill with bentonite pellets (Top pellets = 63.0')
0745		Trip in PVC and ERTs and thermistors; ~~Perm~~ JWT (Bottom of thermister and ERT @ 58.5'; Bottom of 2nd ERT string @ 33.5' bgs); ERT string #0027
0827		Begin well completion; details on well completion log
0845		Postpone completion due to pouring cement pads on other completed boreholes
0945		Remove 5.00' casing (Tot.= 60.7')
0953		Resume well completion
1001		Remove 10.00' casing (Tot. = 50.7')
1012		Begin surging 1st interval; 45.9 to 59.7' bgs
	1115	End surging
1116		Resume completion
1125		Remove 10.00' casing (Tot.=40.7')
1134		Start surging 2nd interval; 34.7' to 45.9' bgs
	1215	End surging; Top of 10-20 silica sand = 32.3' bgs
1232		Remove 10.00' casing (Tot.=30.7')
1235	1715	Break for lunch
1319		Remove 10.00' casing (Tot.= 20.7')
1328		Remove 10.00' casing (Tot.=10.7')
1338		Remove 10.00' casing ~~(Tot.)~~ JWT 7/30/08 (Tot.=0); All temp. casing removed
1345		Mob rig to C6217

Reported By: J. Throolin | Reviewed By: Joe Fitts

Title: Geologist | Date: 7/30/08 | Title: Geologist | Date: 8/15/08

Signature: | Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 7-31-08

Well Name: 399-2-10

Well ID: C6211 ~~C6287~~ C6187 AI 7-31-08

Location: 300-FF-5

Report No.: 4

Start	Finish	Total
Time 0939	Time 1132	Time 3 hr 11 min
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: 4" PVC

See Report No. 1

screen 34.7-59.6 = 25' = 2 interval

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0939		Move over hole: Tag DTB: 59.1' bgs. Note screen: 34.7-59.6
		Tag DTW: 30.7' bgs.
0945		Bailing well.
0950		Trip in Pump + Tremmie → Set intake @ 41' bgs. Prepare to Develope ~~6.5'~~ good.
		below Top of screen. → Set transducer @ ~~31.5'~~ 36.5' bgs. 36.5' bgs
1017		XD_I: 6.13' start Pump Test #5

		XD (ft)	Turb (NTU)	Temp (°C)	DO (mg/L)	pH	Cond. (mS)	Notes:
1011	start Drawdown	~~25.0~~	—	—	—	— 7.42	—	↑flow to ~50 gpm @1019
1019		~~24.2~~ 6.18	24.2	19.9	7.91	~~19.9~~	0.505	49.5 gpm
1028	(T1)	6.05	7.7	19.1	8.18	7.44	0.503	49.5 gpm
1031		6.06	4.66	19.6	8.24	7.46	0.502	45 gpm
1036		6.07	3.35	18.6	8.47	7.48	0.503	48.5 gpm
1041	stop ↓	6.07	2.73	18.8	8.45	7.46	0.502	45.5 gpm
1042	stop start Rec.	XD_F: 6.07' shut off pump before Recovery test started.						
1054	start	Start Development of lower interval = Intake now @ 51' bgs. 8.6' above						
		6.4ton of screen.						
1056	s	6.1	30.4	18.9	8.48	7.64	0.504	84.5 gpm
1103	(T2)	6.095	6.61	18.2	8.68	7.63	0.501	85.5 gpm
1105		6.092	4.20	17.9	8.79	7.65	0.501	85.5 gpm
1110		6.08	2.43	18.0	8.78	7.64	0.500	85.0 gpm
1115			1.58	18.8	8.74	7.67	0.501	85 gpm
1116	1116	stop Development of lower interval						
1132		Trip out Pump, Tremmie + Transducer → Break down + move rig						
1200		Tag DTW: 38.7 DTB: 58.7						

Reported By: A. Lantow

Title: Geologist Date: 7/31/08

Signature: Aaron Lantow

Reviewed By: Joe Fritts

Title: Geologist Date: 8/15/08

Signature: Joe Fritts

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 7/31/08

AL 7-31-08

Well Name: 399-2-10	Well ID: ~~C6287 C6287~~ C6187
Location: 300-FF-5 OU	Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1200	–	RCT: survey rig cable using rag. "Large area wipe"
–	–	2000 dpm above bkgrnd By: 4K dpm total By w/ Thermo
–	–	700 dpm above bkgrnd α: 11K dpm total α w/ Thermo → Lunch →
1300		RCT: Reports back α decayed off = Radon.
		no response on By.

Not Used
AL

Reported By: A. Lantau		Reviewed By: Joe Fitts	
Title: Geologist	Date: 7/31/08	Title: Geologist	Date: 8/15/08
Signature: Aaron Lantau		Signature: [signature]	

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

AL 7-31-08 ~~C6287~~ C6187 JM For AL 8/15/08

Well Name: 399-2-~~27~~ 10 OU	Well ID: ~~C6211~~ ~~C6287~~ AL 7-31-08	Well Location: 300-FF-5 OU	Date: 7/31/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ○ No | Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job 59.1

End of Job 59.1

DEPTH TO BOTTOM:

Start of Job 30.7

End of Job 30.7

PART 2

WELL DEVELOPMENT DATA

Pump Model Grundfos

Intake Depth Test 1 @ 41' bgs, #2 @ 51' bgs

Starting Turbidity T_1: 24.2 / T_2: 30.4

Pump Start	Stop	Flow Rate
10:11:30	10:39:01	45.5 gpm
10:39:01	10:43:04	Recovery
10:54:00	10:16:32	85.5 gpm

Total Pumped 3281 gal.

Final Turbidity T_1: 2.73 NTU / T_2: 1.58 NTU

XD SN/Range (PSI) (20psi)

PART 3

INSTANTANEOUS SLUG TEST

Static Water Level (TOC)

Transducer Depth T_1: 41' / T_2: 51' bgs.

Baseline Start

Injection Start

Baseline Start

Withdrawal Start

Slug Volume

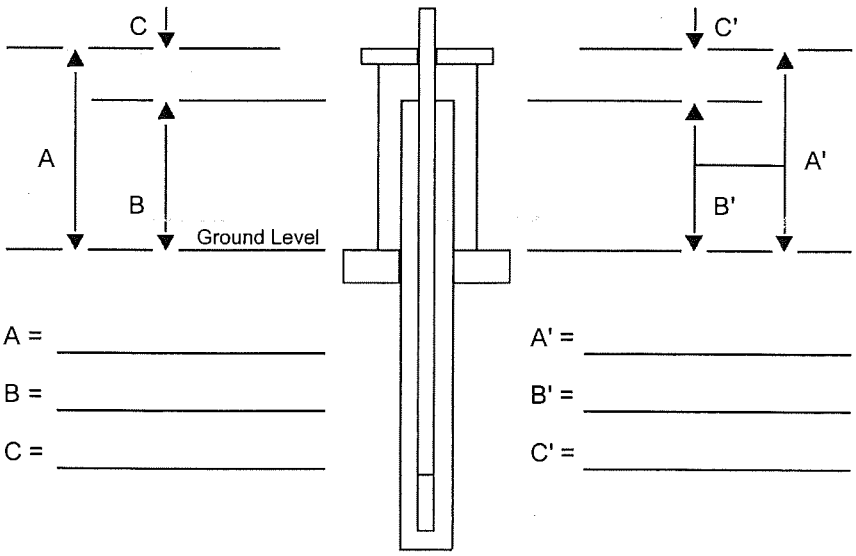
XD SN/Range (PSI)

PART 4

Last Recorded Measurements Date:

Surface level Completion

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: HERMIT: Jeff H3K-45348

Test #5: Drawdown XD_I: 6.13' Intake @ 41' bgs. (T_1)

Test # 6: Recovery

Test # 7: Drawdown XD_I: 6.10 Intake @ 51' bgs. (T_2)

Test # 8: Recovery

Prepared by (print name): A. Lantau	Signature: Geo. Aaron Lantau	Date: 7-31-08
Reviewed by (print name): Joe Fritts	Signature: [signature]	Date: 8/15/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 2

Date: 7/14/08

Purpose: PNNL Characterization 300 Area	Location: 300-FF-5 16 7/14/08
Well ID: C6188 IFC	Well Name: 399-2-11
Drilling Co.: WDC Mike Wilkerson	Rig No.: 139 Rig Make/Mod.: Super Sonic

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic	Pressure ___ psi	Make
Welded ___ Thd	A.R. w/Sonic RS 400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID 7 5/8 / 6 7/8			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

not used 7/14/08

Drig. Co.	Rig No.:	Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm 7/14/08	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

not used

Comments/Remarks:	Estimated Depth to Water

Reported By: Jeee Fritts

Name/Title: CRTM Inc / Geologist

Signature: [signature] Date: 7/14/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 2 of 2

Date: 7/16/08

Well Name: 399-2-11	Well ID: C6188
Location: 300 FF 5	Report No.: 1

Start	Finish	Total
Time 0900	Time 1400	Time 5
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 45 / 45	Hole Depth/Csg 45 /

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0900	1020	clean pigs, rig up on borehole
1020		start drilling - Brian stumbled on back deck,
	1030	fell down - stop - Brian left - resume at 1030
1030		Advance DB 0-5' - recover 0-5' + collect 2 GS at 1035
	1045	Advance DB 5-15, recover 5-12' - collect 3 GS at 1045
1045		Add shoe + 10' casing (10.7) - advance to 5'
		Add 10' casing (20.7) - advance to 15' - clean out
	1100	to 15' RCT ck, CBKg
1100		IH, ck & detect. Advance DB 15-25' - recover
		15-22 + collect 3 GS at 1125
	1200	Add 10' casing (30.7) - Advance to 25 Ft.
1200	1240	Lunch - Resume advance DB. Add 10' casing (40.7) -
		advance casing + DB 25-35', recover 25-32 and
		collect 2 GS at 1300
		Add 10' casing - (50.7) advance DB + casing 35-45, recover
	1400	35-42' - collect 2 GS at 1315,
	1400	Done for day - mtg -
		not used

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 7/16/08	Title: Geologist	Date: 7/18/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7/17/08

Well Name: 399-2-11	Well ID: C6188
Location: 300-FF-5	Report No.: 2

Start	Finish	Total
Time 0600	Time 0600	Time 2
Hole Depth/Csg 45 / 45	Hole Depth/Csg 65 / 60	Hole Depth/Csg 20 / 15

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0625	Attend PID with BTR, RCT, drill crew,
0625		To site, clear, 65°, light breeze. Warm equipment,
	0650	Casing & DB have been advanced 45-55' -
0650		Resume - Pull DB - recover 1.5' - collect 1 GS
		at 0700 - coarse gravel to 2.5". Will run 10' &
	0700	hope to plug barrel with silt & get returns
0700		Advance DB 55-63 - recover 55-63 - collect 4 GS
		at 0720. silt at 55.5'
	0800	Casing to 60' - borehole to 65 - cleaned out.
0800		Move off hole, clean pipe - move to C6187.

Noted

7/17/08

Reported By: Jeff Hills	Reviewed By: L.D. Walker
Title: Geologist Date: 7/17/08	Title: Geologist Date: 7/20/08
Signature: [signature]	Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 6/24/08

Well Name: 399-2-11 | Well ID: C 6188

Location: 300-FF-5 | Report No.: 3

Start	Finish	Total
Time 0530	Time 1230	Time 7
Hole Depth/Csg 63.1 / 59.9	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 _____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0530		Drillers on site conduct POD
0600		Geologist on site. Drillers setting up on new borehole C6188
0645		Tagged bottom at 63.1'
0646		6- 10' drive casing in hole + 5' attached for construction.
		- 5.8' casing stickup. Total casing 65.7'
0700		Assemble well casing - bottom 0.4' end cap + 25' screen
		(mark ERT/thermistor location at 33.5' bgs on screen)
		+ 10' + 10' + 10' + 5' + 5' → top = 40' blank (65.4 total).
0708		Start pouring 3/8" pel-plug bentonite pellets Centralizers on end cap + 6ft above screen
0714		Backpull drive casing
0719		Drive casing stickup = 4.3' (remove 5' drive casing section)
0722		Lower screen section + end cap in hole
0726		Attach 20' blank and secure ERT/thermistor at 33.5' on screen.
		ERT # 0024
0733		Attach 2nd 20' blank section, secure ERT/Therm string.
0740		Position well casing in hole - 9' current stickup - bottom 56.4'
0741		Start pouring 10-20 sand
0747		Added 6 bags - Start backpulling casing
0757		Remove 10' drive casing - 50.7' remaining
0758		Remove 5' PVC blank from top of well = 4' stickup
0759		Tag on sand at 42.3' - bottom casing at 45.7'
0804		Start surge on lower screen interval.
0820		Stop surge - Tag sand at 42.7'
0829		Added 4 bags Tag at 24.3'

Reported By: Lee Brandhuber		Reviewed By: Joe Fritz	
Title: Geologist	Date: 7/24/08	Title: Geologist	Date: 8/13/08
Signature: Lee Brandhuber		Signature: Joe Fritz	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 7/24/08

Well Name: 399-2-11 | Well ID: C 6188

Location: 300-FF-5 | Continuation of Report No.: 3

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
0832		Start backpull on ~~sand~~ drive casing
		remove 10' drive casing = 40.7' total, Stickup = 5.1'
0842		Tag on sand at 28.5'. Start surge.
0855		Tag on sand at 29.4' during surge
0903		Tag on sand at 29.7'
0911		Tag on Sand at 29.8'
0915		Tag on Sand at 30.1'
0923		Tag on Sand at 30.2'
0930		Tag on Sand at 30.3'
0939		Tag on Sand at 30.5'
0950		Tag at 30.7'
0954		Tag at 30.7'. Stabilized and Surge.
0959		Add 10-20 Sand 1/2 bag, tg at 29'
1000		Add 40-140 Sand
1002		Tag 21.1 after 2 bags 40-140
1004		Backpull drive casing
1011		Remove 10' drive casing. 30.7' remaining
1012		Measure sand at 25.3
1021		Backpull and remove 10' drive casing. 20.7' remaining
1023		Tag sand (40-140) at 18.4', BOC at 15.8
1024		Add 40-140 (4 bags). Tag at 10.2'
1026		Start adding bentonite chips.
1029		Tag at 5.7 after 1 bag chips
1031		Backpull and remove 10' casing. 10.7' remaining.
1037		Tag after adding chips at 3.1.
1040		Add 3 bags 40-140 to stabilized top of hole
1041		Remove last casing string. Start breakdown at site
1220		Move Jackstand off. Start set on new location C6205
		23 7-24-08

Reported By: Lee Brouillard | Reviewed By: Joe Fritts

Title: Geologist | Date: 7/24/08 | Title: Geologist | Date: 8/13/08

Signature: Lee Brouillard | Signature: Joe Fritts

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 8-1-08

Well Name: 399-2-11 | Well ID: C6188

Location: 300-FF-5 OU | Report No.: 4

Start	Finish	Total
Time 1230	Time 1450	Time 3hr 20min
Hole Depth/Csg 56.5 / -	Hole Depth/Csg - / -	Hole Depth/Csg - / -

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ See Report No. 1

Rod Size: Screen: 31-56

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1230		Move over hole. Tag: DTB: 56.5 bgs. DTW: 30.1 bgs.
1231		Trip in pump & Tremmie. Set intake @ 41.3' bgs.
		Transducer @ 37.3' bgs.
1315		Start Drawdown Test
		xDI: 6.69

		xD (ft)	Turb (NTU)	Temp (°C)	DO (mg/L)	Cond. (mS)	pH	Notes:
1315		6.65	43.3	22.0	8.31	0.505	7.68	50 gpm
1325		6.63	11.2	20.0	8.31	0.505	7.60	50 gpm
1330		6.65	5.74	19.0	8.46	0.505	7.95	"
1335		6.64	2.79	18.3	8.60	0.504	7.55	"
1340		6.63	2.05	18.3	8.54	0.503	7.55	50 gpm
1345		6.64	1.28	18.4	8.62	0.506	7.57	"
1350	Stop test	6.64	0.85	18.2	8.59	0.507	7.52	"
		Start recovery on Test #2 Contractor lifted probe momentarily.						
1417		lower intake of pump to 51.0' bgs & Start Development of lower interval.						
1418		6.70	123	20.0	8.42	0.502	7.62	87 gpm
1423		6.70	27.4	18.6	8.78	0.504	7.64	
1425		6.710	16.5	18.4	9.00	0.506	7.67	
1427	1430	6.698	6.29	18.2	9.00	0.504	7.67	
1430	1438	pump shut off @ 1430, begin recovery test						
1438		Pull pump & Tremmie.						
1453		Tag DTB: 57.5 bgs DTW: ~~30.5~~ 30.1 - Move to next well.						
	1450	RCT's on site to check cable on pump rig. Readings: ≤ Bkgnd w/ ~~G~~ Thermo						

Reported By: A. Lanham | Title: Geologist | Date: 8-1-08 | Signature: Lanham

Reviewed By: Joe Fritz | Title: Geologist | Date: 8/13/08 | Signature: Joe Fritz

A-6003-651 (REV 1)

WELL DEVELOPMENT AND TESTING DATA

Well Name: 399-2-11 (399-3-28 A) 8-1-08	Well ID: C6188	Well Location: 300-FF-04	Date: 8-1-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ○ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	30.1
End of Job	30.1

DEPTH TO BOTTOM:

Start of Job	56.5'
End of Job	56.5

PART 2

WELL DEVELOPMENT DATA

Pump Model Grundfos 75S-50

Intake Depth T_1: 41.3 / T_2: 51.3

Starting Turbidity T_1: 43.3 / T_2: 123

Pump Start	Stop	Flow Rate
13:15:44	13:48:35 (T_1)	50 gpm (T_1)
13:48:35	14:07:52 (T_1)	Recovery (T_1)
1417	1438 (T_2)	Drawdown ~87 gpm

Total Pumped 3500 gal

Final Turbidity T_1: 6.64 / T_2: 6.29

XD SN/Range (PSI) 5217 (20 psi)

PART 3

INSTANTANEOUS SLUG TEST

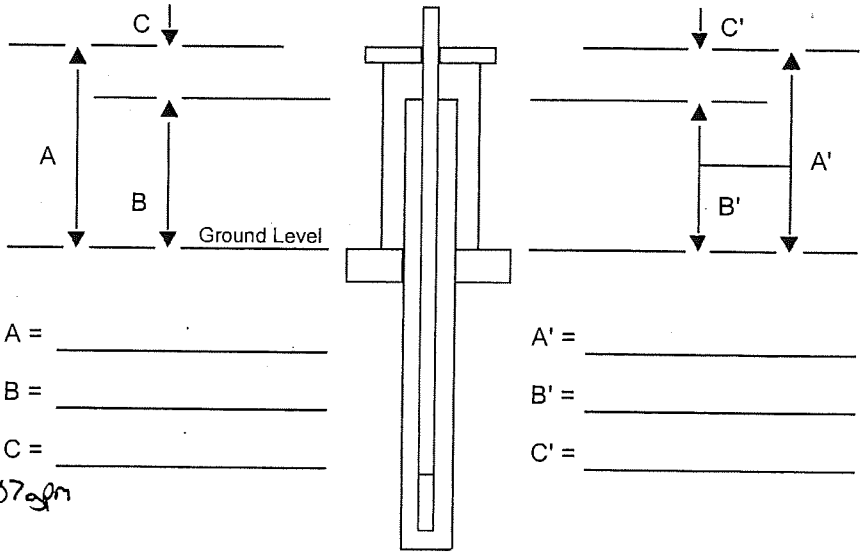
Static Water Level (TOC)	
Transducer Depth	T_1: 37.3 / T_2: 37.3
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Flush w/ Surface. Well Head

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: HERMIT Jeff H3K-4538

XD_I: 6.69

Drawdown on Test #1 (T_1)

Recovery on Test #2

XD_F: 6.69

Prepared by (print name): A. Lantow	Signature: Aaron Lantow	Date: 8-1-08
Reviewed by (print name): Joe Fritz	Signature: Joe Fritz	Date: 8/13/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 2

Date: 6/17/08

Purpose: PNNL Project 300 Area IFC | Location: 300-FF-5

Well ID: C6189 | Well Name: 399-2-12

Drilling Co.: WDC | Driller: Mike Wilkerson | Rig No.: 139 | Rig Make/Mod.: SuperSonic

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 7/8" 6 3/4" ID	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ (Thd.)	A.R. w/Sonic SuperSonic	Drill Pipe O.D. N/A	Model
Planned / Actual	Geoprobe RS400	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic N/A	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water: 26'

Reported By: Joe Fritz

Name/Title: GRAM Inc Geologist

Signature: [signature] Date: 6/17/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 6/17/08

Well Name: 399-2-12 | Well ID: C6189

Location: 200-FF-5 | Report No.: 1

Start	Finish	Total
Time 1200	Time 1630	Time 4.5
Hole Depth/Csg 0 / 0	Hole Depth/Csg 25 / 15	Hole Depth/Csg 25 / 15

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1200	1340	Set up rig & equipment. Set to go.
1340		Advance 4" split spoon (SS) 0-5' - recover 1-4' and collect 4 ~~SS~~ at 1350 6/17/08 Lexan liner (LL) at 1350.
		Advance SS 5-10' - recover 5-10' & collect 5 LL at
	1410	1405 - clean out to 5' - Add bit & casing (10.7')
1410	1430	Casing to 5' - clean out to 10'
1430		Advance SS 10-15' - recover 10-15' - collect 5 LL at 1440
	1515	Advance SS 15-20' - recover 15-19' & collect 4 LL at 1500
1515		Go in w/ 6" OB to clean out - clean out w/ 20' OB
	1530	PM FIH ck, < 0 kg. Add 10' casing (20.7) - advance to 15'
1530		Go in w/ 20' OB to clean out
		PM RCT ck, < 0 kg, clean out to 20 Ft.
		Advance SS 20-25' - recover 20-22' and collect 2 LL
	1600	at 1555
1600	1630	rig maintenance - to office

Not used 6/17/08

Reported By: Joe Fitz		Reviewed By: L.S. Walker	
Title: Geologist	Date: 6/17/08	Title: Geologist	Date: 6/26/08
Signature:		Signature:	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 6/18/08

Well Name: 399-2-12	Well ID: C6189
Location: 300-FF-5	Report No.: 2

Start	Finish	Total
Time 0600	Time 1130	Time 5.5
Hole Depth/Csg 25 / 15	Hole Depth/Csg 65 / 59	Hole Depth/Csg 40 / 44

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: 7 5/8" OD casing
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, drill crew, geologists
0630	0650	To site - warm equipment, perform inspections.
0650		Resume - advance SS 25-30 - recover 25-27.1 and
		collect 3 LL at 0700. Clean out w/ DB to 25 Ft.
		Add 10' casing - advance to 25' (30.7' on)
	0720	clean out to 30' - silty gravel
0720		Advance SS 30-35 - very wet - recover 30.-30.6 -
		spoon blocked off with 4" cobble - ~~clean out w/6" DB~~
		collect 1 LL at 0740. JW 6/18/08
		Add 10' casing (40.7) - advance to 35' - while advancing DB -
		DB to 35' - DB empty - tag at 35' - must of pushed
	0750	material into Formation - N & recovery
0750		Advance SS 35-40 - recover 35-35.5 + collect 1 LL at 0805
		Am RCT ck, < Bkg. Advance SS 40-45 - recover
	0825	40-42.6 & collect 3 LL at 0820.
0825		Add (2) 5' casing (50.7) & advance w/ DB to 45 Ft.
		Poor recovery w/ SS - so collected GS. Advanced DB 35-45 -
	0900	recovered 35-40' & collected 3 GS at 0835
0900		Casing at ~~50~~ JW 6/18/08 45' - advance SS 45-50 - recover 45-48
	0920	& collect 3 LL at 0915.
0920		Advance SS 50-55 & recover 50-55 - collect 5 LL
		at 0930 Add 2(5') casing 60.7 - advance to 55 -
		Clean out w/ DB 50-55 - silt at 52' - I suspect lost spoon
	0930	was mainly clean-out of the sand - also heaving sand.

Reported By: Jac Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/18/08	Title: Geologist	Date: 6/26/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 6/13/08

Well Name: 399-2-12 | Well ID: C6199

Location: 300 - FF - 5 | Continuation of Report No.: 2

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
0930		- cleaned out to 55 - advance SS 55-60 all oxidized silt. Recovered 55-60 - collect SLL at 1000. Discuss contact w/ driller - we feel the OB was more accurate in this case - contact w/ silt at 52. - tag bottom at 59 - so the 55-60' SS is true - oxidized silt. Discuss w/ PNNL (Jake) decide to run a SS 60-65 to confirm/verify reduced boundary. ↑MID ck - Detect
	1025	
1025 -		Casing at 59' - clean out w/ OB to 60'. Reduced silt in bottom of OB run - suspect it is smelling a boundary is at ≈ 59.5'. Discuss w/ PNNL (Bruce B) and he requests we run a SS 60-65' to confirm. Advance SS 60-65 & collect 4 LL at
	1055	1055 - (64-65' LL was damaged & therefore discarded).
1055		Casing to 59' - total depth 65'.
	1130	To training rest of day

Reported By: Joe Fritz | Reviewed By: L.D. Walker

Title: Geologist | Date: 6/18/08 | Title: Geologist | Date: 6/26/08

Signature: | Signature:

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/25/2008

Well Name: 399-2-12 | Well ID: C6189

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 1230	Time 1345	Time 1.25 hrs
Hole Depth/Csg 61 / 59	Hole Depth/Csg 58.0 / 55	Hole Depth/Csg 2.0 / 4.0

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: (A1) 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1230	1305	Setting up rig & jacks on borehole, prep for completion;
1305	324	setting casing shoe to top of bent. depth;
1324		cannot get ERTs for well, will have to wait until PNNL
	1345	personnel can set them up; geo departs for office

Not Used 06/25/08

Reported By: S. Sexton

Title: Geologist | Date: 6/25/08

Signature:

Reviewed By: Joe Fitts

Title: Geologist | Date: 8/6/08

Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 06/26/2008

Well Name: 399-2-12 | Well ID: C6189

Location: 300-FF-5 OU | Report No.: 4

Start	Finish	Total
Time 0600	Time 1545	Time 9.75 hrs
Hole Depth/Csg 58.0 / 55	Hole Depth/Csg Ø / Ø	Hole Depth/Csg 58 / 55

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: #1: 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD @ 300 Areas; 50°, clear, light wind
0630		Setting rig up on borehole, awaiting for PNNL personnel
	0713	to proceed, still need ERTs for this well;
0713		begin tripping in screen 0.3' cap + 10.0 + 10.0; add 5.0' screen + 10.0' casing; ERTs + thermistors taped 2.5'
		below top of screen; + 10.0 + 10.0 = 25.3' screen +
	0755	30.0' casing blank; +10' blank = 65.3' total
0755		begin well completion, see pgs 1-2; bottom of perm.
		screen set @ 56.3' bgs, sensors @ 53.5' bgs; added
		1 bag 10-20 silica sand 3.0' to surface to prevent
	1138	cave in + to hydrate 40-140 sand;
1138		discussing plan of action w/ BTR + drilling supervisor,
	1155	will move jacks and get rig ready for completion;
1155	1225	Lunch
1225		setting rig on well, bailing well + prep for
	1316	development; Pump: Grundfos 75 S-50 8 stage
1316		Calibrating field instruments Motor: Franklin Electric 5hp

	known	read	w/in 10%
turb.	482	479	Y
	50.9	51.1	Y
	4.54 4.45	4.87	Y
pH	4.00	3.94	Y
	10.00	10.30	Y
Cond.	1413	1415	Y

Reported By: S. Sexton		Reviewed By: Joe Fritz	
Title: Geologist	Date: 6/26/08	Title: Geologist	Date: 8/6/08
Signature:		Signature:	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 06/26/2008

Well Name: 399-2-12 | Well ID: C6189

Location: 300-FF-5 OU | Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1337	/	begin test #1: Pump on @ 1339
/	/	Parameters:
/	/	Turb(NTU) pH cond.(µS) D/o(Mg/L) Temp(°C.) xD(ft)
1343		616.0 7.71 434 7.30 19.5 2.662
1347		14.2 7.60 428 7.99 18.7 2.692
1351		10.8 7.65 423 8.28 18.1 2.684
1354		7.33 7.64 422 8.33 18.5 2.657
1358		5.68 7.64 423 8.38 18.0 2.684
1402		4.52 7.64 423 8.44 18.0 2.688
1405	1409	3.38 7.63 423 8.47 18.1 2.679
1409	1422	end pump test #1: begin recovery;
1422	1431	lower in take 10', prep for test #2
1431	/	begin test #2: recorded on 5217, pump on @ 1431
/	/	Parameters:
/	/	Turb. pH Cond. D/o Temp. xD
1433		152 7.67 413 8.11 18.8 2.801
1435		37.2 7.72 414 8.41 17.9 2.786
1438		18.7 7.71 414 8.52 17.8 2.792
1441		12.2 7.68 413 8.57 17.8 2.801
1443		9.66 7.69 412 8.62 17.8 2.795
1446	1448	7.15 7.67 414 8.61 18.2 2.801
1448	1501	end drawdown test, begin recovery test
1501	1545	breakdown rig and move to next development hole

Not Used 06/26/08

Reported By: S. Sexton | Reviewed By: Joe Fitts

Title: Geologist | Date: | Title: Geologist | Date: 8/6/08

Signature: | Signature:

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-12	C6189	300-FF-5 OU	6/26/2008

Reference Measuring Point (unless otherwise noted): ~~TOP OF OUTER CASING (TOC)~~ bgs 6-26-08

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job	26.5' bgs
End of Job	26.35'

DEPTH TO BOTTOM:

Start of Job	56.6' bgs
End of Job	56.3'

PART 2

WELL DEVELOPMENT DATA

Pump Model	758-SO
Intake Depth	46.0 / 50.0
Starting Turbidity	66.0 / 152

Pump Start	Stop	Flow Rate
1339	1409	50-55
1431	1448	85

Total Pumped	1392 / 1442
Final Turbidity	3.38 / 7.15
XD SN/Range (PSI)	5217 / 20.0

PART 3

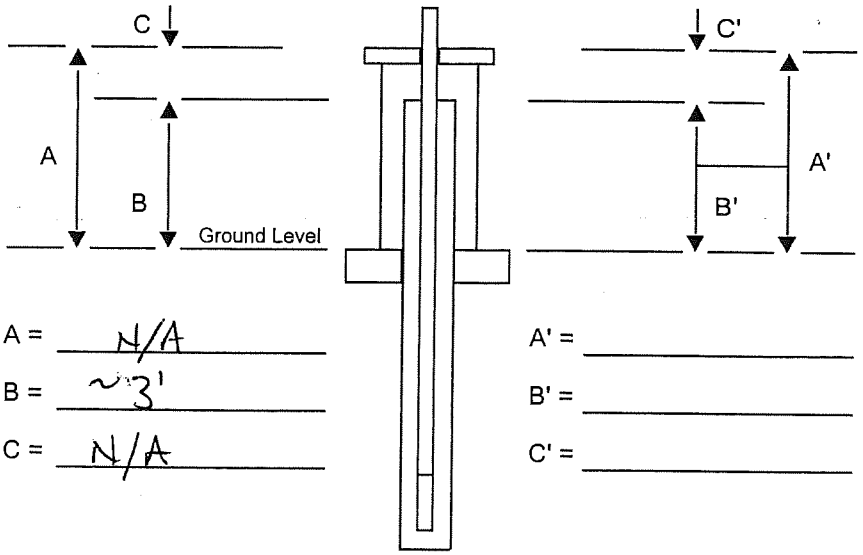
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 6/26/08

Current Measurements Date:



A = N/A

B = ~3'

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

meter: 24389

Test #1: xDi: 3.078

xDf: 3.107

meter: 25781

Test #2: xDi: 3.127

xDf: 3.154

meter: 27223

Perm. casing will be cut to 0.5' bgs following development.

Prepared by (print name): S. Sexton	Signature:	Date: 06/26/08
Reviewed by (print name): Joe Fritts	Signature:	Date: 8/6/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 5/22/08

Purpose: PNNL Project 300 Area IFC

Location: 300-FF-5-OU

Well ID: C6190

Well Name: 399-2-13

Drilling Co.: WDC Driller Mike Wilkerson

Rig No.: 139

Rig Make/Mod.: Super Sonic 2

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 8" OD, 6 7/8" ID	Auger ____	Air ____ Water/Mud ____	Make ____
Grade	Rotary ____	Reverse ____ Direct ____	Model ____
Lbs.Per Ft. ____	Tubex ____	Vol: cfm ____	Choke ____
Material carbon steel	Cable Tool ____	gpm ____	Casing Hammer
Type:	Sonic Super Sonic 2	Pressure ____ psi	Make ____
Welded ____ Thd	A.R. w/Sonic RS 400	Drill Pipe O.D. N/A	Model ____
Planned / Actual	Geoprobe ____	Tool Joint Size N/A	Bit Size
Set At: — / 57	Other: ____	Additives ____	Type ____
Shoe OD/ID ____	& built by Gus Pech	____	Nozzles ____
Reference Measuring Point:	____	____	Rod Size
GROUND LEVEL	____	____	____

Drig. Co. ____ Rig No.: ____ Rig Make/Mod.: ____

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size ____	Auger ____	Air ____ Water/Mud ____	Make ____
Grade	Rotary ____	Reverse ____ Direct ____	Model ____
Lbs.Per Ft. ____	Tubex ____	Vol: cfm ____	Choke ____
Material ____	Cable Tool ____	gpm ____	Casing Hammer
Type:	Sonic ____	Pressure ____ psi	Make ____
Welded ____ Thd.	A.R. w/Sonic N/A	Drill Pipe O.D. ____	Model ____
Planned / Actual	Geoprobe ____	Tool Joint Size ____	Bit Size
Set ____ / ____	Other: ____	Additives ____	Type ____
Shoe OD/ID ____	____	____	Nozzles ____
Reference Measuring Point:	____	____	Rod Size
GROUND LEVEL	____	____	____

Comments/Remarks:

Estimated Depth to Water

Reported By: Joe Fitz

Name/Title: GRAM Inc Geologist

Signature: [signature]

Date: 5/22/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 3

Date: 5/22/08

Well Name: 399-2-13	Well ID: C6190
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 0600	Time 1640	Time 10.5
Hole Depth/Csg 0 / 0	Hole Depth/Csg 62.6 / 57	Hole Depth/Csg 62.6 / 57

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0620	Attend POD with BTR, Drillcrew, RCT, geologists.
0620		To site - 49°, partly cloudy. Finish setting up on
		Next hole - C6190. - 60' casing on pipe truck -
	0745	move drums, equipment
0745		Start with SS Advance SS, 0-5' - recover
		0-3' - collect 3 lexan liners at 0800.
		Advance SS 5-10' - recover 5-8' -
		and collect 3 liners at 0815
	0815	Clean out w/ 6" Drive barrel
0815		Hole caving - Add shoe & casing (10.70')
		0840 - trouble keeping open - add ≈ 2 gals water
		0850 - refusal at 5' - large cobble.
		0905 - Added ≈100 gals water - drilling w/ shoe (casing) -
		still No progress - at 5 Ft - pull casing out
	0925	waiting on OK to move rig. AM, RCT ck, C Detect
0925	0945	Plan is to move rig (borehole) 18"
0945		AM IH ck, C detect. Move hole 18" to the east -
		start w/ casing - No samples 0-10'. 10.7' casing on -
	1005	casing to 10 Ft
1005		Tag at 7 Ft - clean out w/ 6" DB, casing up to 8' -
		Advance SS 10-15 Ft - recover 10-13' - collect 3 liners
		at 10:25. Advance SS 15-20 recover 15.5-17' -
	1035	collect 3 lexan liners at 1035 - Tag at 19.5'
1035		Advance SS 19.5-24.5 recover 19.5-20.5 collect.

Reported By: Jon Fritz		Reviewed By: L.D. Walker	
Title: Geologist	Date: 5/22/08	Title: Geologist	Date: 5/23/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING
Continuation Page

Date: 5/22/08

Well Name: 399-2-13 | Well ID: C6190

Location: 300-FF-5 | Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
	1050	1 lexan liner at 1050
1050		Add 10.0' casing (20.7') Add 10.0' casing (30.7')
		Tag at 19.1 - tag clean ; tool - barrel came up dry and
	1115	empty - tag at 25Ft - Add 2 gals water - casing at 25Ft
1115		Drive ~~of stuck~~ DB to 25' - came up empty again -
	1120	tag at 24' - will try SS
1120		Drive SS 24-29 - recover 24-25 - collect 1 (wet)
	1145	lexan liner at 1135 - tag at 29Ft - 5" rock stuck in SS
1145	1215	Lunch
1215		tag at 29Ft. Advance sgow 29-34Ft. recover
		29-31.5 - collect 3 lexan liners at 1255
	1310	Add 10.0' casing (40.70) - Tag at 29.5 - casing at 35'
1310		Clean out w/ 6" DB 29.5-35 - Ø in barrel.
	1330	tag at 30Ft - DB 30-35 - collect 3 gallons sand
1330	1340	to at 35 - casing at 35
1340		Advance SS 33 - 38' - recover 33-34' - 5" cobble
		stuck in end of ~~barrel~~ DP 5/22/08 SS. - collect 1 lexan
	1400	liner at 1400. Casing at 35.
1400		Advance SS 38 - 43' recover 38-43 - collect 5
		liners at 1415 Tag at 39.2
		Add 10.0' (50.70) - casing to 45Ft. - DB to 45 -
		= 44-45 sandy gravel - call silt 40-44Ft. Tag at
	1440	45.3
1440		SS 45-50 - recover Ø - Add 10' casing. (60.70)
		casing to ~~56~~ DP 5/22/08 ~~57~~ gals 5/22/08 Advance 52-57' SS -
	1520	recover 52-57 & collect ~~5 liners~~ at 1520. Silt at 54Ft.
1520		Advance SS 57-62Ft - recover 57-62 and collect
		5 lexan liners at 1550. - reduced silt. Clean out
	1600	with 6" - tag at 62.6, casing at 57

Reported By: Janet Iltis | Reviewed By: L. D. Walker

Title: Geologist | Date: 5/22/08 | Title: Geologist | Date: 5/23/08

Signature: Janet Iltis | Signature: L D Walker

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 3 of 3

Date: 5/22/08

Well Name: 399-2-13	Well ID: C6190
Location: 300-FF-5	Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1600		cleaning up site - Moving to next location.
	1640	To office

5/22/08 Not used

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 5/22/08	Title: Geologist	Date: 5/23/08
Signature: [signature]		Signature: [signature]	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 05/30/2008

Well Name: 399-2-13 | Well ID: C6190

Location: 300-FF-5 | Report No.: 2

Start	Finish	Total
Time 1330	Time 1545	Time 2.25 hrs
Hole Depth/Csg 62.3 / 57.2	Hole Depth/Csg 56.6 / 55.7	Hole Depth/Csg 5.7 / 1.5

Reference Measuring Point: GROUND SURFACE

Casing String No. ① 2 3 4 ____ Rod Size: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1330	1405	setting rig + jacks on hole;
1405	1435	Drillers to late lunch;
1435		will add 5' casing to backpull + add bentonite to screen
	1513	depth, cannot get ERTs + thermistors today. DTB=67.1 -
	SMS 5-30-08 1502	stkup (4.8) = 62.3' bgs DTW = 31.67 - 4.8 = 26.87' bgs
SMS 5-30-08 1502	1528	Begin completion, see completion pgs 1
1513 1528		cannot get ERTs + thermistors until monday, will continue
	1540	completion activities monday 06/02
1540	1545	Geo finishes paperwork + departs for office

Not used 05/30/08

Reported By: S. Sexton

Title: Geologist | Date: 05/30/08

Signature: S. M. Sexton

Reviewed By: Jeff Griffith

Title: Geologist | Date: 8/7/08

Signature: Jeff

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 6/2/08

Well Name: 399-2-13 | Well ID: 6190

Location: 300-FF-5 | Report No.: 3

Start	Finish	Total
Time 0600	Time 1255	Time 6 hrs 55 min
Hole Depth/Csg 56.5 / 55.7	Hole Depth/Csg 3.0 / 0	Hole Depth/Csg - / -

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) (2) 3 4 ____ See Report No. 1

Rod Size 5/8" 6" 4" ID PVC

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	PTD @ 300 Area
0630		Driller setting up rig on borehole - DTW = 26.4'
0738		Trip screen in hole
0748		Tape ~~etc~~ ERT and thermistor 2.5' ~~BGS~~ BWT down from top of screen
0755		Continue tripping permanent well in hole - Bottom set @ 56.5' bgs
0820		Resume well completion. (Refer to well completion log - pg. 1)
0900		Remove 10.00' temp casing
0918	0933	Start surging 1st interval From 56.0' to 45.6'
0933		Resume well completion
1015		Start surging 2nd interval From 45.6'
1020		RCT surveys pulled casing; ≤ bkgd
1025		Add sand
1057		Stop surging - Resume well completion
1130		Lunch
1200	1255	Resume well completion -
1255		Move to C6197

Not Used 6/2/08

Reported By: J. Throolin | Reviewed By: [illegible]

Title: Geologist | Date: 6/2/08 | Title: Geologist | Date: 8/7/08

Signature: [signature] | Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 6/5/08

Well Name: 399-2-13	Well ID: C6190
Location: 300-FF-5	Report No.: 4

Start	Finish	Total
Time 1500	Time 1600	Time 1
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size:
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1500		Set-up at location DTW 28.80 Fb toc,
	1505	TD, 59.20 Fb toc, stick-up 2.8'
1505		Swab well screen
		Installed depth of well is 59.3 Fb toc, so very
		little sediment in well. SC 34-59' so will start
		with pump at 40ft
		1520 - XD 5218 is in well C6197. - XD 16.018
	1525	1505-1525 swabbed well
1525	1540	Bail well w/ 5' bailer - 35 gals
1540		16.023 on C6197 XD. Swabbing and bailing completed -
		will finish development tomorrow.
	1600	To office

Not used

6/5/08

Reported By: Joe Fritts	Reviewed By: DC Weekes
Title: Geologist Date: 6/5/08	Title: Geologist Date: 8/12/08
Signature: [signature]	Signature: DC Weekes

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 6/6/08

Well Name: 399-2-13 | Well ID: C6190

Location: 300-FF-5 | Report No.: 5

Start	Finish	Total
Time 0600	Time 1030	Time 4.5
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ Rod Size:
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, drillcrew
0630		To site, partly cloudy, breezy, 48°
		DTW 29.15 Fbtoc. Will start with pump at ≈40ft
		Using kit #7, conductivity meter - LaSekd Kit #3
		Turbidity Known Reading
		4.45 4.21
		50.9 50.5
		482 484
		pH 7.00 7.05
		10.00 10.15
		conductivity 1413 1424
		(microseimens)
		XD 5218 in C6197 reading 15.736
		YD 5217 in pump well C6190
		Tests will be Layla WD9 for drawdown and Layla WD10
		for recovery.
	0720	Pump at 39.6 Fbgs - sc 34-59' - so YD about 11' below
		water - wait for XD to stabilize.
		See pg 2 for DATA
		not used JLL 6/6/08

Reported By: Joe Fritts | Reviewed By: DC Weekes

Title: Geologist | Date: 6/6/08 | Title: Geologist | Date: 8/12/08

Signature: JLL | Signature: DC Weekes

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 6/6/08

Well Name: 399-2-13	Well ID: C6190
Location: 300-FF-5	Continuation of Report No.: 5

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		Pumpwell DATA Turbid DO
		XD GPM Flowmeter pH Ec T°C NTU mg/L XD
		5217 GPM MS 5218
		Pump at 39.6 Ftbgs
Initial	0741	11.090 53 9655 0741 - pump ON 15.742
		Initial 53 gpm.
	0747	10.844 49 295 7.55 0.436 17.0 16.9 9.34 15.745
	0755	10.826 52 710 7.68 0.431 11.7 4.48 9.40 15.746
	0805	10.827 50 1200 7.68 0.430 16.7 2.57 9.53 15.740
		stop pump at 0805
	0808	11.094 Lower pump to 49.6 Fbgs
	Initial	21.101 10855 start at 0830 15.749
	0830	60 gpm initial Start test Layla WD9.
	0840	21.056 60g 1795 7.78 0.445 16.7 6.49 9.33 15.749
	0846	21.056 2125 7.77 0.456 16.2 3.86 9.28
		Increase pump rate to max - 70 gpm
	0850	21.068 80 2445 15.752
	0855	21.050 80 2845 7.79 0.450 16.4 5.09 9.42 15.749
	0858	21.062 80 3115 7.79 0.447 16.2 3.34 9.32
	0859	stop Pump and Layla WD9 - start Layla WD10
	0901	21.095
	0914	21.100 15.757
	0919	21.103
	0924	21.112 15.757
	0930	21.109 Stop Test Layla WD10
	0955	- Pump out of well.
	0958	DTW 29.15 Ftbtoc, TD 59.20
	1030	- mob from well -
		[signature] 6/6/08 notified

Reported By: Joe Fritts		Reviewed By: DC Weekes	
Title: Geologist	Date: 6/6/08	Title: Geologist	Date: 8/12/08
Signature: [signature]		Signature: [signature]	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Date: 6/13/08

Purpose: PNNL Project 300 Area FFC | Location: 300 – FF-5-04

Well ID: C6191 | Well Name: 399-2-14

Drilling Co.: WDC Mike Wilkerson | Rig No.: 139 | Rig Make/Mod.: Super Sonic

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8" OD 6 3/8" ID	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon Steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic 2	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic RS400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size N/A	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic N/A	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Comments/Remarks: Driller: Bill Zamow

Estimated Depth to Water

Reported By: Joe Fritz

Name/Title: PNNL Ecologist

Signature: Joe Fritz Date: 6/13/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 6/13/08

Well Name: 399-2-14	Well ID: C6191
Location: 300-FF-5-OU	Report No.: 1

Start	Finish	Total
Time 1100	Time 1615	Time 5.3
Hole Depth/Csg 0 / 0	Hole Depth/Csg 55 / 55	Hole Depth/Csg 55 / 55

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1100	1235	mob to site - setup to drill
1235		Advance DB 0-5' - ~~record~~ 4 GS per 6/13/08 recovr
		0-5' - collect 4 GS at 1245.
		Advance DB 5-10' - recovr 5-10' - collect 2
		GS at 1255 - top 2 sloughy - only sample 8-8'
	1300	Add shoe & casing (10.7) - and advance to 5 Ft
1300		Advance DB 10-15 & recover 10-15 - collect 4 GS
		at 1310. Add 10' casing (20.7) - advance to 15'
		Advance 15-20' - recovr 15-19.5 and collect 3 GS
		at 1320.
		Advance 20-25 - recovr 20-25 & collect 5 GS 6/13/08
	1330	at 1330 ~~Add 10' casing (30.7) advance to 25 Ft.~~
1330		Clean out to 25 Ft - Advance casing 25-30
	1400	and recovr 25-30 - collect 5 GS at 1355.
1400		Water at ~26' - switch hoppers.
		Add 10' casing (30.7) and advance to 25 - we were
	1430	opening hole drilling. clean to to 30 Ft.
1430		Advance DB 30-35 - recovr 30-35 & collect 4
	1450	GS at 1445 - Add 10' (40.7) - advance to 35.
1450		Clean out 30-35' - Advance DB 35-45 & recovr
		35-45' - collect 6 GS at 1510 - Add 10' casing
	1515	(50.7) - Advance to 45' - clean out to 45.
1515		Advance DB 45-55 - recovr 45-53.5 - collect
	1545	4 samples at 1540.

Reported By: Joe Fritz		Reviewed By: L.S. Walker	
Title: Geologist	Date: 6/13/08	Title: Geologist	Date: 6/26/08
Signature:		Signature:	

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 3 of 3

Date: 6/13/08

Well Name: 399-2-14 | Well ID: C6191

Location: 300-FF-5 | Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1545		Add (2) 5' casing (60.7) - advance casing to 55ft - clean out to 55 ft.
		Will TD tomorrow.
	1630	To office

Not used

6/13/08

Reported By: JA Fitts | Reviewed By: L.D. Walker

Title: Geologist | Date: 6/13/08 | Title: Geologist | Date: 6/26/08

Signature: JA Fitts | Signature: LD Walker

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 6/16/08

Well Name: 399-2-14 | Well ID: C6191

Location: 300-FF-5 | Report No.: 2

Start	Finish	Total
Time 0600	Time 0730	Time 1.5
Hole Depth/Csg 55 / 55	Hole Depth/Csg 58.5 / 56	Hole Depth/Csg 3.5 / 1

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: (1) 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend PDD with BTR, RCT, Drill crew + geo.
0630	0650	To site - 54° clear, light breeze. Resume from 55'
0650		Advance OB 55-60 - recover 55-60 + collect 3 GS
		at 0710. brn silt 52-57.5, gray 57.5-60
		Advance casing to 56', borehole to 58.5
	0730	Total Depth - move off hole to 6200
0730		

Not used

Reported By: Joe Fitts

Title: Geologist | Date: 6/16/08

Signature: Joe Fitts

Reviewed By: L.D. Walker

Title: Geologist | Date: 6/26/08

Signature: LD Walker

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/18/2008

Well Name: 399-2-14	Well ID: C6191
Location: 300-FF-5 OU	Report No.: 3

Start	Finish	Total
Time 1000	Time 1100	Time 1.0 hrs
Hole Depth/Csg 58.5 / 56	Hole Depth/Csg 54.2 / 52	Hole Depth/Csg 4.3 / 4.0

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 ____ Rod Size: #1: 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1000	1030	setting up on borehole, prep for completion;
1030		begin completion, see well completion log pg 1- ; driller
		pulled casing too high, did not tag before pulling;
		screen is to be set @ 56.3' bgs, but hole is
		at 54.2'; will need to move sonic rig back to
	1043	hole to clean out
1043	1100	drillers move jacks + completion rig off hole

Not Used 06/18/08

Reported By: S. Sexton		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/18/08	Title: Geologist	Date: 6/26/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/20/2008

Well Name: 399-2-14 | Well ID: C6191

Location: 300-FF-5 OU | Report No.: 4

Start	Finish	Total
Time 0600	Time 1630	Time 16.5 hrs
Hole Depth/Csg 61.7 / 57	Hole Depth/Csg 29 / 35.0	Hole Depth/Csg 32.7 / 22

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1 | Rod Size: #1: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD @ 300 Area (BTR, Drillers, Geos); 53° clear, no wind
0630		Waiting for helper to finish AM training, driller will
		stamp wells that are finished; IH check @ 0905,
	1100	readings non-detect
1100	1154	setting jacks & rig on hole
1154		begin well completion, see pgs 1-1; begin trip-in perm. pvc
		20 slot screen & casing @ 1202 (10' + 10' + 0.3') + 5' =
		25.0' screen + 0.3' sump; 10' casing + 10' + 10' + 10' = 40' perm
		pvc screen, 65.3' total on string; thermistors & EARTs
	1245	set at 33.5' bgs; bottom of sump @ 56.0' bgs
1245	1317	Lunch
1317	1620	resume completion
1620		drillers pack up for day, will have to resume surging
		sand pack on Monday, well is taking lots of
	1630	sand; geo finishes pw & departs @ 1630

Not Used 6-20-08

Reported By: S. Sexton | Reviewed By: Joe Fritts

Title: Geologist | Date: 6/20/08 | Title: Geologist | Date: 6/6/08

Signature: | Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 06/23/2008

Well Name: 399-2-14 | Well ID: C6191

Location: 300-FF-5 OU | Report No.: 5

Start	Finish	Total
Time 0700	Time 1200	Time 5.0 hrs
Hole Depth/Csg 31 / 35	Hole Depth/Csg 3 / 0	Hole Depth/Csg 28 / 35

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ Rod Size: #1: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0700		geo arrives on-site, completions rig setup, begin surging sand pack; see well completion pgs 1- ; RCT
	0846	scans casing on ground @ 0840, readings are non-detect
0846	0917	all temporary casing removed, prep to begin well develop.
0917		prep to bail well; begin calibrating development kit;
		Test Parameters — Pump info
		~~Fluids~~ known / read / w/in 10%
		Turb. 482 / 479 / Y — Pump: Grundfos 75S80
		8 stage
		50.9 / 50.8 / Y — Motor: Franklin Electric
		4.45 / 4.74 / Y — 5 hp for 50 gpm
		pH 4.00 / 4.01 / Y
		10.00 / 10.22 / Y
	0934	cond. 1413 / 1419 / Y
0934		trip-in pump & tremmie to 40.0' bgs; DTB = 56.0' bgs,
		DTW = 27.8' bgs
		Test #1: Pump on @ 1011; continuous @ 50 gpm

	Turb.	pH	cond.	D/O	temp	xD
1016	21.0	7.60	455	8.68	18.2	1.827
1021	6.44	7.56	454	8.84	17.6	1.834
1023	4.81	7.54	452	8.91	17.5	1.874
1027	2.66	7.54	452	8.89	17.5	1.845
1032	1.88	7.54	453	8.92	17.4	1.848
1036	1.77	7.52	453	8.91	17.5	1.846
1042	1052	Pump shut off, begin recovery test				

Reported By: S. Sexton | Reviewed By: Joe Fitts

Title: Geologist | Date: 6/23/08 | Title: Geologist | Date: 8/6/08

Signature: S. Sexton | Signature: Joe Fitts

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 06/23/2008

Well Name: 399-2-14 | Well ID: C6191

Location: 300-FF-5 OU | Continuation of Report No.: 5

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1052	1101	Lower intake to 50.0' bgs for test #2
1101		Test #2: Pump on @ 1101 continuous @ 84 gpm
		Parameters
		Turb / pH / cond. / DO / temp. / ORP
1105		5.01 / 7.64 / 445 / 8.66 / 17.8 / 1,818
1108		4.05 / 7.66 / 445 / 8.82 / 17.7 / 1,857
1110		3.42 / 7.70 / 446 / 8.93 / 17.4 / 1,851
1113		2.38 / 7.69 / 446 / 8.94 / 17.4 / 1,869
1115		1.95 / 7.67 / 446 / 8.92 / 17.6 / 1,876
1119		1.67 / 7.71 / 446 / 8.91 / 17.4 / 1,879
1120	1130	begin recovery test, pump shut off
1130		trip-out pipe & pump, moving rig & jacks to next well; completions rig & driller go to assist in changing hydraulic lines on sonic rig, geo waits on-site
	1200	

Not Used 6-23-08

Reported By: S. Sexton | Reviewed By: Joe Fritz

Title: Geologist | Date: 6/23/08 | Title: Geologist | Date: 8/6/08

Signature: | Signature:

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-14	C6191	300-FF-5 OU	06/23/2008

Reference Measuring Point (unless otherwise noted): ~~TOP OF OUTER CASING (TOC)~~

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No 6-23-08

PART 1

STATIC WATER LEVEL: bgs

Start of Job	27.9
End of Job	28.0

DEPTH TO BOTTOM: bgs

Start of Job	56.0
End of Job	56.0

PART 2

WELL DEVELOPMENT DATA

Pump Model	7SS-50
Intake Depth	46.0/50
Starting Turbidity	21.6/8.01

Pump Start	Stop	Flow Rate
1011	1042	50-55
1101	1120	82-85

Total Pumped	1550/1596
Final Turbidity	1.77/1.67
XD SN/Range (PSI)	5217/200

PART 3

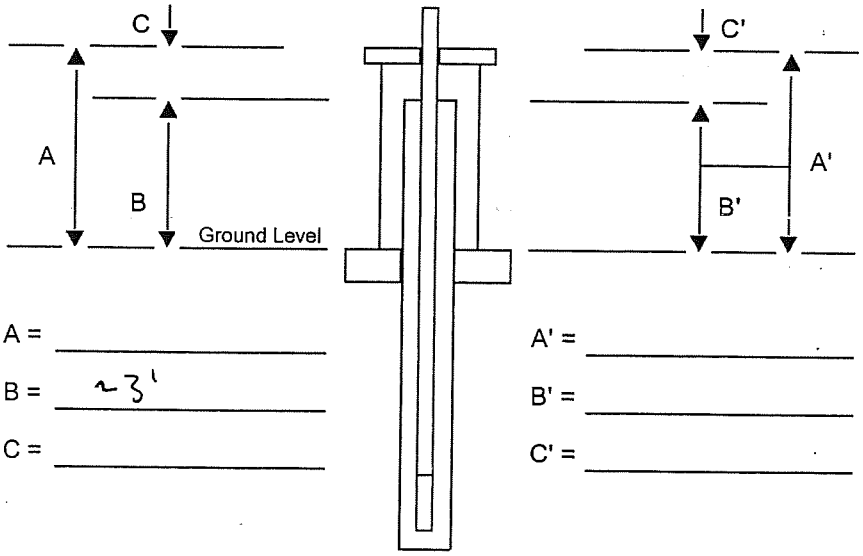
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 6/23/08

Current Measurements Date:



A = _____ A' = _____

B = ~3' B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

meter 212.17

Test #1: xDi: 1.983

xDf: 1.966

Test #2: xDi: 1.974 (~~1.796~~) SMS 6-27 meter 227.89

xDf: 1.971

Prepared by (print name):	Signature:	Date:
S. Sexton		06/23/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz		8/6/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 3

Date: 6/25/08

Purpose: PNNL Project 300 Area IFC | Location: 300-FF-5

Well ID: C6192 | Well Name: 399-2-15

Drilling Co.: WDC Driller Bill Zamoz | Rig No.: 139 | Rig Make/Mod.: Super Sonic

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8 / 6 7/8	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic 2	Pressure ___ psi	Make
Welded ___ (Thd.)	A.R. w/Sonic RS400	Drill Pipe O.D. N/A	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic N/A	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Comments/Remarks:
Note: added ± 200 gallons water during drilling.

Estimated Depth to Water

Reported By: Joe Fritz

Name/Title: CRAM Inc. Geologist

Signature: [signature] Date: 6/24/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 6/25/08

Well Name: 399-2-15 | Well ID: C6192

Location: 300-FF-5 | Report No.: 1

Start	Finish	Total
Time 1000	Time 1630	Time 6.5
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 61.5 / 59	Hole Depth/Csg 61 / 59

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1000	1240	Move rig+equipt to location - decon pipe -
1240		start Drilling. Advance 6" Drive barrel (DB)
	1240	0-5' - recover 0-5' & collect 2 GS at 1240
1240		Add 10' casing & 0.7' shoes (10.7) - advance to 5'
		Advance DB 5-10' - recover 5-10 & collect 2GS at 1250
	1300	Clean out w/ DB to 10'
1300		Advance DB 10-15' - recover 10-15 & collect 2GS at
		1305, Advance DB 15-20, recover 15-20 & collect
	1315	2 GS at 1315
1315		Add 10' casing (20.7) - advance to 15' - clean out
	1330	to 20'
1330		Advance DB 20-25, recover 20-24.5 & collect 2 GS
	1340	at 1335
1340		Advance DB 25-35' recover 25-29.5 & collect 2GS at 1345
		PM RCT ck, CBK
	1400	Add 10' casing (30.7) - advance to 25' - switch out roll-off
1400		Advance DB & casing, 25-35' - clean out 30-35'
	1420	recover 30-35 & collect 2 GS at 1415
1420		DTW 27.5 ft bgs. 40.7' casing in ground at 35',
		Add (2) 5' casing (50.7) Advance DB & casing - 35-45'
	1500	Recover 35-41.5 & collect 3GS at 1500
1500		Advance DB 45-55-~~60~~ 51.5' recovery collect 2 GS at
		1515. Silt at 50'??
	1520	

Reported By: Joe Fitts | Reviewed By: L.D. Walker

Title: Geologist | Date: 6/24/08 | Title: Geologist | Date: 7/7/08

Signature: | Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 3 of 3

Date: 6/25/08

Well Name: 399-2-15 | Well ID: C6192

Location: 300 - FF-5 | Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1520		Advance DB @ 50-60' - recover 52-60' and collect 3 GS at 1530
		silt 50-52 c/a clast
		sand 52-55
		silt 55-58 oxid.
		silt 58-60 grey - reduced.
		~~Casing to 69'~~ pm 6/25/08
	1620	Casing to 59' - borehole to 61.
1620		Note: added ≈ 200 gallons during drilling
		Not used
		6/25/08

Reported By: Joe Fritz | Reviewed By: L.D. Walker

Title: Geologist | Date: 6/25/08 | Title: Geologist | Date: 7/7/08

Signature: | Signature:

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/01/2008

Well Name: 399-2-15

Well ID: ~~399-2-15~~ SMS 7-1-08 C6192

Location: ~~C6192~~ SMS 7-1-08 300-FF-5 OU

Report No.: 2

Start	Finish	Total
Time 1000	Time 1530	Time 5.5 hrs
Hole Depth/Csg 61.5 / 60	Hole Depth/Csg Ø / Ø	Hole Depth/Csg 61.5 / 60

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: #1: 7 7/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1000	1058	Setting up rigs & jacks on borehole, prep for well completion;
1058	1116	begin well completion, adding bentonite to 56.3' bgs
1116		trip in cap + 20' screen = 0.3 + 10 + 10 = 20.3' total, add 5'
		screen (25.3 total) + 10' casing = 35.3', add 20' casing (10+10)
		= 55.3' total, add 10' casing (5'+5') = 65.3' total, bottom of
	1140	well set @ 56.3' bgs, remove 5' = 60.3' total; ERTs @ 33.5'
1140	1514	resume well completion, see pgs 1-2 of well completion log;
1514		tower down rig, move jacks and supplies off of borehole;
	1530	geo finishes pw, & departs; drillers remain

Not Used 07/01/2008

Reported By: S. Sexton		Reviewed By: L. D. Walker	
Title: Geologist	Date: 07/01/08	Title: Geology, SY	Date: 7/7/08
Signature: S. Sexton		Signature: LD Walker	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 07/02/2008

Well Name: 399-2-15 | Well ID: C6192

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 0630	Time 0945	Time 3.25 hrs
Hole Depth/Csg 1 / 0	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0630		set up rig on hole, trip-in pump + tremmie; pump model: Grundfos 75S-50 8-stage, motor: Franklin-Electric
		5 hp, intake set @ 40.0' bgs for first test, will
	0712	lower to 50.0 for second test.
0712		field calibrations for testing instruments:

	known	read	10%
turb.	482	479	Y
turb.	50.9	56.7	Y
turb.	4.45	4.65	Y
pH	10.00	10.36	Y
pH	4.00	3.84	Y
cond.	1413	1417	Y

0744 — Test #1: pump on @ 0744 rate: 50-55 GPM

	turb.(NTU)	pH	cond.(µS)	D/O (mg/L)	temp.(°C)	xD
0748	38.1	7.51	411	8.57	18.2	3.133
0753	11.2	7.54	411	8.61	17.5	3.142
0756	10.1	7.56	407	8.65	17.5	3.131
0800	6.95	7.53	407	8.66	17.4	3.137
0802	5.60	7.56	408	8.66	17.4	3.137
0807	3.42	7.54	407	8.68	17.5	3.146
0803	0814	3.42	7.55	407	8.72	17.7	3.146
0814	0824	pump shut off, begin recovery					
0824	0836	Lower intake to 50.0' bgs					
0886		Test #2: pump on @ 0836 rate: 86 GPM Test: BOLD #6					

Reported By: S. Sexton | Reviewed By: C.D. Welker

Title: Geologist | Date: 7/2/08 | Title: Geologist | Date: 7/7/08

Signature: S. M. Sexton | Signature: C.D. Welker

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 07/02/2008

Well Name: 399-2-15 | Well ID: C6192

Location: 300-FF-5 OU | Continuation of Report No.: 3

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		turb pH cond D/o temp. xD
0838		51.9 7.168 393 8.52 17.7 3.251
0841		14.2 7.170 389 8.76 17.4 3.248
0843		11.8 7.169 390 8.81 17.3 3.233
0845		8.10 7.167 390 8.73 17.4 3.251
0847		6.43 7.166 390 8.75 17.4 3.248
0850		4.38 7.168 391 8.75 17.4 3.245
0854	0855	3.49 7.168 389 8.75 17.5 3.260
0855	0905	begin recovery test on BOLD #7 S/N 5217 xD
0905		EMS 7-2-08 break down values, pull tremmie + pump from well + move rig to next well; geo tags well and finishes
	0945	paperwork; surface completion begins at this well

Not Used 07/02/08

Reported By: S. Sexton		Reviewed By: L.J. Walker	
Title: Geologist	Date: 7/2/08	Title: Geologist	Date: 7/7/08
Signature: L.J. Walker		Signature: LJ Walker	

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-15	C6192	300-FF-5 OU	07/02/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ○ Yes ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job	25.9 bgs
End of Job	26.2 bgs

DEPTH TO BOTTOM:

Start of Job	56.4 bgs
End of Job	56.4 bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	Grundfos 75S-50
Intake Depth	40.0 / 50.0 bgs
Starting Turbidity	38.1 / 51.9

Pump Start	Stop	Flow Rate
0744	0814	50-55
0836	0855	86

Total Pumped	1523 / 1723
Final Turbidity	3.42 / 3.49
XD SN/Range (PSI)	5217 / 20.0

PART 3

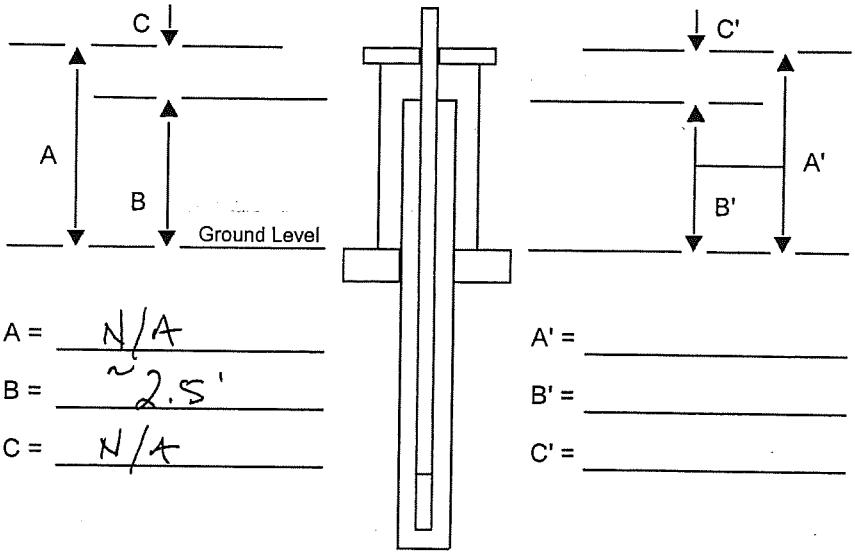
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	N/A
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/02/08

Current Measurements Date:



A = N/A
B = ~2.5'
C = N/A

A' =
B' =
C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: Test#1: meter 30177

xDi: 3.292
xDf: 3.333

Test#2: meter 31700

xDi: 3.342
xDf: 3.352

meter 33423

Prepared by (print name):	Signature:	Date:
S. Sexton		07/02/2008
Reviewed by (print name):	Signature:	Date:
L.D. Walker		7/7/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 3

Date: 6/24/08

Purpose: PNNL Project 300 Area IFC | Location: 300-FF-5

Well ID: C6197 | Well Name: 399-2-16

Drilling Co.: WDC Driller Bill Zamora | Rig No.: 139 | Rig Make/Mod.: Super Sonic

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8" 6 7/8" ID	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic 2	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic RS 400	Drill Pipe O.D. N/A	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic N/A	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Jae Fritts

Name/Title: CRAM Inc, Geologist

Signature: [signature] Date: 6/24/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 6/24/08

Well Name: 399-2-16 | Well ID: C6193

Location: 300 | Report No.: 1

Start	Finish	Total
Time 0930	Time 1630	Time 7
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 62 / 58.7	Hole Depth/Csg 62 / 58.7

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" Casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0930	1005	Mob rig & equipment to location
1005		Start drilling with DB. (drive barrel)
		DB 0-3' - refusal large cobbles. Retry - advance
		DB 0-5' - recover 0-5 & collect 2 GS at 1045
		Advance DB 5-10', recover 5-10 & collect 2 GS
	1100	at 1055
1100		Add 10' casing + shoe (10.7) and advance to 5' -
	1105	clean out to 10',
1105		Advance DB 10-15, recover 10-14.5 & collect 2 GS
		at 1105.
		Advance DB 15-20, recover 15-20 & collect 2 GS at
	1125	1120.
1125		Advance DB 20-25, recover 20-25 collect 2 GS at
	1130	1125 - Add 10' casing, advance to 15'.
1130	1200	lunch.
1200		Casing at 15' - clean out with DB to 25'
	1240	Advance DB 25-35', recover 25-31 & collect
1240	1300	3 GS at 1300
1300		Add 10' casing (50.7) advance to 25' -
	1330	Add 10' casing (40) advance to 35' - clean out to 35'
1330		Advance ~~casing~~ on 6/24/08 DB 35-45' - add 10'
		casing (50.7). advance to 45' - recover 35-40 From
		35-45 DB. collect 2 GS at 1345. Add 10'
		casing (60.7) - advance it to 55 - along with

Reported By: Joe Fitts | Reviewed By: L.D. Walker

Title: Geologist | Date: 6/24/08 | Title: Geologist | Date: 7/7/08

Signature: Joe Fitts | Signature: L.D. Walker

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 6/24/08

Well Name: 399-2-16	Well ID: C6193
Location: 300-FF-5	Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		with DB 45-55. Recover 45-53 & collect
	1415	4 GS at 1405. silt at 53?
1415-		Will drill to 60' - PM Iltck, < detect
		Advance DB 54-60 recover 54-60 & collect
	1440	3 GS at 1435
1440		silt at 54 - brn 54-58, gray 58-60
		casing advanced to 58.7', DB to 62 - total Depth.
	1515	PM RCTck, < Bkg
1515	1630	Clean up site - to office

Not used

6/24/08

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/24/08	Title: Geologist	Date: 7/7/08
Signature: [signature]		Signature: [signature]	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/08/2008

Well Name: 399-2-16	Well ID: C6193
Location: 300-FF-5 OU	Report No.: 2

Start	Finish	Total
Time 0630	Time 1130	Time 5.0 hrs
Hole Depth/Csg 61.7 / 59.5	Hole Depth/Csg 61.7 / 59.5	Hole Depth/Csg 61.7 / 59.5

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: #1: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0630	0717	begin set-up on borehole, prep for completion
0717		tag bottom of well, back pull to bentonite depth; DTB =
	0804	61.7' bgs
0804		trip-in screen & casing 25.3' screen ~~7/8/08~~ (0.3+10+10+5)
		and 40' casing (10+10+10+10)=60.3' total; ERT string
		x13 + thermistors taped to casing 2.5' below top of
		screen; bottom of well set @ 56.3' bgs, ERTs + thermistors
	0823	@ 53.5' bgs
0823	1049	begin completion, see well completion log pgs 1-2;
1049		all temp casing + shoe recovered from hole, moving
	1130	rig to C6198

Not Used

07/08/08

Reported By: S. Sexton		Reviewed By: Joe Fritts	
Title: Geologist	Date: 07/08/08	Title: Geologist	Date: 8/11/09
Signature: L. M. Sexton		Signature: Joe Fritts	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 07/17/2008

Well Name: 399-2-16	Well ID: C6193
Location: 300-FF-5 OU	Report No.: 3

Start	Finish	Total
Time 1000	Time 1230	Time 2.5 hrs
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size:
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1000	1020	Setup rig on well; DTB = 56.4' bgs DTW = 30.2' bgs
1020		trip-in pump; make: Grundfos 75 S-50 8-stage pump
	1030	motor: Franklin-Electric 5 hp; intake set @ 40.0' bgs
1030		Changed field kits, perform field calibrations w/
		new kit - pH which was calibrated for second test
		on C6204: known reading w/in 10%
		turb (NTU): 509 510 Y
		turb: 45.7 46.3 Y
		turb: 5.09 5.18 Y
	1038	cond: 1413 1400 Y
1038		Test #1: on xD 5217 Hermit 3K-45812; pump on @: 1042

	turb(NTU)	pH	D/O (mg/L)	cond (µS)	temp (°C)	xD
1044	>1000	7.53	7.70	489	20.6	8.537
1047	193	7.54	7.98	482	19.1	8.537
1050	52.5	7.56	8.20	470	18.7	8.531
1053	21.5	7.57	8.24	469	18.8	8.528
1055	12.0	7.58	8.23	468	18.8	8.505
1057	9.25	7.57	8.23	470	18.8	8.519
1101	5.05	7.58	8.23	470	19.2	8.504
1108	3.99	7.60	8.19	469	19.4	8.504
1110	3.72	7.59	8.35	470	18.5	8.510
1112	3.97	7.59	8.36	471	18.6	8.486

1112	1122	pump shut off, begin recovery;
1122	1126	lower intake to 50.0' bgs

Reported By: S. Sexton	Reviewed By: Joe Fritts
Title: Geologist Date: 07/17/08	Title: Geologist Date: 8/11/01
Signature: [signature]	Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 07/17/2008

Well Name: 399-2-16

Well ID: C6193

Location: 300-FF-5 OU

Continuation of Report No.: 3

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth					
1126		Test #2: recorded on SunDried WD9					
		pump on at: 1127 rate: 86 intake: 50.0					
		turb.	pH	D/O	cond.	temp.	xD
1129		224	7.63	8.30	469	19.4	16.368
1132		37.9	7.60	8.57	470	18.4	16.380
1134		20.0	7.58	8.64	470	18.2	16.353
1136		14.7	7.58	8.68	471	18.0	16.353
1139		10.5	7.56	8.72	471	17.9	16.353
1141		9.32	7.57	8.77	472	17.9	16.338
1142	1144	7.57	7.57	8.77	469	18.4	16.329
1144	1154	begin recovery test on SunDried WD10					
1154	1230	trip-out pump, tower down rig + move to next well					

Not Used 07/17/2008

Reported By: S. Sexton

Title: Geologist

Date: 07/17/08

Signature: [signature]

Reviewed By: Joe Fritts

Title: Geologist

Date: 8/11/08

Signature: [signature]

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-16	C6193	300-FF-5 ou	07/17/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	30.2 bgs
End of Job	30.3 bgs

DEPTH TO BOTTOM:

Start of Job	56.4 bgs
End of Job	56.4 bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 5-50
Intake Depth	40 / 50 bgs
Starting Turbidity	>1000 / 224

Pump Start	Stop	Flow Rate
1042	1112	50
1127	1144	86

Total Pumped	1467 / 1397
Final Turbidity	3.97 / 7.57
XD SN/Range (PSI)	5217 / 20

PART 3

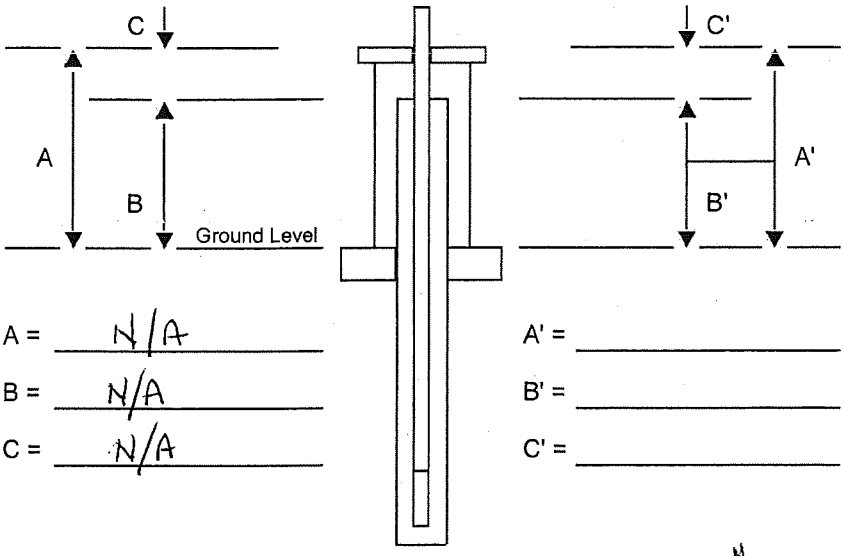
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	N/A
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Current Measurements Date:



A = N/A
B = N/A
C = N/A

A' =
B' =
C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 53911

Test #1

xDi: 8.867

xDf: 8.837

meter: 55378

Test #2

xDi: 17.096

xDf: 17.021

final meter: 56775

Prepared by (print name):	Signature:	Date:
S. Sexton		07/17/2008
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritts		8/4/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 06/12/2008

Purpose: PNNL Project 300 Area IFC | Location: 300-FF-5 O.U.

Well ID: C6195 | Well Name: 399-2-17

Drilling Co.: WDC Mike Wilkerson | Rig No.: 139 | Rig Make/Mod.: Super Sonic II

Casing String No. ① 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8" / 6 7/8" ID	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon Steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic 2	Pressure psi	Make
Welded ___ (Thd.)	A.R. w/Sonic R5400	Drill Pipe O.D. N/A	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic N/A	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: S. Sexton

Name/Title: Geologist

Signature: [signature]

Date: 06/12/2008

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/12/2008

Well Name: 399-2-17	Well ID: C6195
Location: 300-FF-5 O.U.	Report No.: 1

Start	Finish	Total
Time 1300	Time 1615	Time 3.25 hrs
Hole Depth/Csg 0 / 0	Hole Depth/Csg 30 / 25	Hole Depth/Csg 30 / 25

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 ____ Rod Size: 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1300	1338	Rigs moved off 6201, decon & set up plastic on 6195;
1338	1419	setting drill rig on borehole
1419	—	driving core barrel from surface to 5.0';
1425	—	drive barrel to 10' bgs; RCT check < background
1435	—	add 10.0' casing
1440	—	cleaning hole; driving for sample @ 1423 10-15'
1453	—	push db from 15-20; sample @ 1503
1503	—	drove db to 25, only got material to 19' bgs,
	—	will drive casing to 15' and clean to 25'
1510		add 10.0' stick, push to 15'
1518		drive clean-out to 25'
1520		db to 30', only 1 foot material recovered, most likely
SMS 6-12 ~~1525~~		slough from above 25';
1525		add 10.0' casing and drive to 25'
1545		clean-out from 25-30, decided to take samples at
		depth, good representation even mixed w/ slough;
1553		changing hopper, cleaning up; geo catching up/finish
	1615	paperwork
	1615	Geo departs for office

Not Used 06/12/08

Reported By: S. Sexton		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/12/08	Title: Geologist	Date: 6/26/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 6/13/08

Well Name: 399-2-17 | Well ID: C6195

Location: 300-FF-5 | Report No.: 2

Start	Finish	Total
Time 0600	Time 1100	Time 5
Hole Depth/Csg 30 / 25	Hole Depth/Csg 63 / 59.5	Hole Depth/Csg 33 / 34.5

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ See Report No. 1 | Rod Size: 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0640	Afford POD with BTR drill crew
0640		To site - weather clear, 58°, light breeze
	0720	Crew warm equipment
0720		Resume. Advance DB 30-35, recover 30-35 and
	0755	collect 3 GS at 0735 - stop to work on crane
0755		Add 10' casing (40.7) - problem with crane
		controller - unable to move pipe yet.
		0820 - Am Rock <Bkg. - get crane working -
	0835	Add 10' - (40.7) Advance to 35' - clean out to 35'.
0935		Advance DB 35-45 - recover 35-40 & collect 3 GS
	0845	at 0845. 5" coble in DB blocked it off.
0845		Add 5' casing (45.7) and advance to 40', - Add 5' (50.7) -
		Advance to 45. - DB 45-48 @ 6/13/08 50 - recover 45-48 and
	0915	collect 2 samples at 0915.
0915		Added 30 gallons water thru Fer - DTW @ 6.3 Ftbgs
		Advance DB 50-55 - recover 50-52.5 and collect 2 GS
	0930	at 0930
0930		Add (2) 5' casing (60.7) and advance to 55. -
	1000	AM THck, < detect, - clean out to 55 Ft.
1000		Advance DB 55-60 - 7.5' recovery so suspect 55-61 -
		plus swelling of clays - collect 3 samples at 1015.
	1020	silt at 56.5-59.5 oxidized, 59.5-61 - reduced
1020		Casing to 59.5 - DB to 63 Ft.
	1100	Pull rig off borehole - mob to C6191

Reported By: Jeff Fix | Reviewed By: L.D. Walker

Title: Geologist | Date: 6/13/08 | Title: Geologist | Date: 6/26/08

Signature: Jeff Fix | Signature: L.D. Walker

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/23/2008

Well Name: 399-2-17 | Well ID: C6195

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 1230	Time 1630	Time 4.0 hrs
Hole Depth/Csg 61.6 / 60.0	Hole Depth/Csg 25.7 / 25.9	Hole Depth/Csg 35.9 / 34.1

Reference Measuring Point: GROUND SURFACE

Casing String No. ① 2 3 4 ____ Rod Size: #1: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1230	1315	setting up rig + jacks on borehole, initial tag DTB = 61.6
1315		begin completion activies, see well completion log pgs 1-3
		trip-in perm 4" PVC cap + 20' screen (0.3' + 10' + 10') @ 1353,
		add 5' screen (25' total) + 10' casing; GRTs + thermistors
		set at 33.5' bgs, taped to casing; add 20' casing to string,
	1618	55.3 total; add 10' = 65.3' total - 9.8' = 56.5' to bottom;
1618	1630	drillers clean-up, geo finishes pw + departs

Not Used 6/23/08

Reported By: S. Sexton	Reviewed By: Joe Fritz
Title: Geologist Date: 6/23/08	Title: Geologist Date: 8/6/08
Signature:	Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/25/2008

Well ID: C6195 | Well Name: 399-2-17

Location: 300-FF-5 OU | Report No.: 4

Start	Finish	Total
Time 0600	Time 0745	Time 1.75 hrs
Hole Depth/Csg 25 / 26	Hole Depth/Csg 3 / 0	Hole Depth/Csg 22 / 26

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: #1: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD @ trailer (BTR, Drillers, Geos); clear, 52°
0630	0652	set up rig on borehole, prep for completion
0652	0726	begin completion, see well completion log pgs 2-2;
0726	0745	well completed, lowering rig and moving to C6200

Not used 6-25-08

Reported By: S. Sexton | Reviewed By: Joe Fritz

Title: Geologist | Date: 6/25/08 | Title: Geologist | Date: 8/6/08

Signature: | Signature:

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 07/02/2008

Well Name: 399-2-17 | Well ID: C6195

Location: 300-FF-5 OU | Report No.: 5

Start	Finish	Total
Time 1000	Time 1330	Time 3.5 hrs
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)					
1000		Set-up rig on well, bail well & setup pump & tremie					
	1107	while waiting for purge truck to return;					
1107		Purge water truck on-site, connecting hoses & final					
		prep for testing; instruments calibrated @ 0730					
		Test # 1: Pump: Grundfos 75S-50 Motor: Franklin -					
		electric 5 hp					
		Pump on at: 1113 rate: 56.55 xD: 5217					
		turb.(NTUs)	pH	Cond.(mS)	D/O (Mg/L)	temp(°C)	xD(ft)
1116		123	7.73	453	8.85	18.5	2.979
1119		20.8	7.68	449	9.14	18.3	2.974
1121		9.01	7.64	447	9.14	18.2	2.980
1124		5.18	7.61	447	9.19	18.4	2.981
1127		4.26	7.59	446	9.18	18.2	2.984
1130		4.22	7.61	445	9.20	18.3	2.988
1132		3.50	7.59	444	9.20	18.4	2.985
1135		3.31	7.58	444	9.17	18.3	2.983
1139		2.57	7.57	445	9.16	18.5	2.998
1142	1144	1.96	7.57	444	9.14	18.1	2.986
1144	1201	begin recovery, pump shut off @ 1144					
1201	1209	lowering intake 10' to 50.0' bgs					
1209		Test # 2: Pump on @: 1211 rate:				xD 5217	
		Turb.	pH	cond.	D/O	temp	xD
1214		28.8	7.70	418	8.64	19.0	3.128
1218		8.35	7.71	417	8.80	18.2	3.134

Reported By: S. Sexton | Reviewed By: Joe Fritz

Title: Geologist | Date: 07/02/08 | Title: Geologist | Date: 8/6/08

Signature: S. Sexton | Signature: Joe Fritz

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 07/02/08

Well Name: 399-2-17 | Well ID: C6195

Location: 300-FF-5 OU | Continuation of Report No.: 5

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		Test #2 continued:
		Turb. pH cond. D/o temp xD
1220		5.93 7.68 418 8.93 17.9 3.137
1223		3.89 7.68 418 8.97 17.9 3.131
1226		2.81 7.66 418 8.91 17.9 3.122
1229	1230	2.41 7.66 417 8.90 18.4 3.128
1230	1244	pump off @ 1230, collect SMS FD2-08 recovery data
1244		break down pump + tremmie; prep to move truck
	1312	off-site;
1312	1330	geo finishes pw, secures site + departs for office

Not Used 07/02/2008

Reported By: S. Sexton

Title: Geologist Date: 7/2/08

Signature: S. M. Sexton

Reviewed By: Jac Fritts

Title: Geologist Date: 8/6/08

Signature: Jac Fritts

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-17	C6195	300-FF-5 OU	07/02/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊘ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	26.61	bgs
End of Job	26.61	bgs

DEPTH TO BOTTOM:

Start of Job	56.75	bgs
End of Job	56.75	bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model 75 S-50

Intake Depth 40.0 (SMS 7-02-08) / 50.0

Starting Turbidity 123 / 28.8

Pump Start	Stop	Flow Rate
1113	1144	50-55
1211	1230	86

Total Pumped 1511 / 1635

Final Turbidity 1.96 / 2.41

XD SN/Range (PSI) 5217 / 20.0

PART 3

INSTANTANEOUS SLUG TEST

Static Water Level (TOC)

Transducer Depth

Baseline Start

Injection Start

Baseline Start

Withdrawal Start

Slug Volume

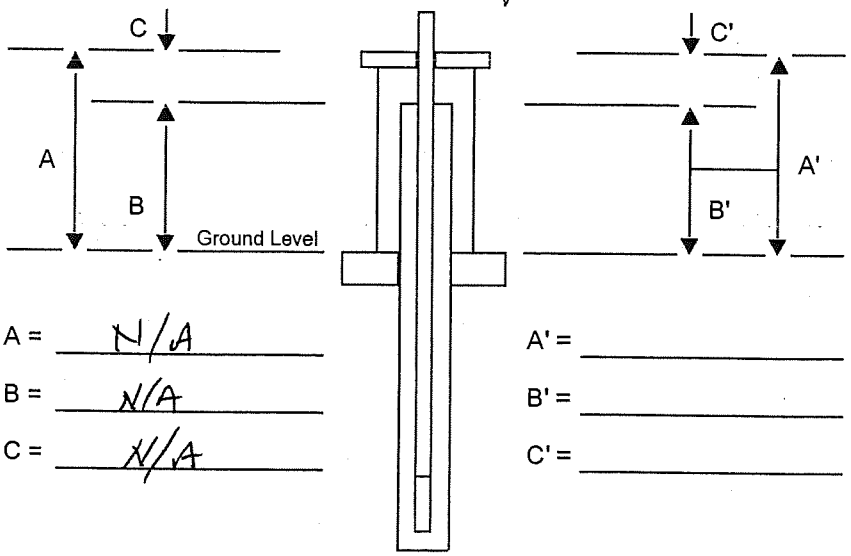
XD SN/Range (PSI)

PART 4

Last Recorded Measurements Date:

Current Measurements Date:

Surface completion



A = N/A

B = N/A

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊘ No

PART 5

COMMENTS:

Test #1: meter 33423

xDi: 3.195

xDf: 3.214

Test #2: meter 34934

xDi: 3.193

xDf: 3.189

meter 36569

Prepared by (print name):	Signature:	Date:
S. Sexton		07/02/2008
Reviewed by (print name):	**Signature:**	**Date:**
Joe Frith		8/6/08

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 2

Date: 6/3/08

Purpose: PNNL Project. 300 Area TFC | Location: 300-FF-5-04

Well ID: C6196 | Well Name: 399-2-18

Drilling Co.: WDC Bill Zamow - Driller | Rig No.: 139 | Rig Make/Mod.: Supersonic 2

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8" OD, 6 7/8" ID	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic SuperSonic 2	Pressure psi	Make
Welded ___ (Thd)	A.R. w/Sonic RS400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size N/A	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic N/A	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: D. Faith

Name/Title: GRAM Inc Geologist

Signature: [signature]

Date: 6/3/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 6/3/08

Well Name: 399-2-18 | Well ID: C6196

Location: 300-FF-5-OU | Report No.: 1

Start	Finish	Total
Time 1100	Time 1630	Time 5.5
Hole Depth/Csg 0 / 0	Hole Depth/Csg 10 / 10	Hole Depth/Csg 10 / 10

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ See Report No. 1 | Rod Size: 7 5/8 casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1100		Moving rig and equipment to location - lots of
	1430	set-up activities. Remove water from top of roll-off.
1430		Start drilling with 6" x 10' OB. (drive barrel)
		push OB 0-5' - collect 2 GS (0-2.5 & 2.5-5') at 1445
	1500	PM RCT ck. <Bkg
1500		Rock pushing casing down - move a couple inches. - resume
		Advance OB 5-10' - collect 4 GS (5-6.5, 6.5-8, 8-9, 9-10)
	1540	at 1525. Add initial 10' casing - casing to 10'
1540	1605	Advance OB to 10' - clean out casing
1605	1615	Advance OB to 15' - will collect sample in morning
1615	1630	To office -

Not Used

6/3/08

Reported By: Joe Fritts		Reviewed By: L. D. Walker	
Title: Geologist	Date: 6/3/08	Title: Geologist	Date: 6/26/08
Signature:		Signature:	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 6/4/08

Well Name: 399-2-18	Well ID: C6196
Location: 300-FF-5-04	Report No.: 2

Start	Finish	Total
Time 0600	Time 1000	Time 4
Hole Depth/Csg 10 / 10	Hole Depth/Csg 15 / 18.7	Hole Depth/Csg 5 / 8.7

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size: 7 5/8" casing
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, RCT and drill crew
0630	0710	To site, clear, light wind, ≈48°. Warm equipment
0710		- DB 10-15' - 4.5" cobble in shoe. collect 3 grab samples
		at 0715 - Add 10' casing - advance to 15' -
	0820	clean out to 15' - difficulty removing gravels
0820		AM IH ck. cdetect. Driller reports problems
		with valve bank - Raising + lowering main head
		is effected - Notify PNNL. Mob rig off-site
	0915	to town to Fix
0915		Casing at 18.7' bgs - DB was to 15'.
	1000	leave site

Not used

6/4/08

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/4/08	Title: Geologist	Date: 6/26/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 6/11/08

Well Name: 399-2-18	Well ID: C6196
Location: 300-FF-5-OU	Report No.: 3

Start	Finish	Total
Time 0600	Time 1430	Time 8.5
Hole Depth/Csg 15 / 18.7	Hole Depth/Csg 65 / 60	Hole Depth/Csg 50 / 41.3

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600		Attend POD with BTR, drill crew, RCT.
	0630	New driller -
0630		Tag borehole - material at 6.5Ft - will need to
		clean it out to 15. Weather cloudy, breezy, 50°.
		Crew doing inspections - set up rig - Driller
		reports the DB was left in hole - so my tag was
	0735	top of DB. - 6" drive barrel
0735		Bring DB up & empty it - tag at 17.5' bgs
		Advance DB 17.5' - 25' and recover 17.5 - 22.5
	0800	collect 4 GS at 0800
0800		Advance DB 22.5 ≈ 28 - recover 22.5 - 25.5 &
		collect 2 GS at 0810. Wet at ≈ 25Ft'
		Tag at 25.5'. Advance DB ~~25.5 ≈ 30 and recover~~ 6/11/08
		25.5 - 33.5 and recover all - collect 5 GS at 0825
		Add 10' casing (30.7) - push to 25.7' - material at
	0845	24.5 - AM RCT ck, < Bkg.
0845		Switch out roll-off. we are in water - clean out
	0930	24.5 - 33' -
0930		Advance DB 33-45' - 20' barrel on - 12' in DB
		~~Note~~: 6/11/08 Collect 12 GS (every Ft) from 33-45' at 0950
	1000	Add 10' casing (40.7) - Advance to 35Ft.
1000		Advance DB to ≈ 40Ft - heaved back up to 34Ft -
		add water to help with heaving. - Add 10' casing (50.7)
	1035	advance to 45Ft - Added ≈ 20 gallons water

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/11/08	Title: Geologist	Date: 6/26/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 6/11/08

Well Name: 399-2-18 | Well ID: C6196

Location: 300-FF-5-OU | Continuation of Report No.: 3

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1035		Go in w/ DB to clean out to 45Ft. Advance DB 45-50' - recover ≈ 2Ft - well sorted sand w/ cobble to 4" - not sure where from -
	1115	
1116		Go in w/ 6" DB 45-55' - recover 2' - collect GS 45-47 From first run, GS 47-49 From 2nd run. - sand is heavy - sample at 1130
	1130	
1130	1200	lunch DTW 27.51' bgs
1200		Add (2) 5' casing (60.7') Advance to 55Ft. Added ≈ 20 gallons water. - go in w/ DB
	1300	49-55Ft - recover 49-54 + collect 5 GS at 1255
	1300	lost ≈ 1' on the deck.
1300		Advance DB 55-60Ft. and collect 5 GS at 1305. recovered 55-60Ft. silt at 57'. Add 5' casing (65.7)
	1330	and advance to 60Ft.
1330		DB cleaned out 55-60' - Added ≈ 10 gallons while
	1350	moving casing down.
1350		DB 60-63' - ∅ recovery - try again. DB 60-65+
		recover 60-65 - collect 2 GS at 1410. Casing at
	1415	60 and DB to 65Ft - end/total depth
1415		PM RCTck, <Bks, PM JHdr, <Detect.
	1430	To office.

Reviewed

6/11/08

Reported By: Jeffries		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/11/08	Title: Geologist	Date: 6/26/08
Signature:		Signature:	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/16/08

Well Name: 399-2-18 | Well ID: C6196

Location: 300-FF-5 OU | Report No.: 4

Start	Finish	Total
Time 1330	Time 1430	Time 1.0 hrs
Hole Depth/Csg 65 / 60	Hole Depth/Csg ~60 / ~55	Hole Depth/Csg ____ / ____

Reference Measuring Point: GROUND SURFACE

Casing String No. ① 2 3 4 ____ Rod Size: #1: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1330		Receive well design plan, setup for backpull & well
	1351	completion; initial tag DTB = 63.2 bgs
1351		begin adding bentonite pellets to 58.5' bgs & prep
	1400	for backpull
1400		casing is plugged, bridged from bentonite; will
		backpull 5' feet & try to knock bentonite from
	1422	the casing
1422		could not knock out bentonite plug, will bring
		sonic rig to clean out borehole after TD
	1430	of hole C6200

Not used 06/16/08

Reported By: S. Sexton | Reviewed By: L.S. Walker

Title: Geologist | Date: 06/16/08 | Title: Geologist | Date: 6/26/08

Signature: | Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/17/2008

Well Name: 399-2-18	Well ID: C6196
Location: 300-FF-5 OU	Report No.: 5

Start	Finish	Total
Time 0600	Time 1415	Time 8.25 hrs
Hole Depth/Csg ~60 / 55	Hole Depth/Csg 3.0 / 6	Hole Depth/Csg ~~3.0~~ 57.0 / 55 SHS 6-17-08

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: #1 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	PoD @ site (BTR, Drillers, Geo), 50°, clear, light wind;
0630		will move rig from C6200 to C6196 to drill out bent.
	0715	plug;
0715	0729	setup on hole, running drive barrel downhole
0729		drilling out bent. plug; borehole drilled down to
	0826	58.5' bgs
0826		moving sonic rig off hole, will setup completion rig
	0856	soon; setting up completions rig @ 0845
0856		tag bottom, DTB = 66.3 - 7.6 stickup = 58.7' bgs; prep for
	0903	well installation
0903		trip-in 20' screen & cap (0.3 + 10.0 + 10.0), add 5'
	0908	screen + 10.0' casing (4" PVC Permanent 0.020" screen)
0908		attaching ERTs + thermistors @ 33.5' bgs to outside
	0920	of perm. casing;
0920		add 20' casing (10.0 + 10.0); add 15' perm casing (10 + 5.0)
		= 25.3' casing & cap + 45.0' casing = 70.3'; bottom of
	0940	screen set @ 58.3' bgs
0940		begin completion activities, see well completion log
	1400	pgs 1-2; remove 5.0' casing for completion 65.3' total;
1400	1415	Moving rig to C6201, geo finishes pw.
		Not Used 6-17-08 [signature]

Reported By: S. Sexton		Reviewed By: Joe Fritts	
Title: Geologist	Date: 06/17/08	Title: Geologist	Date: 8/6/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 06/19/2008

Well Name: 399-2-18 | Well ID: C6196

Location: 300-FF-5 OU | Report No.: 6

Start	Finish	Total
Time 1300	Time 1630	Time 3.5 hrs
Hole Depth/Csg 3.0 / —	Hole Depth/Csg 3.0 / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size:

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1300		setting up rig on borehole, prep for development; swab & bail well; IH check @ 1338;
	1340	
1340		trip-in pump & tremmie (1.5"); pump: Grundfos 75S-8 8-stage; motor: Franklin Electric 5 hp; 4.65' overall length, 0.4' intake length, 2.0' pump, 2.25' motor;
		calibrated test meters @ 0725 on well C6201:
		Turb. known: 482 reading: 479
		Turb. 50.9 50.3
		Turb. 4.45 4.26
		Cond. 1413 1421
		pH 4.00 4.03
	1358	pH 10.00 10.13
1358		Test #1: Final Parameters, pump on @ 1407
		Turb. (NTUs) / pH / cond (µS) / temp °C / D/O (mg/L%) / ×D
1412		53.7 / 7.74 / 381 / 19.5 / 8.46 / 2.987
1417		12.7 / 7.71 / 368 / 17.9 / 8.80 / 2.954
1420		10.4 / 7.68 / 369 / 17.7 / 9.05 / 2.969
1423		6.69 / 7.70 / 368 / 17.7 / 9.12 / 2.969
1428		5.12 / 7.69 / 367 / 17.8 / 9.09 / 2.987
1432	1442	Pump shut off @ 1432, begin recovery
1442	1451	lower intake 10' to 50.0' bgs
1451		Test #2: see pg 2 for parameters; pump on @ 1457
		See page 2 →
		See page 2 →

Reported By: S. Sexton | Reviewed By: Joe Fritts

Title: Geologist | Date: 6/19/08 | Title: Geologist | Date: 8/6/08

Signature: S. Sexton | Signature: Joe Fritts

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 5/20/08

Purpose: PNNL Project 300 Area IFC | Location: 399-2-19

Well ID: C6197 | Well Name: 399-2-19

Drilling Co.: WDC Mike Williamson | Rig No.: 139 | Rig Make/Mod.: SuperSonic 2

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7¼" OD, 6⅞" ID	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic SuperSonic 2 RS400	Pressure ___ psi	Make
Welded ___ (Thd.)	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: 160.0	Other:	Additives	Type
Shoe OD/ID	Built to GIS Peak		Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic N	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic 4	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water
DTW 23.3
ft bgs.
5/20/08

Reported By: Jan Fritz

Name/Title: GRAM Inc. Geologist

Signature: [signature] Date: 5/20/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 3

Date: 5/20/08

Well Name: 399-2-19	Well ID: C6197
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 0600	Time 1700	Time 11.0
Hole Depth/Csg 0 / 0	Hole Depth/Csg 60.8 / 60	Hole Depth/Csg 60.8 / 60

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: (1) 7 8/8" single wall

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600		Attend POD with BTR Drillers and RCT
	0615	Rig is set-up and ready to go
0615		To site - cloudy & 65° - warm rig, equipment
	0640	maintenance
0640		vibrate out barrel from C6203 - same material
	0655	SS-65 - gray-blue ~~silt~~ 5/20/08 silt
0655		Start C6197 - 5' x 4" split spoon.
		Advance spoon 0.0-5.0. - recover 0-2.3' - collect 3
		lexan liners at 0705
		Advance spoon 5-10Ft - recover 5-9' - collect
	0705	4 lexan liners at 0705
0705		Clean out w/ drive barrel (6')
		Advance spoon 10-15' - recover 11-12' - collect
	0735	1 lexan liner at 0735
0735		Add 10' casing and shoe (10.7') AM IH ck, <detect
		Add 10' casing (20.7') - clean out with
		casing. Tag at 12.5ft - casing at ≈15ft -
		clean out with 6" DB. 0800 - Add 3 gallons
	0810	water - material falling out of DB - cleaned out.
0810		Advance SS 15-20'. recover 15-19' - collect 4
		liners at 0825 - AM RCT ck, <Bkg
		Trouble starting generator on pipe truck. - Also charging
	0900	remote from crane -
0900	—	Advance SS 20-25Ft. - recover 20-23.8 - collect 4 liners

Reported By: Joe Tilts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 5/20/08	Title: Geologist	Date: 5/22/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 5/20/08

Well Name: 399_2-19	Well ID: C6197
Location: 300-FF-5	Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
	0920	... at 0915 - Add 10' casing (30.70)
0920		Clean out with DB - Adding water - DB to
		25' - (19-25') - empty - material falling out.
		0950 - couple more trys with 6" barrel - it gets
		hung up between 6" & casing - has to vibrate
	0950	it to get it loose - and gravel falls out.
0950		Tag it at 22 Ft. casing at 25.7.
		Did another run w/ 6" - empty - tag at 25 Ft -
	1000	must of packed the gravel down.
1000		Drive SS 25-30' - in water -
		DTW 23.3 Ft bgs. recover 25-28.8 - collect
	1030	4 liners at 1015.
1030		Advance SS ~~25~~ @ 5/20/08 30-35 Ft. recover 30-32' -
		6" cobble stuck in spoon end - collect 2 lexan liners at 1100.
		Add 10' casing (40.70) Casing at 35.7, clean out
	1130	a small amount of gravel - tag at 34.5 Ft
1130	1200	Lunch Raining
1200		Advance SS 5/20/08 or ~~casing~~ 35-40' - Recover 35-39 Ft.
	1235	collect 4 lexan liners at 1235.
1235		Advance SS 40-45 - Recover 40-44' - collect 4 lexan liners
	1300	Add 10' casing (50.70) - Clean out. at 1250
1300		Clean out to 45' w/ 6" DB - tag at ~~43~~ @ 5/20/08
		44.4' - Advance spoon 45-50' recover 45-48 collect
	1345	PM RCT ck, CBKG 3 lexan liners at 1345
1345		Advance SS 50-55 - recover 50-53 Ft, collect
		3 liners at 1415 Add 10.0' casing (60.70) - casing
	1430	to 55.70' - Ream to 55' - silt (brown) at ≈54 Ft -
1430		SS 55 to 60 Ft - recover 55-60 Ft - collect
	1500	5 lexan liners at 1500

Reported By: Joe Frilts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 5/20/08	Title: Geologist	Date: 5/22/08
Signature: [signature]		Signature: [signature]	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 3 of 3

Date: 5/20/08

Well Name: 399-2-19 | Well ID: C6197

Location: 300-FF-5 | Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1500		45-54 gravelly sand
		54-55 silt
		55-57 Sand (gravelly)
		57-58 silt - oxidized (brn)
		58-60 silt - reduced (blue)
	1520	Will take casing to 60' - and clean out to 61'
1520		1535 - casing to 60' - DB to 60' - tag at 60'
		Drive another barrel - tag at 60.8 ft.
	1615	Stop -
1615	1700	Move rig off borehole - to office

5/20/08 not used

Reported By: Joe Smith		Reviewed By: L.D. Walker	
Title: Geologist	Date: 5/20/08	Title: Geologist	Date: 5/22/08
Signature: Joe Smith		Signature: L.D. Walker	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 05/30/2008

Well Name: 399-2-19 | Well ID: C6197

Location: 300-FF-5 | Report No.: 2

Start	Finish	Total
Time 0600	Time 1330	Time 7.5
Hole Depth/Csg 60.0 / 60	Hole Depth/Csg -48 / 54.5	Hole Depth/Csg 12 / 5.5

Reference Measuring Point: GROUND SURFACE

Casing String No. ① 2 3 4 ____ See Report No. 1 | Rod Size: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0620	POD @ 300 Area (BTR, Driller, Geo); clear, 55°, light wind
0620	0720	Driller setting up rig on borehole
0720	0735	DTB = 64.8 - 4.8 stkup = 60.0 bgs DTW = 31.3 - 4.8 = 26.5
0735	0815	Begin completion activities; see well completion pgs 1-1
0815		begin trip-in permanent 4" pvc screen + casing; 9.98' scrn
		+ 0.3' cap = 10.28 total + 10.0' = 20.28' + 5.0 = 25.28' total =
	0828	24.98' screen + 0.3' cap; + 10.0 blank = 35.28' on string
0828		taping sensors to screen @ 2.5' below top of screen,
	0835	33.5 bgs (second string)
0835		add 10.0' blank = 45.28' on string, + 10.0' blank = 55.28' total
	0908	+ 10.0' blank = 65.28'
0908		Resume completion, see well completion pgs. 1- ; lost tag in
	1042	hole @ centralizer, will have to fish out with magnet;
1042		driller attempts to "feel" tag with tremmie to
	1049	determine if magnet will work; can't feel tag on cent.
1049	1229	making "fishing" tool to slip past cent. and pick up tag;
1229		could not "fish" out tag, will try to pull out perm.
		casing with rig, perm. casing pulls easily from
	1310	hole, will trip-out
1310		All perm. pvc casing + screen removed from hole,
	1330	moving rig to hole C6190
		Not Used L.M. Sept 05/30/08

Reported By: S. Sexton | Reviewed By: Joe Fritz

Title: Geologist | Date: 05/30/08 | Title: Geologist | Date: 8/5/08

Signature: L.M. Sept | Signature: Joe Fritz

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 6/2/08

Well Name: 399-2-19 | Well ID: 16197

Location: 300-FF-5 | Report No.: 3

Start	Finish	Total
Time 1320	Time 1450	Time 1 hr 30 min
Hole Depth/Csg 46.2 / 45.4	Hole Depth/Csg ~46.2 / 46.3	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 _____ Rod Size: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1320	1335	Setup jacks and rig over hole
1335		Tag sand @ 51.0' - 4.8' = 46.2' bgs - Drillers Fabricate fishing
		tool to attempt removing tag rod - no success
1350		Attempt unscrewing top joint using jaws on jack - this ends up
	1440	pushing casing down - Leaves 4.42' stickup
1450		Geo leaves site

Not Used 6/2/08

Reported By: J. Throolin

Title: Geologist | Date: 6/2/08

Signature:

Reviewed By: Joe Fritz

Title: Geologist | Date: 8/5/08

Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 6/3/08

Well Name: 399-2-19 | Well ID: C6197

Location: 300-FF-5 | Report No.: 4

Start	Finish	Total
Time 0600 50 6/3/08	Time 1700	Time 11 hrs
Hole Depth/Csg -4.2 / 46.3	Hole Depth/Csg 0 / 0	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. ① 2 3 4 ____ See Report No. 1 | Rod Size: 7 7/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BJR, RCT, drill crew, geologist
0630		Tic site - 55° breezy, cloudy. 1 6/3/08
		Move over hole to work on locating a ~~46~~ -Ft
		long metal tagger weight. 50.7' of casing is in
	0730	the ground, 4.42' stick-up.
0730		Go in with 6" drive barrel - take it 46-58' - gravel & water
0800		only, Driller says bottom casing is at 50' - took 6"
		OB to 57' - no sign of tag weight. Add (2) 5' (60')
	0920	to the casing - push it to 56'
0920		About 1' twisted flat steel pulled out - Ray says it
		is what was on end of tagger. Tag at 54.1' - go
1000		back in with PB for a final clean out. —
	1100	cleaned out to 58' - casing at 56 Ft
1100	1105	moving rig to C6196 - turn hole over to J Throslin.
1105		Rearrange site - place jacks and well setting rig over hole
		Tag DTB = 62.4' - 4.8' stickup = 57.6' bgs
1210		Trip permanent PVC well in - same casing that was pulled out on 5/30/08
	1240	Bottom of well set at 56.58' bgs
1240		Resume well completion, see well completion log pg. 2
1613		Drillers hydrate sand w/ 10 gal water
1645		Drillers hydrate bentonite w/ 5 gal water
1645	1700	Geo paperwork - Geo depart
		Not used

Reported By: Joe Faith / J. Throslin | Reviewed By: Joe Faith / [illegible]

Title: Geologist | Date: 6/3/08 | Title: Geologist | Date: 8/5/08

Signature: [signature] / [signature] | Signature: [signature] / [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 6/5/08

Well Name: 399-2-19	Well ID: C6197
Location: 300-FF-5	Report No.: 5

Start	Finish	Total
Time 1100	Time 1500	Time 4.0
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size:
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1100		Move From C6203 to C6197
		DTW 28.44 Fb toc, TD 59.05 Fb toc
	1125	2.8' stick-up
1125		swabbing the well. Installed TD 56.58 +
		s/u 2.8 = 59.4' from toc. ≈0.35' sediment in well.
		Sc 34.1 - 59.1' Fb toc
		Meters calibrated/checked earlier today at C6203
	1145	swabb 1125-1145
1145	1200	Bailed 30 gallons - cloudy brn, 5' long bailer
1200		Lower pump to 40 ft - wait for water level to
	1210	stabilize. See p 2 for pumping information.
		Note: XD 5217 is in C6197,
		XD 5218 is in C6190
		See data on page 2

6/5/08

Reported By: JcFritts		Reviewed By: DCWeekes DCWeekes	
Title: Geologist	Date: 6/5/08	Title: Geologist	Date: 8/12/08
Signature: [signature]		Signature: DCWeekes	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 6/5/08

Well Name: 399-2-19 | Well ID: C6197

Location: 300-FF-5 | Continuation of Report No.: 5

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		DATA
		XD gpm total pH Ec T°C NTU DO XD
		5217 gallons Fbgs 5218
		(Flowmeter) Initial pump at 40 ~~Fbgs~~ ~~Fbtoc~~ 6/5/08
Initial	1240	11.727 6630 start pump at 1240 10.346
	1245	10.915 64 320 7.69 .306 18.4 134 8.87 10.344
	1255	11.026 62 940 7.79 .311 17.7 13.7 9.00 10.344
	1307	50 1540
	1310	10.991 50 1690 7.80 .314 18.2 5.02 9.09 10.336
	1311	shut off pump - lower pump
		lower pump to 50.9' - wait for WL to stabilize
		↳ Fbtoc gs 6/5/08
Initial	1346	21.761 8400 Grass Roots WD7 10.338
	1346	start test WD7 - 50 gpm initial
	1355	21.195 50 ~~884~~ 440 7.90 .331 17.0 7.91 9.19 10.336
	1405	21.212 50 960 7.15 .334 16.5 4.14 9.22 10.321
	1407	- pump hiccuped ~ ?
^	1409	Layla WD8 - stop pump, start WD8 test
	1410	21.245 1160
	1410	21.755 10.334
	1417	21.749
	1421	21.746
	1423	21.746
	1424	- Stop Layla WD8
		Total pumped: 1690 + 1160 = 2840
	1435	pump out of well
	1500	To office
		[signature] 6/5/08

Reported By: Joe Fritts | Reviewed By: DC Weekes

Title: Geologist | Date: 6/5/08 | Title: Geologist | Date: 8/12/08

Signature: [signature] | Signature: DC Weekes

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-19	C6197	300-FF-5 JL 6/5/08	6/5/08

Reference Measuring Point (unless otherwise noted): TOP OF ~~OUTER CASING (TOC)~~ PVC

Has the well been surveyed? ○ Yes ☒ No | Does the well have a cement pad? ○ Yes ☒ No

PART 1

STATIC WATER LEVEL:

Start of Job 28.44

End of Job 28.55

DEPTH TO BOTTOM:

Start of Job 59.05

End of Job 59.10

PART 2

WELL DEVELOPMENT DATA

Pump Model Grundfos 75-S-50

Intake Depth 42.8 + 53.7 FS to c

Starting Turbidity > 200 NTU

Pump Start	Stop	Flow Rate
1240	1311	50-64
1346	1409	50

Total Pumped 2840

Final Turbidity 4.14

XD SN/Range (PSI) 20

PART 3

INSTANTANEOUS SLUG TEST

Static Water Level (TOC)

Transducer Depth N/A

Baseline Start

Injection Start

Baseline Start

Withdrawal Start

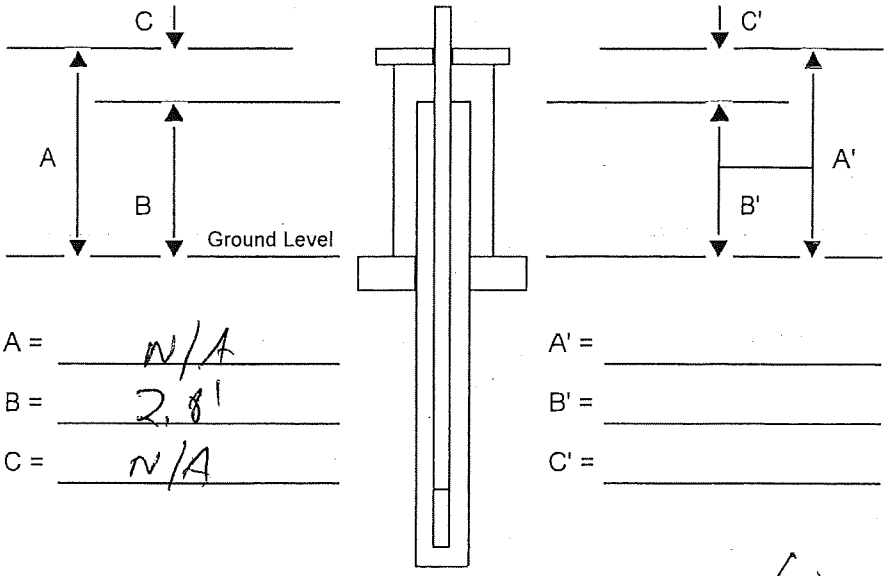
Slug Volume

XD SN/Range (PSI)

PART 4

Last Recorded Measurements Date: 6/5/08

Current Measurements Date:



A = N/A

B = 2.8'

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ☒ No

PART 5

COMMENTS:

- Flow rate and volume pumped measured with flowmeter

Note - this will be completed as a surface completion - therefore the stickup will change

Data logger Info:

Test Grass Roots WD7 - pump at 50.9, Fbgs Drawdown

Grass Roots WD8 - recovery

Prepared by (print name):	Signature:	Date:
Jae Fritts	[signature]	6/5/08
Reviewed by (print name):	**Signature:**	**Date:**
DC Weekes	DC Weekes	8/12/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 6/25/08

Purpose: PNNL characterization | Location: 300-FF-5

Well ID: C6198 300 Area IFC | Well Name: 399-2-20

Drilling Co.: WDC Bill Zamora Driller | Rig No.: 139 | Rig Make/Mod.: Super Sonic 2

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8 / 6 7/8	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic 2	Pressure psi	Make
Welded ___ (Thd.)	A.R. w/Sonic RS 400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size N/A	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic N/A	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Joe Frith

Name/Title: CRAM Inc. Geologist

Signature: [signature] Date: 6/25/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 6/25/08

Well Name: 399-2-20 | Well ID: C6198

Location: 300-FF-5 | Report No.: 1

Start	Finish	Total
Time 0600	Time 1045	Time 5 hr.
Hole Depth/Csg 0 / 0	Hole Depth/Csg 62 / 59.7	Hole Depth/Csg 62 / 59.7

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend PDP with BTR, drill crew.
0630		To site - light wind, sunny, 55°: crew warming
	0700	Equipment
0700		Start drilling - advance DB 0-5' - collect 2 GS - 5' recovery
		at 0705. Advance DB 5-10', recover 5-10'
	0715	and collect 2 GS at 0715
0915		Add 10' casing & 0.7' shoe (10.7') Clean out to 10'
		Advance DB 10'-15' - recover 10-13 & collect 1 GS at 0725
	0730	Advance DB 15-20, recover 15-20 & collect 3 GS at 0730
0730		Advance DB 20-25, recover 20-25 & collect 3 GS at 0750
		Am RCT clr, momentarily delay to verify < bkg.
	0810	Add 10' casing (20.7) - advance to 15' - clean out to 25
0810		Advance DB 25-35 & recover 25-30'. collect GS at 0825
		Add 10' casing (30.7) - advance to 25' - change out hopper
		0835 - Am JH clr, < detect.
		Add 10' casing (40.7) - advance to 35' - DB 30-35' -
	0900	cleaned out - recovered 30-35 & collect 1 GS at 0855
0700		Add 10' casing (50.7) - advance to 45', while advancing DB
		Advance DB 35-45'. recover 35-40 & collect GS at 0905
		Advance DB ~~35-40~~ 6/24/08 45-55' - recover 45-51 & collect
	0930	3 GS at 0925. Add 10' casing - advance to 55' (60.7 ON)
0930		Advance DB 54-60' - recover 54-60 & collect 3 GS at
		0935. Silt at 56' - take cgs to 59.7 DB to 62'
	1045	TD at 62 - move rig off borehole.

Reported By: Joe Fritz | Reviewed By: C.A. Walker

Title: Geologist | Date: 6/25/08 | Title: Geologist | Date: 7/7/08

Signature: [signature] | Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/08/2008

Well Name: 399-2-20 | Well ID: C6198

Location: 300-FF-5 OU | Report No.: 2

Start	Finish	Total
Time 1130	Time 1545	Time 4.25 hrs
Hole Depth/Csg 59.6 / 60	Hole Depth/Csg ∅ / ∅	Hole Depth/Csg 59.6 / 60

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: #1: 7⅝"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1130		set-up rig over borehole, prep to backpull casing
	1223	to bentonite depth; DTB = 59.6' using ERT string #14;
1223		add bentonite to 56.7' bgs; trip in perm screen +
		casing, 0.3 + 10.0 + 10.0 = 20.3' + 5.0 = 25.3' screen + 10.0 + 10.0
		= 45.3 total + 10 + 10 = 65.3' total; ERTs + thermistors
		taped to screen 2.5' below top of screen; screen @
	1255	56.3' ERTs @ 33.5' bgs
1255	1519	begin well completion, see pgs 1-2 of well comp. log
1519		all temp. casing + shoe removed from hole; tower
	1545	down rig + move jacks to C6184 for completion tomorrow

Not Used

Reported By: S. Sexton

Title: Geologist Date: 07/08/08

Signature:

Reviewed By: Joe Fritz

Title: Geologist Date: 8/6/08

Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 07/17/2008

Well Name: 399-2-20 | Well ID: C6198

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 1230	Time 1500	Time 2.5 hrs
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1230	1255	Setup rig on well; DTB = 56.7' bgs DTW = 30.6' bgs
1255		bailing well & prep for development; using xD S217
		w/ Hermit 1t3K-4S348 "Jeff"; field calibrations
	1304	done on well C6193;
1304		trip-in pump & tremmie to 40.0' bgs (intake);
		Pump: Grundfos 75 S-50 8-Stage; motor: Franklin -
	1316	Electric 5hp;
1316		Test#1: pump on @: 1320 rate: 50 intake: 40.0

	turb (NTU)	pH	D/O (mg/L)	cond (µS)	temp (°C)	xD
1322	1000	7.67	7.79	548	22.6	7.149
1327	57.8	7.65	8.10	457	20.3	7.126
1329	18.0	7.63	8.23	454	19.3	7.109
1331	14.2	7.61	8.37	458	19.9	7.127
1335	8.40	7.62	8.42	455	19.1	7.118
1340	5.85	7.61	8.32	457	19.5	7.128
1345	3.73	7.62	8.25	456	19.5	7.099
1349	1350 3.43	7.63	8.30	459	19.3	7.114
1350	1402	begin recovery;				
1402	1407	lower pump intake to 60' bgs				
1407		Test#2: recorded on Kickback WDI				
		pump on @: 1413 rate: 84 intake:				

	turb.	pH	D/O	cond.	temp.	xD
1415	354		8.22	474	20.4	18.389
1418	32.6	7.70	8.59	469	20.1	18.383

Reported By: S. Sexton | Reviewed By: Joe Fritz

Title: Geologist | Date: 07/17/08 | Title: Geologist | Date: 8/6/08

Signature: L M. Sexton | Signature: Joe Fritz

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 07/17/2008

Well Name: 399-2-20 | Well ID: C6198

Location: 300-FF-5 OU | Continuation of Report No.: 3

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		turb. pH D/O cond. temp. xD
1422		9.67 7.67 8.65 467 18.8 18.365
1424		9.97 7.65 8.75 469 18.4 18.368
1426		6.97 7.64 8.79 470 18.2 18.363
1428	1429	5.52 7.62 8.82 469 18.3 18.357
1429	1439	begin recovery test on Kickback WDR
1439	1500	trip-out pump, tower down rig & move to next well

Not Used

07/17/2008

Reported By: S. Sexton | Reviewed By: Joe Fitts

Title: Geologist | Date: 07/17/08 | Title: Geologist | Date: 8/6/08

Signature: | Signature:

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-20	C6198	300-FF-5 OU	07/17/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	30.16 bgs
End of Job	30.16 bgs

DEPTH TO BOTTOM:

Start of Job	56.7 bgs
End of Job	56.7 bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40 / 50 bgs
Starting Turbidity	1000 / 354

Pump Start	Stop	Flow Rate
1320	1350	50
1413	1429	84

Total Pumped	1475 / 1364
Final Turbidity	3.43 / 5.52
XD SN/Range (PSI)	5217 / 20.0

PART 3

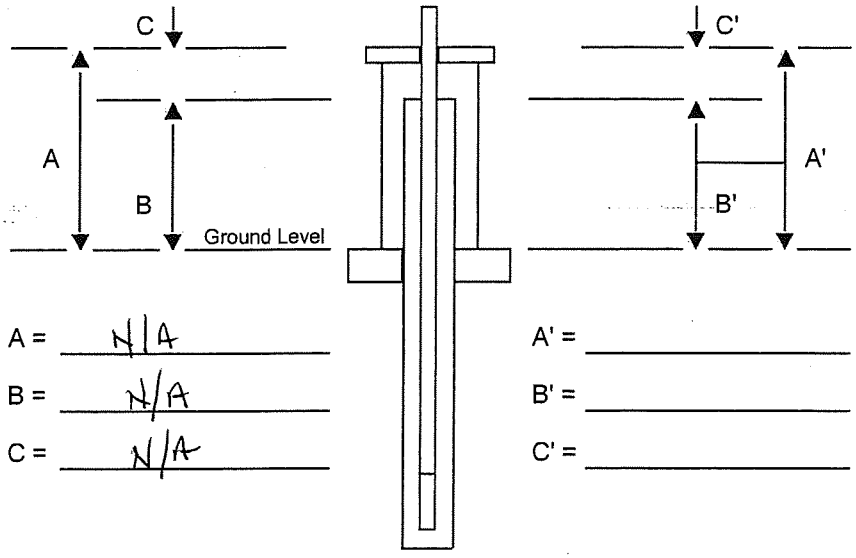
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/17/08

Current Measurements Date:



A = N/A

B = N/A

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ○ No

PART 5

COMMENTS: meter: 56775

Test #1

xDi: 7.223

xDf: 7.183

meter: 58250

Test #2

xDi: 18.633

xDf: 18.571

final meter: 59614

Prepared by (print name): S. Sexton	Signature:	Date: 07/17/08
Reviewed by (print name): Joe Fitts	Signature:	Date: 8/6/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 3

Date: 6/12/08

Purpose: PNNL Project 300 Area IFC	Location: 300-FF-5-OU
Well ID: C6201	Well Name: 399-2-2X1 6/12/08
Drilling Co.: WDC	Rig No.: 139 Rig Make/Mod.: Super Sonic

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8" OD, 6 7/8" ID	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Supersonic 2	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic RS400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size N/A	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Drig. Co.	Rig No.:	Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic N/A	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Comments/Remarks:	Estimated Depth to Water
Driller: Bill Zamow	

Reported By: Joe Fritts

Name/Title: GRAM, Inc. Geologist

Signature: [signature] Date: 6/12/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

PL 6/12/08

Date: 6/12/08

Well Name: 399-2-37 21 | Well ID: C6201

Location: 300-FF-5-01 | Report No.: 1

Start	Finish	Total
Time 0600	Time 1300	Time 8
Hole Depth/Csg 0 / 0	Hole Depth/Csg 61.7 / 58	Hole Depth/Csg 61.7 / 58

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, drillcrew, RCT.
0630		Tgb sik - warm equipment, do inspections, weather
	0700	clear, ~50°, breezy
0700		Start drilling with 6" DB. Advance DB 0-2, recover
		0-2 & collect 1 GS at 0710
		Advance DB 2-10' and recover 2-10' - collect 5 GS
		at 0720 - Add Initial shoe & casing (10.7)
	0735	Advance to 6.7' and clean out w/ DB
0735		AM RCTck, c detect,
	0800	Advance DB 10-15, recover 10-15 & collect 3 GS at 0755
0800		Advance DB 15-25' - recover 15-20 - collect 4 GS at 0810.
		Add 10' casing (20.7') Advance to 15ft - try to
	0845	clean out to 25'
0845		Advance DB 25-35' - recover 25-34' - collect 6 GS
		at 0855 Add 10'(30.7) - advance 25.0 - clean out
	0920	to 25 - empty "dry" rolloff
0920		Add 10'(40.7) - Advance to 35' - clean out
	1000	to 35'
1000		Advance casing 35-45' - recover 35-40' & collect 5 GS at
		1010. Add (2) 5' casing (50.7) - Advance to 45' -
		Advance DB 45-50 recover 45-50 and collect
	1050	4 GS at 1045. 6/13/08
1050		Add 10'(60.7) and advance to 55ft - dry
	1100	material at 51' - clean out to 55ft

Reported By: Joe Faith | Reviewed By: L.D. Walker

Title: Geologist | Date: 6/12/08 | Title: Geologist | Date: 6/26/08

Signature: Joe Faith | Signature: LD Walker

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page ~~3 of 3~~ 6/12/08

Date: 6/12/08

Well Name: 399-2-27 @ 6/10/08 | Well ID: C6201

Location: 300-FF-5-04 | Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1100		Advance DB 55-60 and recover 55-60 - collect GS at 1120. Drilled the slough from top of DB sample for the 50-55' GS.
		Silt (brn) 55-57
	1130	silt (gray) 57-60
1130	1200	Lunch
1200		Advance casing to 58, DB to 61.7ft
	1300	clean up, move to next site

Reported By: Joe Fitts

Title: Geologist | Date: 6/12/08

Signature: Joe Fitts

Reviewed By: L. D. Walker

Title: Geologist | Date: 6/26/08

Signature: LD Walker

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/17/2008

Well Name: 399-2-21 | Well ID: C6201

Location: 300-FF-5 OU | Report No.: 2

Start	Finish	Total
Time 1415	Time 1630	Time 2.25 hrs
Hole Depth/Csg 61 / 58	Hole Depth/Csg 39 / 51	Hole Depth/Csg 22 / 7

Reference Measuring Point: GROUND SURFACE

Casing String No. ① 2 3 4 ____ Rod Size: #1: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1415		Moving jacks + completion rig from C6196 to C6201,
	1508	prep for completion;
1508	1529	backpulling, prep to add perm pvc casing + screen
1529		trip-in 20' screen + cap (0.3+10+10), trip-in 5' ~~casing~~ screen (25' tot)
	1535	+ 10' casing (5+10) = 35.3' on string
1535		attaching ERTs + thermistors @ 33.5' bgs; add 20' to string
		(10+10') = 55.3' on string; add 10' @ 1549 = 65.3' on string;
	1600	bottom of casing + screen set @ 56.4' bgs
1600		completion activities, see well completion log pgs
	1620	1-1;
1620	1630	geo finishes paperwork + departs for office

Not Used 06/17/2008

Reported By: S. Sexton | Reviewed By: Jae Fritz

Title: Geologist | Date: 06/17/08 | Title: Geologist | Date: 8/7/08

Signature: S. M. Sexton | Signature: Jae Fritz

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/18/2008

Well Name: 399-2-21	Well ID: C6201
Location: 300-FF-5 OU	Report No.: 3

Start	Finish	Total
Time 0600	Time 0945	Time 3.75 hrs
Hole Depth/Csg 39 / 51	Hole Depth/Csg 3 / Ø	Hole Depth/Csg 36 / 51

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: #1: 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD @ 300 Area; 50° clear, light breeze
0630	0658	Setup on hole, prep to continue completion;
0658		completion resumes, see completion pages 1-2; IH check
	0932	@ 0844, non-detect;
0932		completion finished, drillers moving jacks and supplies to
		C6191, geo finishes paperwork and moves to C6189 to assist
	0945	with drilling geo.

Not Used 06/18/08

Reported By: S. Sexton	Reviewed By: Joe Fritt
Title: Geologist Date: 06/18/08	Title: Geologist Date: 8/7/08
Signature: [signature]	Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 06/19/2008

Well Name: 399-2-21 | Well ID: C6220

Location: 300-FF-5 OU | Report No.: 4

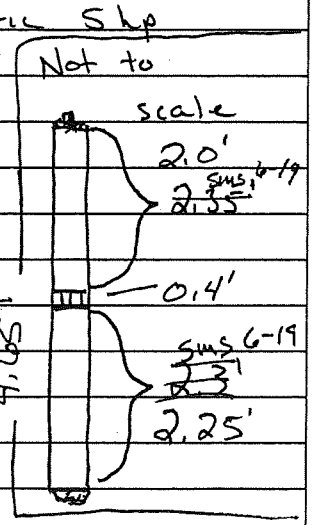
Start	Finish	Total
Time 0600	Time 1300	Time 7.0 hrs
Hole Depth/Csg 3 / ø	Hole Depth/Csg 3 / —	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 _____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD @ 300 Area (BTR, Driller, &Co); 50°, clear, light breeze
0630	0705	Setting up on borehole, prep for development
0705		Prep to trip-in pump: Motor: Franklin Electric 5 hp
		Pump: Grundfos 75S-50
		4.65' total 8- stage pump
		motor: 2.3' screen intake 0.4'
	0725	pump 2.35'
0725		begin test parameters

Calib.		Reading	w/in 10%
Turb	482	479	Y
Turb cond	50.9	50.3	Y
Turb pH	4.45	4.26	Y
Cond	1413 µS	1421	Y
pH	4.00	4.03	Y
	0749	pH 10.00	10.13	Y



0749		last minute prep for well development; moving trucks and setting xD, will run top section of screen first
	0832	Test #1 parameters: pump on @ 0832, pumping @ 50 gpm

	Turb (NTU)	pH	cond (µS)	temp °C	D/O (mg/L)	xD
0832						
0838	4.26	7.85	347	17.4	8.86	2.974
0847 0852	1.99	7.66	342	17.2	9.16	2.977
0852 1114	Shut down for take cover drill					
1114		Resume development:				
1119 1125	0.98	7.70	345	18.0	8.61	2.992

Reported By: S. Sexton | Title: Geologist | Date: 6/19/08 | Signature: S. Sexton

Reviewed By: Joe Fritz | Title: Geologist | Date: 8/7/08 | Signature: Joe Fritz

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 6/19/2008

Well Name: 399-2-21 | Well ID: C6201

Location: 300-FF-5 OU | Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1125		Pump shut off, began recovery, hose disconnected before final reading taken; prep for lower interval test;
1207		Pump turned on; begin test #2 74 gpm
~~1210~~		Turb. pH cond. temp. D/o xD' xD²
1210		22.8 7.76 380 18.4 8.47 2,938 3,392
1215		7.54 7.79 380 17.8 8.81 2,950 3,390
1219		5.20 7.80 380 17.6 8.97 2,951 3,387
1220	1232	begin recovery test
1232	1250	break down valves + trip-out pump + tremmie;
~~1250~~	1300	move truck to next borehole;

Not used 6/19/08

Reported By: S. Sexton	Reviewed By: Joe Fritz
Title: Biologist Date: 6/19/08	Title: Geologist Date: 8/7/07
Signature:	Signature:

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-21	C6201	300-FF-5 OU	06/19/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No 06/19/08

PART 1

STATIC WATER LEVEL:

Start of Job	SMS 6-19 26.5 bgs
End of Job	26.3 bgs

DEPTH TO BOTTOM:

Start of Job	56.3 bgs
End of Job	56.3 bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model: 753-50

Intake Depth: ~~bgs~~ 40.6 bgs / 50.0 bgs

Starting Turbidity: 4.26 / 22.18

Pump Start	Stop	Flow Rate
0832	~~0852~~ 0852	50 gpm
~~1114~~ 1114	1125	50 gpm
1207	1220	74 gpm

Total Pumped: 2050 gal / 975

Final Turbidity: 0.98 / 5.20

XD SN/Range (PSI): 45348 / 20.0

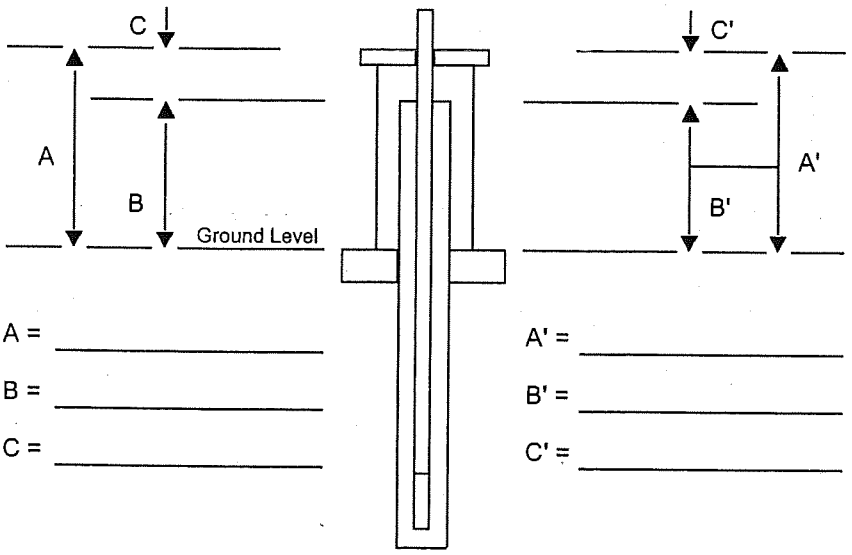
PART 3

INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:	Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

Test #1: xD_i: 3.113 ft. Meter$_i$: 15784

xD_f: 3.136 ft. ~~hose disconnected~~ SMS 6-19 ~~before final~~ reading ~~taken~~ check valve in place

Test #2: 5217 xD_i: 3.037 meter 17055

5218 (Dup) 26.55 bgs xD_i: 3.408

5217 xD_f: 3.059

5218 (Dup) xD_f: 3.404 (well C6197)

Prepared by (print name):	Signature:	Date:
S. Sexton		6/19/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritts		8/4/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 2

Date: 7/14/09

Purpose: PNNL Characterization 300 Area | Location: 300-FF-5

Well ID: C6202 IFC | Well Name: 399-2-22

Drilling Co.: WDC Mike Wilkerson | Rig No.: 709 | Rig Make/Mod.: Super Sonic

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon Steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic R 5400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: 75 /	Other:	Additives Aqua Foam	Type
Shoe OD/ID 7 5/8 6 7/8			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm 7/14/09	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic Not used	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Joe Fitz

Name/Title: Contractor Geologist

Signature:

Date: 7/14/09

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 7/14/08

Well Name: 399-2-22 | Well ID: C6202

Location: 300-FF-5 | Report No.: 1

Start	Finish	Total
Time 0600	Time 1230	Time 6.5
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 15 / 5	Hole Depth/Csg 15 / 5

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, drill crew, RCT.
0630		To site - rigging up, 63° clear.
	1015	clean pipe - Inspections
1015		start drilling with 6" drive barrel (DB)
		Advance DB 0-5' - recover 0-5 collect 2 GS at
		1025. Advance DB 5-15' - recover 5-15 & collect
		4 GS at 1035. Add 10' casing & shoe (10.7) - advance
		to 5' - Advance DB - shear off box on drill rod -
	1050	stop to repair.
1050		Double pin - sub sheared off - look for part.
		1150 - call from driller - down for the day - not. find
		BTRX NCOs
	1215	1200 - Am JH dr, < detect.
1215	1230	No more drilling today.

Not used

7/14/08

Reported By: Jae Frith

Title: Geologist | Date: 7/14/08

Signature:

Reviewed By: L.D. Walker

Title: Geologist | Date: 7/18/08

Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7/15/08

Well Name: 399-2-22	Well ID: C6202
Location: 300-FF-5	Report No.: 2

Start	Finish	Total
Time 1300	Time 1600	Time 3
Hole Depth/Csg 15 / 5	Hole Depth/Csg 45 / 45	Hole Depth/Csg 30 / 40

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1300		Crew obtaining part to repair rig - most of
	1400	morning - set up & ready to drill
1400		Resume - part installed
		Advance DB 15-25 - recover 15-23 & collect
		4 GS at 1415, Add 10' casing (20.7) and
	1420	advance to 15'.
1420		Change out hopper. RCTck, < Bkg.
	1445	IHck, < detect
1445		Add 20' casing (40.7) Advance DB 25-35 w/casing,
		∅ recovery - hole opens to 35' - will add
	1500	a catcher.
1500		Add 10' casing & (50.7) and advance DB & casing 35-45' -
		using a catcher. Recover 35-42' & collect 2 GS
	1535	at 1530
1535	1600	No time for another sample - stop, TO office.

Not used 7/15/08

Reported By: Jo Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 7/15/08	Title: Geologist	Date: 7/18/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7/16/08

Well Name: 399-2-22	Well ID: C6202
Location: 300-FF-5	Report No.: 3

Start	Finish	Total
Time 0600	Time 0900	Time 3
Hole Depth/Csg 45 / 45	Hole Depth/Csg 65 / 60	Hole Depth/Csg 20 / 15

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size: 7 5/8
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, drill crew, RCT,
0630	0710	To site - warm equipment, weather partly cloudy 66°.
0710		Resume from 45 Ft. Add 10' casing (60.7) - advance
		DB & casing 45 to 55' - recover 45-52.7 8 7/16
	0730	collect 3 GS at 0730
0730		Advance DB 55-65 - recover 55-65 - silt at 56' -
		collect 4 GS at 0600
	0820	AM IH Ck. < detect
0820	0835	Advance casing to 60' - borehole to 65
0835	0900	Rig off hole - move to 6188, RCT ck of cuttings, < Bkg

Not used 7/16/08

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 7/16/08	Title: Geologist	Date: 7/18/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 7-28-08

Well Name: 399-2-22 | Well ID: ~~C6206~~ C6202 MSH 7/28/08

Location: 300-FF-5 | Report No.: 4

Start	Finish	Total
Time 0900	Time 1239	Time 3 hrs. 39 min.
Hole Depth/Csg 65.0' / 65.7'	Hole Depth/Csg ~34.0' / 40.7	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: 8" casing = (1)
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0900	Moved from C6205.
0901	0907	Setup site for well construction.
0908		Begin well construction ; details on well completion log.
	0925	Remove 5.0 ft temp. casing, [Tot. = 60.7 ft]
	0930	Preparing to install ERT # 0026 ; thermistors in the ground.
0932		Begin tripping in permanent PVC casing.
	0945	Resume construction.
1002	1003	Trip in surge block.
1004		Begin surging lower half of screened interval.- hoping PVC will drop (slightly high per the spec.)
	1017	Trip surge block out of hole.
	1024	REMOVE 10.0 ft temp. casing, [Tot. = 50.7 ft].
	1030	Trip surge block back down hole.
1031		Again surging lower half of screened interval.
	1100	Surge block tripped out of well ; Geo. informs PNNL Scientist (Horner) of the amount of error between spec. & actual build.
	1123	PNNL Scientist (Horner) informs Geo. error is too far off - PVC will need to be pulled & hole re-drilled in order to start again ; Geo. informs Driller of decision.
	1126	Drillers begin prep. to pull PVC from hole.
1130		Begin pulling PVC.
	1139	Approx. 20ft of screen remains in the hole (screen ripped).

Reported By: Jess Hocking | Reviewed By: Joe Griffin

Title: Geologist | Date: 7/28/08 | Title: Geologist | Date: 8/14/08

Signature: Jess Hocking | Signature: Joe Griffin

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 7-28-08

Well Name: 399-2-22 | Well ID: C6202

Location: 300-FF-5 OU, | Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1226		Drillers get rig/site ready for Sonic rig to re-drill the well. Plan to move to a deep well to begin construction instead.
	1239	Move to C6211.

DOT USED

7/28/08

Reported By: Jess Hocking | Reviewed By:

Title: Geologist | Date: 7/28/08 | Title: Geologist | Date: 8/4/08

Signature: | Signature:

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/29/2008

Well Name: 399-2-22 | Well ID: C6202

Location: 300-FF-5 OU | Report No.: 5

Start	Finish	Total
Time 0600	Time 1530	Time 9.0 hrs
Hole Depth/Csg 34 / 40	Hole Depth/Csg 0 / 0	Hole Depth/Csg 34 / 40

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: #1: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD @ trailer w/ BTR, Drillers; 62° clear, no wind
0630		Warm up rig, perform safety check; move rig over
		borehole & prep to re-drill hole + remove broken
	0736	screen;
0736	0745	advancing clb to 45' bgs;
0745	0750	add 10' casing (5+5) + push to 45'
0750	0808	clean-out to 55 & attempt to remove perm. screen;
0808	0847	perm. screen removed, will clean-out to 60 & push casing
0847	0855	to ~57.5; add 10' (5+5) + advance casing;
0855		borehole to ~61.5, casing to ~60' bgs; prep for well
	0945	construction;
0945		waiting for PNNL to test thermistors + bring out
	1055	ERTs for other wells;
1055	1103	DTB = 61.7' bgs, adding bentonite to 59.5' bgs;
1103		trip in perm screen & casing (0.4+5+10) = 15.4+10' = 25.4'
		total screen; thermistors & ERTs @ 33.5' bgs 6" below
	1128	top of screen; ERT string #26 used; well set @ 58.9
1128		begin completion see well completion pgs 1-2;
		perm tally (0.4+5+10+10) = 25.4' screen + 10+10+10+5+5 =
	1506	65.4' total on string;
1506		all temp casing + shoe removed; break down r.g +
	1530	move to C6209;
	1530	Geo departs, drillers + BTR remain
		Not Used 07/29/2008

Reported By: S. Sexton

Title: Geologist Date: 07/29/08

Signature:

Reviewed By: Jeff Fritz

Title: Geologist Date: 8/14/08

Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7-31-08

Well Name: 399-2-22 | Well ID: C6202

Location: 300-FF-5 | Report No.: 6

Start	Finish	Total
Time 1230	Time 1405	Time 2hr 35min
Hole Depth/Csg - / -	Hole Depth/Csg - / -	Hole Depth/Csg - / -

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ | See Report No. 1

Rod Size: 4" PVC | Screen: 33.4' - 58.5'

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1230		Tag bottom @ 59.0' post bail. DTW: 30.4' bgs.
1240		Trip in Pump + Tremmie + Transducer : 35.1
		Pump intake @ 40.2 bgs. (~~7.6~~ 6.8 below Top of screen), Transducer @ 35.8' bgs.
1250		Start Test # 7 on Hermit # Jeff H3K-54348
		XD$_I$: 5.01' bgs.

		XD (ft)	Turb (NTU)	Temp (°C)	DO (mg/L)	pH	Cond. (mS)	Notes:
1250	start	5.33	1000	22.5	7.37	7.79	0.492	50 gpm
1255		5.30	21.1	20.4	7.93	7.68	0.491	47 gpm
1300		5.29	7.08	19.5	8.19	7.60	0.485	47 gpm
1305		5.29	3.28	18.7	8.18	7.50	0.487	47 gpm
1310		5.28	2.15	18.4	8.26	7.60	0.486	47 gpm
1315		5.28	1.56	18.7	8.20	7.60	0.488	47 gpm
1320	stop Test	5.28	1.43	18.9	8.21	7.61	0.488	47 gpm

1243		XD$_F$: 5.349 Begin Recharge test # 8
		Trip in 10' tremie → intake now @ ~~58~~ 7-31-08 50.8' bgs. Transducer same place.
1332		Start Development of lower section of screen.

1332		5.29	>1000	18.9	8.06	7.70	0.496	47 gpm
1337		5.29	32.9	18.7	8.16	7.65	0.492	"
1342		5.29	9.46	18.8	8.23	7.64	0.491	"
1344		5.29	5.40	18.8	8.24	7.64	0.491	47 gpm

1345		Stop Development = Rig Truck is full.
1358		Trip out Pump & Tremmie + move to next well.
1405		Tag DTB: 59.0 bgs Tag DTW: 30.4 bgs.

Reported By: A. Lantow		Reviewed By: Jeff Fix	
Title: Geologist	Date: 7/31/08	Title: Geologist	Date: 8/14/08
Signature: Aaron Lantow		Signature: Jeff Fix	

A-6003-651 (REV 1)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-22	C6202	300-FF-5	7-31-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job 30.4

End of Job 30.4

DEPTH TO BOTTOM:

Start of Job 59.0

End of Job 59.0

PART 2

WELL DEVELOPMENT DATA

Pump Model Grundfos 75-S-50

Intake Depth T_1: 40.2 / T_2: 50.2

Starting Turbidity 1000

Pump Start	Stop	Flow Rate
12:43:15	13:17:23	T_1 47 gpm
13:17:23	13:23:31	T_1 Recharge.
1332	1345	T_2 47 gpm
		T_2

Total Pumped 2209

Final Turbidity T_1: 1.43 / T_2: 5.40

XD SN/Range (PSI) (20)

PART 3

INSTANTANEOUS SLUG TEST

Static Water Level (TOC)

Transducer Depth 35.1' bgs.

Baseline Start

Injection Start

Baseline Start

Withdrawal Start

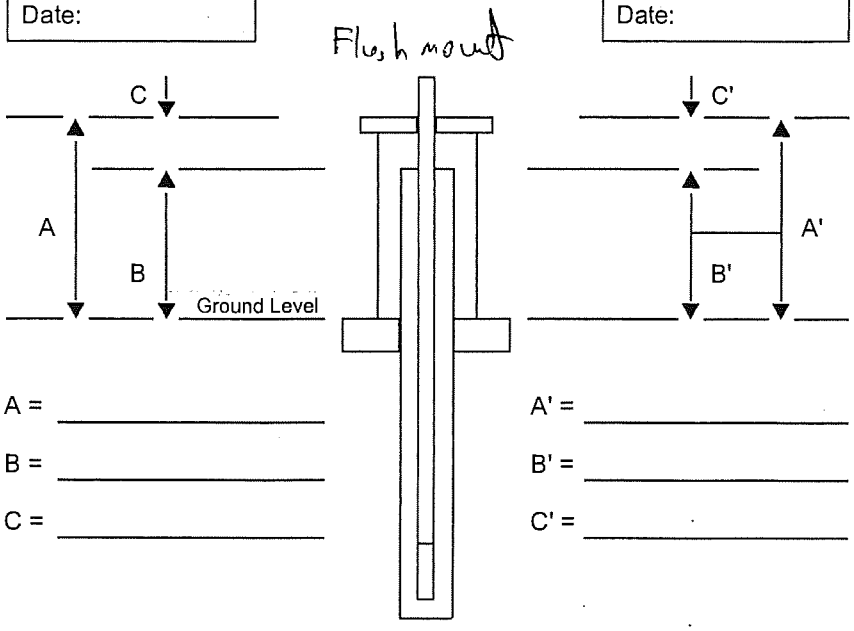
Slug Volume

XD SN/Range (PSI)

PART 4

Last Recorded Measurements Date:

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: HERMIT# Jeff H3K-~~543~~ 54348

Drawdown Test #7

Recovery Test #8 I

Prepared by (print name):	Signature:	Date:
Aaron Lantau	Aaron Lantau	7/31/08
Reviewed by (print name):	**Signature:**	**Date:**
DC Weekes	DC Weekes	8/19/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Date: 7/8/08

300 Area

Purpose: PNNL Characterization IFC | Location: 300-FF-5

Well ID: ~~C6185~~ C6207 | Well Name: 399-2-23

Drilling Co.: Driller Bill Zamora | Rig No.: 39 | Rig Make/Mod.: Super Sonic

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8 / 6 7/8	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic 2	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic RS 400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives N/A	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe N/A	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Joe Fitz

Name/Title: GRAM Inc, Geologist

Signature:

Date: 7/8/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 7/8/08

Well Name: 399-2-23	Well ID: C6207
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 0830	Time 1400	Time 6.0 hrs
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 60.0 / 58.0	Hole Depth/Csg 60.0 / 58.0

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0830	0940	cleaning pipe - moving to location
0940		start drilling w/ 6" Drive barrel (DB)
		Advance 0-4' - collect 2 GS at 0945
		AM RCT ck, <3kg, AM IH ck, < detect
		Advance DB 4-10 - recover 4-10 & collect 2 GS at
	1000	0955.
1000		Add shoe & 10' casing (10.7) and advance to 5'.
		~~No rxn~~ 7/8/08. Advance DB 10-15, recover 10-14.5.
	1010	collect 2 GS at 1010
1010		Advance DB 15-20, recover 15-20 & collect 2 GS
		at 1020. Add 10' casing (20.7) advance to 15'
	1020	clean out to 20.
1020		Advance DB 20-25 - recover 20-24.5 and
		collect 2 GS at 1045.
		Advance DB 25-35' - recover 25-31' and collect
	1100	2 GS at 1055. 7/8/08
1100		Add 10' casing ~~(and advance)~~ (30.7) and advance to 25'
		Trade-out the hopper. Add 10' casing (40.7) -
	1115	advance DB & casing, clean out to 35'
1115		Add 10' casing (50.7) - Advance DB 35-45 - recover
	1145	35-42 & collect 2 GS at 1135
1145	1225	Break for lunch
1225	1230	Resume drilling.
1230	1301	Add 10' casing (60.7' tally); waiting on NCO's. (see pg. 3→)

Reported By: Jon Fritts / T. Buswell		Reviewed By: C. D. Walker	
Title: Geologist	Date: 7/8/08	Title: Geologist	Date: 7/14/08
Signature: [signature] / Tom Buswell		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 7/8/08

Well Name: 399-2-23 | Well ID: C6207

Location: 300-FF-5 | Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1301	/	Advanced DB 45-55' bgs, recovered 45.0-48.5', but lost while
/	/	waiting. Driller suggest advancing to 60.0' bgs to obtain
/	1305	recovery.
1305	/	Advanced DB 45-60' bgs, 10' recovery: 50-60' bgs, + collect
/	1330	2 GS @ 1315.
1330	1350	Advance DB/casing; DB-60.0' bgs (cleanout), casing-58.0' bgs.
1350	~~1400~~ 1410 7/8/08	Demob and move rig to 399-3-28 (C6205).
1400	/	Cleaning site.

not used. (1B) 7/8/08

Reported By: T. Buswell

Title: Geologist | Date: 7/8/08

Signature: Tom Buswell

Reviewed By: L.D. Walker

Title: Geologist | Date: 7/14/08

Signature: L.D. Walker

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/15/2008

Well Name: 399-2-23	Well ID: C6207
Location: 300-FF-5 OU	Report No.: 2

Start	Finish	Total
Time 1000	Time 1515	Time 5.25 hrs
Hole Depth/Csg 60 / 58.5	Hole Depth/Csg 2 / Ø	Hole Depth/Csg 58 / 58.5

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 ____ Rod Size: #1: 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1000	1038	setup rig + jacks on borehole; DTB=57.5 ft bgs
1038	1059	backpull casing to bent. depth; add bentonite
1059		added very little bentonite but seds in shoe caused
		bent. to bridge, backpulled 2' but would not fall,
	1128	will bail + try to knock out bottom;
1128	1136	bailed out well to 59.7' bgs; resume adding bent.
1136		trip in perm screen (0.4+10+10)=20.4+5=25.4' screen
		+ 10+10 HS+5+5=65.4' total on string; ERT string #19
	SMS 7-15 ~~1155~~	used; ERTs + thermistors taped 2.5' below top of
SMS 7-15 ~~1155~~	1155	screen; bottom of sump set @ 56.3' bgs
1155		begin well completion, see completion log pgs 1-2; RCT check
	1455	@ 1427, all readings < bkgrnd;
1455		all temporary casing removed from ground, tower
	1515	down rig + move off well;

Not Used 07/15/2008

Reported By: S. Sexton	Reviewed By: Jae Fritts
Title: Geologist Date: 07/15/08	Title: Geologist Date: 8/13/08
Signature: [signature]	Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 07/16/2008

Well Name: 399-2-23 | Well ID: C6207

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 0730	Time 1000	Time 2.5 hrs
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size:
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0730		Setup rig over well, prep for development & tag:
	0750	DTW: 30.1' bgs DTB = 56.3' bgs; bailing well
0750		Field calibrations:

	known	reading	w/in 10%
turb. (NTU):	482	481	Y
turb. (NTU):	50.9	50.9	Y
turb. (NTU):	4.45	4.71	Y
pH:	7.00	7.17	Y
pH:	10.00	10.37	Y
cond:	1413	1428	Y

0800		trip-in pump & tremmie, intake @ 40.0 ft bgs; xD @					
	0807	35.887' bgs, 5.787' bwt; using xD 5217 on Hermit 3K-4581Z					
0807		Test #1: pump on @ 0810 intake: 40.0 rate: 50					
		turb. (NTU)	pH	D/O (mg/L)	cond. (µS)	temp (°C)	xD
0811		>1000	7.81	7.67	467	18.4	5.448
0815		144	7.73	8.42	455	17.8	5.163
0818		27.1	7.76	8.58	454	17.7	5.152
0822		12.4	7.70	8.62	453	17.6	5.146
0826		5.94	7.69	8.70	453	17.7	5.152
0830		3.76	7.70	8.70	453	17.6	5.152
0834		2.60	7.69	8.75	453	17.5	5.170
0839	0840	2.41	7.69	8.75	452	17.4	5.158
0840	0850	begin recovery					
0850	0858	lower pump intake 10' to 50.0' bgs					

Reported By: S. Sexton | Reviewed By: Joe Fitz

Title: Geologist | Date: 07/16/08 | Title: Geologist | Date: 8/13/08

Signature: L. M. Sexton | Signature: Joe Fitz

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 07/16/2008

Well Name: 399-2-23 | Well ID: C6207

Location: 300-FF-5 OU | Continuation of Report No.: 3

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
0858		Test #2 recorded on SumDried WDS:
		pump on @: 0900 rate: intake: 50.0
		turb. pH D/O cond. temp. xD
0902		329 7.74 8.80 463 17.6 15,152
0904		59.9 7.74 8.97 461 17.3 15,137
0906		19.3 7.77 9.09 459 17.4 15,143
0908		13.2 7.75 9.05 460 17.4 15,155
0910		8.97 7.74 9.02 460 17.4 15,140
0912		6.52 7.76 9.02 460 17.4 15,146
0914		5.45 7.74 9.03 459 17.4 15,155
0916	0918	4.49 7.76 9.07 459 17.3 15,134
0918	0929	pump shut off, begin recovery test on SumDried WD6
0929	0947	pull out pump + tremmie;
0947	1000	tower down rig + move back to C6204

Not Used

L. M. Sexton 07/16/2008

Reported By: S. Sexton		Reviewed By: Joe Fitts	
Title: Geologist	Date: 07/16/08	Title: Geologist	Date: 8/13/08
Signature: L. M. Sexton		Signature: Joe Fitts	

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-23	C6207	300-FF-5 OU	07/16/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No 07/16/08

PART 1

STATIC WATER LEVEL:

Start of Job	30.1 ' bgs
End of Job	30.1 ' bgs

DEPTH TO BOTTOM:

Start of Job	56.3 ' bgs
End of Job	56.3 ' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40.0/50.0
Starting Turbidity	>1000 / 329

Pump Start	Stop	Flow Rate
0810	0840	50
0900	0918	86

Total Pumped	1407 / 1477
Final Turbidity	2.41 / 41.49
XD SN/Range (PSI)	5217 / 20.0

PART 3

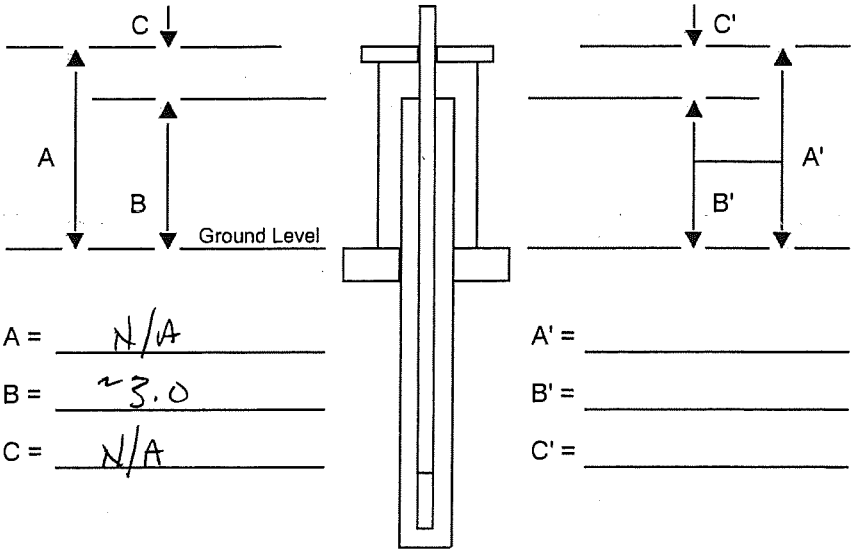
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	N/A
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/16/08

Current Measurements Date:



A = N/A

B = ~3.0

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 48188

Test #1:

xDi: 5.787

xDf: 5.782

Test #2: meter: 49595

xDi: 15.740

xDf: 15.718

final meter: 51072

Prepared by (print name):	Signature:	Date:
S. Sexton		07/16/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz		8/13/08

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 5/23/09

Purpose: PNNL Project 300 Area IFC | Location: 300-FF-5 -OU

Well ID: C6208 | Well Name: 399-2-24

Drilling Co.: WDC | Rig No.: 139 | Rig Make/Mod.: SuperSonic 2

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8 OD, 6 7/8" ID	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic SuperSonic 2	Pressure N/A psi	Make
Welded ___ (Thd.)	A.R. w/Sonic RS 400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: 163.2'	Other:	Additives	Type
Shoe OD/ID	Built by Gus Roch		Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic N/A	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Comments/Remarks:

Estimated Depth to Water

Reported By: Joe Fitz

Name/Title: CRAM Inc. Geologist

Signature: [signature]

Date: 5/23/09

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 5/27/08

Well Name: 299-2-24 | Well ID: C6208

Location: 300-FF-5-OU | Report No.: 1

Start	Finish	Total
Time 0600	Time 0700	Time 3
Hole Depth/Csg 0 / 0	Hole Depth/Csg 10 / 9	Hole Depth/Csg 10 / 9

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1 | Rod Size: 7 5/8" sixle wall

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0620	Attend POD with BTR, drill crew, RCT and geologist.
0620		Move equipment to new site - windy, cloudy,
	0700	periodical rain, ~ 50's.
0700		Start drilling at 0700. 6 oft casing on pipe truck
		Advance SS 0-5' - recover 0-5' - collect 3
		lexan liners at 0710
		Advance SS 5-10' - recover 5.5'-10' - collect 5 lexan
		liners at 0725. Add shoe and 10.0' casing (10.70). While
		advancing casing - crew noticed tilt arm bracket
	0730	supporting main drive broken - Stop.
0730		Pull casing out of borehole - will demob all
		equipment - repair rig & return 5/27/08.
	0900	To office

5/28/08

Reported By: Jim Fritz | Reviewed By: L.D. Walker

Title: Geologist | Date: 5/27/08 | Title: Geologist | Date: 6/5/08

Signature: [signature] | Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 5/28/08

Well Name: 399-2-24	Well ID: C6208
Location: 300-FF-5-OU	Report No.: 2

Start	Finish	Total
Time 0600	Time 1615	Time 10.25
Hole Depth/Csg 10 / ∅	Hole Depth/Csg 10 / 20	Hole Depth/Csg ∅ / 20

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: (1) 7 5/8" single wall
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600		Attend POD with BTR, drillcrew, RCT. Driller (Mike)
		did not return from break - in hospital. Brian will be
	0630	driller
0630		To site - cloudy, light rain, 59°. Rig & equipment
		set up on hole - crew doing warm-up, inspections.
	0710	Borehole has caved to 4.8 ft.
0710		NCO's on site - start cleaning out. 10' casing &
		shoe on (10.70') - using 10' DB to clean it out -
		casing at ≈ 8 ft - clean out to 10 ft - Add 10.0' (20.70')
	0735	casing
0735		Casing to 10 ft - tag at 9.4 ft - push SS 9.4 - 14.4 -
	0810	∅ material in SS - fill out
0810		SS to 10' - push 10-15' - return 10-15' - collect
		5 lexan liners at 0830. Add 10' casing (20.70) -
	0900	casing to 15'
0900		Clean out 10-15' - with 6" DB - 0920 - DB up - ∅ in it.
		clean out 10-15' - no returns - tag at 16 ft - pushing
	0940	material down - will run spoon
0940		0945 - AM RCT ck, CBkg, AM IH ck, c detect
	1000	Push SS 16-21 - ∅ recovery - stop to discuss
1000	1050	Add 10' ft - (30.70') - casing to 20 ft -
1050		Tag at 12.7' - 7.3' in casing - clean out with 6" DB.
		Twist off at surface - while trying to clean out - pull out
	1100	rod & drive barrel - casing moved up. - take off 10' (20.70)

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 5/28/08	Title: Geologist	Date: 6/5/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 5/29/08

Well Name: 399-2-24 | Well ID: C6209

Location: 300-FF-5-OU | Continuation of Report No.: 2

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1100		Bring up barrel - nothing in it - did not add any
	1130	water - lunch break - tg at 13 FT
1130	1200	Lunch @ 5/29/08
1200		casing at ~~36.7'~~ 16.7' - lower DB to ± 16' - ∅
		recovery - pull DB off - will pull up casing to
	1235	check for breaks
1235		Raise casing up most - 20.7' on (+5') looks good - lower
		in hole caved to ± 12.5'. 1300 - casing to ± 17' -
		1305 - casing to 20 FT. - 6" DB to ± 15' - no returns.
		Go in w/ 4" x 10' DB. at 1330 - advance from ± 9-11' -
	1345	∅ returns
1345		Add ± 5 gals water - push 4" DB - a handful of gravel -
	1400	tag at 10'
1400		Go in with 6" DB, - lower to 10' - push 10-15 several times,
	1445	- no returns - casing at ± 15' - tag at 9'
1445		Add 10' (30.70') - advance casing to 20' - pull off to (20.70')
		Crew will make another bit for end of barrel to
	1500	help keep material in.
1530		Waiting on bit - will do in morning
	1615	to offer

5/29/08

Not used

Reported By: Jeff Fritz		Reviewed By: L.D. Walker	
Title: Geologist	Date: 5/29/08	Title: Geologist	Date: 6/5/08
Signature:		Signature:	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 5/29/08

Well Name: 399-2-24	Well ID: C6208
Location: 300-FF-5-OU	Report No.: 3

Start	Finish	Total
Time 0600	Time 1615	Time 10.25
Hole Depth/Csg 10 / 20	Hole Depth/Csg 30 / 30	Hole Depth/Csg 20 / 10

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: (1) 7 5/8" single wall

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, Drill crew, RCT.
0630		To site, cloudy, 56°. New bit for Drive
		barrel on site - will try that. Casing at 20ft -
	0645	Need a grab sample 15-20', warm equipment
0645	0700	AM Ittck. < detect
0700		6" DB advance from 10-15' - ≈ a bucket of coarse
	0740	sand. Advanced from ≈ 14-15' - v. slow - large rock?
0740		At 15' - sand, gravel, with some silt. - wet - and not
		adding water. DB 15-18' - collect grab sample at 0815
		Cobbles to 5" - lots of ground - up (flow-like) rock
		- borehole has been worked much - depth material is
	0815	from is estimated. - dry.
0815		Advance DB from 18-21 - lost all sample when bag burst
	0905	while emptying DB. - tag at 20.8'
0905		Discuss with BTR (Adam) and drillers/drill supervisor -
		difficult drilling conditions - can't turn SS so can't advance it -
		will try the barrel (4.5") OD liner with same liners as w/ SS -
	0940	try that 2ft. DB can be rotated. AM RCT ck
0940		Push ~~spo~~ 5/29/08 DB 20-22 - hard to get liners out
		Go in with 5' SS. - sample from 10' DB for
		geo description only - all material had to be hammered out of DB.
	1030	SS 22-25 - recovered 22-24 & collect 2 lexan liners at 1030
1030		Add 10.0 casing (30.7) - Advance to 25ft - clean out
	1110	w/ 6" DB tag at 25 ft.

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 5/29/08	Title: Geologist	Date: 6/5/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 5/29/08

Well Name: 399-2-24 | Well ID: C6208

Location: 300-FF-5-04 | Continuation of Report No.: 3

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1110		Advance SS 25-30' - recover ≈ 6" of loose
	1135	sandy gravel - no sample collected. -
1135	1210	Lunch
1210		DTW 26.7 Ft/gs - go in with 6" DB to
		clean out to 30ft. Clean out to 30' - collect a 2
		gallon grab sample - drop a 5gal bucket (25-30), at
		1245 - tag bottom - caved to bottom of casing (25Ft).
		Add 10' casing (40.7) - Advance to 30.2' - pull 10' off (30.7)
		(go in w/ 6" to clean out. Empty hopper into "dry" rolloff,
	1310	will switch to "wet" roll-off.
1310		Clean out - tag at 29.6' - casing at 30.2.
	1335	Advance SS (while rotating) to 35' - ∅ recovery
1335		Go in w/ SS w/ Flapper to catch material. - Flapper
	1355	stuck open - ∅ returns
1355		Driller off to get catchers - Bio sample will be
	1500	at 35-40' PM RCT ck, <bkg.
1500		Catcher in SS - tag it 30-35Ft
	1515	only a handfull of 1" gravel -
1515	1615	Discuss approach - Geo to office

Reported By: Joe Fritz | Reviewed By: L.D. Walker

Title: Geologist | Date: 5/29/08 | Title: Geology Tech | Date: 6/5/08

Signature: [signature] | Signature: [signature]

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 5/30/08

Well Name: 399-2-24 | Well ID: C6208

Location: 300-FF-5 OU | Report No.: 4

Start	Finish	Total
Time 0600	Time 1630	Time 10.5
Hole Depth/Csg 30 / 30	Hole Depth/Csg 47 / 46	Hole Depth/Csg 17 / 16

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1 | Rod Size: (O) 7 5/8" single wall

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0625	Attend POD with BTR, drill crew, geo.
0625		To site - clear, sunny, 56°. Warm up equipment,
	0700	perform inspections - Plan is to advance casing.
0700		Add (6) casing (40.70) - Advance to 35ft - going
	0720	with 6" OB. - Advance OB 30-35ft - wait on NCO's.
0720	0750	NCO's on site
0750		Collect 3 grab sample From 30-35 at 0805.
		Also collect 5 gallon for other. DTW 33.1 Fbgs.
		Crew lost 2' rod & bottom 2 Ft of tagger line down hole -
		hope to retrieve when drilling out. - rebar rod - steel.
		Discuss with PNNL (Jake Ar Chris S). We will try to
	0820	retrieve it
0820		AM RCTck, <Bkg, AM ITck, no detects
		0905 - magnet to site - lower on sand line - not able
	0930	to retrieve rod - WDC Super to obtain a magnet.
0930	1050	- fish w/ new magnet - on site at 1050
1050		Try various Fishing methods with PVC, magnet -
	1225	No luck
1225		Will run down casing and try to get it with OB.
		Advance casing to 41 Ft. Added 5' (45.70). Drive
		6" OB 35-40' - collect 4 grab sample at 1310 -
		Found ~ 3" of the rod - Add 5' (50.70) casing on -
		2) 10' joints still on deck - Discuss w/ driller
	1330	going to 43' - take OB 40-43 Ft. - then do spoon

Reported By: Joe Fitts | Reviewed By: L.D. Walker

Title: Geologist | Date: 5/30/08 | Title: Geologist | Date: 6/5/08

Signature: Joe Fitts | Signature: L.D. Walker

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 5/30/08

Well Name: 399-2-24 | Well ID: C6209

Location: 300 - FF-5-OU | Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
13.30		Advance casing to 43ft. - Drive DB 40-43 collect
	1415	4 grab samples at 1405 - will switch to SS.
1415	1445	Lunch
1448		DTW 26.8 'bgs, tag bottom at 40'
		Push SS 40-45ft - likely sand is flowing up into casing. Recover 40-43 and collect 3
	1520	Texan liners at 1520. SM RCTck, < Bkg.
1520		Add 5' casing (55.7') - push to 45.7ft - pull off - only 45.7' casing on. - casing at 45.7 - tag at 42 - push ss 42-47' - recover
	1605	42'-45ft - collect 3 Texan liners at 1605
1605		tag at 44.2 - casing at 46ft - (put 2' on temporarily)
	1630	Clean up - to office

Not used

Reported By:	Jeff Fritz	Reviewed By:	L.D. Walker
Title:	Geologist	Date: 5/30/08	Title: Geologist	Date: 6/5/08
Signature:			Signature:

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 6/2/08

Well Name: 399-2-24 | Well ID: C6208

Location: 200-FF-5-OU | Report No.: 5

Start	Finish	Total
Time 0600	Time 1700	Time 11
Hole Depth/Csg 47 / 46	Hole Depth/Csg 67.5 / 63.2	Hole Depth/Csg 20.5 / 17.2

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1 | Rod Size: (1) 7 5/8" single wall

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, drill crew, geologist, RCT,
0630		To site, 50°, breezy, clear. Crew performing
		inspections, maintenance, warm equipment
		47.7' casing in ow (including a 2' ow temporarily) -
		Last sample was SS 42-47, recovered 42-45
		Tag at 43' bgs, PTW 26.3 Fbgs, casing at 46'. W. have
	0710	had problems w/ heaving - so will try to clean out 43-47'-
0710	0805	Take care of waste -
0805		Advance barrel 43-46' - sand. Add 5' casing, take 2'
		off - (50.7'). - tag sand at 43.4' - still heaving - advance
	0845	casing to 48.2'. tag at 43.5'. AM ILT clr. c' detect.
0845		Trying to clean out - push DB (6") 43.5-48.5'
	0900	Tag at 48.3' Collect grab sample 47-48.5 at 0855
0900		Advance SS 48.3 - 53.3' - recover 48.3 - 51.1 and collect
	1000	2 liners at 0935
1000		Advance casing to 50 ft. - tag at 48.6
		AM RCT clr, <Bkg - Advance DS 48.6 - 51 - tag at 48.5 -
	1030	cleaned out silt/sand - go in to clean out again.
1030		Advance DS 6/2/08 48.5 - 52.5 - collect 3 GS 48.5 - 52.5
		at 1100. Tag at 50.4, casing at 50, rw SS 50-55 -
	1130	Ø return lunch
1130	1200	Lunch
1200		SS with new flapper - Advance 50 - 55' Recover
	1305	50-54 & collect 4 Lexan liners at 1305

Reported By: Joe Fritz		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/2/08	Title: Geologist	Date: 6/5/08
Signature:		Signature:	

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 6/2/08

Well Name: 399-2-24 | Well ID: C6208

Location: 300-FF-5-OU | Continuation of Report No.: 5

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1305		Add 5' casing (55.7') - ~~Advance to~~ pr 6/2/08
		Add 5' casing (60.7) - Advance to 55.7 - go in w/ DB
	1400	to clean out - tag at 55'
1400	1430	Advance spoon 55-60' - only 6" of slough (sand)
1430		Tag at 57.5 - push ss 57.5-62.5 recover
		57.5-60 and collect 3 liners at 1500
	1500	PM RCT ck, < bkg - reduced silt in shoe at 60'.
1500		Add 5' casing (65.7)' - advance to 61 -
		take DB to 60' - tag at 58.5' - brn silt in bottom of
		DB. Difficulty cleaning out - took DB ~~60~~ pr 6/2/08
		58.5-65' - ~~collect~~ pr 6/2/08 after several attempts -
	1600	≈ 58-60 brn clay, 60-65 gray clay. 1630 GS 60-65'
1600		Will advance casing & clean out to TD.
		Casing to 63.2' - tag bottom at 67.5' - Fine sand
	1640	end of barrel (blue-gray) 65-67.5
1640	1700	Moving rig off borehole - to office

Not used [signature] 6/2/08

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/2/08	Title: Geologist	Date: 6/5/08
Signature: [signature]		Signature: [signature]	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 6/6/08

Well Name: 399-2-24 | Well ID: C6208

Location: 300-FF-5 | Report No.: 6

Start	Finish	Total
Time 1015	Time 1730	Time 7 hrs 15 min
Hole Depth/Csg 65.2' / 61.3'	Hole Depth/Csg 0 / 0	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1015		Mobilize to site from C6190 - DTB = 70.0' - 4.8' = 65.2' bgs
1055		Measure out screen: 3 slots 9.99' + 9.99' + 4.98' = 24.96' + 0.3' end cap = 25.26'
1115		Backpull casing - add bentonite to 60.1' bgs - wait for bentonite to hydrate
		After bentonite hydrates DTB: 65.0' - 5.3' = 59.7'
1224		Trip in 4" ID PVC well screen/casing - screen 25.26' + 4x10' = 65.26'
1324		Set bottom of end cap on well @ 58.3'
1325		Start adding sand - refer to well completion log pg. 1
1720		Geo Paperwork
1730		Geo departs

Not used 6/6/08

Reported By: J. Throolin		Reviewed By: Joe Fitz	
Title: Geologist	Date: 6/6/08	Title: Geologist	Date: 8/7/08
Signature:		Signature:	

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 6/9/08

Well Name: 399-2-24 | Well ID: C6208

Location: 300 ff -5 | Report No.: 7

Start	Finish	Total
Time 0600	Time 1130	Time 5.5
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size:

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, Drill crew, RCT.
0630		To site. 55°, clear, sunny
		Well: DTW 29.60 ftstc TD 61.20 FB TOC,
		2.80' s/u. Sc 33-50 ftbgs Installed to
		58.3 ftbgs
0705	0720	swab well
		kit #7 - check knowns. Ec meter reads kit #3
		knowns reading
		pH 7.00
		10.00 10.11
		~~Ec 4.45~~ 6/9 7.11
		Turbidity (NTU)
		4.45 4.47
		50.9 50.9
		482 480
microsiemens/cm		Ec 1413 1422
0730		Bail well w/ 5' x 4" bailer.
	0745	XD 5218 reading 14.909 in C6197 Bailed 30 gallons
0745		Pump intake 2.4' up from bottom of pump — driller has a
		1' length of the 1½" galvanized drop pipe -
		XD - taped just above pump — on drop pipe - XD 5217
		See pax 2 for data
		6/9/08

Reported By:		Reviewed By:	DC Weekes
Title: Geologist	Date: 6/9/08	Title: Geologist	Date: 6/12/08
Signature:		Signature: DC Weekes	

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 6/1/08

Well Name: 399-2-24 | Well ID: C6208

Location: 300-FF-5 | Continuation of Report No.: 7

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		DATA I.V
		Pump well GPM Flowrate pH Ec T°C Turbid DO C6197
		XD 5217 Gallons ms NTU mg/L XD5218
		Pump at 40.6 Ft,s
Initial →		12770 - Flow meter - start pump at 0826
	0826	11690 -50 12770 14890
	0830	11434 -57 13000 7.72 .294 18.3 118 8.22 14.891
	0840	11434 50 830 7.88 .283 12.7 12.6 8.63 14.896
	0850	11420 50 1330 7.82 .285 12.3 5.10 8.69 14.892
	0851	- stop pump - lower to 50.6 Ft,s - wait to stabilize
Initial		21.678 -75 14030 14.883
	0920	start pump at 0920 - start Test Dylon WD1
	0925	21.144 80 1730 7.89 .293 12.2 19.3 8.92 14.880
	0935	21.090 75 2480 7.83 .292 12.3 7.35 8.84 14.860
	0940	21.096 75 2860 7.84 .292 12.3 3.61 9.00 14.869
	0941	21.135 - stop pump - start test Dylon WD2
	0945	21.654 14869
	1012	21.661 Stop test 02 14.879
		Pull pump out of well DTW 29.60' Stc
		TD measured at 61.50 Ft Stc
	1130	- Clean up site - to office

Reported By: Joe Fritz | Reviewed By: DC Weekes

Title: Geologist | Date: 6/9/08 | Title: Geologist | Date: 8/12/08

Signature: [signature] | Signature: DC Weekes

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-24	C6208	BVC	6/9/08

Reference Measuring Point (unless otherwise noted): TOP OF ~~OUTER CASING (TOC)~~ 6/5/06 R

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ○ Yes ⊗ No

PART 1 Fl top of PVC

STATIC WATER LEVEL:

Start of Job	29.60
End of Job	29.60

DEPTH TO BOTTOM:

Start of Job	61.20
End of Job	61.50

PART 2

WELL DEVELOPMENT DATA

Pump Model	75-550
Intake Depth	40.6 & 50.6 Flgs
Starting Turbidity	>200 est.

Pump Start	Stop	Flow Rate
0826	0851	50gpm
0920	1012	75-80gpm

Total Pumped	2860
Final Turbidity	3.61
XD SN/Range (PSI)	20 / X05218

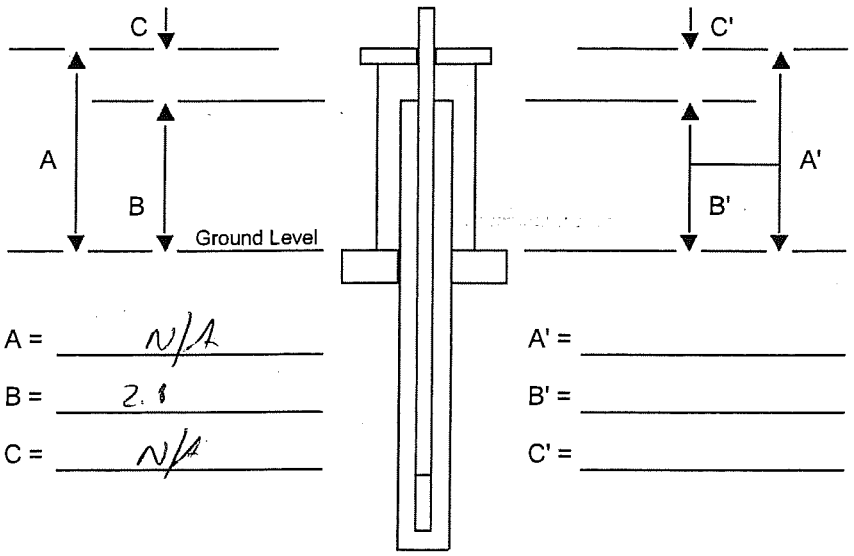
PART 3

INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	N/A
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:	Current Measurements Date:



A =	N/A
B =	2.8
C =	N/A
A' =	
B' =	
C' =	

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

Note - Well stick-up will change - below grade completion.

- Data Logger information:
  test Dylon WD1 - drawdown pump at 50.6 Flgs
  Dylon WD2 - recovery test

Prepared by (print name):	Signature:	Date:
Joe Fitz		6/9/08
Reviewed by (print name):	**Signature:**	**Date:**
DC Weekes	DC Weekes	8/12/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 07/23/2008

Purpose: 300 Area IFC | Location: 300-FF-5

Well ID: C6709 | Well Name: 399-2-25

Drilling Co.: WDC | Rig No.: 139 | Rig Make/Mod.: SuperSonic II

Casing String No. 1 2 (3) 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 5 7/8" / 5 5/8"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic II	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic RS480	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: / 167	Other:	Additives	Type
Shoe OD/ID 5 7/8" / 5 5/8"			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Not Used 7/23/2008

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic Not Used	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

07/23/2008

Comments/Remarks:

Estimated Depth to Water

Reported By: S. Sexton

Name/Title: Geologist GRAM Inc.

Signature: [signature]

Date: 07/23/2008

A-6003-650 (04/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Date: 07/22/2008

Purpose: 300 Area IFC

Location: 300-FF-5 OU

Well ID: C6209

Well Name: 399-2-25

Drilling Co.: WDC Bill Zamow

Rig No.: 139

Rig Make/Mod.: SuperSonic II

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 9 5/8"/9 1/4"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic SuperSonic II	Pressure ___ psi	Make
Welded ___ (Thd.)	A.R. w/Sonic RS400	Drill Pipe O.D.	Model
(Planned) / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: ~60 /	Other:	Additives	Type
Shoe OD/ID 9 5/8"/9 1/4			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

07/22/2008 Not Used

Drig. Co. WDC | Rig No.: 139 | Rig Make/Mod.: SuperSonic II

Casing String No. 1 (2) 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8"/6 7/8"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic SuperSonic II	Pressure ___ psi	Make
Welded ___ (Thd.)	A.R. w/Sonic RS400	Drill Pipe O.D.	Model
Planned / (Actual)	Geoprobe	Tool Joint Size	Bit Size
Set / 123	Other:	Additives	Type
Shoe OD/ID 7 5/8"/6 5/8"			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

07/22/2008 Not Used

Comments/Remarks:

Estimated Depth to Water

Reported By: S. Sexton

Name/Title: GRAM, Inc. Geologist

Signature: [signature]

Date: 07/22/2008

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

~~Continuation~~ Page

Date: 07/22/2008

Well Name: 399-2-25 | Well ID: C6209

Location: 300-FF-5 OU | ~~Continuation~~ of Report No.: 1

Start: 0600 String #1: 9 5/8" Finish: 1700

Total hrs: 11.0

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		hole/casing: o/o hole/casing: 62.5/60
0600	0630	POD @ 300 Area w/ BSTR, Drillers, FH Safety
0630	0718	warm up rig, prep to begin drilling
0718		begin drilling from surface w/ 6" db; advance db 0-5' recover 0-5' 3 GS @ 0722; advance 5-10 recover 5-9.5 @ 0730, 4 GS taken
0740	0747	add 10.0 feet casing + shoe + advance to 5' bgs
0747	0838	rig shut down to change out cable on mainline
0838	0854	~~advance db 10'~~ SMS 7-22-08 clean-out run to 10'
0854		advance 10-15' recover 10-14.5 3 GS @ 0857; advance 15-20, recover 15-20, 3 GS @ 0906; advance db 20-25 recover 20-24.5 3 GS @ 0915;
0922		add 10' casing, push to 25' + clean out; RCT check @
	1024	0950, all reading ← background;
1024	1037	advance db 25-30, recover 25-30 3 GS @ 1032
1037		add split-spoon for sample 30-35'; advance ss 30-35
	1050	recover 2.0' (30-32') 3 samples recovered @ 1046
1050		add 10.0' casing to string, try to push to 35 but will not move, will clean out w/ db + try to advance casing again;
	1142	very slow progress pushing casing from ~~25-35'~~ SMS 7-22-08 15-25'
1142	1241	Lunch
1241	1252	clean out casing to 30', IH check @ 1243 non-detect;
1252	1312	drive ss 30-35', recover 30-31.5 2 LL taken @ 1311
1312		add 10.0' casing + advance to 35' bgs; clean out 30-35'; run db 35-45 + leave in hole, wash casing to 45
	1387	
1387	1402	add 10.0 + push to 45'; recover 35-45' 5 GS @ 1346
1402		clean out to 45', run db 45-50, add 5.0' to string
	1426	and push to 50' bgs; recover 45-50 3 GS @ 1420
1426		run ss 50-55, recover 50-~~53.5~~ SMS 7-22 54' 4 LL @ 1439; clean
	1447	out to 55 + prep for next ss

Reported By: S. Sexton | Reviewed By: Jac Frith

Title: Geologist | Date: 07/22/08 | Title: Geologist | Date: 8/13/08

Signature: S. M. Sexton | Signature: Jac Frith

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 07/22/2008

Well Name: 399-2-25	Well ID: C6209
Location: 300-FF-5 OU	Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1447		add 10.0' casing + advance to 60'; advance ~~SS~~ db SMS 7-22 50-55
	1504	~~recover~~ SMS 7-22 clean-out to 55'
1504	1514	run ss 55-60, recover ~~55-59~~ SMS 7-22 56-60 4 LL @ 1514
1514		add 5' casing + push to 60, clean out to 60' bgs; remove
	1542	5 (61.2' total on string) ~1.2' stkup, casing @ 60' bgs
1542	1600	run ss SMS 7-22 60-65' recover 60-65 5 LL @ 1559
1600	1615	run ss 65-70', recover 65-70' 5 LL @ 1612
1615		TD = 67' bgs, add bentonite to 62.5' bgs; prep to
	1700	move rig off borehole; rig to stay; geo secures site + departs;

Not Used 07/22/2008

Reported By: S. Sexton		Reviewed By: Joe Fritt	
Title: Geologist	Date: 07/22/08	Title: Geologist	Date: 8/13/01
Signature: [signature]		Signature: [signature]	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 07/23/2008

Well Name: 399-2-25 | Well ID: C6209

Location: 300-FF-5 OU | Report No.: 2

Start	Finish	Total
Time 0600	Time 1615	Time 10.25 hrs
Hole Depth/Csg 62.5 / 60	Hole Depth/Csg 90 / 85	Hole Depth/Csg 27.5 / 25

Reference Measuring Point: GROUND SURFACE

Casing String No. ① ② 3 4 ____ See Report No. 1

Rod Size: #1: 9 5/8" #2: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD w/ BTR, Drillers, NCOs; 58° clear, light wind;
0630		waiting for 7 5/8" casing, drillers decon casing, perform site
		maintenance, should be drilling by 10 AM; RCT check @
	0950	0820, readings ← background;
0950	1008	begin trip-in of 7 5/8" casing to 62 ft bgs
1008		clean out bentonite added to hole from 67 to 62' bgs,
	1041	casing pushed to 65' bgs;
1041		advance db 70-75, add 10.0' casing + push to 75; could
		not push to 75, water from truck rushing up casing, will
	1106	pull out db + try to dry drill out of silt
1106		recover 70-75 + 3' slough material, 4 GS @ 1115
1114	1135	advance db 75-80, no recovery 75-80
1135	1239	Lunch
1239		use 20' db to collect samples, to keep db within casing
		for 10' run; advance db 75-85 recover 75-85 4 GS
	1305	@ 1257
1305	1332	add 10.0' casing, advance to 85; clean out run;
1332		add 10' casing + push to 85'; pushed casing ~3', hitting ref.,
		remove 10' + pull out db; no recovery from db; drillers
	1355	leave site to p/u equipment for pumping water;
1355	1436	waiting for drillers to return; ITT check non-detect 1350
1436		drillers resume, add 3' casing + push 2'; remove 3'; seal
	1453	pan to collect water from borehole;
1453	1503	resume drilling, clean-out from 75-80, using lots of water;

Reported By: S. Sexton | Reviewed By: Joe Fritz

Title: Geologist | Date: 07/23/08 | Title: Geologist | Date: 8/13/08

Signature: | Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 07/23/2008

Well Name: 399-2-25 | Well ID: C6209

Location: 300-FF-5 OU | Continuation of Report No.: 2

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1503	1516	add 10' casing & push to 85' bgs; clean out rm to 85'
1516		advance dlb 85-90; drilling v. slow through formation; recover
	1550	85-86, 1 GS @ 1543;
1550		NCOs must leave for appt., drillers will not be able
		to take sample before 1630, shut down for day;
	1615	geo picks up & heads back to office

Not Used

07/23/2008

Reported By: S. Sexton | Reviewed By: Jeff Fi.Ns

Title: Geologist | Date: 07/23/08 | Title: Geologist | Date: 8/13/08

Signature: S. Sexton | Signature: Jeff

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 07/24/2008

Well Name: 399-2-25 | Well ID: C6209

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 0530	Time 1415	Time 8.75 hrs
Hole Depth/Csg 90 / 85	Hole Depth/Csg 130 / 123	Hole Depth/Csg 40 / 38

Reference Measuring Point: GROUND SURFACE

Casing String No. ① ② 3 4 ____ See Report No. 1

Rod Size: #1: ~~7 5/8"~~ 9 5/8" RMS 7-24 #2: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0530	0600	POD w/ BTR, Drillers
0600	0612	warm up rig + equipment
0612	0623	resume clean out run to 90'; cleaned to 98
0623		add 10' casing + push to 95', pumping 20 gpm downhole to flush fines + allow casing to be washed over db;
	0652	ran db 90-95; recover 90-95 4 GS @ 0646
0652		run db 95-100: add 5' casing + push to 100' bgs, using 20 gpm to wash casing over db; recover 95-100 3 GS
	0734	@ 0724
0734		advance ss ~~95~~ RMS 7-24-08 100-105' bgs; cannot drive ss past ~~96-97~~ 101-102 RMS 7-24 ft, will pull out spoon + clean out 2 feet, try again;
	0811	2LL collected at 0810 from failed ss
0811		clean-out 1-2' material to look for sand; remove 5' casing
		add 10' casing, push to ~~100~~ RMS 7-24 105' bgs; remove db recover 5'
	0842	take 3 GS @ 0837
0842		make next short run to check for sand 105-110; push
	0906	casing to 110; recover 105-110 4 GS @ 0904
0906		drive ss to 115' bgs; RCT check @ 0920, all readings ~ bkgrnd; recover 110-115 5 LL @ 0925
	0945	
0945		advance db 115-~~115~~; IH check @ 0955 non-detect
		add 10' casing + push to 115; advance db 115-121 recover
	1048	115-117 1 GS @ 1037
1048		add 5.0' casing to push to 120' bgs; db clean-out to 121;
	1107	will ss 10' to 131 or 132'

Reported By: S. Sexton | Reviewed By: Joe Fitz

Title: Geologist | Date: 07/24/2008 | Title: Geologist | Date: 8/13/08

Signature: L. M. Sexton | Signature: Joe Fitz

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 07/24/200

Well Name: 399-2-25 | Well ID: C6209

Location: 300-FF-5 OU | Continuation of Report No.: 3

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1107	1217	Lunch
1217	1246	advance SS 121-125, recover 121-125 5 LL @ 1242
1246	1310	advance SS 125-130, recover 125-130 5 LL @ 1306
1310		clean out borehole, set casing 2-3' into RLM, seal 8"
	1415	casing and prep to move rig;

Not Used

07/24/2008

Reported By: S. Sexton | Reviewed By: Joe Fritz

Title: Geologist | Date: 07/24/08 | Title: Geologist | Date: 8/13/08

Signature: | Signature:

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/25/2008

Well Name: 399-2-25 | Well ID: C6209

Location: 300-FF-5 OU | Report No.: 4

Start	Finish	Total
Time 1000	Time 1615	Time 6.25 hrs
Hole Depth/Csg 130 / 123	Hole Depth/Csg 171 / 167	Hole Depth/Csg 41 / 44

Reference Measuring Point: GROUND SURFACE

Casing String No. ① ② ③ 4 ____ See Report No. 1

Rod Size: #1: 9 5/8" #3: 5 7/8" #2: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1000		Setup rig over borehole, decon casing & prep to trip-
	1035	in 6" casing to current depth +30 123 SMS 7-25-08
1035		begin trip-in of 6" temporary casing; add 10.0' +shoe
	1059	+10 +10 +10 +10 +10 +10 +10 +10 +10 +10 +10 +10
1059		push casing to 135' bgs, drillers do not have a 5' casing
	1115	section;
1115	1200	lunch
1200		advance 4" db 130 - ~~140~~ 135 SMS 7-25, recover 130-135, 4 GS
		@ 1223; advance db 135-145; add 10.0' casing &
		push to 145; RCT PM check @ 1240 all reading < bkgrnd;
	1252	recover 135-145, ~~recover~~ 5 GS @ 1249 SMS 7-25
1252		advance db 145-155, add 10.0' casing & push to 155,
		using ~ 50-60 gal H_2O to wash casing down; recover
	1320	145-155, 5 GS @ 1315
1320	1340	advance db 155-163, recover 155-163, 5 GS @ 1337;
1340		will try to get a sample of bedrock, may not get
		recovery if in bedrock; advanced db 163-165, add 10'
		casing & push to 165'; advance db 165-~~170~~ 168, recover SMS 7-25
	1447	163-168, 2 GS @ 1458
1447	1522	advance SS 168-170; 3 LL @ 1514 recovered 3'
1522		will push casing ~2' & clean out hole TD = 171 ft bgs
	1604	casing @ 167' bgs;
1604		moving rig off hole for geophysical logging; geo
	1615	finishes pw & departs for office

Reported By: S. Sexton | Reviewed By: Joe Fritz

Title: Geologist | Date: 07/25/08 | Title: Geologist | Date: 8/13/08

Signature: S. M. Sexton | Signature: Joe Fritz

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 07/30/2008

Well Name: 399-2-25	Well ID: C6209
Location: 300-FF-5 OU	Report No.: 5

Start	Finish	Total
Time 0600	Time 1815	Time 12.25 hrs
Hole Depth/Csg 171 / 167	Hole Depth/Csg 55.5 / 54	Hole Depth/Csg 115.5 / 113

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① ② ③ 4 ____ See Report No. 1

Rod Size: #1: 9 7/8" #2: 7 5/8" #3: 5 7/8" (0.0') end.

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD w/ BTR, drillers; clear, 58°, no wind
0630		rig setup over borehole, prep for well construction, waiting
	0738	for well design from FH;
0738	0812	final setup for completion activities
0812		DTB = 170.8' bgs, adding coated bentonite to 126,
		backpulling casing while adding bentonite;
0828		remove 10' 6" casing
0838	0844	remove 10' 6" casing
0844	0940	Break to pour concrete pads.
0940		Backpull casing while adding bentonite
0942		remove 10' of 6" casing Total = 140'
event	0943	RCT onsite for AM check.
1001		Backpull & Remove 10' of 6" casing Total = 130'
1006		Remove 10' of 6" casing Total = 120'
1007		" " " Total = 110' Trip out 6" casing
1008		" " " Total = 100'
1009		" " " Total = 90'
1010		" " " Total = 80'
1013		" " " Total = 70'
1014		" " " Total = 60'
1015		" " " Total = 50'
	1022	Continue to trip out all 6" rods. w/ shoe. (173' out Total.)
1022		Note 120.7' of 7 5/8" casing in ground 3.5' stkup. = 127.2' bgs.
1034	1034	Add 5/8" bentonite chips to 125.0' bgs.

Reported By: A. Lantau / S. Sexton		Reviewed By: Joe Fritts	
Title: Geo. / GCO	Date: 07/30/08	Title: Geologist	Date: 8/13/08
Signature: Aaron Lantau / [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 07/30/2008

Well Name: 399-2-25 | Well ID: C6209

Location: 300-FF-5 OU | Continuation of Report No.: 5

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1042		Add 2.91' sump + 10.00' screen (0.010") slot. +10.00 +10.01 +9.99 +10.00 +10.00 (C) screen
	1057	place centralizers at base of screen ≈ 2.5' from base of sump. cut 1 wing off (C) for bag.
1057		Add 10.00' blank + 5.00 +5.00 (C) + 5.00 + 5.00 + 5.00 + 5.00 + 5.00 + 5.00 (C) + 5.00 + 5.00
	1125	Tag inside of well @ 132.9' TOC. −124.9 = 8' stkup.
1125	1129	Add 111 bg 20/40 sand
1129	1139	move pipe.
1139		Add 20/40 sand + backpull 8" casing. Tally start @ 125'
1150		Remove 5.' of 8" casing ~~+5' of 8" casing~~ AI-7-30-08 Total = ~~120~~ 120'
1200		Add Sand 20/40 mesh
1211	1217	Remove 10' of 8" casing Total = 110
1217	-	casing down to 7.9' ags. ≈ 0.1' screen base @ 122.1' bgs.
	1318	Stop for Lunch
1318	1347	Begin Surging, Tag sand @ 105.5 → Surge 122-105.5 interval
1347	1418	Tag sand @ 104.5 → Add sand continue surging (sand @ 105.5')
1418	1419	Tag sand @ 105.5 → surge complete
1419	1437	Add Sand. 20/40 Colorado Silica Sand
1437		Remove 10' of 8" casing Total = 100'
1458		Remove 10' of 8" casing Total = 90'
1551		remove 10' of 8" casing Total = 80'
1612		remove 10' of 8" casing Total = 70'
1710		Remove 10' of 8" casing Total = 60'
1711		Remove 10' of 8" casing Total = 50'
1713		" " " Total = 40'
1715		" " " Total = 30'
1717		" " " Total = 20'
1719		" " " Total = 10
1721	1723	" " " Total = ∅
1723		All 8" temp. casing + shoe removed from hole; prep to
	1752	begin back pull of 10" casing

Reported By: A. Lantau / S. Sexton | Reviewed By: Joe Fitts

Title: Geologist / Geologist | Date: 07/30/08 | Title: Geologist | Date: 8/13/08

Signature: Aaron Lantau / Sean Sexton | Signature:

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 3 of 3

Date: 07/30/2008

Well Name: 399-2-25 | Well ID: CC209

Location: 300-FF-5 OU | Continuation of Report No.: 5

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1752		resume well completion with 10" casing; backpull casing
	1810	to ~7' bgs, shoe @ 54, fill @ 55.5
1810	1815	Geo secures site + heads to office

Not Used on 7/30/2008

Reported By: S Sexton | Reviewed By: Joe Frith

Title: Geologist | Date: 07/30/08 | Title: Geologist | Date: 8/15/08

Signature: | Signature:

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/31/2008

Well Name: 399-2-25 | Well ID: C6209

Location: 300-FF-5 OU | Report No.: 6

Start	Finish	Total
Time 0600	Time 0830	Time 2.5 hrs
Hole Depth/Csg 55.5 / 55	Hole Depth/Csg 3 / ø	Hole Depth/Csg 52.5 / 55

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 ____ Rod Size: #1: 9 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD w/ drillers, RTR, RCT; 54° clear, no wind
0630	0650	warm up rigs, prep to finish well construction;
0650		Tag borehole ~~well~~ 7-31 DTB = 55.0; begin completion add bentonite chips
	0656	x 4
0656		Remove 10' of 10" casing Total = 51.2'
0701		add bentonite chips, med, x 4
0707		Remove 10' of 10" casing Total = 41.2'
0712		add bentonite chips (med) x 4
0715		Remove 10' of 10" casing Total = 31.2'
0718		add bentonite chips (m) x 4
0721		Remove 10' of 10" casing Total = 21.2'
0726		add bentonite chips (med) x 5
0727		Remove 10' of 10" casing Total = 11.2'
		RCT scanned all 6" & 8" casing on ground, all readings
	0730	negative will return to scan 10" this afternoon
0730		add bentonite chips (med) 7-31 x 4
0734	0738	Remove 10' of 10" casing + shoe Total = ø'
0738		all temporary casing & shoes removed from borehole,
	0809	moving rig off hole & prep to move off-site;
0809		driller bailing well to test straightness & to prep for
	0830	development;
		Not Used 07/31/2008

Reported By: S. Sexton | Reviewed By: Joe Fitts

Title: Geologist | Date: 07/31/08 | Title: Geologist | Date: 8/4/08

Signature: | Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 08/01/2008

Well Name: 399-2-25 | Well ID: C6209

Location: 300-FF-5 OU | Report No.: 7

Start	Finish	Total
Time 1500	Time 1715	Time 2.25 hrs
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ Rod Size:
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1500	1511	Setup rig over well, bail well;
1511		trip in pump: Grundfos 75 S-50 8-Stage w/ Franklin
		Electric 5 hp motor; will set intake to 70 for first
	1524	test, run 3 intervals for testing
1524		Test #1 recorded with 5217 xD on Hermit 1K-4534
		Jeff: Browbeat WD3; pump on @: 1525 rate: 20 intake: 70'

Turb. (NTU)	pH	D/O (mg/L)	cond (µS)	temp (°C)	xD
>1000	8.41	1.28	277	21.5	6.962
333	8.45	1.69	259	19.8	6.793
112	8.44	1.96	264	19.2	6.674
50.9	8.40	1.94	269	19.3	6.632
32.2	8.39	1.82	276	19.4	6.603
22.2	8.38	1.80	278	19.2	6.585
16.2	8.36	1.89	278	19.8	6.540

1622		pump shut off @ 1622, begin recovery test on
	1713	Browbeat WD4;
1713	~~1715~~ 1458-01	geo leaves xD downhole w/ pump, takes Hermit & test
		kit to office, drillers leaving w/drill rig, will continue
	1715	well development Monday.

Not Used 08/01/2008

Reported By: S. Sexton | Reviewed By: Joe Fritts

Title: Geologist | Date: 08/01/08 | Title: Geologist | Date: 8/13/08

Signature: | Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 08/05/2008

Well Name: 399-2-25	Well ID: C6209
Location: 300-FF-5 OU	Report No.: 8

Start	Finish	Total
Time 0600	Time 1000	Time 4.0 hrs
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size:
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD @ 300 Area w/ BTR driller; clear, no wind, 62°
0630		setup rig on well, prep to resume well development,
		pump & xD already in well;
		Field calibrations: known / read / 10%
		turb. (NTU) 509 / 513 / Y
		turb. (NTU) 45.7 / 46.2 / Y
		turb. (NTU) 5.09 / 5.08 / Y
		pH 7.00 / 7.06 / Y
		pH. 10.00 / 10.02 / Y
	0700	cond. (µS) 1423 / 1423 / Y
0700		Pump lowered to 80 ft. bgs
		Test #1: recorded on H3K-45348 "JEFF" Browbeat WD5
		Pump on @: ~~0705~~ 0707 SMS 08/05/08 rate: 26 intake: 80'

		turb. (NTU)	pH	D/O mg/L	cond. (µS)	temp. (°C)	xD
0708		81.0	8.19	1.88	276	17.4	5.412
0714		9.42	8.30	1.67	282	17.5	4.646
0717		13.9	8.30	1.77	277	17.5	4.444
0724		3.28	8.29	2.21	282	17.5	4.203
0730		3.27	8.28	1.71	282	17.4	4.028
0735	0737	2.01	8.28	1.77	283	17.5	3.963
0737	0751	begin recovery test on Browbeat WD6					
0751	0758	lower pump to 100' for intake					
		SEE RG 2 →					

Reported By: S. Sexton		Reviewed By: Joe Fritts	
Title: Geologist	Date: 08/05/08	Title: Geologist	Date: 8/13/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 08/05/2008

Well Name: 399-2-25 | Well ID: C6209

Location: 300-FF-5 OU | Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
0758		Test #2 recorded with H3K-45348 "JEFF"; Drawdown test recorded on Borehead WD7
		~~Long~~ 08-05 turb. Pump on @: 0804 rate: 20.0 intake: 100' bgs
		turb. pH D/O cond. temp. xD.
0805		506 8.29 1.46 308 17.7 4.965
0807		13.4 8.30 2.03 286 17.6 5.004
0818		1.80 8.29 2.63 287 17.8 4.817
0825		2.22 8.28 4.17 286 17.8 4.711
0832	0834	2.27 8.28 4.27 289 17.8 4.592
0834	0844	recovery test recorded on WD8 Browbeat
0844	0920	driller pumping out poly tank;
0920	0949	trip-out pump & tremmie;
0949		pump tripped out, tag water & bottom, geo finishes pw, double checks well list & departs for office
	1000	

Not Used 08/05/2008

Reported By: S. Sexton		Reviewed By: Joe Fitts	
Title: Geologist	Date: 08/05/08	Title: Geologist	Date: 8/13/08
Signature: S. M. Sexton		Signature: Joe Fitts	

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-25	C6209	300-FF-5 OU	08/01/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ○ Yes ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job 30.5' bgs

End of Job N/A

DEPTH TO BOTTOM:

Start of Job 127.0' TOC

End of Job N/A

PART 2

WELL DEVELOPMENT DATA

Pump Model 75 S-50

Intake Depth 70' bgs

Starting Turbidity > 1000

Pump Start	Stop	Flow Rate
1525	1622	20 gpm

Total Pumped 1078

Final Turbidity 16.2

XD SN/Range (PSI) 5217 / 20.0

PART 3

INSTANTANEOUS SLUG TEST

Static Water Level (TOC)

Transducer Depth

Baseline Start

Injection Start N/A

Baseline Start

Withdrawal Start

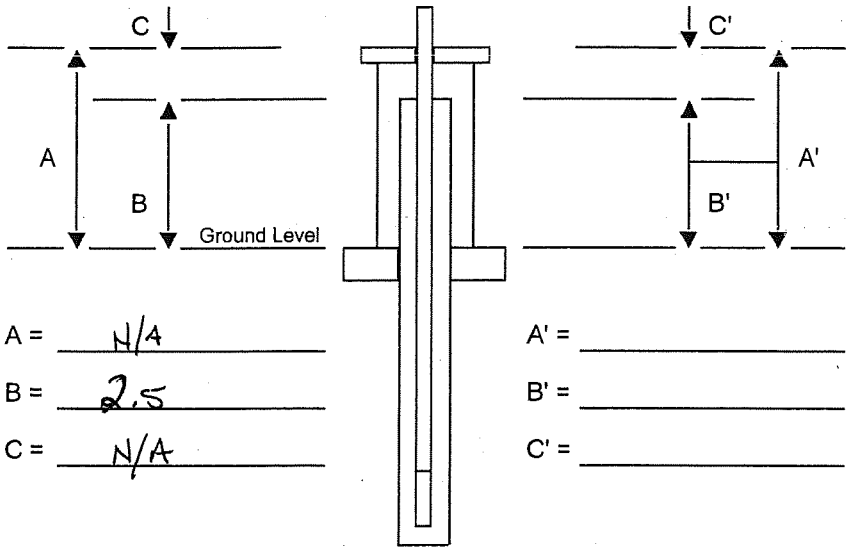
Slug Volume

XD SN/Range (PSI)

PART 4

Last Recorded Measurements Date: 08/01/08

Current Measurements Date:



A = N/A

B = 2.5

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 80863

Test #1:

xDi: 15.277

xDf: 15.256

meter: 81941

Test #2

xDi: No x Used

xDf:

meter: 08/01/08

Test #3

xDi:

xDf:

final meter:

Prepared by (print name):	Signature:	Date:
S. Sexton		08/01/2008
Reviewed by (print name):	**Signature:**	**Date:**
Jo Fritts		8/13/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-25	C6209	300-FF-5 OU	08/05/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ○ Yes ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job	N/A
End of Job	31.2 ft. bgs

DEPTH TO BOTTOM:

Start of Job	N/A
End of Job	124.8 ft. bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	80 / 100
Starting Turbidity	81.0 / 506

Pump Start	Stop	Flow Rate
0707	0737	26
0804	0834	20

Total Pumped	785 / 746
Final Turbidity	2.01 / 2.27
XD SN/Range (PSI)	5217 / 20.0

PART 3

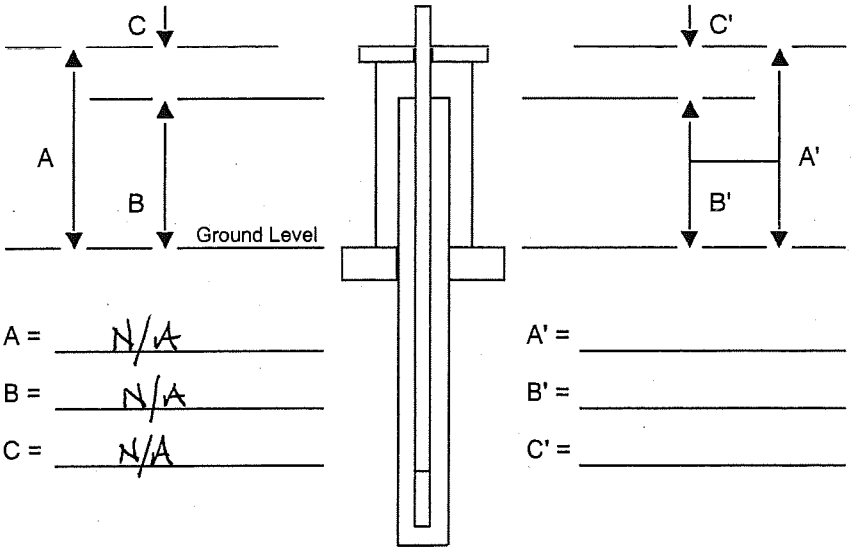
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 08/05/08

Current Measurements Date:



A = N/A
B = N/A
C = N/A

A' = _____
B' = _____
C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 81942

Test #1: xDi: 15.230
xDf: 14.591

meter: 82727

Test #2: xDi: 14.758
xDf: 14.378

meter: 83473

Prepared by (print name):	Signature:	Date:
S. Sexton		08/05/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz		8/13/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 2

Date: 6/23/08

Purpose: PNNL Project 300 Area | Location: 300-FF-5

Well ID: C6210 IFC | Well Name: 399-2-26

Drilling Co.: WDC Driller Bill Zamora | Rig No.: 139 | Rig Make/Mod.: Super Sonic

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8" OD, 6 7/8" ID	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic 2	Pressure psi	Make
Welded ___ (Thd.)	A.R. w/Sonic RS 400	Drill Pipe O.D. N/A	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic N/A	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks: | Estimated Depth to Water

Reported By: Griffiths

Name/Title: GRAM Inc. Geologist

Signature: | Date: 6/23/08

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 6/23/08

Well Name: 399-2-26	Well ID: C6210
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 1300	Time 1630	Time 3.5
Hole Depth/Csg ~~0~~ / ~~0~~	Hole Depth/Csg 25 / 15	Hole Depth/Csg 25 / 15

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1300		Rig had gone to town to replace a leaky hydraulic
	1500	line. Rig up and set-up equipment.
1500		start drilling with 6" ~~Drive~~ 6/23/08 drive barrel.
		Advance DB 0-5' - recover 0-5' & collect 2 GS at 1510
		Advance DB 5-10', recover 5-10' & collect 4 GS at 1515
		Add 10' casing & 0.7' shoe (10.7') - clean
	1530	out to 10' - casing at 5'
1530		Advance DB 10-15; recover 10-15 and collect 2 GS at
		1540. Add 10' casing (20.7) and advance to 15'.
		Advance DB 15-~~20~~ 25 6/23/08 recover 15-21 & collect 3 GS
	1600	at 1550
1600	1620	~~Add~~ 6/23/08 - clean out to 25' - casing at 15
1620	1630	To office.

Not Used

6/23/08

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/23/08	Title: Geologist	Date: 7/7/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 6/24/08

Well Name: 399-2-26 | Well ID: C6210

Location: 300-FF-5 | Report No.: 2

Start	Finish	Total
Time 0600	Time 0930	Time 3.5
Hole Depth/Csg 25 / 15	Hole Depth/Csg 62 / 60	Hole Depth/Csg 37 / 45

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POP with BTR, Drill crew.
0630		To site, warm equipment. Weather clear, 56°.
	0700	Switch hoppers.
0700		Resume - go in with 20' DB. (drive barrel)
		Advance DB 25-35' - recover 25-34 & collect 4 GS
		at 0720 Add 10' casing (30.7) - advance to 25'
	0745	clean out 25-35' - saturated.
0745		Add 10' casing (40.7) - advance to 35'.
		Add 10' (2 x 5') (50.7) - while advancing DB
		Advance DB 35-45' - recover 35-45 & collect 4 GS
	0810	at 0805. Add 5' casing (55.7) - advance to 50'
0810		Advance 45-55' - <1' recovery (sand) - loosing
		sand out the end of the barrel.
		Advance DB 52-60' - recover 52-60' & collect 3 GS
	0830	at 0830 AM RCT ck, < detect.
0630		Silt at 57' - will advance casing to 60' - drill to ≈62'.
		Casing to 60' - Advance DB 60-62 - recover
		60-62 & collect 2 GS at 0905. Tag bottom
		at 62'. AM RCT ck, <bkg.
	0930	Rigging off hole.

Not used 6/24/08

Reported By: Joe Fritts

Title: Geologist | Date: 6/24/08

Signature:

Reviewed By: L.D. Walker

Title: Geologist | Date: 7/7/08

Signature:

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 7-23-08

Well Name: 399-2-26	Well ID: C6210
Location: 300-FF-5	Report No.: 3

Start	Finish	Total
Time 1015	Time 1630	Time 6.25 hrs.
Hole Depth/Csg 61.2 / 60.2	Hole Depth/Csg 0.0 / 0.0	Hole Depth/Csg 61.2 / 60.2

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① ② 3 4 ____ See Report No. 1

Rod Size: #1 = 8" Temp Casing. #2 = 4" Perm. well.

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1015		Start setting up on C6210
1035		Add temporary 5' casing to 60' string.
1116		Tagged bottom at 61.2
		Using 5' blanks and 5' screen
		total casing = 64.4' (use 2 - 2 ft blanks on bottom)
		Blanks up
		20 + 4 + .4 = 24.4, Plant 15 + 5' screen = 20,
		+ 20 blank + 5 blank = 69.4'
1130		Start pouring pellets, bottom of casing = ~ 60.5
1132		Measure pellets at 60'
1134		Backpull casing - bottom of casing 59.9'
1136		Start placement of bottom blank casing - 24.4
1138		Add 5' screen section + 15' blank = 44.4 total
1144		Added 20' blank = 64.4
1146		Add 5' blank = 69.4' total casing
1151		69.4 - 59.4 = 10' stickup. Bottom of cap at 59.4'
1152		Start pouring 10-20 sand
454		Remove top 5' blank = 5' stickup.
1157		Tag sand at 51.9' with 3 bags
1159		Add 1 bag sand
1245		Backpull & remove 5.00' casing
1250		Add Bentonite (N1, 7-23-08) 2 bgs. 10/20 G. Si. Sand
1256		Remove 5.00' casing Total = 55'
1307		Backpull & Remove 5.00' casing

Reported By: Lee Broadhead / A. Lanton		Reviewed By: Joe Fritz	
Title: Geologist / Geologist	Date:	Title: Geologist	Date: 7/31/08
Signature: Lee Broadhead / Aaron Lanton		Signature: Joe Fritz	

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 7-23-08

Well Name: 399-2-26 | Well ID: C6210

Location: 300-FF-5 | Continuation of Report No.: 3

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1307	1322	Add 1.5 bg. 10/20 Colorado Silica Sand to 39.5' bgs.
1322		Backpull & remove 5.00' casing Total = 45
1332		Backpull & remove 5.00' casing - Total = 40'
1340		Add 3/8" coated Bentonite pellets from 39.3 - 36.9 bgs. using tremie
1404		Backpull & remove 5.00' casing
1406		Add 2 bg 10/20 sand
1430		Backpull casing to 31.1' bgs. must stop to allow addition of matls.
1430		Begin surge. → Tag 29.9 → Tag
1445		Tag 29.8
1455		Tag 29.8
1458		Add Sand to 28.3' bgs.
1500		Add Bentonite
1506		Backpull & remove 10.00' casing Total = 30.0'
1510		Add Bentonite 3/8" chips to 15'
1520		Backpull & remove 10.00' casing Total = 20.0'
1522		Add Bentonite chips to 3.7' bgs.
1529		Backpull & remove 10.00' casing Total = 10.00'
1532		Add bentonite to 3.0' bgs.
1534		Add 20/40 colorado Silica Sand to 0.0 bgs.
1536		Add more sand to -1.6' bgs
1538		Backpull last 10.00' casing + 0.58' shoe → All rods removed from ground.
1540		Sand @ ground surface. * used 11 bg chip, 3 bucket pellets, 2 bg 20/40 S., 9 bg. 10/20 S.
1540		break down rig → clean site.
1600		Moving Casing planning to move to new well head.
1630		Geo Departs.

Not used

Reported By: A. Lanton		Reviewed By: J. Griffith	
Title: Geologist	Date: 7-23-08	Title: Geologist	Date: 9/3/08
Signature: Aaron Lanton		Signature: Jeff	

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7-31-08

Well Name: 399-2-26 | Well ID: C6210

Location: 300-FF-5 | Report No.: 4

Start	Finish	Total
Time 1430	Time 1626	Time 2hr 56min
Hole Depth/Csg 59.6 / -	Hole Depth/Csg 59.7 / -	Hole Depth/Csg - / -

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ See Report No. 1

Rod Size: 4" PVC

Screen: 30'-35' bgs.

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1427		Trip in Pump + Tremmie DTW: 30.7, DTB: 59.6 bgs.
		Transducer @ 37.5' bgs.
		Pump intake @ 41.5 bgs.
		xDI: 6.14' Test #1 HERMIT Name: Jeff

xD(ft)	Turb(NTU)	Temp(°C)	DO(mg/L)	pH	Cond(mS)	Notes:
1540 Start	4.72	329	22.7	7.77	7.34	0.514	~30 gpm
1545	4.69	14.2	20.4	7.93	7.35	0.509	30 gpm
1550	4.65	5.62	19.3	8.08	7.36	0.511	"
1555	4.59	4.73	18.9	7.99	7.36	0.507	"
1600	4.66	3.03	18.9	8.16	7.37	0.510	"
1605	4.67	3.03	19.2	8.08	7.40	0.510	"
1610 stop	4.64	~~2.14~~ 7-31-08	18.9	8.15	7.36	0.511	"

Test started slightly after pump kill. #2

1613 Start Recovery test on #2 Test

1626 Trip out Pump + Tremmie

Tag DTB: 59.7 DTW: 30.7' bgs.

Not used AP

Reported By: A. Lantow		Reviewed By: Jeff H.	
Title: Geologist	Date: 7/31/08	Title: Geologist	Date: 9/3/08
Signature: Aaron Lantow		Signature: Jeff H.	

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-26	C6210	300-FF-5	7-31-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	30.7
End of Job	30.7

DEPTH TO BOTTOM:

Start of Job	59.6
End of Job	59.7

PART 2

WELL DEVELOPMENT DATA

Pump Model Grundfos 75-S-50

Intake Depth 41.5' bgs

Starting Turbidity 7-31-08 324 NTU

Pump Start	Stop	Flow Rate
15:32:07	16:13:29	~30 gpm
16:13:29	16:20:38	Recovery.

Total Pumped 1200 gal

Final Turbidity 1.82

XD SN/Range (PSI)

PART 3

INSTANTANEOUS SLUG TEST

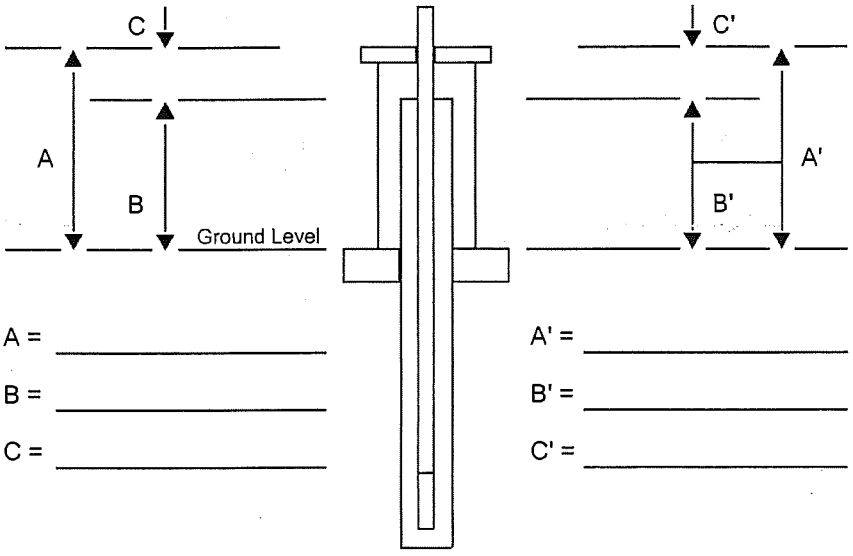
Static Water Level (TOC)	
Transducer Depth	37.5
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Flush-Mount Surface Seal

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: HERMIT # Jeff H3R-45348
Drawdown Test #1
Recovery Test #2
DX_I: 6.14 DxF: 4.64

Prepared by (print name):	Signature:	Date:
A. Lantow	Aaron Lantow	7/31/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz	Geologist	9/3/08

D.175

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 2

Date: 7/17/08

Purpose: RNL 300 Area IFC | Location: 300 - FF-5

Well ID: C6211 | Well Name: 399-2-~~10~~27

Drilling Co.: WDC Mike Wilkerson | Rig No.: 139 | Rig Make/Mod.: Super Sonic 2

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8" OD	Auger	Air ___ Water/Mud ___	Make
Grade 6 9/8" ID	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic R5400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type 7 7/8"
Shoe OD/ID 7 5/8 / 6 7/8			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex Rotary	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size 7 1/2" OD	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Comments/Remarks:

Estimated Depth to Water

Reported By: Jeff Fritz

Name/Title: CRAM Inc. Geologist

Signature: [signature]

Date: 7/17/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 7/17/08

Well Name: 399-2-27	Well ID: C6211
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 1400	Time 1630	Time 2.5
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 25 / 25	Hole Depth/Csg 25 / 25

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size: 7 5/8
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1400	1440	clean pipe, set up rig & equipment
1440		Start drilling with 6" Drive barrel (DB)
		Advance DB 0-5 - recover 0-5' & collect 26 S at 1450
	1450	large rocks - TH ck, ← detect
1450		Advance DB 5-15' - recover 5-15 + collect 4 GS
		at 1500. Add 10' casing & shoe - advance to 5'
		Add 10' casing ~~& shoe~~ 7/17/08 (20.7) - advance,
	1520	clean out to 15' -
1520		Advance DB 15-25' - recover 15-23 & collect 3 GS
		at 1525. Add 10' casing (30.7) - casing to 25'
	1630	To office

Not used [signature] 7/17/08

Reported By: Joe Fritts	Reviewed By: D C Weekes
Title: Geologist Date: 7/17/08	Title: Geologist Date: 8/12/08
Signature: [signature]	Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/18/2008

Well Name: 399-2-27 | Well ID: CC211

Location: 300 Area | Report No.: 2

Start	Finish	Total
Time 0630	Time 0930	Time 3.0 hrs
Hole Depth/Csg 25 / 25	Hole Depth/Csg ~~65~~ 63.5 / 60 (SMS 7-18)	Hole Depth/Csg 38.5 / 35

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0630	0705	Geo onsite w/ POD book; waiting for NLO support;
0705		NLOs on-site; drillers ready, waiting for NLOs to be rdy to
	0716	drill;
0716		advance db 25-35'; easy drilling; add 10,0' and run
	0740	casing to 35' bgs; db 25-35, 8' recovery, 4 samples taken
0740		add 2 5' (10' total) and push to 45'; advance db
	0754	35-45, 1 sample @ 0750 35-37'
0754		advance db 45-55'; add 5' casing + 5' casing + push
	0818	to 55' bgs; IH check @ 0800, readings no detect; no recovery
0818		run db 55-65, 10' recovery 5 samples @ 0825;
	0829	RCT check @ 0835 readings ← background;
0829	0846	drive casing to 60' bgs & clean out; TD=
0846	0930	clean up, lower down + move rig

Not Used
07/18/2008

Reported By: S. Sexton | Reviewed By: Jae Fitts

Title: Geologist | Date: 07/18/2008 | Title: Geologist | Date: 8/6/08

Signature: | Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/21/2008

Well Name: 399-2-27 | Well ID: C6211

Location: 300 - FF-5 OU | Report No.: 3

Start	Finish	Total
Time 1330	Time 1730	Time ~~2.0 hrs~~ 4.0 hrs EMS 7/21/08
Hole Depth/Csg 63.5 / 100	Hole Depth/Csg 50.5 / 51.4	Hole Depth/Csg 13.0 / 8.6

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1 | Rod Size: #1: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1330		arrive on-site, drillers arrive @ 1340; decide
	1410	POD to be construction of one well
1410		setup rig over borehole & prep to backpull / add bent;
	1448	DTB = 63.4' bgs; will add bentonite pellets to 59' bgs
1448	1455	add bentonite pellets from 63.4' to 59' bgs
1455		trip-in perm casing & screen: 0.4 + 2.0 + 2.0 screen = 4.4' +
		10' = 14.4' on string; ERTS & thermistors attached to
		casing at end cap; ERT string #21 used; add 20' (10+10)
		to string = 34.4' + 10+10 = 54.4' on string +10' = 64.4'
	1548	total perm. casing on string;
1548	1730	begin well completion, see completion logs pg 1-1;

Not Used 07/21/08

Reported By: S. Sexton | Reviewed By: Joe Faith

Title: Geologist | Date: 07/21/08 | Title: Geologist | Date: 8/6/08

Signature: | Signature:

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 7/22/08

Well Name: 399-2-27 | Well ID: C6211

Location: 300-FF-5 | Report No.: 4

Start	Finish	Total
Time 0600	Time 0900	Time 3.0
Hole Depth/Csg ____ / ____	Hole Depth/Csg ____ / ____	Hole Depth/Csg ____ / ____

Reference Measuring Point: GROUND SURFACE

Casing String No. ①②③④ ____ See Report No. 1

Rod Size: 7, 5/8

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Arrive on-site. POD
0640		Driller prep. Rig setup on well to continue construction
0649		Top of Bentks at 4.8' - .5' = 4.3' stickup.
0652		Measure top sand at 52'. Bottom of casing at 51.4'.
0657		Start pouring bentonite pellets
0689		Raise casing.
0701		Start pouring 2nd bucket pellets
0707		Add 3rd bucket pellets.
0709		Add 4th bucket pellets
0715		Pull up casing
0716		Remove 5 ft casing - Stick up 36' BOC
0717		Measure pellet depth - Pellets hung up in casing at 36'
0732		Pull up another 5ft casing section. 45.7' casing
0734		Well casing moved up ~ 1ft. Pellets have bridged inside casing at ~ 36'. Remove 5ft casing 40.7' casing
0735		Driller starts removing well casing. Because of bridging well will be pulled.
0737		Pulling up well casing and removing instrument wiring.
0734		When removing well casing it appears pellets have heaved-up and swelled around area where ERT instrument cable sets overlap. Possibly not enough room in annulus.
0748		At ~ 45' original casing depth pellet interval kept in track
0757		All well casing out of the hole
0840		Continue removing 5ft stick casing

Reported By: Lee Brouillard

Title: Geologist | Date: 7/22/08

Signature: Lee Brouillard

Reviewed By: Joe Fitz

Title: Geologist | Date: 8/6/08

Signature: Joe Fitz

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 7/22/08

Well Name: 399-2-27 | Well ID: C6211

Location: 300-FF-5 | Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
0844		remove 5ft - 35.7 ft of casing in hole
0851		pull jacks up hole to setup for another location
0900		Setting up on C6194. End of report for this well.

J-13
7-22-08

Reported By: Lee Brouillard | Reviewed By: Joe Fritz

Title: Geologist | Date: 7/22/08 | Title: Geologist | Date: 8/6/08

Signature: Lee Brouillard | Signature: Joe Fritz

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/28/2008

Well Name: 399-2-27 | Well ID: C6211

Location: 300-FF-5 OU | Report No.: 5

Start	Finish	Total
Time 0830	Time 1030	Time 2.0 hrs
Hole Depth/Csg 45 / 35	Hole Depth/Csg 63.2 / 60	Hole Depth/Csg 18.2 / 25

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 ____ Rod Size: #1: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0830		setup rig over borehole to clean out hole, prep for re-drill;
	0918	
0918		begin re-drill of borehole, will drill down to ~60' bgs; advance db to 45', add 10' casing (5+5) & push to 45'; add 10' (5+5) & push to 55'; AM RCT check @ 1000; push casing to 60' bgs, TD = 63.2
	1030	

Not Used 07/28/2008

Reported By: S. Sexton | Reviewed By: Joe Faith

Title: Geologist | Date: 07/28/08 | Title: Geologist | Date: 8/6/08

Signature: S. M. Sexton | Signature: Joe Faith

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7-28-08

Well Name: 399-2-27 | Well ID: C6211

Location: 300-FF-5 OU, | Report No.: 6

Start	Finish	Total
Time 1239	Time 1703	Time 4 hrs. 24 min.
Hole Depth/Csg ~~58.8~~ 62.2' MJH 7/28/08 / 60.7'	Hole Depth/Csg 39.3' / ~45.0'	Hole Depth/Csg - / -

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 ____ Rod Size: ① 8" casing

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	1239	Moved from C6202.
1240	1228	Begin setting up over borehole.
1229		Begin tripping in PVC.
	1350	Tripping in thermistor and ERT # 0021 as well as PVC overlap @ 33.5 ft bgs.
	1421	Screen placed. [End cap = ~~58.8~~ 59.1' bgs MJH 7/28/08; Btm screen = ~~56.0~~ ~~58.4~~ 58.7' bgs MJH 7/28/08; Top screen = ~~51.0~~ 56.7' bgs MJH 7/28/08]
1429		Begin completion; details on well completion log.
	~~1445~~ 1442	Remove 5.00' joint of temp. casing, [Tot = 60.7 ft]
1458		Begin surging 2.00 ft screen.
	1519	End surging 2.00 ft screen; Top of 10-20 silica = ~~52.4~~ 51.4' bgs. MJH 7/28/08
	1532	Top of Bentonite pellets = 46.4 ft bgs.
	1651	Remove 5.00' joint of temp. casing, [Tot = 55.7 ft]
	1657	Remove 5.00' joint of temp. casing, [Tot. = 50.7 ft]
	1703	End of the day; Drillers / Geo. depart from site.

NOT USED 7/28/08

Reported By: Jess Hocking

Title: Geologist | Date: 7/28/08

Signature:

Reviewed By: Joe Fritts

Title: Geologist | Date: 8/6/08

Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7/29/08

Well Name: 399-2-27 | Well ID: C6211

Location: 300-FF-5 | Report No.: 7

Start	Finish	Total
Time 0600	Time 1020	Time 4 hr 20 min
Hole Depth/Csg 39.5' / ~45.0'	Hole Depth/Csg Ø / Ø	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size 8" Temp.
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD meeting
0630	0650	Setting up over borehole
0650		Resume well completion; details on well completion log.
		Unable to backpull because 40-140 silica sand is tight
0717		Driller leaves to get fitting for tremmie - going to try washing
	0750	sand and circulating to loosen sand and enable backpulling
0750		Driller sets up to circulate water through tremmie pipe
0811		Start pumping water and loosening sand. Backpull ~ 6.0' while pumping
0825		Resume well completion; details on well completion log
0832		Remove 5.00' of temp. casing (Tot. = 45.7')
0851		Remove 5.00' of temp. casing (tot. = 40.7')
0904		Remove 10.00' of temp. casing (Tot. = 30.7')
0929		Remove 10.00' of temp. casing (tot. = 20.7')
0938		Remove 10.00' of temp casing (Tot. = 10.7')
0947		Remove 10.70' of temp. casing (Tot. = Ø); All temp. casing has been
		removed from borehole
0950	1020	Wait for PNNL to bring out ERT and thermister cables
1020		Mob. to C6217

Not Used 7/29/08

Reported By: J. Throolin		Reviewed By: Joe Fritts	
Title: Geologist	Date: 7/29/08	Title: Geologist	Date: 8/6/08
Signature:		Signature:	

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7-31-08

Well Name: 399-2-27 | Well ID: C6211

Location: 300-FS-5 | Report No.: 8

Start	Finish	Total
Time 0805	Time 0917	Time 1 hr 22 min
Hole Depth/Csg 59.15 / -	Hole Depth/Csg - / -	Hole Depth/Csg - / -

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 4" pvc well screen: 54'-56' bgs.

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0805		Trip in Pump + tremmie. Intake 4' from first joint above pump.
		Note: screen btwn. 54'-56' = 2' screen. Set pump intake @ 50' 51' bgs.
0824		Tag water @ 30.5' bgs. DTB: 59.0 Transducer @ 47.0' bgs = 16.7' below water
		XD_I: 16.714

		XD(ft)	Turb.(NTU)	Temp °C	DO(mg/L)	pH	Cond(mS)	Notes:
0832	Start Drawdown	10.3	-	-	-	-	-	~43 gpm
0837		14.44	195	17.8	8.59	7.65	0.511	~23.5 gpm
0842		14.45	15.5	17.8	8.54	7.66	0.502	22.5 gpm
0847		14.33	13.1	17.8	8.65	7.65	0.501	22 gpm
0852		-	9.81	-	-	-	-	-
0857		14.39	9.81	17.8 (8)	8.67	7.67	0.502	22 gpm
0902	Stop test Start Recovery	14.34	~~9.8~~ 8.86 AJ 7-31-08	17.8	8.69	~~7.86~~ AJ 7-31-08 7.68	0.500	22 gpm
0902		XD_F: 16.8' DTB: 59.15 bgs DTW: 30.6 bgs.						
0917		Trip out Pump + Tremmie + Transducer.						

Not Used AJ

Reported By: A. Lantau		Reviewed By: Joe Fritz	
Title: Geologist	Date: 7/31/08	Title: Geologist	Date: 8/6/08
Signature: Aaron Lantau		Signature: Joe Fritz	

A-6003-651 (REV 1)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-27	C6211	300-FF-5	7-31-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ○ No | Does the well have a cement pad? ⊗ Yes ⊗ No It will.

PART 1

STATIC WATER LEVEL:

Start of Job	30.6
End of Job	30.6

DEPTH TO BOTTOM:

Start of Job	59.0
End of Job	59.15

PART 2

WELL DEVELOPMENT DATA

Pump Model	Grundfos 75S50
Intake Depth	51' bgs.
Starting Turbidity	195 NTU

Pump Start	Stop	Flow Rate
08:28:47	09:00:15	43→23→22.5
09:00:15	09:06:56	Recovery

Total Pumped	1542.5 gal
Final Turbidity	8.36 NTU
XD SN/Range (PSI)	5217 (20 psi)

PART 3

INSTANTANEOUS SLUG TEST

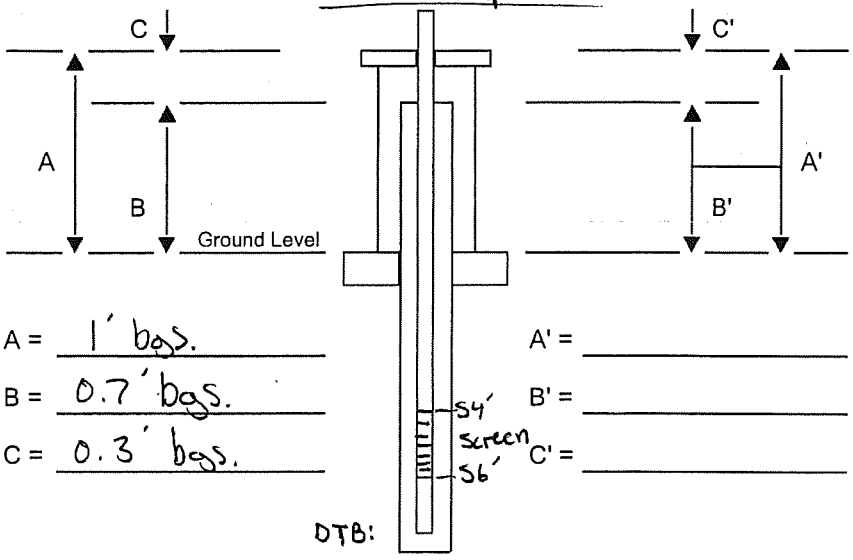
Static Water Level (TOC)	
Transducer Depth	47' bgs.
Baseline Start	N/A
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 7-31-08

Current Measurements Date:

Flush Mount Surface Completion



A = 1' bgs.
B = 0.7' bgs.
C = 0.3' bgs.
A' =
B' =
C' =

Are there any reference marks on the casing strings? ○ Yes ○ No

PART 5

COMMENTS: HERMIT: Jeff H3R-45348
XD_I: 16.7' XD_F: for Drawdown.
Drawdown on test #3
Recovery on test #4

Start Drawdown @ 43 gpm: 0828
Drop gpm @ 23 gpm: 0837
Drop gpm @ 22 gpm 0842 + remain @ 22 gpm for test.

Prepared by (print name):	Signature:	Date:
A. Lantow	Aaron Lantow	7-31-08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz	Joe Fritz	8/6/08

D-186

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 2

Date: 6/27/06

Purpose: PNNL Project 300 Area JFC | Location: 300-FF-5

Well ID: C6212 | Well Name: 399-2-28

Drilling Co.: WDC Drilling Bill Zamoz | Rig No.: 139 | Rig Make/Mod.: SuperSonic

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8 / 6 7/8	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic SuperSonic 2	Pressure ___ psi	Make
Welded ___ (Thd)	A.R. w/Sonic RS400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size N/A	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic N/A	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Joe Frilf.

Name/Title: GRAM, Inc Geologist

Signature:

Date: 6/27/06

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 6/27/08

Well Name: 399-2-28	Well ID: C6212
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 1330	Time 1630	Time 3.0
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 35 / 15	Hole Depth/Csg 35 / 15

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1330	1420	Clean pipe, move rig and equipment
1420		Start drilling w/6" drive barrel
		Advance drive barrel (DB) 0-5' - recover 0-4 & collect 2 GS
		at 1425.
		Advance DB 5-10' - recover 5-10 & collect 2 GS at 1430
		Add shoe & 10' casing (10.7) - advance to 5' &
		clean out to 10'. AM IH ck, < detect,
	1440	PM RCT ck, < Bkg.
1440		Advance DB 10-15, recover 10-5 & collect 2 GS at
		1445.
		Advance DB 15-20 - recover 15-19.5 & collect 2 GS at 1455
	1510	clean out to 20 - (20.7' casing on) - casing at 15'
1510		Advance DB 20-25, recover 20-24.5 & collect 2
	1530	GS at 1515. Empty hopper.
1530		Advance DB 25-35, collect 5 GS at 1550
		hole to 35, casing to 15 - clean up site
	1630	To office

Noted [signature] 6/27/08

Reported By: Joe Fritz		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/27/08	Title: Geologist	Date: 7/7/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/30/2008

Well Name: 399-2-28	Well ID: C6212
Location: 300-FF-5 OU	Report No.: 2

Start	Finish	Total
Time 0600	Time 1000	Time 4.0
Hole Depth/Csg 35 / 15	Hole Depth/Csg 65 / 63.2	Hole Depth/Csg 30 / 48.2

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: #1: 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD @ 300 Area (BTR, Drillers, Geo); 79°, p. Cloudy, lt. wind
0630	0657	AM inspections + rig warm-up;
0657		run drive barrel for clean-out run; add 10.0'
		casing to string @ 0704, will push to 25' + clean-out;
	0710	clean-out run @ 0707, still waiting for NCO support;
0710	0739	NCOs arrive, decon casing
0739		add 10.0' to string, pushing casing to 35'; drillers use
		"baffle" inside shoe to ~~ensu~~ SMS 6-30-08 prevent sample loss; add
		5.0' @ 0803; drive barrel 35-45', recover 35-40
		2 grab samples taken @ 0809; casing @ 45', next
		db sample 45-55'; DB @ 55', add 10' casing and
		push to 55' bgs; DB 45-55, recover 45-~~49~~, 2 GS
		taken @ 0848; DB 55-60, recover 55-60, 5 GS @
	0914	0859; DB 60-65' recover 60-65, 3 samples @ 0912
0914		drillers work to TD borehole, casing set @ 62;
		AM RCT check @ 0927, rding < bkgrnd; AM
		IH check @ 0933, non-detect
		casing - 65.7' in ground, 2.5' s/u - casing at 63.2'
	1000	pos to next location [Note: No sample pictures today]

Reported By: S. Sexton / J Fritts
Title: Geologist / Geologist Date 6/30/08
Signature: [signature] [signature]

Reviewed By: L. D. Walker
Title: Geologist Date: 7/7/08
Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/10/2008

Well Name: 399-2-28 | Well ID: C6212

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 0630	Time 1030	Time 4.0 hrs
Hole Depth/Csg 65 / 63	Hole Depth/Csg 0 / 0	Hole Depth/Csg 65 / 63

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: #1 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0630		Setup rig over borehole, prep to add bentonite
	0651	& back pull casing
0651		adding bentonite; bentonite to 57.3', setting perm casing to
		56.3' bgs; backpulling casing above bentonite depth; trip-in
		perm. casing & screen (0.3 + 2.0 + 10.0) = 12.3' blank + 2' screen,
		+ 10' + 10' + 10' blanks 44.3' total + 10 + 10 = 64.3' total on
	0744	string, setting bottom of well at 56.3' bgs
0744		begin completion, see completion logs pgs 1-2; RCT check @
		0930, all readings ≤ bkgrnd; casing bridged @ 18.0' bgs,
		but all material fell out as casing was pulled from
		the bore hole, had 25' to pull w/12' inside casing, ended
		with 13' open hole, believe no natural fill or ~1ft.
		collapsed in hole. Filled borehole with bent. chips
		13.0' to surface; All temporary casing removed from
	1016	borehole
1016	1030	move rigs & jacks to C6585

Not Used 07/10/2008

Reported By: S. Sexton | Reviewed By: Joe Fitts

Title: Geologist | Date: 07/10/08 | Title: Geologist | Date: 8/13/08

Signature: | Signature:

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/11/2008

Well Name: 399-2-28 | Well ID: C6212

Location: 300-FF-5 OU | Report No.: 4

Start	Finish	Total
Time 1130	Time 1330	Time 2.0 hrs
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ Rod Size:

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1130		setup rig on well; tag well: DTB = 56.5' bgs DTW = 28.8' bgs (SMS 7-11-08)
	1145	bailing well before trip-in pump
1145		trip-in pump: Grundfos 7S S-60 motor: Franklin Electric
	1206	5 hp; drawdown test recorded on H3K-45348 Deadlock WDS
1206		pump on @: 1209 rate: 20.0 intake: 43.0' bgs

turb. (NTU)	pH	D/O (mg/L)	cond. µS	temp (°C)	xD
563	7.61	7.09	453	20.0	10.260
56.5	7.58	7.68	458	19.1	10.260
28.5	7.57	8.00	458	18.7	10.272
20.0	7.58	8.21	459	18.7	10.273
15.7	7.57	8.21	457	18.7	10.276
14.0	7.58	8.29	459	18.7	10.258
12.3	7.58	8.35	458	18.5	10.247

1235	1244	
(SMS 7-11-08) 1244 1304	1304	pump off @ 1244, begin recovery test on Deadlock WDS
1304	1330	trip-out pump + move to next well

Not Used 07/11/2008

Reported By: S. Sexton | Reviewed By: Jue Fritz

Title: Geologist | Date: 07/11/08 | Title: Geologist | Date: 8/13/08

Signature: | Signature:

A-6003-651 (REV 1)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-28	C6212	300-FF-5 OU	07/11/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No 7-11-08

PART 1

STATIC WATER LEVEL:

Start of Job	28.8' bgs
End of Job	28.8' bgs

DEPTH TO BOTTOM:

Start of Job	56.5' bgs
End of Job	56.5' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	43.0' bgs
Starting Turbidity	563

Pump Start	Stop	Flow Rate
1209	1244	20.0

Total Pumped	627 gals
Final Turbidity	12.3 NTU
XD SN/Range (PSI)	5217 / 20.0

PART 3

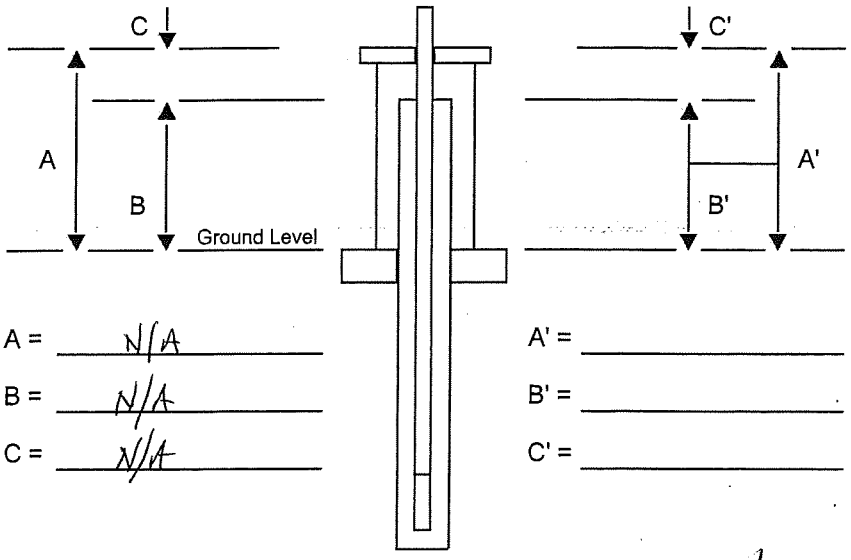
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/11/2008

Current Measurements Date:



A = N/A

B = N/A

C = N/A

A' = _____

B' = _____

C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 39215

SMS 7-11-08

xDi: ~~7.709~~ 11.053

xDf: 11.051

final meter: 39842

Prepared by (print name):	Signature:	Date:
S. Sexton		07/11/2008
Reviewed by (print name):	**Signature:**	**Date:**
Jeff Hs		8/13/08

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Date: 6/26/08

Purpose: PNNL Project 300 Area IFC | Location: 300-FF-5

Well ID: C6216 | Well Name: 399-2-29

Drilling Co.: WDC Bill Zamora | Rig No.: 139 | Rig Make/Mod.: Super Sonic

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8 / 6 3/4	Auger ____	Air ____ Water/Mud ____	Make ____
Grade	Rotary ____	Reverse ____ Direct ____	Model ____
Lbs.Per Ft. ____	Tubex ____	Vol: cfm ____	Choke ____
Material Carbon Steel	Cable Tool ____	gpm ____	Casing Hammer
Type:	(Sonic) Super Sonic 2	Pressure ____ psi	Make ____
Welded ____ (Thd.)	A.R. w/Sonic RS400	Drill Pipe O.D. ____	Model ____
Planned / Actual	Geoprobe ____	Tool Joint Size N/A	Bit Size
Set At: ____ / ____	Other: ____	Additives ____	Type ____
Shoe OD/ID ____			Nozzles ____
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size ____	Auger ____	Air ____ Water/Mud ____	Make ____
Grade	Rotary ____	Reverse ____ Direct ____	Model ____
Lbs.Per Ft. ____	Tubex ____	Vol: cfm ____	Choke ____
Material ____	Cable Tool ____	gpm ____	Casing Hammer
Type:	Sonic N/A	Pressure ____ psi	Make ____
Welded ____ Thd.	A.R. w/Sonic	Drill Pipe O.D. ____	Model ____
Planned / Actual	Geoprobe ____	Tool Joint Size ____	Bit Size
Set ____ / ____	Other: ____	Additives ____	Type ____
Shoe OD/ID ____			Nozzles ____
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: J. Fritz

Name/Title: GRAM Inc Geologist

Signature:

Date: 6/26/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 6/26/08

Well Name: 399-2-29	Well ID: C6216
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 0600	Time 1230	Time 6.5
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 61.5 / 59.7	Hole Depth/Csg 61.5 / 59.7

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend PDD with BTR, Drill crew, Geologist
0630		To site - weather clear, sunny. ≈ 56°. Cleaning
	0800	pipe, moving rig to C6216
0800		Start drilling with 6" drive barrel (DB)
		Advance DB 0-3', recover 0-3' & collect 1 GS at 0805
		Advance DB 3-5 - recover 3-5' & collect 1 GS at 0815
		Advance DB 5-10 - recover 5-10 & collect 2 GS at 0818
	0820	Add shoe & casing - advance to 5' (10.7' on)
0820	0825	Clean out to 10 ft.
0825		Advance DB 10-15 - recover 10-14.5 & collect 2 GS at 0830
		Advance DB 15-20' - recover 15-20 & collect 2 GS at 0840
	0845	Add 10' casing (20.7) - advance to 15'. Clean out 15-20'
0845		Advance DB 20-25' - recover 20-25' & collect 2 GS at 0905
	0920	AM RCT ck, CBKg
0920		change out hopper. Advance DB 25-35 - recover
		25-30 & collect 2 GS at 0940
	0945	Add 10' casing & advance to 25' (30.7 on)
0945		Advancing DB - casing dropped to 29'. Add 5' (35.7)
		pull 5' off after pulling up casing (30.7'). casing at 25' -
		Advance DB/clean out. Add 10' casing (40.7) - advance
		to 35 - Advance DB/clean out 30-35 - recover 30-33 & collect
	1020	1 GS at 1015. water at ≈ 26 ft
1020		Add (2) 5' (50.7) - advance to 45 while advancing DB
	1045	Advance DB 35-45' - recover 35-41 & collect 3 GS at 1045

Reported By: Jon Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/26/08	Title: Geologist	Date: 7/7/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 3 of 3

Date: 6/26/08

Well Name: 399-2-29 | Well ID: C6216

Location: 300-FF-5 | Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1045		Add (2) 5' casing (60.7') Advance DB & casing 45-55 & collect 3 GS at 1105. Recovered 45-53 and collect 3 GS at 1105.
	1110	
1110		Advance DB 55-60 - recovered 55-60 (7' tbl) silt at 55.5.
	1130	
1130	1200	Lunch
1200		Casing to 59.7, TD 61.5'
	1230	move rig & equipment to C6213

Not used

6/26/08

Reported By: Joe Fitts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/26/08	Title: Geologist	Date: 7/7/08
Signature:		Signature:	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/27/2008

Well Name: 399-2-29 | Well ID: C6216

Location: 300-FF-5 OU | Report No.: 2

Start	Finish	Total
Time 1030	Time 1545	Time 5.25 hrs
Hole Depth/Csg 61 / 60	Hole Depth/Csg 1 / 0	Hole Depth/Csg 60 / 60

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1 | Rod Size: #1: 75/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1030	1039	Setting up jacks and rig for completion
1039	1128	backpull casing to top of bentonite depth;
1128		trip-in 0.3 + 10.0 + 10.0 blank = 20.3' sump + 3mc6-27 5.0'
	1142	20-slot screen + 10.0 + 10.0 + 10.0 + 10.0 casing = 65.3';
1142	1529	begin completion, see completion log pgs 1-2;
1529		All temp. casing + shoe removed from hole, tag bottom of well @ 55.0' bgs, screen 34.7' to 29.7' bgs; rig will be moved off site for weekend; break down rig and move off well, geo finishes pw
	1545	+ departs;

Not Used 06/27/08

Reported By: S. Sexton	Reviewed By: L. D. Walker
Title: Geologist Date: 06/27/08	Title: Geologist Date: 7/7/08
Signature: L. M. Sexton	Signature: LD Walker

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/11/2008

Well Name: 399-2-29	Well ID: C6216
Location: 300-FF-5 OU	Report No.: 3

Start	Finish	Total
Time 0945	Time 1130	Time 1.75 hrs
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size:
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0945		setup rig on well; geo tags well: DTB = 55.3' bgs DTW =
	0956	29.0' bgs; bailing well before pump trip-in
0956		trip-in pump + tremmie, intake @ 41.0' bgs; field
		calibration performed earlier @ C6218; Pump: Grundfos
	1005	SMS 7-11-08 ~~750~~ 75 S-50 8-stage Motor: Franklin Electric 5hp.
1005		Test #1 recorded on datalogger 1t3K-45348, Deadlock 03
		Pump on @: 1008 rate: 50 gpm
		turb. pH D/o cond. temp. xD
1014		11.0 7.58 8.52 446 17.9 6.941
1018		3.77 7.58 8.85 448 17.6 6.963
1021		3.23 7.57 8.90 450 17.4 6.856
1025		1.79 7.57 8.90 447 17.7 6.920
1030		1.28 7.57 8.89 448 17.7 6.921
1033		1.28 7.55 8.91 449 17.5 6.937
1036		0.77 7.55 8.93 449 17.5 6.938
1040		0.70 7.56 8.95 450 17.5 6.939
1046	1048	0.71 7.56 8.90 448 17.5 6.916
1048		pump shut off @ 1048, begin recovery test on Deadlock
	1107	WD4
1107	1130	trip-out pump + move to next well (C6212)

Not Used 07/11/08

Reported By: S. Sexton	Reviewed By: Joe Fritts
Title: Geologist Date: 07/11/2008	Title: Geologist Date: 8/14/08
Signature: [signature]	Signature: [signature]

A-6003-651 (REV 1)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-29	C6216	300-FF-5 OU	07/11/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No 07/11/08

PART 1

STATIC WATER LEVEL:

Start of Job	29.0' bgs
End of Job	29.0' bgs

DEPTH TO BOTTOM:

Start of Job	55.3' bgs
End of Job	55.3' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	41.0' bgs
Starting Turbidity	11.0

Pump Start	Stop	Flow Rate
1008	1048	50

Total Pumped	1877
Final Turbidity	0.71
XD SN/Range (PSI)	5217/20.0

PART 3

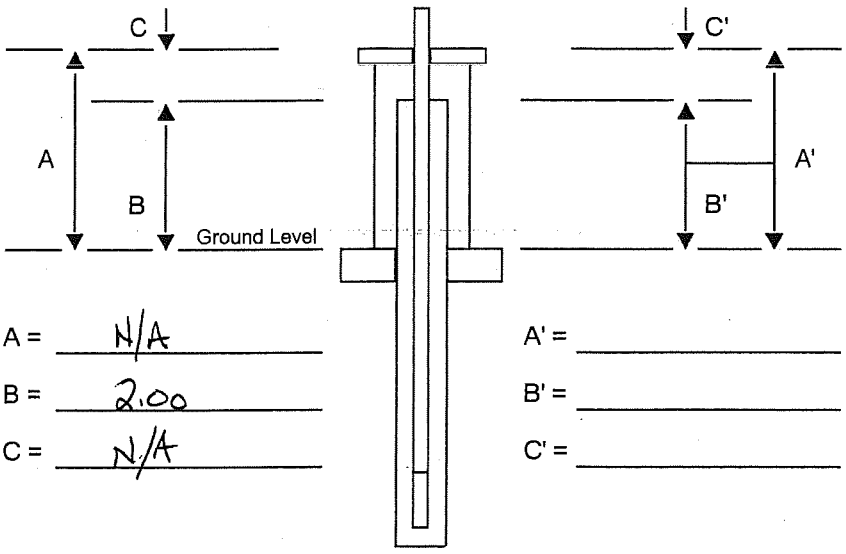
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/11/2008

Current Measurements Date:



A = N/A

B = 2.00

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 37338

xDi: 8.261

xDf: 8.225

final meter: 39215

Prepared by (print name):	Signature:	Date:
S. Sexton		07/11/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz		8/14/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Date: 07/24/2008

Purpose: 300 Areas IFC

Location: 300-FF-5 OU

Well ID: C6217

Well Name: 399-2-30

Drilling Co.: WDC Bill Zamow

Rig No.: 139

Rig Make/Mod.: SuperSonic JT

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8" / 6 7/8"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic SuperSonic	Pressure psi	Make
Welded ___ (Thd.)	A.R. w/Sonic RS400	Drill Pipe O.D.	Model
(Planned) / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: ~605 '	Other:	Additives	Type
Shoe OD/ID		N/A	Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic N/A	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: '	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Comments/Remarks:

Estimated Depth to Water

Reported By: S. Sexton

Name/Title: GRAM, Inc. Geologist

Signature: [signature]

Date: 07/24/2008

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 07/24/2008

Well Name: 399-2-30 | Well ID: C6217

Location: 300-FF-5 OU | Report No.: 1

Start	Finish	Total
Time 1430	Time 1630	Time 2.0 hrs
Hole Depth/Csg 0 / 0	Hole Depth/Csg 25 / 15	Hole Depth/Csg 25 / 15

Reference Measuring Point: GROUND SURFACE

Casing String No. ① 2 3 4 ____ Rod Size: #1: 7 5/8

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1430	1457	Setup rig over location;
1457		commence drilling from surface; advance 6" db 0-5'
		recover 0-5' 4 GS @ 1503; advance db 5-10'
		recover 5-9.5' 4 GS @ 1509; add 10' casing + push
	1515	to 5' bgs, clean out to 10' bgs
1515		advance db 10-15 recover 10-15 3 GS @ 1530;
	1539	advance db 15-20 recover 15-20, 4 GS @ 1536
1539		add 10.0' casing + push to 15' bgs; clean out to 15';
	1605	advance db 20-25' recover 20-25' 3 GS @ 1600
1605	1630	change out hopper, shut off rig + finish day

Not Used on 07/24/2008

Reported By: S. Sexton

Title: Geologist Date: 07/24/08

Signature: S. M. Sexton

Reviewed By: Joe Fritz

Title: Geologist Date: 8/13/08

Signature: Joe Fritz

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/25/2008

Well Name: 399-2-30 | Well ID: C6217

Location: 300-FF-5 OU | Report No.: 2

Start	Finish	Total
Time 0600	Time 1000	Time 4.0 hrs
Hole Depth/Csg 25 / 15	Hole Depth/Csg 64 / 59	Hole Depth/Csg 39 / 44

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: #1: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD w/ Drillers, BTR, RCT; clear, 58°, no wind
0630	0648	prep for drilling, warm up rigs;
0648		commence drilling from 25' bgs; 25-35' recover 5'; 3 GS
		@ 0654; add 10' casing & push to 25; cleanout run
	0722	15-25'; add 10' casing & push to 35' bgs;
0722		advance db 35-45, recover 35-41 ; add 10' (5+5) &
		push to 45' bgs; using 20 gpm to wash casing over db; 3 GS
	0740	@ 0735
0740		add 10' casing (5+5) to string & push to 45' bgs;
	0811	advance db 45-55' recover 45-55, 6 GS @ 0754
0811	0830	advance ss 55-60, recover 55-60, 5 LL @ 0825
0830		will advance casing to 61' bgs, clean out to ~62 &
	0930	TD hole; TD = 64.0 ft bgs, casing @ 59'
0930	1000	move rig off hole & setup on C6209

Not Used 07/25/2008

Reported By: S. Sexton		Reviewed By: Joe Fritz	
Title: Geologist	Date: 07/25/08	Title: Geologist	Date: 8/13/08
Signature: L M. Sexton		Signature: Joe Fritz	

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7/29/08

Well Name: 399-2-30 | Well ID: C6217

Location: 300-FF-5 | Report No.: 3

Start	Finish	Total
Time 1020	Time 1540	Time 5 hrs 20 min
Hole Depth/Csg 64.0' / 60.7'	Hole Depth/Csg Ø / Ø	Hole Depth/Csg - / -

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 ____ Rod Size: 8" Temp casing

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1020		Setup pump setting rig over borehole
1045		Add bentonite pellets to bring depth up to 60.0' bgs
1055		Trip in 4" shedule 40 PVC casing and screen (2.90' cap&sump + 2.00' screen +
		10.00' blank + 5.00' blank + 10.05' blank + 10.05' blank + 10.05' blank + 10.05' blank +
		5.00' blank = 65.1' total PVC)
1115	1140	Wait for other crew to finish using lifting bail
1140		Trip in 4" PVC; (Endcap = 58.9' bgs; Bottom screen = 56.0' bgs; Top screen = 54.0'
		bgs); ERT string #002.8; ERT #1 & Thermistor set @ 58.5' bgs; ERT #2 set @ 33.5' bgs
1230		Begin completion; details on well completion log
1258		Begin surging 2.00' screen
1313		End surging 2.00' screen; Top of 10-20 silica = 53.5' bgs; Resume
		well completion
1322		Remove 5.00' casing (Total = 55.7')
1424		Remove 5.00' casing (Tot. = 50.7')
1436		Remove 5.00' casing (Tot. = 45.7')
1443		Remove 5.00' casing (Tot. = 40.7')
1454		Remove 10.00' casing (Tot. = 30.7')
1505		Remove 10.00' casing (Tot. = 20.7')
1513		Remove 10.00' casing (Tot. = 10.7')
1523		Remove 10.70' casing (Tot. = Ø); All temp. casing removed from borehole
1523	1540	Tower down rig/Geo. paperwork
1540		Geo. depart
		Not used 7/29/08

Reported By: J. Throelin

Title: Geologist | Date: 7/29/08

Signature:

Reviewed By: Joe Fitz

Title: Geologist | Date: 8/13/08

Signature:

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 7/30/08

Well Name: 399-2-30 | Well ID: 6217

Location: 300-FF-5 | Report No.: 4

Start	Finish	Total
Time 1345	Time 1620	Time 2 hrs 35 min
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 ____ Rod Size: 4" perm. PVC

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)						
1345		Mob. rig/setup rig for development						
1410		Tag DTW = 31.54' - 0.8' stickup = 30.74' bgs; DTB = 60.1 - 0.8 = 59.3' bgs						
1436		Bail sediment out of well						
1440		Calibrate/test field instruments						
		Turbidity: 5.09 NTU std.		Readings: 5.11				
		45.7 NTU Std.		" : 45.8				
		509 NTU Std.		" : 510				
		pH : 7.00 std.		" : 6.99				
		10.00 Std.		" : 10.03				
		Conductivity: 1413 µS		" : 1401 µS				
1448		Set pump intake @ 50.0' bgs; Transducer @ 46.0' bgs						
		Flow meter XD	Turb.(NTU)	Temp(°C)	pH	D.O.(mg/L)	Cond.(mS)	
		61695	15.403	—	—	—	—	—
1516		Start pump and drawdown test #5 on Hermit 3000; started						
		pumping @ 30 gal/min; Reduce pump rate to 26 gal/min @ 1520						
	1520	—	6.650	—	—	—	—	—
	1525	61863	6.950	13.1	22.3	7.59	8.29	0.507
	1535	61915	7.147	4.03	19.8	7.63	8.34	0.490
	1540	61998	7.153	2.28	19.5	7.63	8.64	0.487
	1545	62062	7.091	1.85	19.7	7.68	8.68	0.496
		62141	7.150	1.44	20.1	7.70	8.61	0.496
1551		Shut off pump; Start recovery test #6						
1600		—	15.420	—	—	—	—	—
1601		Stop recovery test #6						

Reported By: J. Throolin | Reviewed By: Jeffries

Title: Geologist | Date: 7/30/08 | Title: Geologist | Date: 8/13/08

Signature: | Signature:

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 7/30/08

Well Name: 399-2-30 | Well ID: C6217

Location: 300-FF-5 | Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1602	1615	Trip pump out
1615	1620	Clean up site
1620		Mobr rig to C6215

Not used

Reported By: J. Throelin

Title: Geologist | Date: 7/30/08

Signature:

Reviewed By:

Title: Geologist | Date: 8/13/08

Signature:

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-30	C6217	300-FF-5	7/30/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? Ø Yes Ø No

PART 1

STATIC WATER LEVEL:

Start of Job	31.54
End of Job	31.53

DEPTH TO BOTTOM:

Start of Job	60.1
End of Job	60.1

PART 2

WELL DEVELOPMENT DATA

Pump Model	75-550
Intake Depth	50.0
Starting Turbidity	13.1

Pump Start	Stop	Flow Rate
1516	1551	26 gal/min

Total Pumped	~~446~~ 860 gal	1170 gal
Final Turbidity	1.44	
XD SN/Range (PSI)	5217/20 psi	

PART 3

INSTANTANEOUS SLUG TEST

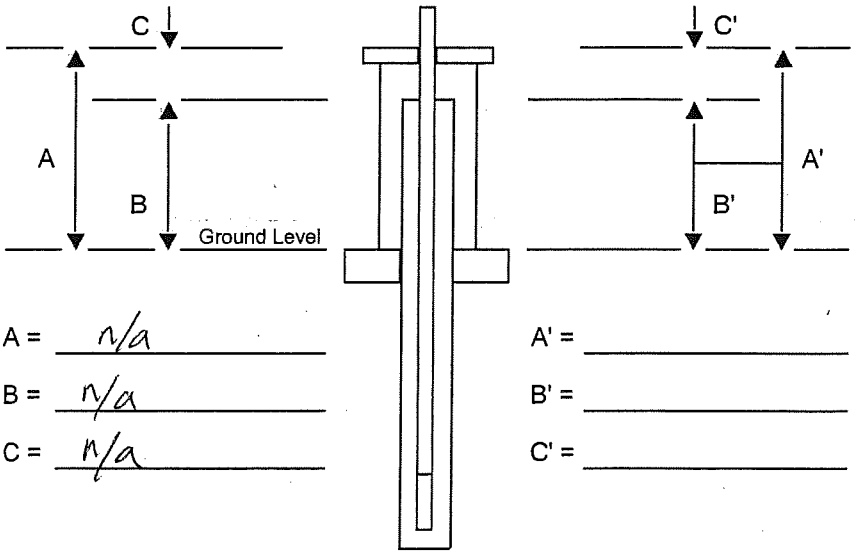
Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Stop	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

Used 7/30/08

PART 4

Last Recorded Measurements Date:

Current Measurements Date:



A = n/a

B = n/a

C = n/a

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

XD initial: 15.403

XD Final: 15.420

Prepared by (print name):	Signature:	Date:
J. Throolin		7/30/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fitz		8/13/08

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Date: 6/19/08

Purpose: PNNL Project 300 Area IFC | Location: 300-FF-5

Well ID: C6218 | Well Name: 399-2-31

Drilling Co.: WDC Driller Brian | Rig No.: 129 | Rig Make/Mod.: Super Sonic

Casing String No. ① 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8" OD, 6 7/8" ID	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic 2	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic RS 400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size N/A	Bit Size
Set At: ___ / ___	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic N/A	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set ___ / ___	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: J. Griffith

Name/Title: GRAM Inc Geologist

Signature: [signature]

Date: 6/19/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 6/17/08

Well Name: 399-2-31 | Well ID: C6218

Location: 300-FF-5 | Report No.:

Start	Finish	Total
Time 1200	Time 1615	Time 4.3
Hole Depth/Csg 0 / 0	Hole Depth/Csg 25 / 25	Hole Depth/Csg 25 / 25

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: O 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1200	1315	Set-up on location. Weather clear 80°
1315		Start drilling with 6" DriveSarrel (DB) -
		Advance to 10' w/ DB - recover 0-7' & collect
		4 grab samples (0-5) at 1345. Add 10' casing & bit -
	1355	(10.7) - Advance to 7' - clean out to 10'
1355		Advance DB 10-15, recover 10-14 & collect 2 GS at 1410
		Add 10' casing (20.7) - advance to 15'. RM RCT clr.
	1430	< detect. - tough drilling
1430		Advance DB 15-25FT - recover 15-23' & collect 5 GS
		at 1510. Add 10' casing (30.7) - advance to 25FT.
	1515	cleaning out to 25'
1515		tough cleaning the casing -
	1615	Done - to offs.

not used

6/19/08

Reported By: Joe Fitz

Title: Geologist Date: 6/19/08

Signature: Joe Fitz

Reviewed By: L. S. Walker

Title: Geologist Date: 7/7/08

Signature: L S Walker

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 6/20/08

Well Name: 399-2-31 | Well ID: C6217

Location: 300-FF-5 | Report No.: 2

Start	Finish	Total
Time 0600	Time 1400	Time 8
Hole Depth/Csg 25 / 25	Hole Depth/Csg 63 / 59	Hole Depth/Csg 38 / 34

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1 | Rod Size (1) 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, Safety, and Geo.
0630		To site - 55° clear, sunny. Crew traded roll-off-
	0700	about to hit water, warm equipment. Tag at 23'.
0700		In w/ 6" DB to clean out - clean out and
		tag at 25.4'. Advance DB 25-35 - recover 25-30 &
		collect 2 GS at 0735. Add 10' casing (40.7) and
	0745	advance to 35'
0745		Advance DB 30-35 - clean-out. Missed 30-35 in
	0805	original DB - so collect 2 GS 30-35 at 0800
0805		Advance DB 35-45 - recover 35-43 - and collect
	0845	4 GS at 0820 - crew getting casing.
0845		Add 10' casing (50.7) - advance to 45'.
	0900	AM THck - detect
0900		Advance DB 45-55' - recover 45-53 & collect
	0940	4 GS at 0940
0940		Add 10' (60.7) Advance to 55',
	1010	1010 - AM RCT ck. = BKG.
1010	1030	Clean out w/ 6" DB to 55' -
1030		Advance DB 55-60 - recover 55-60 & collect 4 GS
		at 1050 - silt at 55.5' - Advance casing to 57'-
	1130	Clean out w/ DB to 63' - tag at 63'
1130	1400	Move rig & Lunch.
		6/20/08

Reported By: Joe Fitz | Reviewed By: L.D. Walker

Title: Geologist | Date: 6/20/08 | Title: Geologist | Date: 7/7/08

Signature: | Signature:

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/30/2008

Well Name: 399-2-31 | Well ID: C6218

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 0900	Time 1345	Time 4.75 hrs
Hole Depth/Csg 63 / 59	Hole Depth/Csg 4 / —	Hole Depth/Csg 59 / 59

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: #1 : 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0900		Receive well design, finish setting up rig on bore
	0913	hole
0913		initial tag DTB = 63.0' bgs; adding bentonite
	0922	from 63.0 - 56' bgs
0922		trip-in 10' sump + cap (10.3') + 2.0' screen + 10.0'
		= 22.3' total, add 10.0 + 10.0 = 42.3' total + 5.0 +
	0932	5.0 + 5.0 = 62.3' 4" PVC casing total; bottom set @ 54.25
0932	1309	begin well completion, see logs pgs 1-2;
1309		plugged bentonite in casing, pulling perm. pvc from
	1339	hole, will pull out temp + re-drill borehole;
1339		All casing removed from hole, borehole tagged @ 4' bgs,
	1345	drillers will move completions rig to C6213 for completion.

Not Used 6/30/2008

Reported By: S. Sexton		Reviewed By: L. D. Walker	
Title: Geologist	Date: 06/30/08	Title: Geologist	Date: 7/7/08
Signature: L. M. Sexton		Signature: LD Walker	

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 7/1/08

Well Name: 399-2-31	Well ID: C6218
Location: 300-FF 5	Report No.: 4

Start	Finish	Total
Time 0930	Time 1630	Time 7
Hole Depth/Csg — / —	Hole Depth/Csg 55 / 55	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: (1) 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0930		Setting up over borehole. This borehole was drilled
		6/19-6/20/08. Well was installed, but due to
		problems, well + casing (drill) was removed. We
		will clean out to bottom - 63Ft.
	0910	cleaning pipe.
0910	1030	start reaming, casing to 35'
1030	1135	casing to 55'
1135	1215	Lunch
1215		Discuss well completion - will ream to 56' - in sall well
	1315	Ream to 56.8 -
1315		Lower wellstring - 64.5' long string - 8.5' s/u
	1340	puts it at 56' - 1.9' cut off at surface
1340		pour 50lb bags 10/20 sand - unable to tag sand
		(Added 1 bag) - hitting centralizer w/ tag line - use tremie
		pipe. Add 2 bags (50lb 10-20) - casing at 55, tag at 51.
		pull casing to 56 - tg at 54 - Add (0.75 bags - ~~tag at 2.75~~
		(2.75) tg at 49' - cut off ' casing
		pull casing up to 50' - tg sand at 49.5 -
	1425	pull casing to 49' - sand at 49.5
1425		3/8" coated bentonite pellets - 50lb bucket, tremie at 48.
	1445	tremie clogged - about ½ bucket made it down hole.
1445		Pull casing to 47.7' - tg pellets at 50' → Add more
		pellets (1.3 buckets in) - tag at. - error in
	1525	counting tremie - pellets are higher.

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 7/1/08	Title: Geologist	Date: 7/2/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 7/1/08

Well Name: 399-2-31	Well ID: C6218
Location: 300-FF-5	Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1525		Pull 10' casing (50.7) - pull to 44.7 - tag pellets
	1530	at 42' - must pull the well.
1530	1535	Pull well string.
1535		Go in w/ DB to clean out - casing (50.7) out = 45'
		Pull 10' casing & add (2) 5' (50.7) to make installation
	1615	easier. - advance to 45 -
1615		Add 2(5') 60.7 - advance to 55. - clean
	1630	out to 55' - Done for day

7/1/08

not used

Reported By: Jon Fritz		Reviewed By: L.D. Walker	
Title: Geologist	Date: 7/1/08	Title: Geologist	Date: 7/7/08
Signature: [signature]		Signature: [signature]	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 7/2/08

Well Name: 399.2-31	Well ID: C6218
Location: 300-FF-5	Report No.: 5

Start	Finish	Total
Time 0600	Time 1100	Time 5
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1 Rod Size: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, Drill crew, RCT.
0630		To site, 61°, clear. warm equipment - we will
	0650	Finish clean-out, lower well, & install.
0650		Resume clean-out. Inspect PVC removed from well
		yesterday - all OK - screen clean.
	0700	Clean out - tag at 56' - need 56.4'
0700	0730	Casing to 56, hole open to 57
0730		Lowering casing - well string - 64.5' long - new 10'
		joint at surface. 64.5
		- 8.1 s/u → 6' to top of jacks.
		56.4
		- 12.4 (bottom joint)
		44 - bottom of SC
	0800	Casing at 56 - Add 2 bags sand - well has 8.1' s/u -
0800		Pull casing to 54.7' - 7 (10') joints on deck of tremie.
		Add 1 bag sand (3) 50 lb bags 10-20 tag at 49' -
		Pull casing to 50' - tag sand at 49.7' - take 5' casing
		off (55.7) - tag at 50' (sand) lower tremie for pellets.
	0840	casing at 49.7, Add 1/3 bucket 3/8" coated pellets - tag at 48
0840		pull casing to 48.3, tag pellets at 48.8 - Add more (1/2
		bucket total) - tag at 48' - Add 2.5 bags sand - casing
		at 48.3, sand at 40.5. pull 5' (50.7) - casing at 44.7 - tag sand
		at 42 - Add .5 bag (3) - tag at 40.5, pull casing to 41.7,
	0910	tag sand at ~41 - add .5 bag (3.5) tag at 39.2' -

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 7/2/08	Title: Geologist	Date: 7/7/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 7/2/08

Well Name: 399-2-31 | Well ID: C6218

Location: 300-FF-5 | Continuation of Report No.: 5

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		F-7/4/08
0910		Pull 15' casing (~~40.7~~) (45.7') - casing at 39.7 - tg sand
	0920	at 39.2 - set up to swab
0920		swab screen interval (42-44) 0920-0935 - 39.5
	0940	0935-0940 - 39.5 - steady
0940		casing at 39.7 - Add .25 bucket pellets, pull
		casing to 38.7' Add pellets (2/3 bucket total) tg
		at 37.2. Pull ~~10'~~ F-7/2/08 5' casing (40.7)
		pull to 34.7.
	1000	Prepare to pour medium bentonite chips.
1000		casing at 34.7 - Add 2 bags tg at 25
		pull 10' (30.7)
		casing at 24.7 Add 1.5 bags (3.5) tg at 20
		" " " Add 1.5 bags (5) tg at 15
	1005	pull 10' (20.7)
		casing at 14.7 Add 2 bags (7) tg at 6'
		pull 10' (10.7)
	1015	Casing at 4.7 Add 1 bag (8) tg at 6'
1015		Pull rig & equipment off
		Add 7 bags chips (15 total) - material to
	1100	1' bgs.

7/2/08 reviewed

Reported By: Joe Faith		Reviewed By: L.D. Walker	
Title: Geologist	Date: 7/2/08	Title: Geologist	Date: 7/7/08
Signature:		Signature:	

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 07/11/2008

Well Name: 399-2-31 ~~399-2-18~~ sms 7/11/08

Well ID: C6218

Location: 300-FF-5 OU

Report No.: 6

Start	Finish	Total
Time 0600	Time 0945	Time 3.75 hrs
Hole Depth/Csg 6 / 6	Hole Depth/Csg 6 / 6	Hole Depth/Csg ~ / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD w/ BTR, drillers; clear, light wind 59°
0630		setup for well development, prep to bail well; geo
		tags well & sets up calibration; DTB = 56.3' bgs DTW =
	0729	28.8' bgs
0729		instrument field calibration
		known / reading / w/in 10%
		pH 7.00 / 7.05 / Y
		pH 10.00 / 10.32 / Y
		turb. 482 NTU / 482 (NTU) / Y
		turb. 50.9 NTU / 50.7 NTU / Y
		turb. 4.45 NTU / 4.21 NTU / Y
	0743	cond. 1413 µS / 1421 µS / Y
0743		trip-in pump & trremmie; Pump: Grundfos 75 S-50 8-stg,
		Motor: Franklin Electric 5hp; intake set @ 46.0' bgs
		2' above screen; test #1 recorded w/xD 5217 on data logger H3K -45348
		Pump on @ 0802 Rate: 20 gpm test #1: Deadlock 01

	turb. (NTU)	pH	cond. (µS)	temp. (°C)	D/O	xD
0814	25.4	7.87	414	17.5	7.58	0.102
0818	12.3	7.84	407	17.4	7.91	0.091
0821	11.6	7.75	404	17.4	7.78	0.094
0830	6.78	7.74	402	17.5	8.09	0.132
0833	5.43	7.72	401	17.6	8.08	0.156
0837	5.04	7.72	400	17.5	8.08	0.159
0840	5.02	7.73	400	17.6	8.19	0.144

Reported By: S. Sexton

Title: Geologist Date: 07/11/08

Signature: S. M. Sexton

Reviewed By: Joe Fitle

Title: Geologist Date: 8/15/08

Signature: Joe Fitle

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 07/11/2008

Well Name: ~~399-2-18~~ SMS 7/11/08 399-2-31

Well ID: CC6218

Location: 300-FF-5

Continuation of Report No.: 6

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		Pump shut off @ 0809 to recharge well, using 2ft
	0851	screen, turn pump back on w/ xD @ 8.255 @ 0811
0851		pump shut off @ 0851, begin recovery test on Deadlock
	0908	OZ; end recovery test @ 0908
0908	0945	trip-out pump + move to CC6217

Not Used
SMS 07-11-08

Reported By: S. Sexton

Title: Geologist Date: 07/11/08

Signature: S. Sexton

Reviewed By: Joe Fritz

Title: Geologist Date: 8/5/08

Signature: Joe Fritz

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-31	C6218	300-FF-5 OU	07/11/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes 07/11/08 ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job	28.18' bgs
End of Job	28.19' bgs

DEPTH TO BOTTOM:

Start of Job	56.13' bgs
End of Job	56.13' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	7SS-50
Intake Depth	4010
Starting Turbidity	25.4

Pump Start	Stop	Flow Rate
0802	0855	20

Total Pumped	768
Final Turbidity	5.02
XD SN/Range (PSI)	5217/2010

PART 3

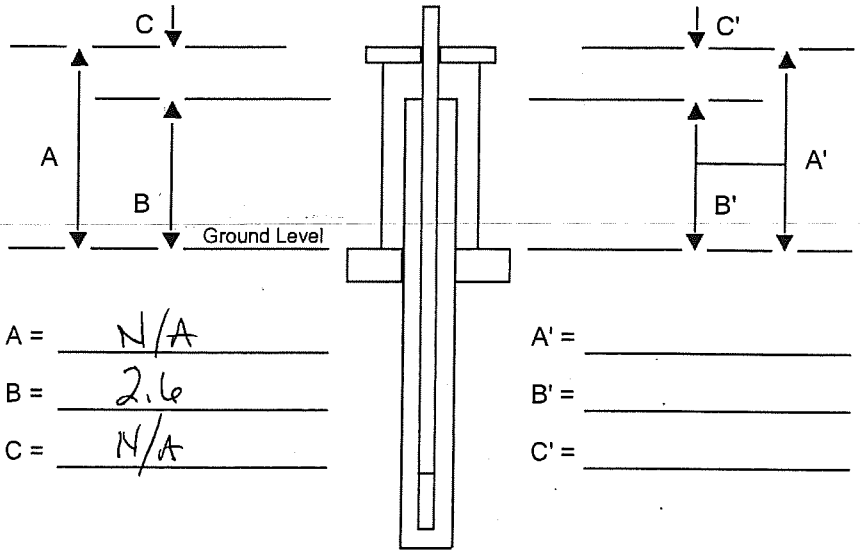
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/11/08

Current Measurements Date:



A = N/A

B = 2.6

C = N/A

A' = _____

B' = _____

C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 36570

xDi: 8.159

xDf: 8.214

final meter: 37338

pump shut off from 0809 to 0811

initial gpm ~50, turned down to 20 for 40 mins

Prepared by (print name):	Signature:	Date:
S. Sexton		07/11/2008
Reviewed by (print name):	**Signature:**	**Date:**
J. Griffis		8/15/09

D-216

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Date: 7/10/08

Purpose: PNNL Characterization 300 Area | Location: 300 - FF-5

Well ID: C6194 IFC | Well Name: 399-3-23

Drilling Co.: WIC Driller Bill Zamor | Rig No.: 13 | Rig Make/Mod.:

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon Steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ (Thd)	A.R. w/Sonic	Drill Pipe O.D. N/A	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other: Sonic	Additives 7/10/08	Type
Shoe OD/ID 7 5/8 6 7/8			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	N/A gpm	Casing Hammer
Type:	Sonic 7/10/08	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Jeff Fitz

Name/Title: GRAM Inc, geologist

Signature:

Date: 7/10/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 7/10/08

Well Name: 399-3-23	Well ID: C6194
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 1100	Time 1530	Time 4.5
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 65 / 57.7	Hole Depth/Csg 65 / 57.7

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1100	1130	Clean pipe, move rig and equipment
1130	1155	Lunch
1155		Start drilling with 6" drive barrel (DB). Advance DB
		0-5', recover 0-5' and collect 2 GS at 1200
		Advance DB 5-10', recover 5-10' and collect 2 GS
	1210	at 1205. Add shoe & casing (10.7) - advance to 5'
1210		Advance DB 10-15, recover 10-15 & 2 GS at 1220.
		IH ck, < detect.
		Advance DB 15-20, recover 15-17.5 & collect
	1230	1 GS at 1230
1230	1255	Add 10' casing (20.7) - advance to 15' - clean out to 20'
1255		Advance DB 20-25, recover 20-24, collect 2 GS
		at 1300. Advance DB 25-35 - recover 25-29 & collect
		2 GS at 1310. Add 10' casing (30.7) - advance to
		25, clean out to 30. Trade out hopper.
	1320	Very high winds
1320		Add 10' casing (40.7) - advance to 35' - clean out
		25-35' - recover 30-35 & collect 1 GS (slough) at
	1340	1340 Add 10' casing (50.7)
1340		Advance DB 35-45 (with casing) - recover 35-41.5 &
	1355	collect 3 GS at 1355.
1355		Add 10' casing (60.7) advance casing & DB
		45-55 - recover 45-52 & collect 4 GS at 1425.
	1425	Silt at 52.5

Reported By: Jan Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 7/14/08	Title: Geologist	Date: 7/14/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 7/10/08

Well Name: 399-3-23	Well ID: C6194
Location: 300-FF-5	Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1425		Advance DB 55-~~60~~ 61 7/10/08 and recover 55-61,
		collect 3 GS at 1440
	1500	1500 - RCT Ck, ← Bkg. Silt at 50.5
1500		Advance casing to 57.7 borehole to 65 -
		had to advance a bit further due to problems
		loosing the material.
	1530	Move off borehole

Not used

7/10/08

Reported By: Joe Fritts		Reviewed By: L. D. Walker	
Title: Geologist	Date: 7/10/08	Title: Geologist	Date: 7/14/08
Signature: [signature]		Signature: [signature]	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/17/2008

Well Name: 399-3-23	Well ID: C6194
Location: 300-FF-5 OU	Report No.: 2

Start	Finish	Total
Time 1500	Time 1630	Time 1.5 hrs
Hole Depth/Csg 65 / 57.5	Hole Depth/Csg 57 / 56.5	Hole Depth/Csg 8.0 / 1.0

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size:
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1500		Setup rig on borehole; prep for well construction;
	1528	DTB = 65.2' bgs
1528		add bentonite to 57.2' bgs; looking for 5' screens
		for well; can't find, will need to order more before
	1630	well construction can continue;

Not Used 07/17/2008

Reported By: S. Sexton

Title: Geologist Date: 07/17/08

Signature: S. Sexton

Reviewed By: Joe Fritz

Title: Geologist Date: 8/14/08

Signature: Joe Fritz

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 1 of 2

Date: 7/22/08

Well Name: 399-3-23 | Well ID: C6194

Location: 300-FF-5 | ~~Continuation of~~ Report No.: 3

Start time 0900 Finish 1505

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
0900		Setup vactes on well / drive casing to continue previous construction
0920		Continue setup, waiting on additional screen needed for construction
0931		Tagged bottom on bentonite at 56.3'
0957		Measured well construction casing in setup area
		cap = 0.4 10' + 40' screen on-site waiting on 5'
		40' blank casing
1002		Placed centralizer below screen on end cap
		Placed centralizer above screen on bottom of 1st blank.
		Waiting on 5' additional screen needed to construct.
1106		Additional 5' screen arrives on site (25' screen + 40' blank + .4 cap)
1108		Place 0.4 cap + 20 ft screen = 20.4 ft
		Add 5' screen = 25.4 ft
1111		Attach ERT and thermistor bottom probe on screen (located ~ 33.5' bgs and constructed)
1113		Add 20' blank = 45.4'
1117		Continue taping on ERT + Thermistor string on casing
1120		Add 20' blank = 65.4
1126		Measured well casing stickup at 9' (65.4 - 9 = 56.4)
1127		Start pouring 10/20 Sand
1131		Poured (5 bags) - Start backpull on drive casing.
1141		Remove 10' section of drive casing
1145		Cut off 4' of well casing. Stickup now 5'
1147		Tg on sand at 42.4'. Add (1 bag) to 38.7'
1205		Swab cannot get past top of upper 5' screen (lip on casing)
1207		Switch to using bailer to check obstruction - made it to bottom
1214		Trim rubber swab and start surge
1217		Stop for Lunch
1247		Resume surge
1258		Tg sand at 40.2' bgs
1259		Add Sand (3 bags)

Reported By: Lee Brandt		Reviewed By: Joe Fitz	
Title: Geologist	Date: 7/22/08	Title: Geologist	Date: 8/14/09
Signature: Lee Brandt		Signature: Joe Fitz	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 7/22/08

Well Name: 399-3-23 | Well ID: C6194

Location: 300-FF-5 | Continuation of Report No.: 2

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1304		Add a (1 bag) 10/20 → (10 bags total at this point)
1308		Start backpulling drive casing
1313		Remove 10' section drive casing (40.7') casing in hole
1316		pull up casing again (5' of stickup)
1318		Surging upper screen section.
1354		Measured level at 31.1' bgs (at centralizer)
		Measured level at 29.' (added 3/4 bag 10/20)
1407		Measured level at 29 completed surge
1409		Start adding 40/140 sand
1416		Measured at 22.3' (Added 2 bags)
1419		Start backpulling drive casing
1419		Remove 10' drive casing (stickup at 4.4'
1425		Added (2 bags sand)
1426		Added (1 bag sand)
1427		Added (1/2 bag - Tag at 26.1' (5.5 bags total)
1430		Remove 10' drive casing total casing = 20.7 in hole
1436		Add 1.5 bags (7 total)
1438		Add 1 bag (8 total) tag at 10.2' bgs
1443		Start adding bentonite chips
1446		Add 1.5 bag bentonite chips measured at 5'
1449		Backpull 10' drive casing, total casing = 10.7 in hole
1457		Measured chips at 3
1458		Added 1.5 bags 10/20 sand on top chips (to keep hole open)
1520		Backpulled last 10' drive casing and shoe.
1525		Start breakdown to setup on new hole for construction.

JB 7-22-08

Reported By: Lee Brouillard | Reviewed By: Joe Fitts

Title: Geologist | Date: 7-22-08 | Title: Geologist | Date: 8/14/08

Signature: [signature] | Signature: [signature]

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7-31-08

Well Name: 399-3-23 | Well ID: C6194

Location: 300-FF-5 | Report No.: 4

Start	Finish	Total
Time 1648	Time 1800	Time 2 hr 12 min
Hole Depth/Csg 57.0 / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ | See Report No. 1

Rod Size: 4" PVC

Screen: 31-56

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1648		Tag DTB: 57.0' bgs DDW: ~~33.7~~ 30.7 bgs. Set up over hole. AI 7-31-08
1649		Bail well Set up HERMIT name: Jeff H31c-~~45348~~ AI 7-28-08 -45348
1654		Trip in pump + Tremmie → Set pump intake @ 41.5' bgs. =10.5' below Top of screen
	Test#3	XD1: 6.76 Set Transducer @ 37.5' bgs.

From	To	XD(ft)	Turb(NTU)	Temp(°C)	DO(mg/L)	pH	Cond.(mS)	Notes:
1658								
1700		—	—	—	—	—	—	~50 gpm
1705		6.38	270	20.8	8.10	7.73	~~5.05~~ 0.501 AI 7-31-08	~50 gpm
1710		6.39	24.8	19.3	8.46	7.56	0.501	"
1715		6.38	6.0	18.7	8.50	7.51	0.498	"
1720		6.39	2.25	18.2	8.58	7.51	0.498	"
1725		6.38	1.79	18.4	8.60	7.51	0.501	"
1730		6.379	1.62	18.4	8.52	7.53	0.497	"
1735		6.38	1.38	18.1	8.64	7.53	0.497	" Purge Truck full
1735		Start Recovery Test on Test #4						
1746		Stop finish Test						
1800		BTR stop work before ~~Development~~ of lower interval begins.						
		Geo departs for office to complete paperwork.						

Not used

Reported By: A. Lantow

Title: Geologist | Date: 7-31-08

Signature: Aaron Lantow

Reviewed By: Joe Fritz

Title: Geologist | Date: 8/14/08

Signature: Joe Fritz

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 8-1-08

Well Name: 399-3-23	Well ID: C6194
Location: 300-FF-5 OU	Report No.: 4

Start	Finish	Total
Time 0600	Time 0830	Time 2 hrs
Hole Depth/Csg 57.0 / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size: 4" PVC
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0700	P.O.D. Windy ~30 mph sustained.
0700		Set up @ well head.
0718		Start to lower pump to 51.5' bgs.
		Calibrate Field Instruments
		pH: 7.00 std. measure: 6.86
		10.00 std measure: 10.01
		Conductivity: 1,413 µS std. measure: 1.473 µS
		Turbidity: 5.09 std measure: 5.14 retry 5.05
		45.7 std measure: 45.5
		509.0 std measure: 513
		X_{DI}: 6.86'
0727		Begin development of lower screen interval: Pump intake @ 51.5' bgs.

0727	xD(ft)	Turb(NTU)	Temp(°C)	DO(mg/L)	pH	Cond.(mS)	Notes:
0727	6.76	25.0	17.7	9.13	8.16	0.554	68 gpm
0732	6.75	5.93	17.4	9.16	7.69	0.504	68 gpm
0737	6.75	5.21	17.2	9.25	7.66	0.504	Tank almost full
0742	6.75	3.46	17.1	9.27	7.63	0.502	

~~0747~~	0743	Stop pump = Tank is full pumped 1,088 gal
		X_{DF}: 6.84'
0745		Trip out pump + Tremmie.
0813		Tag DTB: 57.0' bgs. Tag DTW. 31.0' bgs.
	0830	Move off hole.
		[signature]

Reported By: A. Lantau		Reviewed By: Joe Fritts	
Title: Geologist	Date: 8-1-08	Title: Geologist	Date: 8/14/08
Signature: Aaron Lantau		Signature: Joe Fritts	

A-6003-651 (REV 1)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-23	C6194	300-FF-5	7-31-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC) -8/1/08

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	33.7
End of Job	~~30.1~~ 8-1-08 31.0

DEPTH TO BOTTOM:

Start of Job	57.0
End of Job	57.0

PART 2

WELL DEVELOPMENT DATA

Pump Model: Grundfos 75-S-50

Intake Depth: T_1: 41.5 / T_2: 51.5'

Starting Turbidity: T_1: 270 NTU / T_2: 25.0

Pump Start	Stop	Flow Rate
16:58:47	17:30:16	T_1 50 gpm
17:30:16	17:41:44	T_1 Recovery
0727	0743	T_2 ~~8~~ 8-1-08 68 gpm

Total Pumped: 3744 gal 8-1-08

Final Turbidity: T_1: 1.38 T_2: ~~6~~ 8-1-08 3.46

XD SN/Range (PSI): #5217 (20)

PART 3

INSTANTANEOUS SLUG TEST

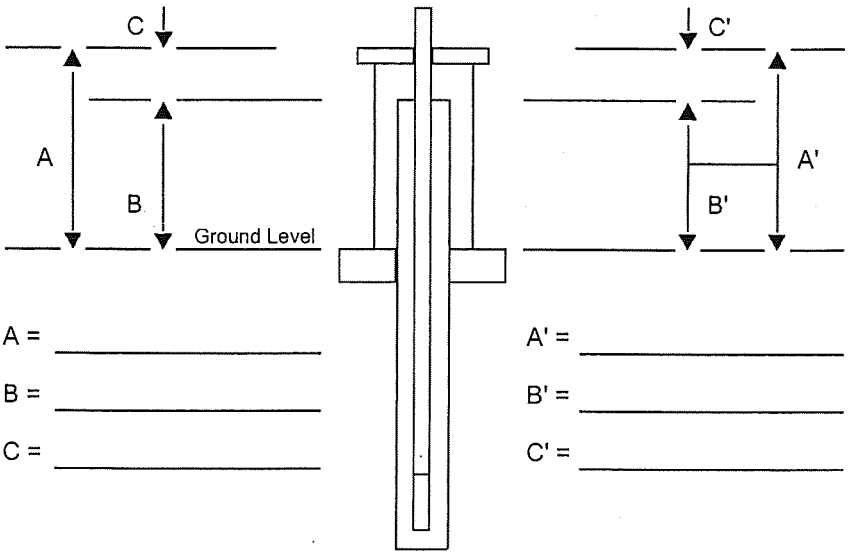
Static Water Level (TOC)	
Transducer Depth	37.5' bgs.
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Well Head Flush w/ Surface.

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: HERMIT: Jeff-H3K-45348

Drawdown on Test #3 : T_1 Interval 1

Recovery on Test #4 : T_1

XD_I: 6.76

XD_F: 6.84

Drawdown + recovery on lower interval performed on 8-1-08

Prepared by (print name):	Signature:	Date:
A. Lantow	Aaron Lantow	7/31/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritts	Joe Fritts	8/14/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Date: 7/9/08

Purpose: PNNL Characterization | Location: 300 - FF - 5

Well ID: C6199 300 Area IFC | Well Name: 399-3-24

Drilling Co.: WDC Driller Bill Zamot | Rig No.: 139 | Rig Make/Mod.: SuperSonic

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8 4	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon Steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic SuperSonic 2	Pressure ___ psi	Make
Welded ___ (Thd.)	A.R. w/Sonic RS400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Joe Fritz

Name/Title: GRAM Inc, Geologist

Signature: [signature]

Date: 7/9/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 7/9/08

Well Name: 399-3-24	Well ID: C6199
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 1500	Time 1600	Time 1
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 15 / 5	Hole Depth/Csg 15 / 5

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1500	1520	Rigging up, cleaning pipe.
1520		Start drilling with 6" DB (drive barrel)
		Advance DB 0-5' - recover 0-5' & collect 2 GS at 1525. Advance DB 5-10. ~~collect~~ 7/9/08 recover 5-10'
	1535	& collect 2 GS at 1535
1535		And shoe & 10' casing (10.7') and advance to 5'
		Advance DB 10-15' after cleaning out. Recover
	1550	10-15 & collect 2 GS at 1545'
1550		Clean up - ready to go.
	1600	To office

Not used

7/14/08

Reported By: Joe Fitz		Reviewed By: C. S. Walker	
Title: Geologist	Date: 7/15/08	Title: Geologist	Date: 7/14/08
Signature:		Signature:	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7/10/08

Well Name: 399-3-24 | Well ID: C6199

Location: 300 - FF-5 | Report No.: 2

Start	Finish	Total
Time 0600	Time 1100	Time 5
Hole Depth/Csg 15 / 5	Hole Depth/Csg 65 / 58	Hole Depth/Csg 50 / 53

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1 | Rod Size: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0620	Allard POD with BTR, Drill crew RCT
0620		To site, warm equipment. NCO's will be late due
	0745	to getting locked out of Bldg. 0745 - NCOs on site
0745		Resume w/ DB. Advance DB 15-20, recover 4.5' &
		collect 2 GS at 0800
	0810	clean out to 20'
0810		Advance DB 20-25' recover 20-24' & collect 2 GS at
	0830	0825. Add 10' casing (20.7) and advance to 15'
0830		Advance DB 25-35' - recover 25-29' & collect 2 GS at
		0840. Add 10' (30.7) - advance to 25'. Add
		10' casing (40.7) advance to 35'. Clean out 25-35 - recover
		≈4' & collect 1 GS at 0900. Previously
	0900	loaded out hopper
0900		Advance DB & casing 35-45 - Added 10' (50.7),
		Attempt RC Tck 8 Bks. Advance 35-45 - recover 2' -
		collect 1 GS at 0920 - used a catcher - but
	0920	lost sample. No clean-out.
0920		Add 10' (60.7) - advance DB & casing 45-55' -
		recover 5' - large rock blocked it off. silt -
		unable to tell depth.
		Advance DB 55-60' - recover ≈ 54-60' & collect 3 GS
		at 0950. Silt at 32.5 ft. Casing to 58' - had
	1040	to take DB to 65 to keep material in. - Move off.

Reported By: Joe Fitts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 7/10/08	Title: Geologist	Date: 7/14/08
Signature:		Signature:	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 1 of 1

Date: 7/22/08

Well Name: 399-3-24 | Well ID: C6199

Location: 300-FF-5 | ~~Continuation of~~ Report No.: 3

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Start time 1515 — Finish: 1623)
1515		Start setup on hole to build well
1520		60' casing in hole + add 5' to stickup = 65' (For construction)
1538		Hole depth = 63.4' 60.7
1539		Stickup = 2.7' on 60' string (BOC = ~~57.5'~~ 58)
		~6.1' of open hole total casing = 60.7
1552		Working on assembling well casing
		0.4' end cap + (10' + 10' + 5') screen + 10' blank = 35'
		+ 10' blank + 5' + 5' + 5' + 5' = 30' (Total = 65')
1600		Centralizers at bottom of screen (cap) + top of screen bottom blank)
1604		Start pouring bentonite pellets
1611		Measured at 57.3' on pellets (2 buckets total)
1614		Back pull casing
1617		Remove (well-construction 5') Stickup of 4.4 (BOC = 56.3)
1622		Measured top of bentonite at 57.6'
1623		Shut down truck. Will resume tomorrow

7-13
7-22-08

Reported By: L. Brouillard | Reviewed By: Joe Fitz

Title: Geologist | Date: 7/22/08 | Title: Geologist | Date: 8/5/08

Signature: L. Brouillard | Signature: Joe Fitz

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 7/23/08

Well Name: 399-3-24	Well ID: C6199
Location: 300-FF-5	Report No.: 4

Start	Finish	Total
Time 0600	Time 1015	Time 4.25 hrs
Hole Depth/Csg 57.3 / 56.3	Hole Depth/Csg 0 / 0	Hole Depth/Csg 57.3 / 56.3

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: # 1: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600		POD
0640		Tag bentonite at 57.3'
0703		Waiting on calibrated ERT cable to be brought on-site
0717		Well screen assembled. Placing ERT/Thermistor string at start point of 33.5 ft bgs on screen. Centralizers top/bottom of screen
0732		All 65.4 casing in hole. Stickup at 9'. Bottom of casing 56.4
0733		Start pouring 10/20 Sand - sand pack start at 57.3
0737		Added (5 bags) 10-20 Sand
0746		Backpulling drive casing.
0750		Remove 10' drive casing (total 50.7 in hole)
0752		Cut off 4' PVC. Stickup now 5'.
0754		Top of drive casing 4.8' stickup. BOC - 45.9'
0757		Measure sand at 45.1'
0759		Added 1 bag at 41.3' (Total 6 bags at this point)
0802		Start surge on lower screen sand pack
0817		Measure sand at 42.2'
0821		Added 4 bags - measure sand at 28'. BOC - 45.9
0824		Start backpulling drive casing
0832		Remove 10' drive casing - total casing 40.7' in hole
0835		Measured sand at 31'. Casing stickup 4.7'
		Measure sand at 27.1' after adding 1 bag
0842		Start surge on upper screen. Bottom of drive casing at 36'
0916		Stop surge, measure sand at 29.4'
0917		Add sand to 29' (1/4 bag)

Reported By: Leo Brouillard		Reviewed By: Joe Fitz	
Title: Geologist	Date: 7/23/08	Title: Geologist	Date: 9/5/08
Signature: Leo Brouillard		Signature: Joe Fitz	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 7-23-08

Well Name: 399-3-24 | Well ID: C6199

Location: 300-FF-5 | Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
0918		Added 1 ft bag of 40-140 sand
0927		Backpull and remove 10' drive casing (total casing 30.7' in hole)
0931		4.7' stickup on drive casing
0933		Add 3 bags 40-140 sand (total 4 bags)
0934		tag at 15.9' on top sand
0937		Backpull and remove 10' drive casing (total casing 20.7' in hole)
0939		Measured sand at 18'. Drive casing stickup 4.8'
0942		Measured 9.8'. Added 3.5 bags 40-140
0944		Added 1.5 Bags chips. Tag at 3.2'
0948		Remove 10' drive casing (total casing 10.7' in hole)
0954		Add 1.5 bags. Tag top of bentonite chips at 3'
0956		Remove last 10' drive casing (Added 2.5 bags sand to ring hole open.
1010		Preparing to move off hole.
1015		Moving over to C6210

Reported By: Lee Brouillard		Reviewed By: Joe Fitts	
Title: Geologist	Date: 7-23-08	Title: Geologist	Date: 8/5/08
Signature:		Signature:	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 8-1-08

Well Name: 399-3-24 | Well ID: C 6199

Location: 300-FF-5 OU | Report No.: 5

Start	Finish	Total
Time 0830	Time 0950	Time 1.5 hrs
Hole Depth/Csg 56.7 / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 4" Perm. Pvc Screen: 31'-56' bgs.

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0830		Purge truck arives. 2,500 gal capacity.
0830		Set up over well head.
0835		Tag DTB: 56.7' bgs. DTW: 29.9' bgs.
0835		Trip in Pump & Trannie Intake at 41.3' bgs.
		Using HERMIT Jeff H3K-45348 Transducer: 37.3
		XD$_I$: 6.69 Test #5 on HERMIT

		XD(Ft)	Turb.(NTU)	Temp(°C)	DO(mg/L)	pH	Cond.(mS)	Notes:
0845	Start Test (1)	6.45	629	18.5	8.50	8.00	0.503	50 gpm Test #5
0850		6.45	10.7	18.0	8.82	7.62	0.503	50 gpm
0855		6.45	8.50	17.9	8.85	7.60	0.502	-
0900		6.45	6.43	17.7	8.88	7.52	0.501	-
0905		6.45	4.66	17.7	8.87	7.51	0.503	50 gpm
0910		6.46	4.03	17.7	8.92	7.50	0.503	-
0915 *	Stop Test (1)	6.45	3.41	17.6	8.94	7.52	0.503	
0920		Recharge on same test #5						
~~0925~~	0922	~~Trip 10' trennie in.~~						Intake @ 51.3' bgs.
~~0930~~	0925	Stop recovery test #5. no recovery test on its own.						
0935		contractor lifted probe before test stoped.						
0928		lower pump intake to 51.3' bgs. & lower transducer back to 37.3'						
0931	Start Test (2)	6.603	71.4	17.9	9.11	7.60	0.504	87 gpm
0936		6.603	11.3	17.8	9.09	7.56	0.502	87 gpm
0941	Stop (2)	6.603	7.08	17.6	9.09	7.59	0.501	87 gpm
0940	0947	Start recovery test on test #6 on HERMIT						
0947		Trip out Pump & Trennie, Tag DTB: 56.8' DTW: 3.0' bgs move to next site.						

Reported By: A. Lantow		Reviewed By: Joe Fritz	
Title: Geologist	Date: 8-1-08	Title: Geologist	Date: 8/5/08
Signature: Aaron Lantow		Signature: Joe Fritz	

A-6003-651 (REV 1)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-24	C6199	300-FF5 OU	8-1-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ○ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	29.9
End of Job	30.0

DEPTH TO BOTTOM:

Start of Job	56.7
End of Job	56.7

PART 2

WELL DEVELOPMENT DATA

Pump Model Grundfos 75-S-50

Intake Depth T_1: 41.3' / T_2: 51.3'

Starting Turbidity 645 NTU

Pump Start	Stop	Flow Rate
08:39:04	0915 T_1	50 gpm
0915	09:25 T_1	Recovery
0931	0941	T_2 Drawdown
0941	0951	T_2 Recovery

Total Pumped ~~3500~~ 2500 (A 8-1-08)

Final Turbidity T_1: 3.41 / T_2: 7.08

XD SN/Range (PSI) #5217 (20psi)

PART 3

INSTANTANEOUS SLUG TEST

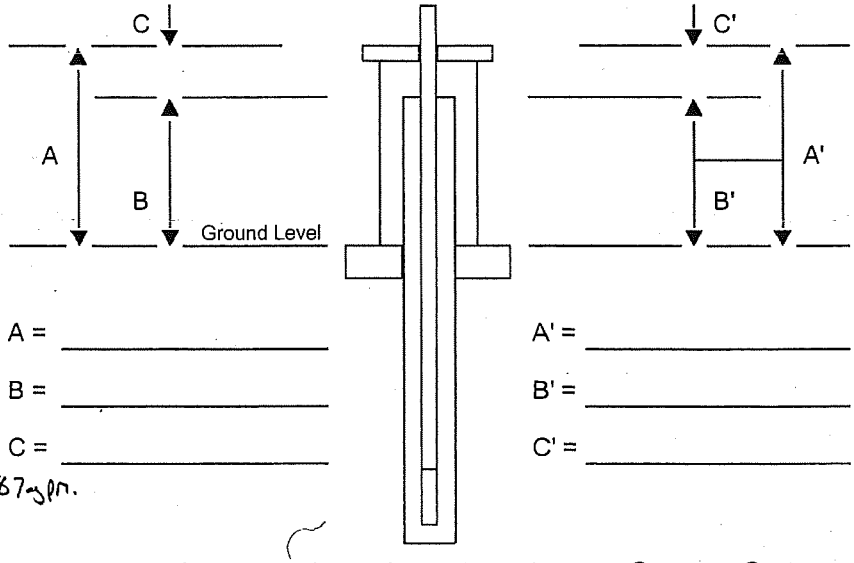
Static Water Level (TOC)	
Transducer Depth	37.3' bgs
Baseline Start	No Test Performed
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Ground Level Completion

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

87 gpm.

Are there any reference marks on the casing strings? ○ Yes ○ No

PART 5

COMMENTS: HERMIT Jeff H3K-45348

Drawdown on Test# 5 (T Interval) XD_I: 6.69 1500 gal

Recovery on Test# 5 (upper)

Recovery test on #same test as drawdown test... test..

Run recovery test on #5 Test on hermit on (lower) interval.

XD_F: 6.60

Prepared by (print name):	Signature:	Date:
A. Lantow	Aaron Lantow	8-1-08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz	Joe Fritz	8/5/08

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 3

Date: 6/16/08

Purpose: PNNL Project - 300 Area IFC | Location: 300-FF-5-04

Well ID: C6200 | Well Name: 399-3-25

Drilling Co.: WDC Driller Bill Zamow | Rig No.: 139 | Rig Make/Mod.: Super Sonic

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8 in, 6 7/8 in	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic 2	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic RS400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size N/A	Bit Size
Set At: ___/___	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic N/A	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set ___/___	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Driller

Name/Title: GRAM Inc Geologist

Signature:

Date: 6/13/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 6/16/08

Well Name: 399-3-25	Well ID: C6200
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 0730	Time 1630	Time 9
Hole Depth/Csg 0 / 0	Hole Depth/Csg 55 / 55	Hole Depth/Csg 55 / 55

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: (D) 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0710	0900	Setup on location
0900		Start drilling - Advance 5' splitspoon (SS) 0-5' - recover 0-4.5' & collect 5 lexan liners (LL) at 0910.
		Am RCT ck, < detect.
		Advance SS 5-10' - recover 5-8' and collect 3 LL at 0930. Clean out with 6" OB - Add shoe & 10' casing
	0950	(10.7').
0950		Am FHCk, < detect.
	1000	Advance SS 10-15' - recover 10-12' & collect 2 LL at 1000
1000		Advance SS 15-20 - recover 15-20 & collect 5 LL at 1010.
		Clean out w/ OB - Add 10' casing (20.7) - advance to 9' - take 10' off, hole caved to 7' - clean out - tough
		drilling - Add 10' casing (20.7') - advance to 15 Ft. - material
	1050	at 12' - clean out to 20'
1050		Advance SS 20-25 - recover 20-23 & collect 3 LL at 1110
		Advance SS 25-30 - recover 25-27.4 and collect 3 LL
		at 1120 - clean out with OB. - Add 10' casing (30.7)
	1135	advance to 25'.
1135	1205	Lunch.
1205	1230	Clean out to 25' - trade out roll-off
1230		clean out to 30' - Advance SS 30-35 recover 30-34 &
		collect 4 LL at 1250 - clean out to 35 Ft - Add 10'
		casing (40.7) - advance to 35 - clean out to 35'
	1335	Advance SS 35-40 - recover 35-38.8 & collect 4 LL at 1335.

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/16/08	Title: Geologist	Date: 6/26/08
Signature: Joe Fritts		Signature: L.D. Walker	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 6/16/08

Well Name: 399-3-25	Well ID: C6200
Location: 300-FF-5	Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1335		Add 5' casing (45.7) - Advance to 40' - clean out
		w/ DB. Add 3' casing just to move up and down -
	1420	pull off - Adding water
1420		Advance ~~[illegible]~~ TH 6/16/08 SS 40-45 - Ø recovery - sand.
		Fell out - go in with DB. - Add 5' casing (50.7)
		Advance to 45'. Advance DB 45-~~4~~50 collect 2 GS
	1500	at 1455, 6/16
1500		Add 5' casing, (55.7 on) Advance to 50' - clean out.
	1515	PM RCT ck, <3 kg
1515		Advance SS 50-55 - recover 50-52 & collect 2 LL
	1530	at 1530. Added ≈ 75 gallons water today.
1530		Add 5' casing (60.7') - advance to 55.
	1630	All for Today - resume tomorrow. To office

Not used

[signature] 6/16/08

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/16/08	Title: Geologist	Date: 6/26/08
Signature: [signature]		Signature: LD Walker	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 6/17/08

Well Name: 399-3-25	Well ID: C6200
Location: 300-FF-5	Report No.: 2

Start	Finish	Total
Time 0600	Time 1200	Time 6
Hole Depth/Csg 55 / 55	Hole Depth/Csg 65 / 61	Hole Depth/Csg 10 / 6

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size: 7 5/8" casing

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, Drillcrew, Safety, Geo.
0630		To site - clear 56°. We have no NCO
		coverage this morning, so move off borehole to clean
		out C6196 - bentonite bridged in it yesterday.
		55' casing on - at 55 ft.
	0640	Return from C6196 - ready to drill - wait on NCO.
0640	1000	NCO's back from training - resume
1000		Run in with SS. - Advance 55-60' - recover 55-60
		and collect 5 LL at 1010. silt at 57.5
	1035	Advance casing to 60 - clean out
1035		Advance SS - tag slough - pull out & go in w/DB to
		clean out to 60. - Advance SS 60-65 - recover
	1115	60-65 & collect 5 LL at 1110.
1115		Hole cleaned out to 62, casing at 61 -
	1135	rig down to move to C6189
1135	1200	—

6/17/08 not used

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/17/08	Title: Geologist	Date: 6/26/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/25/2008

Well Name: 399-3-25 | Well ID: C6200

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 0745	Time 1230	Time 4.75 hrs
Hole Depth/Csg 60.4 / 61	Hole Depth/Csg Ø / Ø	Hole Depth/Csg 60.4 / 61

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: #1: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0745	0810	setting rig on hole, prep for completion
0810		getting perm. casing together, setting casing shoe to bentonite
		depth; DTB = 60.4' bgs at initial tag; IH check on hole,
	0847	non-detect;
0847		trip-in casing & screen; 0.3' cap + 10' screen + 10' screen; add
		5' screen + 10' casing; taping ERTs + thermistors to casing,
		depth = 33.5' bgs; + 10' + 10' + 10' = 65.3'; well set @ 56.9', thermistors
	0928	+ ERTs @ 33.1' bgs
0928	1200	begin well completion, see completion log pgs 1-2;
1208		all casing + shoe removed from borehole; lower tower
	1230	and move rig to next well;

Not used 06/25/2008 M. Sexton

Reported By: S. Sexton		Reviewed By: Joe Fritz	
Title: Geologist	Date: 6/25/08	Title: Geologist	Date: 8/5/08
Signature: M. Sexton		Signature: Joe Fritz	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 06/27/2008

Well Name: 399-3-25 | Well ID: C.60200

Location: 300-FF-5 OU | Report No.: 4

Start	Finish	Total
Time 0600	Time 1015	Time 4.25 hrs
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD @ 300 trailer (BTR, Drillers, bros); 52°, clear, light wind
0630		setting rig up on well and trip-in pump + tremie to 40' bgs; Pump model: 755-50 brundfos, Moto: Franklin Electric 5hp; calibrating test instruments:
		known / read / 10%
		turb: ~~1413~~ 482 / ~~1427~~ 480 / Y
		50.9 / 50.4 / Y
		4.45 / 4.50 / Y
		pH: 4.00 / 3.99 / Y
		10.00 / 10.12 / Y
	0729	cond: 1413 / 1427 / Y
0729	0809	waiting for purge truck; truck on site @ 0809
0809	0812	prep to start drawdown test
0812		test #1: pump on @ 0812; running 50 gpm

	turb.	pH	cond.	D/o	temp.	xD
0818	15.2	7.66	397	8.83	17.5	2.933
0823	6.57	7.63	393	8.91	17.4	2.936
0826	4.62	7.60	393	8.94	17.4	2.940
0829	3.43	7.59	393	8.98	17.4	2.940
0833	2.85	7.58	393	8.99	17.5	2.937

0846	0902	pump shut off, begin recovery
0902	0911	lowering intake to 50.0' bgs
0911		test #2: recorded on xD 5217 test #3
		pump on @ 0913; running 85gpm → See pg. 2

Reported By: S. Sexton | Reviewed By: Joe Fitz

Title: Geologist | Date: 6/26/08 | Title: Geologist | Date: 8/5/08

Signature: L. M. Sexton | Signature: Joe Fitz

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 06/26/2008

Well Name: 399-3-25	Well ID: C6200
Location: 300-FF-5 OU	Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		turb. pH cond. D/O temp. xD
0917		17.4 ~~3.4~~ SMS 6-27 7.69 417 8.83 17.3 3.152
0920		8.22 7.70 417 8.99 17.1 3.153
0924		5.61 7.70 417 9.02 17.1 3.150
0926	0928	3.95 7.69 417 9.02 17.1 3.162
0928		pump shut off, begin recovery test, on xD5217
	0940	test #4;
0940		break down tremmie + remove pump from well;
		geo finishes tagging well DTB=56.9 DTW=26.35; move rig to
	1015	C6216

Not Used 06/27/2008

Reported By: S. Sexton		Reviewed By: Joe Frith	
Title: Geologist	Date: 6/26/08	Title: Geologist	Date: 8/5/08
Signature: [signature]		Signature: [signature]	

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-25	C6200	300-FF-5 OU	04/27/2008

Reference Measuring Point (unless otherwise noted): ~~TOP OF OUTER CASING (TOC)~~

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No (6-27)

PART 1

STATIC WATER LEVEL:

Start of Job	26.7
End of Job	26.35

DEPTH TO BOTTOM:

Start of Job	56.9
End of Job	56.9

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40.0 / 50.0
Starting Turbidity	15.2 / 17.4

Pump Start	Stop	Flow Rate
0812	0846	50
0913	0928	85

Total Pumped	1724 / 1228
Final Turbidity	2.85 / 3.95
XD SN/Range (PSI)	5217 / 20.0

PART 3

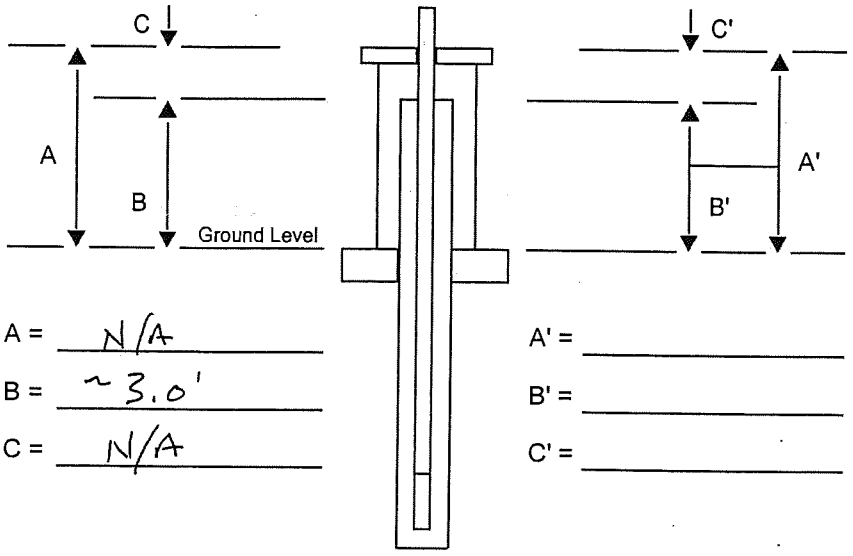
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	N/A
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Current Measurements Date:



A = N/A

B = ~3.0'

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

meter: 27223

Test #1: xDi: 3.187

xDf: 3.216

meter: 28947

Test #2: xDi: 3.249

xDf: 3.288

Final meter reading: 30175

Prepared by (print name):	Signature:	Date:
S. Sexton		04/27/2008
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz		8/5/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 5/14/08

Purpose: Characterization 300 Area TFC | Location: 300-FF-5-OU

Well ID: C6203 | Well Name: 399-3-26

Drilling Co.: WDC / Blue Star | Rig No.: 139 | Rig Make/Mod.: Super Sonic 2

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 7/8" OD, 6 7/8" ID	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic 2	Pressure ___ psi	Make
Welded ___ (Thd.)	A.R. w/Sonic RS 400	Drill Pipe O.D. N	Model
Planned / Actual	Geoprobe	Tool Joint Size A	Bit Size
Set At: - 156.8	Other:	Additives	Type
Shoe OD/ID	Built by Chris Pech		Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drig. Co.	Rig No.:	Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic N	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic A	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water 31.70 ftbgs on 5/16/08

Reported By: JW Fellis

Name/Title: GRAM Inc. Geologist

Signature: [signature] Date: 5/14/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 5/14/08

Well Name: 399-3-26 | Well ID: C6203

Location: 300-FF-5-04 | Report No.: 1

Start	Finish	Total
Time 0600	Time 1400	Time 8
Hole Depth/Csg 0 / 0	Hole Depth/Csg 35 / 29	Hole Depth/Csg 35 / 29

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: (1) 7 5/8" OD casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0615	Attend POD with BTR, drill crew, RCT and logger
0615		To site - 55° cloudy. Rig is set up on
	0735	location - Finish preparing to drill
0735		Start drilling - 4" SS - w/ liners
		0740 0-5' - 3.5' of recovery - collect 4 sample in Lexan liners at 0745 -
		Back in with drill 5/14/08 SS - refusal - will try to
	0750	get through w/ 6" barrel. Top of wreneboro. 6.6'
0750		0800 - 6" barrel to 5 FT
		0815 - Driller took 6" 5-10' - collect 2 gal grab sample,
		0810/0 10'-15' collect 2 samples (grab) Driller didn't think SS
	0815	would go. collect - 5/14/08 Sampled at 0820
0815		Add shoe (0.7') and 10.00' casing (10.70)
	0840	Add 10.0 (20.7') Advance to ~ 15 FT.
0940		Hard drilling 15-20 ft - large cobbles. bit on SS ruined
		recovered 15.2-18 ft. Some deformation of liners
	0910	due to heat. Tag at 17 FT. 0905 sample time
0910		SS 17-25' - recovery 20-25 FT. 5/14/08 17-22'
		to 20.5 sh, 20.5-22' silt. - collect 3 sample at 0915
	0940	Broke off - while cleaning out with 6" barrel
0940		Driller requests to add water to help Free 6"
		barrel that is stuck in casing. Add 5 gals water -
	1010	got it unstuck.
1010	1020	Am I it check, < detect

Reported By: Joe Fitz		Reviewed By: L. D. Walker	
Title: Geologist	Date: 5/14/08	Title: Geologist	Date: 5/21/08
Signature:		Signature:	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 5/14/08

Well Name: 399-3-26	Well ID: C6203
Location: 300-FF-5-OU	Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1020		Repair made to drill rod - resume drilling - reaming
	1040	with 6" barrel. Ream to 25 ft.
1040		SS advanced from 25 to 30 ft - recovery 25 to 26.8
		collect 2 samples at 1055, Tag at 30.10 (1055)
	1100	samples look like silty gravel - slough?
1100		SS 30-35 ft recover 30-32'
		sandy gravel - to 3". collect 2 sample at 1110.
	1130	Add 10.00 (30.7') lunch
	1130	Add 9.98 (40.68) - casing to 35 ft
1130	1200	Lunch
1200		Start to ream/clean out to 35 ft - problem
		with sonic head - hydraulic fuel going into
	1220	head, not pumping out - stop
1220		Pull out drive barrel - hook up to casing.
		Pull 9.98 (30.7') left - casing at 329 ft.
	1400	Pull rig off hole - to town to work on.
		To office

Not read

5/14/08

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 5/14/08	Title: Geologist	Date: 5/21/08
Signature: [signature]		Signature: [signature]	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 5/15/08

Well Name: 399-3-26 | Well ID: C6203

Location: 300-FF-5-OU | Report No.: 2

Start	Finish	Total
Time 0630	Time 1300	Time 6.5
Hole Depth/Csg 35 / 29	Hole Depth/Csg 66 / 56.8	Hole Depth/Csg 31 / 27.8

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1 | Rod Size: (1) 7 5/8" OD casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0630		To site, review POD. Weather, sunny, clear 55°.
		Crew rigging up - will continue from 35 Ft
		Casing is at 29 - so will need to clean out & advance
		casing to 35' before sampling. Measured casing on deck -
		(3) 10' & (1) 5' - close enough. Drive barrel (6") with
	0705	shoe & sub is 11.5 ft
0705		0714 - Add 10 Ft casing (40.68) - to ≈35 Ft - ream
		with 6" barrel - hard drilling - to 33 Ft. Add ≈5 gals
		water - pull out 6" cobble - mixture of sandy
		gravel with fair amount of silt/clay - unable to
	0755	identify contact due to sloughing - tag at 35.2'
0755		0810 - Advance 4" SS 35-40' - recovery 35-36.8 - collect
	0810	2 samples at 0810. - wet
0810		SS 40-45 - recovery 40-43 collect 3 samples at 0825
		Add 10' (50.68) - casing to 45 Ft - clean out
		with DB, heaving - tag at 42 Ft - driller requests
	0850	to add water - we are at saturation - so told him OK to add.
0850	0905	Add ≈ 100 gals water - work casing a bit - tag at 45'
0905		- SS 45-50 - recover 4.5 - 47.4 collect 3 Iexon lines -
	0930	AM RCT ck, < Bkg. at 0925
0930		AM I It ck, < detect
		SS 50-55' - recovered 50-55' - collect 5 Iexon lines
		at 0945. Add 10' (60.68) - advance to 55 Ft -
	1005	Clean out to 55 Ft - silt.

Reported By: Joe Fitts | Reviewed By: C.D. Walker

Title: Geologist | Date: 5/15/08 | Title: Geologist | Date: 5/21/08

Signature: Joe Fitts | Signature: C.D. Walker

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 5/15/08

Well Name: 399-3-26	Well ID: C6203
Location: 300-FF-5-OU	Continuation of Report No.: 2

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1005		Tag at 55ft - run SS 55-~~59ft~~ 60' 5/15/08 - clay swelling
		recover SS-60' ⇒ 59-60' liner folded over,
	1030	ruined - collect 5 lexan liner, 55-59' at 1025
1030		Discuss finish w/ driller - est clay/silt 52-60,
	1040	casing is at 55' - will take to at least 56.5,
1040		Problem w/ hydraulic pump again - NO circulation -
		able to push/vibrate casing to 57ft - tag
	1105	bottom at 55.6'
1105		cap off hydraulic line - will be able to vibrate
		briefly - lower in 6" DB to clean out.
		Clean out - tag at 66ft - casing at 57 -
		will be able to pull rig off to repair -
	1200	and borehole will be ready to log
1200		PM RCT dr <bkg
		Pull rig off - move to next location
	1300	to office. DTW 31.70 fbgs

not used 5/15/08

Reported By: Joe Fritts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 5/15/08	Title: Geologist	Date: 5/21/08
Signature: [signature]		Signature: [signature]	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 05/22/2008

Well Name: 399-3-26 | Well ID: C6203

Location: 300-FF-5-OU | Report No.: 3 BMS 6-9-08

Start	Finish	Total
Time 0855	Time 1710	Time 8.25 hrs
Hole Depth/Csg 64 / 56.8	Hole Depth/Csg 3.0 / Ø	Hole Depth/Csg 61 / 56.8

Reference Measuring Point: GROUND SURFACE

Casing String No. ① 2 3 4 ____ Rod Size: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0855		Mob truck & jacks from C6180 to borehole; setting plastic
	0920	& set-up for completion activities
0920		DTB = 68.8 - 4.8 stkup = 64' bgs DTW = 33.74 - 4.8 = 28.94' bgs;
	0948	continue set-up
0948		Begin completion, see Well Completion pgs 1- ;
		added 1.5 buckets of 3/8" coated bentonite pellets,
		tagged at 58.0' bgs, will check again before placing
	1000	permanent casing
1000	1018	wiring transmitters to perm casing (ERT @ 55.5, Therm. 54.5')
1018		trip-in cap (0.31'), sump (5') + part of 20-slot screen (9.98')
		total = 15.29' PVC 4" ID Sch. 40 thd.
1030		add 9.98' to string = 25.27' total
1036		add 14.98' to string = 40.25' total; String 2, both ERTs
	1040	& Thermistors @ 33.5' bgs;
1040		Informed by PNNL that thermistors & ERTs must be
	1055	placed 1 foot lower, will trip out, reset & trip-in;
1055	1115	Re-trip in casing & screen ERT @ 56.5', therm @ 55.5
1115	1222	work on hold, reevaluating well development plan;
1222		PNNL decides to take lower emitters away, remove
		5' sump, set bottom of casing @ 52.3' bgs; taking
	1231	off sensors, will then add more bentonite
1231	1250	tag bottom & add bentonite: 53.0' bgs after bent. add.
1250		trip-in pvc cap & screen: 0.31' cap + screen (9.98 x 2)
	1254	= 20.27' on string;

Reported By: S. Sexton | Reviewed By: Joe Fritz

Title: Geologist | Date: 05/22/08 | Title: Geologist | Date: 8/7/08

Signature: [signature] | Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 5/22/08

Well Name: 399-3-26 | Well ID: C6203

Location: 300 Areas -FF-5-OU | Continuation of Report No.: 3 SUMS 6-09-08

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1254		trip-in 2x10.01' pvc perm casing = 40.29' total; taping
	1307	ERT + thermistor to casing @ 33.5' bgs;
1307		add 20.01' to string = 60.3' total; permanent casing set
		at 52.3' bgs, will double check when complete;
	1325	screen interval = 52-32 ft bgs.;
1325		Resume well completion, see pages 1-2 of well completion
	1656	Log
1656	1710	Geo finishes paperwork & departs for office

Not used 05/22/2008

Reported By: S. Sexton | Reviewed By: Joe Fritts

Title: Geologist | Date: 05/22/08 | Title: Geologist | Date: 8/7/08

Signature: | Signature:

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 6/5/08

Well Name: 399-3-26	Well ID: C6203
Location: 300-FF-5	Report No.: 4

Start	Finish	Total
Time 0600	Time 1100	Time 5.0
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size:
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, drillcrew, RCT.
0630		Stop test and remove pump from C6186. Move
		rig to C6203 - Ray is driller. well has 2.7' s/u,
	0750	tag bottom at 51.8 Ft bgs, D TW 25.93 Ft bgs.
0750		Swabbing the screen interval. TD 52.3 Ft bgs, so ≈0.5'
	0805	sediment in well.
0805	0820	Bail w/ 5' long bailer. - 30 gallons out, tag at 54.7 Ft btoc -
0820		Cleaned out - screen is 32-52 Ft bgs - will pump
		initially from 39.7 Ft bgs - 40' + 2.4 (pump intake) - 2.7 s/u.
		Using kit #7 - check meters
		Turbidity known / reading
		4.45 / 4.28
		50.9 / 50.5
		482 / 484
		pH 7.00 / 7.09
		10.00 / 10.10
(micro seimen)		conductivity 1413 / 1423 at 15.8°C (meter labeled Field kit #3)
	0850	- pump at 39.7 (Ft bgs)
	0900	- start pump, gpm measured using flowmeter.
		Note: XD 5217 is in C6203
		XD 5218 is in 6190
		See page 2 for data
		not used [signature] 6/5/08

Reported By: Joe Fritts		Reviewed By: DC Weekes	
Title: Geologist	Date: 6/5/08	Title: Geologist	Date: 8/12/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 6/5/08

Well Name: 399-3-26 | Well ID: C6203

Location: 300-FF-5 | Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		DATA
		5217 gpm Flowmeter pH Ec T°C NTU DO XD
		XD gpm MS MV/L 5218
Initial		11.70 3350 pump at 39.7 Fbgs 10.314
	0900	start pumping - will not run data logger - dc periodically.
	0905	11.347 50 3610 7.30 .511 17 59.5 9.55 10.315
	0915	11.326 -45 650 7.64 .476 16.5 12.2 9.60 —
	0930	11.326 -45 1350 7.66 .479 16.6 4.74 9.63 10.314
		stop pump at 0930 4.
	0933	11.60 - lower pump 10Ft to 49.7 Ftbgs
		lower pump = 9Ft - pump at 48.7 Ftbgs
Initial		20.157 will contest Grass Root. WD5 10.325
	0949	start pump & data logger Initial 50 gpm
	0955	19.842 50 1850 7.68 .476 16.8 11.6 9.46 10.323
	1000	Increase pump rate to 60 gpm
	1005	19.770 60 2240 7.70 .476 16.7 6.45 9.69 10.326
	1010	60 ~~2350~~ 6/5/09 10.326
	1015	19.791 63 2870 7.64 .478 16.7 3.52 9.49 10.326
	1020	Pump off - Test WD5 off, WD6 on - about a 30
	1021	Sec delay starting Grassroot WD6
	1024	20.152 3280 gallon total pumped
	1027	20.150
	1031	20.155
	1040	20.161 10.335
	1049	20.161 10.332
	1050 -	Stop Test WD6
	1100	- pull pump out - water truck taken.
		DTW 28.70 Ft toc
		Mon to 6197.
		~~over~~ - page 2 for data 6/5/09

Reported By: Joe Fritz | Reviewed By: DC Weekes

Title: Geologist | Date: 6/5/09 | Title: Geologist | Date: 8/12/08

Signature: | Signature:

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 5/23/08

Well Name: 399-3-26	Well ID: C6203
Location: 300-FF-5	Report No.: 5

Start	Finish	Total
Time 0600	Time 0930	Time 3.5 hrs
Hole Depth/Csg 3.0 / Ø	Hole Depth/Csg 1.5 / Ø	Hole Depth/Csg -1.5 / Ø

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ Rod Size: 7 5/8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0615	To trailer for POD.
0615	0645	To site, setting up for completion activities.
0645	0815	Begin mixing and pouring Portland neat cement surface seal.
0815	0900	Drillers leave site to get new drill/equipment.
0900	0930	Drillers return to site. Begin mixing/pouring neat cement.
0930	/	Drillers move to C6186 to begin surface completion. (See FAR for
/	/	C6186).

not used
TB 5/23/08

Reported By: T. Buswell /	Reviewed By: Joe Fritts
Title: Geologist Date: 5/23/08	Title: Geologist Date: 8/7/08
Signature: [signature] /	Signature: [signature]

A-6003-651 (REV 1)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-26	C6203	300-FF-5 PVC	6/5/08

Reference Measuring Point (unless otherwise noted): TOP OF ~~OUTER CASING (TOC)~~ TOC 6/5/08

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job	28.63
End of Job	28.70

DEPTH TO BOTTOM:

Start of Job	54.5
End of Job	54.6

PART 2

WELL DEVELOPMENT DATA

Pump Model	Franklin SHP/Grundfos
Intake Depth	39.7 & 48.7 Ftbgs 75-5-50
Starting Turbidity	> 200 NTU

Pump Start	Stop	Flow Rate
0900	0930	45-50 gpm
0949	1020	55-60 gpm

Total Pumped	3280
Final Turbidity	3.52
XD SN/Range (PSI)	20

PART 3

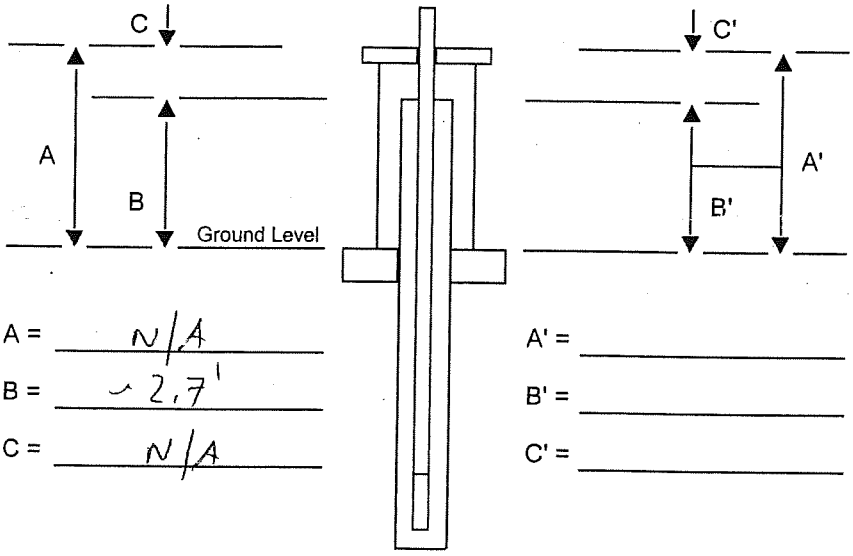
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	N/A
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 6/5/08

Current Measurements Date:



A = N/A

B = ~2.7'

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

Flow rate & volume pumped measured with a flow meter

Note: well will be completed as a surface completion - therefore the stick-up will change

Data Logger Information:

Grass Roots WD5 - pump at 48.7 Ftbgs; drawdown

Grass Roots WD6 - recovery

Prepared by (print name): Jae Fritz	Signature:	Date: 6/5/08
Reviewed by (print name): J DC Weekes	Signature:	Date: 8/12/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Date: 7/9/08

Purpose: PNNL Characterization 300 Area | Location: 300-FF-5

Well ID: C6204 IFC | Well Name: 399-3-27

Drilling Co.: WDC Driller Bill Zamora | Rig No.: 39 | Rig Make/Mod.: Super Sonic II

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8 / 6 7/8	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic 2	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic RS 400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic N/A	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Joe Frith

Name/Title: GRAM Inc / Geologist

Signature: [signature]

Date: 7/9/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 7/9/08

Well Name: 399-3-27 | Well ID: C6204

Location: 300-FF-5 | Report No.: 1

Start	Finish	Total
Time 0930	Time 1500	Time 5.5
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 62 / 57	Hole Depth/Csg 62 / 57

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1 | Rod Size: 7 5/8" OD

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0930	1020	clean pipe & set-up rig & equipment
1020		start drilling with 6" drive barrel (OB)
		Advance OB 0-3' - recover 0-3' & collect 1 GS at 1025.
		Advance OB 3-5' recover 3-5' & collect 1 GS at 1030
	1040	Advance OB 5-10' - recover 5-10' - collect 2 GS at 1040
1040		Add shoe & casing (10.7') and advance to 15'
	1050	clean out to 10Ft.
1050		Advance OB 10-15', recover 10-15' & collect 2 GS at 1100
	1105	Advance OB 15-20' - recover 15-18.5' & collect 2 GS at 1105
1105		Add 10' casing (20.7'). advance to 15'.
	1130	clean out to 20Ft.
1130	1200	Lunch.
1200		Advance OB 20-25Ft - recover 20-24' & collect 2 GS at 1215
	1215	Switch out hopper.
1215		Advance OB 25'-35' - recover 25-30' & collect 2 GS at 1220. Add 10' casing (30.7) and advance to 25' (lean out 25-35- sample 30-35 (DGS at 1235'
1240	1245	Add 10' casing (40.7) advance OB & casing ~~35-45 @ 7/9/08~~ 25-35'
1245		Add 10' casing (50.7) - Advance OB & casing 35-45'
	1320	Recover only 1' - collect GS at 1320 (35-45')
1320		Add 10' casing (60.7) - advance 45-55' - only a
	1330	Ft of "slough" so V. little recovery 35-45'

Reported By: Jaf Gillis | Reviewed By: L.S. Walker

Title: Geologist | Date: 7/9/08 | Title: Geologist | Date: 7/14/08

Signature: | Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 3

Date: 7/9/08

Well Name: 399-3-27 | Well ID: C6204

Location: 300 - FF-5 | Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1330		OB & casing advance ↓ 45-55' - recover
	1350	45-55 & collect 4 GS at 1340
1350		Silt at 50.5' - Take OB to 62, carry to 57' -
	1500	Pull off & clean pipe
		RCT ck, < Bkg.

Reported By: Joe Fitz | Reviewed By: L.D. Walker

Title: Geologist | Date: 7/9/08 | Title: Geologist | Date: 7/14/08

Signature: Joe Fitz | Signature: L.D. Walker

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/15/2008

Well Name: 399-3-27 | Well ID: C6204

Location: 300-FF-5 OU | Report No.: 2

Start	Finish	Total
Time 1515	Time 1615	Time 1.0 hr
Hole Depth/Csg 59.5 / 57.0	Hole Depth/Csg 58.0 / 57.0	Hole Depth/Csg 1.5 / ∅

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 ____ Rod Size: #1: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1515		Setup jacks + rig over borehole, prep to backpull casing
	1551	and add bentonite
1551	1615	add 2.5 gallons bentonite to 58.0 ft. bgs;
	1615	Secure site + depart.

Not Used

Reported By: S. Sexton

Title: Geologist | Date: 07/15/08

Signature:

Reviewed By: Joe Fitz

Title: Geologist | Date: 9/3/08

Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/16/2008

Well Name: 399-3-27 | Well ID: C6204

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 0600	Time 1330	Time 5.0 hrs
Hole Depth/Csg 58.0 / 57.0	Hole Depth/Csg Ø / Ø	Hole Depth/Csg ____ / ____

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: #1: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD w/ Drillers, BTR, RCT; p.cloudy 60° no wind
0630	0643	setup on borehole, prep for completion;
0643		trip-in perm screen & casing (6.4 + 10 + 10 + 5) = 25.4' of screen + 10 + 10 + 10 + 10 = 65.4' total on string; waiting
	0721	for transmitters from PNNL
0721		no response from PNNL about transmitters, will move rig
	0730	to next well for development;
1000	1007	return rig to well & setup;
1007		trip-in screen w/ERTS #20 + thermistors 2.5' below
		top of screen; bottom of well set @ 56.4' bgs, instruments
	1020	@ 33.5' bgs
1020	1317	begin completion; see pgs 1-2 of completion log
1317		all casing removed from hole; tower down rig + head to
	1330	monthly Safety meeting;

Not Used

07/16/08

Reported By: S. Sexton	Reviewed By: Joe Fitt
Title: Geologist Date: 07/16/08	Title: Geologist Date: 8/2/08
Signature: S. Sexton	Signature: Joe Fitt

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 07/17/2008

Well Name: 399-3-27 | Well ID: C6204

Location: 300-FF-5 OU | Report No.: 4

Start	Finish	Total
Time 0630	Time 1000	Time 3.5 hrs
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0630		setting up rig on well for development; DTB=56.8'
	0700	bgs, DTW: 30.13' bgs;
0700		bailing well; geo performs field calibrations:

	known	reading	w/in 10%
turb. (NTU):	482	480	Y
turb.:	50.9	50.8	Y
turb.:	4.45	4.36	Y
pH:	7.00	7.17	Y
cond (µS):	1413	1423	Y
pH:	10.00	10.17	Y

0716		trip in pump to 40' bgs: Pump Grundfos 75 S-50 8-stage motor: Franklin Electric 5 hp; pump intake 3 ft from bottom;
		Test #1: using xD 5217 with Hermit 3K-45812
		pump on @: 0729 rate: 50 intake: 40.0

	turb. (NTU)	pH	D/O (mg/L)	cond. (µS)	temp (°C)	xD
0731	81.7		8.31	483	18.0	7.673
0738	10.6		8.78	480	17.5	7.718
0742	3.32		8.97	479	17.5	7.715
0749	1.45		8.99	478	17.3	7.712
0758	1.43		9.11	480	17.4	7.703
0756	0759		1.13		9.09	480	17.4	7.709
0759	0809	begin recovery;						
0809	0815	lower intake to 50' bgs and prep for test #2						

Reported By: S. Sexton | Reviewed By: Jae Fritz

Title: Geologist | Date: 07/17/08 | Title: Geologist | Date: 9/3/08

Signature: L. M. Sexton | Signature: Jae Fritz

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 07/17/2008

Well Name: 399-3-27 | Well ID: C6204

Location: 300-FF-5 OU | Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
0815	0845	waiting for new pH meter
0845		field calibration for pH: known - 7.00 reading - 7.09
	0856	known - 10.00 reading - 10.03
0856		Test #2: Drawdown recorded on SunDried WD7
		pump on at: 0858 rate: 84 intake: 50.0
		turb. pH D/O cond. temp. xD
0900		36.0 7.52 8.90 485 17.8 2.235
0903		4.09 7.53 9.10 481 17.4 2.224
0907		2.26 7.50 9.17 480 17.5 2.221
0910		1.37 7.49 9.16 481 17.3 2.224
0912	0914	0.97 7.51 9.21 481 17.2 2.212
0914	0925	pump shut off begin recovery test on SunDried WD8
0925	1000	tower down rig + move to next well

Not Used 07/17/08

Reported By: S. Sexton | Reviewed By: Joe Fritz

Title: Geologist | Date: 07/17/08 | Title: Geologist | Date: 9/3/08

Signature: S. Sexton | Signature: Joe Fritz

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-27	C6204	300-FF-5 ou	07/17/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊘ No

Does the well have a cement pad? ○ Yes ⊘ No 07/17/08

PART 1

STATIC WATER LEVEL:

Start of Job	30.3' bgs
End of Job	30.3' bgs

DEPTH TO BOTTOM:

Start of Job	56.8' bgs
End of Job	56.8' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40/50 bgs
Starting Turbidity	817/36.0

Pump Start	Stop	Flow Rate
0729	0759	50
0858	0914	84

Total Pumped	1524/1313
Final Turbidity	1.13/0.97
XD SN/Range (PSI)	5217/20

PART 3

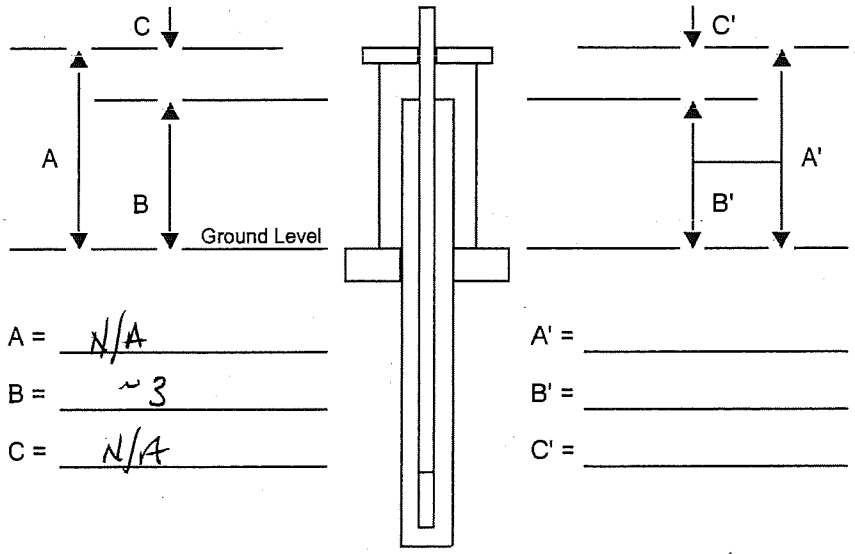
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/17/08

Current Measurements Date:



A = N/A

B = ~3

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊘ No

PART 5

COMMENTS: meter: 51073

Test #1

xDi: 7.941

xDf: 7.932

meter: 52597

Test #2

xDi: 2.511

xDf: 2.501

final meter: 53910

Prepared by (print name): S. Sexton	Signature:	Date: 07/17/2008
Reviewed by (print name): Joel A.	Signature:	Date: 9/3/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Date: 7/8/08

Purpose: PNNL Characterization 300 Area IFC | Location: 300-FF-5

Well ID: C6205 | Well Name: 399-3-28

Drilling Co.: Driller: Bill Zamoz / WDC | Rig No.: 139 | Rig Make/Mod.: SuperSonic II

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8 / 6 7/8	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon Steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic SuperSonic 2	Pressure ___ psi	Make
Welded ___ Thd	A.R. w/Sonic RS 400	Drill Pipe O.D. not used (12) 7/8/08	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool not used.	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic (12) 7/8/08	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Shoe = 0.7'

Estimated Depth to Water

Reported By: T. Buswell

Name/Title: GRAM Inc., Geologist

Signature: Tessa Buswell | Date: 7/8/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 7/8/08

Well Name: 399-3-28 | Well ID: C6205

Location: 300-FF-5 | Report No.: 1

Start	Finish	Total
Time 1400	Time 1630	Time 2.5 hrs
Hole Depth/Csg ∅ / ∅	Hole Depth/Csg 20.0 / 15.0	Hole Depth/Csg 20.0 / 15.0

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1 | Rod Size: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1400	1440	Cleaning pipe - moving rig from C6207 to location.
1440	/	Start drilling w/ "drive barrel" (DB); 6" diam.
/	/	→ Advance DB 0-5' bgs @ 1445; recover 0-5'; collect 2
/	1450	Grab samples (GS) @ 1445.
1450	/	Advance 5-10' bgs; recover 5-10' bgs; collect 2
/	1500	GS @ 1450. RCT ≤ bkgd.
1500	1515	Tala lunch break
1515	1530	Add on 10.0' casing + 0.7' shoe = 10.7' tally. Advance to 5.0' bgs
1530	/	Advance DB 10-15' bgs; recover 10-14'; collect 2 GS @
/	1540	1535.
~~1540~~		~~Add on 10' casing = 20.7' tally. Advance to~~
1540	/	Advance DB 15-20' bgs; recover 15-20'; collect 3 GS @
/	1550	1545.
1550	1555	Add on 10' casing = 20.7' tally. Advance to 15.0' bgs.
1555	1615	NCO's leave site. Drillers clean out casing.
1615	1630	Drillers clean-up/secure site. Green paperwork.
1630	/	Green leave site.

not used.

Reported By: T. Buswell		Reviewed By: L. D. Walker	
Title: Geologist	Date: 7/8/08	Title: Geologist	Date: 7/14/08
Signature: T. Buswell		Signature: L. D. Walker	

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7/9/08

Well Name: 399-3-28	Well ID: C6205
Location: 300-FF-5	Report No.: 2

Start	Finish	Total
Time 0600	Time 0930	Time 3.5
Hole Depth/Csg 20 / 15	Hole Depth/Csg 64.5 / 59	Hole Depth/Csg 44.5 / 44

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: 7 5/8" OD
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, drill crew, RCT.
0630		To site, weather clear, 60°. perform rig maintenance,
	0655	warm equipment. Resume
0655		Advance DB 20-25, recover 20-23.5' & collect 2
		GS at 0700. Advance DB 25-35, recover 25-34
	0710	& collect 4 GS at 0710
0710		Change out hopper. Add 10' casing (30.7) - advance to
		25. Add 10' casing (40.7) - advance to 35.
	0745	Adding water. clean out to 35'.
0745		Advance DB & casing (Added 10' - (50.7)) 35-45'
		recover 35-40.5 & collect 2 GS at 0800
		Add 10' casing (60.7) - Advance 45-55, recover 45-49.5
	0820	& collect 1 GS at 0815
0820		Advance 55-60 - recover 6.5' - collect 2 GS at 0825
		silt at 55.5. AmIttek, < detect
	0840	Advance DB 60-65, recover 60-65 & collect 2 GS at 0835
0840		Advance DB to 64.5 - casing to 59
	0930	move off hole to C6204. RCT did ck of cuttings,
		< Bkg.

Noted JR 7/8/08

Reported By: Joe Fritts		Reviewed By: L. D. Walker	
Title: Geologist	Date: 7/9/08	Title: Geologist	Date: 7/14/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 7-24-08

Well Name: 399-3-28	Well ID: C6205
Location: 300-FF-5	Report No.: 3

Start	Finish	Total
Time 1220	Time 1635	Time 4.25
Hole Depth/Csg 61.2 / ~~58.7~~ 58.7	Hole Depth/Csg 45.1 / 45.8	Hole Depth/Csg ____ / ____

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1220		Start setting up for well construction
1245		TOP of drive casing is bent and torn in thread area
		Drillers need to set a top piece to attach to casing
1329		Attached threaded top to casing. Pulled up ~ 1.5'
1337		Measured bottom of hole at 61.2' bgs
1340		60 ft of casing in hole. Top of torn casing stick up is 2'
		bottom of casing is 58' bgs + 1.7 = 58.7.
1345		Start pouring bentonite pellets
1354		Poured 1 bucket bentonite - measured to 57'.
1407		Stickup = 3.4'. Tagged bentonite at 55.8'
1414		Appears to be some bentonite caught up inside drive casing.
		60.7 - 3.4 = 57.3
1423		Used bailer to clear bottom of casing. Measured bentonite 57.8'
		Assemble well casing. Screen 10 + 10 + 5 (top) = 25' + .4 cap
		Blank casing all 5' sections 8 x 5' = 40'. → 65.4 total
		Centralizer on end cap and directly above top of casing.
1444		Well Screen assembled attaching ERT/Thermister 33.5' ERT # 0025
		→ # C6205
1452		Attach 20' blank casing + string
1455		Attach 20' blank and start attaching ERT/Thermister string
1503		All casing in hole - stickup = 3' bottom of casing at 56.4'.
1504		Start pouring 10-20 sand
1512		Complete adding 6 bags
1520		Need to remove upper 10' of PVC well casing. Cannot thread
		on to damage drive casing to pull up

Reported By: Lee Brouillard		Reviewed By: Joe Fitts	
Title: ~~Geologist~~	Date: 7-24-08	Title: Geologist	Date: 8/15/08
Signature: Lee Brouillard		Signature: Joe Fitts	

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 7-24-08

Well Name: 399-3-28 | Well ID: C6205

Location: 300-FF-5 | Continuation of Report No.: 3

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1522		Attaching tap to try and pull up casing.
1528		Back pulling drive casing
1536		Remove 10' drive casing. total casing = 50.7'
1546		Driller is making a fishing tool to try and retrieve
		ERT/Thermistor cabling down in casing.
1550		Retrieved instrument cabling. Drive casing stickup = 4.8'
1556		Tag on sand 42.3. Start surge on lower screen
1627		Complete surge. Tag sand at 45.1 ft.
1631		Previously removed 5ft section of PVC well stickup
		current PVC stickup is 4ft.
1639		Shut down for day. Remove sand pot demobilize
1645		Leave site for day.

Reported By: Lee Bouillard | Reviewed By: Joe Fitts

Title: Geologist | Date: 7-24-08 | Title: Geologist | Date: 8/15/08

Signature: Lee Bouillard | Signature: Joe Fitts

7-24-08

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7-25-08

Well Name: 399-3-28 | Well ID: C6205

Location: 300-FF-5, | Report No.: 4

Start	Finish	Total
Time 0600	Time 0900	Time 3 hrs.
Hole Depth/Csg 45.1' / 45.8'	Hole Depth/Csg ~ 22.0' / ~ 30.7'	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: (1)

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0628	P.O.D. Mtg.
0629	0631	Move to well location.
0632	0644	Set up equipment to resume well completion.
0645		Resume well completion ; details on well completion log.
	0706	Remove 10.00 ft of temporary casing. [Tot. = 40.7 ft ; including lifting bail]
	0712	Begin surging upper half of the screened interval.
	0728	End surging upper half of the screened interval.
	0743	Driller informs Geo. something on the pump setting rig is leaking hydraulic oil - Diapers have been placed under the rig at the source ; Completion on temporary hold until problem is fixed.
	0800	Driller informs Geo. hydraulic leak is a tad more serious than what was originally thought - Plans to take rig off-site to find and fix the problem ; Completion ; Development activities do not look good for today.
	0900	Geo. heads for town - activities suspended until Monday (7/28/08).
		NOT USED 7/25/08

Reported By: Jess Hocking

Title: Geologist Date: 7/25/08

Signature: Jess Hocking

Reviewed By: Joe Fritz

Title: Geologist Date: 8/15/08

Signature: Joe Fritz

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 21 MDH 7/28/08

Date: 7-28-08

Well Name: 399-3-28 | Well ID: C6205

Location: 300-FF-5, | Report No.: 5

Start	Finish	Total
Time 0600	Time 0754	Time 1hr. 54min.
Hole Depth/Csg ~22.0' / ~30.7'	Hole Depth/Csg 0 / 0	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: (1) 8" casing
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0625	P.O.D Mtg.
0626	0628	Move to well site.
0628	.	Drillers set up & make equipment ready to resume
	0720	completion
0721		Resume completion ; details on well completion log.; Remove
		10.00 ft temp. casing, [Tot. = 30.7 ft]
	0731	Remove 10.00 ft. temp. casing, [Tot. = 20.7 ft]
	0741	Remove 10.00 ft. temp. casing, [Tot. = 10.7 ft]
	0751	Remove 10.70 ft. temp. casing, [Tot. = 0 ft]; All temp.
		casing has been removed from the ground.
	0754	Driller breaks down pump setting rig - move to next
		hole. (C6202).

Not used
7/28/08

Reported By: Jess Hocking | Reviewed By: Jeff Fitts

Title: Geologist | Date: 7/28/08 | Title: Geologist | Date: 8/15/08

Signature: | Signature:

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 8-1-08

Well Name: 399-3-28 | Well ID: C6205

Location: 300-FF-5 OU | Report No.: 6

Start	Finish	Total
Time 1030	Time 1200	Time 1.5 hrs
Hole Depth/Csg 57.0' / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: 4"

See Report No. 1 Screen 31-56

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)	Turb. (NTU)	pH	D/O (mg/L)	cond. (µS)	temp (°C)	xl	gpm
1030		Tag DTB: 57.0' bgs DTW: 30.7' bgs.							
1031		Bail well							
?		Test #1 recorded on H3K-45348 JEFF: pump: Grundfos 75S-80							
		Motor: Franklin Electric 5 hp; drawdown recorded StrongArm WIT							
		Pump on @ 1040 rate: 50gpm intake: 41.0'							
1040	Start (T1) Drawdown		401	7.49	7.91	5.01	21.2	4.86	50 gpm
1045			28.1	7.56	8.21	485	19.4	4.88	
1050			12.2	7.60	8.38	478	18.6	4.88	
1055			10.4	7.59	8.44	485	18.4	4.86 8-1-08 AE	
1100			5.94	7.59	8.35	489	18.7	~~4.88~~ 4.88	
1105			~~6.15~~ 3.83 AE 8-1-08	7.60	8.40	488	18.7	4.87	
1110	stop (T1)		2.97	7.60	8.38	486	18.6	4.86	50 gpm
1110	1126	Start recovery test # 8 on Hermit							
1126		lower pump intake to 51.0' bgs. Transducer remains stationary.							
1126 1131			446	7.66	8.37	499	20.4	4.96	87 gpm
1136			19.6	7.67	8.53	498	19.0	4.95	
1141			6.14 AE 8-1-08	7.70	8.63	497	18.7	4.97	
1146			~~7.14~~ 6.98	7.70	8.67	4.99	18.7	4.99	87 gpm
1147		Truck full → Turn off pump.							
1200		Trip out pump + Transie.							
—	1200	Tag DTB: 57.0 DTW: 30.9' bgs							
		not used AE							

Reported By: A. Lantow | Reviewed By: Joe Faith

Title: Geologist | Date: 8-1-08 | Title: Geologist | Date: 8/15/08

Signature: Logan Lantow | Signature:

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-28	C6205	300-FF-5 OU	8-1-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	~~57.0~~ At 8-1-08	30.7
End of Job	30.9	

DEPTH TO BOTTOM:

Start of Job	57.0
End of Job	57.0

PART 2

WELL DEVELOPMENT DATA

Pump Model: Grundfos 75-5-50

Intake Depth: T_1: 41.0' bgs / T_2: 51.0

Starting Turbidity: T_1: 401 / T_2: 446

Pump Start	Stop	Flow Rate
10:36:15	11:08:46 (T1)	50 gpm
11:08:46	(T1) At 8-1-08 87 gpm Recovery	
1126	1147	(T2) 87 gpm

Total Pumped: 3500 gal

Final Turbidity: T_1: 2.97 / T_2: 6.98

XD SN/Range (PSI): 5217 (20 psi)

PART 3

INSTANTANEOUS SLUG TEST

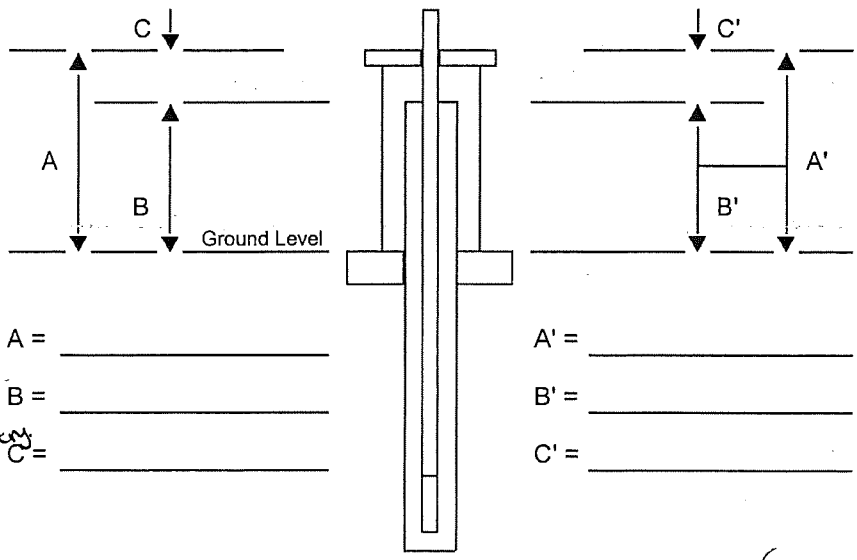
Static Water Level (TOC)	
Transducer Depth	37.0' bgs.
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Ground Level Surface Completion

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: HERMIT Jeff H3K-4538

XD_I: 5.11

Drawdown on Test#7 Interval (T1)

Recovery on Test#8

XD_F: 5.90

Prepared by (print name):	Signature:	Date:
A. Landau	Jason Lantz	8-1-08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Frith		8/15/08

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 2

Date: 6/30/08

Purpose: PNNL Project 300 Area IFC | Location: 300-FF-5

Well ID: C6206 | Well Name: 399-3-29

Drilling Co.: WDC Pilot Bill Zamora | Rig No.: B9 | Rig Make/Mod.: SuperSonic

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8"/6 7/8"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Calwstpl	Cable Tool	gpm	Casing Hammer
Type:	Sonic SuperSonic 2 RS400	Pressure psi	Make
Welded ___ (Thd)	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives N/A	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co.	Rig No.:	Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm N/A	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:	Estimated Depth to Water

Reported By: Sue Fitts

Name/Title: GRAM Inc / Geologist

Signature: [signature]

Date: 6/30/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 07/11/2008

Well Name: 399-3-29 | Well ID: C6206

Location: 300-FF-5 OU | Report No.: 4

Start	Finish	Total
Time 1530	Time 1730	Time 2.0 hrs
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 _____ Rod Size:
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1530		setup on well; geo tags well: DTB = 56.3' bgs DTW = 28.91 bgs; bailing well & setup for development; field instrument calibration done this AM;
		test #1 not recorded on xD, will wait for test #2
		begin test #1: pump: Grundfos 75 S-50 8-stage pump
		motor: Franklin Electric 5 hp
		pump on @: 1559 rate: 50.0 intake: 40.0
		turb. (NTU) / pH / D/O (mg/L) / cond. (µS) / temp. (°C) / xD
1603		104 / 7.75 / 7.93 / 438 / 18.7 / 0.346
1607		14.4 / 7.71 / 8.49 / 432 / 17.9 / 0.225
1610		11.3 / 7.66 / 8.75 / 430 / 17.9 / 0.147
1613		4.75 / 7.63 / 8.79 / 429 / 17.9 / 0.094
1617	1623	pump shut off to allow for recharge
1623		Resume test #1
1624		4.55 / 7.48 / 8.77 / 430 / 17.8 / 0.304
1628		2.85 / 7.44 / 8.88 / 429 / 17.8 / 0.301
1630		2.07 / 7.40 / 8.87 / 430 / 17.7 / 0.283
1633	1635	1.79 / 7.38 / 8.92 / 429 / 17.7 / 0.268
1635	1645	lower pump to 50.0' bgs for test #2
1645		Test #2 recorded w/ xD 5217 on datalogger #3K-45348
		Deadlock WD9; lower xD as well; pump on @ 1645 rate: 84
		turb. / pH / D/O / cond. / temp. / xD
1647		39.7 / 7.44 / 8.99 / 439 / 17.6 / 18.793
1649		8.51 / 7.43 / 9.11 / 439 / 17.4 / 18.778

Reported By: S. Sexton
Title: Geologist Date: 07/11/08
Signature: S. Sexton

Reviewed By: Joe Fritz
Title: Geologist Date: 8/1/08
Signature: Joe Fritz

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/09/2008

Well Name: 399-3-29 | Well ID: C6206

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 1030	Time 1545	Time 5.25 hrs
Hole Depth/Csg 63.5 / 58.5	Hole Depth/Csg ø / ø	Hole Depth/Csg 63.5 / 58.5

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 ____ Rod Size: #1: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1030	1163	setup completions rig over borehole, prep for completion
1163		tag bottom @ 63.6' bgs; backpull casing + add bentonite to ~56'; bentonite @ 57', trip-in perm. screen (0.3 + 10+10+5) = 25.3' screen, 20-slot, + 10+10+10+10 casing = 65.3' total on string; using ERT string #17, ERTs + thermistors taped to screen 2.5' below top of screen;
	1233	bottom of screen @ 56.3', transmitters @ 33.5' bgs
1233	1522	begin completion, see log pgs 1-2;
1522	1545	all casing removed + shoe; move rig + jacks to C6212

Not Used

07/09/2008

Reported By: S. Sexton | Reviewed By: Joe Fritz

Title: Geologist | Date: 07/09/08 | Title: Geologist | Date: 7/11/08

Signature: | Signature:

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7/1/08

Well Name: 399-3-29	Well ID: C6206
Location: 300-FF-5	Report No.: 2

Start	Finish	Total
Time 0600	Time 0730	Time 1.5
Hole Depth/Csg 55 / 55	Hole Depth/Csg 64 / 58.2	Hole Depth/Csg 9 / 3.2

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: 7 5/8" OD
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600		Attend POD with BTR, drillcrew, RCT.
	0635	To site - warm equipment
0635		Resume from 55 ft Advance DB 55-60 ft, recover 10' -
		not sure why so much - collect 3 GS (55-61) at
	0710	0705.
0710	0730	Casing to 58.2, TD 64' - move off borehole
		AMRCTx, < Bkg, AMJH, < detect, ≈200 gallons water
		added to well.

Not used [signature] 7/1/08

Reported By: Joe Fritz		Reviewed By: L.D. Walker	
Title: Geologist	Date: 7/1/08	Title: Geologist	Date: 7/7/08
Signature: [signature]		Signature: LD Walker	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 2 of 2

Date: 6/30/08

Well Name: 399-3-29	Well ID: C6206
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 1000	Time 1630	Time 6.5
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 55 / ~~45~~ 55 JL 6/30/08	Hole Depth/Csg 55 / ~~45~~ 55 JL 6/30/08

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: (1) 7 5/8" OD

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1000	1115	Clean pipe, rig up on C6206 -
1115		Start w/ 6" Drive barrel (DB). Advance 0-4' -
		recover 0-4 & collect 2 GS at 1225.
		Advance DB 4-10' & collect 3 GS at 1130 -
	1130	recovered 4-10'.
1130	1140	Add shoe & 10' casing - 10.70 Advance to 5'
1140	1210	Lunch.
1210	1240	Clean out to 10 FY
1240		Advance DB 10-15 - recover 10-15 & collect 2 GS
		at 1250. Advance DB 15-20 - recover 15-20 & collect 6/30 pm
	1305	2 GS at 1300. Add 10' casing (20.7) advance to ~~20'~~ 15'
1305		Trouble getting casing down - only at 9' - large cobbles?
	1340	casing to 15' - clean out to 20' -
1340		Advance DB 20-25 - recover 20-25 & collect 2 GS at 1345
	1420	Trade out hopper - break due to hot weather.
1420		Advance DB 25-35, recover 25-32 & collect 2 GS at
		1430. Add 10' casing (30.7) - advance to 25' -
	1435	stop to clean pipe
1435		1500 - resume. Add 10' casing (40.7) - Advance to 35'
	1515	Clean out to 35'
1515		Add 10' casing (50.7) & advance casing & DB 35-45' -
		recover 35-42.5 & collect 3 GS at 1530. Advance DB
		45-55 - recover 45-55 & collect 4 GS at 1550. silt
	1630	at 53. casing at 55 - Done for Day - to office

Reported By: [signature] Jeff Fitts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/30/08	Title: Geologist	Date: 7/7/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 07/11/2008

Well Name: 399-3-29 | Well ID: C6206

Location: 300-FF-5 OU | Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		continuation from pg1
		turb. pH D/o cond. temp xD
1650		5.99 7.43 9.23 <140 17.5 18.784
1652		3.58 7.43 9.22 440 17.4 18.775
1653	1655	2.79 7.44 9.28 440 17.6 18.796
1655	1706	begin recovery test Deadlock WD10
1706	1730	trip-out pump and clean/secure site

Not Used

07/11/2008

Reported By: S. Sexton

Title: Geologist Date: 07/11/08

Signature:

Reviewed By: Joe Fritz

Title: Geologist Date: 8/11/08

Signature:

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-29	C6206	300-FF-5 OU	07/11/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No 7-11-08

PART 1

STATIC WATER LEVEL:

Start of Job	28.9 ft bgs
End of Job	28.9' bgs

DEPTH TO BOTTOM:

Start of Job	56.3' bgs
End of Job	56.3' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40.0 / 50.0
Starting Turbidity	104 / 39.7

Pump Start	Stop	Flow Rate
1559	1617	50
1623	1635	50
1645	1655	84

Total Pumped	1345 / 845
Final Turbidity	1.79 / 2.79
XD SN/Range (PSI)	5217 / 20.0

PART 3

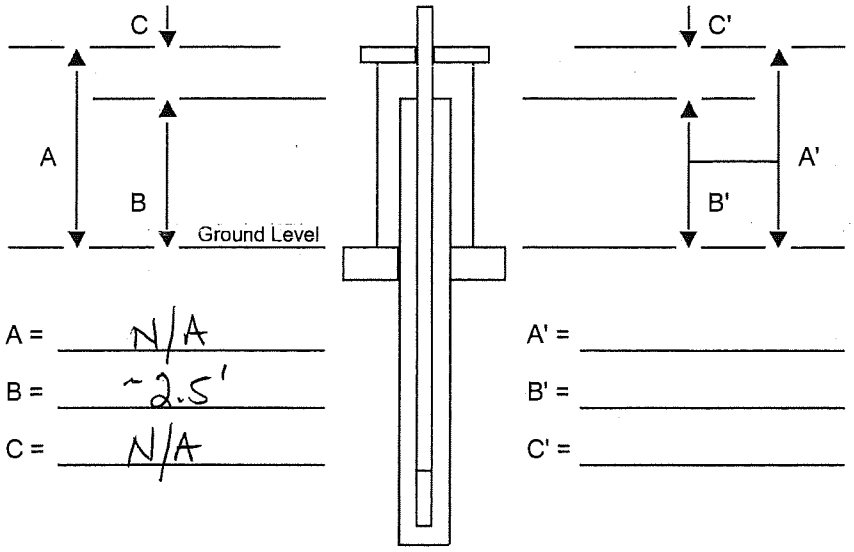
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	N/A
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/11/08

Current Measurements Date:



A = N/A

B = ~2.5'

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

Test #1 meter: 40500

xDi: 0.411

xDf: 0.413

Test #2 meter 411845

xDi: 19.318

xDf: 19.288

final meter: 42690

Prepared by (print name):	Signature:	Date:
S. Sexton	Geologist	07/11/2008
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz		8/11/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Date: 6/26/08

Purpose: PNNL Project 300 Area IFC	Location: 300-FF-5
Well ID: C6213	Well Name: 399-3-30
Drilling Co.: WDC Bill Zamoz	Rig No.: 139 Rig Make/Mod.: SuperSonic

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8 6 7/8	Auger	Air Water/Mud	Make
Grade	Rotary	Reverse Direct	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic SuperSonic 2	Pressure psi	Make
Welded Thd.	A.R. w/Sonic RS400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Not used [signature] 6/26/08

Drig. Co.	Rig No.:	Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air Water/Mud	Make
Grade	Rotary	Reverse Direct	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure psi	Make
Welded Thd.	A.R. w/Sonic N/A	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

[signature] 6/26/08

Comments/Remarks:	Estimated Depth to Water

Reported By: Joe Fritts

Name/Title: GRAM Inc Geologist

Signature: [signature] Date: 6/26/08

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 6/26/08

Well Name: 399-3-30	Well ID: C6213
Location: 300-FF-5	Report No.: 1

Start	Finish	Total
Time 1230	Time 1600	Time 5.5
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 45 / 45	Hole Depth/Csg 45 / 45

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: 7 5/8" casing
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1230		Move rig & equipment to location - Steam-clean
	1315	pipe. 1315 -
1315		Start drilling w/ 6" Drive barrel (DB)
		Advance DB 0-5' - recover 0-5' & collect 2 GS at
		1325
		Advance DB 5-10' - recover 5-10 & collect 3 GS at
	1340	1330. Add shoe & 10' casing (10.7) - advance to 5'
1340		Advance DB to 10' - clean out
		Advance DB 10-15, recover 10-14 & collect 2 GS at
	1345	1345.
1345		Advance DB 15-20' - recover 15-19.5 - collect GS at
		1355. Add 10' casing - advance to 15'
	1405	PM IH ck. - detect clean out to 20',
1405		PM RCT ck, < Bkg.
		Advance DB 20-25' - recover 20-25 & collect 2 GS at 1415.
		1440 - trade out roll-off
		Advance DB 25-35 - recover 25-34 & collect 3 GS
	1500	at 1455
1500		Add 10' casing, advance to 25' (30.7 on).
		Add 10' casing, advance to 35' (40.7 on) Clean out
		w/DB ≈ 27-35' - collect 2 GS at 1520.
	1525	Water truck/pipe truck to wash pipe.
1525		Advance casing (Add 10' - 50.7) and DB 35-45' - recover
	1600	35-41.5 & collect 3 GS at 1545 - stop at 45

Reported By: Joe Fritts		Reviewed By: L. D. Walker	
Title: Geologist	Date: 6/26/08	Title: Geologist	Date: 7/7/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 6/27/08

Well Name: 399-3-30 | Well ID: C6213

Location: 300-FF-5 | Report No.: 2

Start	Finish	Total
Time 0600	Time 0900	Time 3.0
Hole Depth/Csg 45 / 45	Hole Depth/Csg 61.5 / 59.5	Hole Depth/Csg 16.5 / 14.5

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend POD with BTR, drill crew, geologist
0630	0655	To site, warm equipment, weather clear, 56°
0655		Recover from 45' - casing & borehole
		Advance DB & casing from 45-55' - recover 45-50'
	0710	collect 2 GS at 0710
0710		Advance DB 55-60, recover 8' - Brn silt at 55.5'
		collect 2 GS at 0720
		Advance casing to 59.5' -
	0800	AM RCT ck c BKs
0800	0900	Move rig & equipment

N/A used 6/27/08

Reported By: Joe Fritts | Reviewed By: L.D. Walker

Title: Geologist | Date: 6/27/08 | Title: Geologist | Date: 7/2/08

Signature: [signature] | Signature: LD Walker

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 06/30/2008

Well Name: 399-3-30 | Well ID: C6213

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 1400	Time 1615	Time 2.25 hrs
Hole Depth/Csg 61.5 / 60	Hole Depth/Csg 39 / 46	Hole Depth/Csg 22.5 / 14

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: #1: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1400		Moving rig from C6218 to C6213, setting up jacks and
	1443	rig put down visqueen & prep for completion;
1443	1512	add bentonite to bring borehole depth to 56.0 ft bgs;
1512		trip-in cap (0.3') + 20' blank (10+10); add 5.0' screen +
		20' casing (10+10) = 45.3' total, centralizers at top + ~~bottom~~ Sump 60-30
		of screen + bottom of sump; add 20' casing (10+10) = 65.3'
		total 4" perm pvc casing + screen, set @ 55.3' bgs,
	1528	screen interval 30-35' bgs;
1528	1607	begin completion activities, see completion log pgs 1-1;
1607	1645	break down rig for day, geo finishes pw + departs

Not used 6/30/2008

Reported By: S. Sexton		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/30/08	Title: Geologist	Date: 7/7/08
Signature: L. M. Sexton		Signature: LD Walker	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/01/2008

Well Name: 399-3-30 | Well ID: C6213

Location: 300-FF-5 OU | Report No.: 4

Start	Finish	Total
Time 0630	Time 1000	Time 3.5 hrs
Hole Depth/Csg 39 / 46	Hole Depth/Csg 3 / 0	Hole Depth/Csg 36 / 46

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ Rod Size: #1: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0630	0642	set-up completions rig on borehole;
0642		begin well completion; @ 0801, work temp. halted, casing was pulled to open hole to get shoe to bentonite depth, had small cave-in ~2-3 ft. natural backfill in hole, receive PNNL approval to continue as is and not re-drill the hole; slough @ ~26-28' bgs
	0815	
0815		resume completion, surging screen, see well completion log pgs 1-2; All temp casing removed @ 0940
	0940	
0940	1000	break down rig, move jacks, rig, plastic to next loc.

Not used 07/01/2008

Reported By: S. Sexton		Reviewed By: L.D. Walker	
Title: Geologist	Date: 7/01/08	Title: Geologist	Date: 7/7/08
Signature:		Signature:	

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/11/2008

Well Name: 399-3-30	Well ID: C6213
Location: 300-FF-5 OU	Report No.: 5

Start	Finish	Total
Time 1330	Time 1530	Time 2.0 hrs
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size:
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1330		setup rig over well; geo tags well: DTB = 55.5' bgs DTW =
	1351	28.9' bgs; driller bailing well
1351		trip-in pump: Grund fos 75 S-50 8-stage pump,
		motor: Franklin-Electric 5 hp; field instruments
	1414	calibrated earlier
1414		test data recorded w/ xD 5217 on H3K-45348 Deadlock
		WD 7; pump on @: 1414 Rate: 20.0 intake: 40.0

		turb. (NTU)	pH	D/O (mg/L)	cond. (µS)	temp (°C)	xD
1417		208	7.65	9.16	480	20.2	1.261
1422		11.0	7.66	9.65	479	18.6	1.318
1425		5.54	7.64	9.79	480	18.4	1.324
1428		6.77	7.61	9.73	480	18.4	1.325
1433		4.21	7.59	9.65	479	18.6	1.325
1436		3.63	7.59	9.89	479	18.3	1.349
1439		4.49	7.58	9.75	479	18.4	1.337
1443	1445	3.78	7.61	9.86	477	18.5	1.328

1445	1458	pump shut off, begin recovery test on Deadlock WD8
1458		recovery test finished; trip-out pump + move rig to
	1530	next well

Not Used 07/11/2008

Reported By: S. Sexton		Reviewed By: Joe Fritts	
Title: Geologist	Date: 07/11/08	Title: Geologist	Date: 8/7/08
Signature: [signature]		Signature: [signature]	

A-6003-651 (REV 1)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-30	C6213	300-FF-5 OU	07/11/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC) 7-11-08

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ○ Yes ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job	28.9' bgs
End of Job	28.9' bgs

DEPTH TO BOTTOM:

Start of Job	55.5' bgs
End of Job	55.5' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40.0' bgs
Starting Turbidity	208

Pump Start	Stop	Flow Rate
1414	1445	20

Total Pumped	6056 gallons
Final Turbidity	3.78
XD SN/Range (PSI)	5217/20.0

PART 3

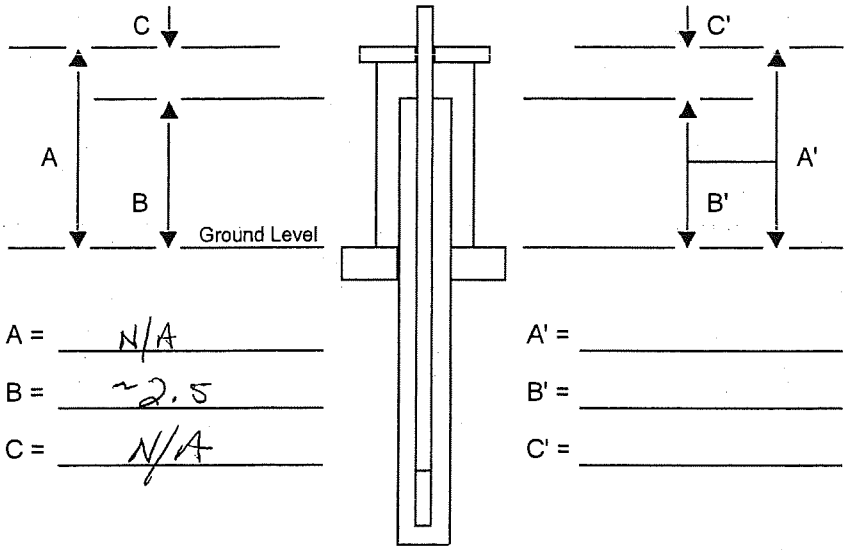
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	N/A
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/11/2008

Current Measurements Date:



A = N/A | A' =

B = ~2.5 | B' =

C = N/A | C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 39844

xDi: 7.671

xDf: 7.639

final meter: 40500

Prepared by (print name):	Signature:	Date:
S. Sexton		07/11/2008
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fitts		8/7/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 2

Date: 6/20/08

Purpose: RMNL Project 300 Area IFC | Location: 300 - FF-5

Well ID: C6214 | Well Name: 399-3-31

Drilling Co.: WDC Driller Brion | Rig No.: 139 | Rig Make/Mod.: Super Sonic

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8 OD, 6 3/4" ID	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon Steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic Super Sonic 2	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic RS400	Drill Pipe O.D. N/A	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic N/A	Pressure psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Joe Fitts

Name/Title: CHAM Inc, Geologist

Signature:

Date: 6/20/08

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 2 of 2

Date: 6/20/09

Well Name: 399-3-31 | Well ID: C6214

Location: 300-FF-5 | Report No.: 1

Start	Finish	Total
Time 1400	Time 1630	Time 2.5
Hole Depth/Csg 0 / 0	Hole Depth/Csg 25 / 15	Hole Depth/Csg 25 / 15

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1 | Rod Size: 7 5/8" OD casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1400		MOS From C6218 to location - setup all
	1440	rig & equipment
1440		Start w/ 6" DB, Advance DB 0-5' - recover 0-4'
		PM IH Ck, <detect, PM RCT ck, <BKs
	1500	collect 2 GS at 1455
1500		Advance DB 5-10' - recover 5-10' & collect 3 GS
	1515	at 1510
1515		Add 10' casing & shoe (10.7') - advance to 5'
	1525	clean out to 10'
1525		Advance DB 10-15, recover 4.5' & collect 4 GS
		at 1535. Advance casing to 15' and clean out.
		Advance DB 15-25, recover 5.5' & collect 3 GS
	1550	at 1545.
1550		Advance DB 20-25 recover 5' & collect 3 GS
		at 1600. Collected 15 GS total.
	1630	Secure site - to office

6/20/09

Reported By: Joe Fitz		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/20/09	Title: Geologist	Date: 7/7/08
Signature:		Signature:	

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 6/23/08

Well Name: 399-3-31 | Well ID: C6214

Location: 300-FF-5 | Report No.: 2

Start	Finish	Total
Time 0600	Time 1300	Time 7
Hole Depth/Csg 25 / 15	Hole Depth/Csg 63 / 60	Hole Depth/Csg 38 / 45

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ See Report No. 1

Rod Size: 7 5/8" OD casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	Attend PDM with RTR, all crew to site. Warm equipment, perform inspections
0630		
	0700	Weather clear, 55°.
0700		- Go in w/ 6" DB to clean out - hole open to 24'
		cleaned out - advanced DB to 35' - at 0715
	0800	NCO's on site 0800
0800		Advanced DB 25-35 - recover 25-35 & collect 4 GS
		at 0810 - IW water - Trade roll-offs. Add 10'
	0830	casing (30.7) - advance to 25'.
0830		work on hydraulic wrench.
		Am RCT ck. < Bkg. clean out to 35 - add 10' casing
	0900	(40.7) - advance to 35' - clean out to 35'
0900		Add (2) 5' casing (50.7)' - advance to 45'.
	0920	AM FIT ck. < detect
0920		Advance DB 35-45 - recover 8.5' & collect 4 GS at 0930
		Add (2) 5' casing - (60.7) Advance to 55'.
	0950	Advance DB 45-55 - Ø recovery, DTW 28.1 Flgs
0950		Go back in w/ DB - clear to 55' - must have pushed
		material (SG?) into formation - go in with DB
		55-60'. Advance DB 55-60 - Ø recovery again.
		Advance DB 55.5-61 - recovery 55.5-61' and collect
	1030	3 GS at 1030 -, silt at 55.5.
1030		Casing to 60', borehole to 63'
	1300	Rig down & take rig to town to service

Reported By: Joe Fitts		Reviewed By: L.D. Walker	
Title: Geologist	Date: 6/23/08	Title: Geologist	Date: 7/7/08
Signature: Joe Fitts		Signature: L.D. Walker	

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/14/2008

Well Name: 399-3-31 | Well ID: C6214

Location: 300-FF-5 OU | Report No.: 3

Start	Finish	Total
Time 1000	Time 1545	Time 5.75 hrs
Hole Depth/Csg 62.9 / 60	Hole Depth/Csg ø / ø	Hole Depth/Csg 62.9 / 60

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ Rod Size: #1: 7 5/8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1000	1121	setup rig on borehole, prep for completion activities;
1121	1130	add bentonite to depth;
1130		trip-in sump, screen + casing (0.4 + 2.0 + 2.0 + 2.0 + 10) = 16.4' + 10 + 10 = 36.4 + 10 + 10 = 56.4 + 10 = 66.4' on string ERT string #16 attached at 0.9' above bottom of sump + 0.5' below top of casing #2 (should be 58.5 + 33.5' bgs) thermisters from 58.5 to surface
	1212	bottom of well @ 59.6' bgs, ERT string 1 @ 58.6, 2 @ 33.6
1212	1535	begin completion, see pgs 1-2 of well completion logs;
1535		all casing removed from hole; tower down rig
	1545	move jacks

Not Used

07/14/2008

Reported By: S. Sexton

Title: Geologist Date: 07/14/08

Signature: S. M. Sexton

Reviewed By: Joe Fitts

Title: Geologist Date: 8/14/08

Signature: Joe Fitts

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 7/18/08

Well Name: 399-3-301 JR 8/14/08	Well ID: C6214
Location: 300-FF-5	Report No.: 4

Start	Finish	Total
Time 0600	Time 0905	Time 3 hrs 5 min
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. ① 2 3 4 ____ See Report No. 1

Rod Size: 4" I.D. PVC permanent casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0615	Attend POD
0615		Setup for development
0700		Calibration check of field instruments:
		Turbidity: 5.09 NTU Std. Readings: 5.14 ⇒ good
		45.7 NTU Std. " : 46.1 ⇒ good
		509 NTU Std. " : 511 ⇒ good
		pH: 7.00 std. " : 7.05 ⇒ good
		10.00 std. " : 10.03 ⇒ good
		Conductivity: 1413 std. " : 1410 ⇒ good
0700	0720	Bail out water/sediment
0720		Trip in pump and tremie: Pump Grundfos 75 S-50: Franklin Electric 5hp motor
0738		Pump test - Parameter readings - Drawdown: Test #3
		xD Pump Turb. (NTU) °C pH D.O. (mg/L) Cond. (mS)
	0744	59615 Start Pump - started @ 80 gpm - drawdown too
		much - cut back flow to 60 gpm @ 0750
	0750	7.524 - 2.46 19.7 7.39 8.80 0.491
	0800	7.638 60595 0.81 18.7 ~~8.92~~ SWT 7.54 8.92 0.479
	0805	7.671 60875 0.55 18.4 7.55 9.08 0.481
	0815	7.583 61320 0.42 18.3 7.56 9.11 0.474
	0820	7.598 61695 — — — — —
0820		Shut off pump - Start recovery test: Test #4
	0825	15.893 — — — — — —
	0830	15.911 — — — — — —
	0835	15.899 — — — — — —

Reported By: J. Throolin	Reviewed By: Joe Fritts
Title: Geologist Date: 7/18/08	Title: Geologist Date: 8/14/08
Signature: [signature]	Signature: [signature]

A-6003-651 (REV 1)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 7/18/08

Well Name: 399-3-301 [illegible] 8/14/08

Well ID: C6214

Location: 300-FF-5

Continuation of Report No.: 4

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		~~Rump~~ INT Test parameters
		XD
	0840	15.887
	0845	15.887
0845		Stop recovery test: Test #4 — Remove pump and tremmie pipe
0900		Tag DTB = 60.0' bgs; DTW = 30.95' bgs
0900	0905	Geo. depart

Not Used [signature] 7/18/08

Reported By: J. Throolin

Title: Geologist

Date: 7/18/08

Signature: [signature]

Reviewed By: Joe Fritts

Title: Geologist

Date: 8/14/08

Signature: [signature]

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-30 9/14/09	C6214	300-FF-5	7/18/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	30.95
End of Job	30.95

DEPTH TO BOTTOM:

Start of Job	60.1
End of Job	60.0

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	50.0
Starting Turbidity	2.46 NTU

Pump Start	Stop	Flow Rate
0745	0820	55 gpm

Total Pumped	2080
Final Turbidity	0.42 NTU
XD SN/Range (PSI)	5217/ 20 psi

PART 3

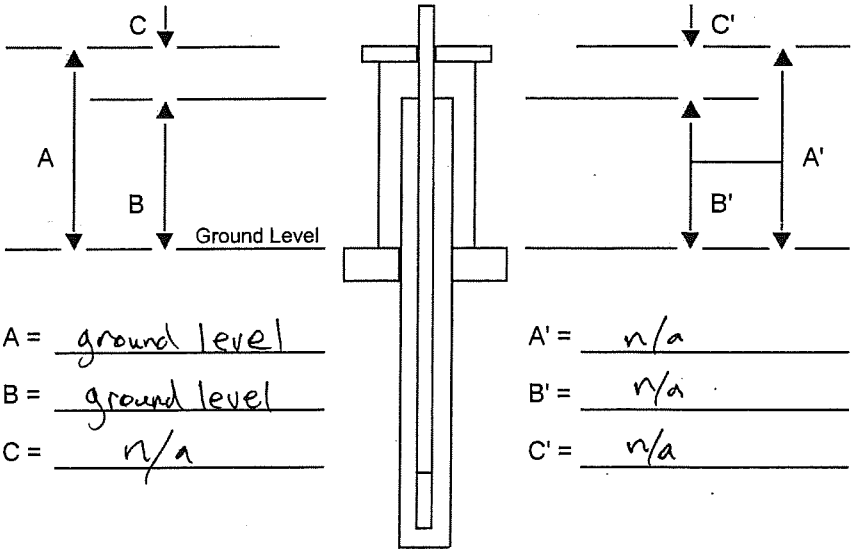
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Current Measurements Date:



A =	ground level
B =	ground level
C =	n/a
A' =	n/a
B' =	n/a
C' =	n/a

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

Initial XD: 15.928
Final XD: 15.887

Prepared by (print name): Jacob Throolin	Signature:	Date: 7/18/08
Reviewed by (print name): Joe Fritz	Signature:	Date: 8/14/08

A-6003-644 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Date: 07/18/2008

Purpose: 300 Areas IFC | Location: 300-FF-5 OU

Well ID: C6215 | Well Name: 399-3-32

Drilling Co.: WDC Mike Wilkerson | Rig No.: 139 | Rig Make/Mod.: Super Sonic

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 7 5/8"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic SuperSonic	Pressure ___ psi	Make
Welded ___ (Thd.)	A.R. w/Sonic R5400	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID 7 5/8 / 6 7/8			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Not used

Comments/Remarks:

Estimated Depth to Water

Reported By: S. Sexton

Name/Title: GRAM Inc Geologist

Signature:

Date: 07/18/2008

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 07/18/2008

Well Name: 399-3-32 | Well ID: C6215

Location: 300-FF-5 OU | Report No.: 1

Start	Finish	Total
Time 0930	Time 1500	Time 5.5 hrs
Hole Depth/Csg ø / ø	Hole Depth/Csg 63 / 60	Hole Depth/Csg 63 / 60

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: (1) 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0930	1000	setup drill rig over borehole location, prep to drill;
1000		begin drilling from ø feet; advance drive barrel
	1007	~~5-10~~ 0-5' recover 0-5' 3 samples taken @ 1004
1007	1026	well walkdowns with FH + PNNL
1026		advance db 5-10' recover 5 feet 3 samples @ 1030
1032		add 10' casing and push to 5' bgs; add 10' push
		to 10; some resistance drilling past ~7' bgs; push to 15'
1042		advance db 15-25' recover 15-20 3 samples @ 1048
1052		add 10' casing + push to 25
1054	1101	advance db 25-35'
1101	1116	stop to change hopper
1116		advance db ~~35-45'~~ 25-35, add 10' casing & push to 35'
	1139	bgs; recover 25-31 5 samples @ 1128
1139	1259	Lunch
1259		advance db 35-45'; add 5' + 5' casing + advance to
		45'; recover ~~35~~-39' 4 samples @ 1311
1312		advance db 45-55; add 5' + 5' casing + push
		to 55; recover 45-48' 2 samples @ 1327
1344		advance db 55-63, recover 7'; 5 samples taken @
	1400	1348
1400		push casing to 60' TD hole + move rigs; TD = 63.0'
	1450	bgs
1450	1500	Geo secures site & departs:
		Not Used 07/18/2008

Reported By: S. Sexton		Reviewed By: Joe Fitz	
Title: Geologist	Date: 07/18/08	Title: Geologist	Date: 8/13/08
Signature:		Signature:	

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 07/28/2008

Well Name: 397-3-32 | Well ID: C6215

Location: 300-FF-5 OU | Report No.: 2

Start	Finish	Total
Time 1030	Time 1630	Time 6.5 hrs
Hole Depth/Csg 62 / 60	Hole Depth/Csg 3 / 0	Hole Depth/Csg 59 / 60

Reference Measuring Point: **GROUND SURFACE**

Casing String No. (1) 2 3 4 ____ See Report No. 1

Rod Size: #1: 7 5/8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1030	1125	setup rig over hole, prep for well construction
1125	1225	Lunch
1225	1231	Final prep for well construction;
1231		add 5' casing for easier backpull, add bentonite to ~~57.5~~ 5810 bgs 7.28.08
	1239	
1239		trip-in sump 0.4 + 2.0 + 10 = 12.4' + 2.0' screen + 10' blank =
		24.4' total + 10' blank = 34.4' + 10 = 44.4' total + 10 = 54.4 +
	1312	10 = 64.4' on string + 5' = 69.4' total on string
1312	1630	begin well completion, see completion log pgs 1-2;

Not Used 07/28/2008

Reported By: S. Sexton	Reviewed By: Jay Fritts
Title: Geologist Date: 07/28/08	Title: Geologist Date: 8/13/08
Signature: S. M. Sexton	Signature: Jay Fritts

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7/30/08

Well Name: 399-3-32	Well ID: C6215
Location: 300-FF-5	Report No.: 3

Start	Finish	Total
Time 1620	Time 1710	Time 50 min
Hole Depth/Csg — / —	Hole Depth/Csg — / —	Hole Depth/Csg — / —

Reference Measuring Point: **GROUND SURFACE**

Casing String No. @ 2 3 4 ____ See Report No. 1

Rod Size: 4" PVC perm. casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
1620		
1635		DTB = 58.3' bgs; DTW = 33.20' bgs
1640		Bail out sediment
1647		Start tripping in pump; pump set @ 43.9' - 2.2' stickup = 41.7' bgs
1655		Transducer set @ 37.8' bgs
1702	1716	Geo. paperwork
1740		Geo. depart

Not Used 7/30/08

Reported By: J. Throolin		Reviewed By: Jane Faith	
Title: Geologist	Date: 7/30/08	Title: Geologist	Date: 8/13/08
Signature:		Signature:	

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 7-31-08

Well Name: 399-3-32	Well ID: C6215
Location: 300-FF-5 OU	Report No.: 4

Start	Finish	Total
Time 0700	Time 0805	Time 1 hr. 5 min
Hole Depth/Csg - / -	Hole Depth/Csg - / -	Hole Depth/Csg - / -

Reference Measuring Point: **GROUND SURFACE**

Casing String No. 1 2 3 4 ____ Rod Size:
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0600	0630	POD. Note: well Has 2' screen
0630		On site Calibrate Field Instruments.
		Turbidity: 5.09 NTU std. measure: 5.17
		45.7 NTU std. measure: 45.8
		509.0 NTU std. measure: 514.0
		pH : 7.00 std : ~~6.696~~ 18.3°C 7.02 18.3°C
		10.00 std : 10.10 18.3°C
		Conductivity: 1.413 mS std : 1.401 mS
		DTW: 30.6 Trans. @ 37.8' bgs Probe #5217
		XD: I = 7.276'
		Start Drawdown Test on Hermit named Jeff H3K-45348 #1 (Drawdown)

		XD (ft)	Turb (NTU)	Temp (°C)	DO (mg/L)	pH	Cond (mS)	Notes: 19.8 gpm Start
0701	start.							
0711	Draw. Test #1	5.568	514	16.6	8.82	7.36	.486	19.0 gpm
0716		5.533	21.0	16.7	8.70	7.37	.482	18.5 ~~19.5~~ gpm
0721		5.500	12.0	17.0	8.77	7.39	.487	18.5 gpm
0726		5.56	7.99	17.3	8.88	7.40	.483	18.5 gpm
0730	Start Test #2	Start Recovery Test #2						valve open.
		Hope back flow check valve worked.						
0735		XDF: 7.28						
0735		Trip out pump. 56.6' bgs.						
0805		Tag bottom at ~~58.6~~ 7-31-08, tag DTW: 30.6						
		move to Next well						
		Not used AL						

Reported By: A. Lankau		Reviewed By: Jue Fitts	
Title: Geologist	Date: 7/31/08	Title: Geologist	Date: 8/13/08
Signature: Aaron Lankau		Signature: [signature]	

A-6003-651 (REV 1)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-32	C6215	300-FF-5	7-31-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	33.20 ' bgs
End of Job	30.6 bgs.

DEPTH TO BOTTOM:

Start of Job	58.3 bgs.
End of Job	58.6 bgs.

PART 2

WELL DEVELOPMENT DATA

Pump Model	Grundfos 75S50 ± 8 stage.
Intake Depth	41 ' bgs.
Starting Turbidity	514

Pump Start	Stop	Flow Rate
6:57:33	7:26:36	18.5
7:26:38	7:32:12	Recovery

Total Pumped	536.5 gal
Final Turbidity	7.99 NTU
XD SN/Range (PSI)	6712 (20psi)

PART 3

INSTANTANEOUS SLUG TEST

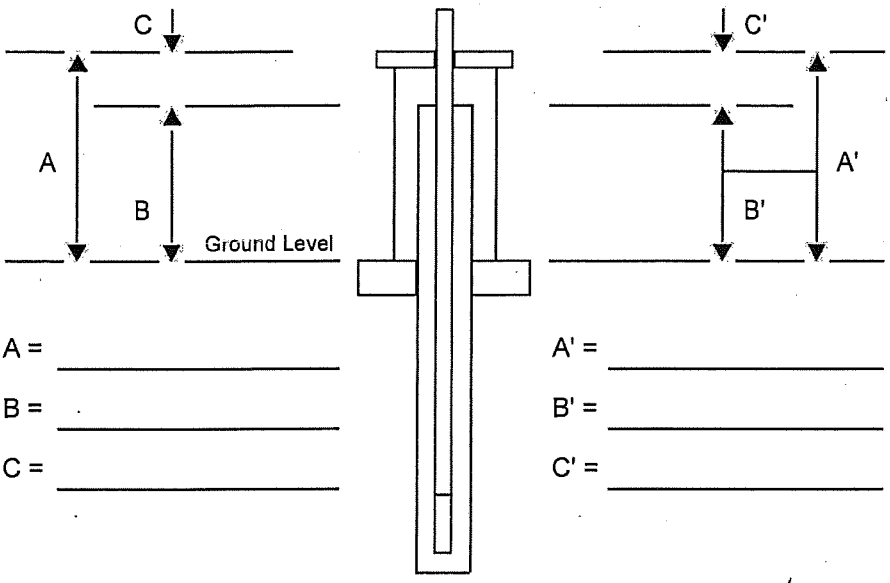
Static Water Level (TOC)	
Transducer Depth	37.8 ' bgs.
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 7-31-08

Flush w/ surface

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

XD initial: 7.276 XD final: 5.56 for Drawdown

Data logger: Jeff #3k-45348

Drawdown on Test #1

Recovery on Test #2

Prepared by (print name):	Signature:	Date:
A. Lantow	Aaron Lantow	7-31-08
Reviewed by (print name):	**Signature:**	**Date:**
Jeff Fritz		8/13/08

Appendix E

Well Development and Testing Data Sheets

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-7	C6184	300-FF-5 ou	07/15/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	29.85' bgs
End of Job	29.7' bgs

DEPTH TO BOTTOM:

Start of Job	56.6' bgs
End of Job	56.56' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40.0 / 50.0
Starting Turbidity	299 / 322

Pump Start	Stop	Flow Rate
0808	0838	50
0857	6912	86

Total Pumped	1380 / 1471
Final Turbidity	1.16 / 2.66
XD SN/Range (PSI)	5217 / 20

PART 3

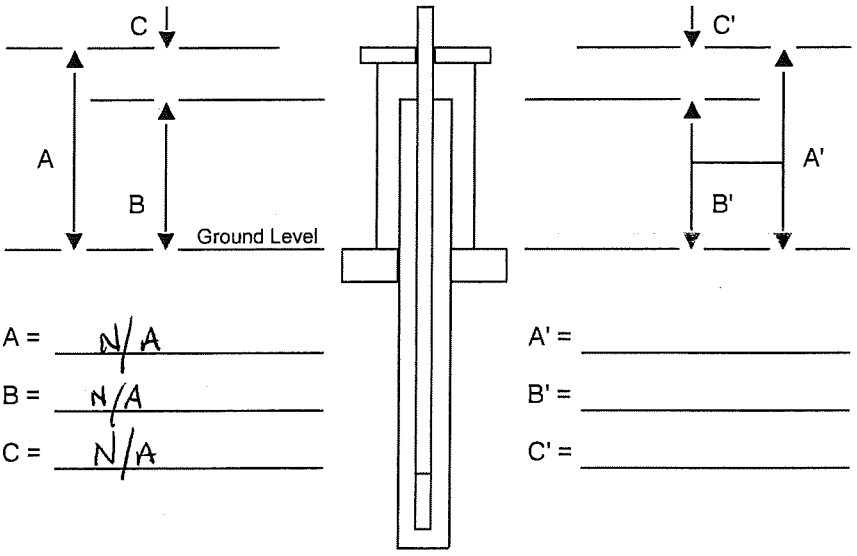
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/15/2008

Current Measurements Date:



A = N/A
B = N/A
C = N/A

A' =
B' =
C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 45638

Test #1

xDi: 8.813

xDf: 8.835

meter: 47018

Test #2: recorded on SunDried WD3

xDi: 16.042

xDf: 16.023

final meter: 48189

Prepared by (print name): S. Sexton	Signature:	Date: 07/15/2008
Reviewed by (print name): Jan Fitz	Signature:	Date: 8/15/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-8	C6185	300-FF-5 ou	07/14/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	29.5 bgs
End of Job	29.5 bgs

DEPTH TO BOTTOM:

Start of Job	56.4 bgs
End of Job	56.4 bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40 / 50
Starting Turbidity	764 / 105

Pump Start	Stop	Flow Rate
0819	0849	50
0907	0926	86

Total Pumped	1316 / 1533
Final Turbidity	1.63 / 3.72
XD SN/Range (PSI)	5217 / 20.0

PART 3

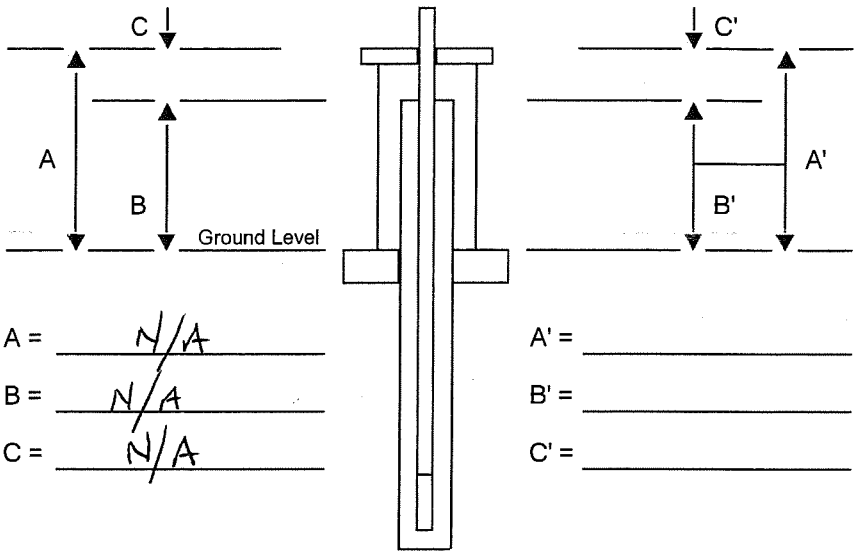
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	N/A
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/14/08

Current Measurements Date:



A = N/A

B = N/A

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 42789

Test #1

xDi: 8.971

xDf: 8.962

Test #2 meter: 44105

xDi: 12.279

xDf: 12.282

final meter: SMS 7-14-08 ~~44038~~ 45038

Prepared by (print name):	Signature:	Date:
S. Sexton		07/14/2008
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz		8/6/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-9	C6186	300-FF-5	6/4/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ☒ No | Does the well have a cement pad? ○ Yes ☒ No

PART 1

STATIC WATER LEVEL:

Start of Job	27.51
End of Job	Not measured

DEPTH TO BOTTOM:

Start of Job	58.85
End of Job	Not measured

PART 2

WELL DEVELOPMENT DATA

Pump Model	Grundfos 75-S-50
Intake Depth	50.9 & 40.9 Fbgs
Starting Turbidity	>200

Pump Start	Stop	Flow Rate
1500	1538	30-60gpm
1554	1621	60gpm

Total Pumped	3120 gallons
Final Turbidity	4.89
XD SN/Range (PSI)	20

PART 3

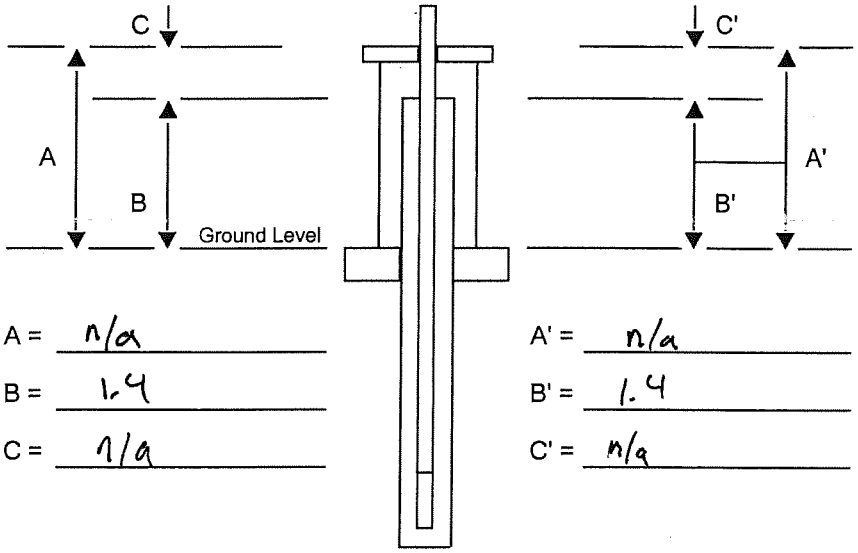
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	N/A
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Current Measurements Date:



A =	n/a	A' =	n/a
B =	1.4	B' =	1.4
C =	n/a	C' =	n/a

Are there any reference marks on the casing strings? ○ Yes ○ No

PART 5

COMMENTS:

- Gallons pumped record w/ flow meter, rate checked periodically
- Note- well will be completed as a surface completion - therefore the S/N will change.

Data Logger Information: Pump at 50.9 Fbgs:
Poison Ivy WD1 - drawdown
Poison Ivy WD2 - recovery
Pump at 40.9 Fbgs
Poison Ivy WD3 - drawdown
Poison Ivy WD4 - recovery

Prepared by (print name): Jan Fitz	Signature:	Date: 6/4/08
Reviewed by (print name): DC Weekes	Signature: DC Weekes	Date: 8/12/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

AL 7-31-08 ~~C6287~~ C6187 JM For AL 8/15/08

Well Name: 399-2-~~27~~ 10 OU	Well ID: ~~C6211~~ ~~C6287~~ AL 7-31-08	Well Location: 300-FF-5 OU	Date: 7/31/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ○ No | Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job 59.1

End of Job 59.1

DEPTH TO BOTTOM:

Start of Job 30.7

End of Job 30.7

PART 2

WELL DEVELOPMENT DATA

Pump Model Grundfos

Intake Depth Test 1 @ 41' bgs, #2 @ 51' bgs

Starting Turbidity T_1: 24.2 / T_2: 30.4

Pump Start	Stop	Flow Rate
10:11:30	10:39:01	45.5 gpm
10:39:01	10:43:04	Recovery
10:54:00	10:16:32	85.5 gpm

Total Pumped 3281 gal.

Final Turbidity T_1: 2.73 NTU / T_2: 1.58 NTU

XD SN/Range (PSI) (20psi)

PART 3

INSTANTANEOUS SLUG TEST

Static Water Level (TOC)

Transducer Depth T_1: 41' / T_2: 51' bgs.

Baseline Start

Injection Start

Baseline Start

Withdrawal Start

Slug Volume

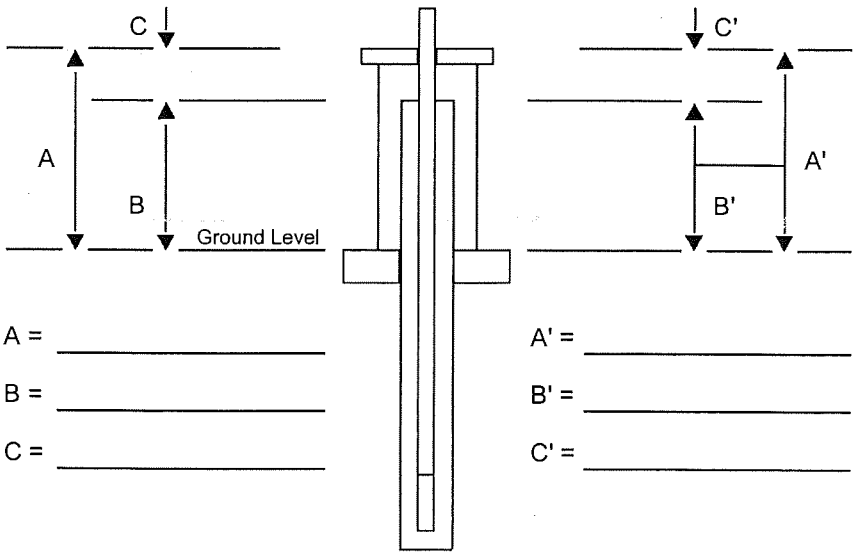
XD SN/Range (PSI)

PART 4

Last Recorded Measurements Date:

Surface level Completion

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: HERMIT: Jeff H3K-45348

Test #5: Drawdown XD_I: 6.13' Intake @ 41' bgs. (T_1)

Test # 6: Recovery

Test # 7: Drawdown XD_I: 6.10 Intake @ 51' bgs. (T_2)

Test # 8: Recovery

Prepared by (print name): A. Lantau	Signature: Geo. Aaron Lantau	Date: 7-31-08
Reviewed by (print name): Joe Fritts	Signature: [signature]	Date: 8/15/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name: 399-2-11 (399-3-28 A) 8-1-08	Well ID: C6188	Well Location: 300-FF-OU	Date: 8-1-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ○ No | Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	30.1
End of Job	30.1

DEPTH TO BOTTOM:

Start of Job	56.5'
End of Job	56.5

PART 2

WELL DEVELOPMENT DATA

Pump Model Grundfos 75S-50

Intake Depth T_1: 41.3 / T_2: 51.3

Starting Turbidity T_1: 43.3 / T_2: 123

Pump Start	Stop	Flow Rate
13:15:44	13:48:35 (T_1)	50 gpm (T_1)
13:48:35	14:07:52 (T_1)	Recovery (T_1)
1417	1438 (T_2)	Drawdown ~87 gpm

Total Pumped 3500 gal

Final Turbidity T_1: 6.64 / T_2: 6.29

XD SN/Range (PSI) 5217 (20 psi)

PART 3

INSTANTANEOUS SLUG TEST

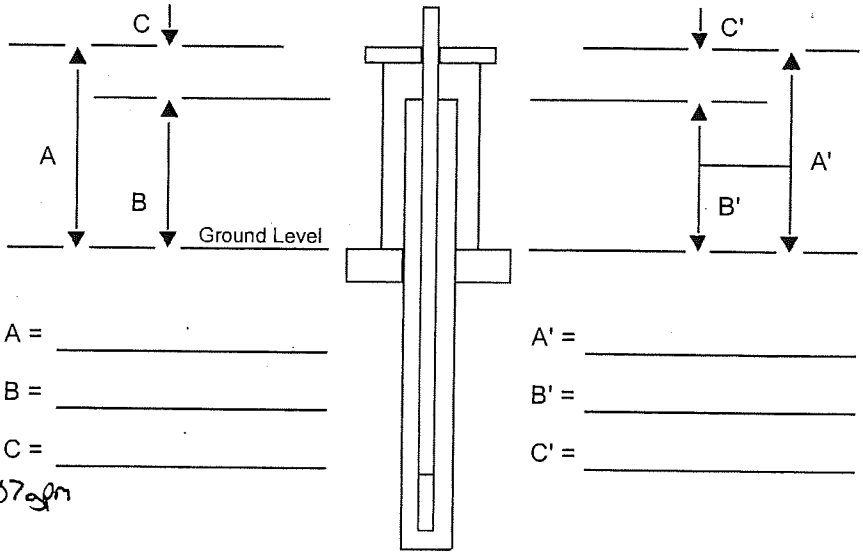
Static Water Level (TOC)	
Transducer Depth	T_1: 37.3 / T_2: 37.3
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Flush w/ Surface. Well Head

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: HERMIT Jeff H3K-4538

XD_I: 6.69

Drawdown on Test #1 (T_1)

Recovery on Test #2

XD_F: 6.69

Prepared by (print name): A. Lantow	Signature: Aaron Lantow	Date: 8-1-08
Reviewed by (print name): Joe Fritz	Signature: Joe Fritz	Date: 8/13/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-12	C6189	300-FF-5 OU	06/26/2008

Reference Measuring Point (unless otherwise noted): ~~TOP OF OUTER CASING (TOC)~~ bgs 06-26-08

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job	26.5' bgs
End of Job	26.35'

DEPTH TO BOTTOM:

Start of Job	56.6' bgs
End of Job	56.3'

PART 2

WELL DEVELOPMENT DATA

Pump Model	758-SO
Intake Depth	46.0 / 50.0
Starting Turbidity	66.0 / 152

Pump Start	Stop	Flow Rate
1339	1409	50-55
1431	1448	85

Total Pumped	1392 / 1442
Final Turbidity	3.38 / 7.15
XD SN/Range (PSI)	5217 / 20.0

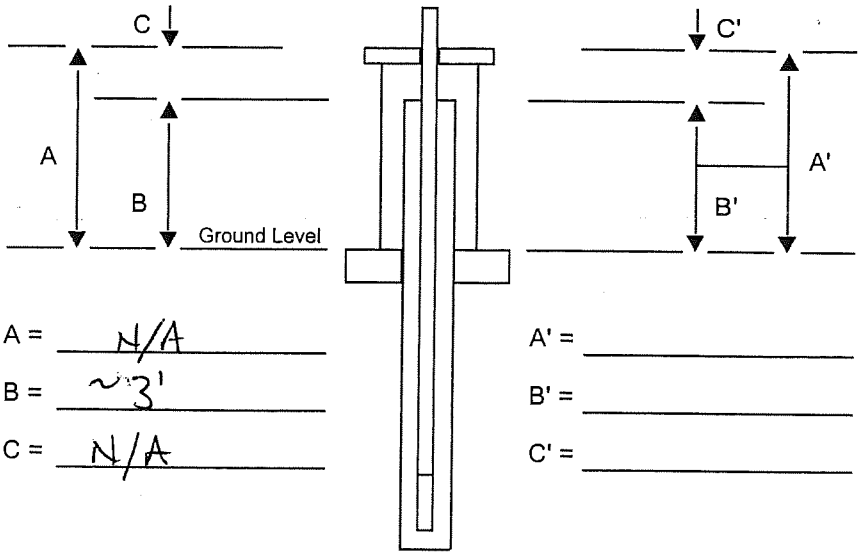
PART 3

INSTANTANEOUS SLUG TEST

Static Water Level (TOC)
Transducer Depth
Baseline Start
Injection Start
Baseline Start
Withdrawal Start
Slug Volume
XD SN/Range (PSI)

PART 4

Last Recorded Measurements	Current Measurements
Date: 6/26/08	Date:



A =	N/A	A' =	
B =	~3'	B' =	
C =	N/A	C' =	

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

meter: 24389

Test #1: xDi: 3.078

xDf: 3.107

meter: 25781

Test #2: xDi: 3.127

xDf: 3.154

meter: 27223

Perm. casing will be cut to 0.5' bgs following development.

Prepared by (print name): S. Sexton	Signature:	Date: 06/26/08
Reviewed by (print name): Joe Fritts	Signature:	Date: 8/6/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-13	C6190	300-FF-5 PVC	6/5-6/6/08

Reference Measuring Point (unless otherwise noted): TOP OF ~~OUTER CASING (TOC)~~ DK 6/5/08

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job	28.90
End of Job	29.15

DEPTH TO BOTTOM:

Start of Job	59.20
End of Job	59.20

PART 2

WELL DEVELOPMENT DATA

Pump Model	Grundfos 75-S-50
Intake Depth	39.6 & 49.6 Fbgs
Starting Turbidity	> 200 NTU

Pump Start	Stop	Flow Rate
0741	0805	49-53 gpm
0830	0859	60-80 gpm

Total Pumped	315
Final Turbidity	3.34
XD SN/Range (PSI)	20

PART 3

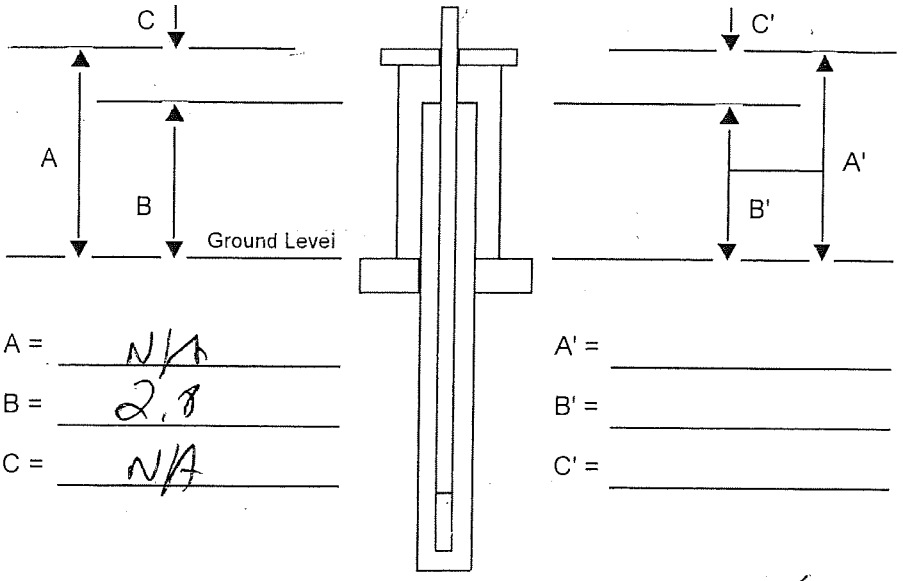
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	N/A
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 6/5/08

Current Measurements Date:



A =	N/A
B =	2.8
C =	N/A
A' =	
B' =	
C' =	

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

- Flow rate and volume pumped measured with flowmeter
- Note: PVC stick-up (B above) will change. Following below-grade completion.

DataLogger Information - pump at 49.6 Fbgs
Layla WD9 - Drawdown
Layla WD10 - Recovery

Prepared by (print name): Joe Fitz	Signature:	Date: 6/6/08
Reviewed by (print name): DC Weekes	Signature:	Date: 8/12/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-14	C6191	300-FF-5 OU	06/23/2008

Reference Measuring Point (unless otherwise noted): ~~TOP OF OUTER CASING (TOC)~~

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No 6-23-08

PART 1

STATIC WATER LEVEL: bgs

Start of Job	27.9
End of Job	28.0

DEPTH TO BOTTOM: bgs

Start of Job	56.0
End of Job	56.0

PART 2

WELL DEVELOPMENT DATA

Pump Model	7SS-50
Intake Depth	46.0/50
Starting Turbidity	21.6/8.01

Pump Start	Stop	Flow Rate
1011	1042	50-55
1101	1120	82-85

Total Pumped	1550/1596
Final Turbidity	1.77/1.67
XD SN/Range (PSI)	5217/200

PART 3

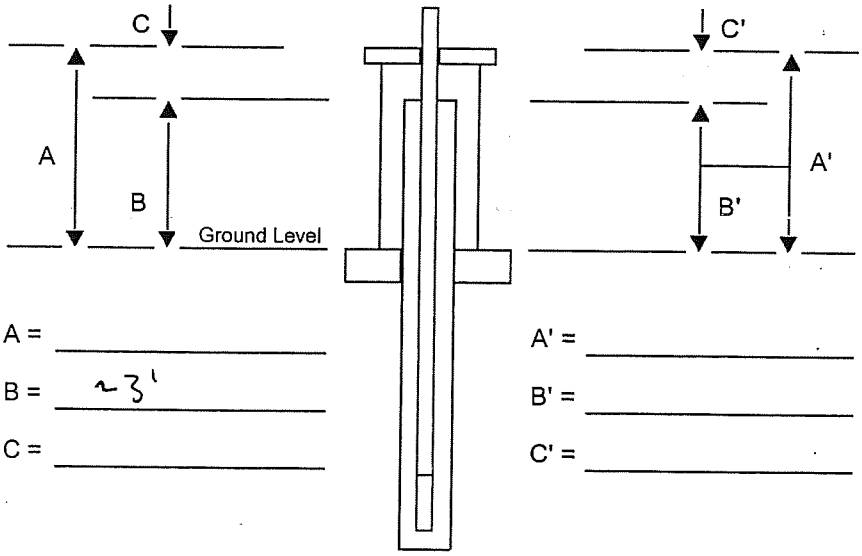
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 6/23/08

Current Measurements Date:



A = _____ A' = _____

B = ~3' B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

meter 212.17

Test #1: xDi: 1.983

xDf: 1.966

Test #2: xDi: 1.974 (1.796) SMS 6-27 meter 227.89

xDf: 1.971

Prepared by (print name):	Signature:	Date:
S. Sexton		06/23/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz		8/6/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-15	C6192	300-FF-5 OU	07/02/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ○ Yes ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job	25.9 bgs
End of Job	26.2 bgs

DEPTH TO BOTTOM:

Start of Job	56.4 bgs
End of Job	56.4 bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	Grundfos 75S-50
Intake Depth	40.0 / 50.0 bgs
Starting Turbidity	38.1 / 51.9

Pump Start	Stop	Flow Rate
0744	0814	50-55
0836	0855	86

Total Pumped	1523 / 1723
Final Turbidity	3.42 / 3.49
XD SN/Range (PSI)	5217 / 20.0

PART 3

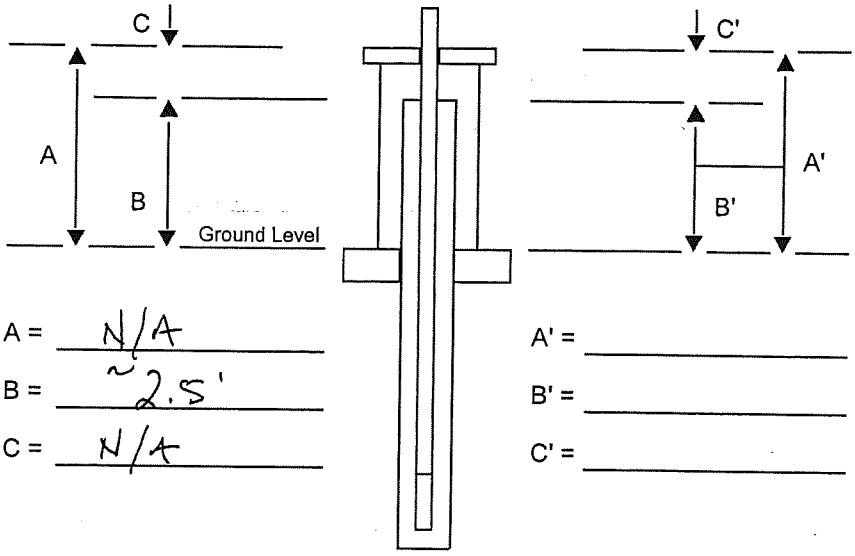
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	N/A
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/02/08

Current Measurements Date:



A = N/A
B = ~2.5'
C = N/A

A' =
B' =
C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: Test#1: meter 30177

xDi: 3.292
xDf: 3.333

Test#2: meter 31700

xDi: 3.342
xDf: 3.352

meter 33423

Prepared by (print name):	Signature:	Date:
S. Sexton		07/02/2008
Reviewed by (print name):	Signature:	Date:
L.D. Walker		7/7/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-16	C6193	300-FF-5 ou	07/17/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	30.2 bgs
End of Job	30.3 bgs

DEPTH TO BOTTOM:

Start of Job	56.4 bgs
End of Job	56.4 bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 5-50
Intake Depth	40 / 50 bgs
Starting Turbidity	>1000 / 224

Pump Start	Stop	Flow Rate
1042	1112	50
1127	1144	86

Total Pumped	1467 / 1397
Final Turbidity	3.97 / 7.57
XD SN/Range (PSI)	5217 / 20

PART 3

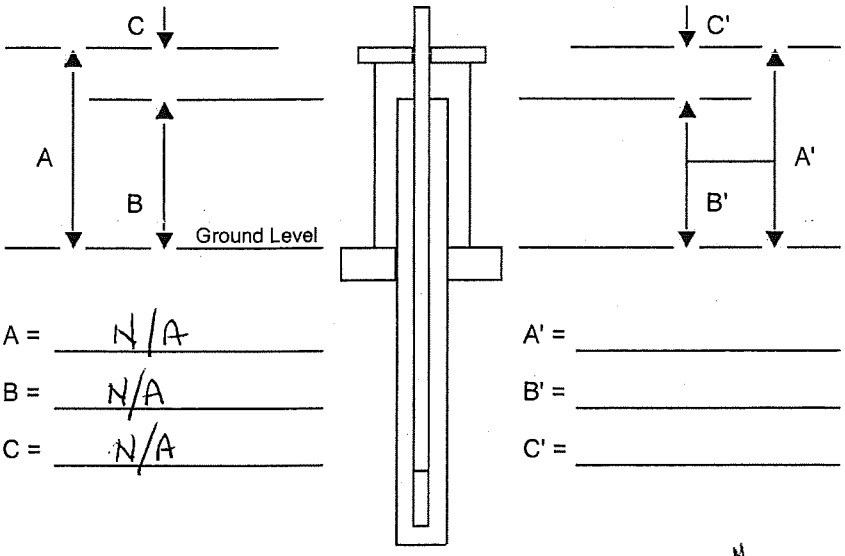
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	N/A
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Current Measurements Date:



A = N/A
B = N/A
C = N/A

A' =
B' =
C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 53911

Test #1

xDi: 8.867

xDf: 8.837

meter: 55378

Test #2

xDi: 17.096

xDf: 17.021

final meter: 56775

Prepared by (print name):	Signature:	Date:
S. Sexton		07/17/2008
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritts		8/4/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-17	C6195	300-FF-5 OU	07/02/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊘ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	26.61	bgs
End of Job	26.61	bgs

DEPTH TO BOTTOM:

Start of Job	56.75	bgs
End of Job	56.75	bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model 75 S-50

Intake Depth 40.0 (SMS 7-02-08) / 50.0

Starting Turbidity 123 / 28.8

Pump Start	Stop	Flow Rate
1113	1144	50-55
1211	1230	86

Total Pumped 1511 / 1635

Final Turbidity 1.96 / 2.41

XD SN/Range (PSI) 5217 / 20.0

PART 3

INSTANTANEOUS SLUG TEST

Static Water Level (TOC)

Transducer Depth

Baseline Start

Injection Start

Baseline Start

Withdrawal Start

Slug Volume

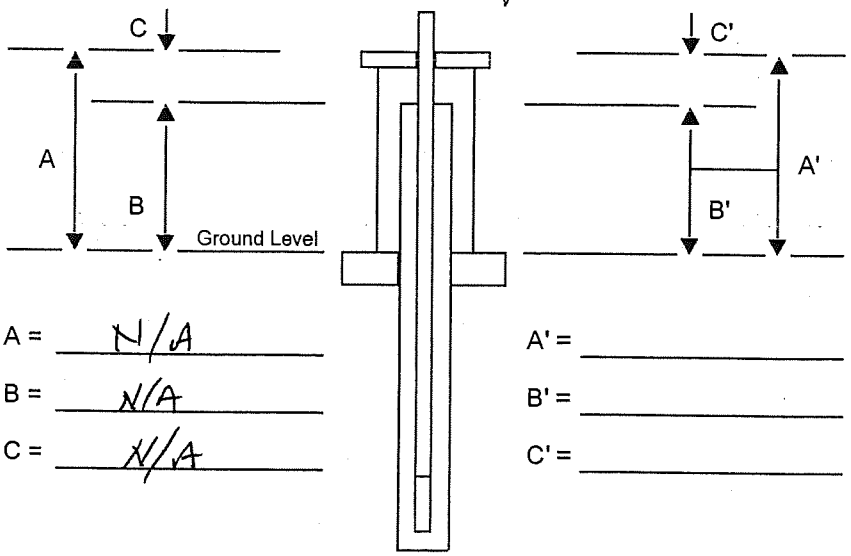
XD SN/Range (PSI)

PART 4

Last Recorded Measurements Date:

Current Measurements Date:

surface completion



A = N/A

B = N/A

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊘ No

PART 5

COMMENTS:

Test #1: meter 33423

xDi: 3.195

xDf: 3.214

Test #2: meter 34934

xDi: 3.193

xDf: 3.189

meter 36569

Prepared by (print name):	Signature:	Date:
S. Sexton		07/02/2008
Reviewed by (print name):	**Signature:**	**Date:**
Joe Frith		8/6/08

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-18	C6196	300-FF-5 OU	06/19/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ○ Yes ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job	26.15
End of Job	26.35

DEPTH TO BOTTOM:

Start of Job	58.6' bgs
End of Job	58.6' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S -50
Intake Depth	40.0 / 50.0
Starting Turbidity	53.7 / 26.5

Pump Start	Stop	Flow Rate
1467	1432	73 gpm
1457	1515	74 gpm

Total Pumped	1825 / 1332
Final Turbidity	5.12 / 2.45
XD SN/Range (PSI)	45348 / 20.0

PART 3

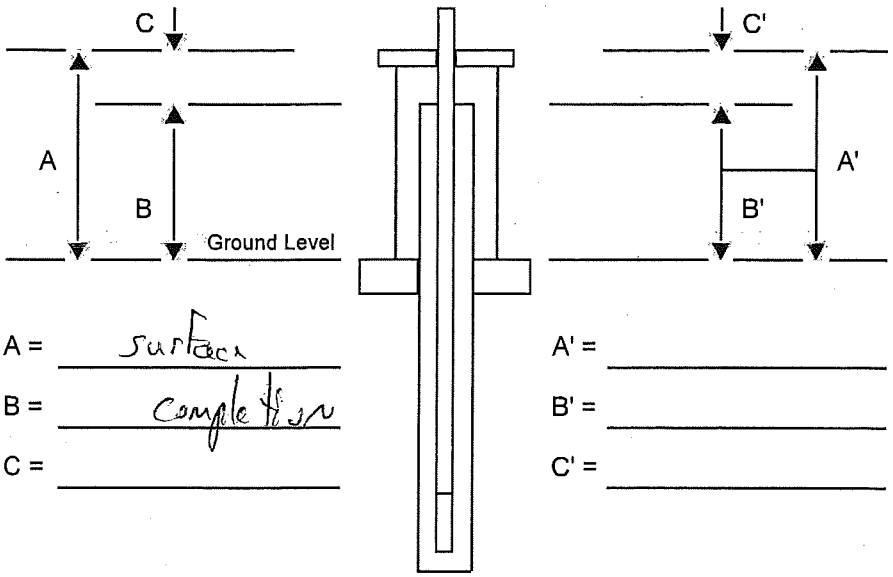
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Current Measurements Date:



A = surface

B = completion

C =

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter 18198

Test #1: xDi: 3.238

xDf: 3.243

Test #2: 5217 xDi: 3.270 meter 19861

5218(dup) xDi: 3.427

5217 xDf: 3.291

5218 (dup) xDf: 3.436 (well C6197)

final meter reading 21293

Prepared by (print name):	Signature:	Date:
S. Sexton		6/19/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fitz		8/6/08

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-19	C6197	300-FF-5 JL 6/5/08	6/5/08

Reference Measuring Point (unless otherwise noted): TOP OF ~~OUTER CASING (TOC)~~ PVC

Has the well been surveyed? ○ Yes ☒ No | Does the well have a cement pad? ○ Yes ☒ No

PART 1

STATIC WATER LEVEL:

Start of Job 28.44

End of Job 28.55

DEPTH TO BOTTOM:

Start of Job 59.05

End of Job 59.10

PART 2

WELL DEVELOPMENT DATA

Pump Model Grundfos 75-S-50

Intake Depth 42.8 + 53.7 FS to c

Starting Turbidity > 200 NTU

Pump Start	Stop	Flow Rate
1240	1311	50-64
1346	1409	50

Total Pumped 2840

Final Turbidity 4.14

XD SN/Range (PSI) 20

PART 3

INSTANTANEOUS SLUG TEST

Static Water Level (TOC)

Transducer Depth N/A

Baseline Start

Injection Start

Baseline Start

Withdrawal Start

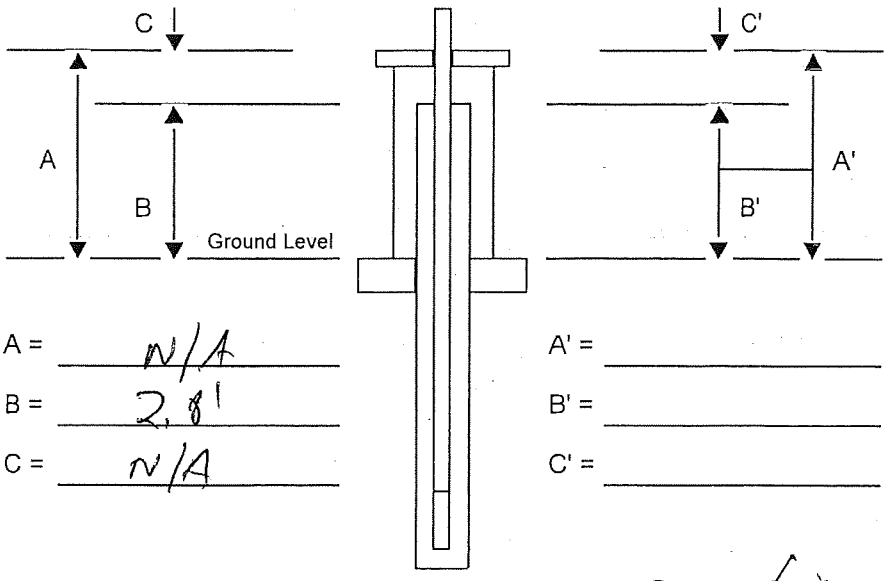
Slug Volume

XD SN/Range (PSI)

PART 4

Last Recorded Measurements Date: 6/5/08

Current Measurements Date:



A = N/A

B = 2.8'

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ☒ No

PART 5

COMMENTS:

- Flow rate and volume pumped measured with flowmeter

Note - this will be completed as a surface completion - therefore the stickup will change

Data logger Info:

Test Grass Roots WD7 - pump at 50.9, Fbgs Drawdown

Grass Roots WD8 - recovery

Prepared by (print name):	Signature:	Date:
Jae Fritts	[signature]	6/5/08
Reviewed by (print name):	**Signature:**	**Date:**
DC Weekes	DC Weekes	8/12/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-20	C6198	300-FF-5 OU	07/17/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	30.16 bgs
End of Job	30.16 bgs

DEPTH TO BOTTOM:

Start of Job	56.7 bgs
End of Job	56.7 bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40 / 50 bgs
Starting Turbidity	1000 / 354

Pump Start	Stop	Flow Rate
1320	1350	50
1413	1429	84

Total Pumped	1475 / 1364
Final Turbidity	3.43 / 5.52
XD SN/Range (PSI)	5217 / 20.0

PART 3

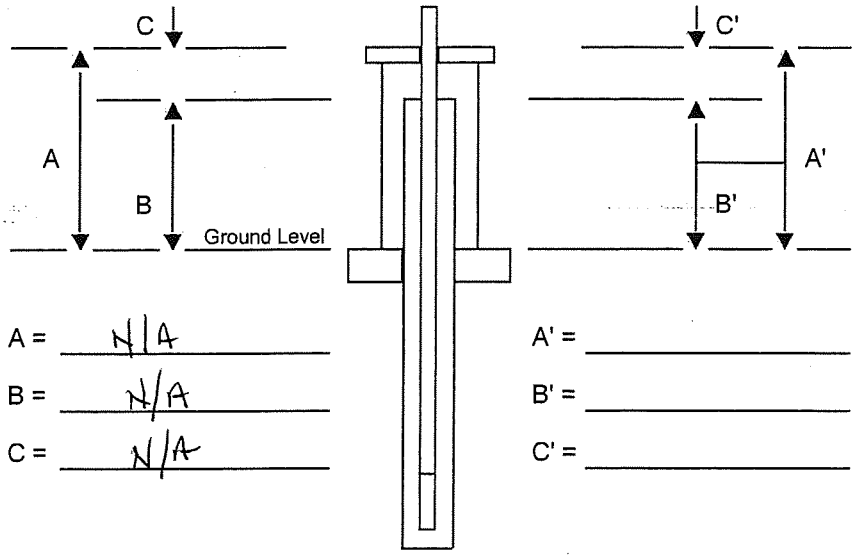
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/17/08

Current Measurements Date:



A = N/A

B = N/A

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ○ No

PART 5

COMMENTS: meter: 56775

Test #1

xDi: 7.223

xDf: 7.183

meter: 58250

Test #2

xDi: 18.633

xDf: 18.571

final meter: 59614

Prepared by (print name): S. Sexton	Signature:	Date: 07/17/08
Reviewed by (print name): Joe Fitts	Signature:	Date: 8/6/08

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-21	C6201	300-FF-5 OU	06/19/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No 06/19/08

PART 1

STATIC WATER LEVEL:

Start of Job	SMS 6-19 26.5 bgs
End of Job	26.3 bgs

DEPTH TO BOTTOM:

Start of Job	56.3 bgs
End of Job	56.3 bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model: 753-50

Intake Depth: 40.0 bgs / 50.0 bgs

Starting Turbidity: 4.26 / 22.18

Pump Start	Stop	Flow Rate
0832	~~0852~~	50 gpm
~~1114~~ 1114	1125	50 gpm
1207	1220	74 gpm

Total Pumped: 2050 gal / 975

Final Turbidity: 0.98 / 5.20

XD SN/Range (PSI): 45348 / 20.0

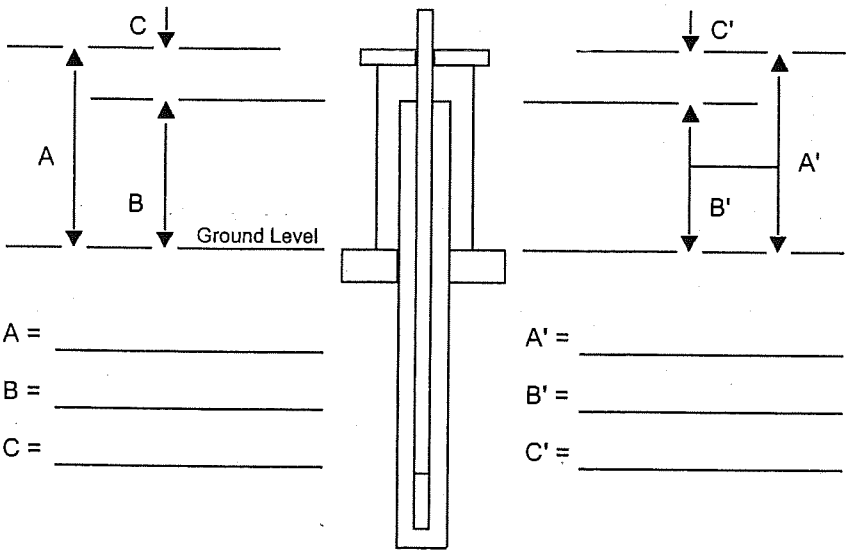
PART 3

INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:	Current Measurements Date:



A = _____ B = _____ C = _____

A' = _____ B' = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

Test #1: xD_i: 3.113 ft. Meter$_i$: 15784

xD_f: 3.136 ft. ~~hose disconnected~~ SMS 6-19 ~~before final~~ reading ~~taken~~ check valve in place

Test #2: 5217 xD_i: 3.037 meter 17055

5218 (Dup) 26.55 bgs xD_i: 3.408

5217 xD_f: 3.059

5218 (Dup) xD_f: 3.404 (well C6197)

Prepared by (print name):	Signature:	Date:
S. Sexton		6/19/08
Reviewed by (print name):	**Signature:**	**Date:**
Jae Fritts		8/4/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-22	C6202	300-FF-5	7-31-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊘ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job 30.4

End of Job 30.4

DEPTH TO BOTTOM:

Start of Job 59.0

End of Job 59.0

PART 2

WELL DEVELOPMENT DATA

Pump Model Grundfos 75-S-50

Intake Depth T_1: 40.2 / T_2: 50.2

Starting Turbidity 1000

Pump Start	Stop	Flow Rate
12:43:15	13:17:23	T_1 47 gpm
13:17:23	13:23:31	T_1 Recharge.
1332	1345	T_2 47 gpm
		T_1

Total Pumped 2209

Final Turbidity T_1: 1.43 / T_2: 5.40

XD SN/Range (PSI) (20)

PART 3

INSTANTANEOUS SLUG TEST

Static Water Level (TOC)

Transducer Depth 35.1' bgs.

Baseline Start

Injection Start

Baseline Start

Withdrawal Start

Slug Volume

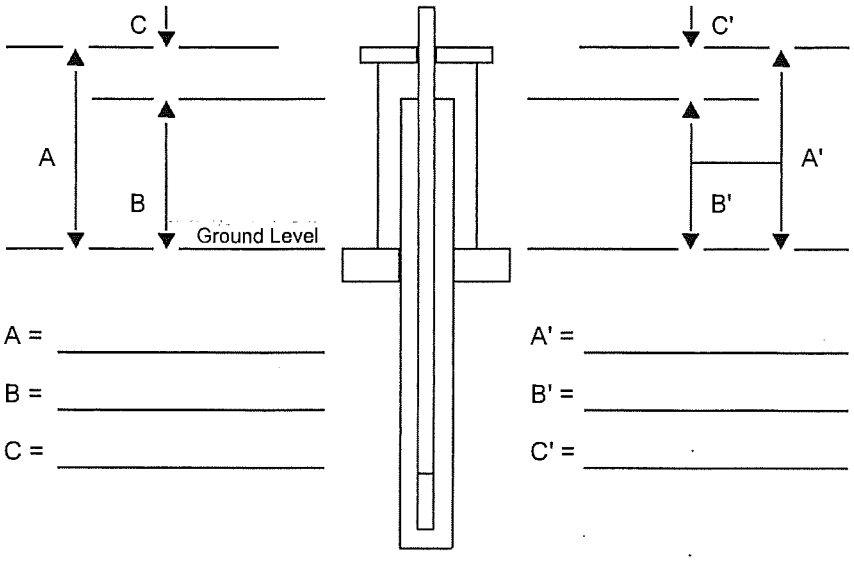
XD SN/Range (PSI)

PART 4

Last Recorded Measurements Date:

Current Measurements Date:

Flush mount



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊘ No

PART 5

COMMENTS: HERMIT # Jeff H31-~~313~~ 54348

Drawdown Test #7

Recovery Test #8 I

Prepared by (print name):	Signature:	Date:
Aaron Lantau	Aaron Lantau	7/31/08
Reviewed by (print name):	**Signature:**	**Date:**
DC Weekes	DC Weekes	8/19/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-23	C6207	300-FF-5 OU	07/16/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No 07/16/08

PART 1

STATIC WATER LEVEL:

Start of Job	30.1 ' bgs
End of Job	30.1 ' bgs

DEPTH TO BOTTOM:

Start of Job	56.3 ' bgs
End of Job	56.3 ' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40.0/50.0
Starting Turbidity	>1000 / 329

Pump Start	Stop	Flow Rate
0810	0840	50
0900	0918	86

Total Pumped	1407 / 1477
Final Turbidity	2.41 / 41.49
XD SN/Range (PSI)	5217 / 20.0

PART 3

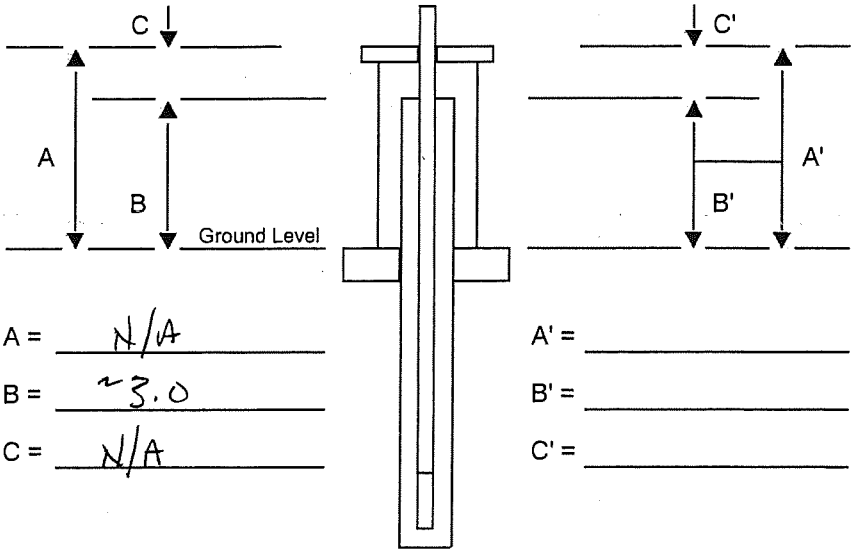
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	N/A
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/16/08

Current Measurements Date:



A = N/A

B = ~3.0

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 48188

Test #1:

xDi: 5.787

xDf: 5.782

Test #2: meter: 49595

xDi: 15.740

xDf: 15.718

final meter: 51072

Prepared by (print name):	Signature:	Date:
S. Sexton		07/16/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz		8/13/08

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-24	C6208	BVC	6/9/08

Reference Measuring Point (unless otherwise noted): TOP OF ~~OUTER CASING (TOC)~~ 6/5/06 R

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No

PART 1 Ft top of PVC

STATIC WATER LEVEL:

Start of Job	29.60
End of Job	29.60

DEPTH TO BOTTOM:

Start of Job	61.20
End of Job	61.50

PART 2

WELL DEVELOPMENT DATA

Pump Model	75-550
Intake Depth	40.6 & 50.6 Ftbgs
Starting Turbidity	>200 est.

Pump Start	Stop	Flow Rate
0826	0851	50gpm
0920	1012	75-80gpm

Total Pumped	2860
Final Turbidity	3.61
XD SN/Range (PSI)	20 / X05218

PART 3

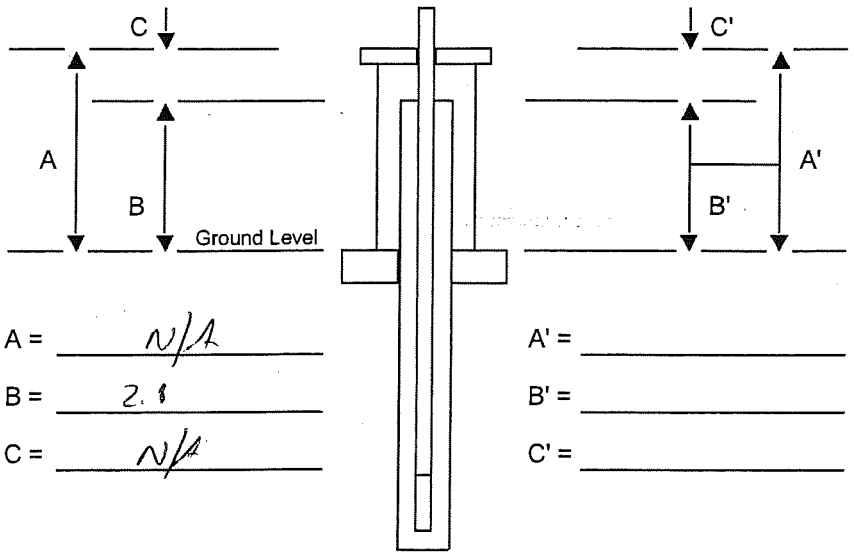
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	N/A
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Current Measurements Date:



A =	N/A
B =	2.8
C =	N/A
A' =	
B' =	
C' =	

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

Note - Well stick-up will change - below grade completion.

- Data Logger information:
  test Dylon WD1 - drawdown pump at 50.6 Ftbgs
  Dylon WD2 - recovery test

Prepared by (print name): Joe Fitz	Signature:	Date: 6/9/08
Reviewed by (print name): DC Weekes	Signature: DC Weekes	Date: 8/12/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-25	C6209	300-FF-5 OU	08/01/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ○ Yes ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job 30.5' bgs

End of Job N/A

DEPTH TO BOTTOM:

Start of Job 127.0' TOC

End of Job N/A

PART 2

WELL DEVELOPMENT DATA

Pump Model 75 S-50

Intake Depth 70' bgs

Starting Turbidity > 1000

Pump Start	Stop	Flow Rate
1525	1622	20 gpm

Total Pumped 1078

Final Turbidity 16.2

XD SN/Range (PSI) 5217 / 20.0

PART 3

INSTANTANEOUS SLUG TEST

Static Water Level (TOC)

Transducer Depth

Baseline Start

Injection Start N/A

Baseline Start

Withdrawal Start

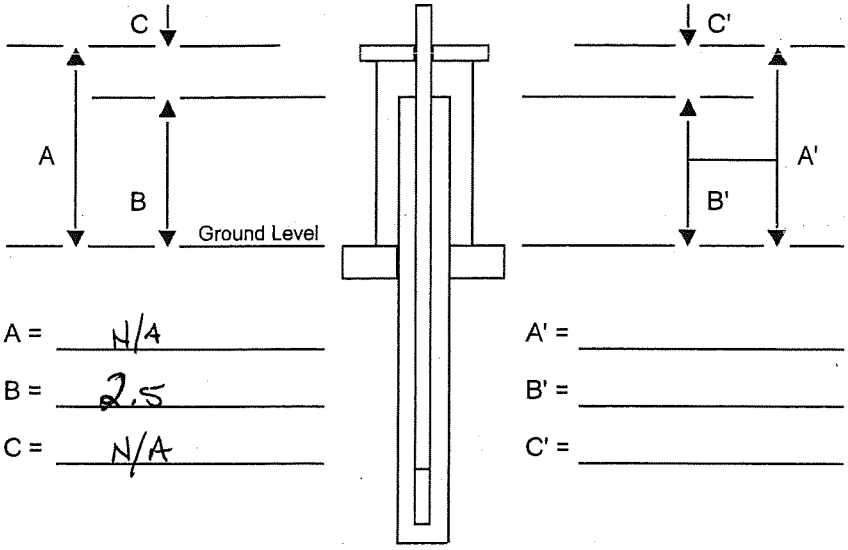
Slug Volume

XD SN/Range (PSI)

PART 4

Last Recorded Measurements Date: 08/01/08

Current Measurements Date:



A = N/A

B = 2.5

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 80863

Test #1:

xDi: 15.277

xDf: 15.256

meter: 81941

Test #2

xDi: No x Used

xDf:

meter: 08/01/08

Test #3

xDi:

xDf:

final meter:

Prepared by (print name):	Signature:	Date:
S. Sexton		08/01/2008
Reviewed by (print name):	**Signature:**	**Date:**
Jo Fritts		8/13/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-25	C6209	300-FF-5 OU	08/05/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job N/A

End of Job 31.2 ft. bgs

DEPTH TO BOTTOM:

Start of Job N/A

End of Job 124.8 ft. bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model 75 S-50

Intake Depth 80 / 100

Starting Turbidity 81.0 / 506

Pump Start	Stop	Flow Rate
0707	0737	26
0804	0834	20

Total Pumped 785 / 746

Final Turbidity 2.01 / 2.27

XD SN/Range (PSI) 5217 / 20.0

PART 3

~~**INSTANTANEOUS SLUG TEST**~~

~~Static Water Level (TOC)~~

~~Transducer Depth~~

~~Baseline Start~~

~~Injection Start~~

~~Baseline Start~~

~~Withdrawal Start~~

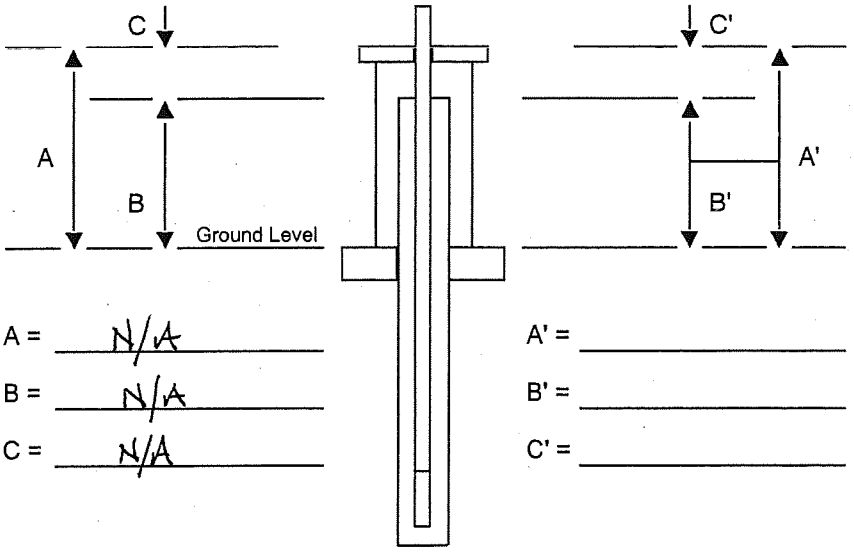
~~Slug Volume~~

~~XD SN/Range (PSI)~~

PART 4

Last Recorded Measurements Date: 08/05/08

Current Measurements Date:



A = N/A

B = N/A

C = N/A

A' = _____

B' = _____

C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 81942

Test #1: xDi: 15.230

xDf: 14.591

meter: 82727

Test #2: xDi: 14.758

xDf: 14.378

meter: 83473

Prepared by (print name):	Signature:	Date:
S. Sexton		08/05/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz		8/13/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-26	C6210	300-FF-5	7-31-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	30.7
End of Job	30.7

DEPTH TO BOTTOM:

Start of Job	59.6
End of Job	59.7

PART 2

WELL DEVELOPMENT DATA

Pump Model Grundfos 75-S-50

Intake Depth 41.5' bgs

Starting Turbidity 7-31-08 324 NTU

Pump Start	Stop	Flow Rate
15:32:07	16:13:29	~30 gpm
16:13:29	16:20:38	Recovery.

Total Pumped 1200 gal

Final Turbidity 1.82

XD SN/Range (PSI)

PART 3

INSTANTANEOUS SLUG TEST

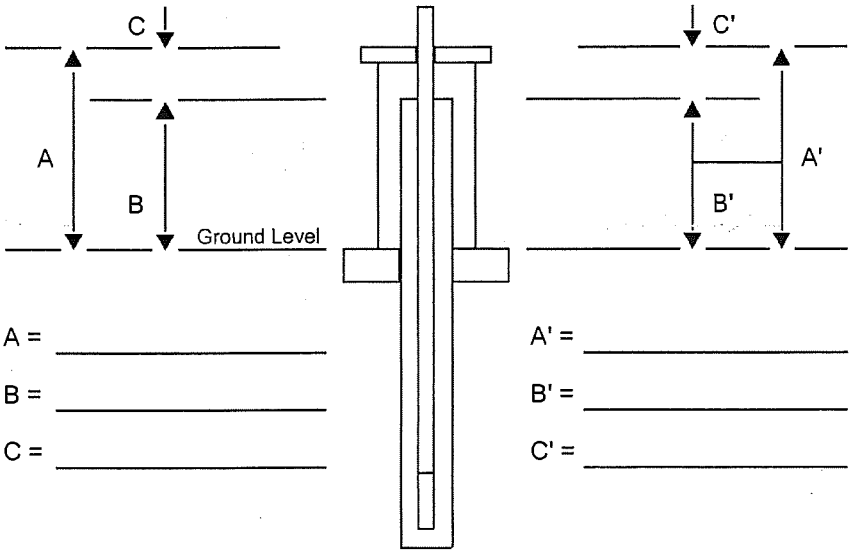
Static Water Level (TOC)	
Transducer Depth	37.5
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Flush-Mount Surface Seal

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: HERMIT # Jeff H3R-45348
Drawdown Test #1
Recovery Test #2
DX_I: 6.14 DxF: 4.64

Prepared by (print name):	Signature:	Date:
A. Lanham	Aaron Lanham	7/31/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz	Geologist	9/3/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-27	C6211	300-FF-5	7-31-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ○ No | Does the well have a cement pad? ⊗ Yes ⊗ No It will.

PART 1

STATIC WATER LEVEL:

Start of Job	30.6
End of Job	30.6

DEPTH TO BOTTOM:

Start of Job	59.0
End of Job	59.15

PART 2

WELL DEVELOPMENT DATA

Pump Model	Grundfos 75S50
Intake Depth	51' bgs.
Starting Turbidity	195 NTU

Pump Start	Stop	Flow Rate
08:28:47	09:00:15	43→23→22.5
09:00:15	09:06:56	Recovery

Total Pumped	1542.5 gal
Final Turbidity	8.36 NTU
XD SN/Range (PSI)	5217 (20 psi)

PART 3

INSTANTANEOUS SLUG TEST

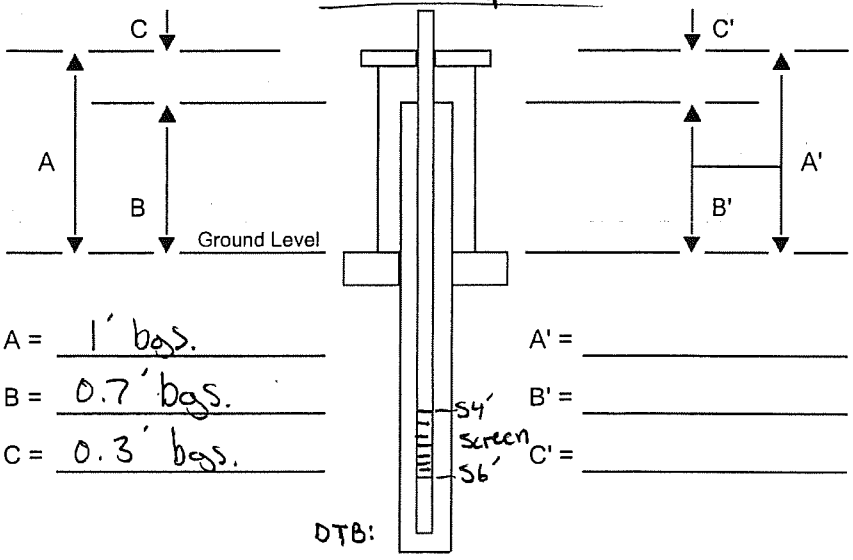
Static Water Level (TOC)	
Transducer Depth	47' bgs.
Baseline Start	N/A
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 7-31-08

Current Measurements Date:

Flush Mount Surface Completion



A = 1' bgs.
B = 0.7' bgs.
C = 0.3' bgs.
A' =
B' =
C' =

Are there any reference marks on the casing strings? ○ Yes ○ No

PART 5

COMMENTS: HERMIT: Jeff H3R-45348
XD_I: 16.7' XD_F: for Drawdown.
Drawdown on test #3
Recovery on test #4

Start Drawdown @ 43 gpm: 0828
Drop gpm @ 23 gpm: 0837
Drop gpm @ 22 gpm 0842 + remain @ 22 gpm for test.

Prepared by (print name):	Signature:	Date:
A. Lantow	Aaron Lantow	7-31-08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz	Joe Fritz	8/6/08

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-28	C6212	300-FF-5 OU	07/11/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No 7-11-08

PART 1

STATIC WATER LEVEL:

Start of Job	28.8' bgs
End of Job	28.8' bgs

DEPTH TO BOTTOM:

Start of Job	56.5' bgs
End of Job	56.5' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	43.0' bgs
Starting Turbidity	563

Pump Start	Stop	Flow Rate
1209	1244	20.0

Total Pumped	627 gals
Final Turbidity	12.3 NTU
XD SN/Range (PSI)	5217 / 20.0

PART 3

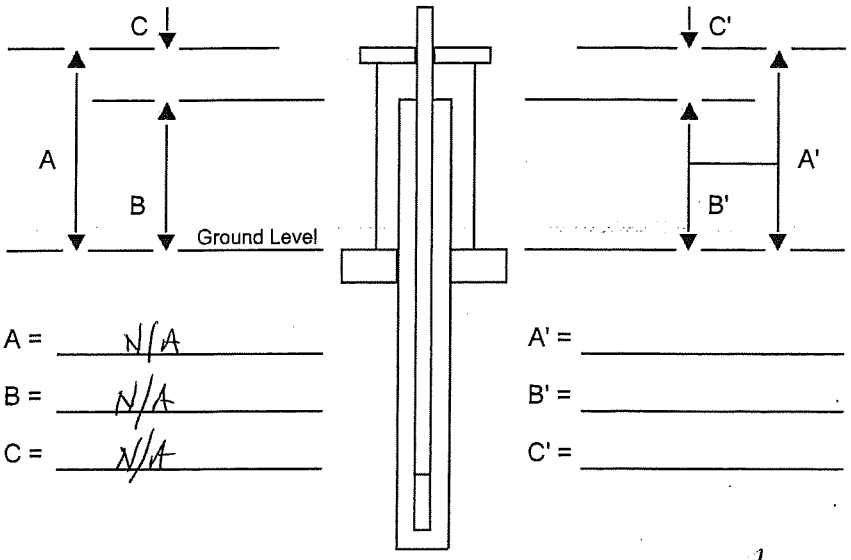
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/11/2008

Current Measurements Date:



A = N/A

B = N/A

C = N/A

A' = _____

B' = _____

C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 39215

SMS 7-11-08

xDi: ~~7.709~~ 11.053

xDf: 11.051

final meter: 39842

Prepared by (print name):	Signature:	Date:
S. Sexton		07/11/2008
Reviewed by (print name):	**Signature:**	**Date:**
Jeff Hs		8/13/08

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-29	C6216	300-FF-5 OU	07/11/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No 07/11/08

PART 1

STATIC WATER LEVEL:

Start of Job	29.0' bgs
End of Job	29.0' bgs

DEPTH TO BOTTOM:

Start of Job	55.3' bgs
End of Job	55.3' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	41.0' bgs
Starting Turbidity	11.0

Pump Start	Stop	Flow Rate
1008	1048	50

Total Pumped	1877
Final Turbidity	0.71
XD SN/Range (PSI)	5217/20.0

PART 3

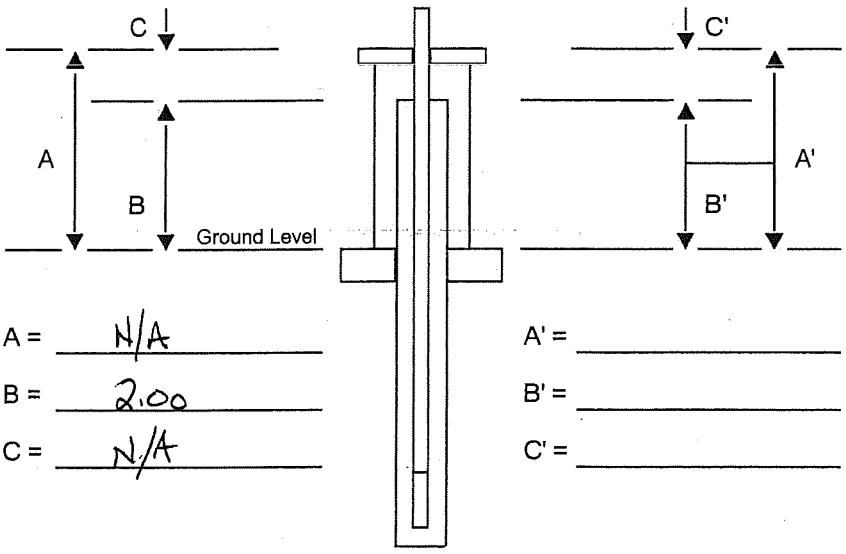
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/11/2008

Current Measurements Date:



A = N/A

B = 2.00

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 37338

xDi: 8.261

xDf: 8.225

final meter: 39215

Prepared by (print name):	Signature:	Date:
S. Sexton		07/11/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz		8/14/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-30	C6217	300-FF-5	7/30/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? Ø Yes Ø No

PART 1

STATIC WATER LEVEL:

Start of Job	31.54
End of Job	31.53

DEPTH TO BOTTOM:

Start of Job	60.1
End of Job	60.1

PART 2

WELL DEVELOPMENT DATA

Pump Model	75-550
Intake Depth	50.0
Starting Turbidity	13.1

Pump Start	Stop	Flow Rate
1516	1551	26 gal/min

Total Pumped	~~446~~ 8608 gal	1170 gal
Final Turbidity	1.44	
XD SN/Range (PSI)	5217/20 psi	

PART 3

INSTANTANEOUS SLUG TEST

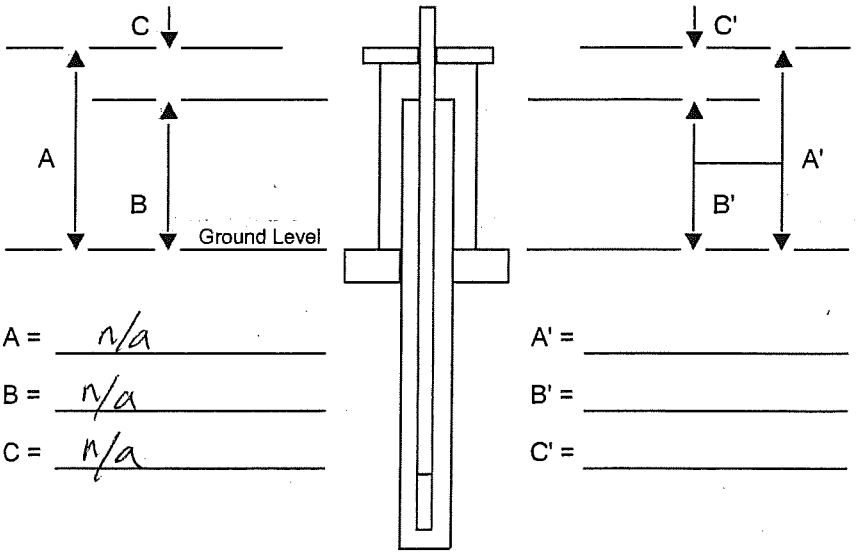
Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Stop	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

Used 7/30/08

PART 4

Last Recorded Measurements Date:

Current Measurements Date:



A = n/a

B = n/a

C = n/a

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

XD initial: 15.403

XD Final: 15.420

Prepared by (print name):	Signature:	Date:
J. Throolin		7/30/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fitz		8/13/08

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-2-31	C6218	300-FF-5 OU	07/11/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes 07/11/08 ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job	28.18' bgs
End of Job	28.19' bgs

DEPTH TO BOTTOM:

Start of Job	56.13' bgs
End of Job	56.13' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	7SS-50
Intake Depth	4010
Starting Turbidity	25.4

Pump Start	Stop	Flow Rate
0802	0855	20

Total Pumped	768
Final Turbidity	5.02
XD SN/Range (PSI)	5217/2010

PART 3

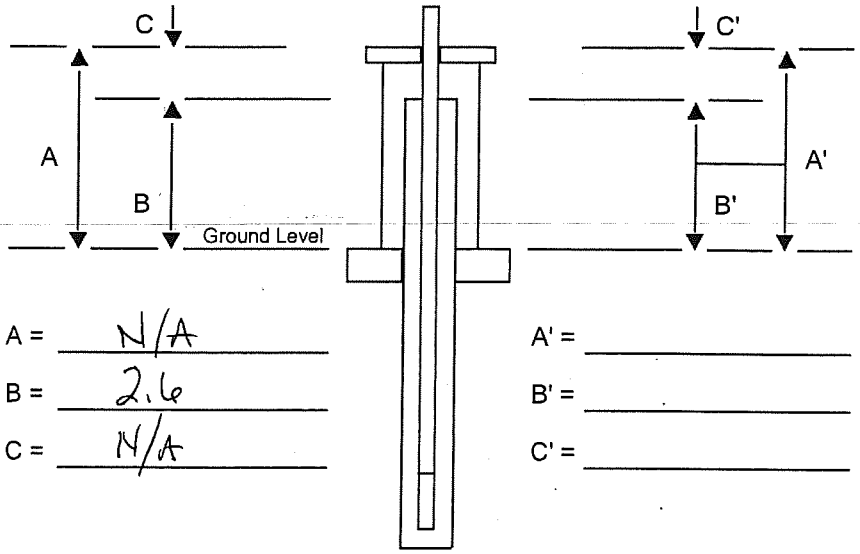
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/11/08

Current Measurements Date:



A = N/A

B = 2.6

C = N/A

A' = _____

B' = _____

C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 36570

xDi: 8.159

xDf: 8.214

final meter: 37338

pump shut off from 0809 to 0811

initial gpm ~50, turned down to 20 for 40 mins

Prepared by (print name):	Signature:	Date:
S. Sexton		07/11/2008
Reviewed by (print name):	**Signature:**	**Date:**
J. Griffis		8/15/09

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-23	C6194	300-FF-5	7-31-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC) -8/1/08

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	33.7
End of Job	~~30.1~~ 8-1-08 31.0

DEPTH TO BOTTOM:

Start of Job	57.0
End of Job	57.0

PART 2

WELL DEVELOPMENT DATA

Pump Model: Grundfos 75-S-50

Intake Depth: T_1: 41.5 / T_2: 51.5'

Starting Turbidity: T_1: 270 NTU / T_2: 25.0

Pump Start	Stop	Flow Rate
16:58:47	17:30:16	T_1 50 gpm
17:30:16	17:41:44	T_1 Recovery
0727	0743	T_2 ~~8~~ 8-1-08 60 gpm

Total Pumped: 3744 gal 8-1-08

Final Turbidity: T_1: 1.38 T_2: ~~6~~ 3.46

XD SN/Range (PSI): #5217 (20)

PART 3

INSTANTANEOUS SLUG TEST

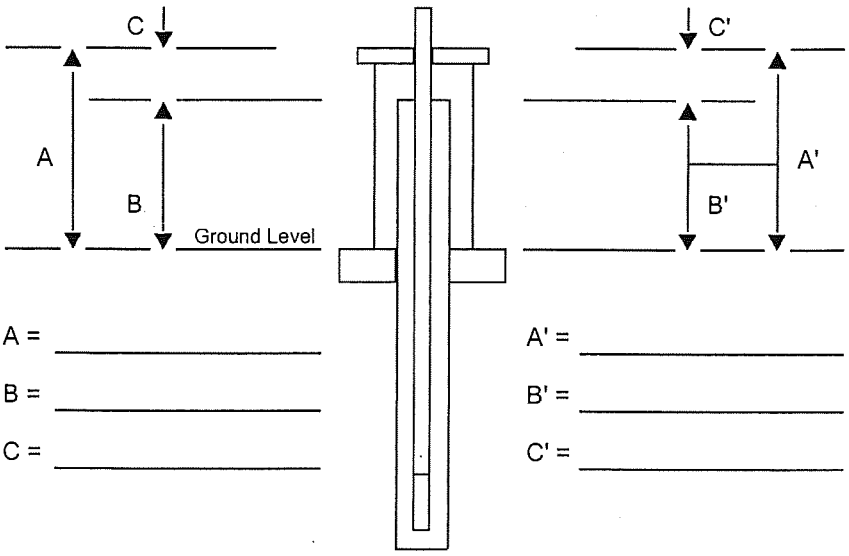
Static Water Level (TOC)	
Transducer Depth	37.5' bgs.
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Well Head Flush w/ Surface.

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: HERMIT: Jeff-H3K-45348

Drawdown on Test #3 : T_1 Interval 1

Recovery on Test #4 : T_1

XD_I: 6.76

XD_F: 6.84

Drawdown + recovery on lower interval performed on 8-1-08

Prepared by (print name):	Signature:	Date:
A. Lantow	Aaron Lantow	7/31/08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritts	Joe Fritts	8/14/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-24	C6199	300-FF5 OU	8-1-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ○ No | Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	29.9
End of Job	30.0

DEPTH TO BOTTOM:

Start of Job	56.7
End of Job	56.7

PART 2

WELL DEVELOPMENT DATA

Pump Model Grundfos 75-S-50

Intake Depth T_1: 41.3' / T_2: 51.3'

Starting Turbidity 645 NTU

Pump Start	Stop	Flow Rate
08:39:04	0915 T_1	50 gpm
0915	09:25 T_1	Recovery
0931	0941	T_2 Drawdown
0941	0951	T_2 Recovery

Total Pumped ~~3500~~ 2500 (A 8-1-08)

Final Turbidity T_1: 3.41 / T_2: 7.08

XD SN/Range (PSI) #5217 (20psi)

PART 3

INSTANTANEOUS SLUG TEST

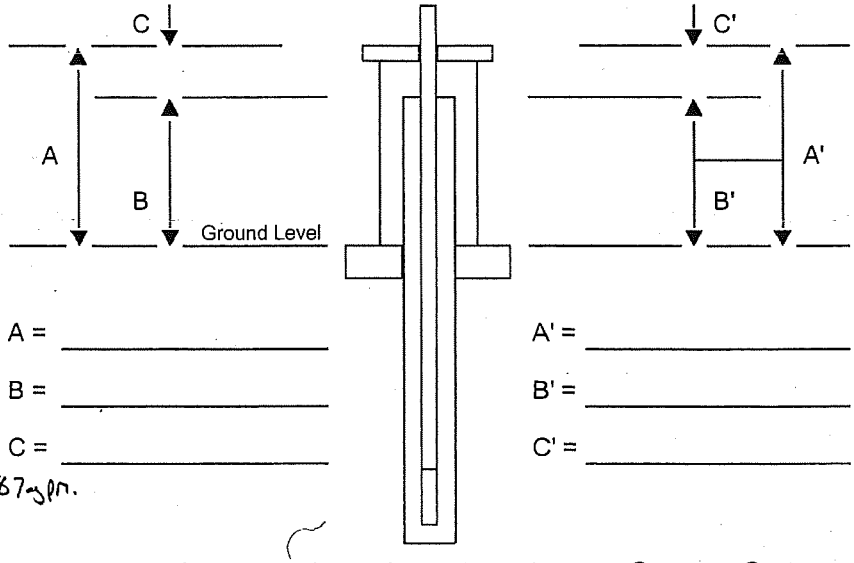
Static Water Level (TOC)	
Transducer Depth	37.3' bgs
Baseline Start	No Test Performed
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Ground Level Completion

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

87 gpm.

Are there any reference marks on the casing strings? ○ Yes ○ No

PART 5

COMMENTS: HERMIT Jeff H3K-45348

Drawdown on Test# 5 (T Interval) XD_I: 6.69 1500 gal

Recovery on Test# 5 (upper)

Recovery test on #same test as drawdown test... test..

Run recovery test on #5 Test on hermit on (lower) interval.

XD_F: 6.60

Prepared by (print name):	Signature:	Date:
A. Lantow	Aaron Lantow	8-1-08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz	Joe Fritz	8/5/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-25	C60200	300-FF-5 OU	04/27/2008

Reference Measuring Point (unless otherwise noted): ~~TOP OF OUTER CASING (TOC)~~

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No (4-27-08)

PART 1

STATIC WATER LEVEL:

Start of Job	26.7
End of Job	26.35

DEPTH TO BOTTOM:

Start of Job	56.9
End of Job	56.9

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40.0 / 50.0
Starting Turbidity	15.2 / 17.4

Pump Start	Stop	Flow Rate
0812	0846	50
0913	0928	85

Total Pumped	1724 / 1228
Final Turbidity	2.85 / 3.95
XD SN/Range (PSI)	5217 / 20.0

PART 3

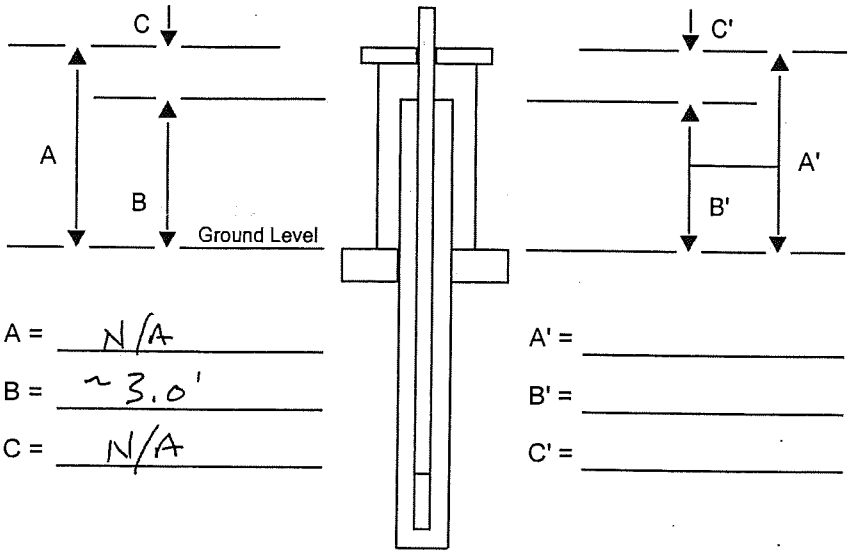
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	N/A
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Current Measurements Date:



A = N/A

B = ~3.0'

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

meter: 27223

Test #1: xDi: 3.187

xDf: 3.216

meter: 28947

Test #2: xDi: 3.249

xDf: 3.288

Final meter reading: 30175

Prepared by (print name):	Signature:	Date:
S. Sexton		04/27/2008
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz		8/5/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-26	C6203	300-FF-5 PVC	6/5/08

Reference Measuring Point (unless otherwise noted): TOP OF ~~OUTER CASING (TOC)~~ TOC 6/5/08

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job	28.63
End of Job	28.70

DEPTH TO BOTTOM:

Start of Job	54.5
End of Job	54.6

PART 2

WELL DEVELOPMENT DATA

Pump Model	Franklin SHP/Grundfos
Intake Depth	39.7 & 48.7 Ftbgs 75-5-50
Starting Turbidity	> 200 NTU

Pump Start	Stop	Flow Rate
0900	0930	45-50 gpm
0949	1020	55-60 gpm

Total Pumped	3280
Final Turbidity	3.52
XD SN/Range (PSI)	20

PART 3

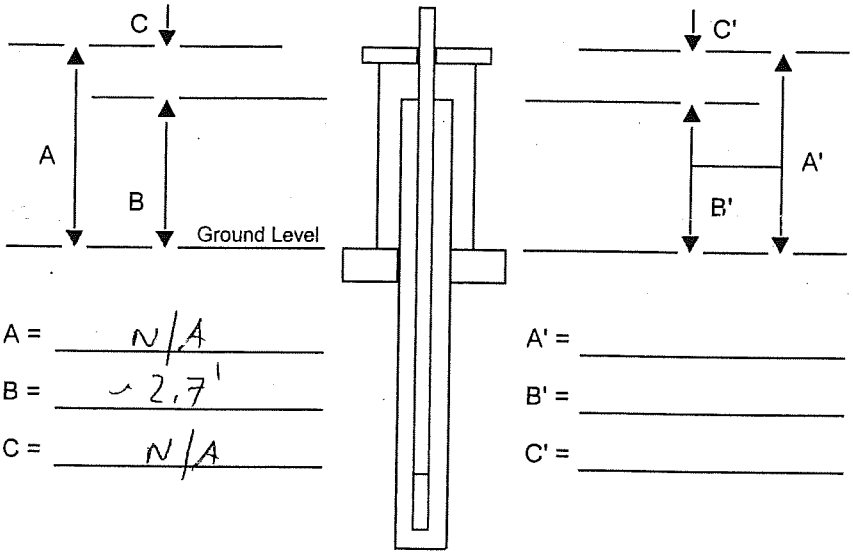
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	N/A
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 6/5/08

Current Measurements Date:



A = N/A

B = ~2.7'

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

Flow rate & volume pumped measured with a flow meter

Note: well will be completed as a surface completion - therefore the stick-up will change

Data Logger Information:

Grass Roots WD5 - pump at 48.7 Ftbgs; drawdown

Grass Roots WD6 - recovery

Prepared by (print name): Jas Fritz	Signature:	Date: 6/5/08
Reviewed by (print name): J DC Weekes	Signature:	Date: 8/12/08

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-27	C6204	300-FF-5 OU	07/17/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊘ No

Does the well have a cement pad? ○ Yes ⊘ No 07/17/08

PART 1

STATIC WATER LEVEL:

Start of Job	30.3' bgs
End of Job	30.3' bgs

DEPTH TO BOTTOM:

Start of Job	56.8' bgs
End of Job	56.8' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40/50 bgs
Starting Turbidity	817/36.0

Pump Start	Stop	Flow Rate
0729	0759	50
0858	0914	84

Total Pumped	1524/1313
Final Turbidity	1.13/0.97
XD SN/Range (PSI)	5217/20

PART 3

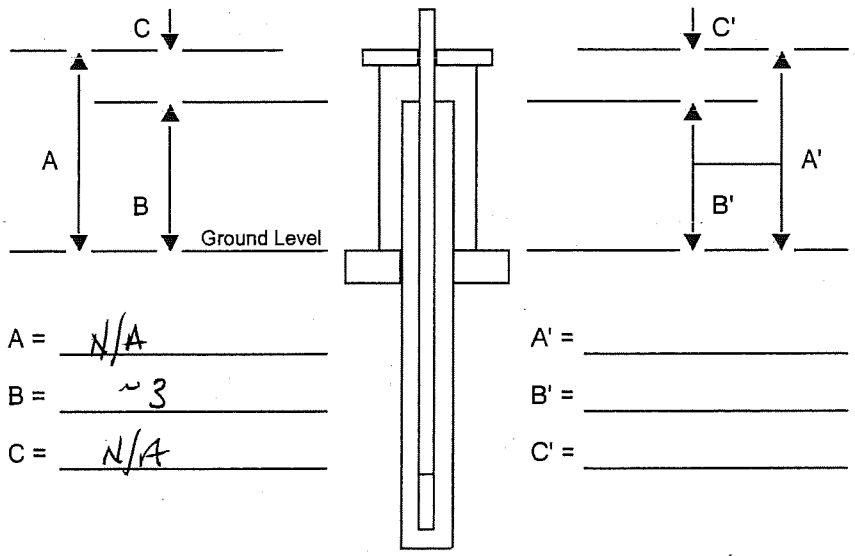
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/17/08

Current Measurements Date:



A = N/A

B = ~3

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊘ No

PART 5

COMMENTS: meter: 51073

Test #1

xDi: 7.941

xDf: 7.932

meter: 52597

Test #2

xDi: 2.511

xDf: 2.501

final meter: 53910

Prepared by (print name):	Signature:	Date:
S. Sexton		07/17/2008
Reviewed by (print name):	**Signature:**	**Date:**
Joel A.		9/3/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-28	C6205	300-FF-5 OU	8-1-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	~~57.0~~ At 8-1-08	30.7
End of Job	30.9	

DEPTH TO BOTTOM:

Start of Job	57.0
End of Job	57.0

PART 2

WELL DEVELOPMENT DATA

Pump Model: Grundfos 75-5-50

Intake Depth: T_1: 41.0' bgs / T_2: 51.0

Starting Turbidity: T_1: 401 / T_2: 446

Pump Start	Stop	Flow Rate
10:36:15	11:08:46 (T1)	50 gpm
11:08:46	(T1) At 8-1-08 87 gpm Recovery	
1126	1147 (T2)	87 gpm

Total Pumped: 3500 gal

Final Turbidity: T_1: 2.97 / T_2: 6.98

XD SN/Range (PSI): 5217 (20 psi)

PART 3

INSTANTANEOUS SLUG TEST

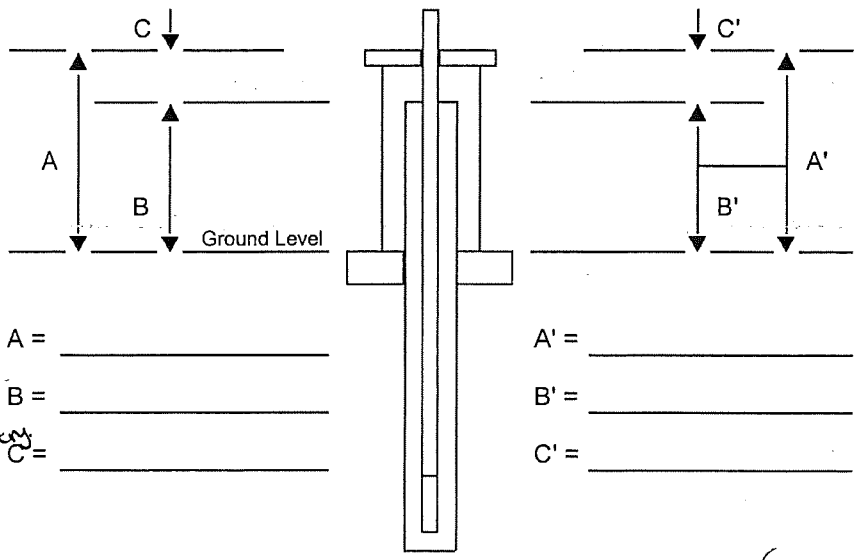
Static Water Level (TOC)	
Transducer Depth	37.0' bgs.
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Ground Level Surface Completion

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: HERMIT Jeff H3K-4538

XD_I: 5.11

Drawdown on Test#7 Interval (T1)

Recovery on Test#8

XD_F: 5.90

Prepared by (print name):	Signature:	Date:
A. Landau	Jason Lutes	8-1-08
Reviewed by (print name):	**Signature:**	**Date:**
Joe Frith		8/15/08

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-29	C6206	300-FF-5 OU	07/11/2008

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ○ Yes ⊗ No 7-11-08

PART 1

STATIC WATER LEVEL:

Start of Job	28.9 ft bgs
End of Job	28.9' bgs

DEPTH TO BOTTOM:

Start of Job	56.3' bgs
End of Job	56.3' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40.0 / 50.0
Starting Turbidity	104 / 39.7

Pump Start	Stop	Flow Rate
1559	1617	50
1623	1635	50
1645	1655	84

Total Pumped	1345 / 845
Final Turbidity	1.79 / 2.79
XD SN/Range (PSI)	5217 / 20.0

PART 3

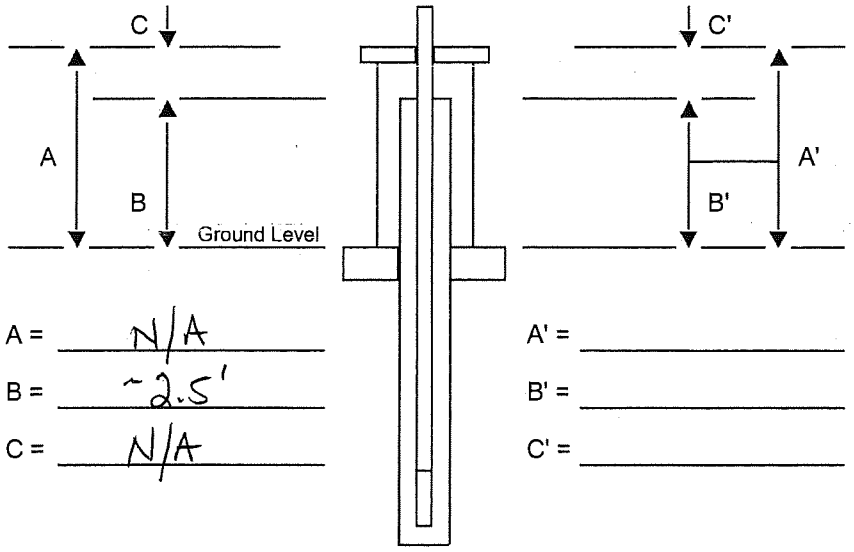
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	N/A
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/11/08

Current Measurements Date:



A = N/A

B = ~2.5'

C = N/A

A' =

B' =

C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

Test #1 meter: 40500

xDi: 0.411

xDf: 0.413

Test #2 meter 411845

xDi: 19.318

xDf: 19.288

final meter: 42690

Prepared by (print name):	Signature:	Date:
S. Sexton	Geologist	07/11/2008
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fritz		8/11/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-30	C6213	300-FF-5 OU	07/11/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC) 7-11-08

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ○ Yes ⊗ No

PART 1

STATIC WATER LEVEL:

Start of Job	28.9' bgs
End of Job	28.9' bgs

DEPTH TO BOTTOM:

Start of Job	55.5' bgs
End of Job	55.5' bgs

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	40.0' bgs
Starting Turbidity	208

Pump Start	Stop	Flow Rate
1414	1445	20

Total Pumped	6056 gallons
Final Turbidity	3.78
XD SN/Range (PSI)	5217/20.0

PART 3

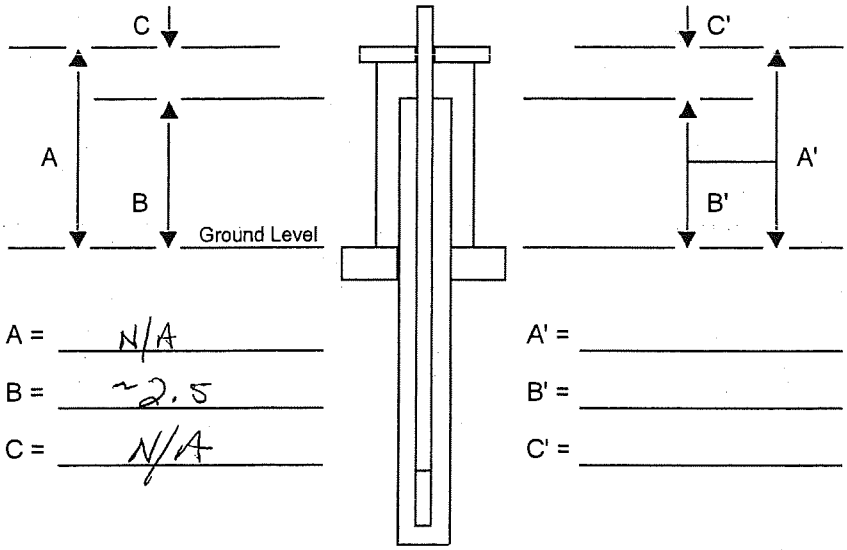
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	N/A
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 07/11/2008

Current Measurements Date:



A = N/A | A' =

B = ~2.5 | B' =

C = N/A | C' =

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS: meter: 39844

xDi: 7.1671

xDf: 7.1639

final meter: 40500

Prepared by (print name):	Signature:	Date:
S. Sexton		07/11/2008
Reviewed by (print name):	**Signature:**	**Date:**
Joe Fitts		8/7/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-30 9/14/09	C6214	300-FF-5	7/18/08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No

Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	30.95
End of Job	30.95

DEPTH TO BOTTOM:

Start of Job	60.1
End of Job	60.0

PART 2

WELL DEVELOPMENT DATA

Pump Model	75 S-50
Intake Depth	50.0
Starting Turbidity	2.46 NTU

Pump Start	Stop	Flow Rate
0745	0820	55 gpm

Total Pumped	2080
Final Turbidity	0.42 NTU
XD SN/Range (PSI)	5217/ 20 psi

PART 3

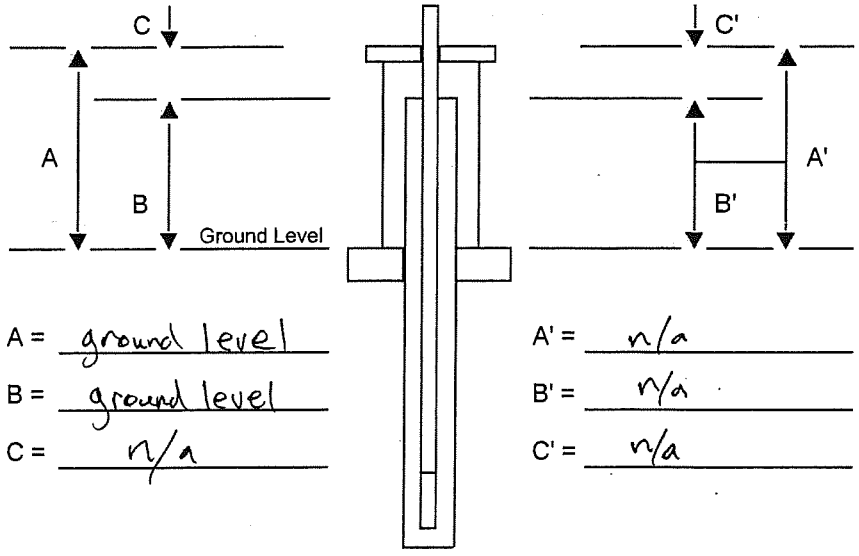
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date:

Current Measurements Date:



A =	ground level
B =	ground level
C =	n/a
A' =	n/a
B' =	n/a
C' =	n/a

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

Initial XD: 15.928
Final XD: 15.887

Prepared by (print name): Jacob Throolin	Signature:	Date: 7/18/08
Reviewed by (print name): Joe Fritz	Signature:	Date: 8/14/08

A-6003-644 (03/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name:	Well ID:	Well Location:	Date:
399-3-32	C6215	300-FF-5	7-31-08

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊗ No | Does the well have a cement pad? ⊗ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	33.20 ' bgs
End of Job	30.6 bgs.

DEPTH TO BOTTOM:

Start of Job	58.3 bgs.
End of Job	58.6 bgs.

PART 2

WELL DEVELOPMENT DATA

Pump Model: Grundfos 75S50 ± 8 stage.

Intake Depth: 41 ' bgs.

Starting Turbidity: 514

Pump Start	Stop	Flow Rate
6:57:33	7:26:36	18.5
7:26:38	7:32:12	Recovery

Total Pumped: 536.5 gal

Final Turbidity: 7.99 NTU

XD SN/Range (PSI): 6712 (20psi)

PART 3

INSTANTANEOUS SLUG TEST

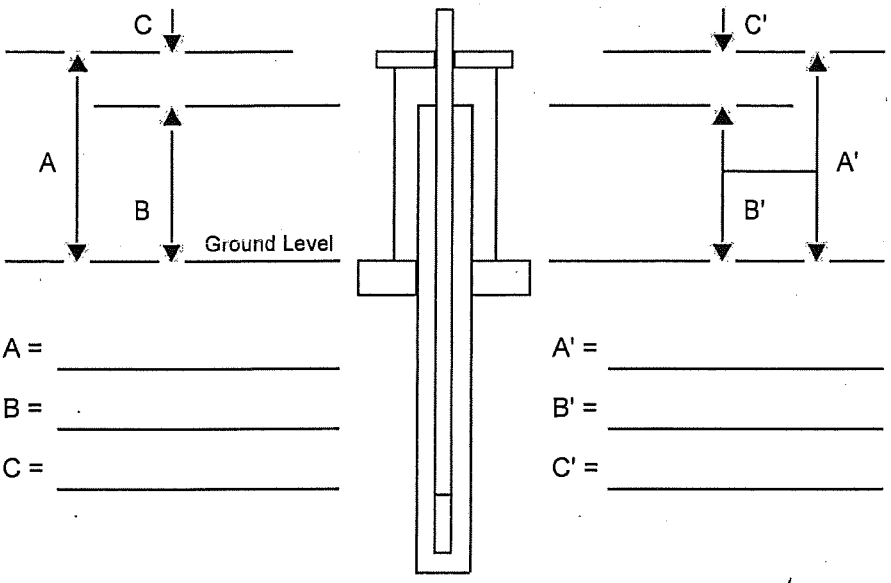
Static Water Level (TOC)	
Transducer Depth	37.8 ' bgs.
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: 7-31-08

Flush w/ surface

Current Measurements Date:



A = _____ A' = _____

B = _____ B' = _____

C = _____ C' = _____

Are there any reference marks on the casing strings? ○ Yes ⊗ No

PART 5

COMMENTS:

XD initial: 7.276 XD final: 5.56 for Drawdown

Data logger: Jeff #3k-45348

Drawdown on Test #1

Recovery on Test #2

Prepared by (print name):	Signature:	Date:
A. Lantow	Aaron Lantow	7-31-08
Reviewed by (print name):	**Signature:**	**Date:**
Jeff Fritz		8/13/08

Appendix F

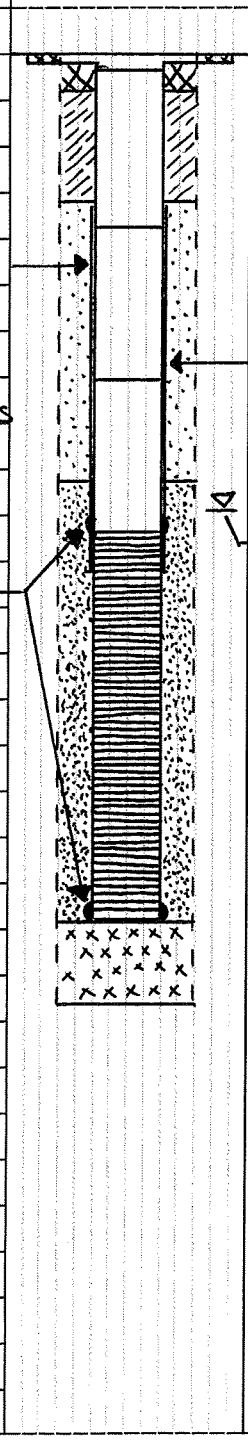
Well Summary Sheets

WELL SUMMARY SHEET

Start Date: 06/27/08
Finish Date: 07/09/08
Page 1 of 1

Well ID: C6184
Well Name: 399-2-7
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 08/05/08
Reviewed By: [illegible]
Date: 8/15/08
Signature: [signature]
Signature: [signature]

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface 12" diameter protective vault w/ screw down lid 0-1.0 ft bgs ERTs #15: 3.3 to 33.8 4" ID Schedule 40 PVC casing 0.5 to 31.3 ft. bgs 4" PVC screen, 0.020" + end cap 31.3 to 56.6 ft. bgs centralizer Portland cement grout: 0 to 2.6 ft bgs bentonite chips: 2.6 to 9.7 ft bgs 40-140 silica sand: 9.7 to 28.0 ft bgs 10-20 silica sand: 28.0 to 56.7 ft bgs bentonite pellets: 56.7 to 62.0 ft bgs All temporary casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-11: Sandy Gravel (SG)
		11-12: Sand (S)
15		12-25: silty sandy Gravel (msG)
		Thermistors: 3.3 to 33.8
		25-36: sandy Gravel (sG)
30		DTW = 29.9 on 07/15/2008
		36-55.5: Gravel (G)
45		
		55.5-62: silt (M)
60		TD = 62.0 ft bgs on 06/27/2008
		All depths recorded in feet "below ground surface" (bgs)
75		

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 07/07/08
Finish Date: 07/10/08
Page 1 of 1

Well ID: C6185
Well Name: 399-2-8
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 08/04/08
Reviewed By: Jag Frith
Date: 8/6/08
Signature: S. Sexton
Signature: Jag Frith

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface	
12" diameter protective vault w/ screw down lid 0-1.0 ft bgs	
ERTs #18: 3-33.5	→ thermistors
4" ID Schedule 40 PVC casing 0.5 to 31.0 ft. bgs	
4" PVC screen, 0.020" + end cap 31.0 to 56.3 ft. bgs	
centralizer	→
cement grout: 0 to 3.0 ft. bgs	
bentonite chips: 3.0 to 10.2 ft bgs	
40-140 silica sand: 10.2 to 28.6 ft bgs	
10-20 silica sand: 28.6 to 57.0 ft. bgs	
bentonite pellets: 57.0 to 58.0 ft. bgs	
slough material: 58.0 to 60.0 ft. bgs	
All temporary casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-8: sandy Gravel (sG)
		8-9: Sand (S)
		9-21.5: sandy Gravel (sG)
15		Thermistors: 3-33.5 ft. bgs
		21.5-24.5: silt (M)
		24.5-38: sandy Gravel (sG)
30		DTW = 29.5 ft. bgs on 07/14/08
		38-41: silt (M)
45		41-48.5: Sand (S)
		48.5-50.5: Gravel (G)
		50.5-60: silt (M)
60		TD = 60 ft bgs on 07/08/08
		All depths recorded in feet "below ground surface" (bgs)
75		

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 05/12/2008
Finish Date: 06/04/2008
Page 1 of 1

Well ID: C6186
Well Name: 399-2-9
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 06/10/08
Reviewed By: Joe Fritz
Date: 8/6/08
Signature: S. Sexton
Signature: Joe Fritz

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface	
12" diameter protective vault with screw down lid 0-1.0 ft. bgs	
ERTs: 33.5 to 10.0	→
4" I.D. Schedule 40 PVC casing 0.5 to 33.47 ft. bgs	
4" PVC screen, 0.020" + cap 33.47 to 58.75 ft bgs	
centralizer	→
cement grout: 1.0 to 3.4 ft. bgs	
granular bentonite: 3.4 to 9.75 ft. bgs	
40-140 silica sand: 9.75 to 30.65 ft bgs	
10-20 silica sand: 30.65 to 58.75 ft. bgs	
bentonite pellets: 58.75 to 63.7 ft. bgs	
backfill slough material: 63.7 to 65.0 ft. bgs	
All 7 5/8" temporary casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-0.7: gravel drill pad
		0.7-27: sandy Gravel (sG)
15		Thermistors: 33.5 to 10.0
30		27-29.4: silty Sand (mS)
		29.4-54: sandy Gravel (sG)
		DTW = 34.1 ft. bgs on 05/14/2008
45		
		54-54.8: Silt (M)
		54.8-58: sandy Gravel (sG)
		58-59.5: sand (S)
60		59.5-65: silt (M)
		TD = 65.0' on 05/13/2008
75		All depths recorded in "feet below ground surface" (bgs)

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 07/17/2008
Finish Date: 07/31/2008
Page 1 of 1

Well ID: C6187
Well Name: 399-2-10
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 08/05/08
Reviewed By: Jeff Fritz
Date: 8/15/08
Signature:
Signature:

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface 12" diameter protective vault w/ screw down lid 0-1.0 ft. bgs ERTs # 27: 3 to 58.5	
4" ID Schedule 40 PVC casing 0.5 to 34.7 ft. bgs 4" PVC screen, 0.020" + endcap 34.7 to 60.0 ft. bgs centralizer	
Portland cement grout: 0 to 3.0 ft. bgs bentonite chips: 3.0 to 10.0 ft. bgs 40-140 silica sand: 10.0 to 31.7 ft. bgs 10-20 silica sand: 31.7 to 62.0 ft. bgs bentonite pellets: 62.0 to 66.8 ft bgs	
All temporary casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-10: gravelly Sand (gS)
		10-24: silty sandy Gravel (msG)
15		Thermistors: 3 to 58.5 ft. bgs
		24-26: Silt (M)
		26-37.5: sandy Gravel (sG)
30		DTW = 30.7 on 07/31/2008
		37.5-42: silt (M)
45		42-52: sandy Gravel (sG)
		52-56: Gravel (G)
		56-~~65~~ SMS 08-05 67.5: silt (M)
60		
		TD = 67.5 ft bgs on 07/28/2008
75		All depths recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

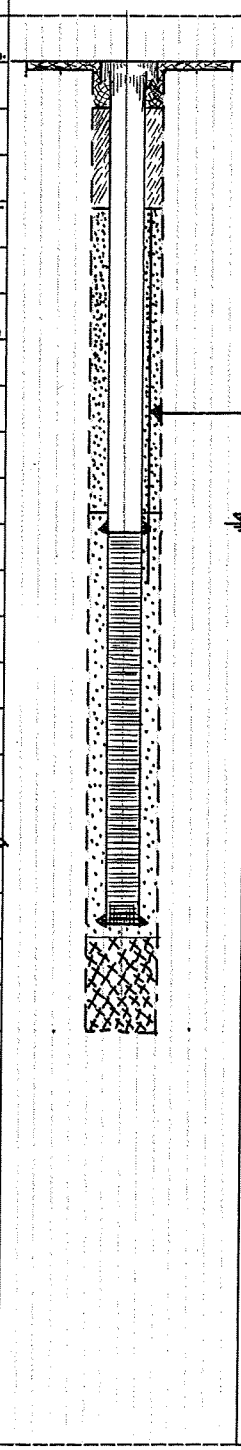
WELL SUMMARY SHEET

Start Date: 7/16/08
Finish Date: 8/1/08
Page 1 of 1

Well ID: C6188	Well Name: (C6188) 309-2-11
Location: 300-FF-5 OU	Project: 300 Area IFC
Prepared By: A. Lantau Date: 8-6-08	Reviewed By: Jay Fritz Date: 8/13/08
Signature: Aaron Lantau	Signature: [signature]

CONSTRUCTION DATA

Description	Diagram
Cement Pad: 4'x4', 0-0.5' bgs.	
Well Vault: 12" OD. C.S. waterproof w/bolted Lid. 0.0'-1.0' bgs.	
Casing: 4" ID. PVC 0.5-31.0' bgs.	
Screen: 4" ID. PVC continuous "V" wire wrap 0.020" slot 31.0'-56.0' bgs.	
End Cap: 4" ID. PVC 56.0'-56.4' bgs.	
Thurmistor: 10.0'-33.5' bgs.	
Cement Grout Seal: 0.5'-3.1' bgs.	
Bentonite Chips: 3.1'-10.2' bgs.	
Hydrophilic Sand Pack: 20-140 mesh CO. Si. sand 10.2-29.0' bgs	
Filter Sand Pack: 10-20 mesh CO. Si. sand 29.0'-57.0' bgs	
Bentonite Pellets: 57.0'-63.1' bgs.	



Notes:
All Temporary casing was removed from ground on (7/24/08)

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0'-9': Gravelly Sand (gS)
		9'-29.5': Silty Sandy Gravel (mSG)
15		
		Thurmistor: 10.0'-33.5' bgs.
		•DTW: 30.1' bgs (8/1/08)
30		29.5'-32': Silt (M)
		32.0'-48.0': Sandy Gravel (SG)
45		48.0'-55.5': Gravel (G)
		55.5'-61.0': Silt (M)
60		61-63.0': Silt (M)
	T.D.	TD: 63.1' bgs on (7/17/08)
75		

Notes:
All Depths recorded in "feet below ground surface" (bgs)

A-6003-643 (03/03)

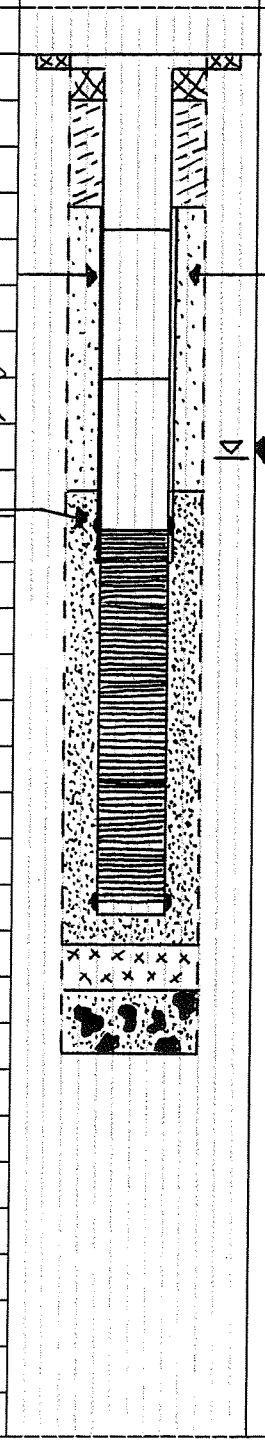
WELL SUMMARY SHEET

Start Date: 06/17/2008
Finish Date: 06/25/2008
Page 1 of 1

Well ID: C6189
Well Name: 399-2-12
Location: 300-FF-5 OU
Project: 300 Areas IFC
Prepared By: S. Sexton Date: 7/3/08
Reviewed By: Jon Fritts Date: 8/6/08
Signature: S. Sexton
Signature: Jon Fritts

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush with drilling surface	
12" protective vault w/ locking lid 0-1 ft. bgs	
ERTs: 33.5 to 10.0	
4" ID Sch. 40 PVC casing 0.5 to 31.0' bgs	
4" ID PVC screen + end cap 31.0 to 56.3' bgs	
centralizer	
cement grout: 1.0 to 3.0 ft. bgs	
granular bentonite: 3.0 to 10.0 ft. bgs	
40-140 silica sand: 10.0 to 28.6 ft. bgs	
10-20 silica sand: 28.6 to 58.0 ft. bgs	
bentonite pellets: 58.0 to 61.0 ft. bgs	
natural backfill: 61.0 to 65.0 ft. bgs	
All temporary 7 5/8" casing removed from borehole	



GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-17.5: sandy Gravel (sG)
15		Thermistors: 33.5 to 10.0
		17.5-31: silty Gravel (mG)
		DTW = 26.0 ft. bgs on 06/17/2008
30		31-51: gravelly Sand (gS)
45		
		51-52: Gravel (G)
		52-59.5: silt (M)
60		59.5-65: sandy Silt (sM)
		TD = 65 ft. bgs on 6/18/08
75		All depths are recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 05/22/2008
Finish Date: 06/02/2008
Page 1 of 1

Well ID: C6190
Well Name: 399-2-13
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 6/04/08
Reviewed By: Jeff Fritz
Date: 8/7/08
Signature: S. M. Sexton
Signature: Jeff Fritz

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface	
12" diameter protective vault w/ screw down lid 0-1.0' bgs	
ERTs: 33.5 to 10.0	
4" ID Schedule 40 PVC casing 0.5 - ~~32.0~~ 31.2' bgs SMS 6-9	
4" PVC screen 0.020" + cap 31.2 to 56.5' bgs	
centralizer	
Cement grout: 1.0 - 3.0' bgs	
granular bentonite: 3.0 - 11.5' bgs	
40-140 silica sand: 11.5 - 28.9' bgs	
10-20 silica sand: 28.9 - 56.5' bgs	
bentonite pellets: 56.5 - 62.3' bgs	
All temporary 7 5/8" casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-10.5: sandy Gravel (SG)
15		10.5-15: gravelly Sand (gS)
		15-40: sandy Gravel (SG)
		Thermistors: 33.5 to 10.0
30		DTW = 28.8' on 06/05/2008
		40-44: silt (M)
45		44-54: sandy Gravel (SG)
		54-62.6: silt (M)
60		TD = 62.6' bgs on 05/22/08
75		All depths recorded in "feet below ground surface"

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 06/13/2008
Finish Date: 06/23/2008
Page 1 of 1

Well ID: C6191
Well Name: 399-2-14
Location: 300-FF-5 OU
Project: 300 Areas IFC
Prepared By: S. Sexton
Date: 7/7/08
Reviewed By: Jag Fritz
Date: 8/6/08
Signature: S. Sexton
Signature: Jag Fritz

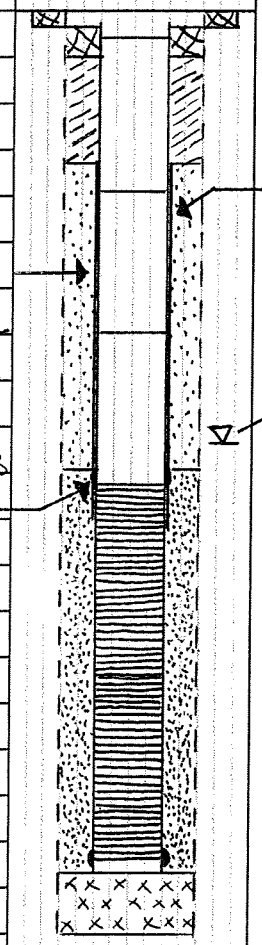
CONSTRUCTION DATA

Description

6" concrete pad flush with drilling surface
12" diameter protective vault w/ screw down lid 0-1.0 ft. bgs
ERTs: 33.5 to 10.0
4" ID Schedule 40 PVC casing 0.5 to 30.7 ft. bgs
4" PVC screen, 0.020" + cap 30.7 to 56.0 ft. bgs
centralizer
cement grout:
1.0 to 3.0 ft. bgs
granular bentonite:
3.0 to 9.8 ft. bgs
40-140 silica sand:
9.8 to 29.8 ft. bgs
10-20 silica sand:
29.8 to 56.0 ft. bgs
bentonite pellets:
56.0 to 60.0 ft. bgs

All temporary 7 5/8" casing removed from borehole

Diagram



GEOLOGIC/HYDROLOGIC DATA

Depth in Feet

0
15
30
45
60
75

Graphic Log

Lithologic Description

0-18: Sandy Gravel (sG)
Thermistors: 33.5 to 10.0
18-20: silty Gravel (mG)
20-28: sandy Gravel (sG)
DTW = 27.9 on 06/23/2008
28-32: gravelly Sand (gS)
32-33: silt (M)
33-39: sandy Gravel (sG)
39-40.5: silt (M)
40.5-47: gravelly Sand (gS)
47-52: Gravel (G)
52-60.0: silt (M)
TD = 60.0 on 06/16/2008

All depths recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 6-25-08
Finish Date: 7-2-08
Page 1 of 1

Well ID: C6192
Well Name: 399-2-15
Location: 300-FF-5 OU
Project: 300 AREA IFC
Prepared By: Jess Hopkins
Date: 8/7/08
Reviewed By: Joe Fitts
Date: 8/13/08
Signature:
Signature:

CONSTRUCTION DATA

Description	Diagram
8" Temporary Casing* 0 - 60 ft bgs	
4" sch. 40 PVC RISER 0 - 31.0 ft bgs	
4" sch. 40 PVC CONT. WIRE WRAP SCREEN 31.0 - 56.0 ft bgs	
4" sch. 40 PVC End Cap 56.0 - 56.3 ft bgs	
Coated Bentonite Pellets 61.5 - 57.5 ft bgs	
Colorado Silica (10-20#) 57.5 - 27.6 ft bgs	
Colorado Silica (40-140#) 27.6 - 10.1 ft bgs	
Medium Bentonite Chips 10.1 - 2.8 ft bgs	
Portland Cement 2.8 - 0 ft	
ERTs placed at 33.5 ft bgs.	
DTW = 25.9 ft bgs (7/2/08)	
DTB (TD) = 61.5 ft bgs	
* All TEMPORARY CASING HAS BEEN REMOVED FROM THE GROUND.	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-0.5' Gravel Drill Pad
		0.5-6' Sandy Gravel (sG)
		6-10' Silty Sandy Gravel (msG)
		10-19' Sandy Gravel (sG)
20		19-21' Silty Gravel (mG)
		21-25' Silty Sandy Gravel (msG)
		25-30' Sandy Gravel (sG)
		30-35' Silty Sandy Gravel (msG)
40		35-46' Sandy Gravel (sG)
		46-50' Gravelly Sand (gS)
		50-52' Silt (M)
		52-55' Gravelly Sand (gS)
60		55-61.5' Silt (M)
80		
100		

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: SMS 8-07-08 04/24/08
Finish Date: 07/17/08
Page 1 of 1

Well ID: C6193
Well Name: 399-2-16
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 08/07/08
Reviewed By: Joe Fayhee
Date: 9/5/08
Signature: S. M. Sexton
Signature: Joe Fayhee

CONSTRUCTION DATA

Description:

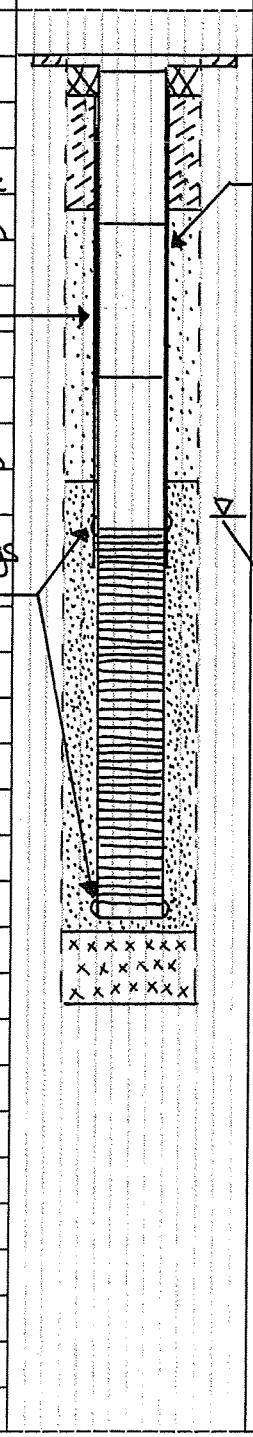
6" concrete pad flush to drilling surface
12" diameter protective vault w/ screw down lid 0-1.0 ft bgs
ERTs #13: 3-33.5

4" ID Schedule 40 PVC casing 0.5 to 31.0 ft bgs
4" PVC screen, 0.020" t
end cap 31.0 to 56.3 ftbgs
centralizer

Portland cement grout:
0 to 3.0 ft bgs
bentonite chips:
3.0 to 10.0 ft bgs
40-140 silica sand:
10.0 to 27.8 ft. bgs
10-20 silica sand:
27.8 to 57.2 ft bgs
bentonite pellets:
57.2 to 61.7 ft bgs

All temporary casing removed from borehole

Diagram:



GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-3: sand (S)
		3-8: sandy Gravel (sG)
		Thermistors: 3-33.5 ft bgs
		8-10: Gravel (G)
15		10-12: sandy Gravel (sG)
		12-14: silty Gravel (mG)
		14-18: sandy Gravel (sG)
		18-20: silty Gravel (mG)
		20-25: Gravel (G)
30		25-54: sandy Gravel (sG)
		DTW = 30.2 on 07/17/2008
45		
		54-62: silt (M)
60		TD = 62.0 ft bgs on 06/24/2008
		All depths recorded in feet "below ground surface" (bgs)
75		

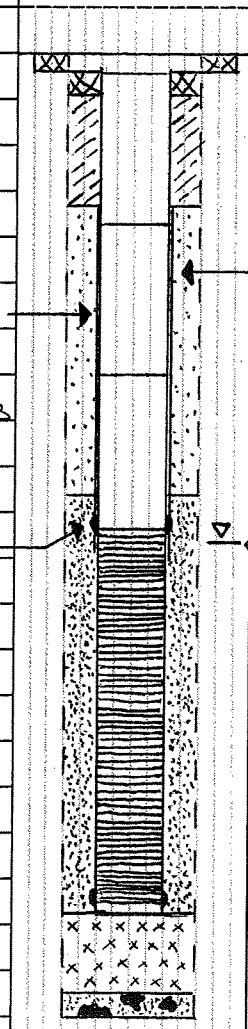
A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 06/12/2008
Finish Date: 06/25/2008
Page 1 of 1

Well ID: C6195
Well Name: 379-2-17
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 7/7/08
Reviewed By: Joe Fritz
Date: 8/6/08
Signature: S. Sexton
Signature: Joe Fritz

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush w/ drilling surface	
12" protective vault w/ screw down lid 0-1.0 ft. bgs	
ERTs: 33.5 to 10.0	
4" schedule 40 PVC casing 0.5 to 31.2 ft. bgs	
4" PVC screen, 0.020" + cap 31.2 to 56.5 ft. bgs	
centralizer	
cement grout: 1.0 to 2.7 ft. bgs	
granular bentonite: 2.7 to 10.0 ft. bgs	
40-140 silica sand: 10.0 to 28.0 ft. bgs	
10-20 silica sand: 28.0 to 57.5 ft. bgs	
bentonite pellets: 57.5 to 61.6 ft. bgs	
natural backfill: 61.6 to 63.0 ft. bgs	
All temporary 7 5/8" casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-40: sandy Gravel (sG)
15		Thermistors: 33.5 to 10.0
30		DTW = 26.3 on 06/13/2008
		40-45: No recovery
45		45-56.5: gravelly Sand (gS)
60		56.5-63: silt (M)
		TD = 63.0 on 06/13/2008
75		All depths recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 06/03/2008
Finish Date: 06/17/2008
Page 1 of 1

Well ID: C 6196
Well Name: 399-2-18
Location: 300-FF-5 OU
Project: 300 Areas IFC
Prepared By: S. Sexton
Date: 7/3/08
Reviewed By: Joe Fritz
Date: 8/6/08
Signature: S. Sexton
Signature: Joe Fritz

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush with drilling surface	
12" protective vault with screw down lid 0-1.0 ft. bgs	
ERTs: 33.5 to 10.0	
4" ID Schedule 40 PVC casing 0.5 to 33.0 ft. bgs	
4" PVC screen, 0.020", + cap 33.0 to 58.3 ft. bgs	
centralizer	
cement grout: 1.0 to 3.0 ft. bgs	
granular bentonite: 3.0 to 10.1 ft. bgs	
40-140 silica sand: 10.1 to 30.7 ft. bgs	
16-20 silica sand: 30.7 to 58.7 ft. bgs	
bentonite pellets: 58.7 to 63.2 ft. bgs	
natural back fill: 63.2 to 65.0 ft. bgs	
All temporary 7 5/8" casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-10: sandy Gravel (sG)
15		10-17: gravelly Sand (gS)
		Thermistors: 33.5 to 10.0
		17-21: sandy Gravel (sG)
		21-22.5: silt (M)
30		22.5-46: sandy Gravel (sG)
		DTW = 27.5 on 06/11/08
45		46-56: gravelly Sand (gS)
		56-57: Gravel (G)
60		57-65: Silt (M)
		TD = 65.0 ft. bgs on 6/11/08
75		All depths recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

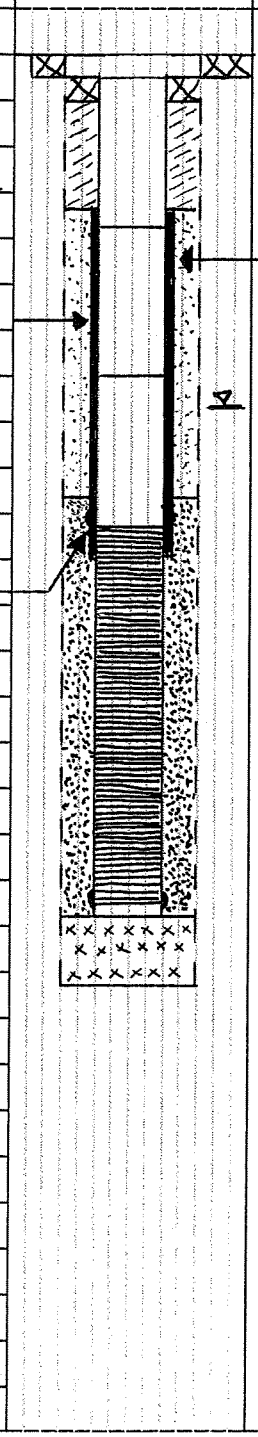
WELL SUMMARY SHEET

Start Date: 05/20/2008
Finish Date: 06/05/2008
Page 1 of 1

Well ID: C6197
Well Name: 399-2-19
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 6/10/08
Reviewed By: Joseph Fritz
Date: 8/5/08
Signature: S. Sexton
Signature: Joseph Fritz

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface	
12" diameter protective vault w/screw down lid 0-1.0 ft. bgs	
ERTs: 33.5 to 10.0	
4" ID Schedule 40 PVC casing 0.5 to 31.28 ft. bgs	
4" screen, PVC, 0.020" + cap 31.28 to 56.58 ft. bgs	
centralizer	
cement grout: 1.0 to 3.0 ft. bgs	
granular bentonite: 3.0 to 10.0 ft bgs	
40-140 silica sand: 10.0 to 29.1 ft bgs	
10-20 silica sand: 29.1 to 57.6 ft. bgs	
bentonite pellets: 57.6 to 60.8 ft. bgs	
All temporary 7 5/8" casing removed from borehole	



GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-0.6: gravel drill pad
		0.6-27: sandy gravel (SG)
15		Thermistors: 33.5 to 10.0
		DTW: 23.3' 05/20/2008
30		27-31.5: gravelly Sand (gS)
		31.5-33: silt (M)
		33-45: sandy Gravel (SG)
45		45-54: gravelly Sand (gS)
		54-55: silt (M)
		55-57: gravelly Sand (gS)
60		57-60.8: silt (M)
		TD = 60.8' bgs on 05/20/08
		All depths are recorded in "feet below ground surface"
75		

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 06/25/08
Finish Date: 07/08/08
Page 1 of 1

Well ID: C6198	Well Name: 399-2-20
Location: 300-FF-5 OU	Project: 300 Area IFC
Prepared By: S. Sexton Date: 08/04/08	Reviewed By: Jay Fritts Date: 8/6/08
Signature: [signature]	Signature: [signature]

CONSTRUCTION DATA

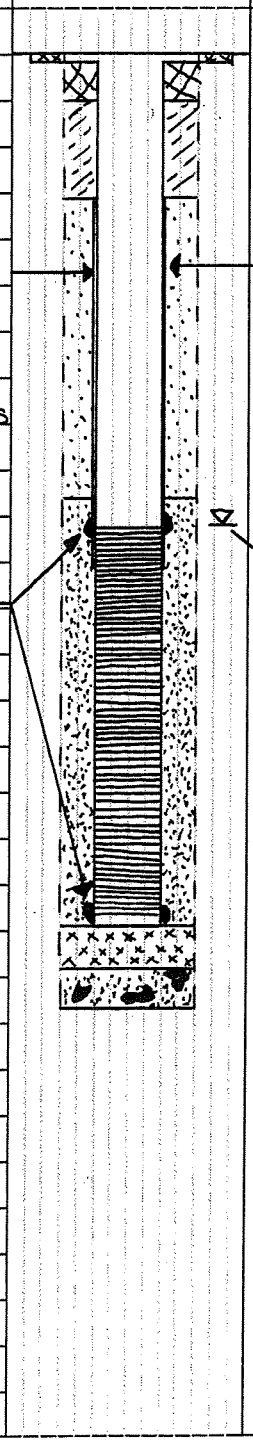
Description

6" concrete pad flush to drilling surface
12" diameter protective vault w/ screw down lid 0 to 1.0 ft. bgs
ERTs #14: 3-33.5

4" ID Schedule 40 PVC casing 0.5 to 31.0 ft bgs
4" PVC screen, 0.020" + end cap 31.0 to 56.3 ft. bgs
centralizer
cement grout: 0-3.0 ft. bgs
bentonite chips: 3.0 to 9.3 ft. bgs
40-140 silica sand: 9.3 to 28.8 ft. bgs
10-20 silica sand: 28.8 to 56.7 ft. bgs
bentonite pellets: 56.7 to 59.6 ft. bgs
slough material: 59.6 to 62.0 ft. bgs

All temporary casing removed from borehole

Diagram



GEOLOGIC/HYDROLOGIC DATA

Depth in Feet

0
15
30
45
60
75

Graphic Log



Lithologic Description

0-7: gravelly Sand (gS)
7-20: silty Gravel (mG)
Thermistors: 3-33.5 ft. bgs
20-24: Gravel (G)
24-54: sandy Gravel (sG)
DTW = 30.6 ft bgs on 07/17/2008
54-56: Gravel (G)
56-62: Silt (M)
TD = 62.0 ft bgs on 06/25/2008

All depths recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 06/12/2008
Finish Date: 06/18/2008
Page 1 of 1

Well ID: C6201
Well Name: 399-2-21
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 7/3/08
Reviewed By: Joe Fritts
Date: 9/7/08
Signature: S. Sexton
Signature: Joe Fritts

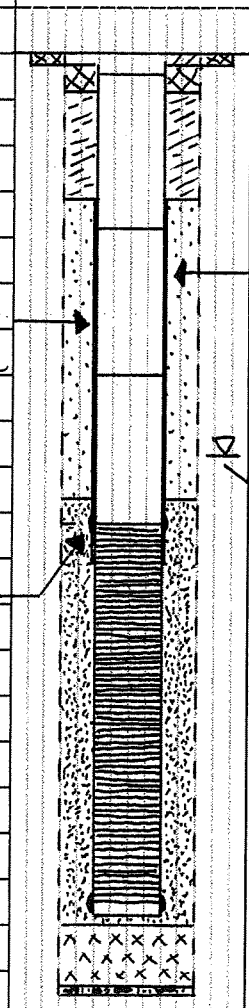
CONSTRUCTION DATA

Description

6" concrete pad flush with drilling surface
12" protective vault with screw down lid
0-1.0 ft. bgs
ERTs: 33.5 to 10.0
4" ID Schedule 40 PVC casing 0.5 to 31.1 ft bgs
4" PVC screen, 0.020" + cap 31.1 to 56.4 ft. bgs
centralizer
cement grout:
1.0 to 2.5 ft. bgs
granular bentonite:
2.5 to 9.5 ft. bgs
40-140 silica sand:
9.5 to 29.0 ft bgs
10-20 silica sand:
29.0 to 57.1 ft. bgs
bentonite pellets:
57.1 to 61.1 ft. bgs
natural backfill:
61.1 to 61.7 ft bgs

All temporary 7 5/8" casing removed from borehole

Diagram



GEOLOGIC/HYDROLOGIC DATA

Depth in Feet

0
15
30
45
60
75

Graphic Log

Lithologic Description

0-6: sandy Gravel (sG)
6-6.5: Sand (S)
6.5-17: sandy Gravel (sG)
Thermistors: 33.5 to 10.0
17-19: silty Gravel (mG)
19-45: sandy Gravel (sG)
DTW = 26.5 on 06/19/2008
45-55: gravelly Sand (gS)
55-61.7: Silt (M)
TD = 61.7' bgs on 6/12/2008
All depths recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 07/14/2008
Finish Date: 07/29/2008
Page 1 of 1

Well ID: C6202
Well Name: 399-2-22
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 08/04/08
Reviewed By: Joe Fritz
Date: 8/14/08
Signature: L. M. Sexton
Signature: Joe Fritz

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface	
12" diameter protective vault w/ screw down lid 0-1.0 ft. bgs	
ERTs #26: 34.1 to 3.6	
4" ID Schedule 40 PVC casing 0.5 to 33.4 ft. bgs	
4" PVC screen, 0.020" + end cap 33.4 to 58.9 ft. bgs	
centralizer	
cement grout: 1.0 to 3.0 ft. bgs	
bentonite chips: 3.0 to 9.0 ft. bgs	
40-140 silica sand: 9.0 to 29.5 ft. bgs	
10-20 silica sand: 29.5 to 59.5 ft. bgs	
bentonite pellets: 59.5 to 61.7 ft. bgs	
backfill slough material: 61.7 to 65.0 ft. bgs	
All temporary casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-6: gravelly Sand (gS)
		6-25: sandy Gravel (sG)
15		Thermistors: 34.1 to 3.6
		25-35: No Recovery
30		DTW = 30.4 on 07/31/2008
		35-56: sandy Gravel (sG)
45		
		56-65: silt (M)
60		
		TD = 65.0 ft. bgs on 07/16/2008
75		All depths recorded in feet "below ground surface" (bgs)

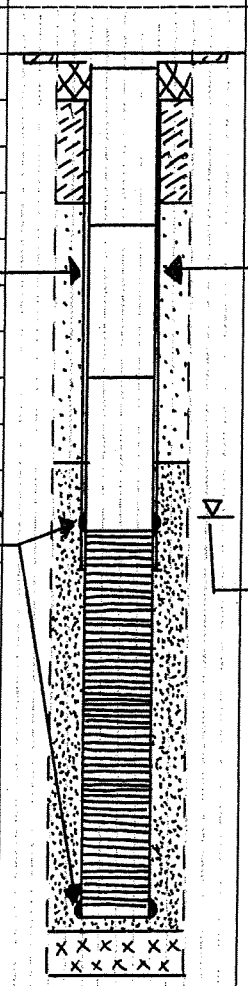
A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 07/08/2008
Finish Date: 07/16/2008
Page 1 of 1

Well ID: C60207
Well Name: 399-2-23
Location: 300-FF-5OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 08/06/08
Reviewed By: Joe Fritz
Date: 8/13/08
Signature: S. Sexton
Signature: Joe Fritz

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface 12" diameter protective vault w/ screw down lid 0 to 1.0 ft bgs ERTs #19: 3 to 33.5 4" ID Schedule 40 PVC casing 0.5 to 31.0 ft bgs 4" PVC screen, 0.020" t end cap 31.0 to 56.3 ft bgs centralizer Portland cement grout: 0 to 3.0 ft bgs bentonite chips: 3.0 to 9.6 ft bgs 40-140 silica sand: 9.6 to 26.5 ft bgs 10-20 silica sand: 26.5 to 57.1 ft bgs bentonite pellets: 57.1 to 59.7 ft bgs All temporary casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-4: gravelly Sand (gS)
		4-55: sandy Gravel (sG)
15		Thermistors: 3-33.5 ft. bgs
30		DTW = 30.1 ft bgs on 07/16/08
45		
		55-60: silt (M)
60		TD = 60.0 ft bgs on 07/08/2008
		All depths recorded in feet "below ground surface" (bgs)
75		

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 05/23/2008
Finish Date: 06/06/2008
Page 1 of 1

Well ID: C6208
Well Name: 399-2-24
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 6/10/08
Reviewed By: Joe Fritz
Date: 8/7/08
Signature: S. Sexton
Signature: Joe Fritz

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface	
12" diameter protective vault w/ screw down lid 0-1.0 ft. bgs	
ERTs: 33.5 to 10.0	
4" ID Schedule 40 PVC casing 0.5 to 33.0' bgs	
4" ID Schedule 40 PVC screen 0.020" + cap 33.0 to 58.3' bgs	
centralizer	
cement grout: 1.0 to 3.0' bgs	
granular bentonite: 3.0 to 10.0' bgs	
40-140 silica sand: 10.0 to 31.2' bgs	
10-20 silica sand: 31.2 to 59.7' bgs	
~~backfill slough:~~ SMS 6-10-08	
bentonite pellets: 59.7 to 65.2' bgs	
backfill slough: 65.2 to 67.5' bgs	
All temporary 7 5/8" casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-0.5: gravel drill pad
		0.5-7.0: sandy Gravel (sG)
		7.0-10.0: gravelly Sand (gS)
		10.0-18.0: sandy Gravel (sG)
15		
		Thermistors: 33.5 to 10.0
		18-26: silty sandy Gravel (msG)
		26-36: Gravel (G)
30		DTW = 26.7' on 05/29/2008
		36-40: sandy Gravel (sG)
		40-41: sand (S)
		41-42: sandy Gravel (sG)
45		42-47.5: sand (S)
		47.5-49: silt (M)
		49-51.5: sandy Gravel (sG)
		51.5-52.5: silt (M)
60		52.5-58.0: sandy Gravel (sG)
		58.0-65.0: silt (M)
		65.0-67.5: sand (S)
		TD = 67.5' bgs on 06/02/08
75		
		All depths recorded in "feet below ground surface"

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 07/22/2008
Finish Date: 07/31/2008

Well ID: C6209	Well Name: 399-2-25
Location: 300-FF-5 OU	Project: 300 Area IFC
Prepared By: S. Sexton — Date: 08/07/08	Reviewed By: Joe Fritts — Date: 8/13/08
Signature: [signature]	Signature: [signature]

CONSTRUCTION DATA

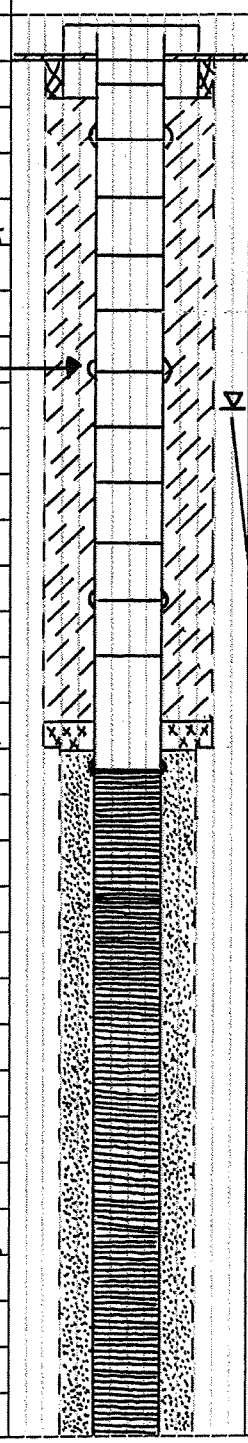
Description

6" concrete pad, 4' x 4' cement grout 0-3.0 ft bgs. corner posts.
8" stainless steel protective monument w/ locking cap 3.0 ft ags to 3.0 ft. bgs
centralizer

4" ID Schedule 40 PVC riser 2.3 ft ags to 62.0 ft. bgs
4" PVC wire wrap screen, 0.010", 62.0 to 122.0 ft bgs
4" ID Schedule 40 PVC sump + end cap 122.0 to 124.9 ft bgs

Portland cement grout: 0.5 ft. ags to 3.0 ft bgs
bentonite chips: 3.0 to 57.7 ft bgs
bentonite pellets: 57.7 to 60.3 ft. bgs
20-40 mesh silica sand: 60.3 to 125.0 ft bgs
bentonite chips: 125.0 to 138.6 ft bgs
bentonite pellets: 138.6 to 170.8 ft bgs

Diagram

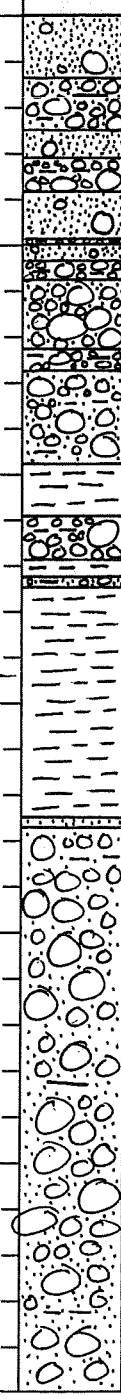


GEOLOGIC/HYDROLOGIC DATA

Depth in Feet

0, 20, 40, 60, 80, 100

Graphic Log



Lithologic Description

0-6.5: gravelly Sand (gS)
6.5-10: silty sandy Gravel (msG)
10-12.5: gravelly Sand (gS)
12.5-15: silty Gravel (mG)
15-19: gravelly Sand (gS)
19-20: silty Gravel (mG)
20-21.5: gravelly Sand (gS)
21.5-23: silty Gravel (mG)
23-29: sandy Gravel (sG)
29-31: silty Gravel (~~S~~ mG) SWS 8-7-08
31-39: silty sandy Gravel (msG)
39-43.5: silt (M)
43.5-47.5: silty Gravel (mG)
47.5-49: silt (M)
DTW: 30.5 on 08/01/2008
49-50: silty sandy Gravel (msG)
50-70: silt (M)
70-71: sand (S)
71-121: silty sandy Gravel (msG)

A-6003-643 (03/03)

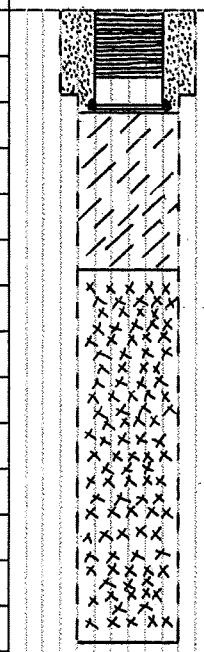
WELL SUMMARY SHEET

Start Date: 07/22/2008
Finish Date: 07/31/2008
Page 2 of 2

Well ID: C6209
Well Name: 399-2-25
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 08/07/08
Reviewed By: Joe Fritz
Date: 8/13/08
Signature: S. Sexton
Signature: Joe Fritz

CONSTRUCTION DATA

Description



Diagram

All temporary casing removed from borehole

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
120		
		121-128: silt (M)
		128-162: sandy Silt (sM)
140		
		162-163: silt (M)
160		163-171: clay/weathered basalt
		TD = 171.0 ft. bgs on 07/25/2008
180		TT = highly weathered basalt most resembling clay

All depths were recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 6-23-08
Finish Date: 7-31-08
Page 1 of 1

Well ID: C6210
Well Name: 399-2-26
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: A. Lantau
Date: 8-11-08
Reviewed By: Jay Fix
Date: 9/3/08
Signature: Aaron Lantau
Signature:

CONSTRUCTION DATA

Description	Diagram
Flush Mount Well Vault:	
12" OD, C.S. 0.0'-1.0' bgs.	
Well Casing blank:	
4" OD, PVC, Sch 40	
0.5'-30.0' bgs	
Vee wire Screen:	
4" ID, PVC, 0.020" slot	
30.0'-35.0' bgs.	
Sump & End Cap:	
4" ID, PVC, sch 40.	
35.0'-59.4' bgs.	
Concrete Pad/Seal:	
4'x4', 0.0-3.7' bgs.	
Bentonite Medium Chips:	
3.7'-28.3' bgs.	
10-20 Silica Sand:	
28.3'-36.9' bgs.	
Bentonite 3/8" Pellets:	
36.9'-39.3' bgs.	
10-20 Silica Sand:	
39.3'-59.8' bgs	
Bentonite 3/8 Pellets:	
59.8'-62.1' bgs.	
Notes:	
· All temporary casing removed from ground on 7-23-08	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0.0-8.0': Sandy Gravel (SG)
		8.0-9.5': Sand (S)
		9.5'-18.0': Sandy Gravel (sG)
15		18.0-21.0': Silty Gravel (mG)
		21.0-29.0': Sandy Gravel (sG)
		29.0-34.0': Silt (M)
30 ▼		DTW: 30.7'
		34.0-40.0': Sandy Gravel (sG)
		40.0-43.0': Gravelly Sand (gS)
45		43.0-52.0': no recovery
		52.0-54.0': Sand (S)
		54.0-57.0': Gravel (G)
		57.0-62.1': Silt (M)
60		
		T.D.

Notes:
· All measurements are in feet below ground." (bgs).
· No thurmistors nor ERT's were installed in the anulus.

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 07/17/2008
Finish Date: 07/29/2008
Page 1 of 1

Well ID: C6211	Well Name: 399-2-27
Location: 300-FF-5 OU	Project: 300 Areas IFC
Prepared By: S. Sexton Date: 07/31/08	Reviewed By: Jay Fritts Date: 8/6/08
Signature: [signature]	Signature: [signature]

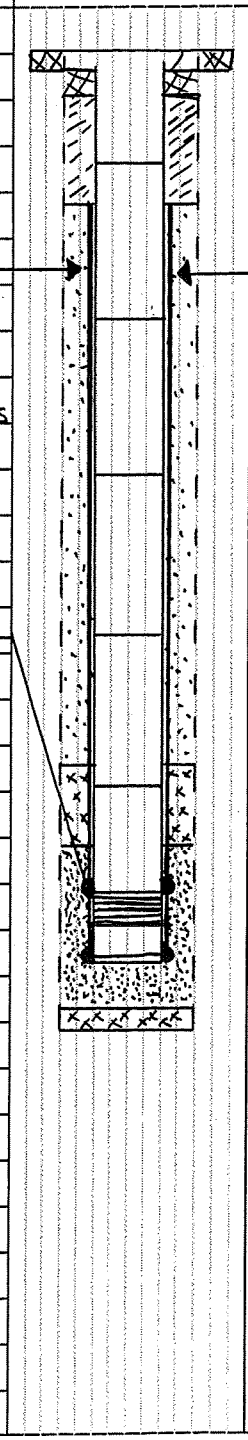
CONSTRUCTION DATA

Description

6" concrete pad flush to drilling surface
12" diameter protective vault w/screw down lid 0-1.0 ft. bgs
ERT string #21
58.5 to 10.0 ft bgs
4" ID Schedule 40 PVC casing: 0.5 to 54.7 ft bgs
4" PVC screen, 0.020": 54.7 to 56.7 ft. bgs
4" PVC sump w/cap: 56.7 to 59.1 ft. bgs
centralizer
cement grout: 1.0 to 3.0 ft. bgs
bentonite chips: 3.0 to 10.0 ft. bgs
40-140 silica sand: 10.0 to 46.4 ft bgs
bentonite pellets: 46.4 to 51.4 ft. bgs
10-20 silica sand: 51.4 to 62.2 ft. bgs
bentonite pellets: 62.2 to 63.5 ft. bgs

All 7 5/8" temporary casing removed from borehole

Diagram

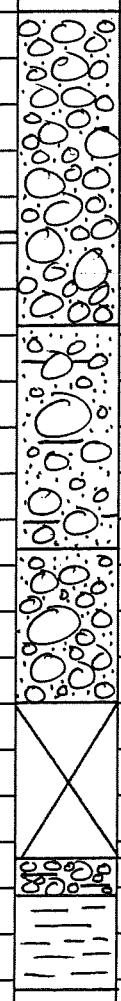


GEOLOGIC/HYDROLOGIC DATA

Depth in Feet

0
15
30
45
60
75

Graphic Log



Lithologic Description

0-20: sandy Gravel (sG)
Thermistors: 58.5 to 10.0 ft bgs
20-35: silty sandy Gravel (msG)
35-45: sandy Gravel (sG)
45-55: No Recovery
55-57.5: silty Gravel (mG)
57.5-63.5: Silt (M)
TD = 63.5 on 07/18/2008

All depths recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 06/27/2008
Finish Date: 07/11/2008
Page 1 of 1

Well ID: C6212	Well Name: 399-2-28
Location: 300-FF-5 OU	Project: 300 Area IFC
Prepared By: S. Sexton — Date: 08/06/08	Reviewed By: [signature] — Date: 8/13/08
Signature: [signature]	Signature: [signature]

CONSTRUCTION DATA

Description

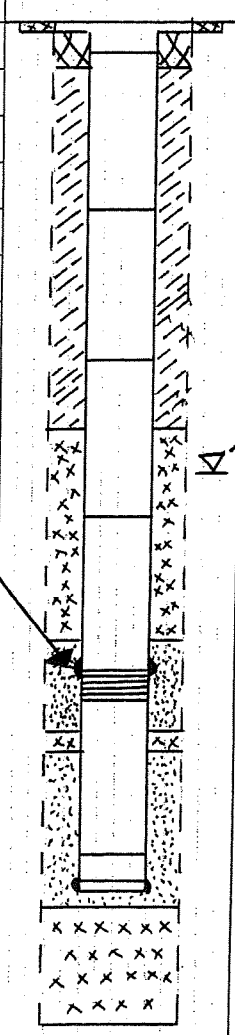
6" concrete pad flush to drilling surface
12" diameter protective vault w/ screw down lid 0 to 1.0 ft bgs

4" ID Schedule 40 PVC casing 0.5 to 42.0 ft. bgs
4" PVC screen, 0.020" 42.0 to 44.0 ft. bgs
4" ID Schedule 40 PVC sump 44.0 to 56.3 ft bgs
centralizer

Portland cement grout: 0 to 3.0 ft bgs
bentonite chips: 3.0 to 26.3 ft bgs
bentonite pellets: 26.3 to 40.0 ft. bgs
10-20 silica sand: 40.0 to 46.1 ft bgs
bentonite pellets: 46.1 to 47.4 ft bgs
10-20 silica sand: 47.4 to 57.3 ft bgs
bentonite pellets: 57.3 to 64.7 ft bgs

All temporary casing removed from borehole

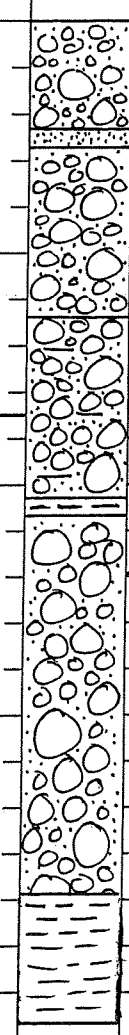
Diagram



GEOLOGIC/HYDROLOGIC DATA

Depth in Feet: 0, 15, 30, 45, 60, 75

Graphic Log



Lithologic Description

0-7: sandy Gravel (sG)
7-8: sand (S)
8-19: sandy Gravel (sG)
19-31: silty sandy Gravel (msG)
DTW = 28.8 ft bgs on 07/11/08
31-32: silt (M)
32-56.5: sandy Gravel (sG)
56.5-65: silt (M)
TD = 65.0 ft bgs on 06/30/2008

All depths recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 06/26/2008
Finish Date: 07/11/2008
Page 1 of 1

Well ID: C 62160
Well Name: 399-2-29
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton Date: 08/06/08
Reviewed By: Joe Fritz Date: 8/14/08
Signature: S. Sexton
Signature: Joe Fritz

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface	
12" diameter protective vault w/ screw down lid 0-1.0 ft bgs	
4" ID Schedule 40 PVC casing 0.5 to 30.0 ft bgs	
4" PVC screen, 0.020" 30.0 to 35.0 ft. bgs	
4" ID Schedule 40 PVC sump + cap 35.0 to 56.3 ft. bgs	
centralizer	
Portland cement grout: 0 to 3.0 ft. bgs	
bentonite chips: 3.0 to 25.0 ft. bgs	
bentonite pellets: 25.0 to 27.2 ft bgs	
10-20 silica sand: 27.2 to 36.85 ft. bgs	
bentonite pellets: 36.85 to 39.2 ft bgs	
10-20 silica sand: 39.2 to 55.3 ft. bgs	
bentonite pellets: 55.3 to 61.0 ft bgs	
All temporary casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-3: sandy Gravel (sG)
		3-6: gravelly Sand (gS)
		6-16: silty Gravel (si G)
15		
		16-45: sandy Gravel (sG)
30		DTW = 29.0 on 07/11/2008
45		45-55.5: gravelly Sand (gS)
60		55.5-61.5: silt (M)
75		

A-6003-643 (03/03)

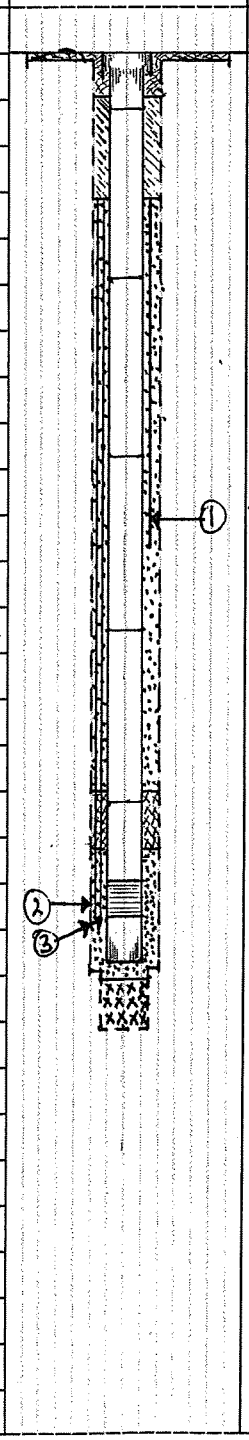
WELL SUMMARY SHEET

Start Date: 7/24/08
Finish Date: 7/30/08
Page 1 of 1

Well ID: C6217
Well Name: 399-2-30
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: A. Lantow
Date: 7-28-08
Reviewed By: Joe Fritz
Date: 9/3/08
Signature: Aaron Lantow
Signature:

CONSTRUCTION DATA

Description	Diagram
Cement Pad: 4'x4'	
0.0'-0.5' bgs.	
Well Vault: 12" OD. C.S.	
0.0-1.0' bgs.	
Well:	
Casing: 4" ID, PVC. sch 40	
0.5'-54.4' bgs.	
Screen: 4" ID, vee wire	
PVC, 0.020" slot	
54.4'-56.4' bgs.	
Sump: 4" ID, sch40, PVC	
56.4'-58.9' bgs	
End Cap: 4" ID. sch40, PVC	
58.9-59.3' bgs.	
ERT: 10.0'-33.5' bgs. ①	
ERT: 10.0-56.0' bgs ②	
Thurmistor: 10.0-56.0' bgs ③	
Cement Seal: 0.5-3.0' bgs	
Bentonite Chips: 3.0'-10.0' bgs	
40-140 Sand : 10.0'-47.0' bgs	
Bentonite Pellets : 47.0'-52.0' bgs	
10-20 Sand : 52.0'-60.0' bgs	
Bentonite Pellets: 60.0'-64.0' bgs.	



GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0'-4': Sandy Gravel (sG)
		4'-5': Sand (S)
		5'-6.5': Sandy Gravel (sG)
		6.5-11': Silty Sandy Gravel (msG)
		11'-18': Silty Gravel (mG)
15		18'-36': Silty Sandy Gravel (msG)
30 ▽		DTW: 31.5' (8-1-08)
		36'-47': Gravelly Sand (gS)
45		47-52: Silt (M)
		52-55.5: Gravelly Sand (gS)
		55.5-59.5: Silt (M)
60		59.5-64: Silt (M)
	T.D.	TD: 64.0' on 7/25/08

Notes:
- All rods removed from ground on 7/29/08
- All measurements are in feet below ground surface. (bgs.)

A-6003-643 (03/03)

WELL SUMMARY SHEET

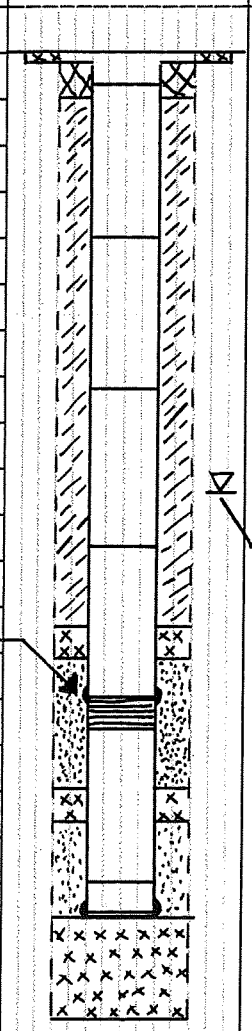
Start Date: 06/19/2008
Finish Date: 07/02/2008
Page 1 of 1

Well ID: C6218	Well Name: 399-2-31
Location: 300-FF-5 OU	Project: 300 Area IFC
Prepared By: S. Sexton Date: 08/05/08	Reviewed By: [signature] Date: 8/15/08
Signature: [signature]	Signature: [signature]

CONSTRUCTION DATA

Description
6" concrete pad flush to drilling surface
12" diameter protective vault w/ screw down lid 0-1.0 ft. bgs
4" ID Schedule 40 PVC casing 0.5 to 42 ft. bgs
4" PVC screen, 0.020": 42.0 to 44.0 ft. bgs
4" ID Schedule 40 PVC casing + end cap: 44.0 to 56.3 ft. bgs
centralizer
Portland cement grout: 0 to 3.0 ft. bgs
bentonite chips: 3.0 to 37.2 ft. bgs
bentonite pellets: 37.2 to 39.5 ft. bgs
10-20 silica sand: 39.5 to 48.0 ft. bgs
bentonite pellets: 48.0 to 50.0 ft. bgs
10-20 silica sand: 50.0 to 56.4 ft. bgs
bentonite pellets: 56.4 ft to 63 ft. bgs
All temporary casing removed from borehole

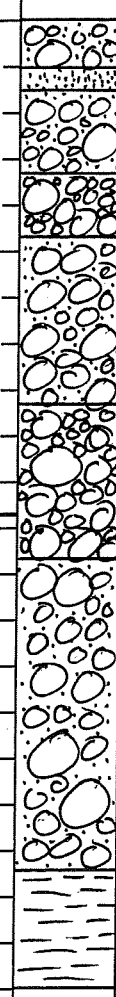
Diagram



GEOLOGIC/HYDROLOGIC DATA

Depth in Feet: 0, 15, 30, 45, 60, 75

Graphic Log



Lithologic Description
0-3: sandy Gravel (SG)
3-4.5: Sand (S)
4.5-10: sandy Gravel (SG)
10-14: Gravel (G)
14-25: sandy Gravel (SG)
25-35: Gravel (G)
DTW = 28.8 ft. bgs on 07/11/08
35-55.5: sandy Gravel (SG)
55.5-63: silt (M)
TD = 63.0 ft. bgs on 06/20/2008
All depths recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 7/10/08
Finish Date: 8/1/08
Page 1 of 1

Well ID: C6194
Well Name: 399-3-23
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: A. Lantow
Date: 8-5-08
Reviewed By: Joe Fritz
Date: 8/14/08
Signature: Aaron Lantow
Signature: Joe Fritz

CONSTRUCTION DATA

Description	Diagram
Concrete Pad: 4'x4' 0.0'-0.5' bgs.	
Well Vault: 12" OD., C.S., 0.0'-1.0' bgs.	
3.3'-31.0': ERT	
Permanent Casing: 4" ID, PVC, 0.5'-31' bgs.	
Screen: 4" ID. "V" wire wrap 0.020" slot. PVC, 31.0'-56.0' bgs.	
End Cap: 4" ID., PVC 56.0'-56.4' bgs.	
Cement Grout Seal: 0.5'-3.0' bgs.	
Bentonite Chips: 3.0'-10.2' bgs.	
Sand: 40-140 mesh CO. Si. 10.2'-29.0' bgs.	
Sand: 10-20 mesh CO. Si. 29.0'-56.3' bgs	
Bentonite Pellets: 56.3'-~~56~~ 65.0' bgs.	

Notes:
- All Temporary Casing was Removed from Ground on 7/22/08

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0'-10.5': Gravelly Sand (gS)
		10.5'-12.0': Sand (S)
15		12.0'-35.0': Sandy Gravel (sG)
		Thermistor: 3.3'-33.5' bgs.
30 (8/1/08, 7/22/08)		• DTW: 31.0' bgs on 8/1/08 (static) • DTW: 33.7' bgs on 7/22/08
		35.0'-50.5': Gravelly Sand (gS)
45		50.5'-52.5': Gravel (G)
		52.5'-65.0': Silt (M)
60		T.D.: 65' on 7/10/08
	T.D.	
75		Notes: • All Depths recorded in feet below ground surface.

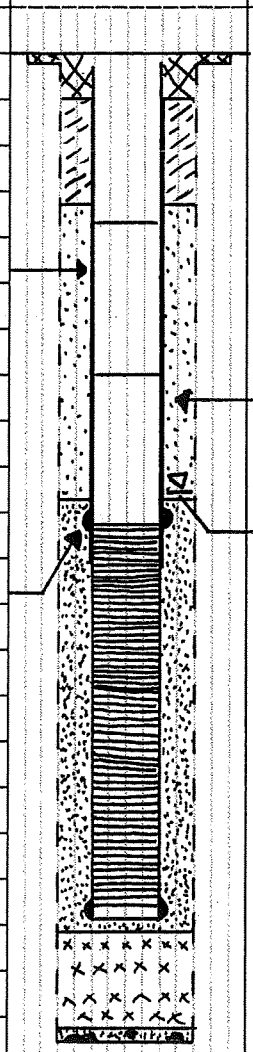
A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 07/09/2008
Finish Date: 07/22/2008
Page 1 of 1

Well ID: C6199
Well Name: 399-3-24
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 08/04/08
Reviewed By: Joe Fritz
Date: 8/5/08
Signature: S. Sexton
Signature: Joe Fritz

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface	
12" diameter protective vault w/ screw down lid 0-1.0 ft. bgs	
ERTs: 3-33.5	
4" ID Schedule 40 PVC casing 0.5 to 31.0 ft. bgs	
4" PVC screen, 0.020," + end cap: 31.0 to 56.4 ft. bgs	
centralizer	
cement grout: 0-3.0 ft. bgs	
bentonite chips: 3.0 - 9.8 ft. bgs	
40-140 silica sand: 9.8 - 29.0 ft. bgs	
10-20 silica sand: 29.0 - 57.3 ft bgs	
bentonite pellets: 57.3 - 63.4 ft. bgs	
All temporary casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-12: gravelly Sand (gS)
		12-12.5: sand (S)
15		12.5-15: sandy Gravel (sG)
		15-35: sandy Gravel (sG)
		Thermistors: 3-33.5
30		DTW = 29.9 ft. bgs 08/01/08
		35-52.5: gravelly Sand (gS)
45		
		52.5-65: silt (M)
60		TD = 65.0 ft. bgs on 07/10/2008
75		All depths recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 06/16/2008
Finish Date: 06/25/2008
Page 1 of 1

Well ID: C6200
Well Name: 399-3-25
Location: 300-FF-5 OU
Project: 300 Areas IFC
Prepared By: S. Sexton
Date: 7/07/08
Reviewed By: Jaq Frith
Date: 8/5/08
Signature: S. Sexton
Signature: Jaq Frith

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush with drilling surface	
12" protective vault with screw down lid 0-1 ft bgs	
ERTs: 33.1 to 9.6	
4" ID Schedule 40 PVC casing 0.5 - 31.6 ft. bgs	
4" ID PVC screen 0.020" + end cap 31.6 - 56.9 ft. bgs	
centralizer	
Cement grout: 0-3 ft. bgs	
Granular bentonite: 3-10 ft. bgs	
40-140 silica sand: 10 - 27.1 ft bgs	
10-20 silica sand: 27.1 - 57.3 ft bgs	
Bentonite pellets: 57.3 - 60.4 ft. bgs	
Natural backfill: 60.4 - 65.0 ft. bgs	
All temporary 7 5/8" casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-0.5: Gravel drill Pad
		0.5-18: sandy Gravel (sG)
		18-23: silty Gravel (mG)
15		Thermistors: 33.1 to 9.6
		23-40: sandy Gravel (sG)
		DTW = 26.7' on 06/16/2008
30		
		40-44.5: gravelly Sand (gS)
		44.5-45: Silt (M)
45		45-54: sandy Gravel (sG)
		54-57.5: Gravel (G)
		57.5-65: silt (M)
60		TD = 65.0 ft bgs on 06/17/2008
75		All measurements are recorded in "feet below ground surface"

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 05/14/2008
Finish Date:
Page 1 of 1

Well ID: C6203
Well Name: 399-3-26
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 6/22/08
Reviewed By: Jon Fritz
Date: 8/7/08
Signature: S. Sexton
Signature: Jon Fritz

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface	
12" diameter protective vault w/ screw down lid 0 - 1.0 ft. bgs	
ERTs: 33.5 to 10.0	
4" ID Schedule 40 PVC casing ~~1~~ sms 6-22-08 0.5 to 32.0 ft bgs	
4" PVC screen, 0.020" + cap 32.0 to 52.31 ft. bgs	
centralizer	
cement pad/grout: 1.0 to 3.0 ft. bgs	
granular bentonite: 3.0 to 9.6 ft. bgs	
40-140 silica sand: 9.6 to 30.0 ft. bgs	
10-20 silica sand: 30.0 to 53.7' bgs	
bentonite pellets: 53.7 to 64.0 ft. bgs	
slough material: 64.0 to 66.0 ft. bgs	
All temporary 7 5/8" casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-0.5: gravel drill pad
		0.5-20.5: sandy Gravel (sG)
15		Thermistors: 33.5 to 10.0
		20.5-26.0: clayey Silt (M)
30		26.0-42.0: sandy Gravel (sG)
		DTW = 31.70' 05/15/2008
45		42.0-52.0: gravelly Sand (gS)
		52.0-66.0: Silt (M)
60		
		TD = 66.0' on 05/15/2008
75		All measurements are in "feet below ground surface"

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 07/09/2008
Finish Date: 07/16/2008
Page 1 of 1

Well ID: C6204
Well Name: 399-3-27
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 08/11/08
Reviewed By: Jeff Ms
Date: 9/3/08
Signature: S. Sexton
Signature:

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface	
12" diameter protective vault w/ screw down lid 0-1.0 ft bgs	
ERTs = 20: 3.4-33.9	
4" ID Schedule 40 PVC casing 0.5 to 31.4 ft bgs	
4" PVC screen, 0.020" + end cap 31.4 to 56.8 ft. bgs.	
centralizer	
Portland cement grout: 0 to 2.5 ft bgs	
bentonite chips: 2.5 to 9.7 ft bgs	
40-140 silica sand: 9.7 to 28.7 ft bgs	
10-20 silica sand: 28.7 to 58.0 ft bgs	
bentonite pellets: 58.0 to 59.6 ft bgs	
backfill slough: 59.6 to 62.0 ft bgs	
All temporary casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-8: gravelly Sand (gS)
		8-17: sandy Gravel (sG)
15		Thermistors: 3.4 to 33.9 ft bgs
		17-24: silty Gravel (mG)
		24-27.5: sandy Gravel (sG)
30		27.5-29: Sand (S)
		29-48: sandy Gravel (sG)
		DTW = 30.3 on 07/17/2008
45		
		48-50.5: Gravel (G)
		50.5-62: silt (M)
60		
		TD = 62.0 on 07/09/2008
75		All depths recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

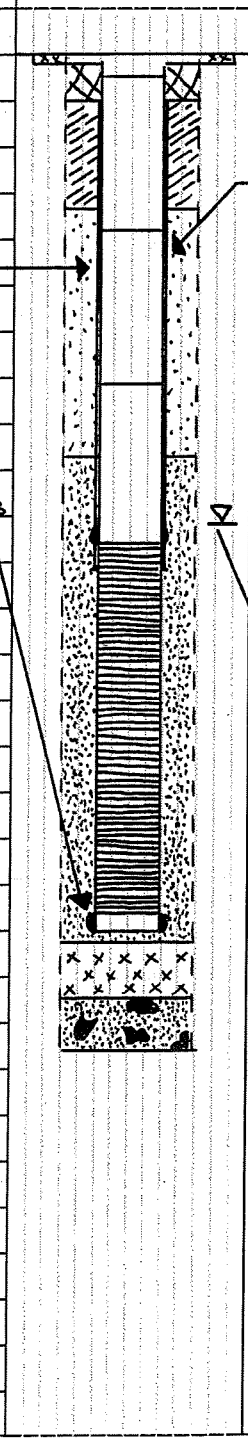
WELL SUMMARY SHEET

Start Date: 07/08/08
Finish Date: 08/01/08
Page 1 of 1

Well ID: C6205
Well Name: 399-3-28
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 08/05/08
Reviewed By: Joe Fayth
Date: 8/15/08
Signature: S. Sexton
Signature: Joe Fayth

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface	
12" diameter protective vault w/ screw down lid 0-1.0 ft bgs	
ERTs: 3-33.5	
4" ID Schedule 40 PVC casing 0.5 to 31.6 ft bgs	
4" PVC screen, 0.020" + end cap 31.6 to 57.0 ft bgs	
centralizer	
Portland cement grout: 0 to 3.0 ft. bgs	
bentonite chips: 3.0 to 10.3 ft. bgs	
40-140 silica sand: 10.3 to 25.75 ft bgs	
10-20 silica sand: 25.75 to 57.8 ft. bgs	
bentonite pellets: 57.8 to 61.2 ft. bgs	
slough material: 61.2 to 64.5 ft. bgs	
All temporary casing removed from borehole	



GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-12: gravelly Sand (gS)
		Thermistors: 3-33.5 ft. bgs
15		12-20: sandy Gravel (sG)
		20-30: silty sandy Gravel (gsiS)
30		30-52: sandy Gravel (sG)
		DTW = 30.7 on 08/01/2008
45		
		52-55.5: Gravel (G)
		55.5-64.5: silt (M)
60		
		TD = 64.5 ft. bgs on 07/09/2008
75		All depths recorded in feet "below ground surface" (bgs)

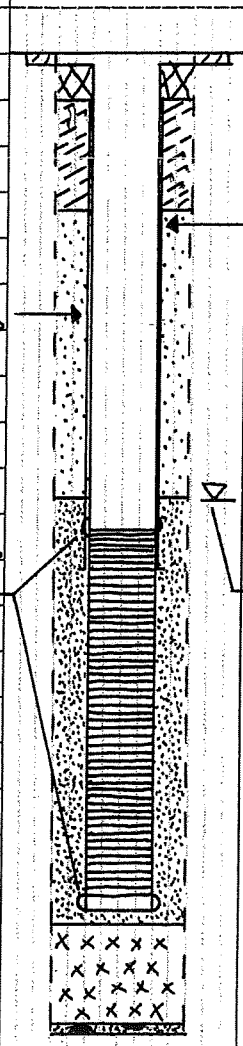
A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 06/30/2008
Finish Date: 07/11/2008
Page 1 of 1

Well ID: C6206
Well Name: 399-3-29
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 08/11/08
Reviewed By: Jacob Smith
Date: 8/11/08
Signature: S. Sexton
Signature: Jacob Smith

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface 12" diameter protective vault w/ screw down lid 0-1.0 ft bgs ERTs = 17: 3-33.5 ft bgs 4" ID Schedule 40 PVC casing 0.5 to 31.0 ft bgs 4" PVC screen, 0.020" + end cap 31.0 to 56.3 ft bgs centralizer Portland cement grout: 0 to 3.0 ft bgs bentonite chips: 3.0 to 10.0 ft bgs 40-140 silica sand: 10.0 to 29.0 ft bgs 10-20 silica sand: 29.0 to 57.0 ft bgs bentonite pellets: 57.0 to 63.6 ft. bgs All temporary casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-4: gravelly Sand (gS)
		4-17.5: sandy Gravel (sG)
		Thermistors: 3 to 33.5 ft bgs
15		17.5-24: silty sandy Gravel (msG)
		24-52: sandy Gravel (sG)
30		DTW = 28.9 on 07/11/2008
45		
		52-53: Gravel (G)
		53-64: Silt (M)
60		TD = 64.0 ft bgs on 07/01/08
75		All depths recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 06/26/2008
Finish Date: 07/01/2008
Page 1 of 1

Well ID: C 6213
Well Name: 399-3-30
Location: 300-FF-5 OU
Project: 300 Areas IFC
Prepared By: S Sexton
Date: 7/7/08
Reviewed By: Joe Fayfich
Date: 8/7/08
Signature: S Sexton
Signature: Joe Fayfich

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush with drilling surface	
12" diameter protective vault with screw down lid 0-1.0 ft bgs	
4" ID Schedule 40 PVC casing 0.5 to 30.0 ft. bgs	
4" ID PVC screen, 0.020" 30.0 to 35.0 ft. bgs	
4" ID Schedule 40 PVC Sump + cap 35.0 to 55.3 ft. bgs	
centralizer	
cement grout: 1.0 to 3.0' bgs	
bentonite chips: 3.0 to 25.8 ft. bgs	
bentonite pellets: -25.8 to 26.7 ft. bgs	
natural backfill: 26.7 to 28.0 ft. bgs	
10-20 silica sand: 28.0 to 37.2 ft. bgs	
bentonite pellets: 37.2 to 39.2 ft. bgs	
10-20 silica sand: 39.2 to 55.3 ft. bgs	
bentonite pellets: 55.3 to 60.5 ft. bgs	
Slough: 60.5 to 61.5 ft. bgs	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-19: sandy Gravel (sG)
15		
		19-26: silty Gravel (mG)
30		26-35: silty sandy Gravel (msG)
		DTW = 28.9 ft bgs 7/11/08
		35-49: sandy Gravel (sG)
45		
		49-55.5: Gravel (G)
60		55.5-61.5: silt (M)
		TD = 61.5 ft. bgs on 6/27/08
		All temporary casing removed from borehole
75		
		All depths recorded in feet "below ground surface" (bgs)

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 06/26/2008
Finish Date: 07/18/2008
Page 1 of 1

Well ID: C6214
Well Name: 399-3-31
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 08/04/08
Reviewed By: Joe Fritz
Date: 8/14/09
Signature:
Signature:

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface	
12" diameter protective vault w/ screw down lid 0-1.0 ft bgs	
ERTs #16: 3 to 58.6	
4" ID Schedule 40 PVC casing 0.5 to 53.2 ft. bgs	
4" PVC screen, 0.020" 53.2 to 55.2 ft. bgs	
4" ID Schedule 40 PVC sump + cap 55.2 to 59.6 ft bgs	
centralizer	
Portland cement grout: 0 to 3.6 ft. bgs	
bentonite chips: 3.6 to 9.2 ft. bgs	
40-140 silica sand: 9.2 to 46.0 ft. bgs	
bentonite pellets: 46.0 to 51.2 ft. bgs	
10-20 silica sand: 51.2 to 59.8 ft. bgs	
bentonite pellets: 59.8 to 62.9 ft. bgs	
All temporary casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-11.5: sandy Gravel (sG)
		Thermistors: 3-58.6 ft. bgs
15		11.5-18: gravelly Sand (gS)
		18-20.5: silty Gravel (mG)
		20.5-25: sandy Gravel (sG)
		25-33: silty sandy Gravel (msG)
30		DTW = 28.1 on 06/23/2008
		33-45: sandy Gravel (sG)
45		45-55.5: No Recovery
		55.5-63: silt (M)
60		TD = 63.0 ft. bgs on 06/23/2008
75		

A-6003-643 (03/03)

WELL SUMMARY SHEET

Start Date: 07/18/08
Finish Date: 07/28/08
Page 1 of 1

Well ID: C6215
Well Name: 399-3-32
Location: 300-FF-5 OU
Project: 300 Area IFC
Prepared By: S. Sexton
Date: 08/06/08
Reviewed By: Joe Fritz
Date: 8/13/08
Signature: S. Sexton
Signature: Joe Fritz

CONSTRUCTION DATA

Description	Diagram
6" concrete pad flush to drilling surface	
12" diameter protective vault w/ screw down lid 0-1.0 ft bgs	
4" ID Schedule 40 PVC casing 0.5 to 42.2 ft bgs	
4" PVC screen, 0.020" 42.2 to 44.2 ft bgs	
4" ID Schedule 40 PVC sump 44.2 to 56.6	
centralizer	
Portland cement grout: 0 to 3.0 ft bgs	
bentonite pellets: 3.0 to 39.6 ft bgs	
10-20 silica sand: 39.6 to 46.0 ft bgs	
bentonite pellets: 46.0 to 47.4 ft bgs	
10-20 silica sand: 47.4 to 58.0 ft bgs	
bentonite chips: 58.0 to 62.0 ft bgs	
All temporary casing removed from borehole	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-7: sandy Gravel (sG)
		7-28: silty sandy Gravel (wsG)
15		
		28-29: silt (M)
30		29-56: sandy Gravel (sG)
		DTW = 33.2 on 07/30/2008
45		
		56-63: silt (M)
60		
		TD = 63.0 ft bgs on 07/18/2008
75		

A-6003-643 (03/03)

Appendix G

Downhole Geophysical Logs

399-2-5 (C5708)
Log Data Report

Borehole Information:

Borehole:	399-2-5 (C5708)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	33.25	GWL Date:	10/01/07
North (m)	East (m)	Drill Date	TOC Elevation	Total Depth (ft)	Type
not available	not available	09/28/07	not available	129	Cable

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Carbon Steel	0.75	11 3/4	10 3/4	1/2	0.75	129

Borehole Notes:

The logging engineer measured the casing and stickup using a steel tape. Measurements were rounded to the nearest 1/16 in.

Logging Equipment Information:

Logging System:	Gamma 4L		Type:	SGLS (60%) SN: 47TP32211A
Effective Calibration Date:	07/09/07	Calibration Reference:	HGLP-CC-020	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4H		Type:	NMLS SN: H310700352
Effective Calibration Date:	11/22/06	Calibration Reference:	HGLP-CC-020	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	3	4 Repeat			
Date	10/01/07	10/01/07			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	129.0	0.0			
Finish Depth (ft)	0.5	13.0			
Count Time (sec)	100	100			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
ft/min	N/A[2]	N/A			
Pre-Verification	DL041CAB	DL041CAB			
Start File	DL041000	DL041259			
Finish File	DL041257	DL041285			
Post-Verification	DL041CAA	DL041CAA			
Depth Return Error (in.)	0	0			
Comments	No fine gain adjustment	No fine gain adjustment			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	1	2 Repeat			
Date	09/28/07	09/28/07			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	0.0	20.0			
Finish Depth (ft)	32.0	23.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
ft/min	N/A	N/A			
Pre-Verification	DH722CAB	DH722CAB			
Start File	DH722000	DH722129			
Finish File	DH722128	DH722141			
Post-Verification	DH722CAA	DH722CAA			
Depth Return Error (in.)	N/A	+ 0.5			
Comments	No fine gain adjustment	No fine gain adjustment			

Logging Operation Notes:

Logging was conducted with a centralizer on the sondes. Logging data acquisition is referenced to ground level. Repeat data were acquired in this borehole to evaluate each system's performance.

Analysis Notes:

Analyst:	Henwood	Date:	10/16/07	Reference:	GJO-HGLP 1.6.3, Rev. 0

Pre-run and post-run verifications for the SGLS (G4L) were acquired in the Amersham verifier, serial number 115 which is enhanced in the naturally occurring radionuclides K-40, U-238, and Th-232 (KUT). The verification criteria were met.

A casing correction for 1/2-in.-thick casing was applied to the SGLS log data.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with EXCEL worksheet template identified as G4LJuly07.xls using efficiency functions and corrections for casing, water, and dead time as determined from annual calibrations. No correction for dead time was necessary. A correction for water was applied to data acquired below 33 ft in depth.

The NMLS data are presented as counts per second. A calibration for casing inside diameters greater than 8-in. is not available.

Results and Interpretations:

A plot of manmade radionuclides is included for Cs-137 and processed uranium (U-235 and U-238). The plot indicates all detections based on the routine processing software. All of the detections were at or near the respective MDLs. Inspection of each spectrum where a detection was indicated revealed no full energy peaks. Therefore, the detections are considered to be statistical fluctuations and are not considered valid. No other manmade radionuclides were indicated.

There is a strong indication of radon in the groundwater. Comparison of the 1764 keV and 609 keV Bi-214 gamma rays show differing concentrations after corrections for water and casing. The casing and water correction factors decrease with increasing energy. Gamma rays originating inside the casing are not attenuated by the steel casing, and the net effect of applying the correction factors is to amplify results from

low-energy gamma rays. The fact that the 609 keV gamma ray results in a higher apparent concentration than the 1764 keV gamma line suggests that radon is present in the groundwater. Typical formation concentrations of naturally occurring U-238 are between approximately 0.5 and 1.5 pCi/g. The concentrations above the groundwater level are consistent with these values for the assays of both the 609 and 1764 keV peaks. Note that enhanced radon is not related to the existence of manmade uranium.

The neutron moisture results are reported in counts per second because no valid calibration is available for borehole inside diameters greater than 8 inches. It is not known to what degree this measurement reflects formation moisture.

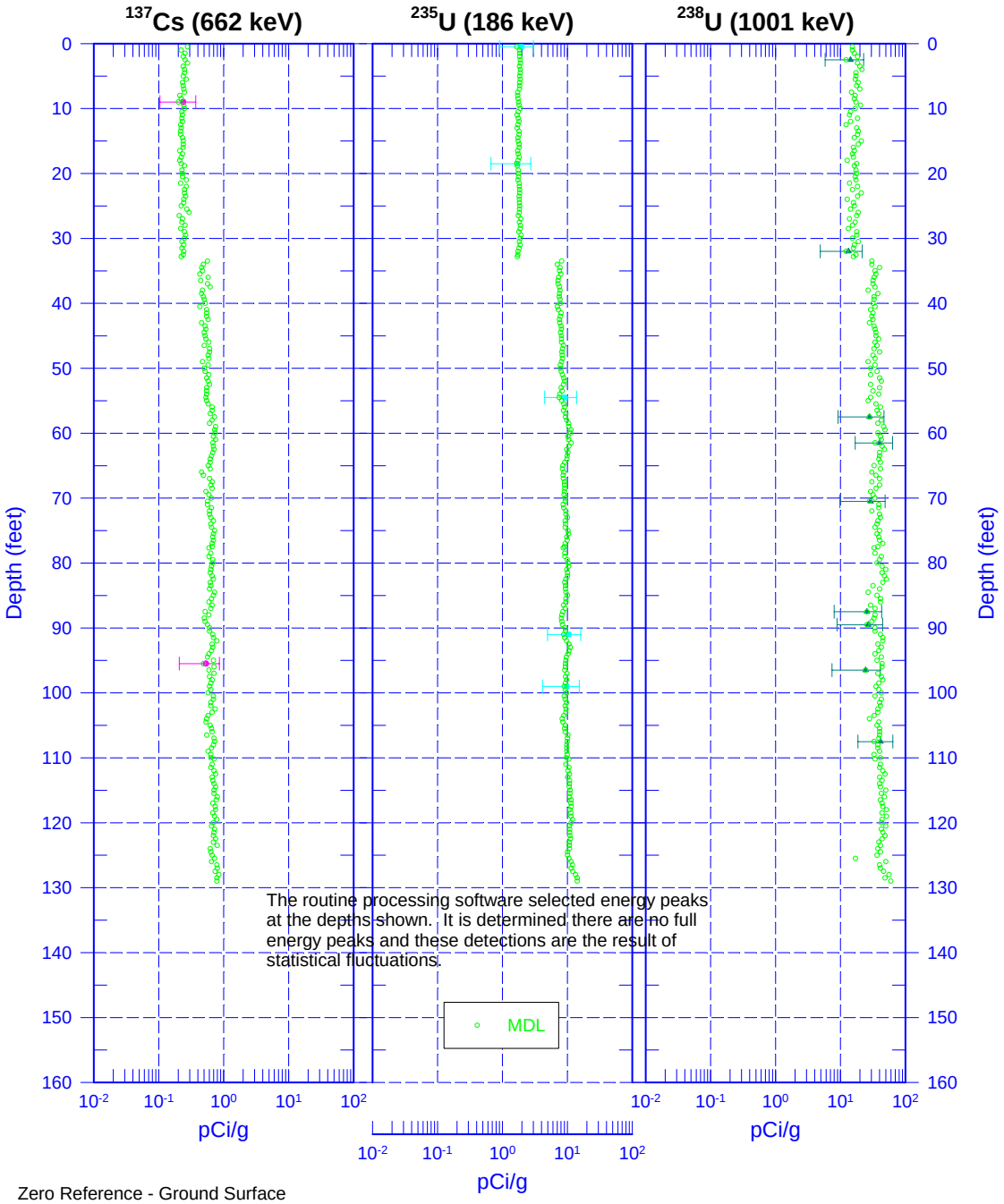
The repeat sections generally indicate good agreement of the naturally occurring KUT and moisture.

List of Log Plots:

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Moisture
Total Gamma & Dead Time
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

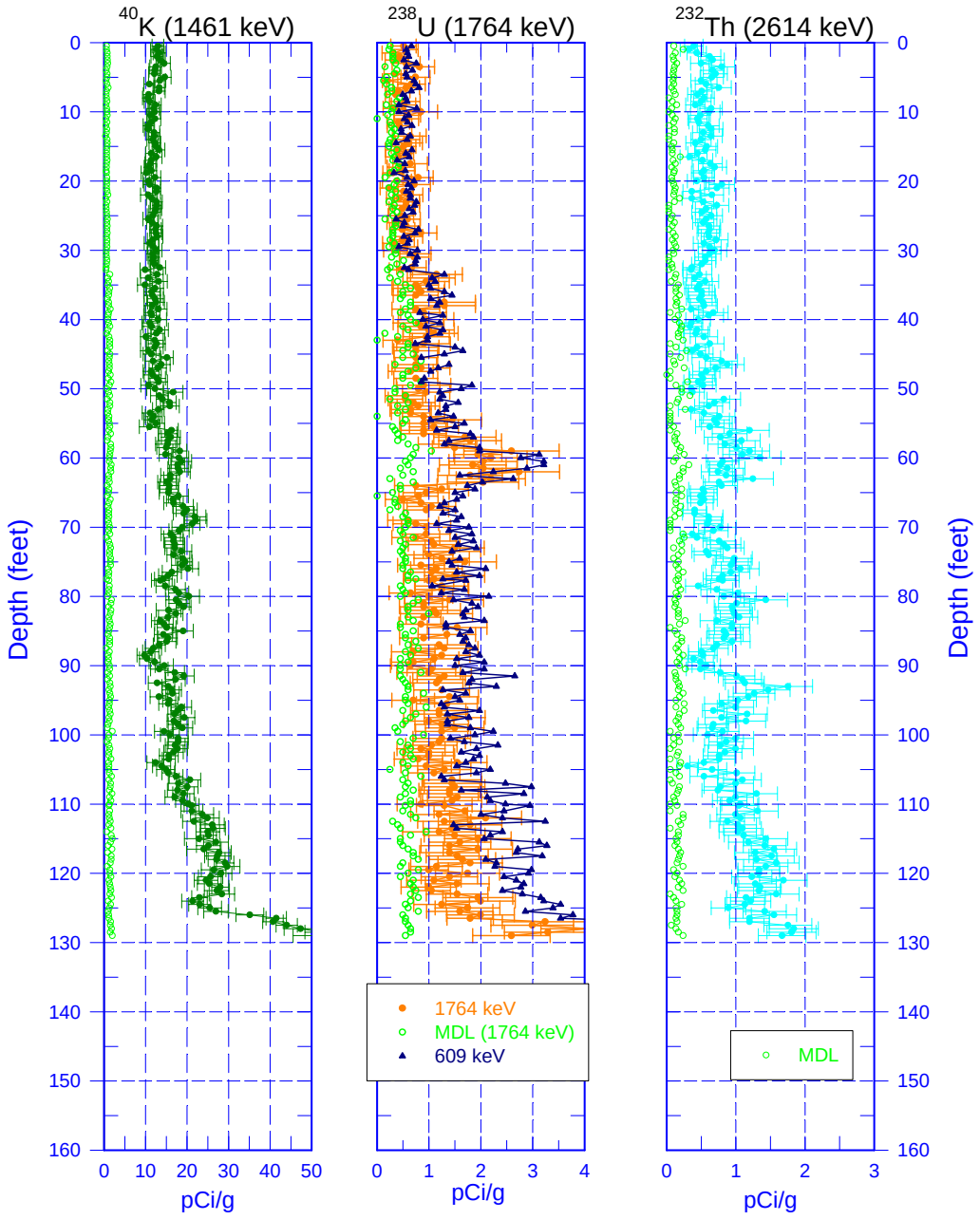
[1] GWL – groundwater level

399-2-5 (C5708)
Manmade Radionuclides

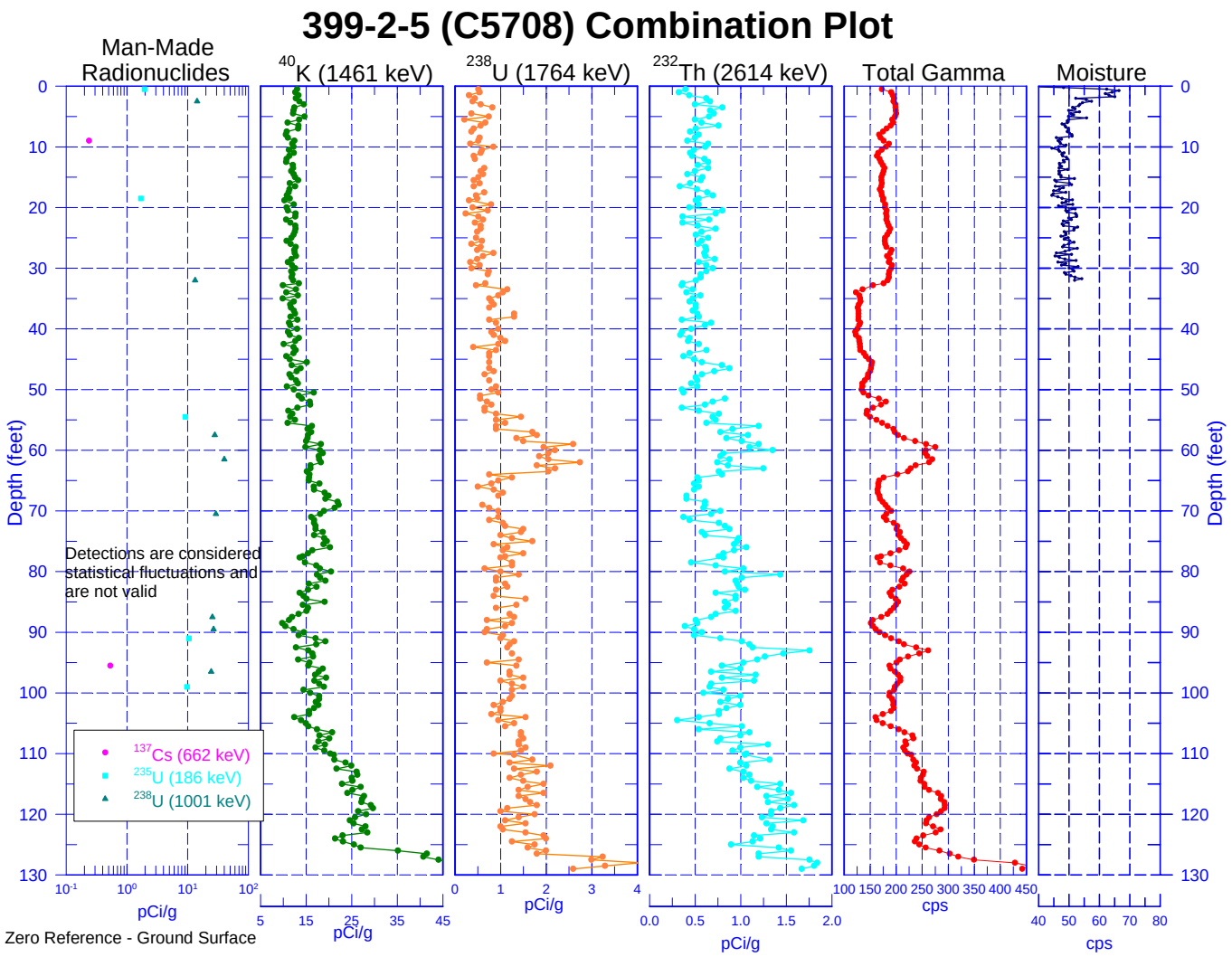


Zero Reference - Ground Surface

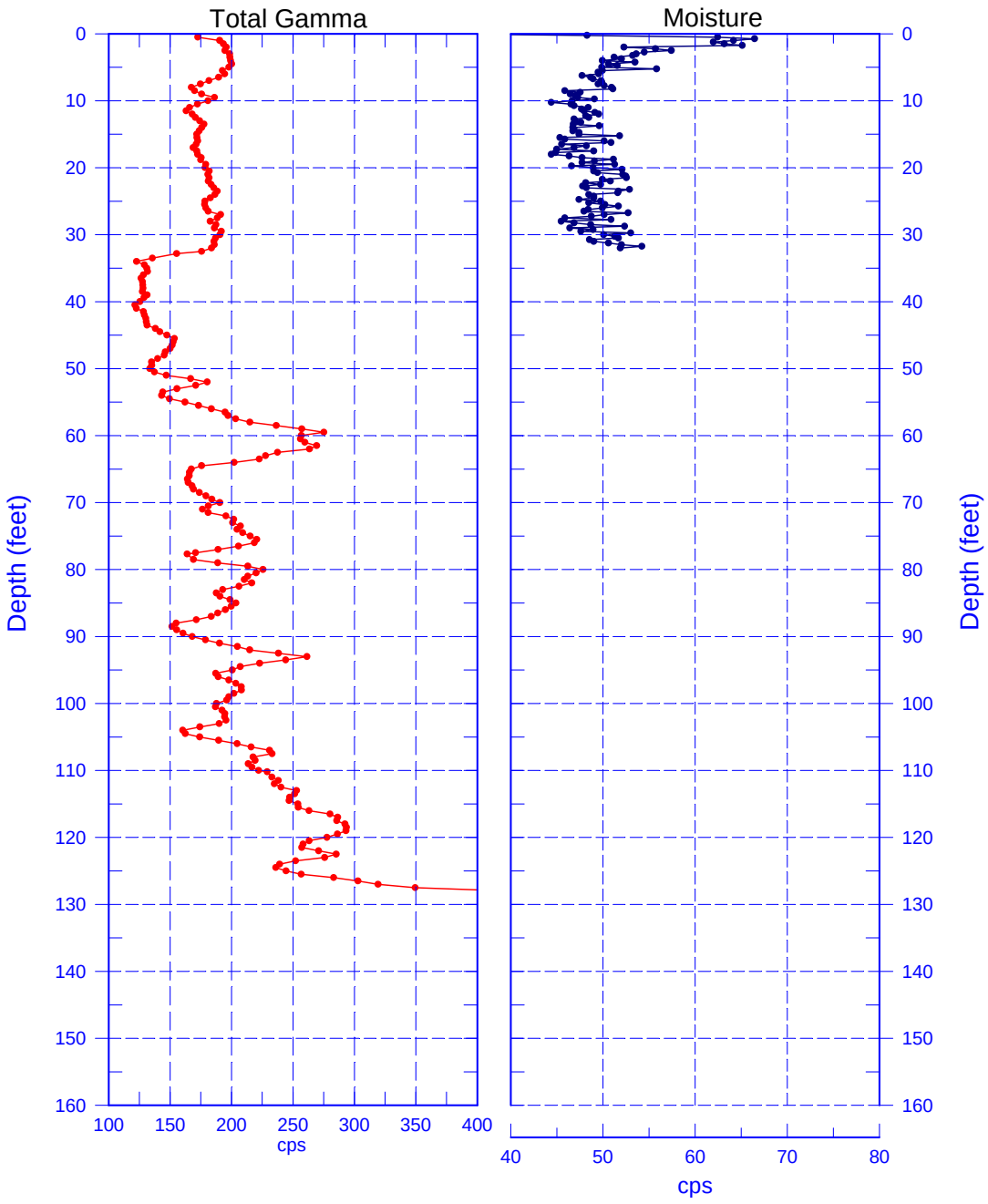
399-2-5 (C5708)
Natural Gamma Logs



Zero Reference - Ground Surface

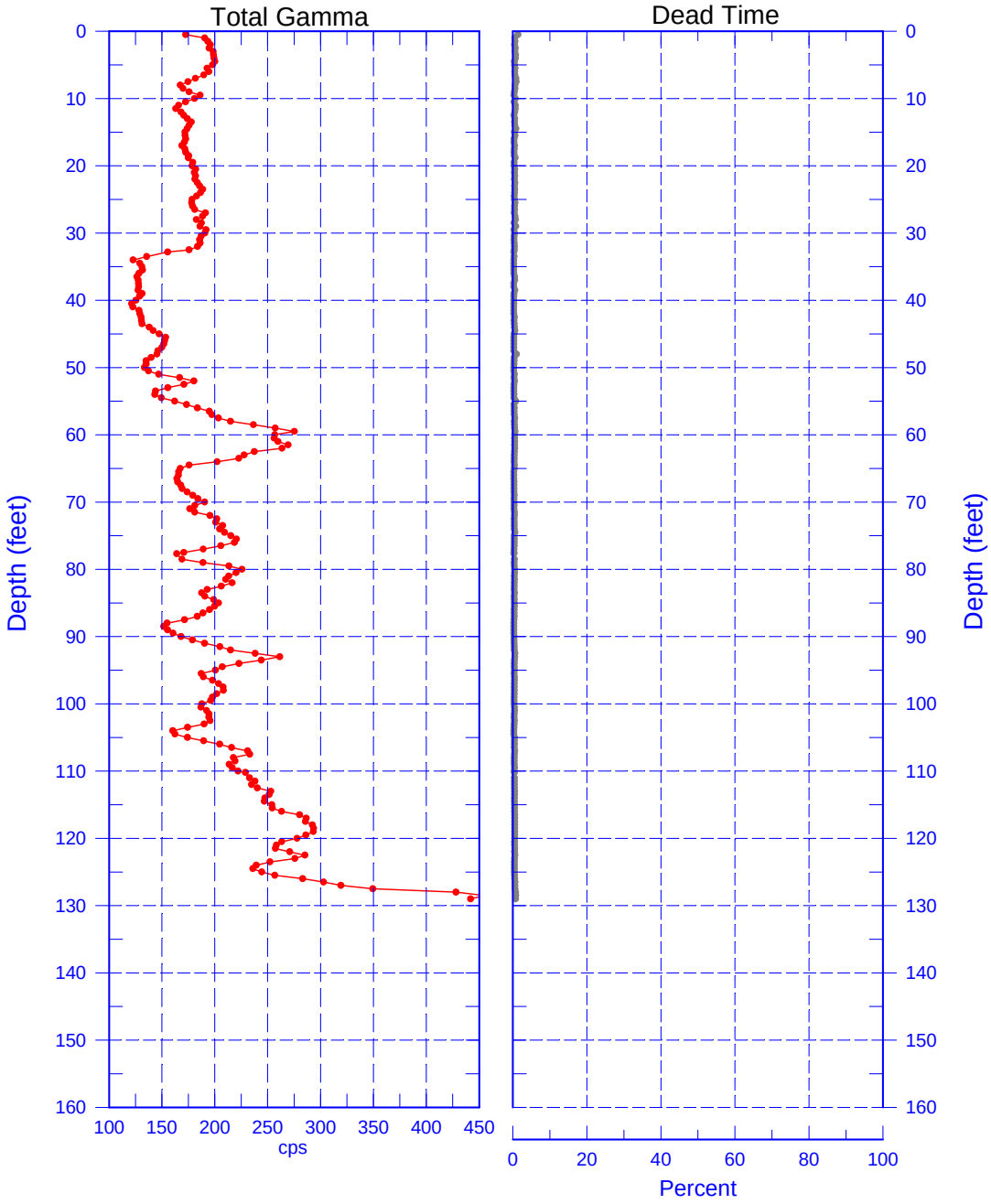

399-2-5 (C5708) Combination Plot
Man-Made Radionuclides
40K (1461 keV)
238U (1764 keV)
232Th (2614 keV)
Total Gamma
Moisture
Depth (feet)
Detections are considered statistical fluctuations and are not valid
137Cs (662 keV)
235U (186 keV)
238U (1001 keV)
pCi/g
cps
Zero Reference - Ground Surface

399-2-5 (C5708)
Total Gamma & Moisture



Reference - Ground Surface

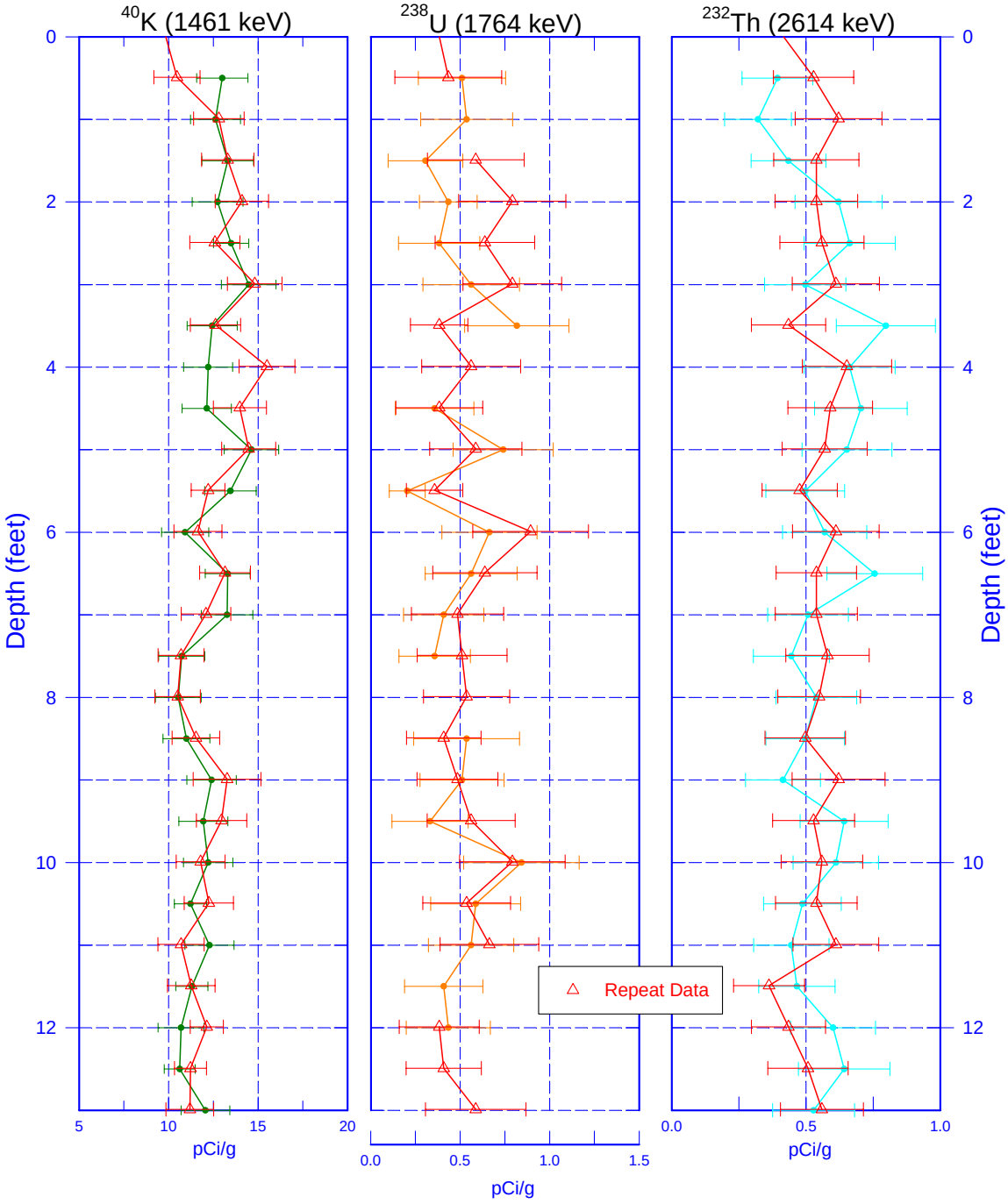
399-2-5 (C5708)
Total Gamma & Dead Time



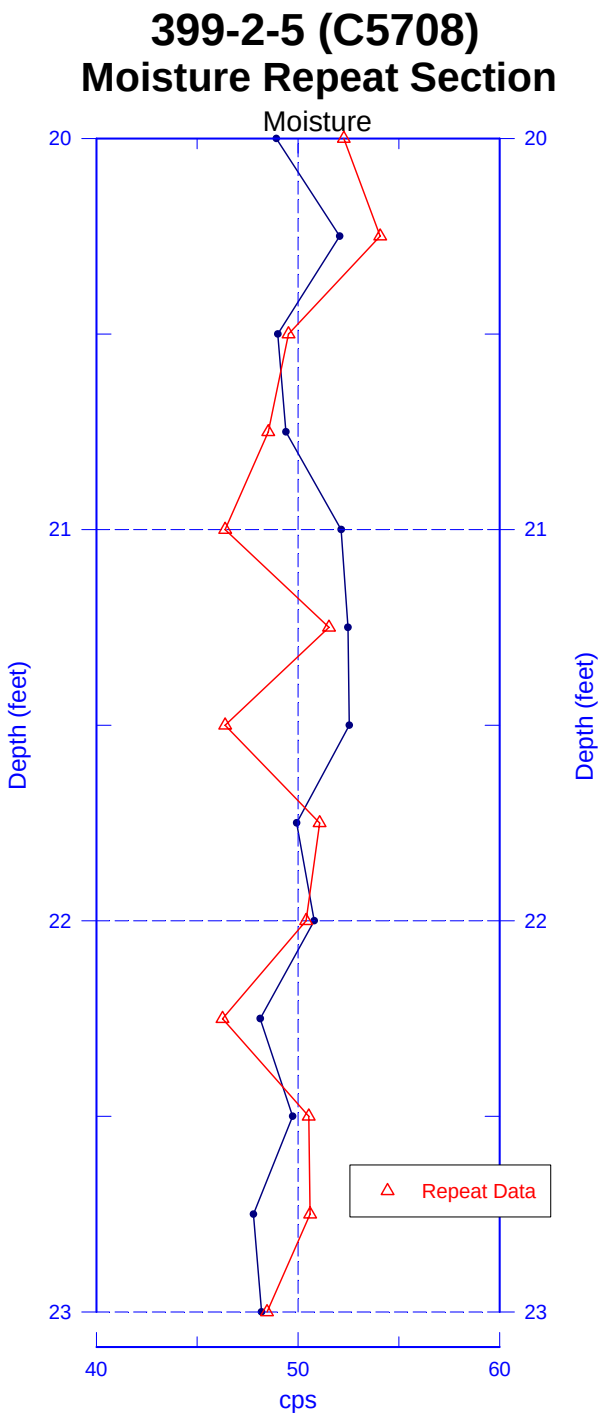
Reference - Ground Surface

399-2-5 (C5708)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface



Reference - Ground Surface

399-2-7 (C6184)
Log Data Report

Borehole Information:

Borehole:	399-2-7 (C6184)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	27.1	GWL Date:	6/28/2008
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116084.5	594235.3	06/27/2008	N/A	62	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	1.1	7 5/8	6 7/8	3/8	-1.1	59

Borehole Notes:

Casing data and total depth was reported by the site geologist. Casing diameter was measured using a steel tape and rounded to the nearest 1/16–inch. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type: Serial No.:	60% HPGe SGLS 47TP32211A
Effective Calibration Date:	12/31/2007	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	
Logging System:	Gamma 4 H		Type: Serial No.:	NMLS H310700352
Effective Calibration Date:	11/6/2008	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	6/27/2008	6/28/2008			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	61.0	12.0			
Finish Depth (ft)	0.0	6.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DL561CAB	DL561CAB			
Start File	DL561000	DL561123			
Finish File	DL561122	DL561135			
Post-Verification	DL561CAA	DL561CAA			
Depth Return Error (in.)	0.0	0.0			
Comments	None	None			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	1	2 Repeat			
Date	6/27/2008	6/27/2008			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	0.0	11.0			
Finish Depth (ft)	26.75	14.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
ft/min	NA	NA			
Pre-Verification	DHG32CAB	DHG32CAB			
Start File	DHG32000	DHG32108			
Finish File	DHG32107	DHG32120			
Post-Verification	DHG32CAA	DHG32CAA			
Depth Return Error (in.)	NA	0.0			
Comments	None	None			

Logging Operation Notes:

The SGLS data were collected using Gamma 4, HO 68B-3573. Pre and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. A centralizer was installed on the sonde. Maximum logging depth was 61.15 feet before the sonde un-weighted.

The NMLS data were collected using Gamma 4, HO 68B-3573. Pre and post-survey verification measurements were acquired in the standard field verifier. A centralizer was installed on the sonde. Maximum logging depth was 26.75 feet before water was encountered.

Analysis Notes:

Analyst:	SPINNER	Date:	10/14/2008	Reference:	GJO-HGLP 1.6.3, Rev. 0

The SGLS AND NMLS pre and post-survey verifications spectra met acceptance criteria.

Analyses of log data suggest slight discrepancies with field reports of depth to water and casing depth. Corrections of log data were applied according to the analysis assumptions in the table below.

Top (ft)	Bottom (ft)	T (in)	ID (in)	Comments
0	27.1	0.375	6 7/8	No water correction
28	59	0.375	6 7/8	GWL reported @ 27.1 ft; adjusted to 28 ft.
59.1	62	0	NA	Casing depth reported @ 59 ft; adjusted to 59.1 ft.

T = casing thickness used to calculate energy-dependent casing correction factor
ID = casing inside diameter used to calculate energy-dependent water correction factor

Results and Interpretations:

The Man-Made Radionuclides, Cs-137 (662 keV), U-235 (186 keV) and U-238 (Pa-234m [1001keV]) were identified by the routine processing software at various depth intervals. Scrutiny of the individual spectra indicates that the Cs-137 detections from 10.0 to 11.0 feet are valid. Maximum Cs-137 concentration is 0.17 pCi/g at 11.0 feet. Detections obtained outside of this depth range are associated with processing software, are statistical fluctuations, and are not valid. Scrutiny of the individual spectra indicates the U-238 (Pa-234m) detections may be valid at 10.5 and 11.5 feet, however corroborating energy peaks at the 766 keV (Pa-234m) or at 186 keV (U-235) were not present and the detections were not repeatable. The detections are too near the MDL to determine validity. The remaining U-238 detections outside this range were determined to be statistical fluctuations and are not valid. The detection of U-235 at 49.0 feet is considered a statistical fluctuation and is not valid.

The Natural Gamma Logs (KUT) indicates stratigraphic changes at 12 feet and 54 feet.

The Natural Gamma Logs (KUT) and the Moisture Repeat plots indicate good repeatability.

The Manmade Radionuclides Repeat Log shows a repeatable detection for Cs-137 at 10.0 feet. The U-238 did not repeat.

List of Log Plots:

Depth Reference is ground surface.

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Manmade Radionuclides
Repeat Section of Natural Gamma Logs
Repeat Section of Moisture

[1] GWL – groundwater level
[2] TOC – top of casing

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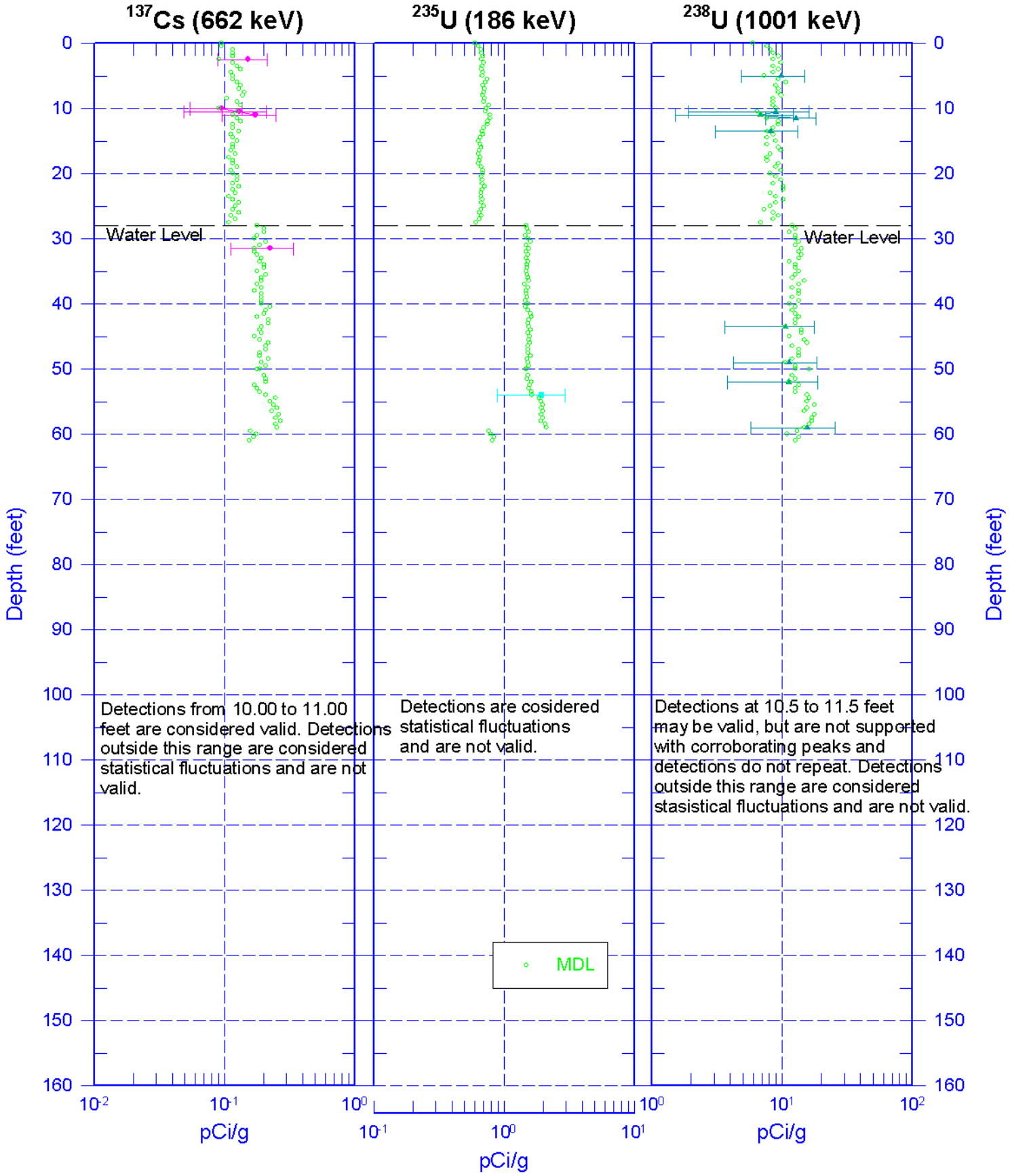
399-2-7 (C6184)
Manmade Radionuclides



Zero Reference - Ground Surface

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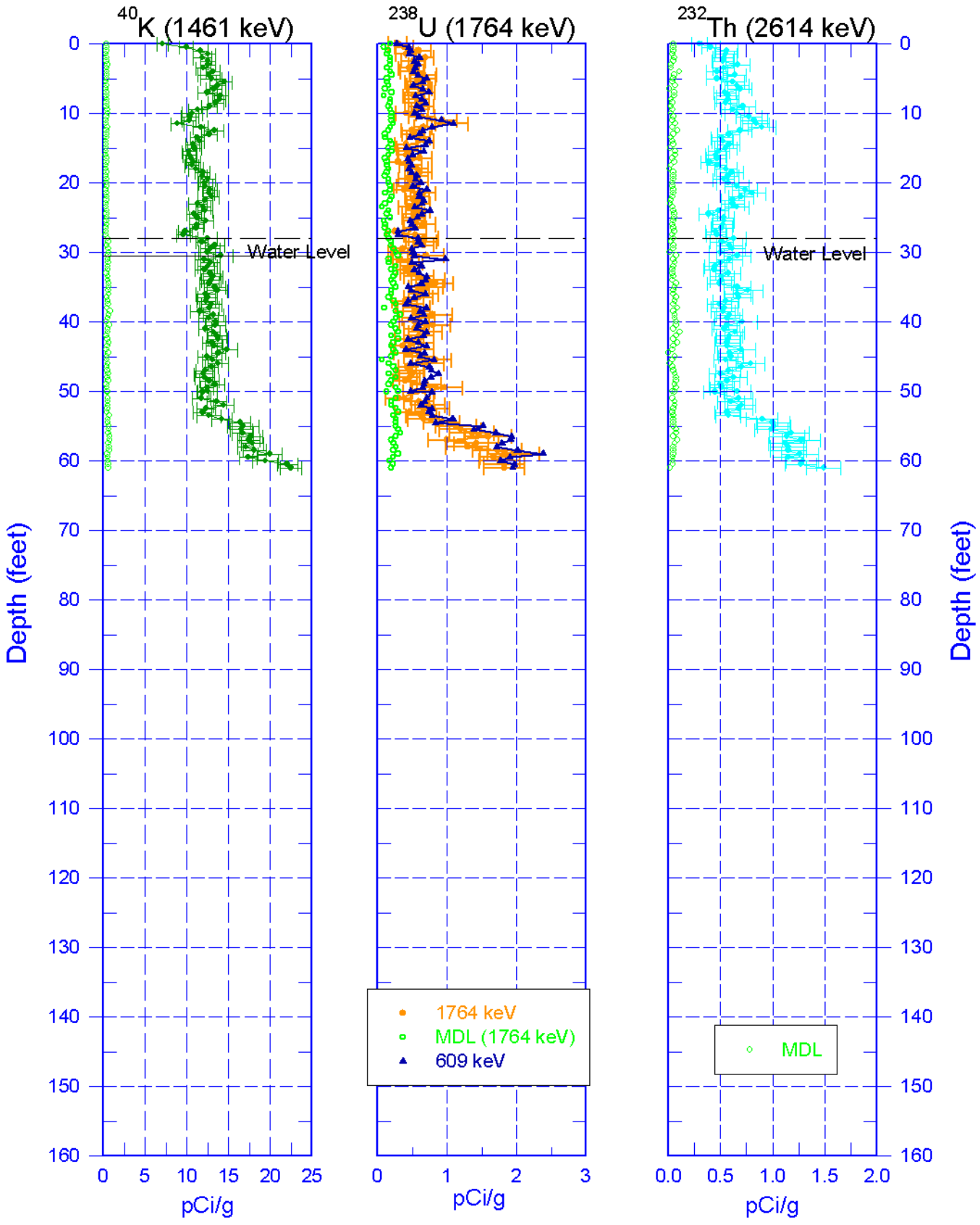
399-2-7 (C6184)
Natural Gamma Logs



Zero Reference - Ground Surface

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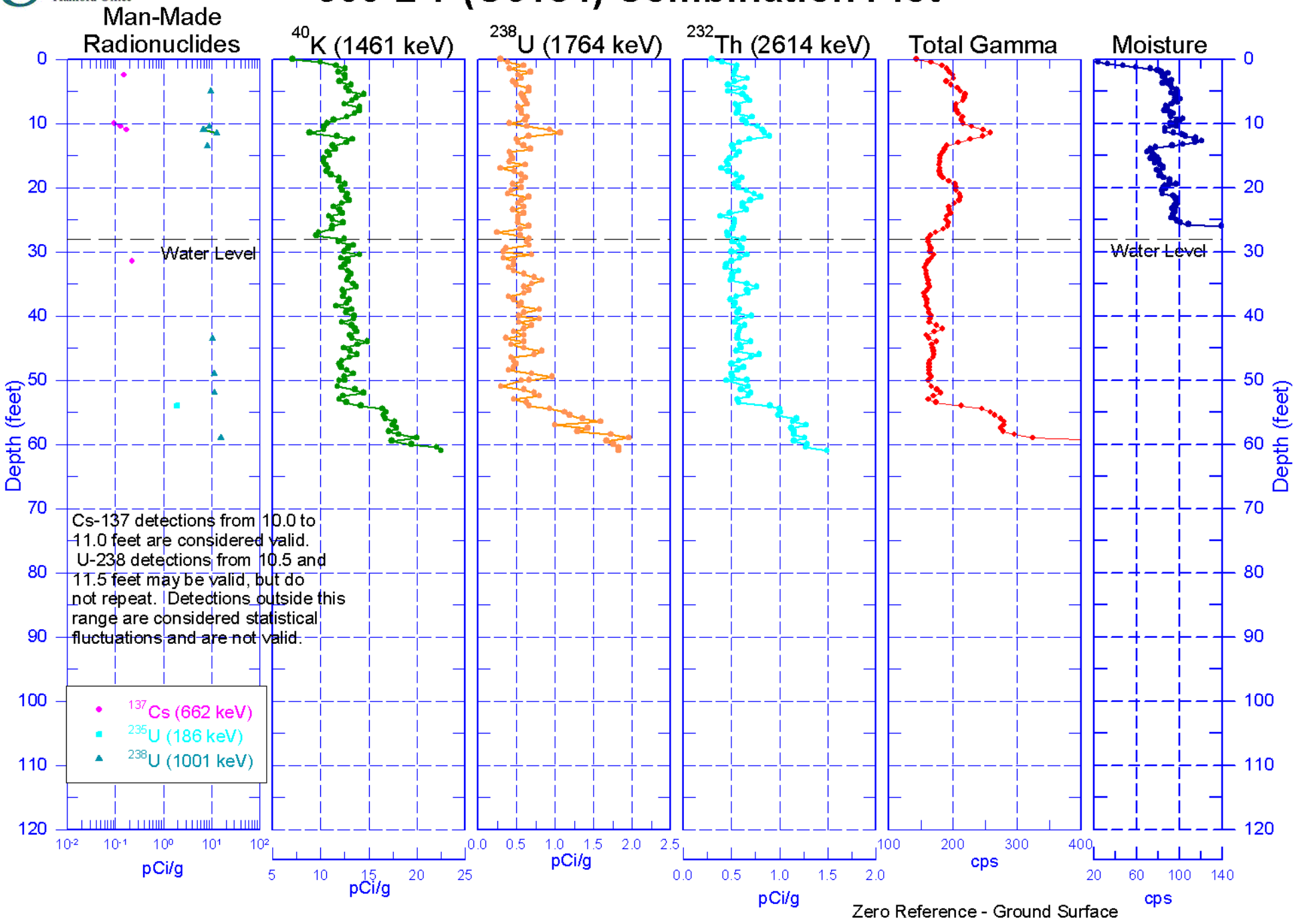
399-2-7 (C6184) Combination Plot



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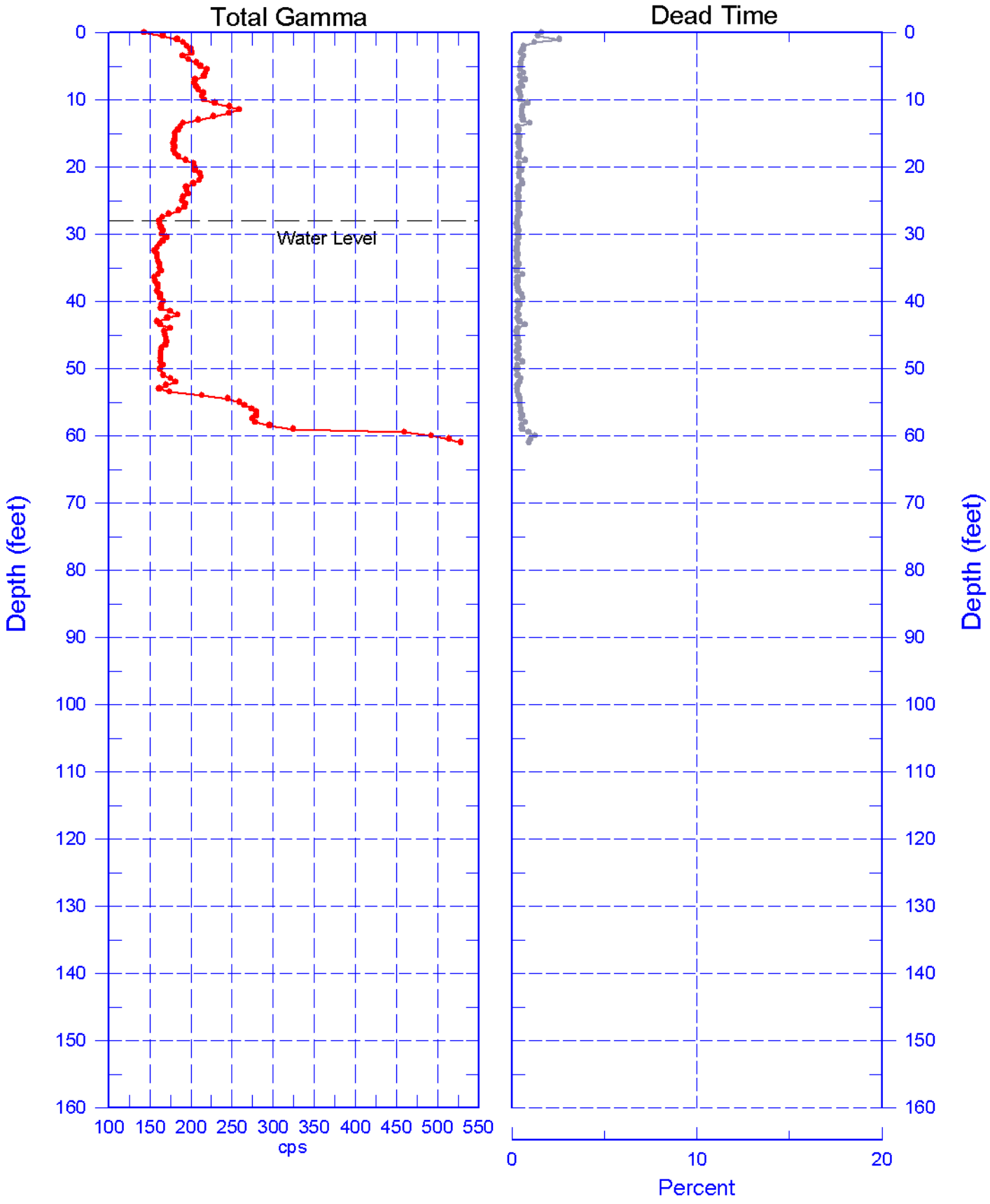
399-2-7 (C6184)
Total Gamma & Dead Time



Reference - Ground Surface

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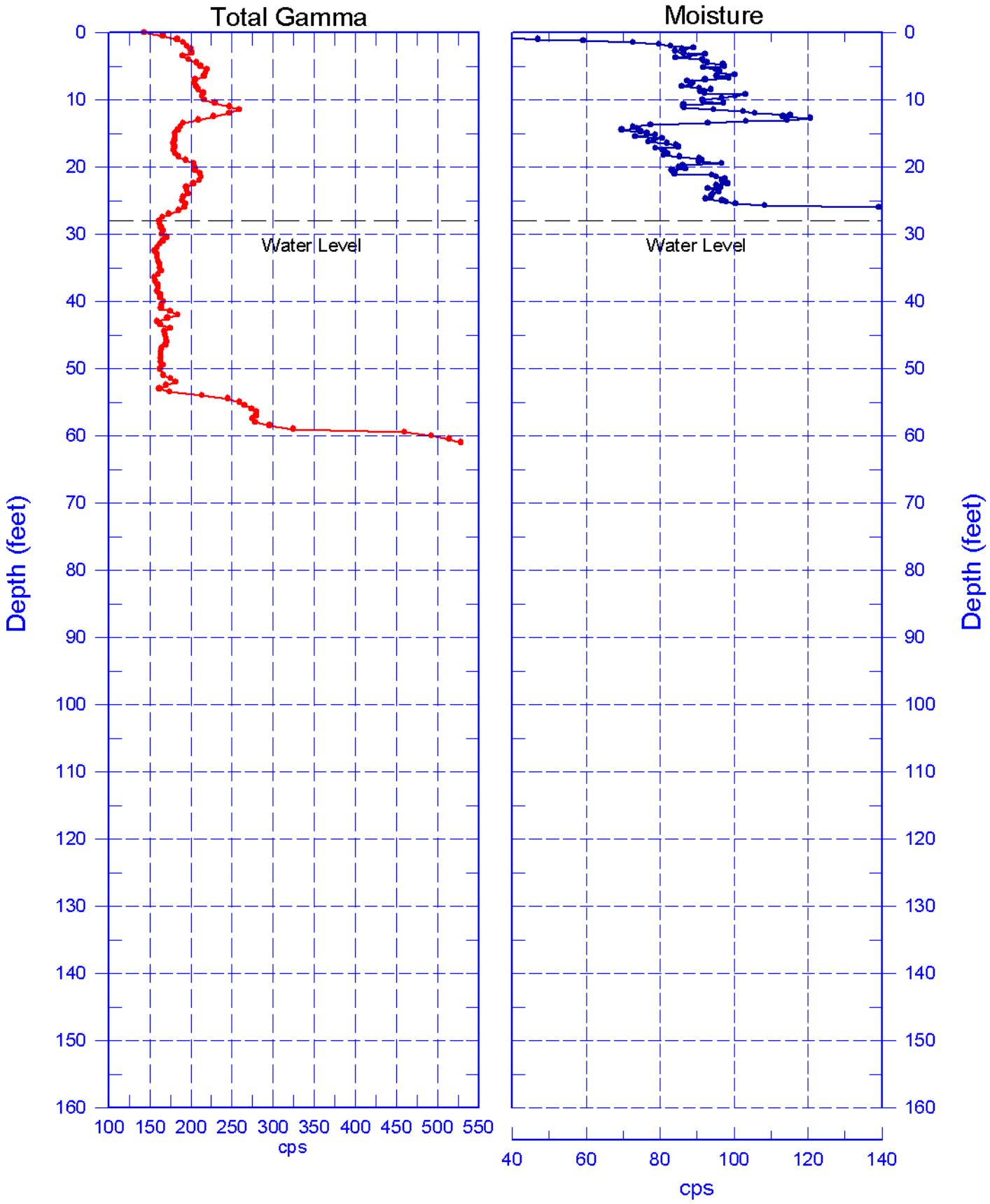
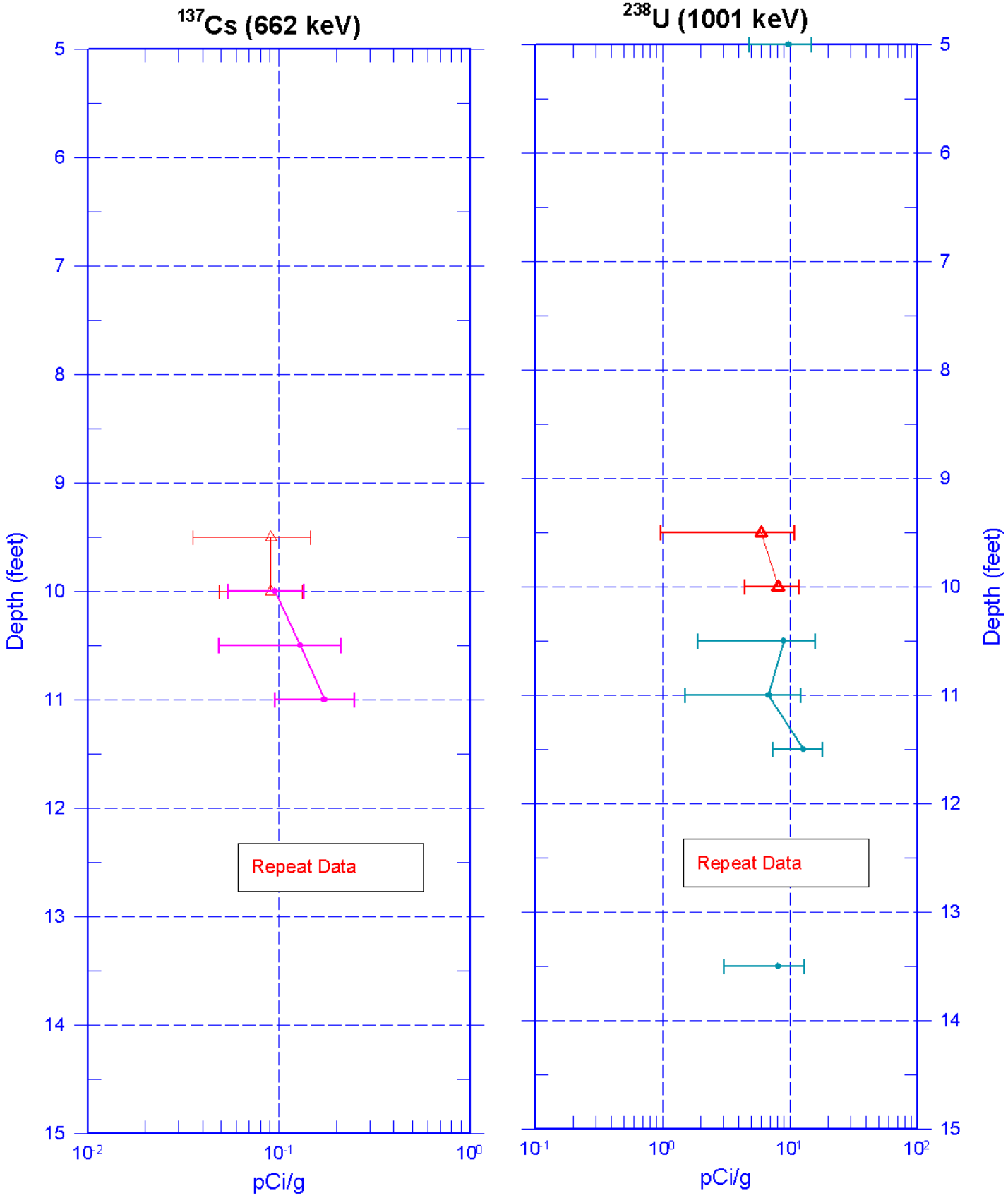
399-2-7 (C6184)
Total Gamma & Moisture



Reference - Ground Surface

399-2-7 (C6184)

Repeat Section of Manmade Radionuclides



Zero Reference - Ground Surface

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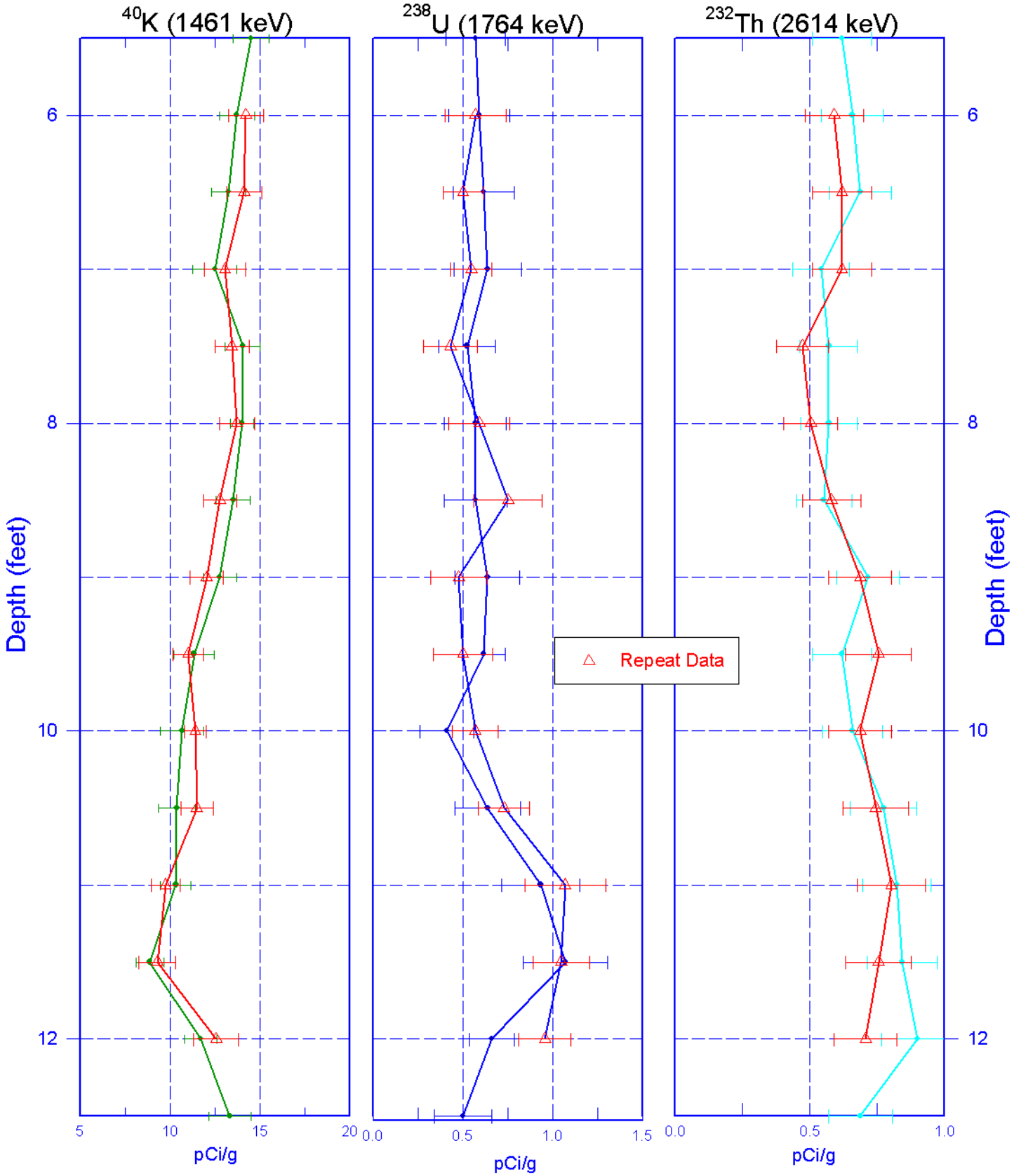
399-2-7 (C6184)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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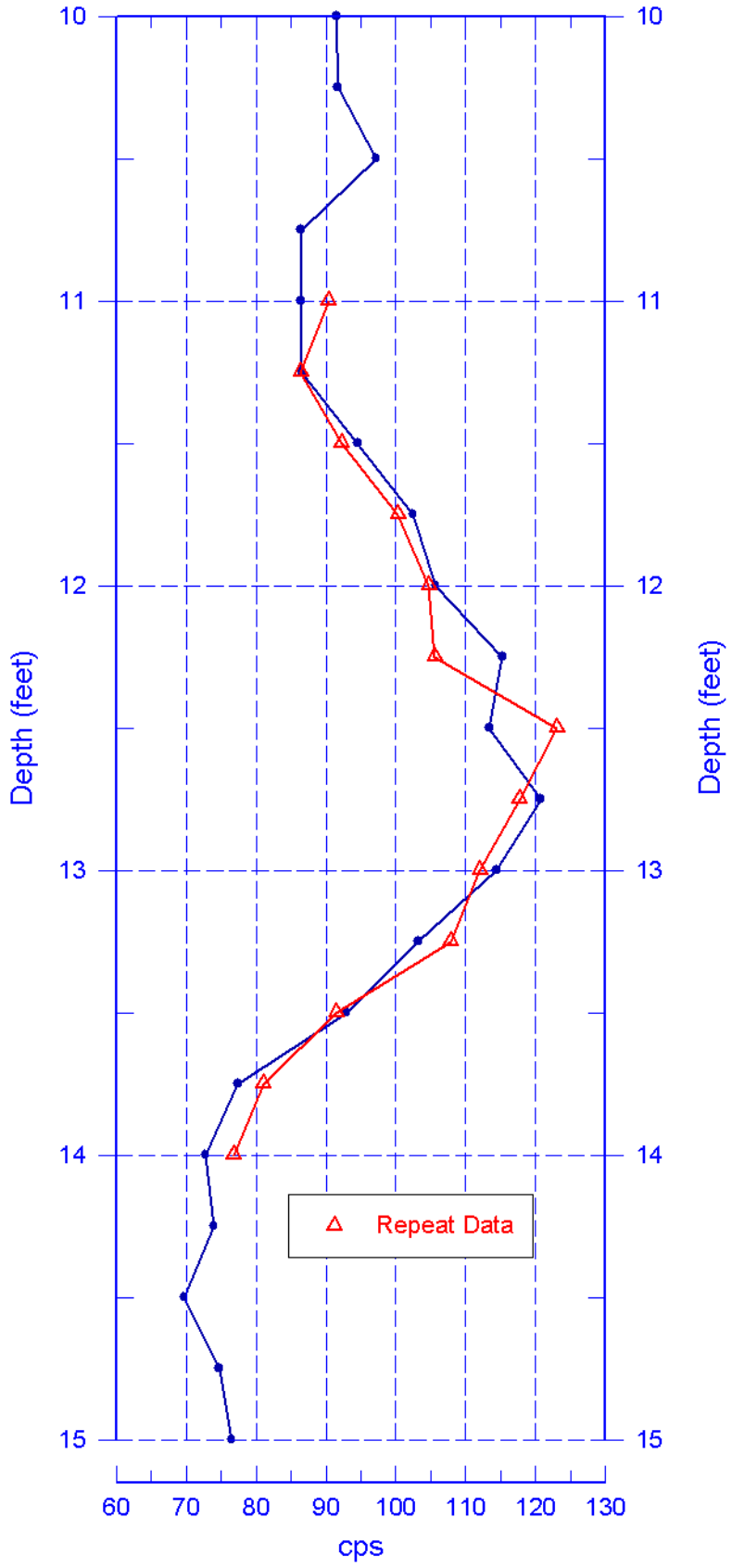
399-2-7 (C6184)
Repeat Section of Moisture



Reference - Ground Surface

399-2-8 (C6185)
Log Data Report

Borehole Information:

Borehole:	399-2-8 (C6185)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	27.7	GWL Date:	07/09/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116090.2	594243.4	07/09/08	Unknown	60	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	3.7	7 5/8	6 7/8	3/8	3.7	57.0

Borehole Notes:

Casing data, and total depth were reported by the site geologist. Logging engineer measured depth to water with an e-tape. Casing diameters were measured using a steel tape and rounded to the nearest 1/16-in. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type:	60% HPGe SGLS
			Serial No.:	47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type:	NMLS
			Serial No.:	H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat
Date	07/08/08	07/08/08
Logging Engineer	McClellan	McClellan
Start Depth (ft)	57.0	42.0
Finish Depth (ft)	0.0	36.0
Count Time (sec)	200	200
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.5	0.5
Log Speed (ft/min)	N/A	N/A
Pre-Verification	DL581CAB	DL581CAB
Start File	DL581000	DL581115
Finish File	DL581114	DL581127
Post-Verification	DL581CAA	DL581CAA

Log Run	1	2 Repeat
Depth Return Error (in.)	0	0
Comments	No fine gain adjustment made.	No fine gain adjustment made.

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat
Date	07/09/08	07/09/08
Logging Engineer	Pearson	Pearson
Start Depth (ft)	0.0	27.75
Finish Depth (ft)	27.75	24.0
Count Time (sec)	15	15
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.25	0.25
Log Speed (ft/min)	N/A	N/A
Pre-Verification	DHG52CAB	DHG52CAB
Start File	DHG52000	DHG52112
Finish File	DHG52111	DHG52127
Post-Verification	DHG52CAA	DHG52CAA
Depth Return Error (in.)	N/A	0
Comments	None	None

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. Maximum logging depth achieved was 57.6 ft before the sonde un-weighted. A centralizer was installed on the sonde. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier.

Analysis Notes:

Analyst:	Henwood	Date:	08/27/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre- and post-survey verification spectra met the acceptance criteria for the established system. NMLS pre- and post-survey verification spectra met the acceptance criteria for the established system.

A casing correction for a 3/8-in. thick casing was applied from ground surface to 57 ft. A water correction was also applied during analysis from 27.7 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. There is no direct calibration data available for a 6 7/8-in. inner diameter borehole casing. Therefore, moisture data are reported in counts per second (cps).

Results and Interpretations:

U-238 (Pa-234m) was detected at 19 and 19.5 ft at a maximum concentration of 10 pCi/g. Gamma energy spectra at these points show definite photopeaks for the 1001.03 keV gamma ray associated with Pa-234m. A corroborating

photopeak for Pa-234m at 766.36 keV is not indicated. However, the detection of the 1001 keV gamma ray of Pa-234m is near its MDL and the gamma ray yield from the 766 keV peak is approximately one-third of the 1001 gamma ray. Therefore, it is expected that the 766 keV gamma ray would not be detected at low concentrations of Pa-234m. Spectra from other detections of Cs-137 and U-238 were individually inspected and it was determined the detections were statistical fluctuations associated with the processing software.

A relatively high concentration of Th-232 is indicated at approximately 39 ft. The significance of this "anomaly" is unknown until compared with other boreholes in the vicinity to determine the spatial continuity. The KUT repeat plots indicate good repeatability.

The moisture repeat plot indicates good repeatability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs
Repeat of Moisture

[1] GWL – groundwater level
[2] TOC – top of casing

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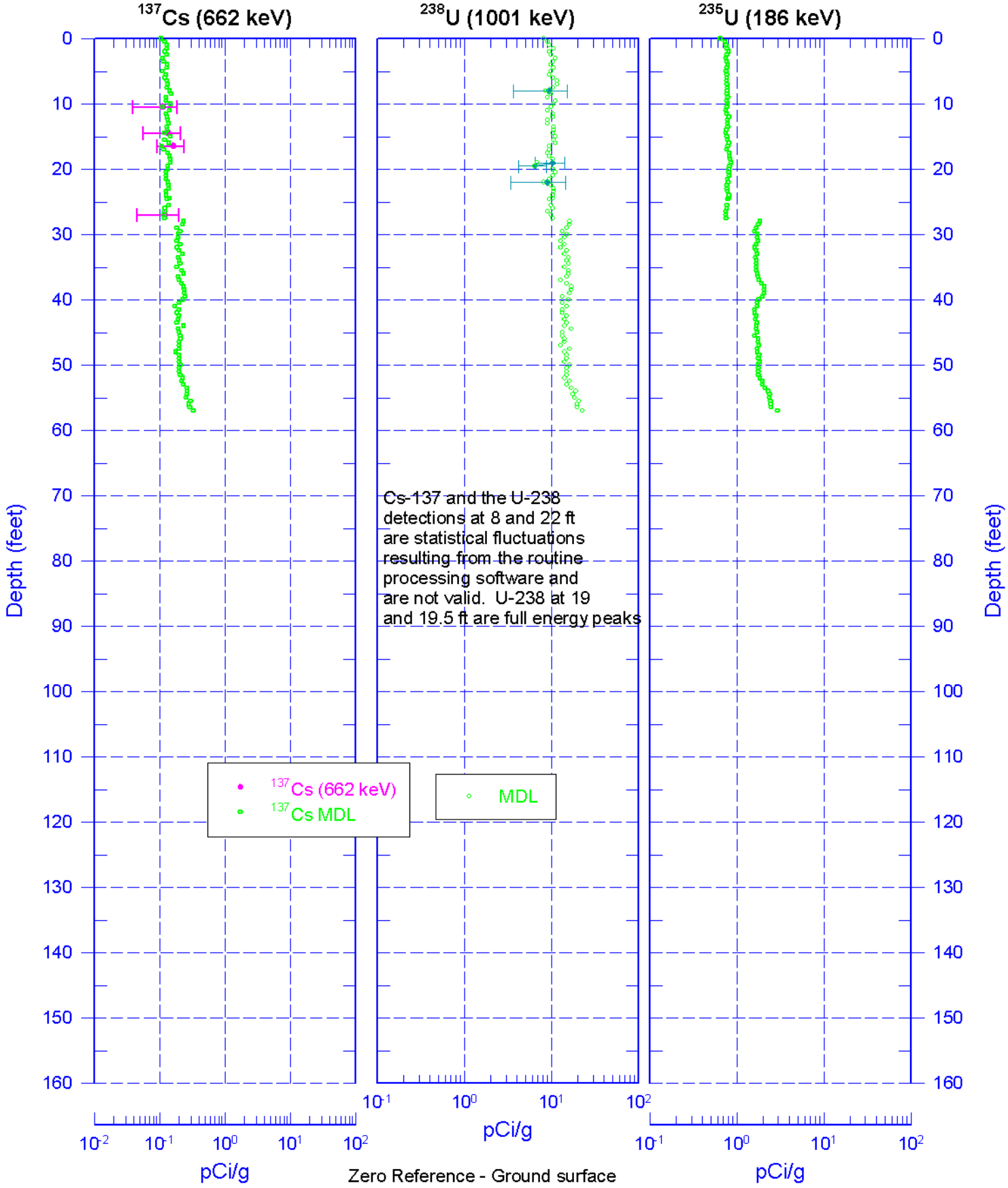
399-2-8 (C6185)
Man-Made Radionuclides



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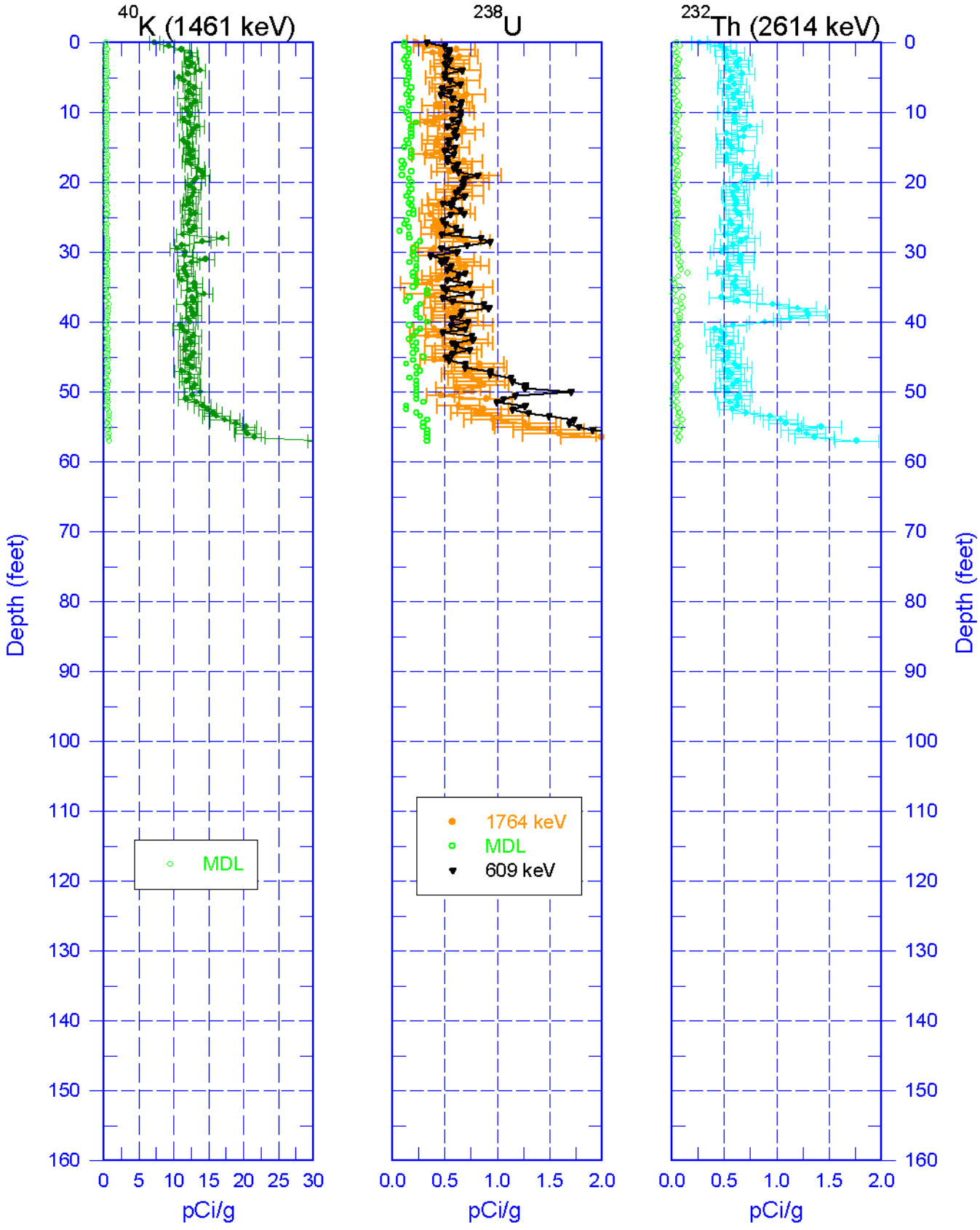
399-2-8 (C6185)
Natural Gamma Logs



Zero Reference - Ground surface

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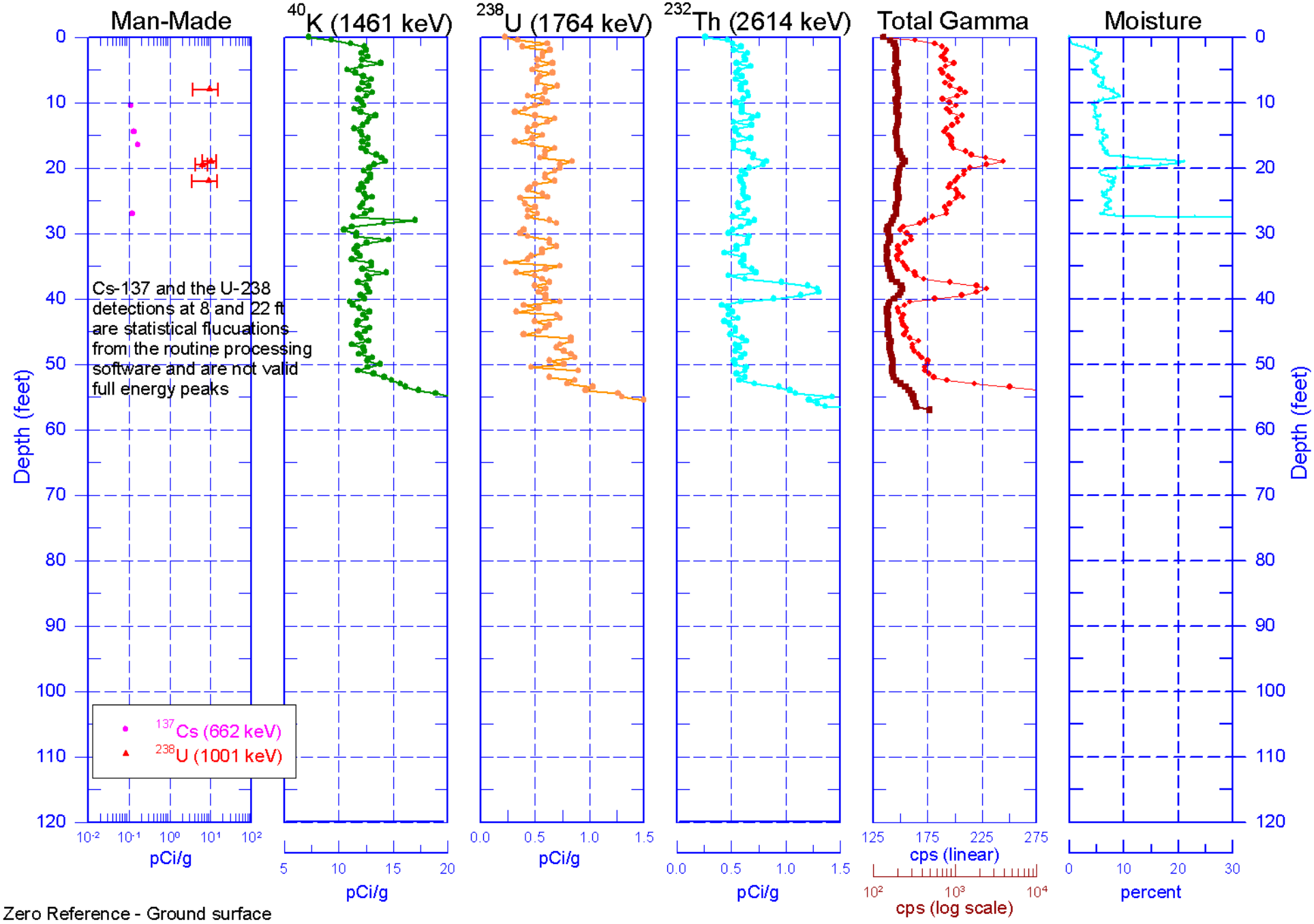
399-2-8 (C6185) Combination Plot



Zero Reference - Ground surface

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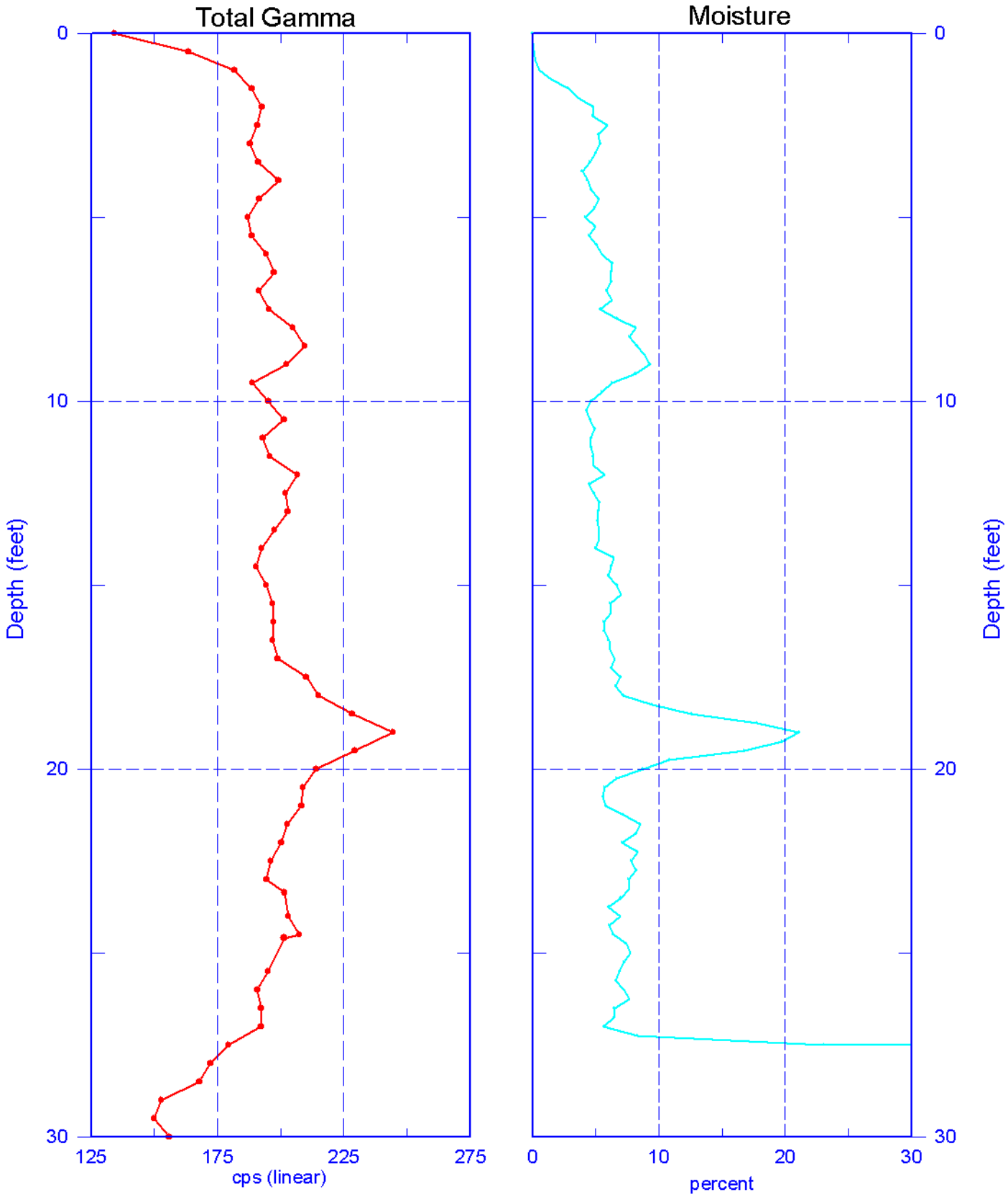
399-2-8 (C6185)
Total Gamma & Moisture

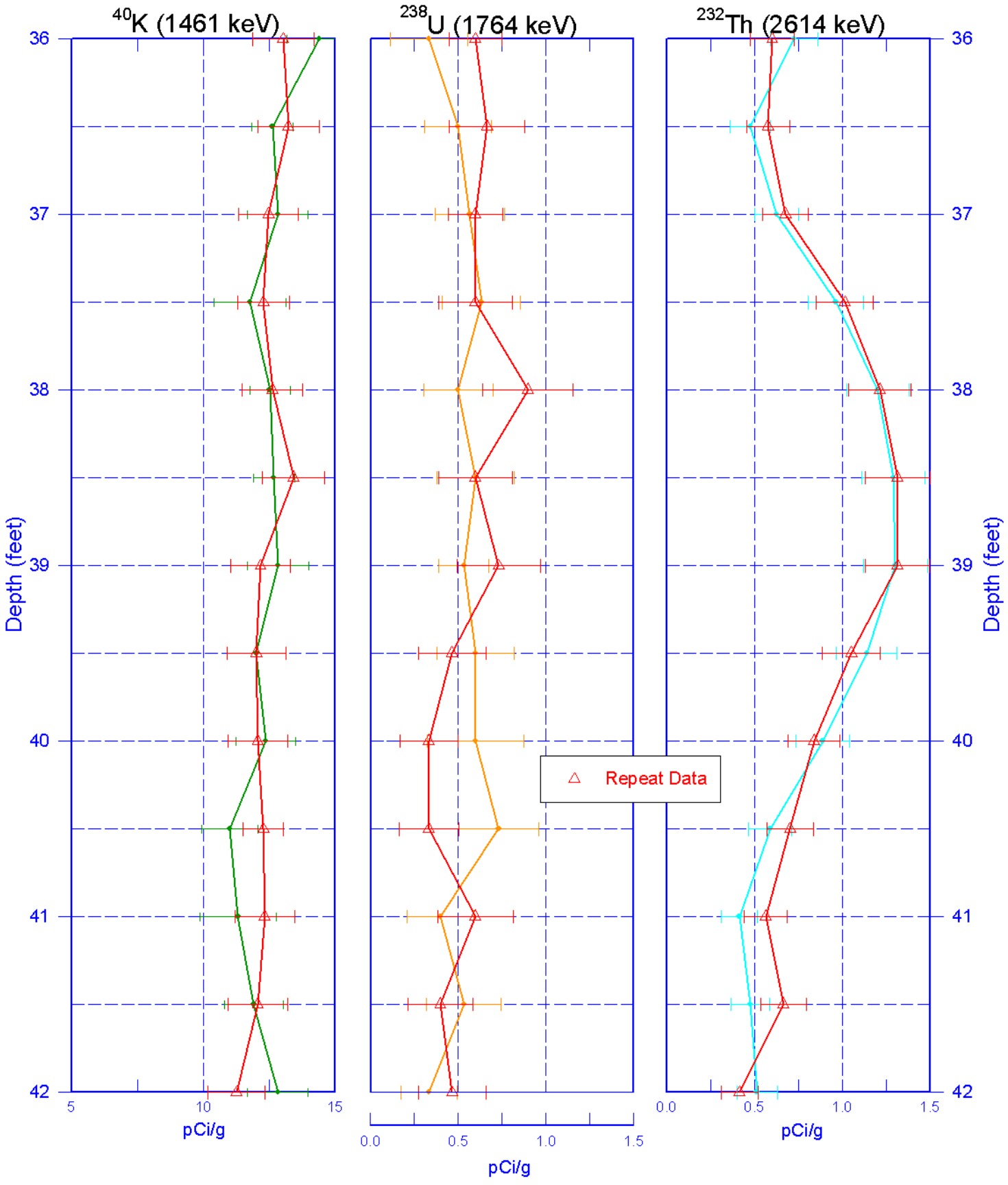


Reference - Ground Surface

Stoller
Hanford Office

399-2-8 (C6185)

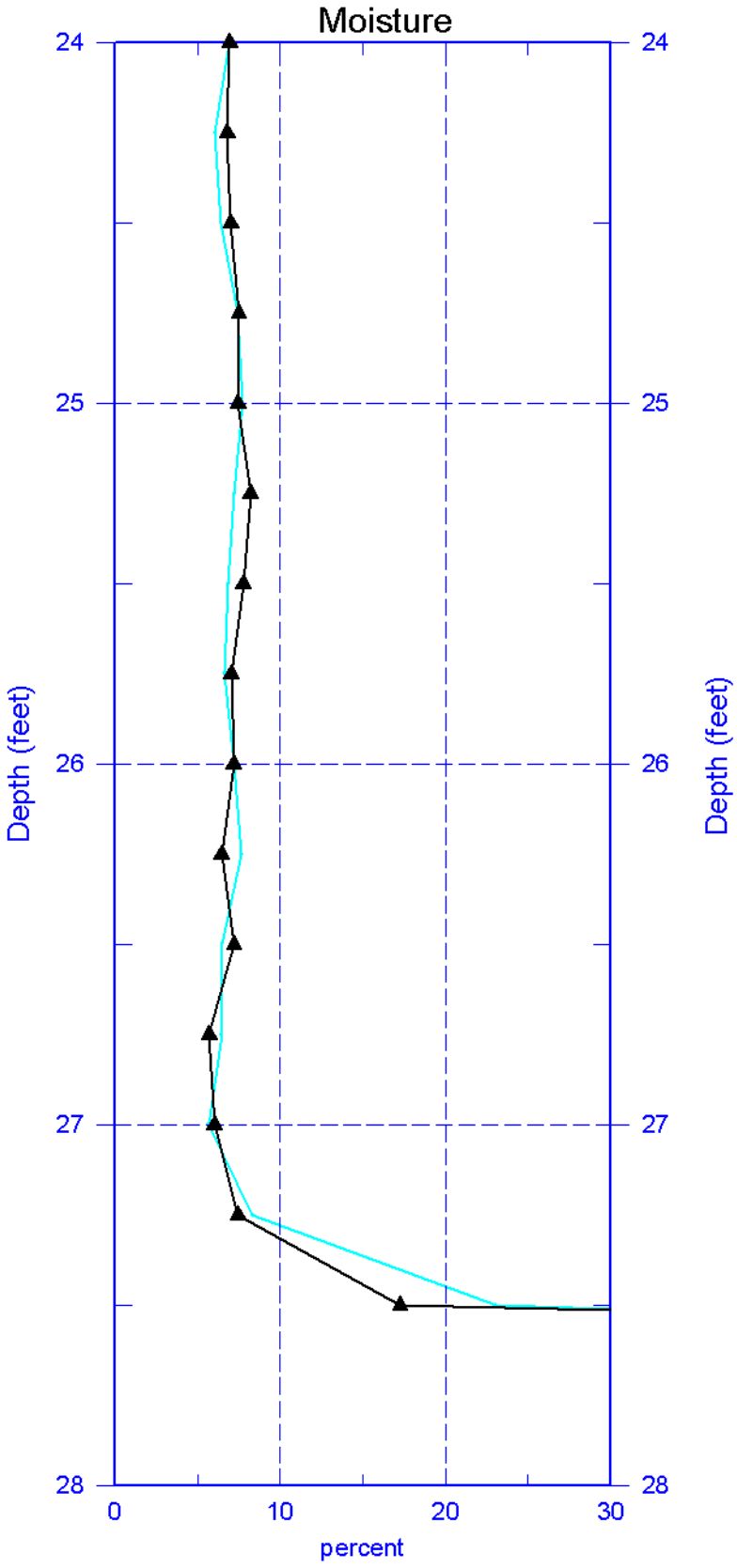
Repeat Section of Natural Gamma Logs



Zero Reference - Ground surface

Stoller
Hanford Office

399-2-8 (C6185)
Repeat of Moisture



Reference - Ground Surface

399-2-9 (C6186)
Log Data Report

Borehole Information:

Borehole:	399-2-9 (C6186)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	34.1	GWL Date:	05/14/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
Unknown	Unknown	5/13/08	Unknown	65.0	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	2.85	7 5/8	6 7/8	3/8	-2.85	62.8

Borehole Notes:

Well site geologist reported depth to bottom, depth to water and depth of casing. Logging engineer measured casing using a steel tape and rounding to the nearest 1/16-in. The zero reference is the ground surface for log data.

Logging Equipment Information:

Logging System:	Gamma 1 N		Type: / Serial No.:	60% HPGe SGLS / 45TP22010A
Effective Calibration Date:	03/28/08	Calibration Reference:	HGLP-CC-031	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 1 M		Type: / Serial No.:	NMLS / H340207279
Effective Calibration Date:	05/06/08	Calibration Reference:	HGLP-CC-032	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3 Repeat
Date	05/14/08	05/15/08	05/16/08
Logging Engineer	McClellan	McClellan	McClellan
Start Depth (ft)	0.0	50.0	63.5
Finish Depth (ft)	51.0	63.5	57.0
Count Time (sec)	200	200	200
Live/Real	R	R	R
Shield (Y/N)	N	N	N
MSA Interval (ft)	0.5	0.5	0.5
Log Speed (ft/min)	N/A	N/A	N/A
Pre-Verification	AN071CAB	AN072CAB	AN073CAB
Start File	AN071000	AN072000	AN073000
Finish File	AN071102	AN072027	AN073013
Post-Verification	AN071CAA	AN072CAA	AN073CAA
Depth Return Error (in.)	0.5 high	0	0
Comments	Fine gain adjustment made before –086.	Fine gain adjustment made prior to –020.	No fine gain adjustment made. Repeat section.

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	4	5
Date	05/16/08	05/16/08
Logging Engineer	McClellan	McClellan
Start Depth (ft)	0.0	30.75
Finish Depth (ft)	30.75	27.0
Count Time (sec)	15	15
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.25	0.25
Log Speed (ft/min)	N/A	N/A
Pre-Verification	AM001CAB	AM001CAB
Start File	AM001000	AM001124
Finish File	AM001123	AM001139
Post-Verification	AM001CAA	AM001CAA
Depth Return Error (in.)	N/A	0
Comments	None	Repeat section.

Logging Operation Notes:

Data were collected using Gamma 1, HO 68B-3574. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-118 field verifier. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. A centralizer was installed on the sonde prior to logging. Maximum logging depth achieved was 63.5 ft before sonde un-weighted.

Analysis Notes:

Analyst:	LEGLER	Date:	6/09/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre- and post-survey verification spectra met the acceptance criteria for the established system. NMLS pre- and post-survey verification spectra met the acceptance criteria for the established system, but the verification spectrum file AM001CAB had a measurement above the upper control limit for count rate (cps).

A casing correction for a 3/8-in. thick casing was applied during analysis for depths up to 62.8 ft. where casing ends, leaving 0.7 ft of open hole uncorrected. A water correction was also applied during analysis from 33.5 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G1NMay08.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations.

NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G1MMay08.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in. inner diameter borehole casing.

Results and Interpretations:

U-235 was detected at 15 ft and U-238 was detected at 22 ft and 57 ft. Further inspection of the spectra at these depths indicate that these detections are statistical fluctuations associated with the processing software and are not considered valid. A plot of the manmade radionuclides for Cs-137, U-235, and U-238 are also included in this log data report.

Repeat sections of SGLS and NMLS logs showed good repeatability.

The water level was adjusted in the SGLS log to 33.5 from 34.1 ft due to a depth return error of 0.5-in high in the first log run (0 –51 ft). The water level in the borehole also appears to have increased to approximately 30 ft based on the observation in NMLS log on 5/16/08.

SGLS data collected on 5/14/08 indicated depth to groundwater at approximately 33.5 ft. NMLS data collected on 5/16/08 indicate depth to ground water at approximately 30.75 ft. The depth to groundwater appears to fluctuate with changes in river level.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs
Repeat Section of Moisture

[1] GWL – groundwater level
[2] TOC – top of casing

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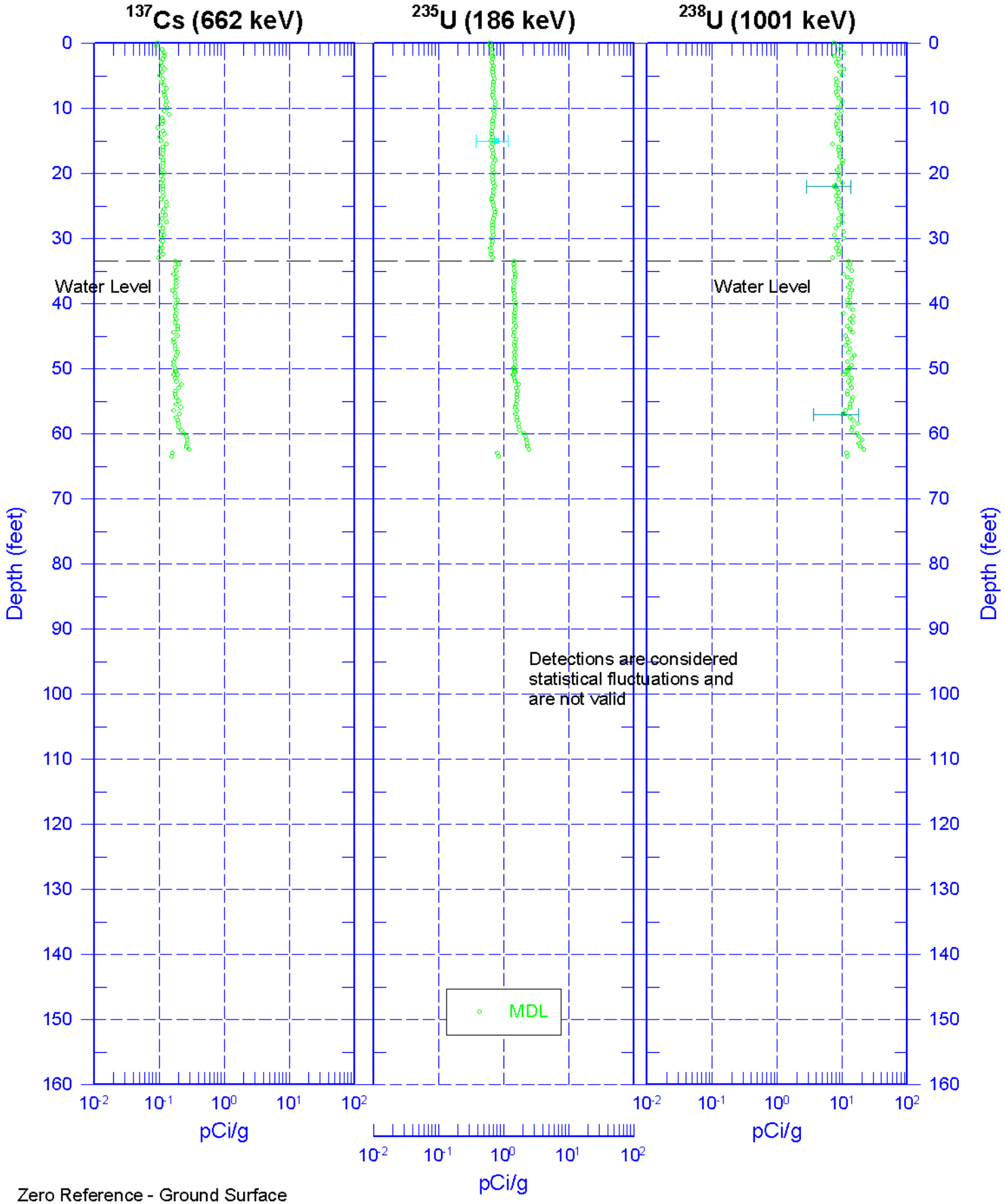
399-2-9 (C6186)
Manmade Radionuclides



Zero Reference - Ground Surface

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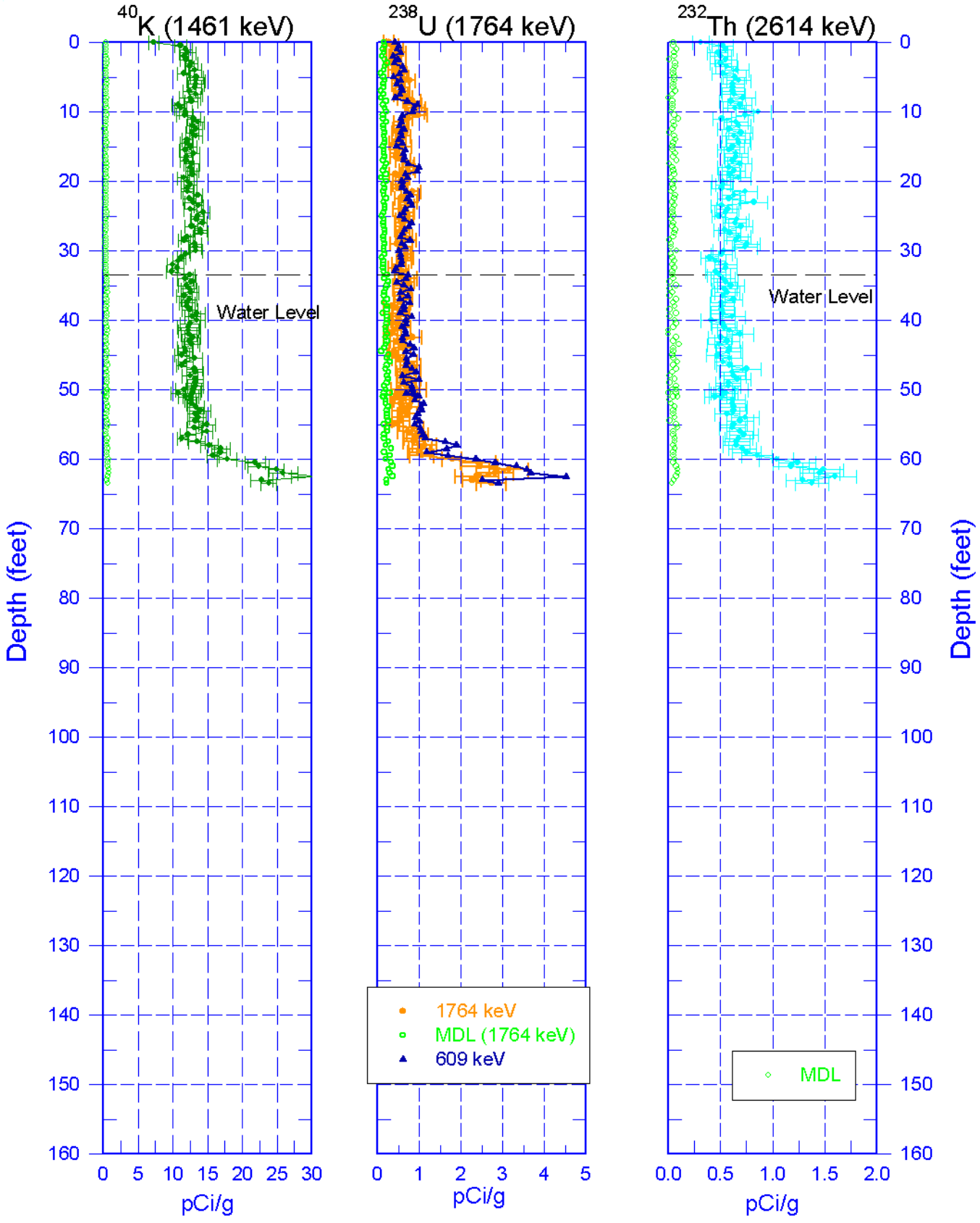
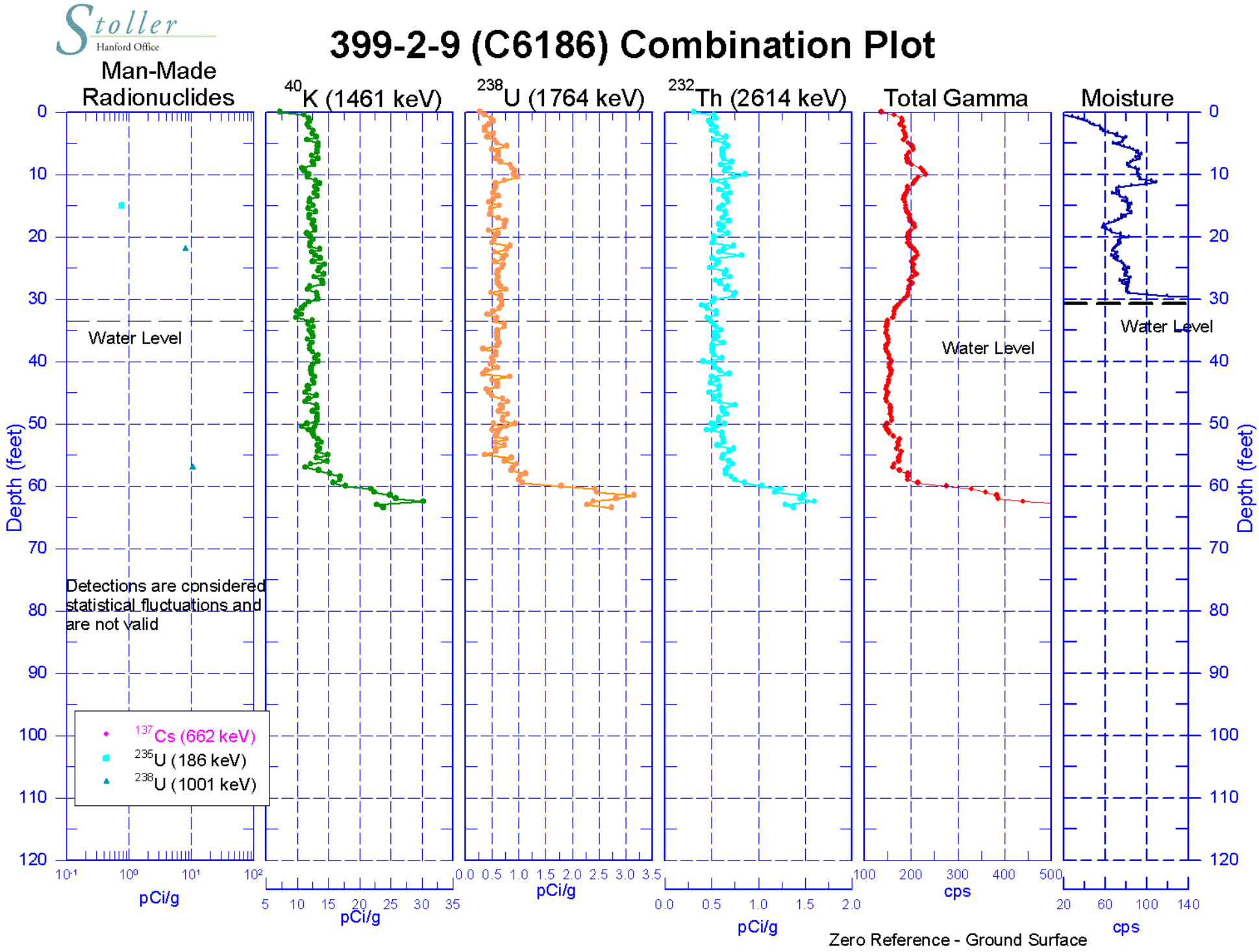
399-2-9 (C6186)
Natural Gamma Logs



Zero Reference - Ground Surface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399-2-9 (C6186) Combination Plot
Man-Made Radionuclides
40K (1461 keV)
238U (1764 keV)
232Th (2614 keV)
Total Gamma
Moisture
Water Level
Water Level
Water Level
Detections are considered statistical fluctuations and are not valid
137Cs (662 keV)
235U (186 keV)
238U (1001 keV)
Depth (feet)
pCi/g
pCi/g
pCi/g
pCi/g
cps
cps
Zero Reference - Ground Surface

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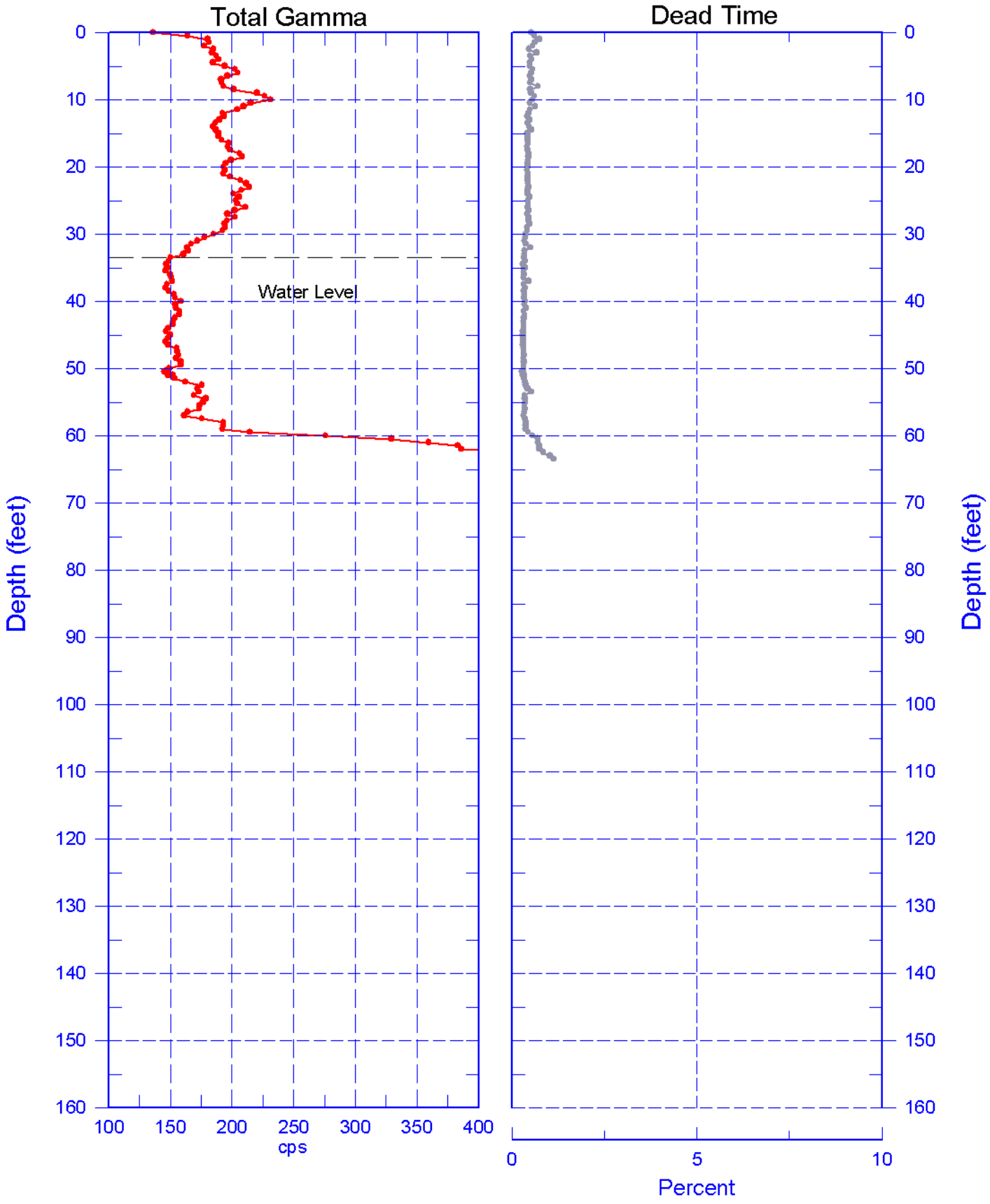
399-2-9 (C6186)
Total Gamma & Dead Time



Reference - Ground Surface

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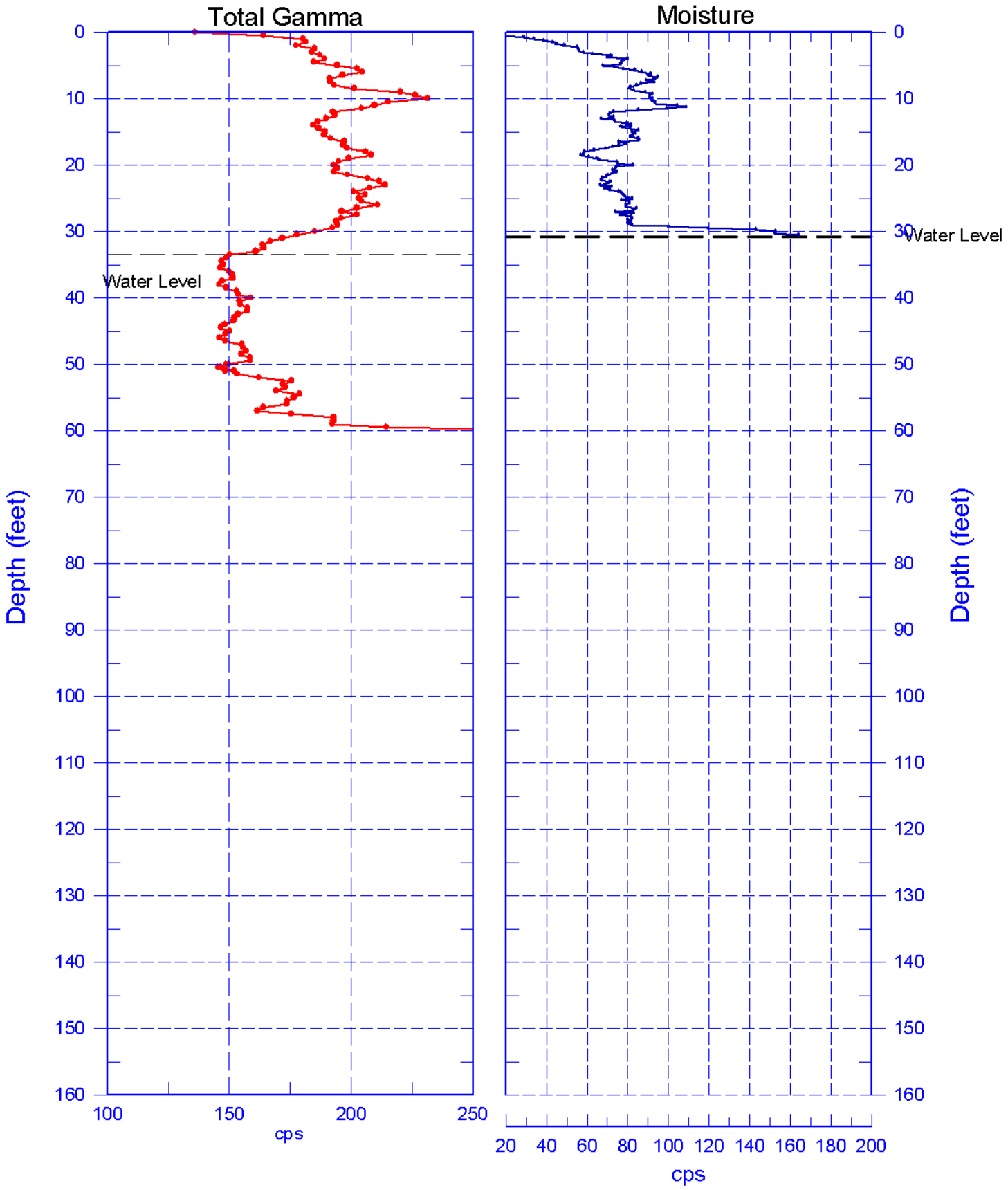
399-2-9 (C6186)
Total Gamma & Moisture



Reference - Ground Surface

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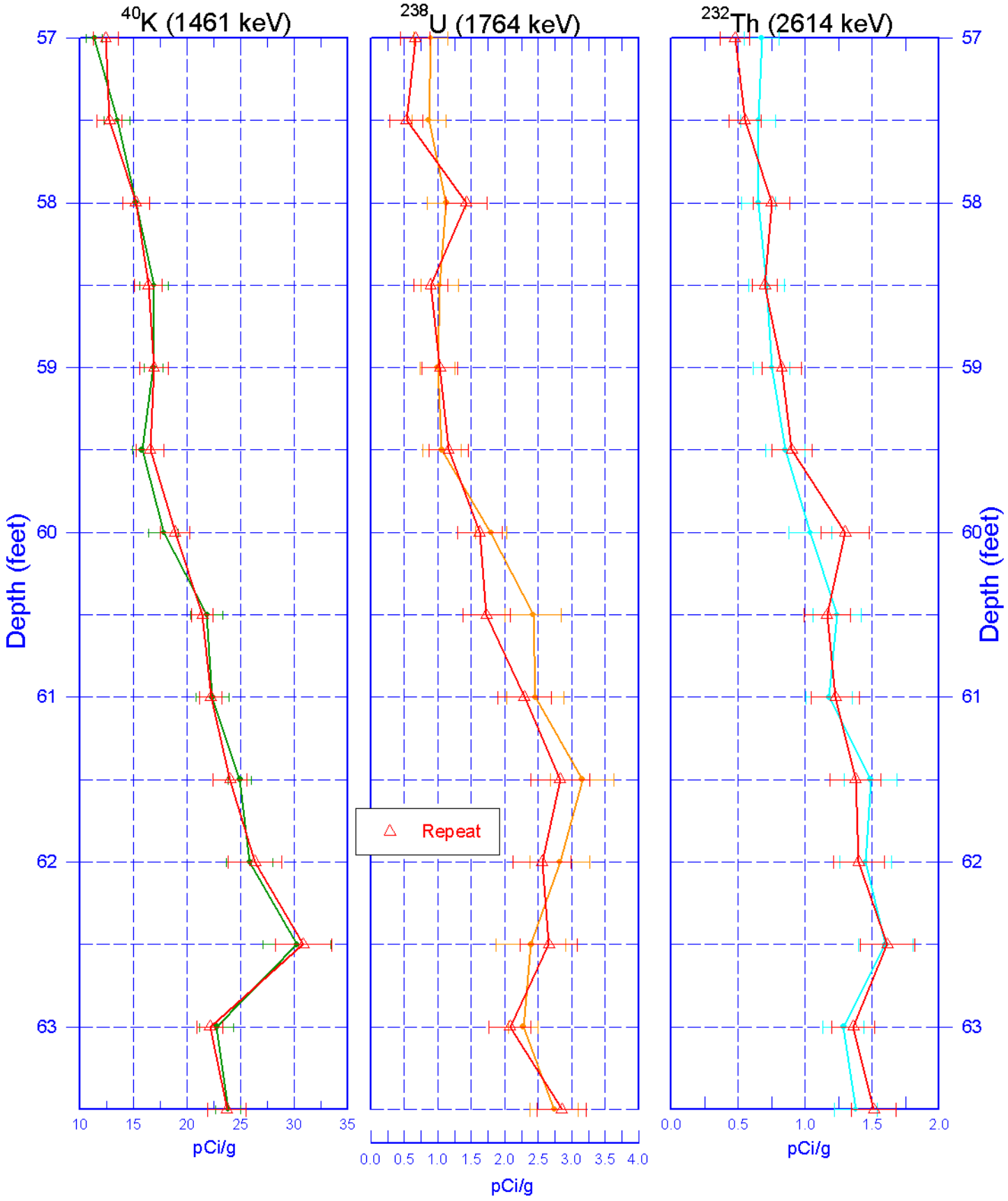
399-2-9 (C6186)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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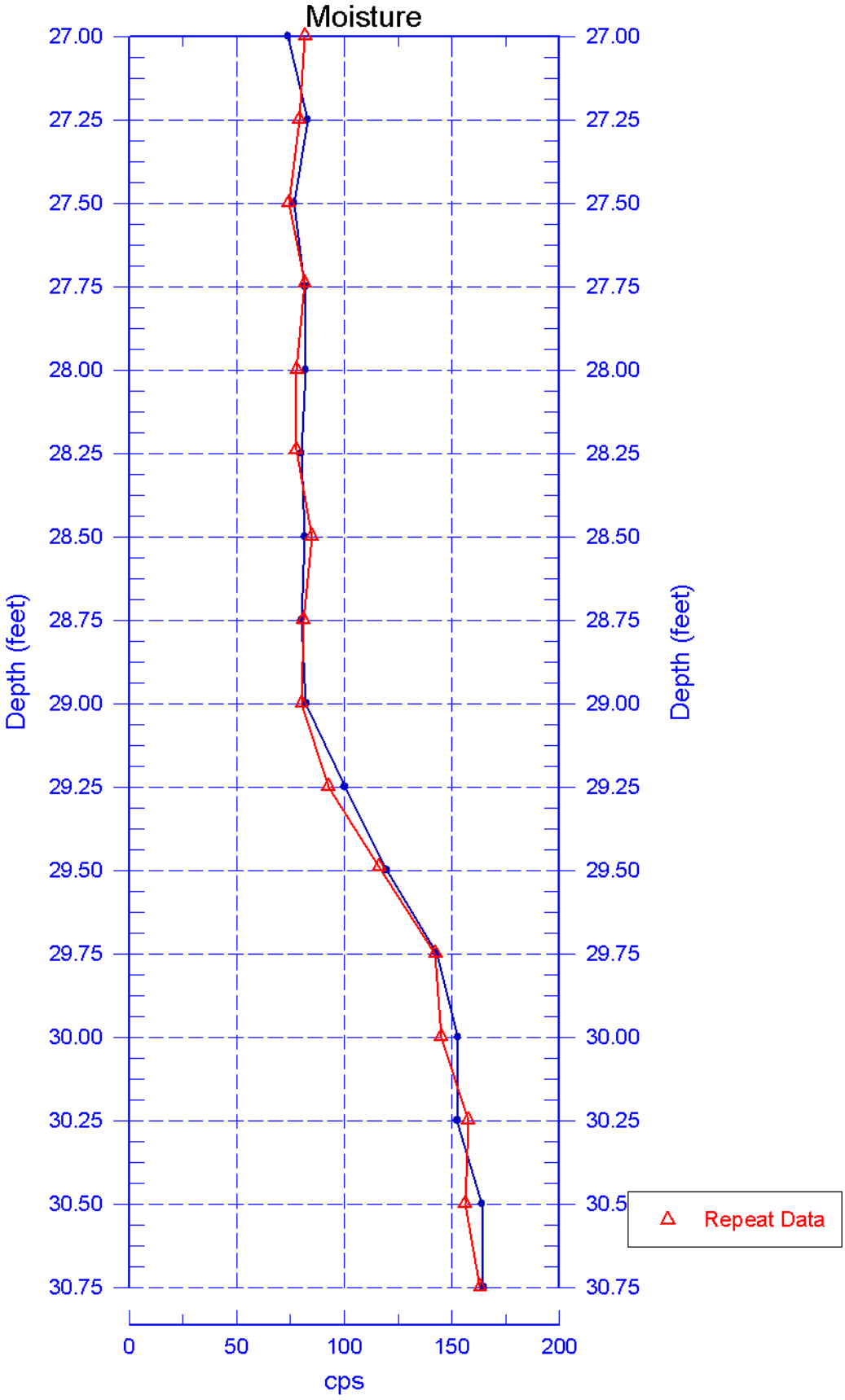
399-2-9 (C6186)
Moisture Repeat Section



Reference - Ground Surface

399-2-10 (C6187)
Log Data Report

Borehole Information:

Borehole:	399-2-10 (C6187)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	31.4	GWL Date:	07/18/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116094.5	594234.4	07/17/08	Unknown	65	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	0.8	7 5/8	6 7/8	3/8	0.8	60.0

Borehole Notes:

Casing data, and total depth were reported by the site Geologist. Logging engineer measured depth to water with an e-tape. Casing diameters were measured using a steel tape and rounded to the nearest 1/16-in. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type: / Serial No.:	60% HPGe SGLS / 47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type: / Serial No.:	NMLS / H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat	5	6 Repeat	
Date	07/08/08	07/08/08	07/28/08	07/28/08	
Logging Engineer	McClellan	McClellan	McClellan	McClellan	
Start Depth (ft)	59.0	12.0	66.5	66.5	
Finish Depth (ft)	0.0	6.0	56.0	65.0	
Count Time (sec)	200	200	200	200	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	0.5	0.5	0.5	0.5	
Log Speed (ft/min)	N/A	N/A	N/A	N/A	
Pre-Verification	DL651CAB	DL651CAB	DL711CAB	DL711CAB	
Start File	DL651000	DL651119	DL711000	DL711022	
Finish File	DL651118	DL651131	DL711021	DL711025	
Post-Verification	DL651CAA	DL651CAA	DL711CAA	DL711CAA	
Depth Return Error (in.)	+0.25	0	N/A	0	
Comments	No fine gain adjustment	No fine gain adjustment	No fine gain adjustment	No fine gain adjustment	

Log Run	1	2 Repeat	5	6 Repeat	
	made.	made.	made.	made.	

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat
Date	07/18/08	07/18/08
Logging Engineer	Pearson	Pearson
Start Depth (ft)	0.0	25.0
Finish Depth (ft)	31.25	28.0
Count Time (sec)	15	15
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.25	0.25
Log Speed (ft/min)	N/A	N/A
Pre-Verification	DHH22CAB	DHH22CAB
Start File	DHH22000	DHH22000
Finish File	DHH22125	DHH22125
Post-Verification	DHH22CAA	DHH22CAA
Depth Return Error (in.)	N/A	0
Comments	None	None

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. Maximum logging depth achieved was 66.6 ft before the sonde un-weighted. A centralizer was installed on the sonde. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier.

Analysis Notes:

Analyst:	Henwood	Date:	08/28/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre- and post-survey verification spectra met the acceptance criteria for the established system. NMLS pre- and post-survey verification spectra met the acceptance criteria for the established system.

A casing correction for a 3/8-in. thick casing was applied from ground surface to 65 ft. A water correction was also applied during analysis from 31.4 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. There is no direct calibration data available for a 6 7/8-in. inner diameter borehole casing. Therefore, moisture data are reported in counts per second (cps).

Results and Interpretations:

No manmade radionuclides were detected. Spectra, where detections of Cs-137, U-238, and U-235 using the routine processing software were indicated, were individually inspected. It was determined the detections are statistical fluctuations and are not valid.

The KUT data indicate good repeatability.

The moisture data indicate good repeatability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs
Repeat of Moisture

[1] GWL – groundwater level
[2] TOC – top of casing

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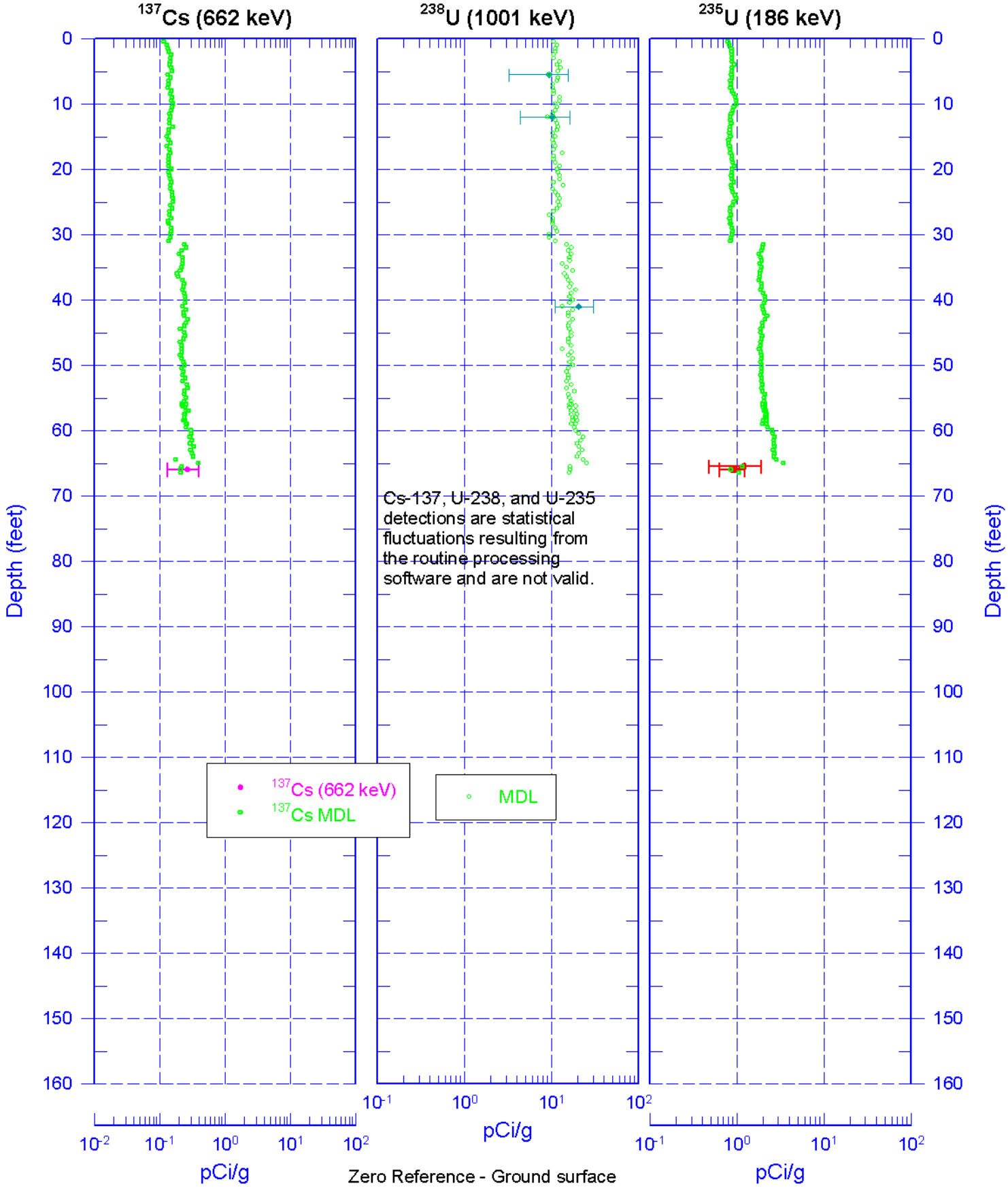
399-2-10 (C6187)

Man-Made Radionuclides



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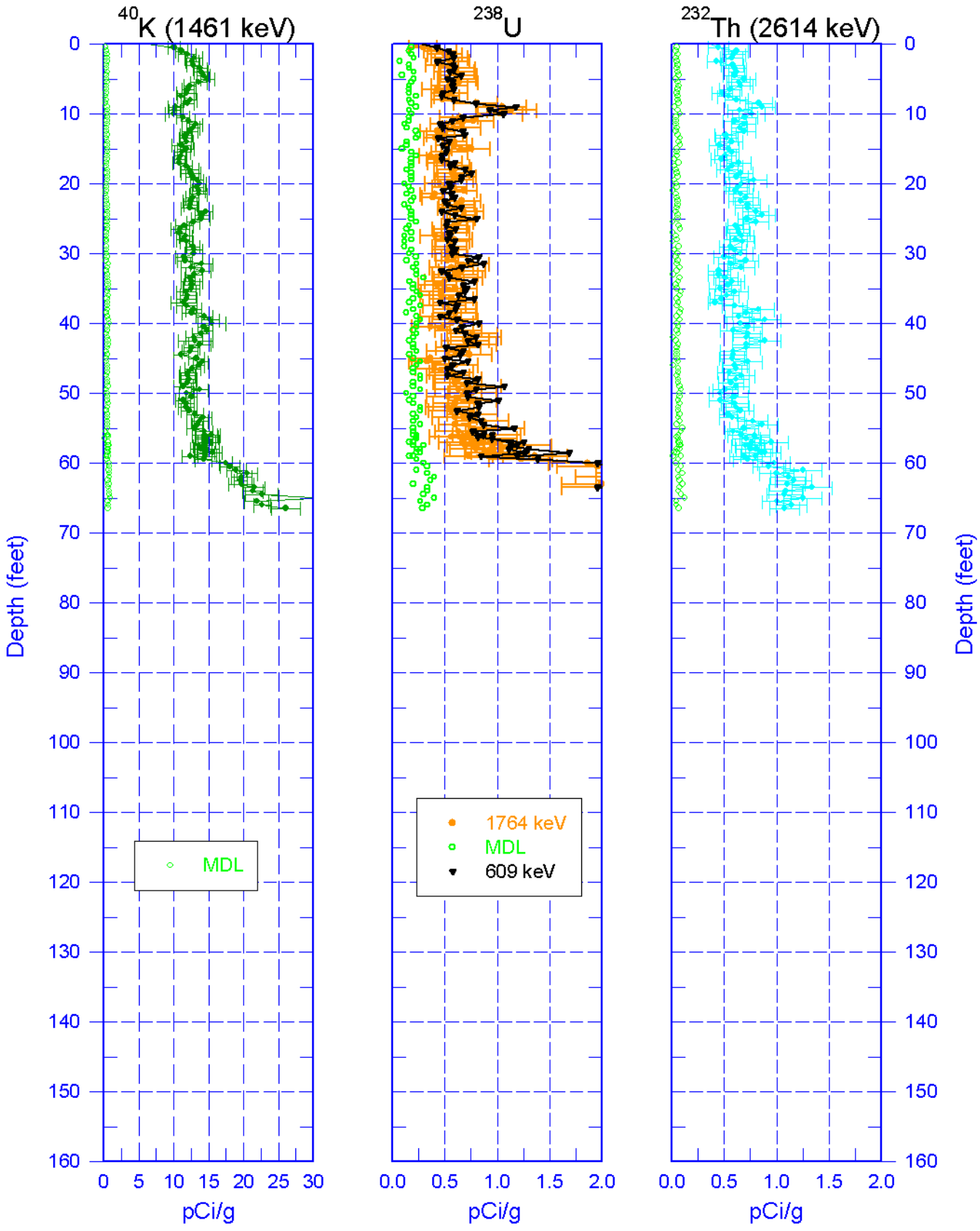
399-2-10 (C6187)
Natural Gamma Logs



Zero Reference - Ground surface

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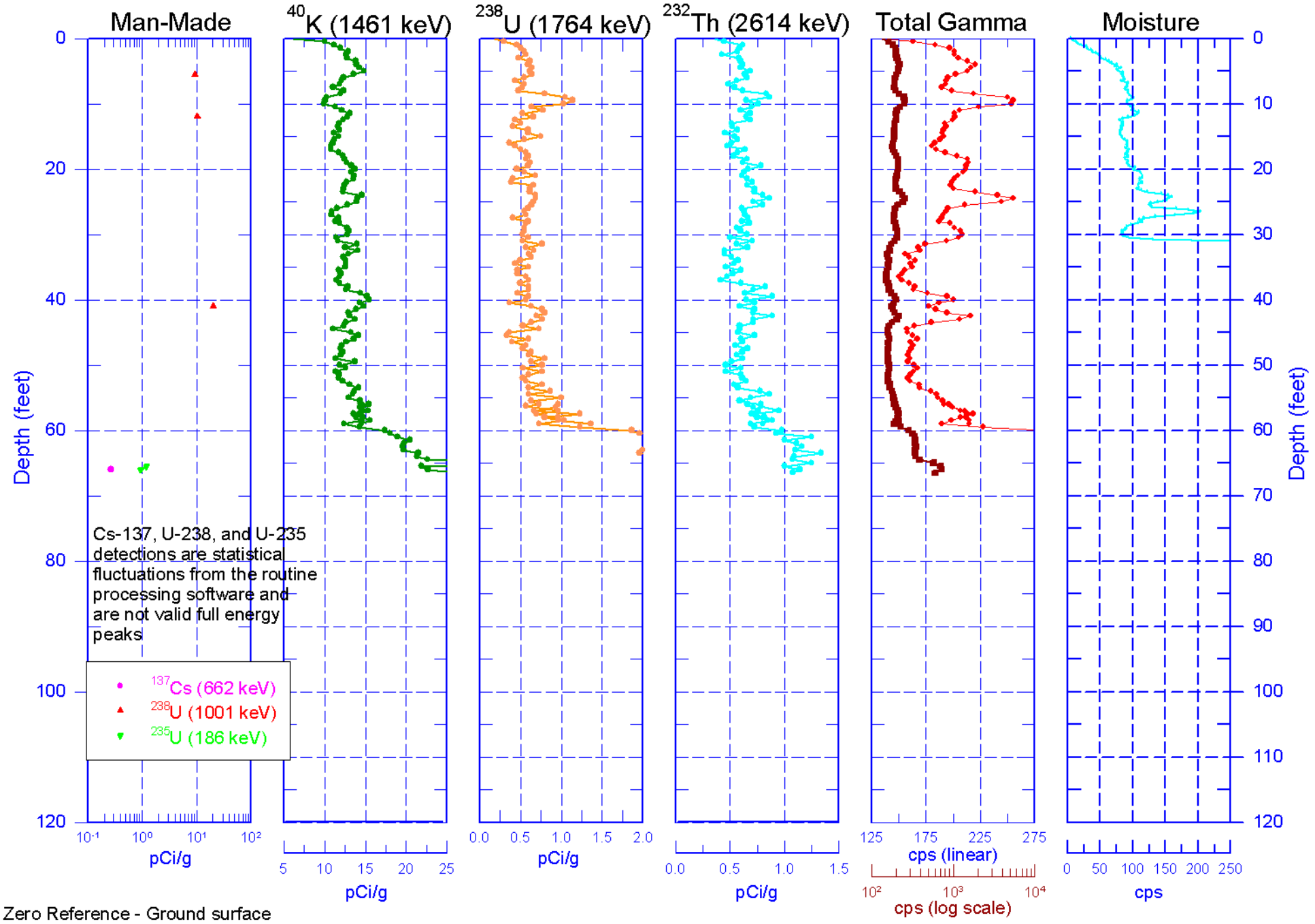
399-2-10 (C6187) Combination Plot



Zero Reference - Ground surface

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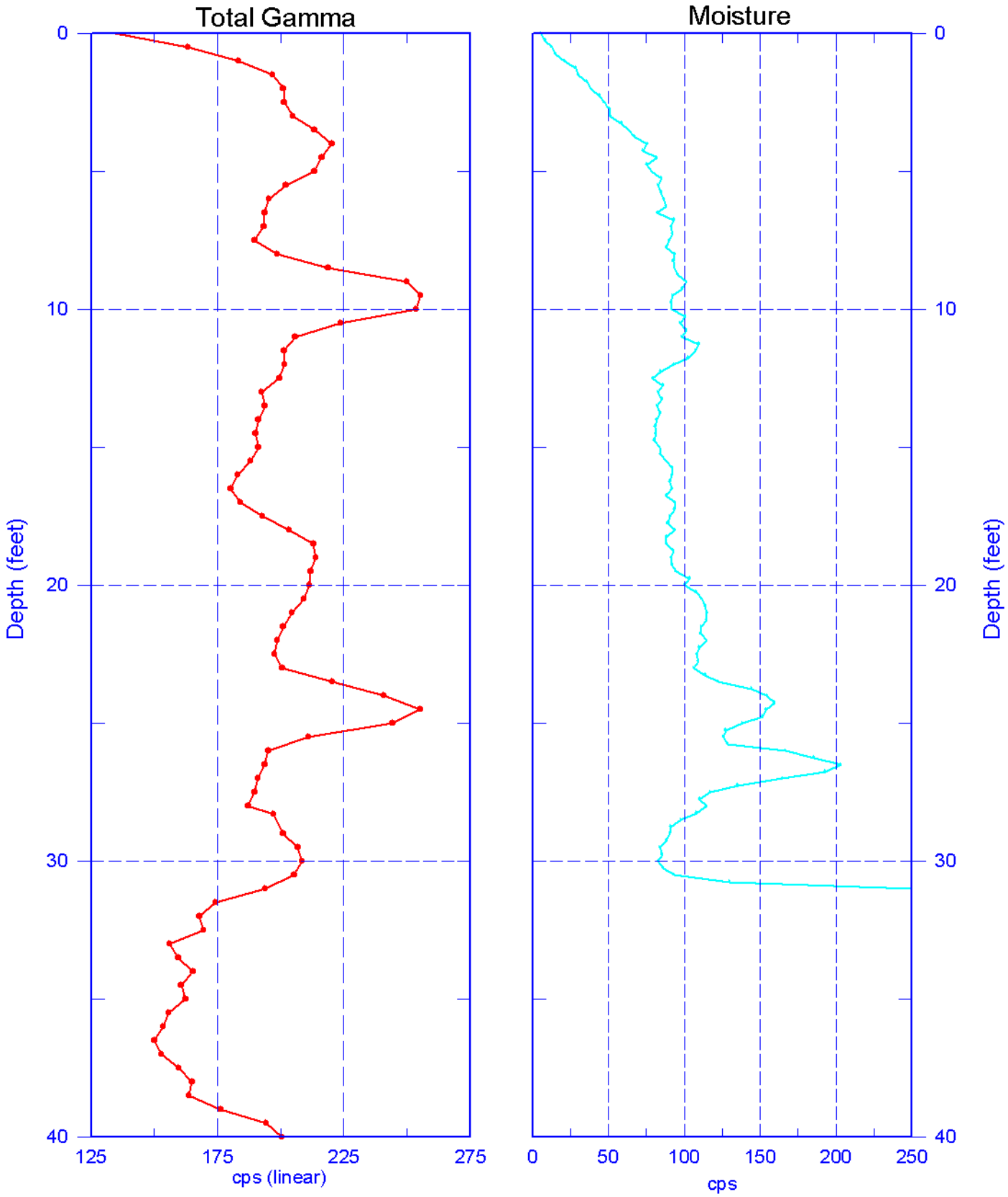
399-2-10 (C6187)
Total Gamma & Moisture



Reference - Ground Surface

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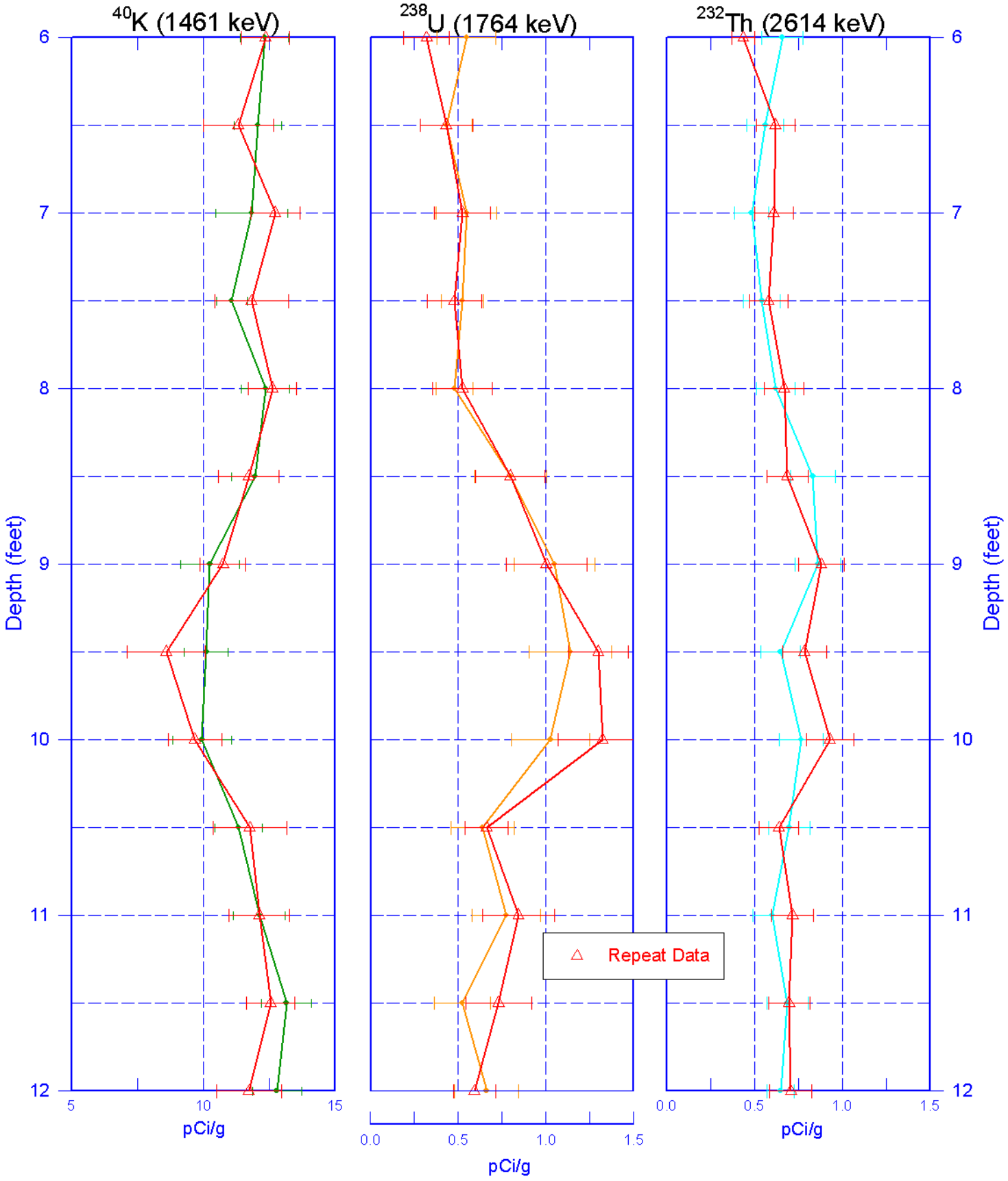
399-2-10 (C6187)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground surface

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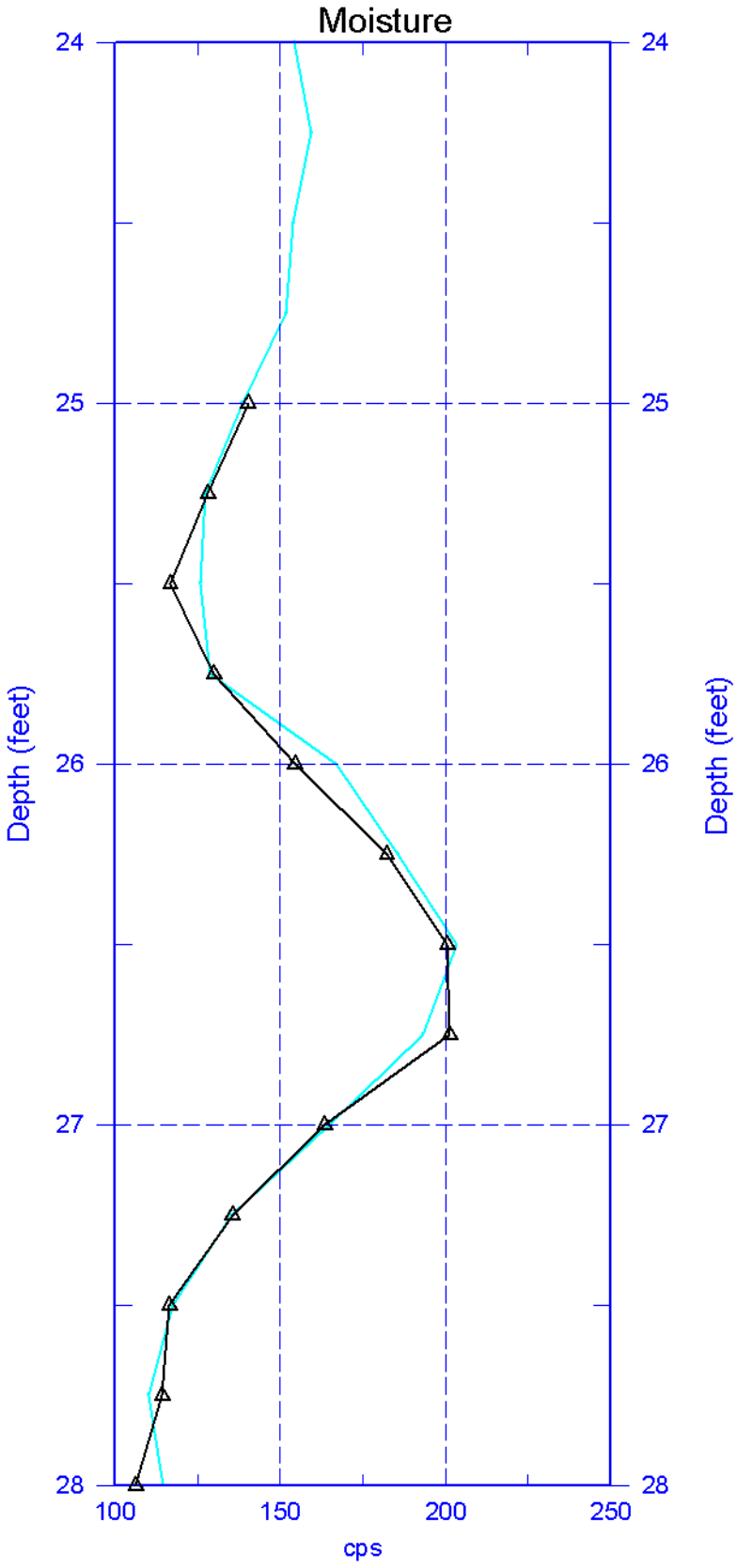
399-2-10 (C6187)
Repeat of Moisture



Reference - Ground Surface

399-2-11 (C6188)
Log Data Report

Borehole Information:

Borehole:	399-2-11 (C6188)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	30.9	GWL Date:	7/20/2008
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116074.5	594236.1	7/16/2008	unknown	65	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	0.7	7 5/8	6 7/8	3/8	-0.7	60.0

Borehole Notes:

Casing data and total depth was reported by the site geologist. Casing diameter was measured using a steel tape and rounded to the nearest 1/16– inch. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type: Serial No.:	60% HPGe SGLS 47TP32211A
Effective Calibration Date:	12/31/2007	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	
Logging System:	Gamma 4 H		Type: Serial No.:	NMLS H310700352
Effective Calibration Date:	11/6/2008	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat	3	4 Repeat	
Date	7/20/2008	7/20/2008	7/21/2008	7/21/2008	
Logging Engineer	Pearson	Pearson	Pearson	Pearson	
Start Depth (ft)	63.5	14.0	63.5	14.0	
Finish Depth (ft)	0.0	8.0	0.0	8.0	
Count Time (sec)	200	200	200	200	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	0.5	0.5	0.5	0.5	
Log Speed (ft/min)	NA	NA	NA	NA	
Pre-Verification	DL661CAB	DL661CAB	DL671CAB	DL671CAB	
Start File	DL661000	DL661128	DL671000	DL671128	
Finish File	DL661127	DL661140	DL671127	DL671140	
Post-Verification	DL661CAA	DL661CAA	DL671CAA	DL671CAA	
Depth Return Error (in.)	¼ HIGH	0.0	0.0	0.0	
Comments	Adjusted gain after DL661041-06 3 and –125.	Repeat Section	None	Repeat Section	

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	1	2 Repeat			
Date	7/20/2008	7/20/2008			
Logging Engineer	PEARSON	PEARSON			
Start Depth (ft)	0.0	26.0			
Finish Depth (ft)	30.75	29.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
ft/min	NA	NA			
Pre-Verification	DHH32CAB	DHH32CAB			
Start File	DHH32000	DHH32124			
Finish File	DHH32123	DHH32136			
Post-Verification	DHH32CAA	DHH32CAA			
Depth Return Error (in.)	NA	0.0			
Comments	None	Repeat Section			

Logging Operation Notes:

The gain shifted during the first log run resulting in poor peak resolution. The cable head connector was cleaned and a second survey was completed with success. Files DL661000 through DL661140 from the first survey remain unused in the databank. The DL671000 through DL671140 files from the second run were used to complete this survey.

The SGLS data were collected 7/20/2008-using Gamma 4, HO 68B-3573 logging system. Pre and post-survey verification measurements were acquired in the Amersham KUTh –115-field verifier. A centralizer was installed on the sonde. Maximum logging depth was 63.5 ft before the sonde un-weighted.

The Neutron Moisture data were collected 7/20/2008 using the Gamma 4, HO 68B-3573 logging system. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. A centralizer was installed on the sonde. Maximum logging depth was 30.75 ft before water was encountered.

Analysis Notes:

Analyst:	L. SPINNER	**Date:**	10/1/2008	**Reference:**	GJO-HGLP 1.6.3, Rev. 0

The SGLS and NMLS pre- and post-survey verifications spectra met acceptance criteria.

Analyses of log data suggest slight discrepancies with field reports of depth to water and casing depth. Corrections of log data were applied according to the analysis assumptions in the table below.

Top (ft)	Bottom (ft)	T (in)	ID (in)	Comments
0	31.75	0.375	6 7/8	No water correction
32	59.5	0.375	6 7/8	GWL reported @ 30.9 ft; adjusted to 31.75 ft.
60	65	0	NA	Casing depth reported @ 60 ft; adjusted to 59.5 ft
T = casing thickness used to calculate energy-dependent casing correction factor ID = casing inside diameter used to calculate energy-dependent water correction factor				

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calculations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an

EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because calibration data is not available for a 6 7/8 inch inner diameter borehole casing.

Results and Interpretations:

The Man-Made Radionuclides, Cs-137, U-235 and U-238 (Pa-234m) were identified by the routine processing software at various depth intervals. Scrutiny of the individual spectra indicated that the energy peaks are not valid, and are considered statistical fluctuations.

Co-60 was detected at 0.07 pCi/g at 13.50 ft and 0.06 pCi/g at 14.00 ft. These detections are valid and the 1333 keV energy peak is corroborated by the Co–60-energy peak at 1173 keV.

The peaks at 10.5 and 57 ft in the Natural Gamma Log may indicate stratigraphy changes at these depths.

The Natural Gamma Logs (KUT) and the Moisture Repeat plot indicate good repeatability.

List of Log Plots:

Depth Reference is top of casing

Manmade Radionuclides (Cs-137, Co-60, U-235 and U-238)
Natural Gamma Logs (KUT)
Combination Plot (MM, KUT, TG, Moisture)
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat of Manmade Radionuclides
Repeat Section of Natural Gamma Logs (KUT)
Moisture Repeat Section (26-29 feet)

[1] GWL – groundwater level
[2] TOC – top of casing

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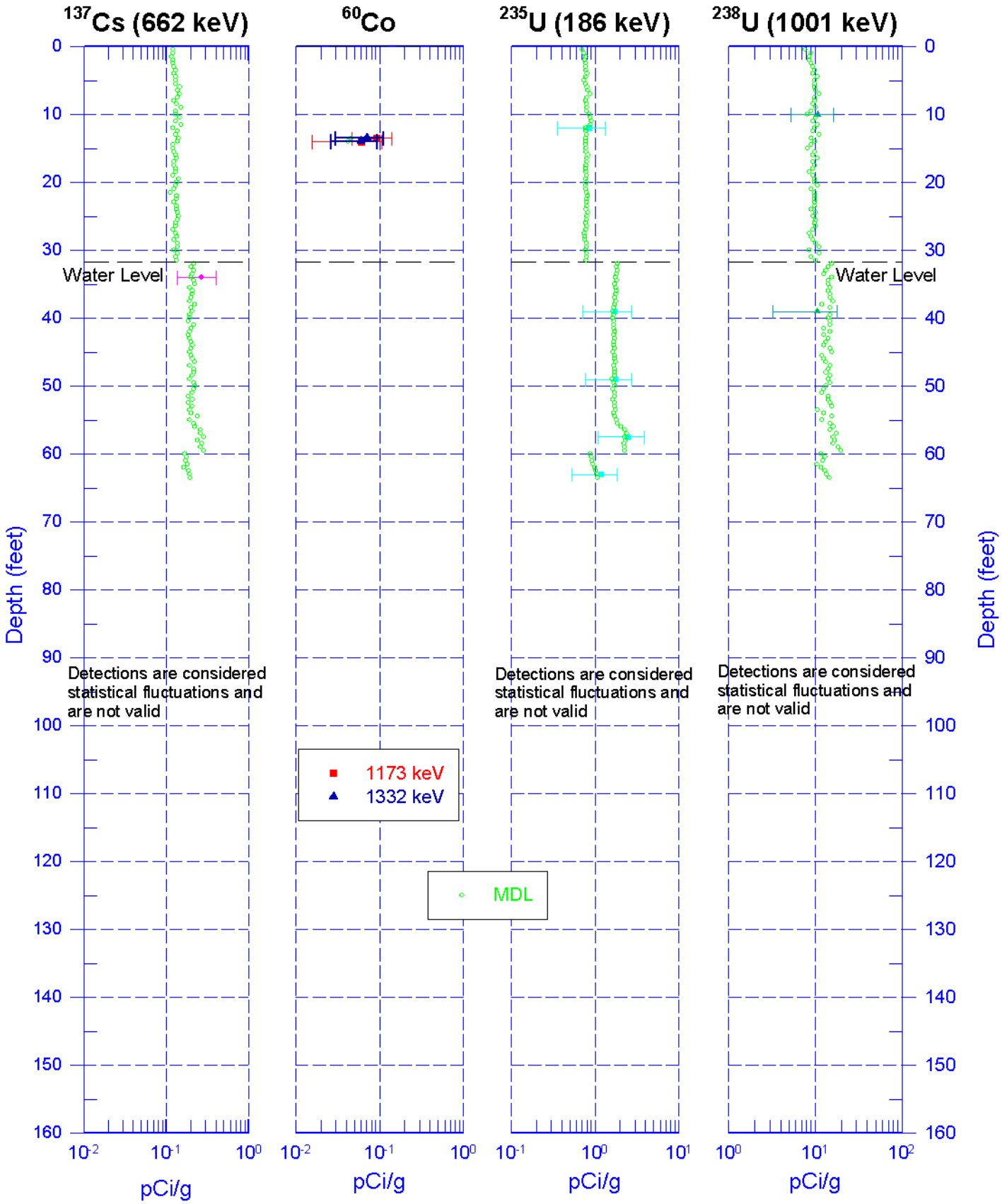
399-2-11 (C6188)
Manmade Radionuclides



Zero Reference - Ground Surface

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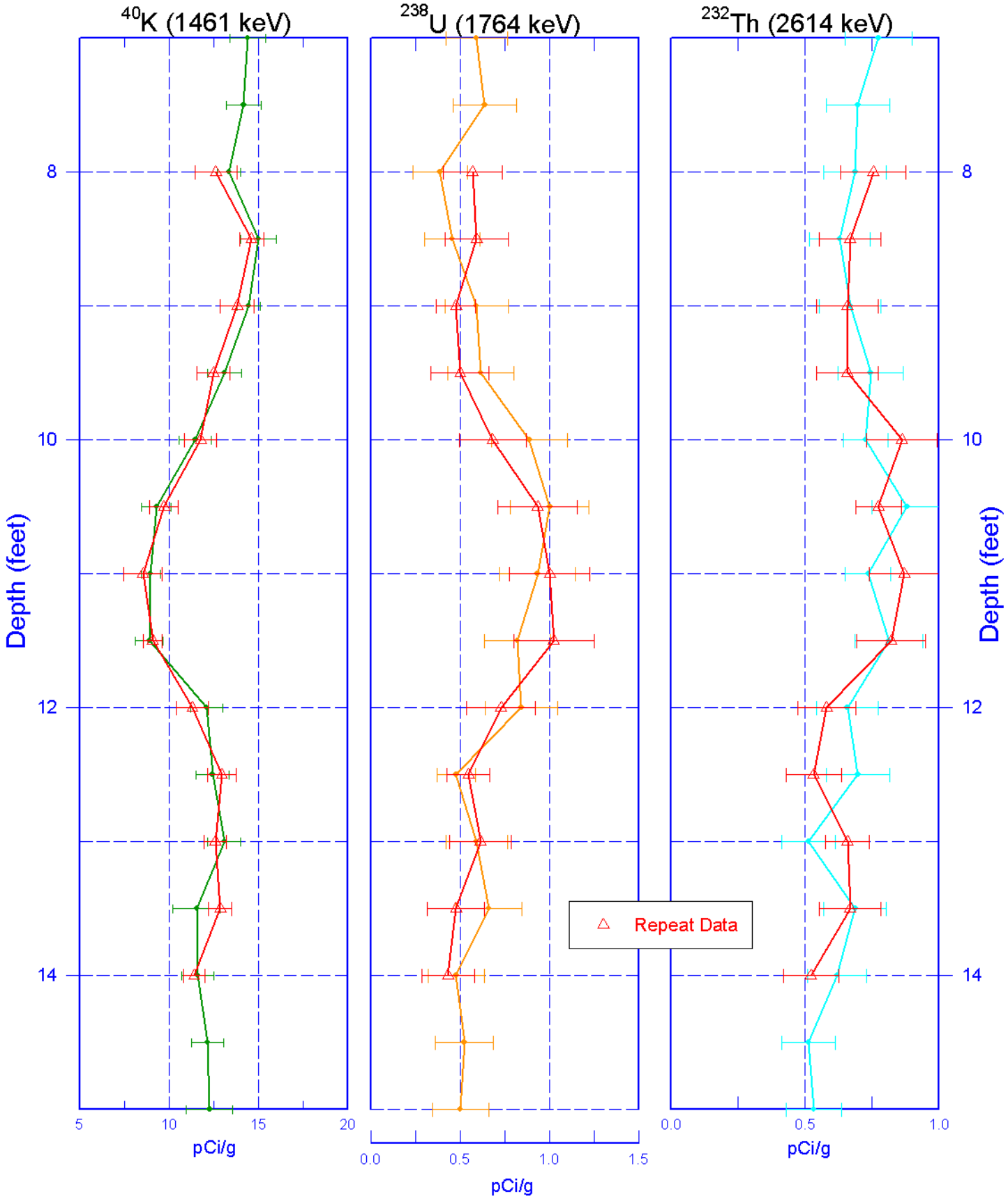
399-2-11 (C6188)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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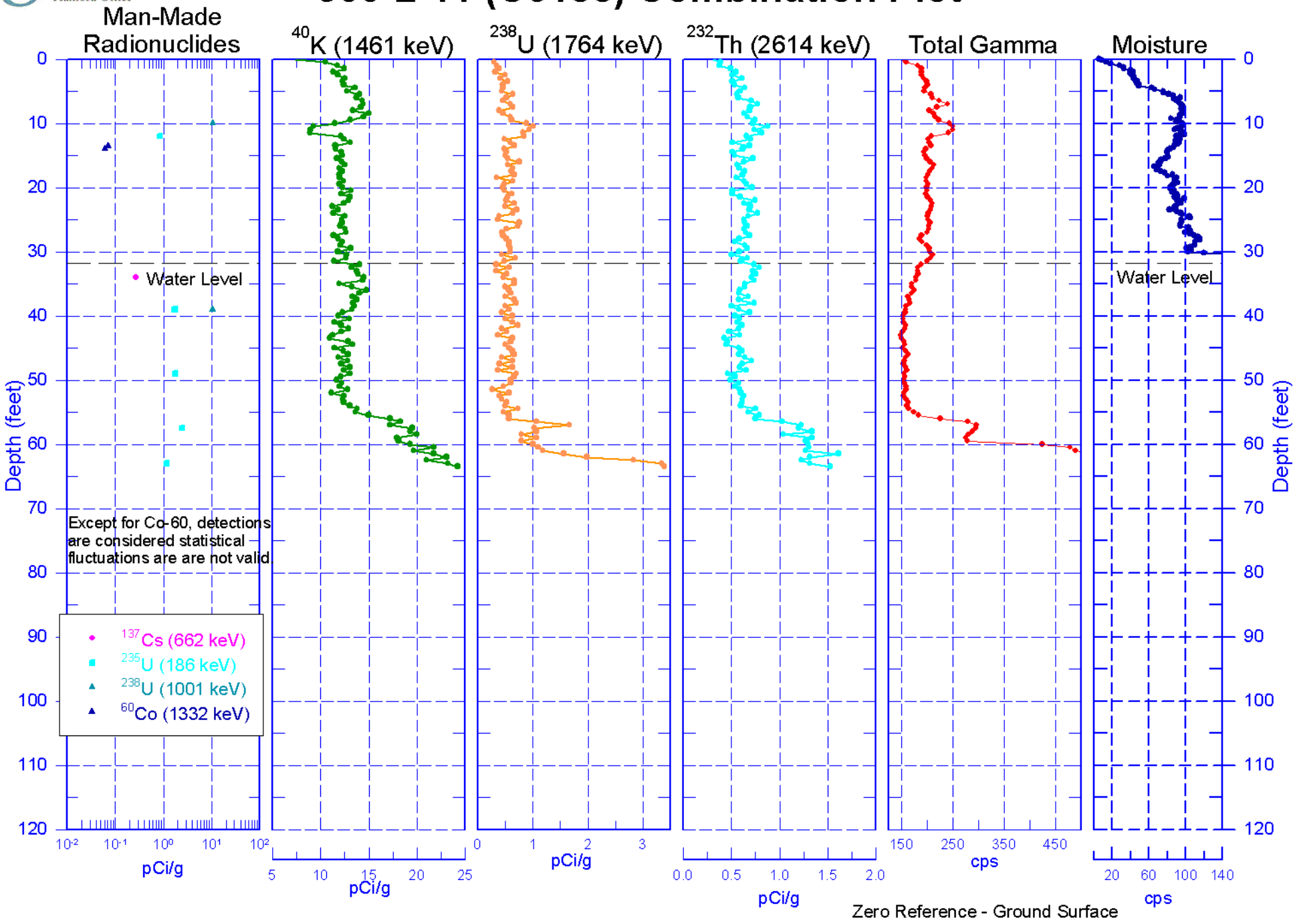
399-2-11 (C6188) Combination Plot



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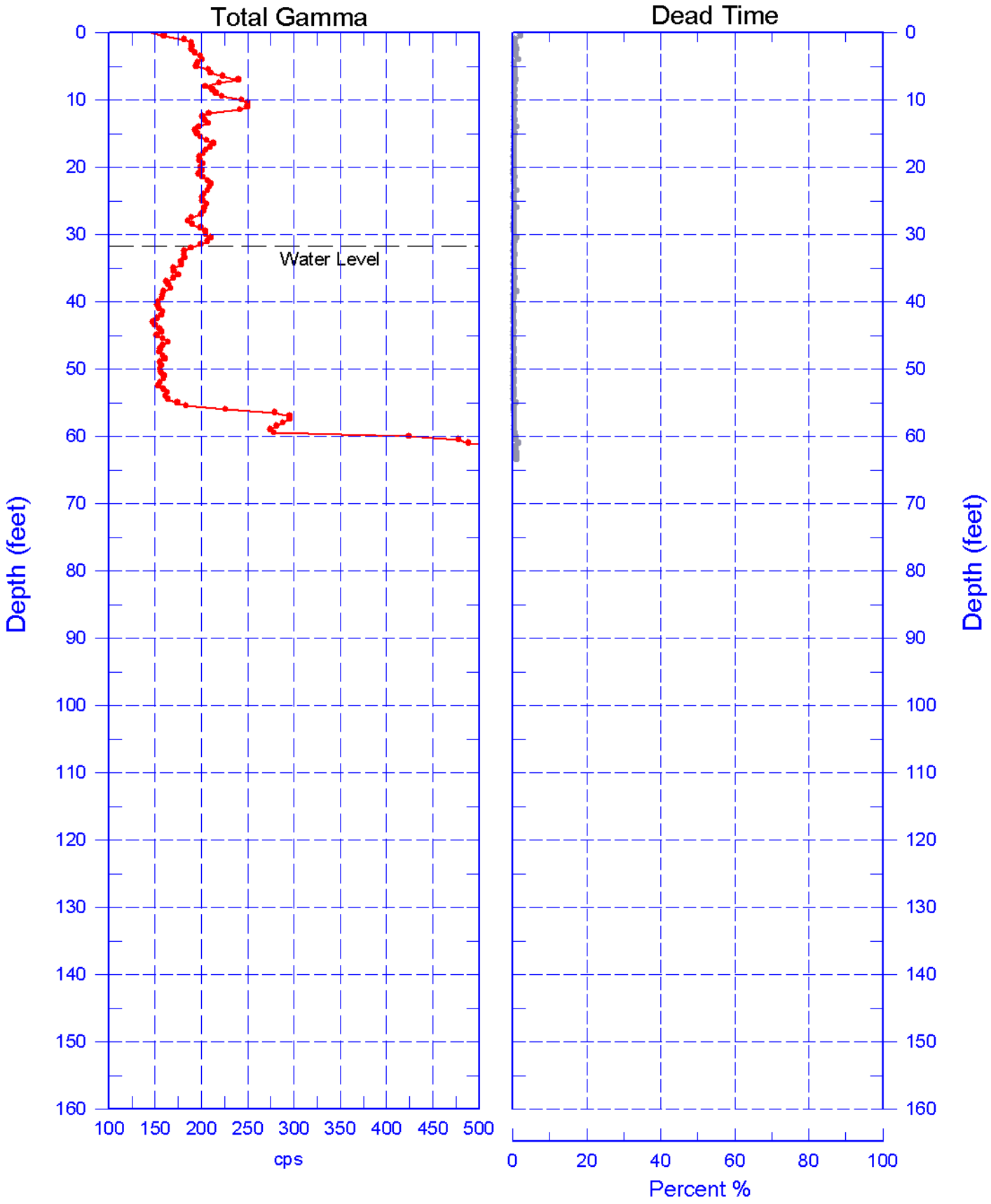
Hanford Office

399-2-11 (C6188)
Total Gamma & Dead Time



Reference - Ground Surface

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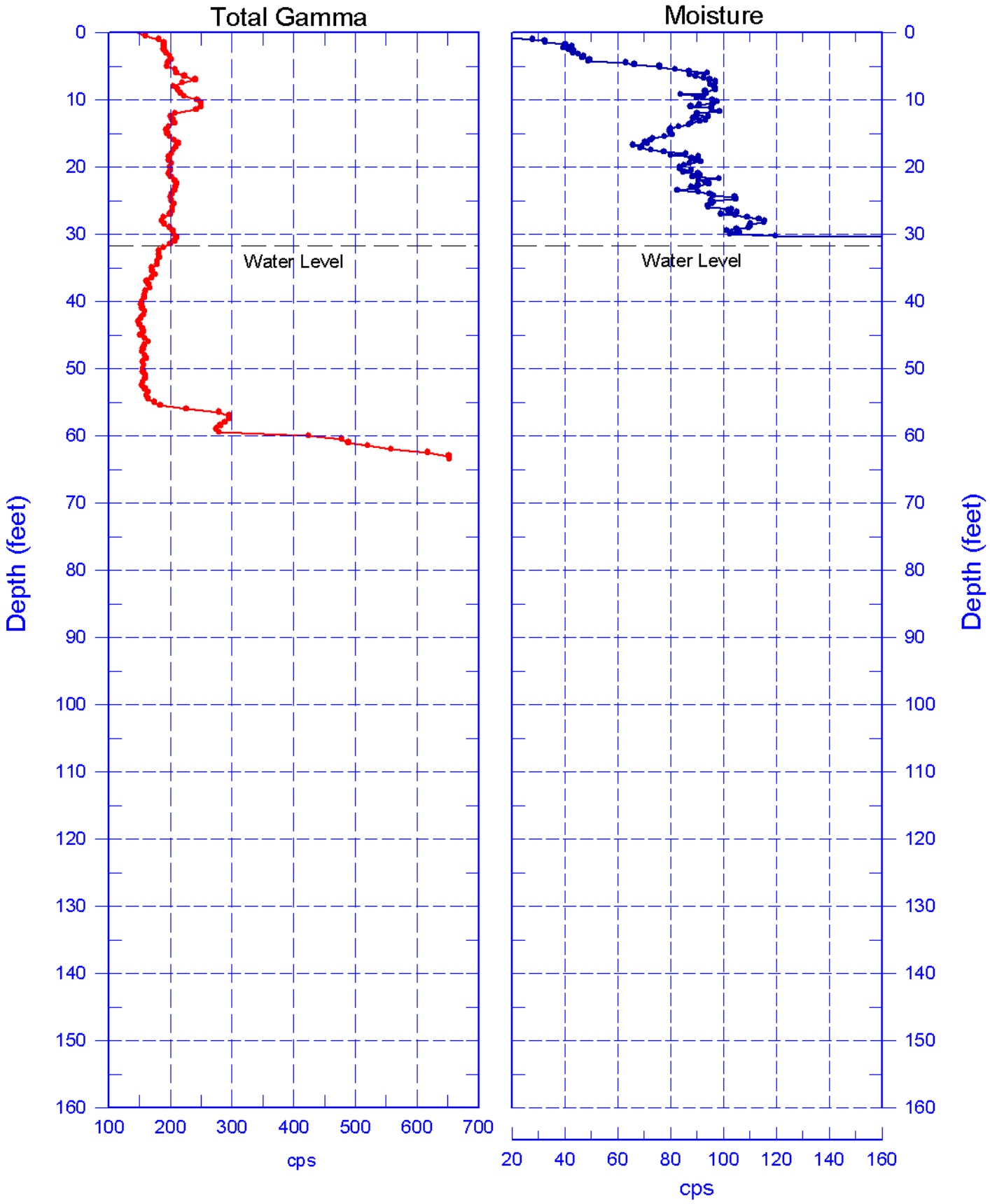
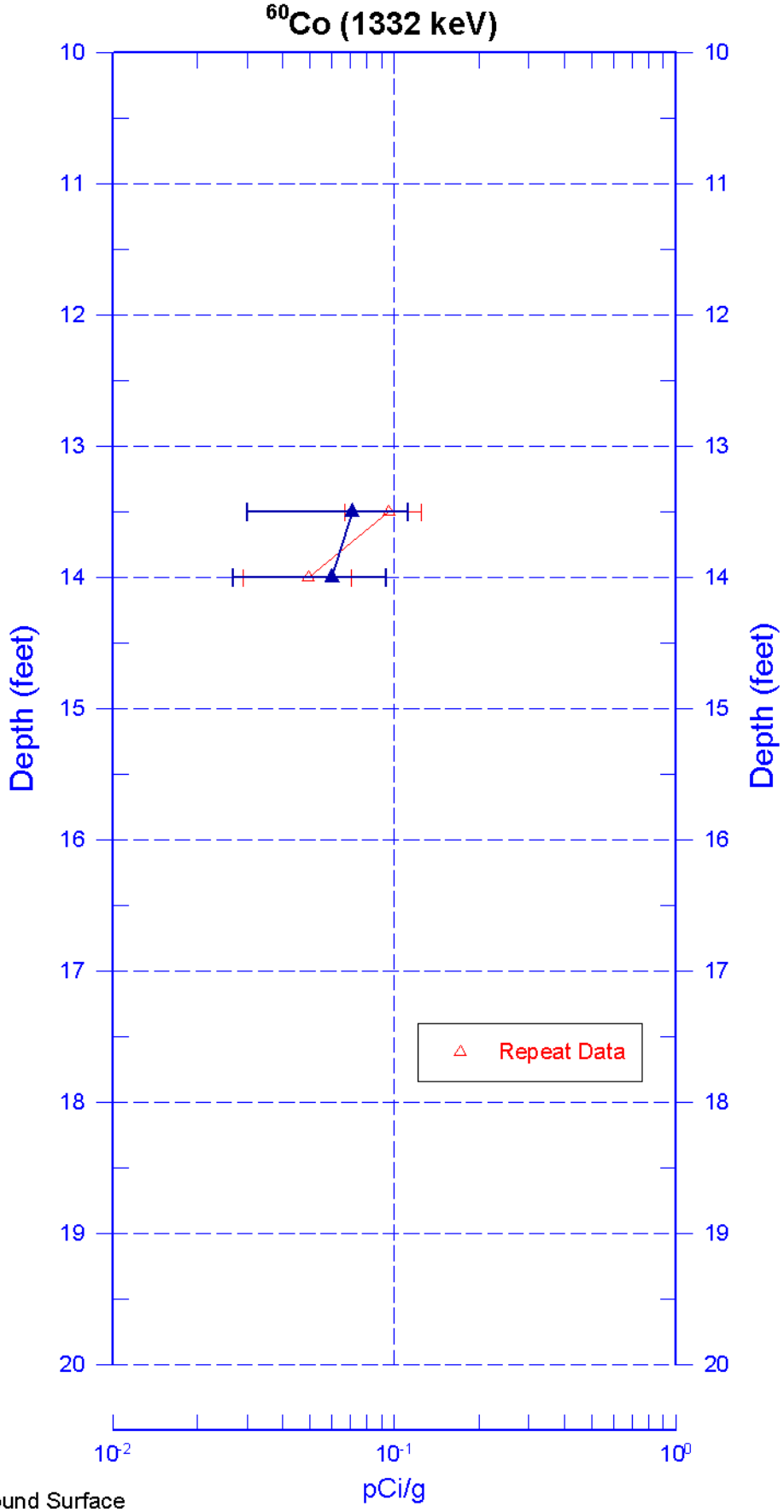
399-2-11 (C6188)
Total Gamma & Moisture



Reference - Ground Surface

399-2-11 (C6188)
Manmade Radionuclides Repeat Section



Zero Reference - Ground Surface

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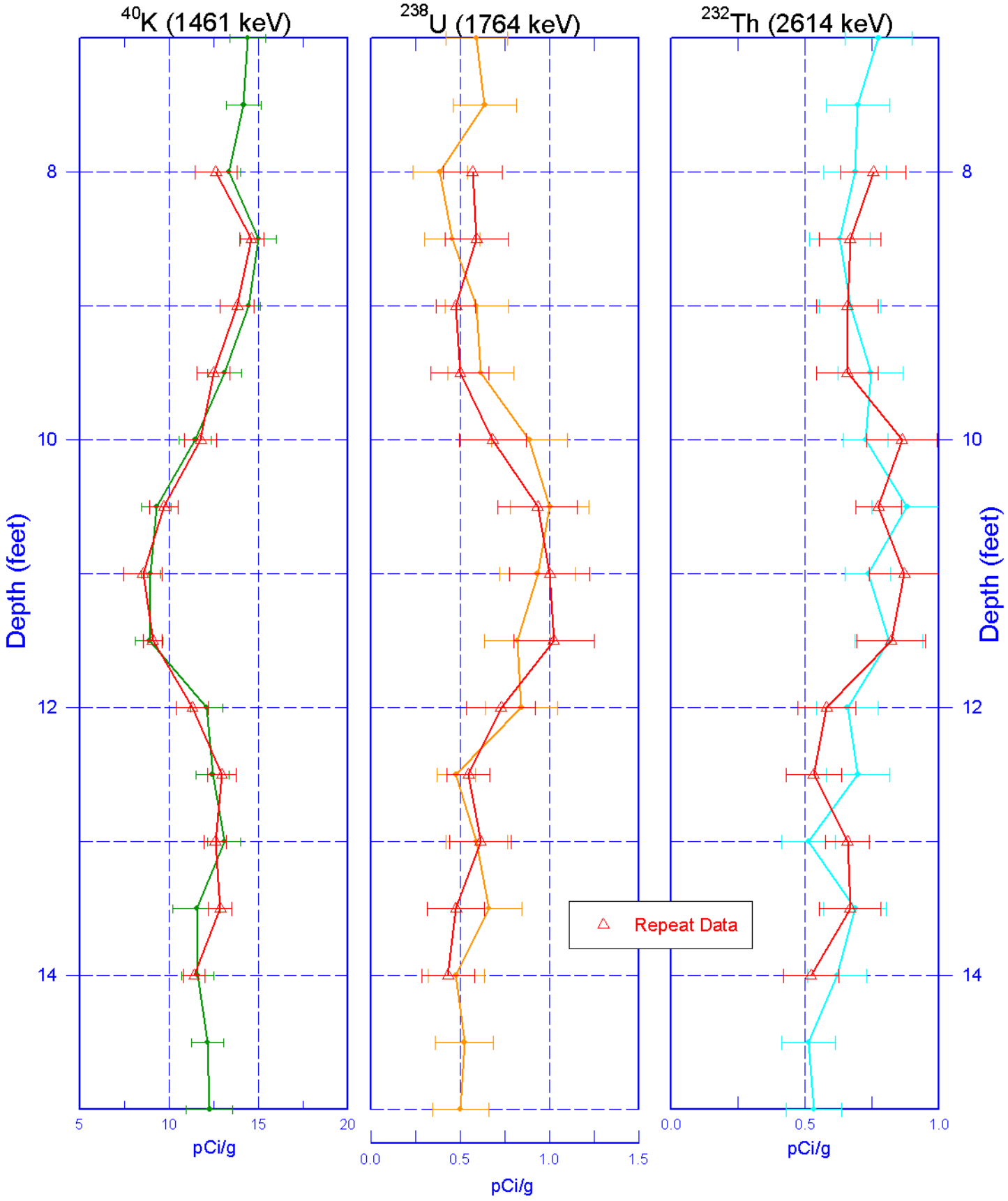
399-2-11 (C6188)

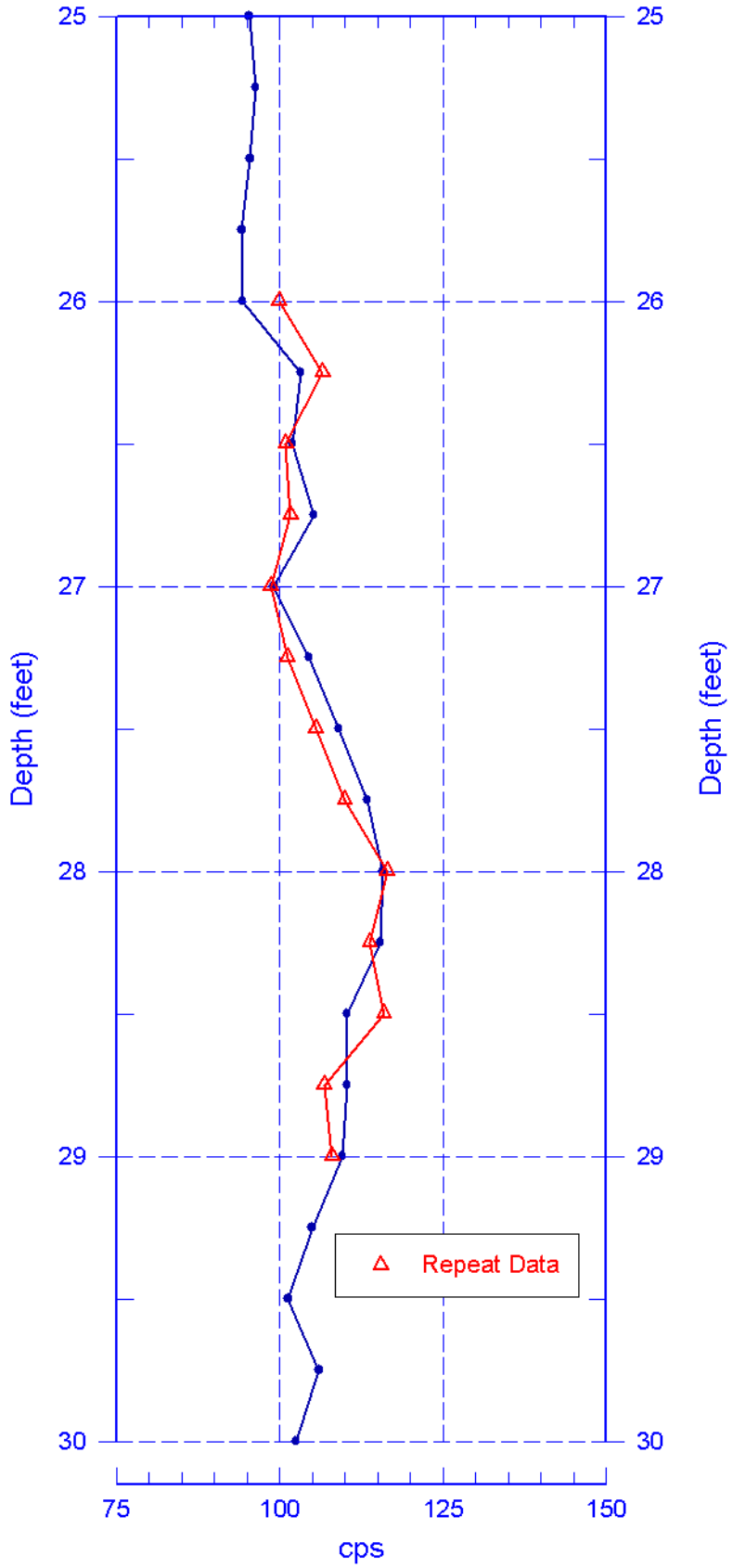
Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

Stoller
Hanford Office

399-2-11 (C6188)
Moisture Repeat Section



Reference - Ground Surface

399-2-12 (C6189)
Log Data Report

Borehole Information:

Borehole:	399-2-12 (C6189)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	27.3	GWL Date:	06/23/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116086.0	594252.5	06/18/08	Unknown	65	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	0.8	7 5/8	6 7/8	3/8	-0.8	59

Borehole Notes:

Casing data and total depth are reported by the site Geologist. Logging engineer measured depth to water using an e-tape. Casing diameters were measured using a steel tape and rounded to the nearest 1/16".

Logging Equipment Information:

Logging System:	Gamma 4 L		Type:	SGLS
			Serial No.:	47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type:	NMLS
			Serial No.:	H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	06/23/08	06/23/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	0.0	30.0			
Finish Depth (ft)	28.0	24.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	N/A	N/A			
Pre-Verification	DL491CAB	DL491CAB			
Start File	DL491000	DL491125			
Finish File	DL491124	DL491137			
Post-Verification	DL491CAA	DL491CAA			
Depth Return Error (in.)	0	NA			
Comments	No fine gain adjustment made.	Repeat Section			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat			
Date	06/23/08	06/23/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	0.0	28.0			
Finish Depth (ft)	28.0	25.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	N/A	N/A			
Pre-Verification	DHF62CAB	DHF62CAB			
Start File	DHF62000	DHF62113			
Finish File	DHF62112	DHF62125			
Post-Verification	DHF62CAA	DHF62CAA			
Depth Return Error (in.)	NA	0			
Comments	None	Repeat Section			

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum logging depth for the SGLS was 62.3 ft. before the sonde un-weighted. A centralizer was installed on the sonde.

Analysis Notes:

Analyst:	LEGLER	Date:	09/15/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

The SGLS pre- and post-survey verification spectra met the acceptance criteria for the established system. NMLS pre- and post-survey verification spectra met the acceptance criteria for the established system, but the verification spectrum file DHF62CAA had measurements above the upper control limit for counts per second (cps).

A casing correction for a 3/8-in. thick casing was applied during analysis for depths up 59 ft where casing ends, leaving 3 ft of open borehole uncorrected. A water correction was also applied during analysis from 27.3 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time, and water as determined by annual calibrations.

NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in. inner diameter borehole casing.

Results and Interpretations:

Cs- 137 was detected at 7 ft, 12.5 – 15 ft, and 54.0 ft. Inspection of the individual spectra for these depths, indicate that detections at 7 and 54 ft are statistical fluctuations associated with the processing software and are not considered valid.

Co-60 was detected at 13.5 – 15.5 ft.

U-235 and U-238 (Pa-234m) were also detected at various isolated depths in this borehole. Inspection of the individual spectra for these depths indicate that these detections are statistical fluctuations associated with the processing software and not considered valid.

A moisture increase is observed at approximately 18 ft.

Repeat sections of Natural Gamma and NMLS logs showed good repeatability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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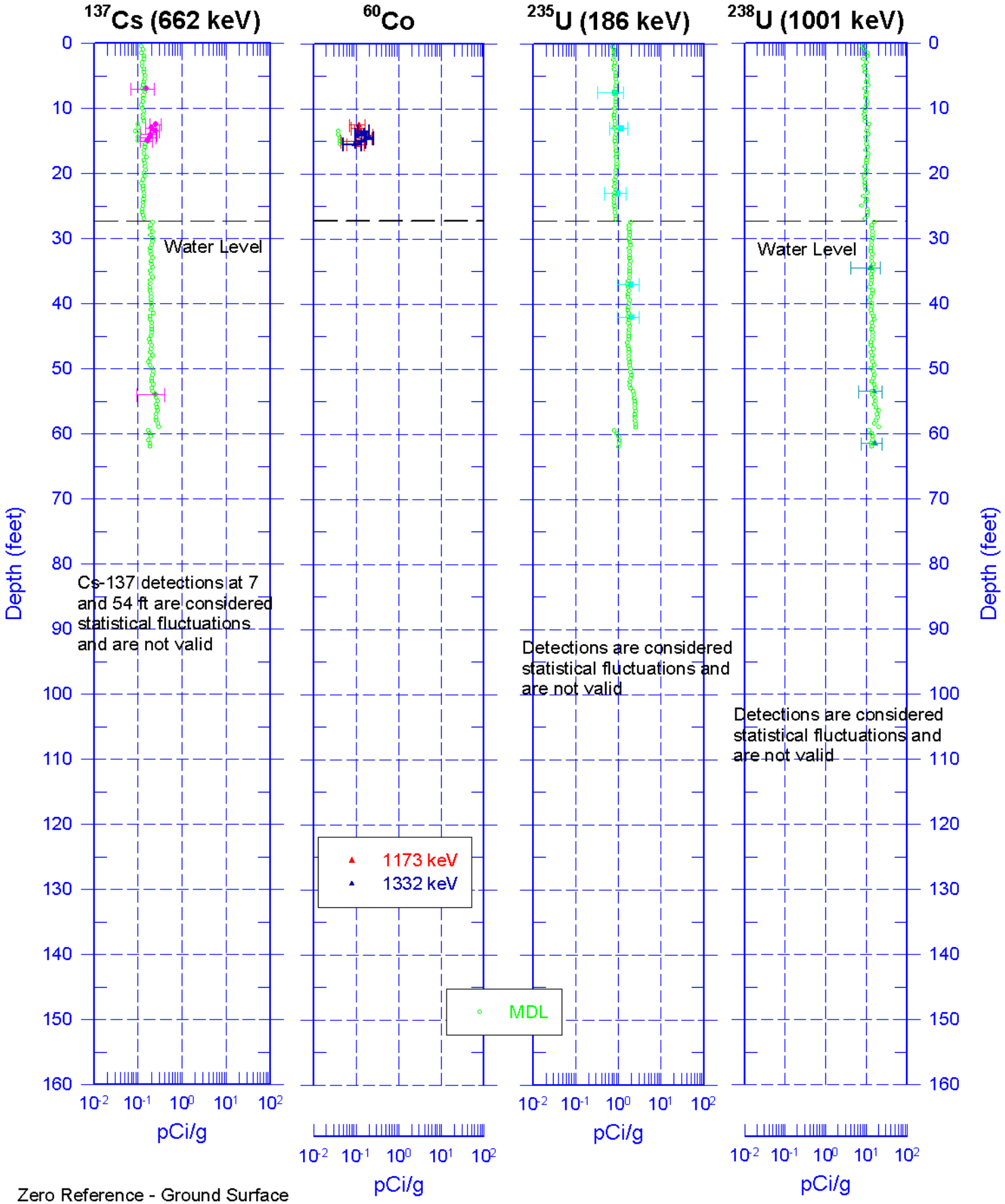
399-2-12 (C6189)
Manmade Radionuclides



Zero Reference - Ground Surface

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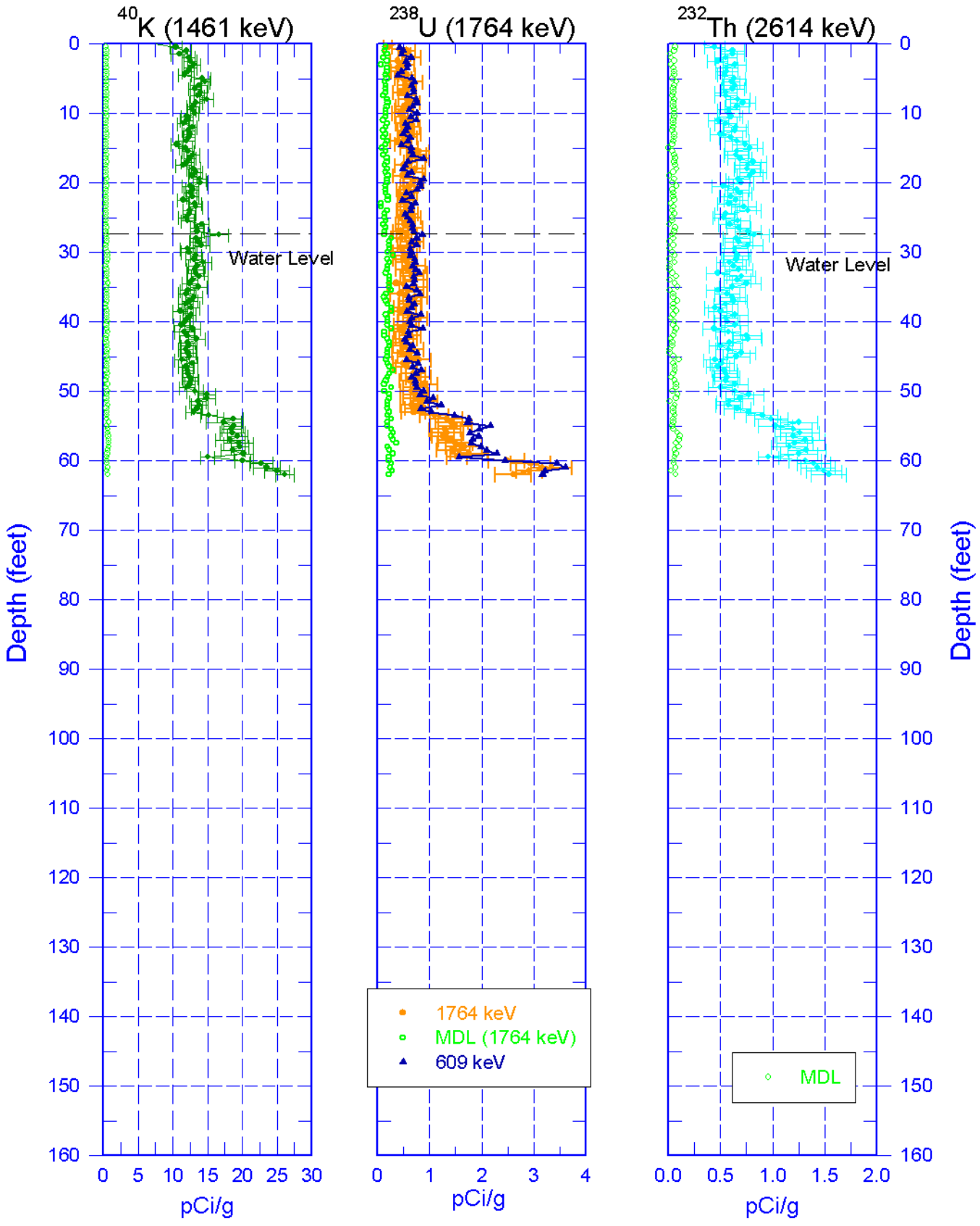
399-2-12 (C6189)
Natural Gamma Logs



Zero Reference - Ground Surface

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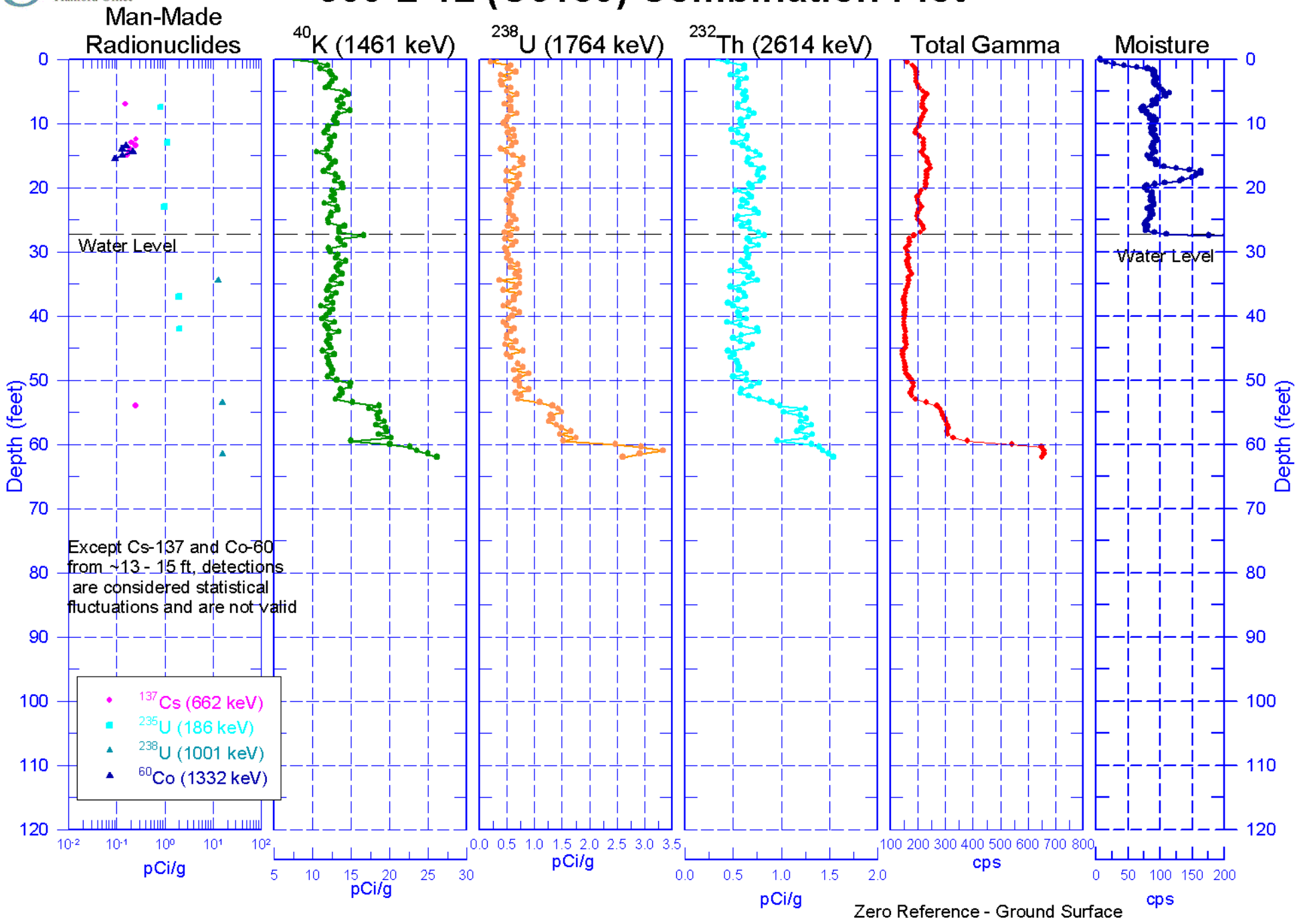
399-2-12 (C6189) Combination Plot



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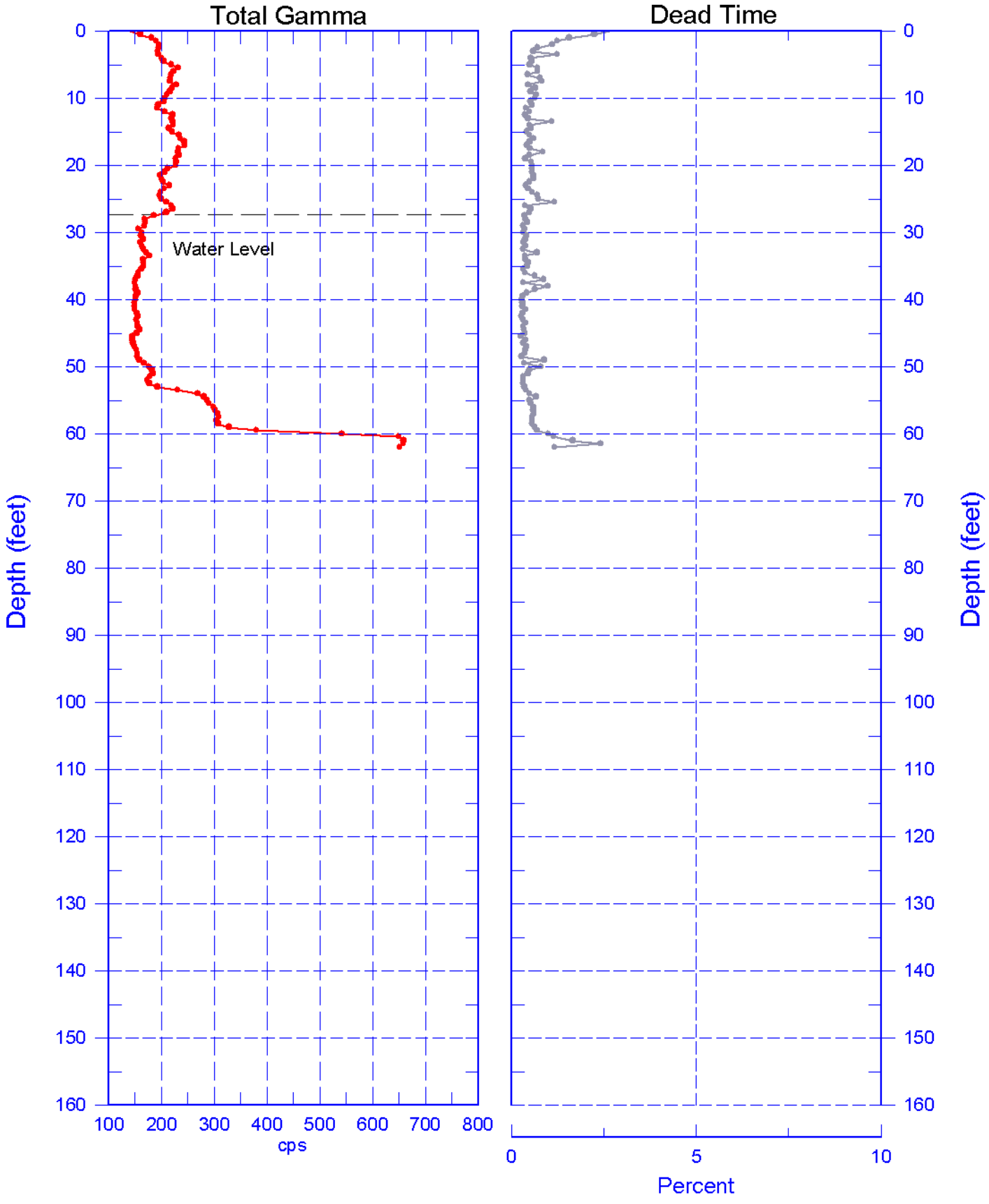
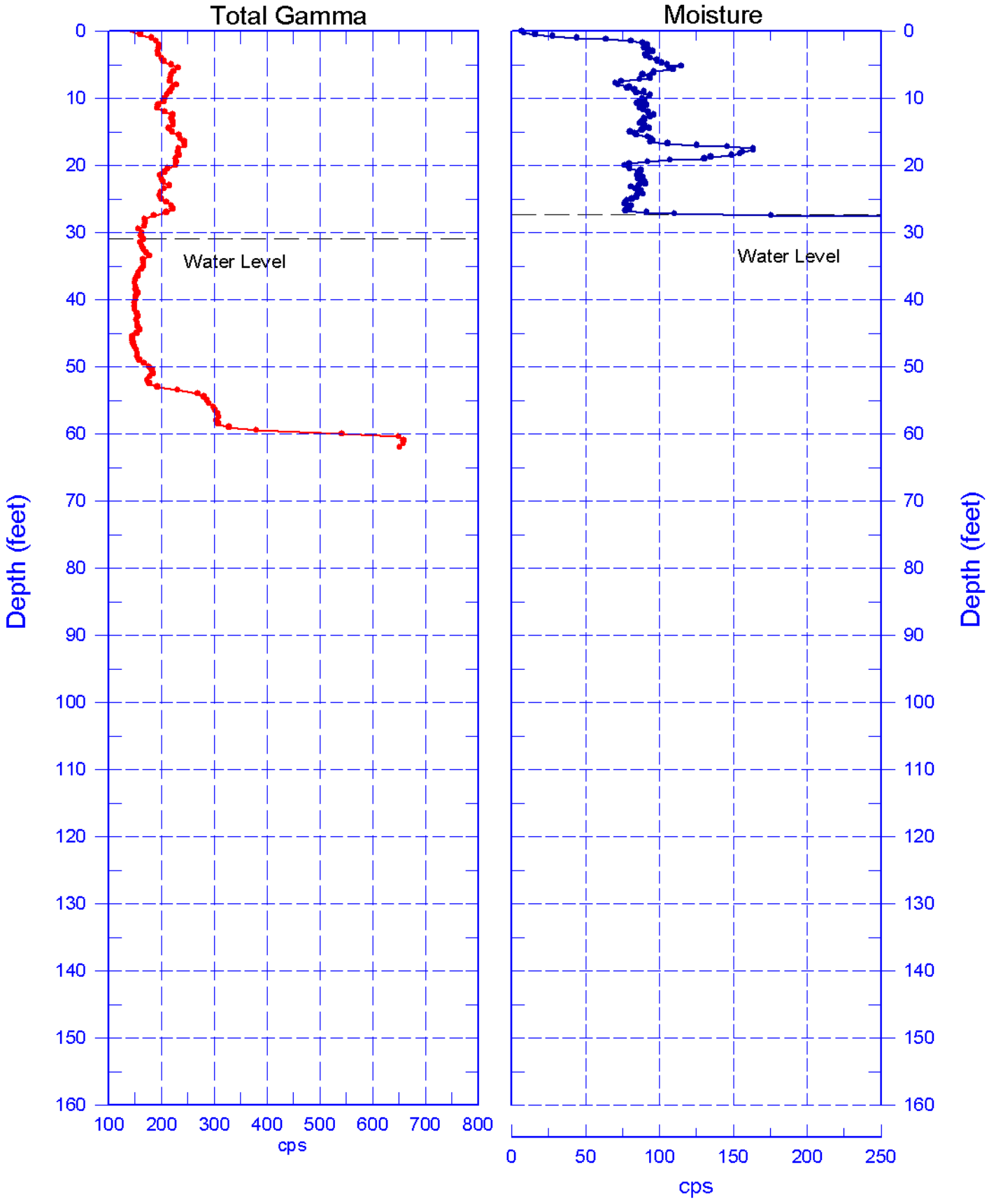
399-2-12 (C6189)
Total Gamma & Dead Time



Reference - Ground Surface

Stoller
Hanford Office

399-2-12 (C6189)
Total Gamma & Moisture



Reference - Ground Surface

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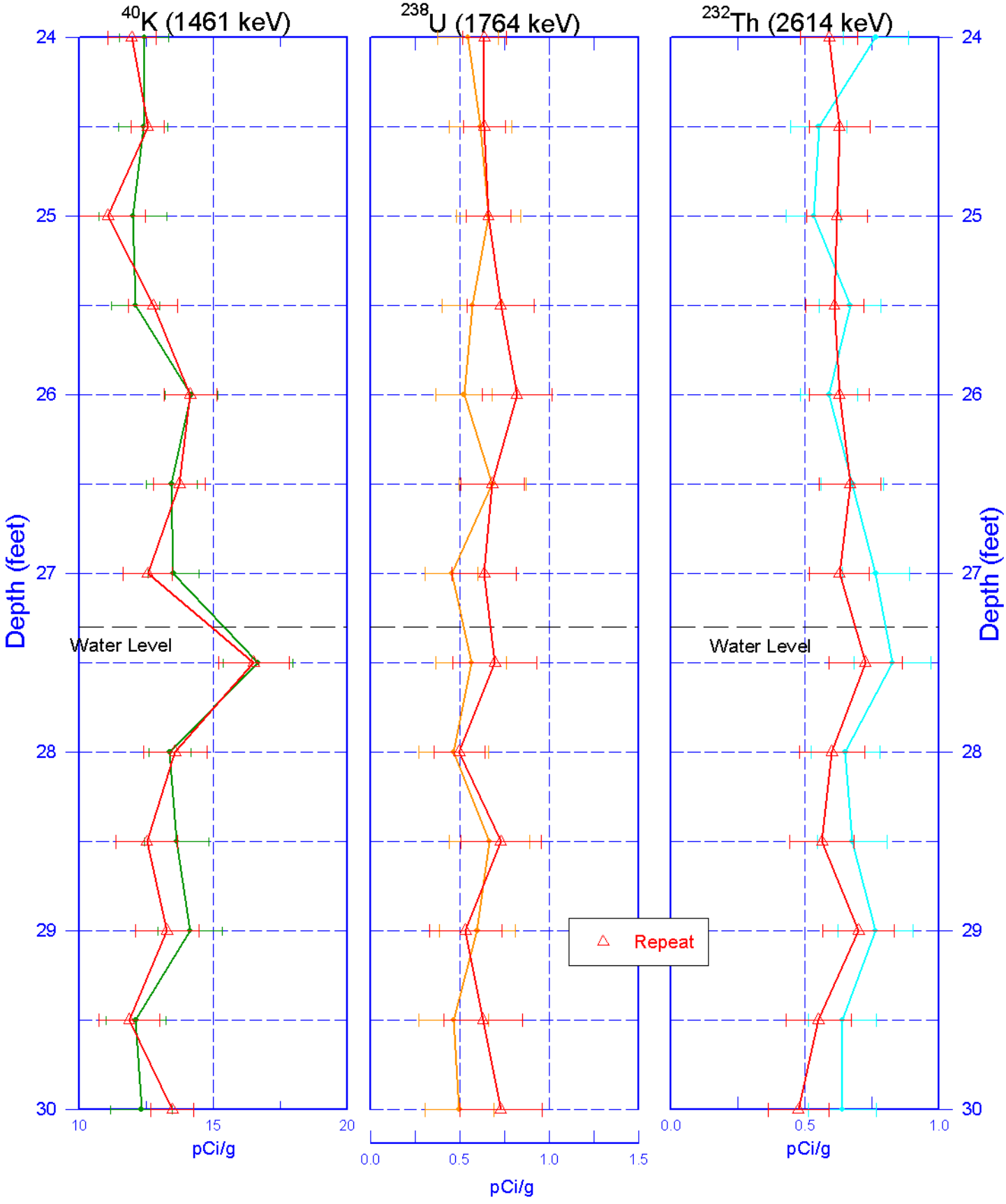
399-2-12 (C6189)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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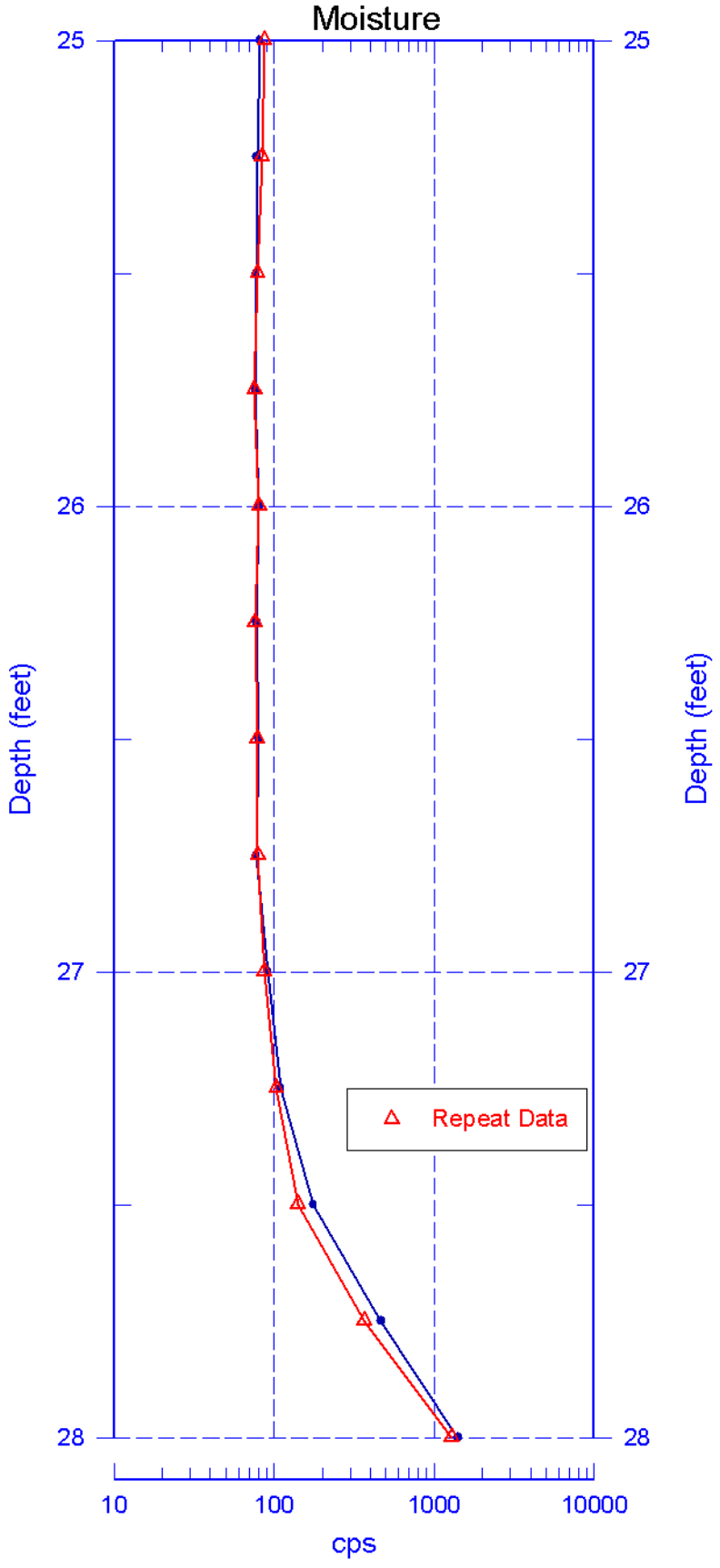
399-2-12 (C6189)
Moisture Repeat Section



Reference - Ground Surface

399-2-13 (C6190)
Log Data Report

Borehole Information:

Borehole:	399-2-13 (C6190)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	28.0	GWL Date:	05/22/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
Unknown	Unknown	05/22/08	Unknown	62.6	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	3.6	7 5/8	6 7/8	3/8	-3.6	57.0

Borehole Notes:

Well site geologist reported depth to bottom, depth to water, and depth of casing. Water level appears to fluctuate with the level of the river. Logging engineer measured casing diameter using a steel tape and rounding to the nearest 1/16-in. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 1 N		Type:	60% HPGe SGLS
			Serial No.:	45TP22010A
Effective Calibration Date:	03/28/08	Calibration Reference:	HGLP-CC-031	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 1 M		Type:	NMLS
			Serial No.:	H340207279
Effective Calibration Date:	05/06/08	Calibration Reference:	HGLP-CC-032	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3
Date	05/27/08	05/28/08	05/28/08
Logging Engineer	Spatz	Spatz	Spatz
Start Depth (ft)	0.0	54.0	38.0
Finish Depth (ft)	55.0	58.0	44.0
Count Time (sec)	200	200	200
Live/Real	R	R	R
Shield (Y/N)	N	N	N
MSA Interval (ft)	0.5	0.5	0.5
Log Speed (ft/min)	N/A	N/A	N/A
Pre-Verification	AN077CAB	AN078CAB	AN078CAB
Start File	AN077000	AN078000	AN078009
Finish File	AN077110	AN078008	AN078021
Post-Verification	AN077CAA	AN078CAA	AN078CAA
Depth Return Error (in.)	0	N/A	0
Comments	Fine gain adjustment made after files 065 and 090.	No fine gain adjustment made.	Repeat section

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	4	5
Date	05/23/08	05/23/08
Logging Engineer	Pearson	Pearson
Start Depth (ft)	0.0	16.0
Finish Depth (ft)	31.75	20.0
Count Time (sec)	15	15
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.25	0.25
Log Speed (ft/min)	N/A	N/A
Pre-Verification	AM005CAB	AM005CAB
Start File	AM005000	AM005128
Finish File	AM005127	AM005144
Post-Verification	AM005CAA	AM005CAA
Depth Return Error (in.)	N/A	0
Comments	None	Repeat section

Logging Operation Notes:

Data were collected using Gamma 1, HO 68B-3574. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-118 field verifier. Maximum logging depth was 58.0 ft approximately 1-ft below casing. A centralizer was installed on the sonde. NMLS pre- and post-survey verification measurements were acquired in the AmBe standard.

Analysis Notes:

Analyst:	LEGLER	Date:	07/17/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre- and post-survey verification spectra met the acceptance criteria for the established system, but the verification spectra files AN078CAB, and AN078CAA had measurements above the upper control limits for the 609 keV energy line and 2614 keV energy line respectively. NMLS pre- and post-verification spectra met the acceptance criteria for the established system.

A casing correction for a 3/8-in. thick casing was applied during analysis for depths up to 57.0 ft, where casing ends, leaving 1ft of open hole uncorrected. A water correction was also applied during analysis from 28.0 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G1NMar08.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G1MMay08.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in. inner diameter borehole casing.

Results and Interpretations:

Cs-137, U-235, and U-238 were detected by the routine processing software at various depths in this borehole. Inspection of the individual spectra at these depths indicates that these detections are statistical fluctuations and are not valid.

A fine grain sediment layer can be seen at 40.5 ft, by the increases in the total gamma, K-40 (1461 keV), natural U-238 (1764 keV), and Th-232 (2614keV).

The KUT plots indicated good repeatability. Moisture plots indicate some variability.

SGLS log data collected on 5/22/08 indicates depth to groundwater at approximately 28 ft. NMLS data collected on 5/23/08 indicate depth to groundwater at approximately 31 ft. Depth to water is reported as 33 ft on the Logging Request Tracking Sheet (no date provided). The groundwater level appears to fluctuate with the river level.

List of Log Plots:

Depth reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Manmade Radionuclides
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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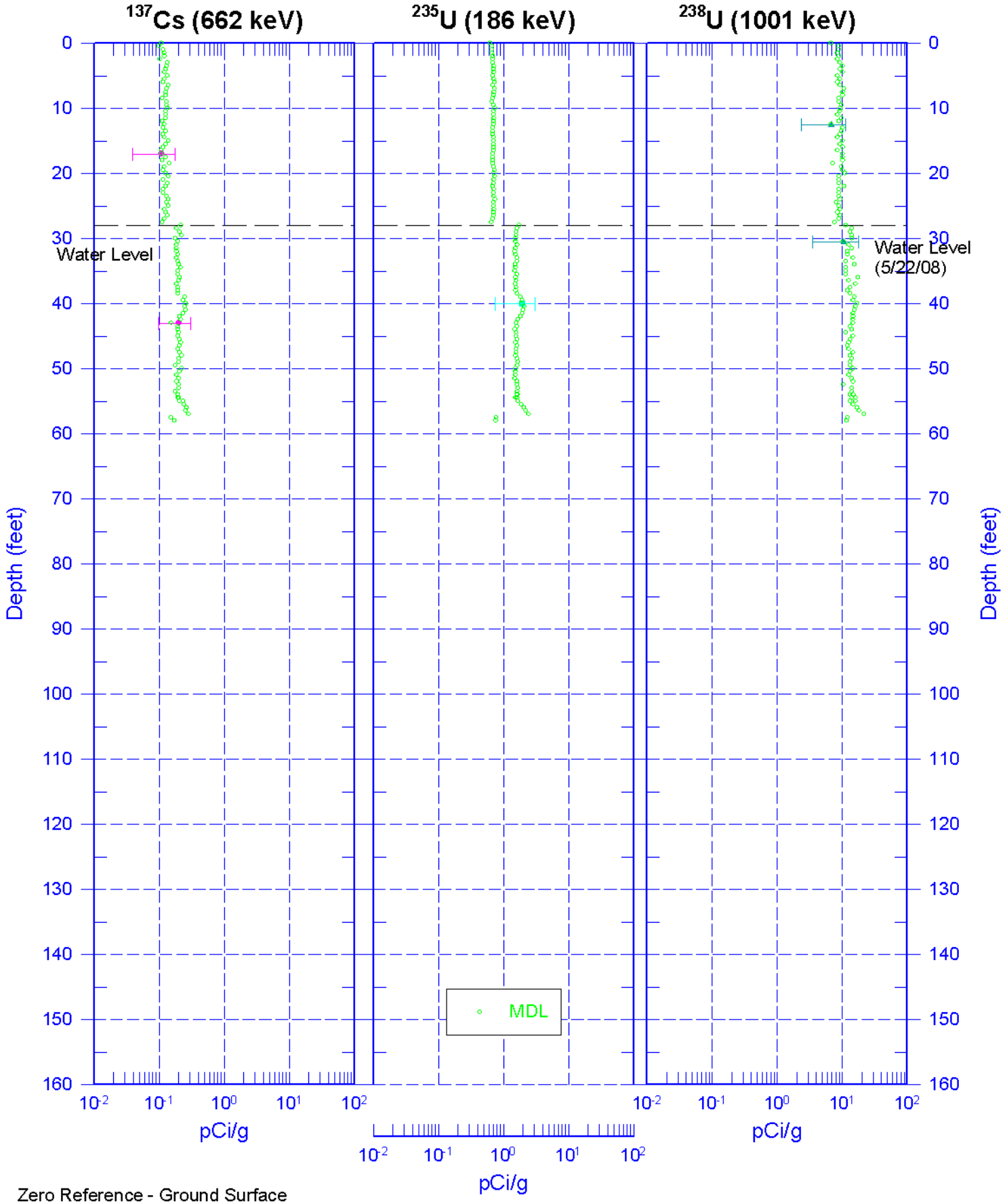
399-2-13 (C6190)
Manmade Radionuclides



Zero Reference - Ground Surface

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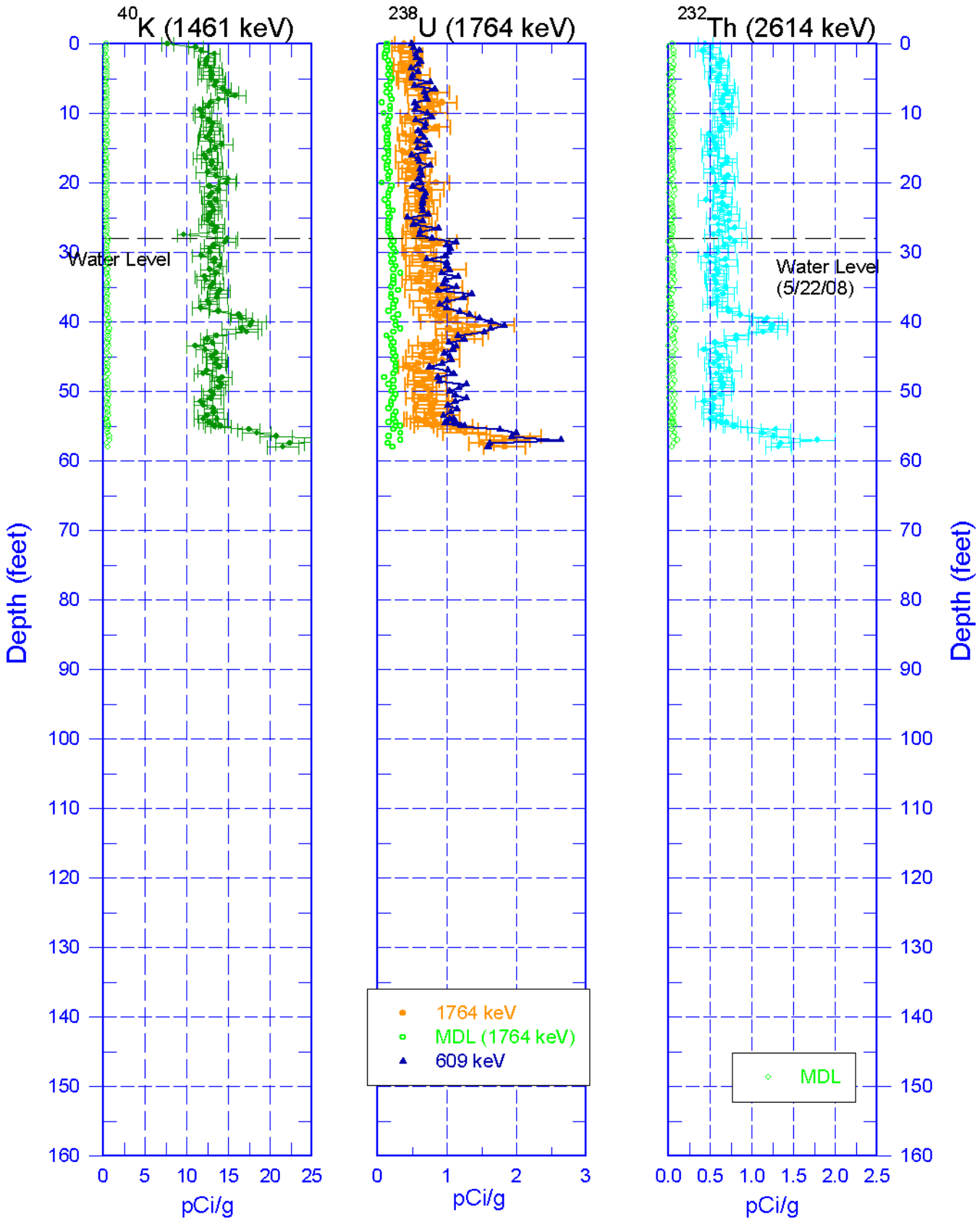
399-2-13 (C6190)
Natural Gamma Logs



Zero Reference - Ground Surface

Stoller
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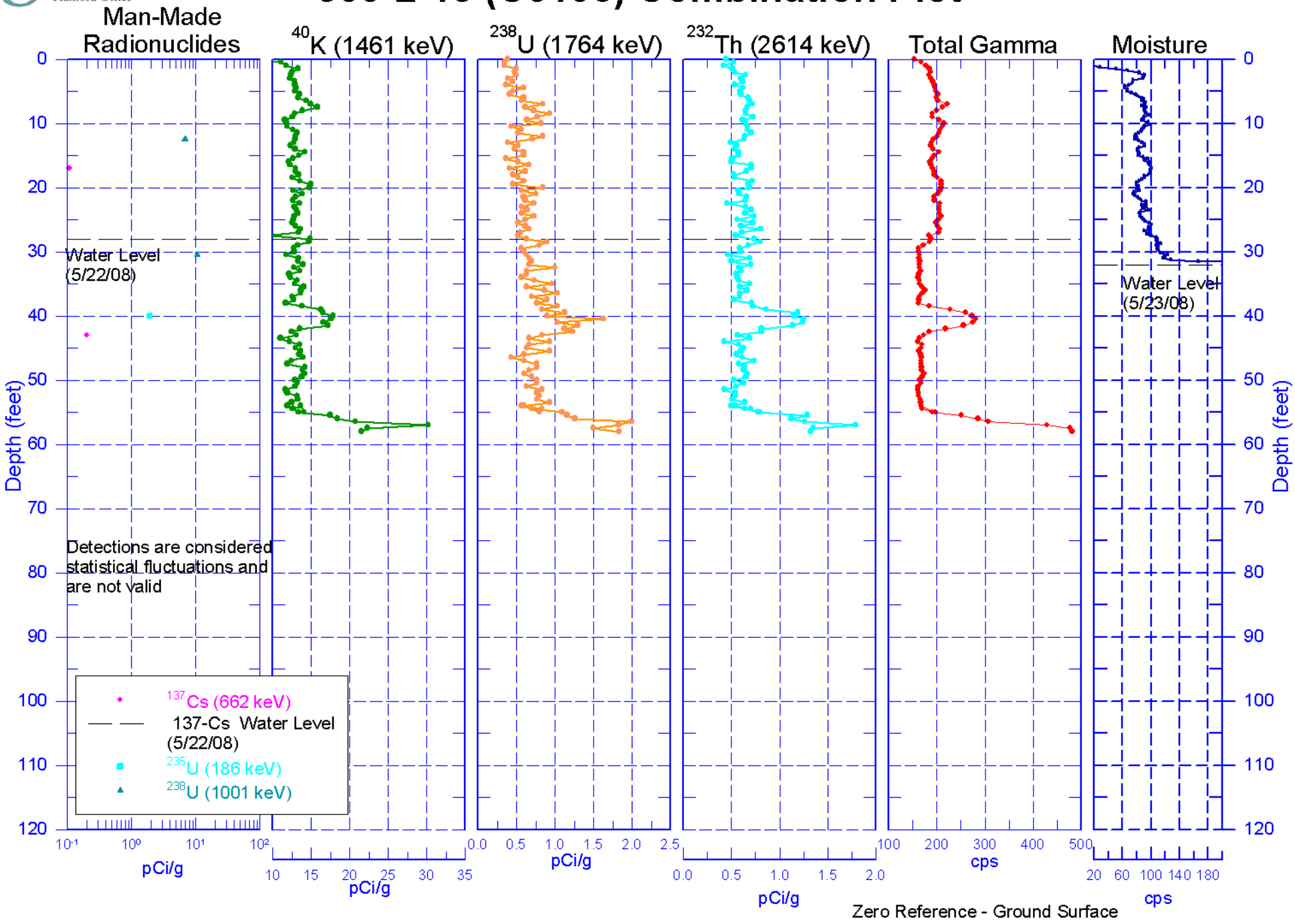
399-2-13 (C6190) Combination Plot



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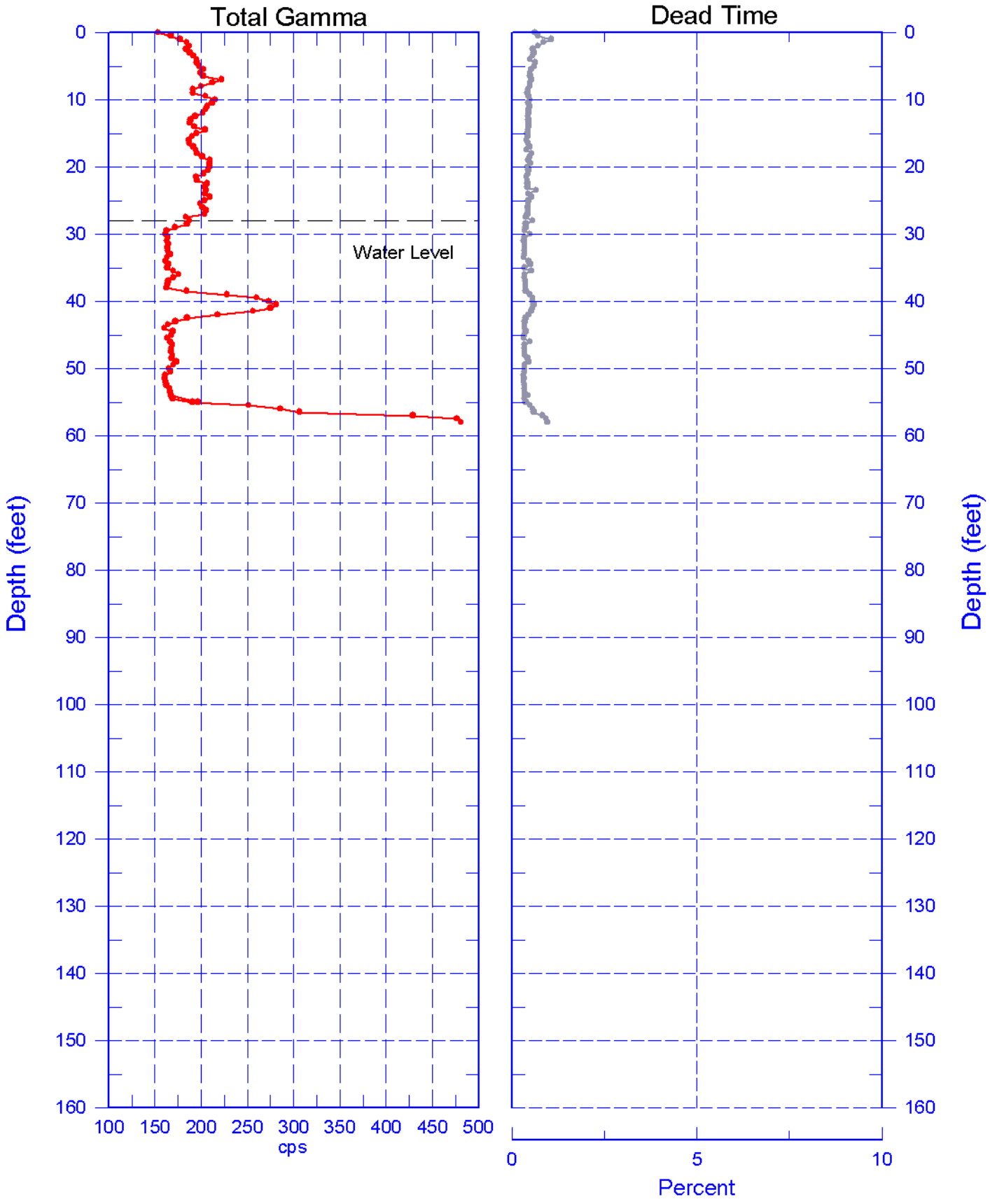
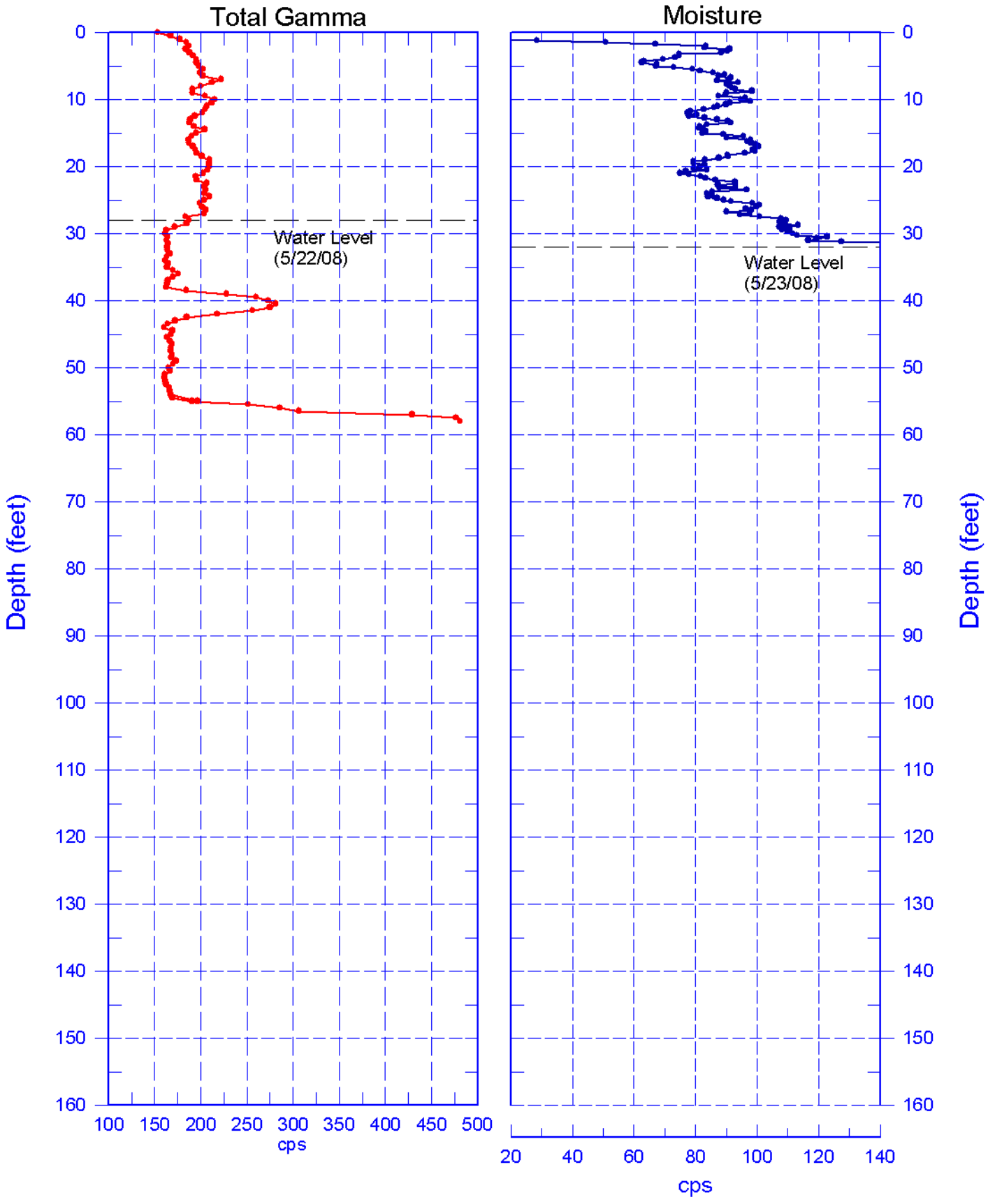
399-2-13 (C6190)
Total Gamma & Dead Time



Reference - Ground Surface

Stoller
Hanford Office

399-2-13 (C6190)
Total Gamma & Moisture

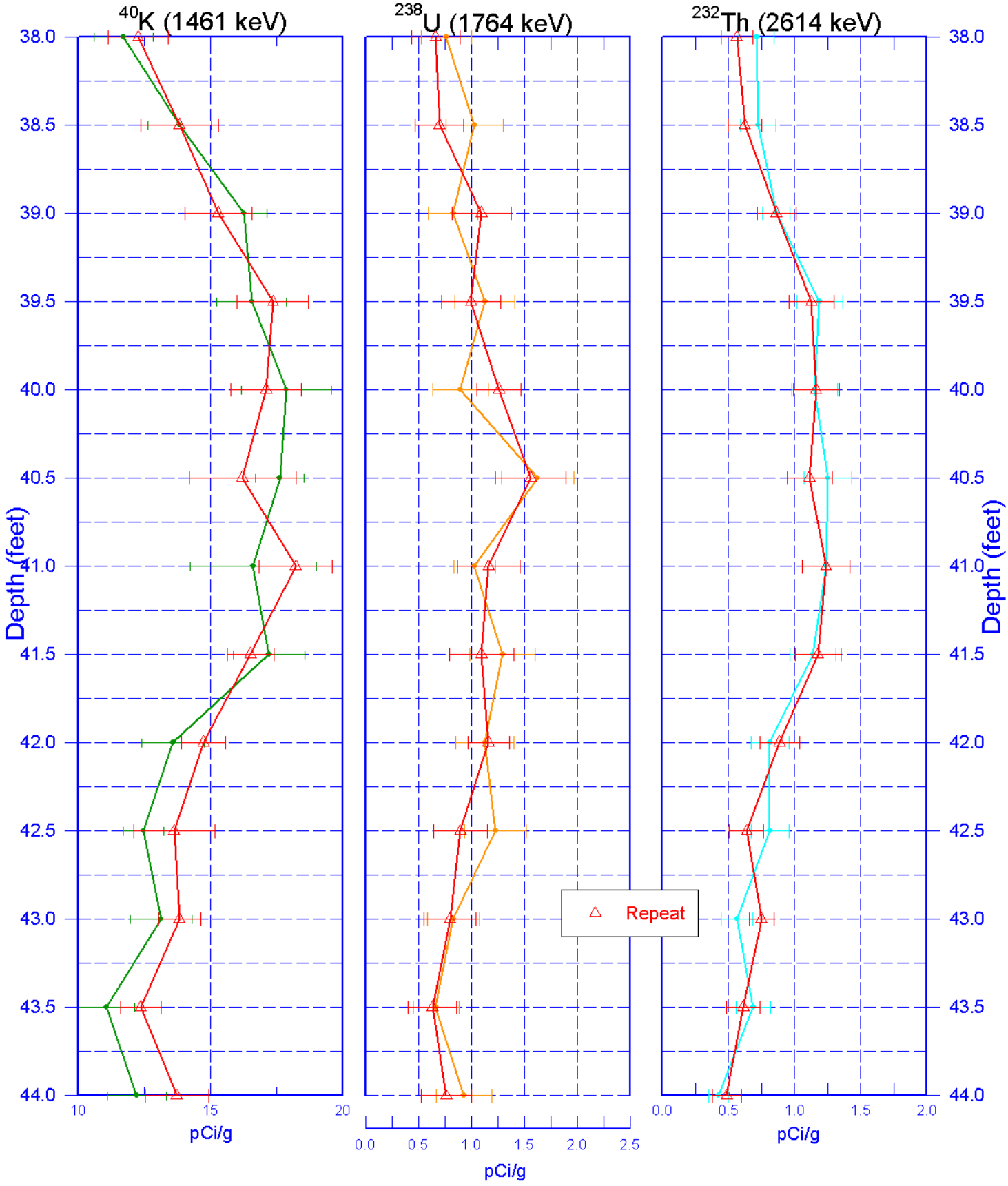


Reference - Ground Surface

Stoller
Hanford Office

399-2-13 (C6190)

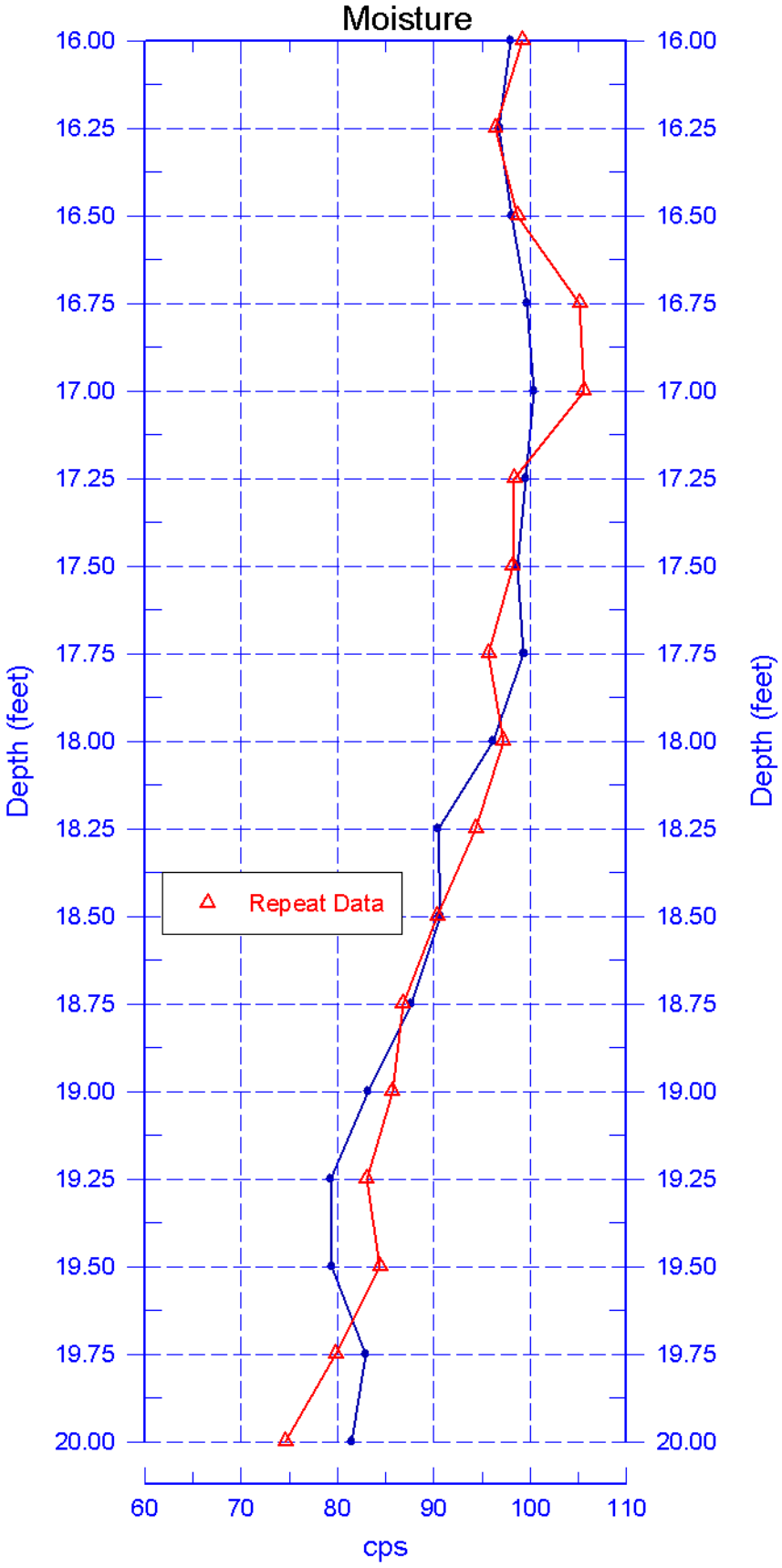
Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

Stoller
Hanford Office

399-2-13 (C6190)
Moisture Repeat Section



Reference - Ground Surface

399-2-14 (C6191)
Log Data Report

Borehole Information:

Borehole:	399-2-14 (C6191)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	30.3	GWL Date:	06/17/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116070.3	594245.2	06/16/08	Unknown	58.5	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	0.6	7 5/8	6 7/8	3/8	-0.6	56.0

Borehole Notes:

Casing data, and total depth were reported by the site geologist. Logging engineer measured depth to water with an e-tape. Casing diameters were measured using a steel tape and rounded to the nearest 1/16-in. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type:	60% HPGe SGLS
			Serial No.:	47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type:	NMLS
			Serial No.:	H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat
Date	06/17/08	06/17/08
Logging Engineer	Pearson	Pearson
Start Depth (ft)	58.0	2.0
Finish Depth (ft)	0.5	7.5
Count Time (sec)	200	200
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.5	0.5
Log Speed (ft/min)	N/A	N/A
Pre-Verification	DL461CAB	DL461CAB
Start File	DL461000	DL461116
Finish File	DL461115	DL461127
Post-Verification	DL461CAA	DL461CAA
Depth Return Error (in.)	0	0
Comments	No fine gain adjustment made.	Repeat Section

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat
Date	06/17/08	06/17/08
Logging Engineer	Pearson	Pearson
Start Depth (ft)	0.0	0.0
Finish Depth (ft)	29.25	3.0
Count Time (sec)	15	15
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.25	0.25
Log Speed (ft/min)	N/A	N/A
Pre-Verification	DHF32CAB	DHF32CAB
Start File	DHF32000	DHF32118
Finish File	DHF32117	DHF32130
Post-Verification	DHF32CAA	DHF32CAA
Depth Return Error (in.)	N/A	0
Comments	None.	Repeat Section

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. Maximum logging depth achieved was 58.0 ft before the sonde un-weighted. A centralizer was installed on the sonde. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum logging depth achieved was 29.25 ft.

Analysis Notes:

Analyst:	LEGLER	Date:	07/29/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre- and post-survey verification spectra met the acceptance criteria for the established system. NMLS pre- and post-survey verification spectra met the acceptance criteria for the established system, but spectra file DHF32CAB had measurements above the upper control limit for counts per second (cps).

A casing correction for a 3/8-in. thick casing was applied from ground surface to 56 ft where casing ends, leaving 2 ft of open borehole uncorrected. A water correction was also applied during analysis from 30.3 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in. inner diameter borehole casing.

Results and Interpretations:

Cs-137, U-235, and U-238 (Pa-234m) were detected sporadically throughout this borehole. Inspection of the individual spectra at the various depths indicates that these detections are statistical fluctuations associated with the processing software and are not valid.

The KUT repeat plots indicate good repeatability. The moisture repeat plot indicates good repeatability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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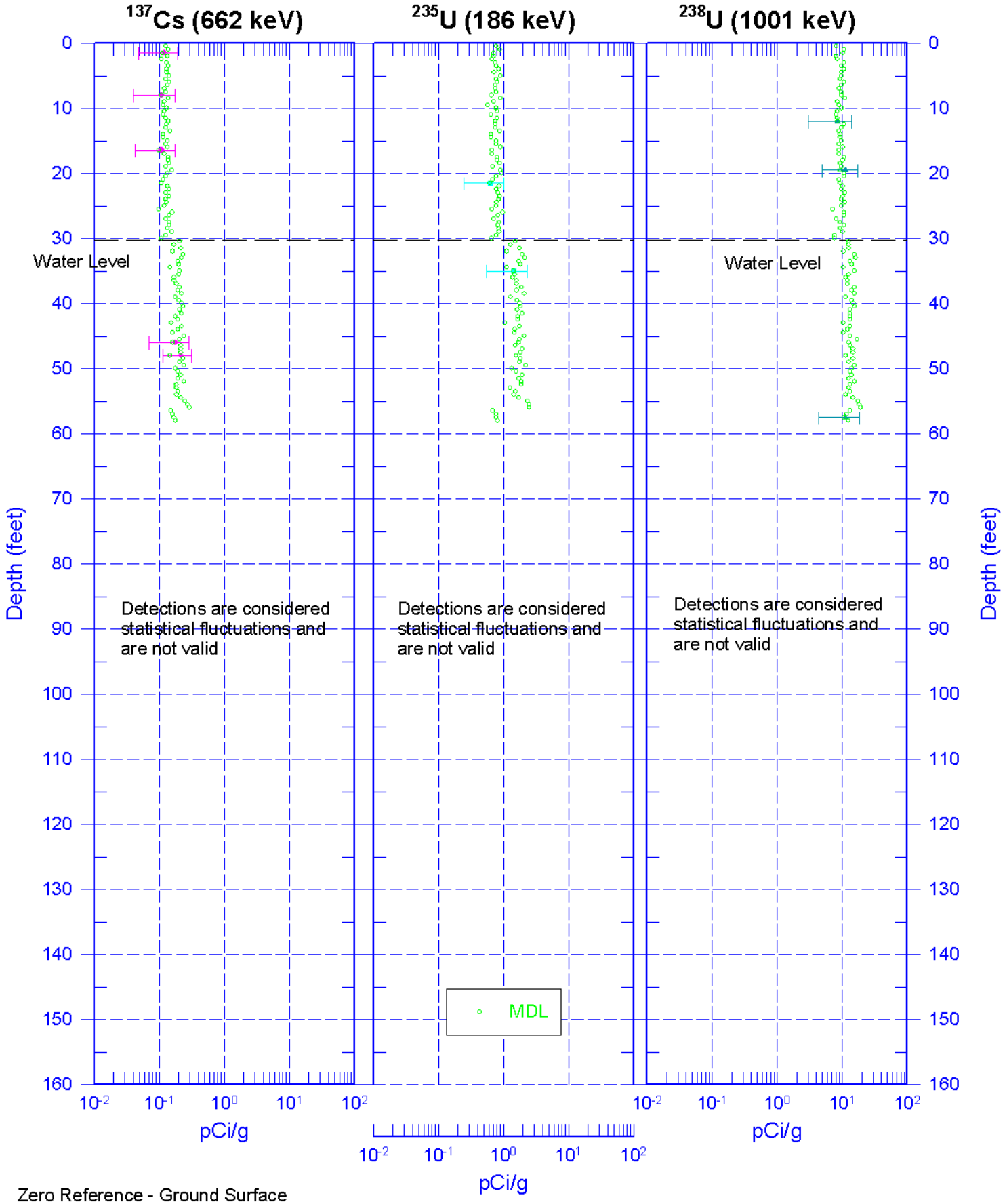
399-2-14 (C6191)
Manmade Radionuclides



Zero Reference - Ground Surface

Stoller
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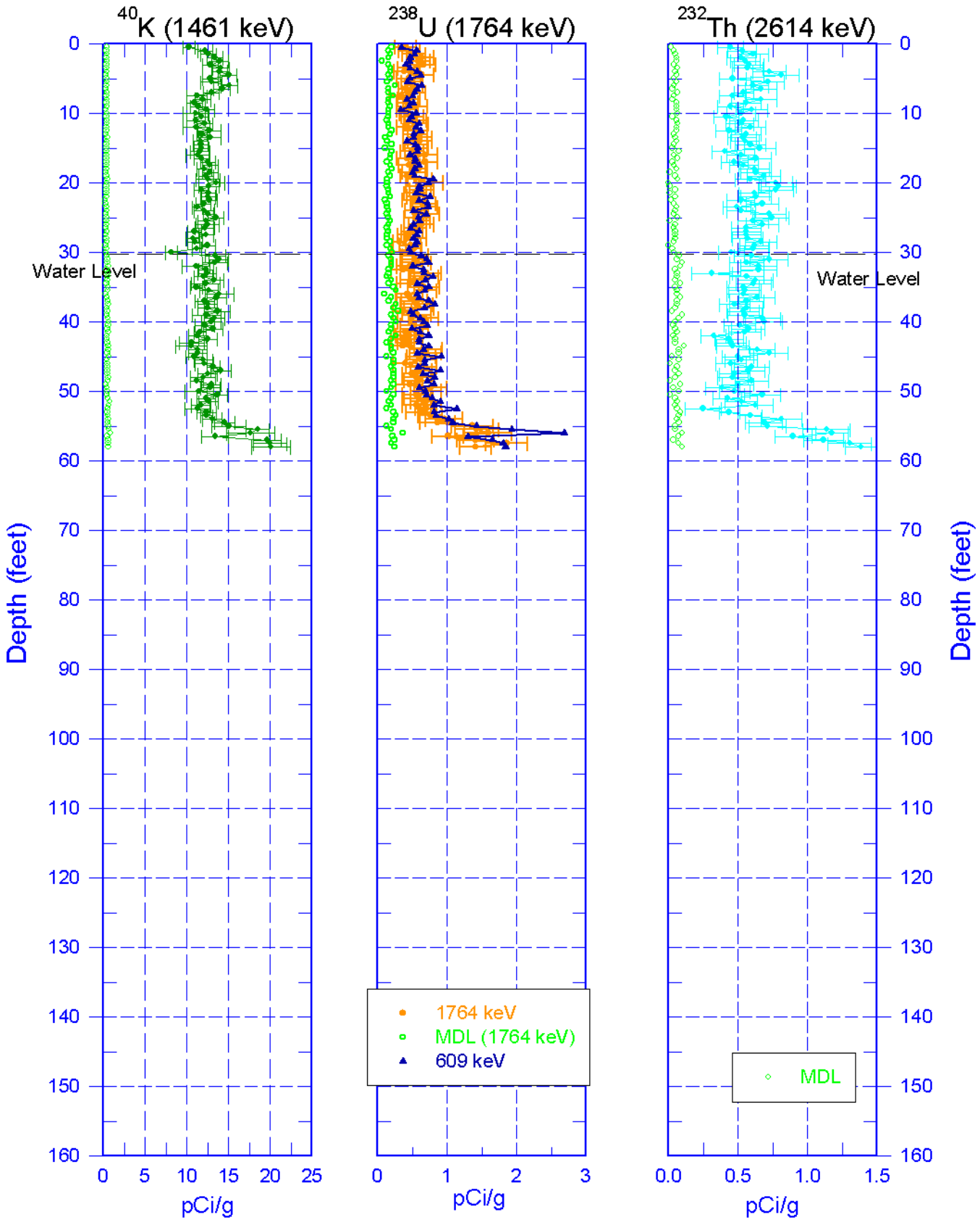
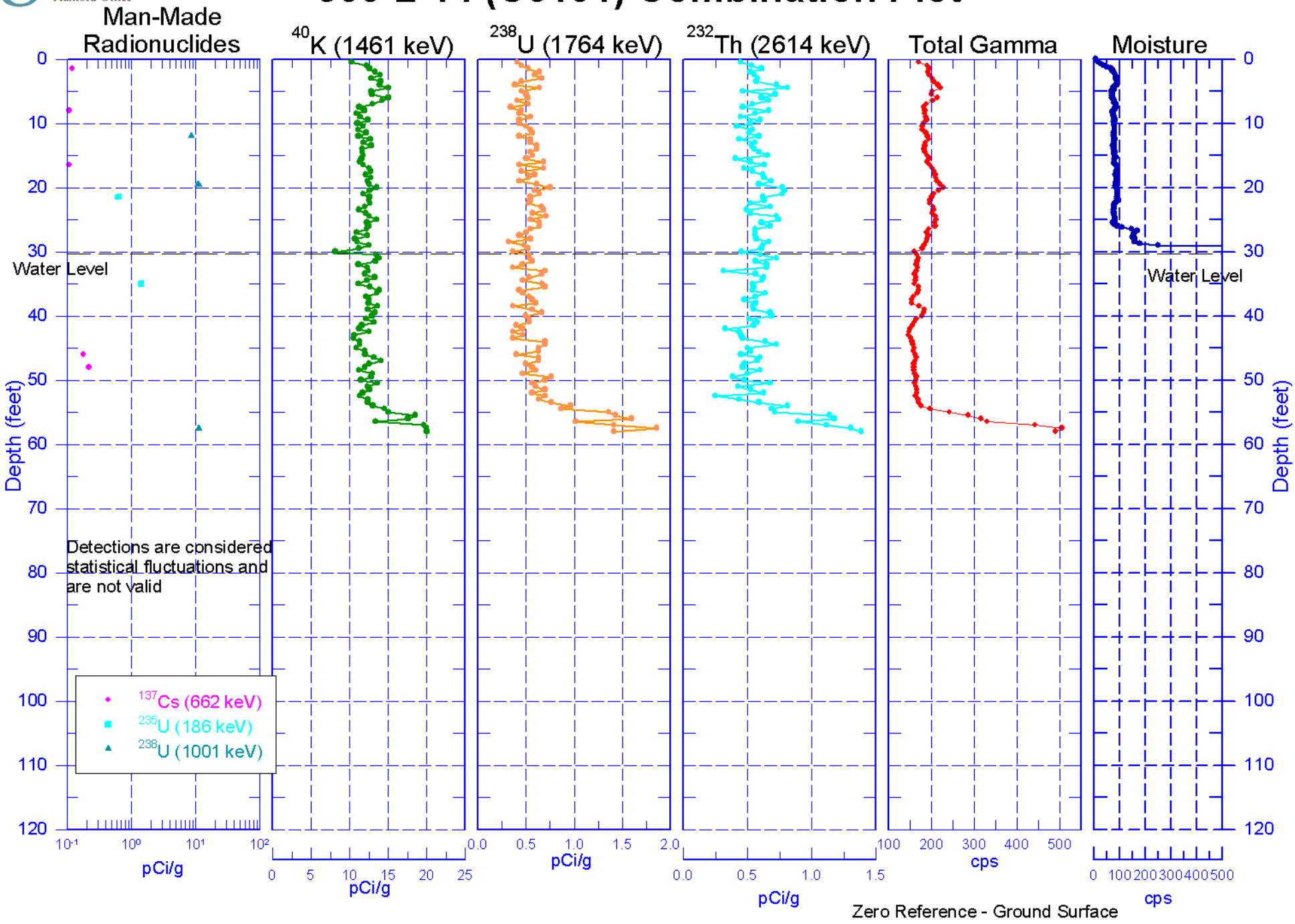
399-2-14 (C6191)
Natural Gamma Logs



Zero Reference - Ground Surface

Stoller
Hanford Office

399-2-14 (C6191) Combination Plot



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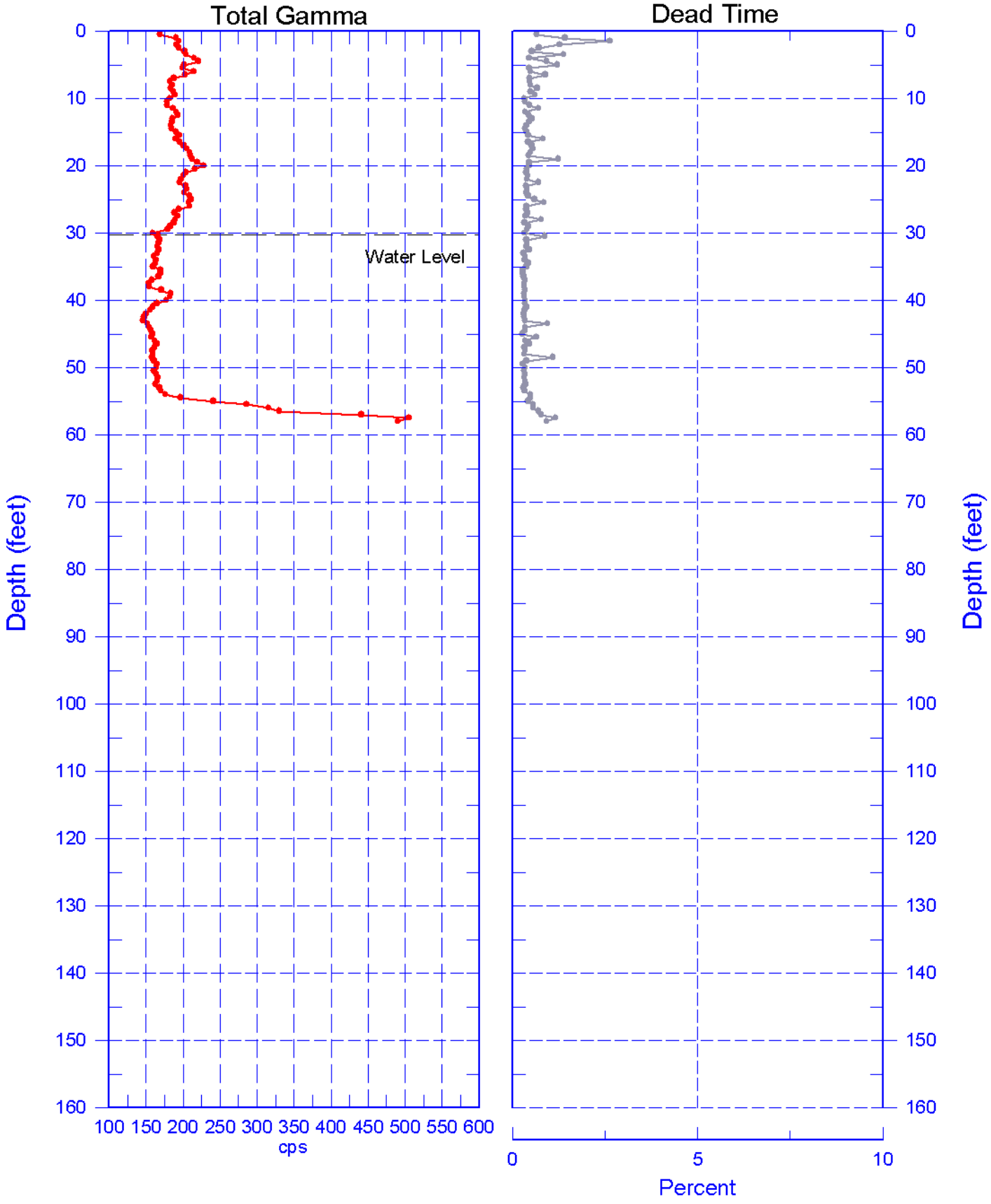
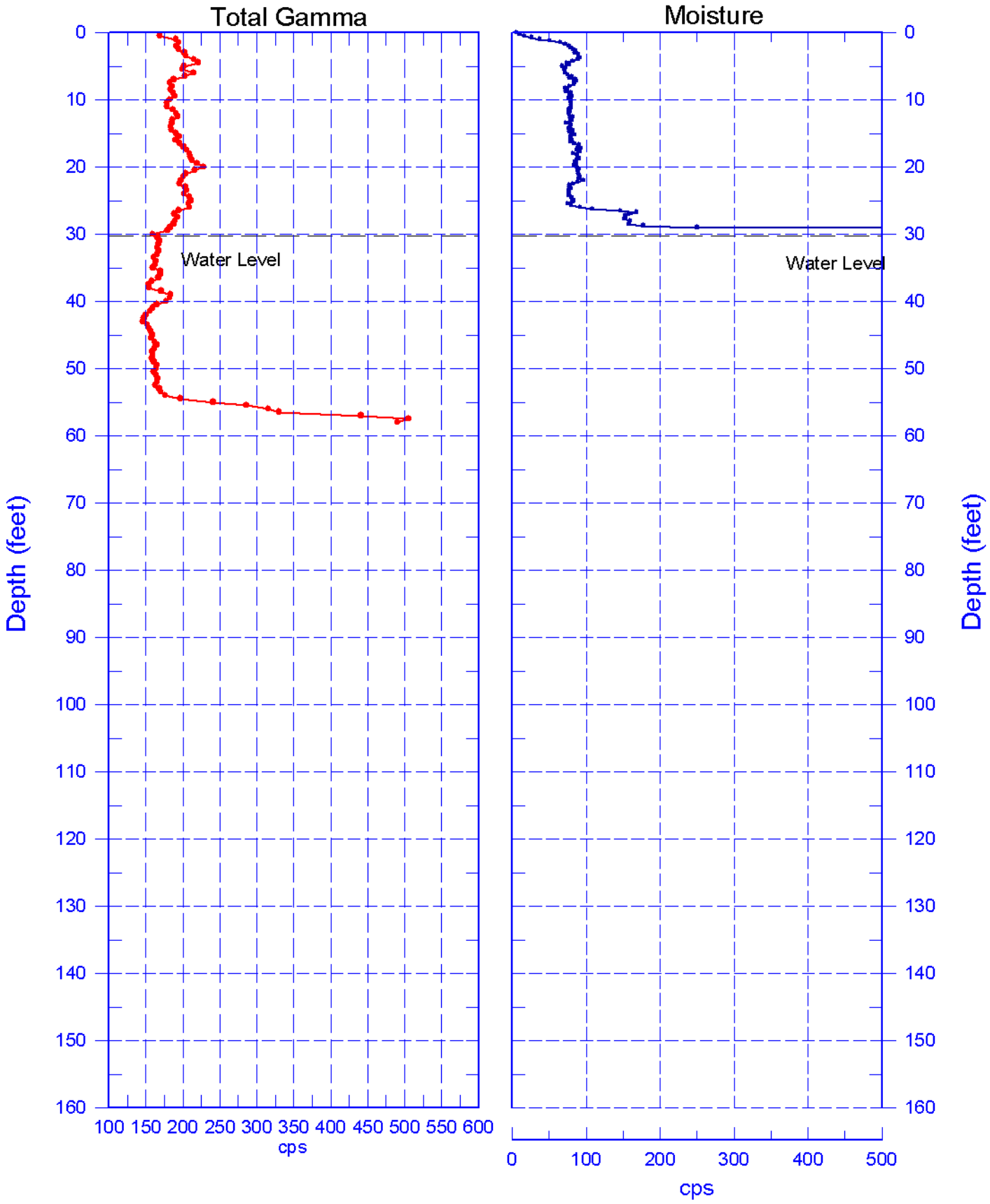
399-2-14 (C6191)
Total Gamma & Dead Time



Reference - Ground Surface

Stoller
Hanford Office

399-2-14 (C6191)
Total Gamma & Moisture



Reference - Ground Surface

Stoller
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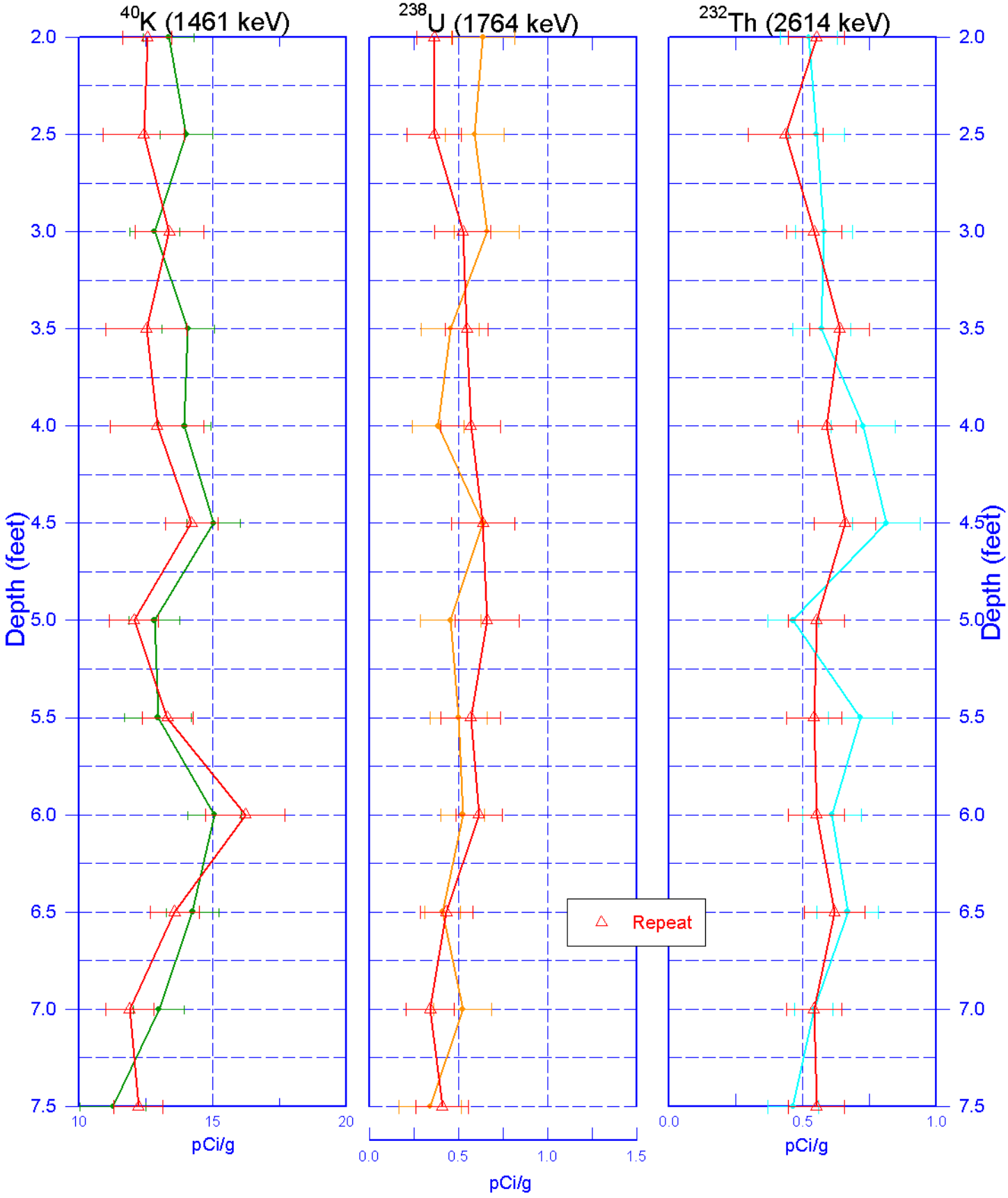
399-2-14 (C6191)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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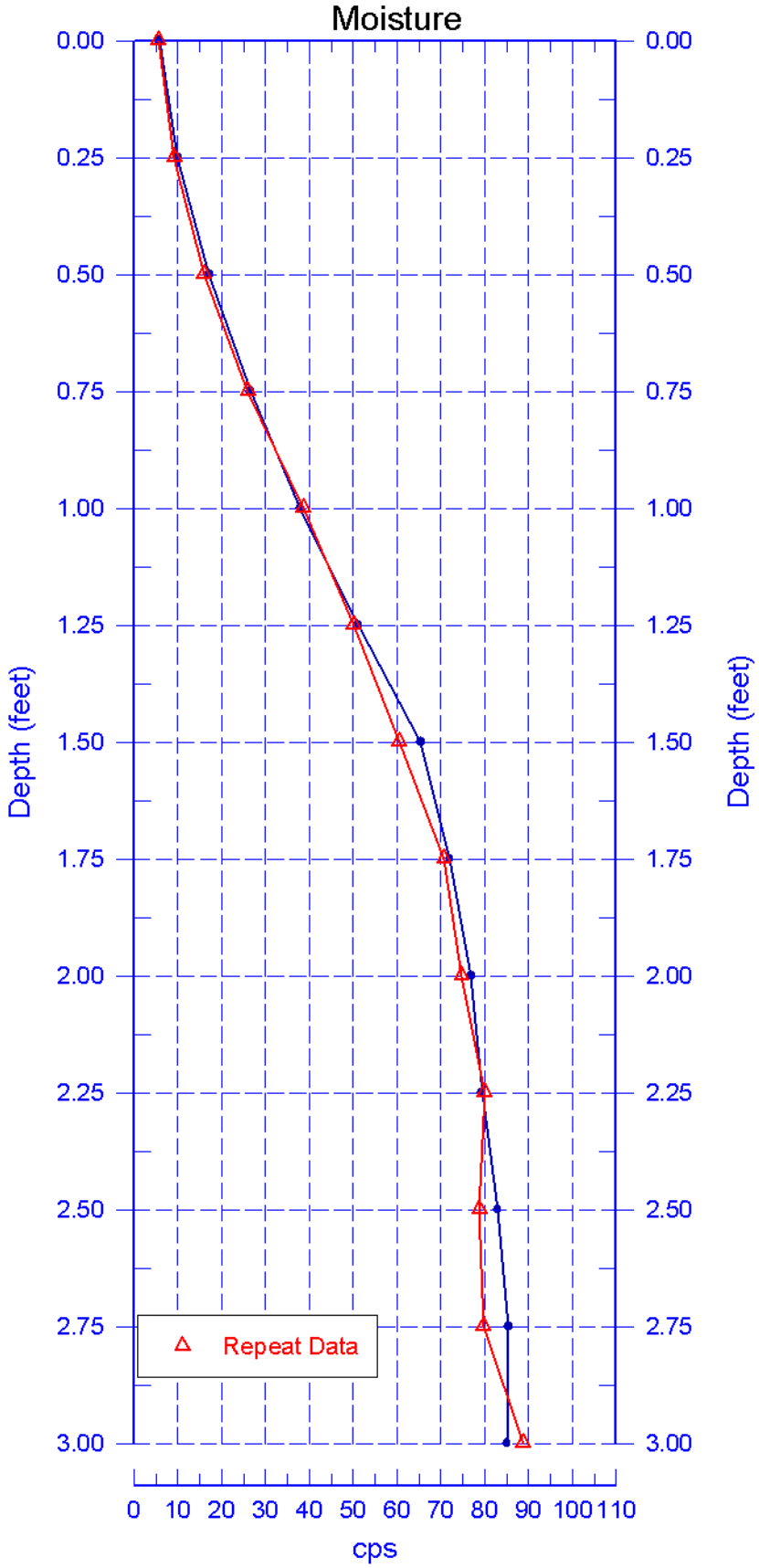
399-2-14 (C6191)
Moisture Repeat Section



Reference - Ground Surface

399-2-15 (C6192)
Log Data Report

Borehole Information:

Borehole:	399-2-15 (C6192)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	26.8	GWL Date:	06/28/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116076.0	594253.4	06/26/08	Unknown	61	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	1.1	7 5/8	6 7/8	3/8	-1.1	59

Borehole Notes:

Casing data and total depth were reported by the site geologist. The logging engineer measured the depth to water with an e-tape. Casing diameters were measured using a steel tape and rounding to the nearest 1/16 inch. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type:	60% HPGe SGLS
			Serial No.:	47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type:	NMLS
			Serial No.:	H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	06/28/08	06/28/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	61.5	12.0			
Finish Depth (ft)	0.0	6.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DL541CAB	DL541CAB			
Start File	DL551000	DL551124			
Finish File	DL551123	DL551136			
Post-Verification	DL551CAA	DL511CAA			
Depth Return Error (in.)	1 High	1 High			
Comments	None	Repeat Section			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat			
Date	06/28/08	06/28/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	0.0	4.0			
Finish Depth (ft)	26.75	7.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DHG22CAB	DHG22CAB			
Start File	DHG22000	DHG22108			
Finish File	DHG22107	DHG22120			
Post-Verification	DHG22CAA	DHG22CAA			
Depth Return Error (in.)	NA	0			
Comments	None	Repeat Section			

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum logging depth was 61.61 ft before the sonde un-weighted. A centralizer was installed on the sonde.

Analysis Notes:

Analyst:	LEGLER	Date:	10/01/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

The pre- and post-survey verification spectra met the acceptance criteria for the established systems. A casing correction for a 3/8-in thick casing was applied during analysis for depths up to 59 ft, where casing ends, leaving 2.5 ft of open borehole uncorrected. A water correction was also applied from 26.8 ft to total logged depth of the borehole.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in inner diameter borehole casing.

Results and Interpretations:

Cs-137, U-235, and U-238 (Pa-234m) were detected in this borehole at isolated depths throughout the borehole. Inspection of the individual spectra at these various depths indicates that these detections are statistical fluctuations associated with the processing software and are not considered valid.

The KUT and Moisture repeat plots show good repeatability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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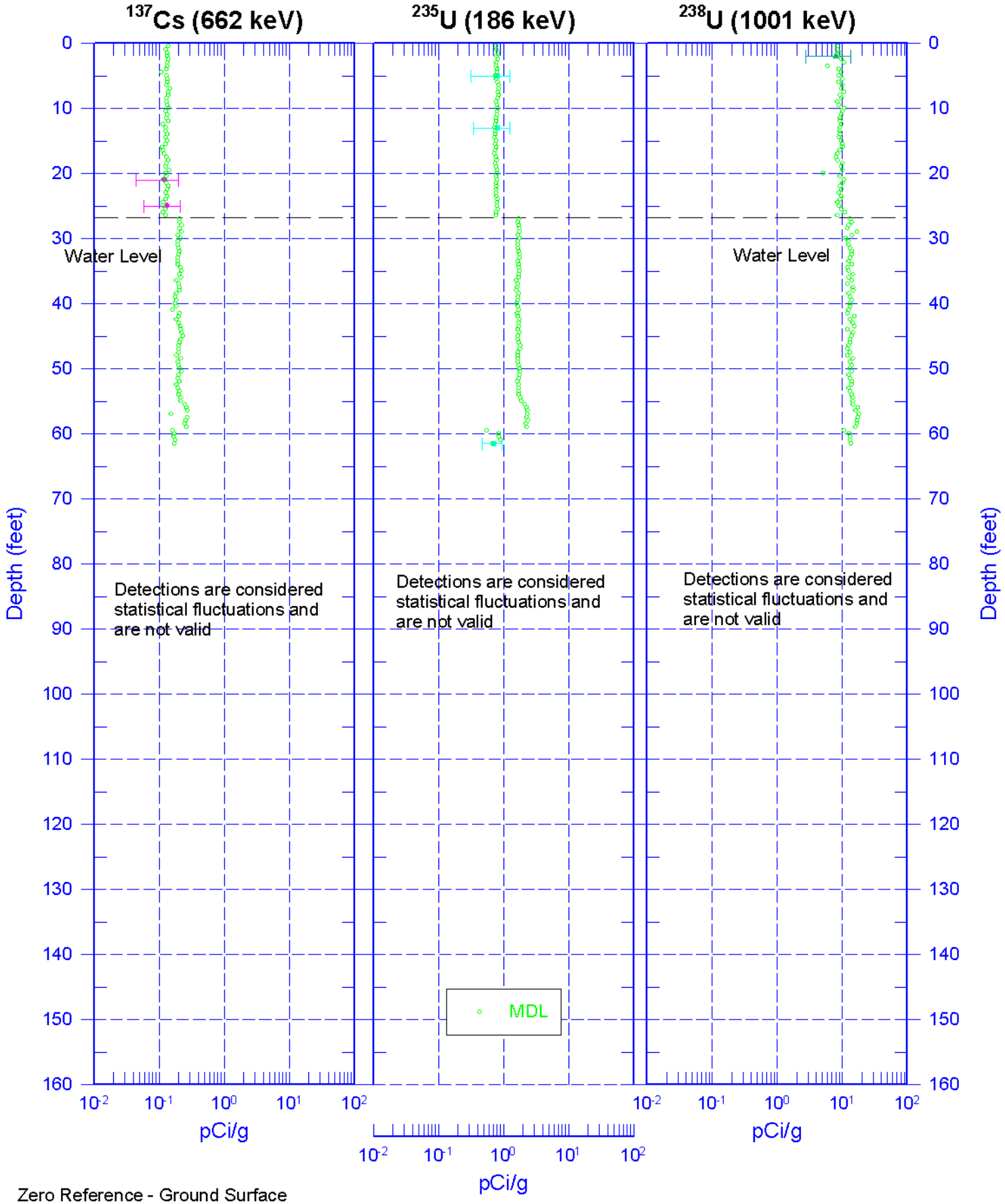
399-2-15 (C6192)
Manmade Radionuclides



Zero Reference - Ground Surface

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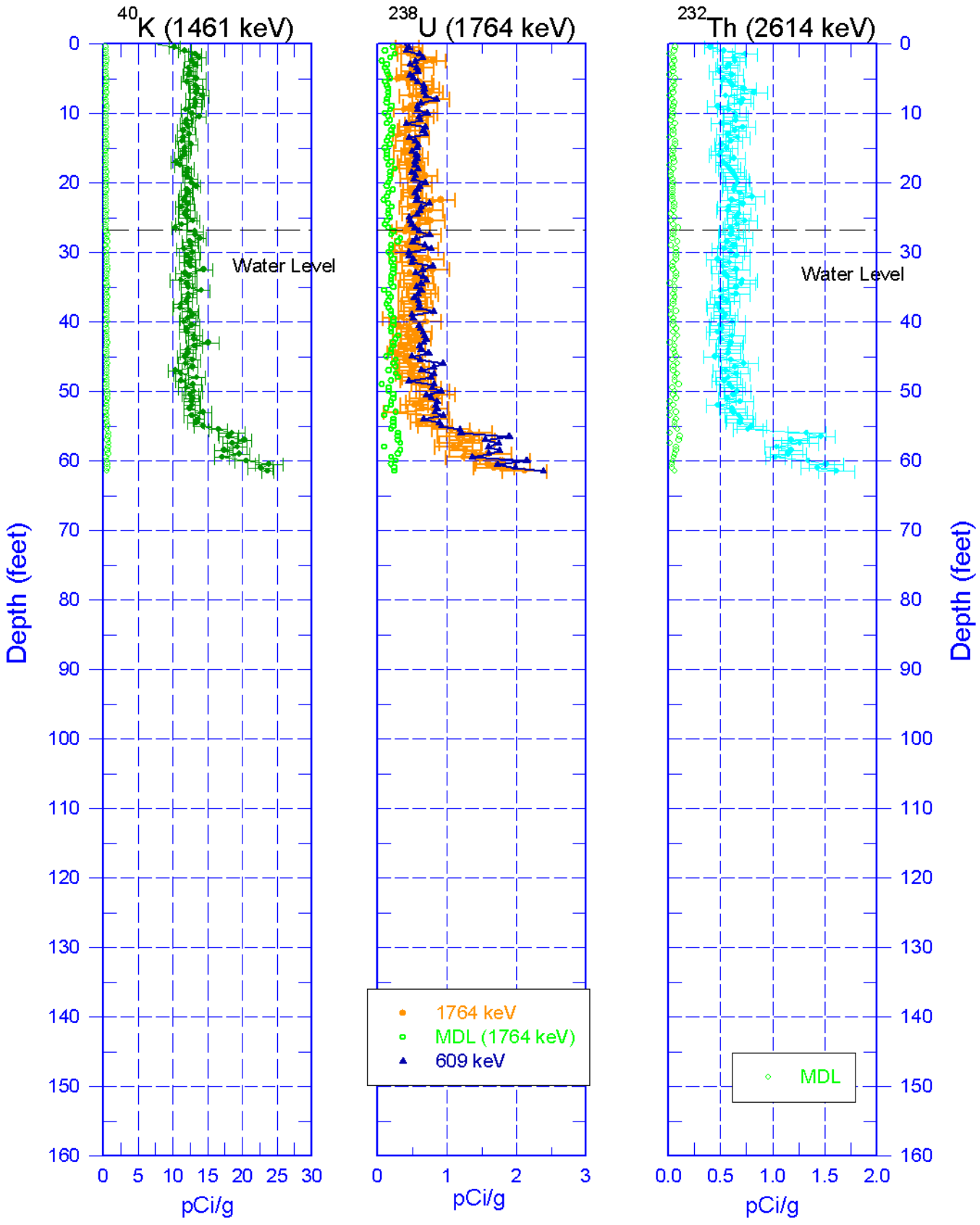
399-2-15 (C6192)
Natural Gamma Logs



Zero Reference - Ground Surface

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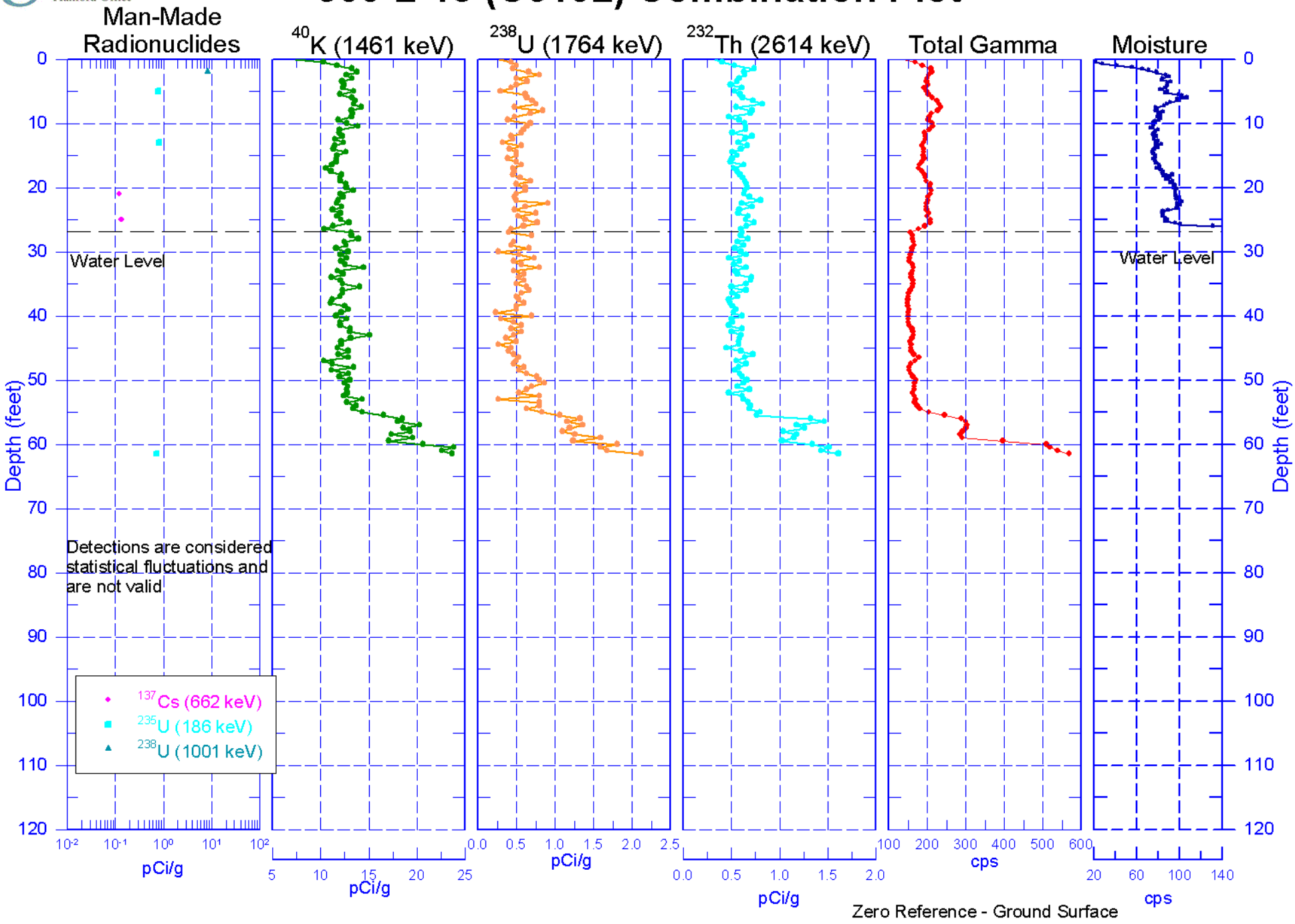
399-2-15 (C6192) Combination Plot



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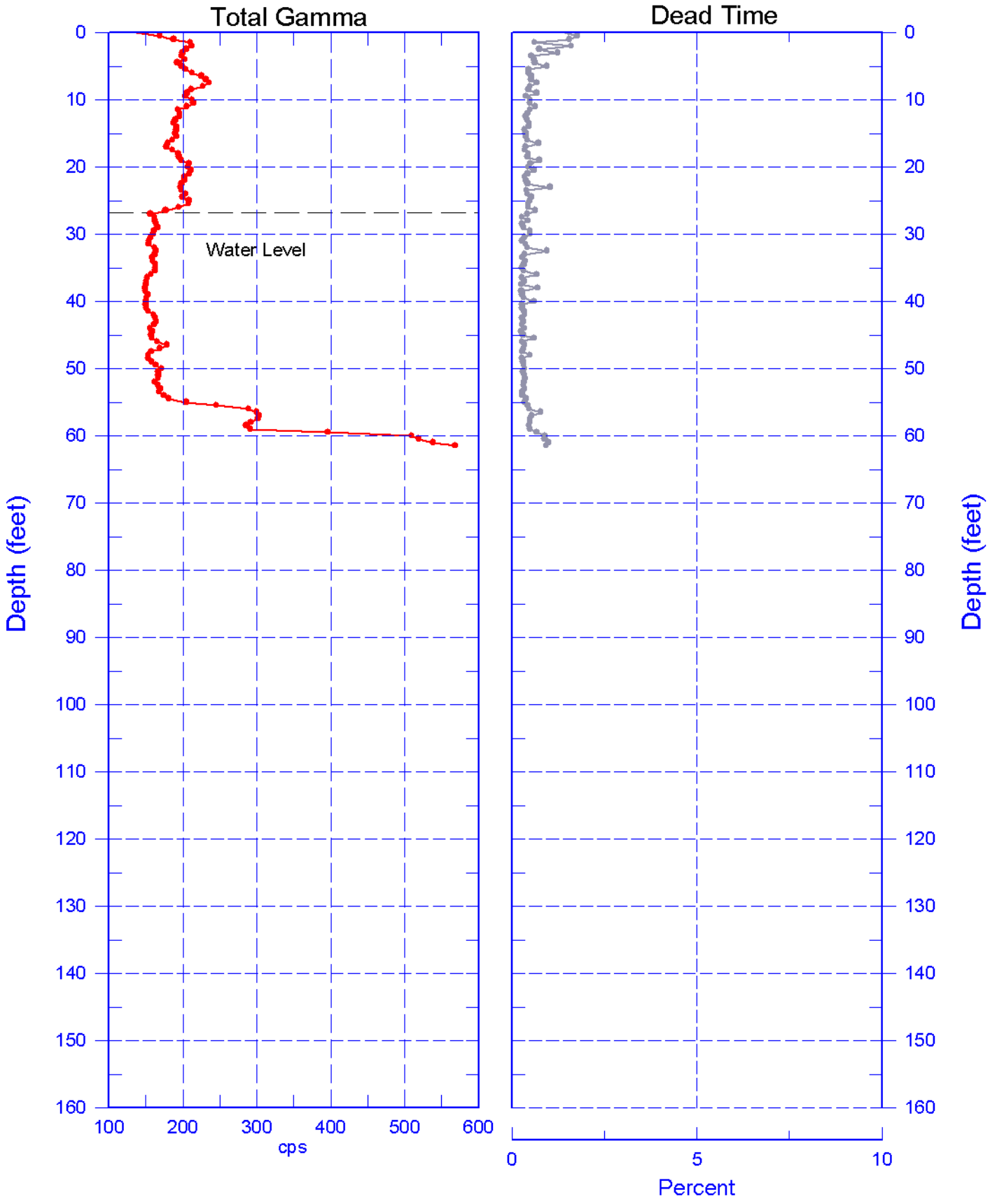
399-2-15 (C6192)
Total Gamma & Dead Time



Reference - Ground Surface

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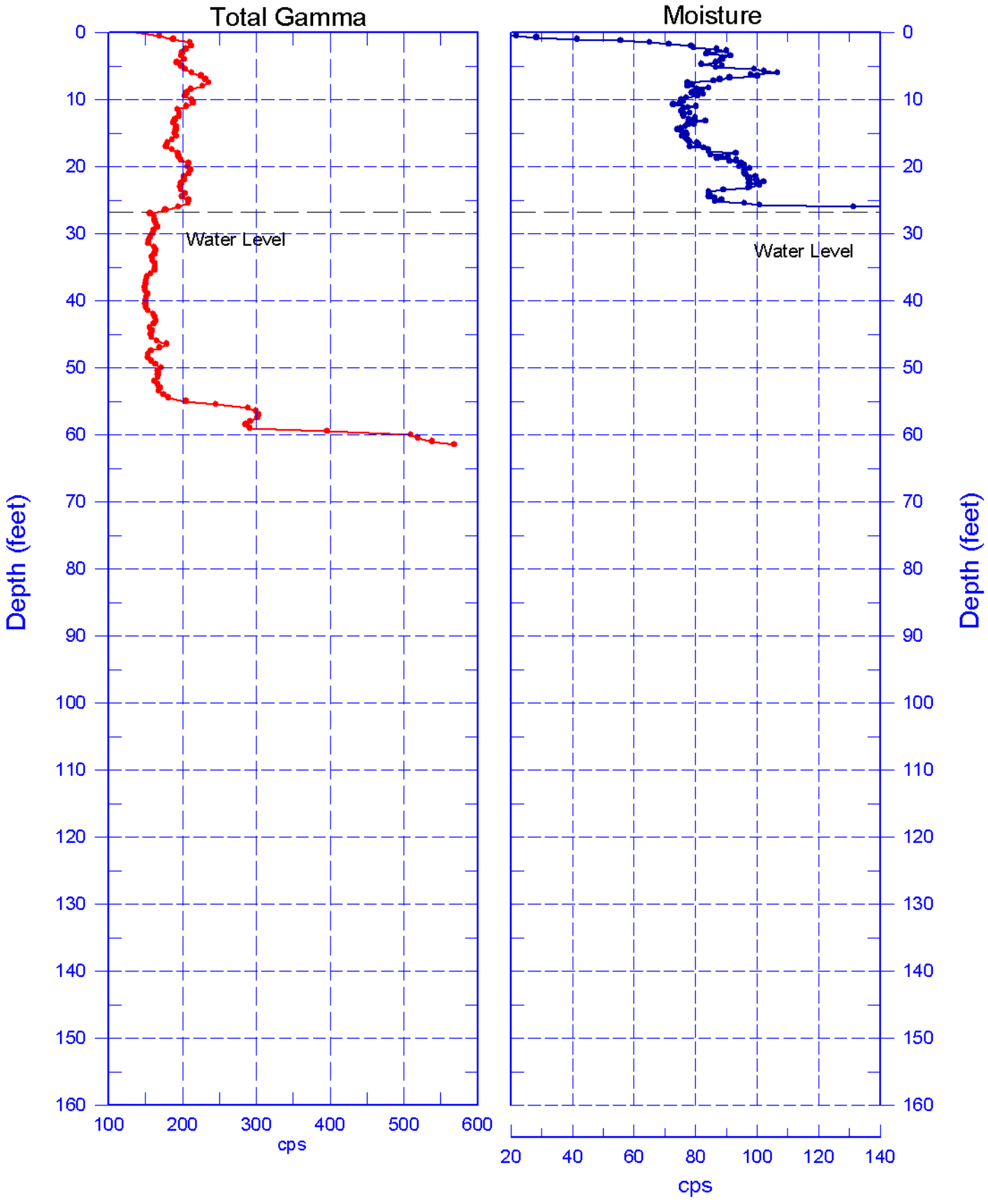
399-2-15 (C6192)
Total Gamma & Moisture



Reference - Ground Surface

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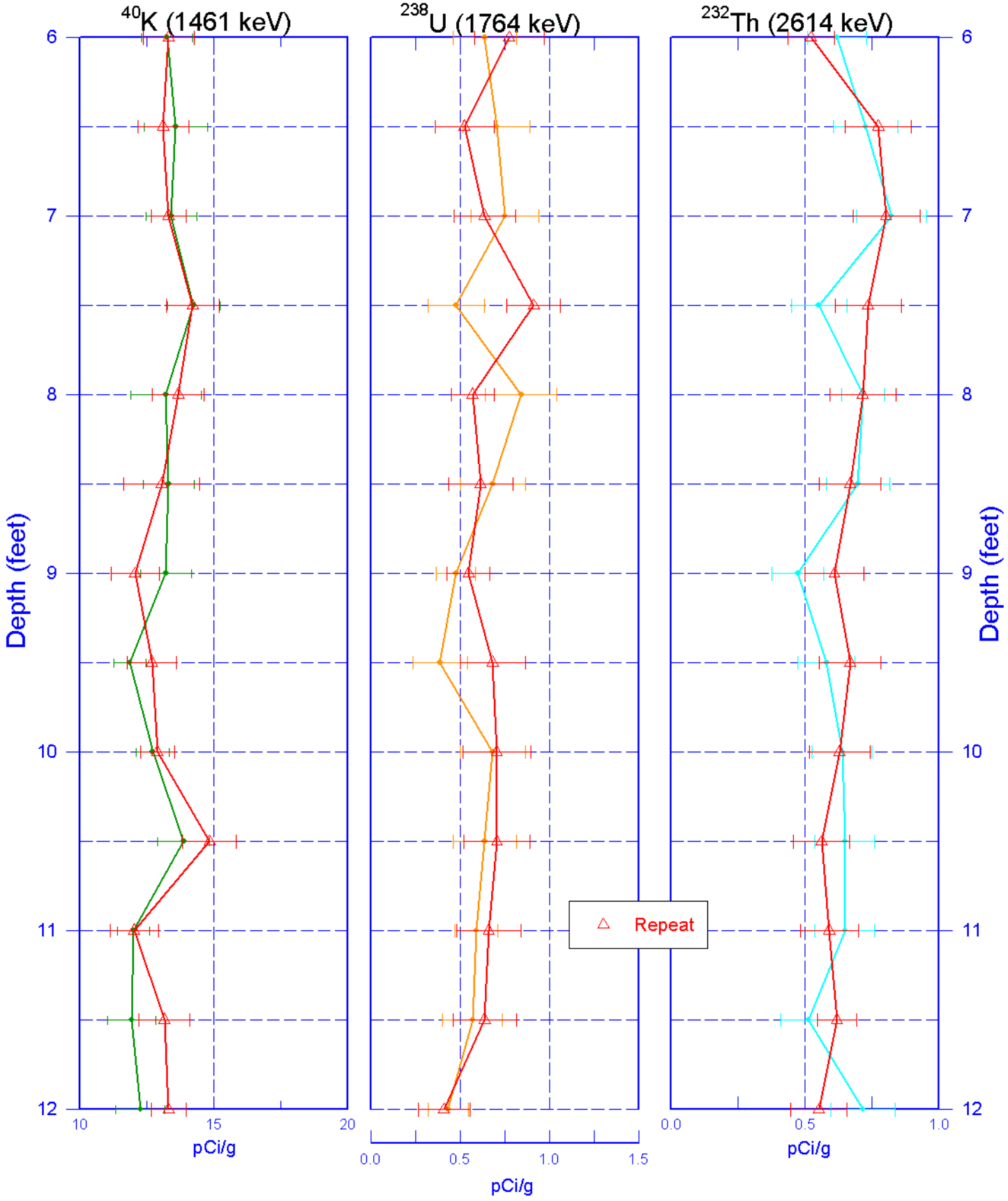
399-2-15 (C6192)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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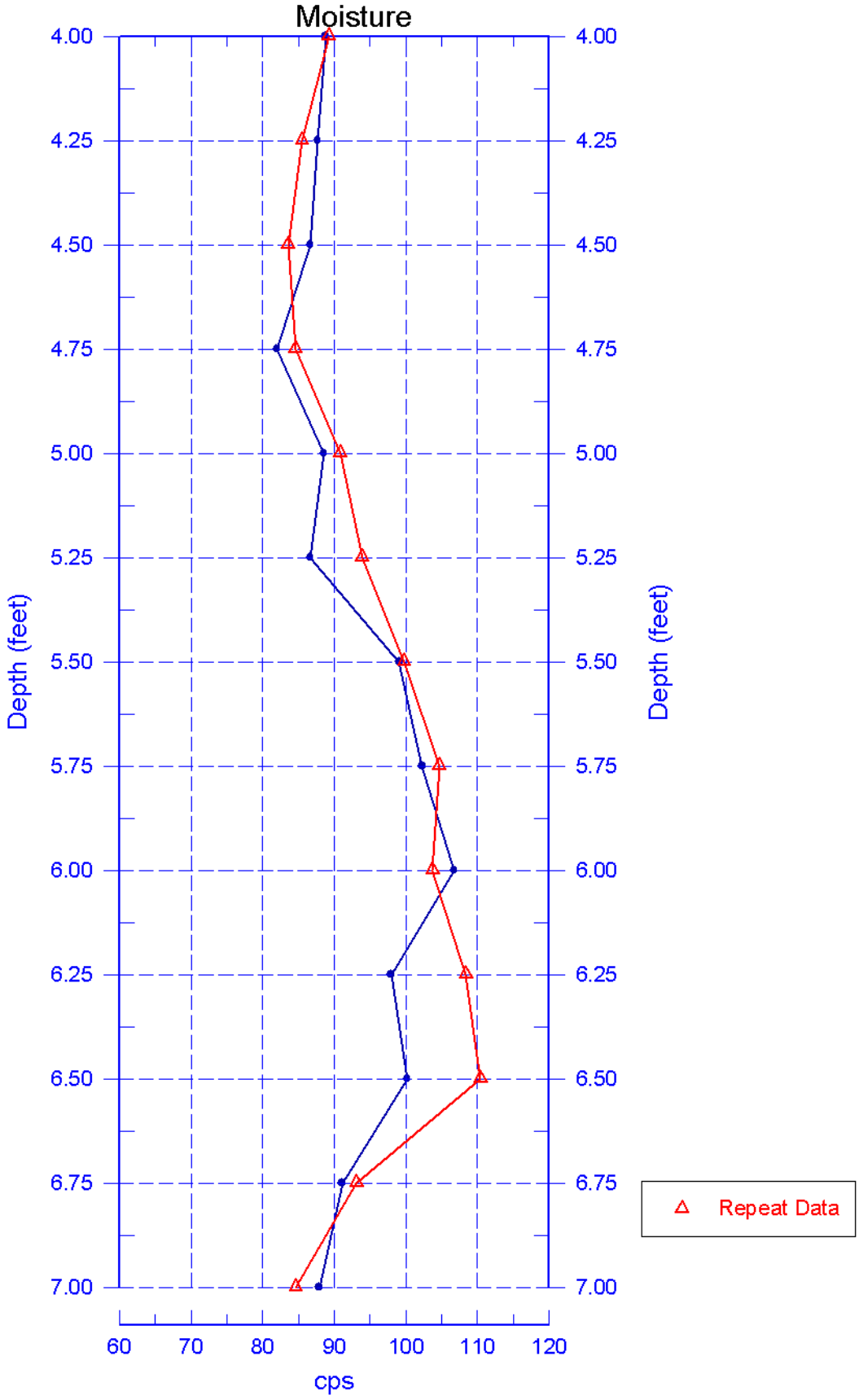
399-2-15 (C6192)
Moisture Repeat Section



Reference - Ground Surface

399-2-16(C6193)
Log Data Report

Borehole Information:

Borehole:	399-2-16 (C6193)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	26.1	GWL Date:	06/27/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116081.8	594261.6	06/26/08	Unknown	62	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	1.7	7 5/8	6 7/8	3/8	-1.7	58.7

Borehole Notes:

Casing data and total depth were reported by the site geologist. The logging engineer measured the depth to water with an e-tape. Casing diameters were measured using a steel tape and rounded to the nearest 1/16 inch. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type:	60% HPGe SGLS
			Serial No.:	47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type:	NMLS
			Serial No.:	H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	06/27/08	06/27/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	61.0	6.0			
Finish Depth (ft)	0.0	12.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DL531CAB	DL531CAB			
Start File	DL531000	DL531123			
Finish File	DL531122	DL531135			
Post-Verification	DL531CAA	DL531CAA			

Log Run	1	2 Repeat			
Depth Return Error (in.)	NA	1.25 High			
Comments	Fine gain adjustment made at –087 and –120	Repeat Section.			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat			
Date	06/27/08	06/27/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	0.0	4.0			
Finish Depth (ft)	26.25	7.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DHG02CAB	DHG02CAB			
Start File	DHG02000	DHG02106			
Finish File	DHG02105	DHG02118			
Post-Verification	DHG02CAA	DHG02CAA			
Depth Return Error (in.)	NA	½ high			
Comments	None	Repeat Section			

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum logging depth for the SGLS was 61.21 ft before the sonde un-weighted. A centralizer was installed on the sonde.

Analysis Notes:

Analyst:	LEGLER	Date:	09/26/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre- and post-survey verification spectra met the acceptance criteria for the established system. NMLS pre- and post-survey verification spectra met the acceptance criteria for the established system, but the verification file DHG02CAA had measurements above the upper control limit for counts per second (cps).

A casing correction for a 3/8-in thick casing was applied to spectral data during analysis for depths up 58.7 ft, where casing ends, leaving 2.3 ft of open borehole uncorrected. A water correction was also applied from 26.1 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in. inner diameter borehole casing.

Results and Interpretations:

Cs-137 was detected at 6, and 49.5 ft, but inspection of the individual spectra indicates that these detections are statistical fluctuations associated with the processing software.

U-235 was detected at 15 and 48 ft, but inspection of the individual spectra indicates that these detections are statistical fluctuations associated with the processing software.

U-238 (Pa-234m) was detected at 61 ft, but inspection of the spectra indicates that this detection is a statistical fluctuation associated with the processing software.

Co-60 was detected at 6 ft, and 10 – 11.4 ft, with a maximum concentration of 0.07 pCi/g at 10 feet.

The KUT, moisture and manmade repeat plots show good repeatability.

List of Log Plots:

Depth Reference is top of casing

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Manmade Repeat Section
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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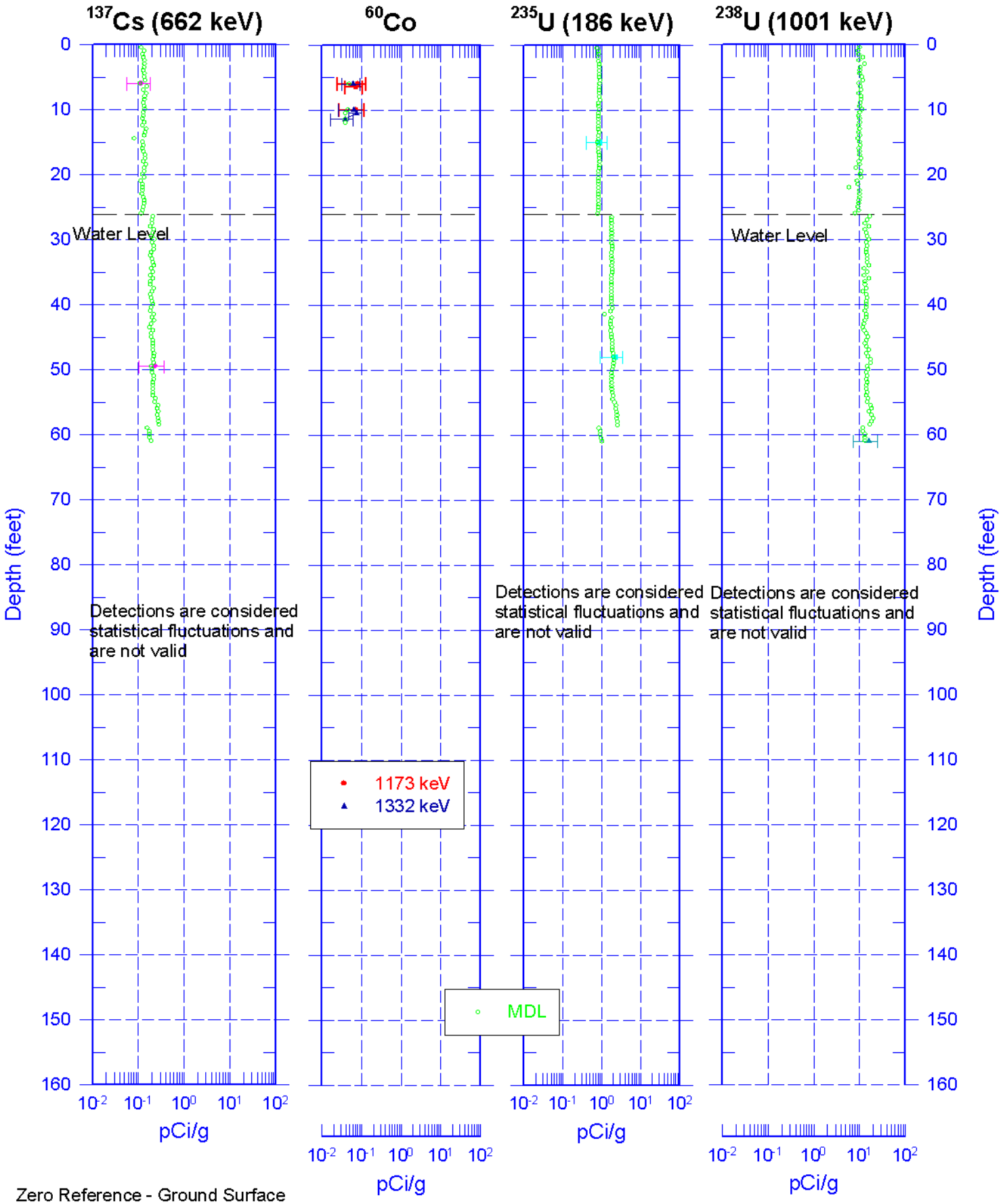
399-2-16 (C6193)
Manmade Radionuclides



Zero Reference - Ground Surface

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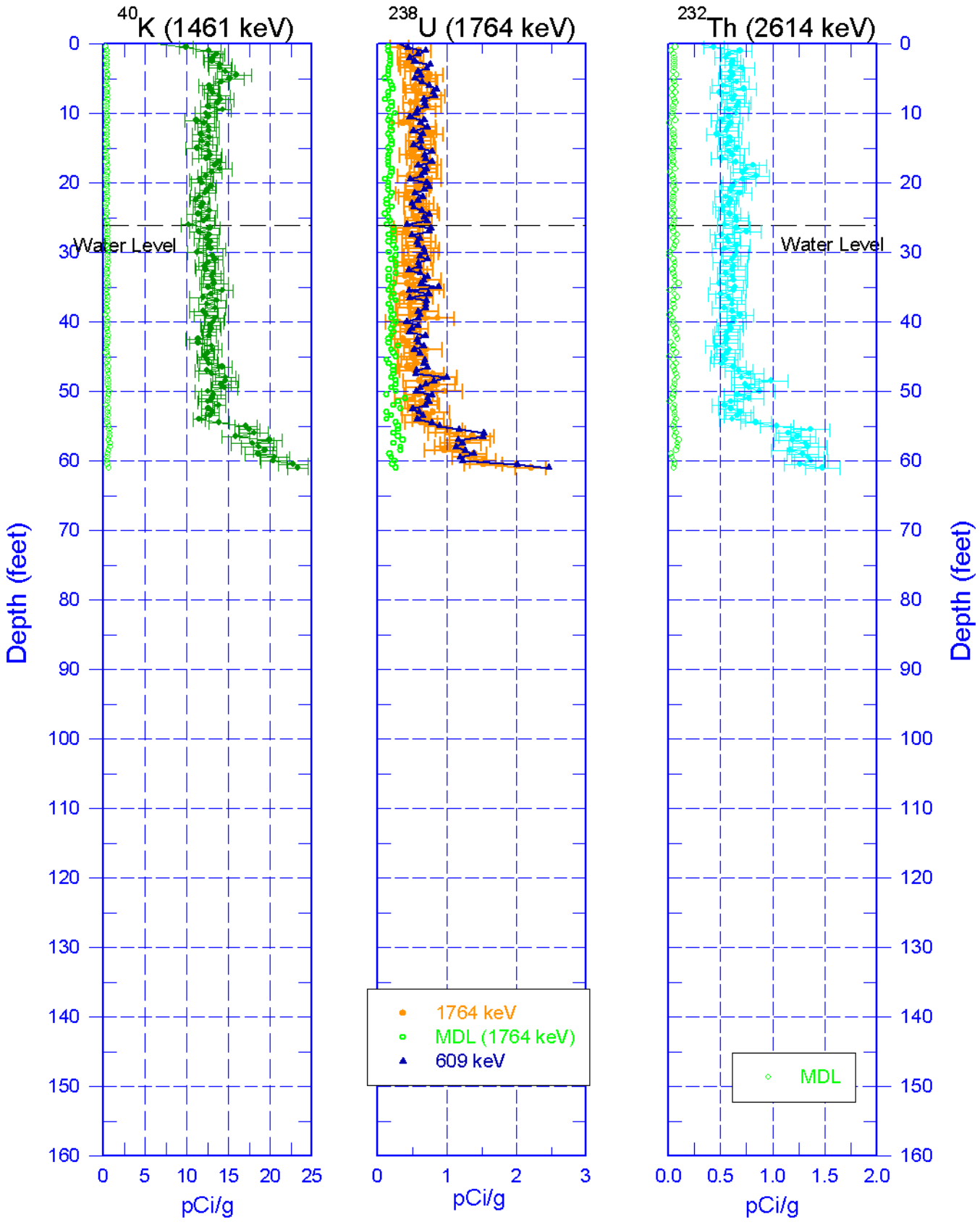
399-2-16 (C6193)
Natural Gamma Logs



Zero Reference - Ground Surface

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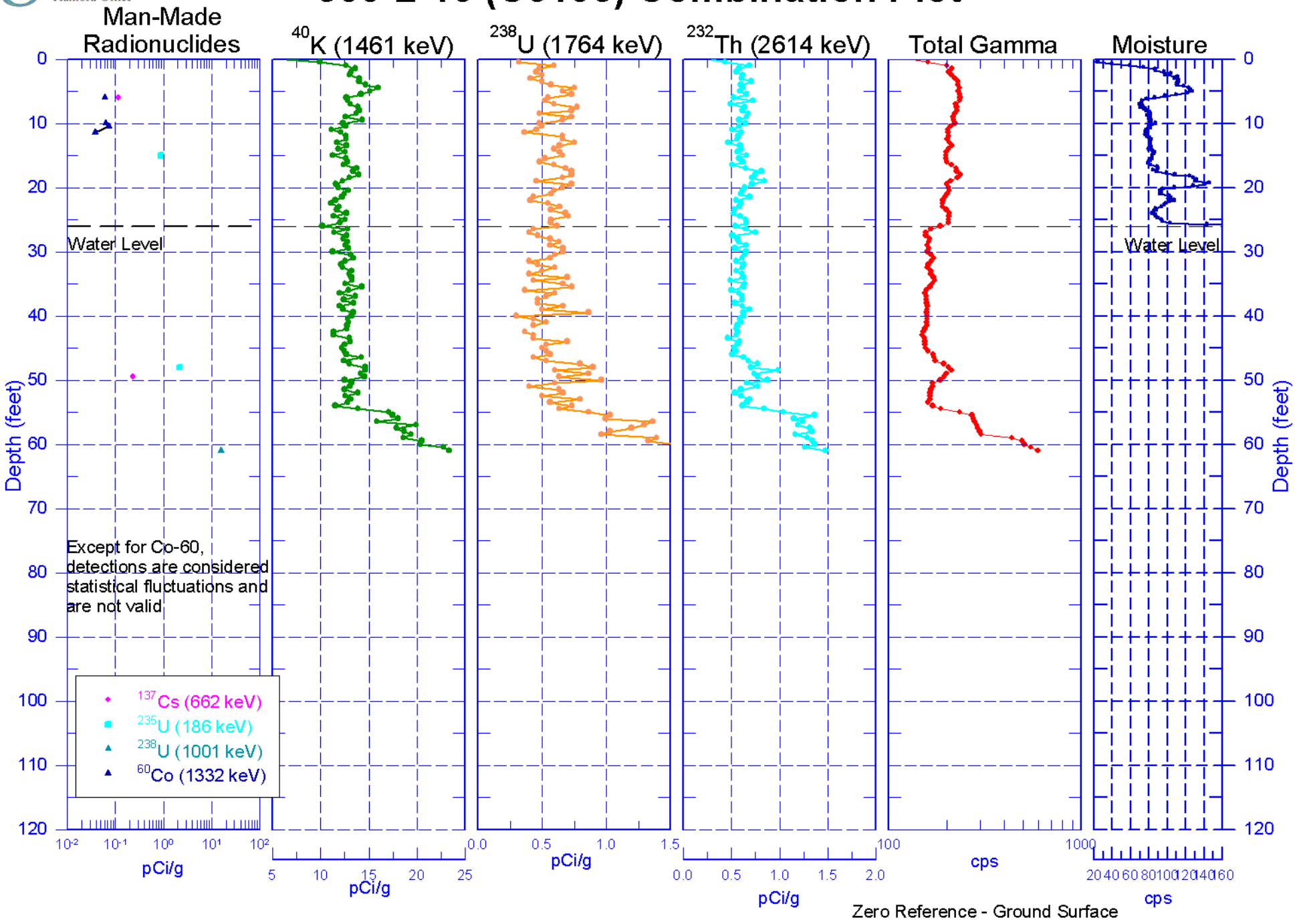
399-2-16 (C6193) Combination Plot



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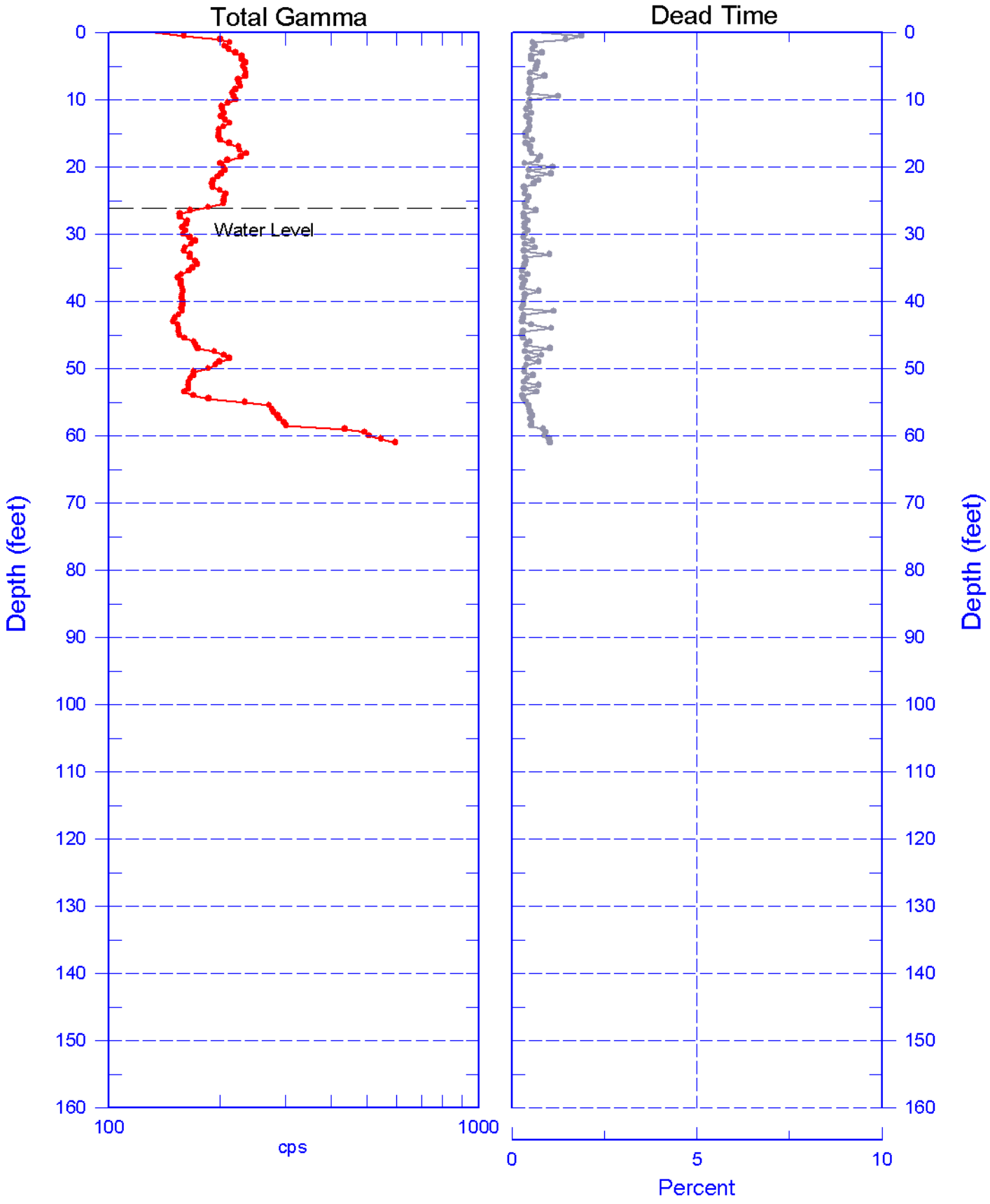
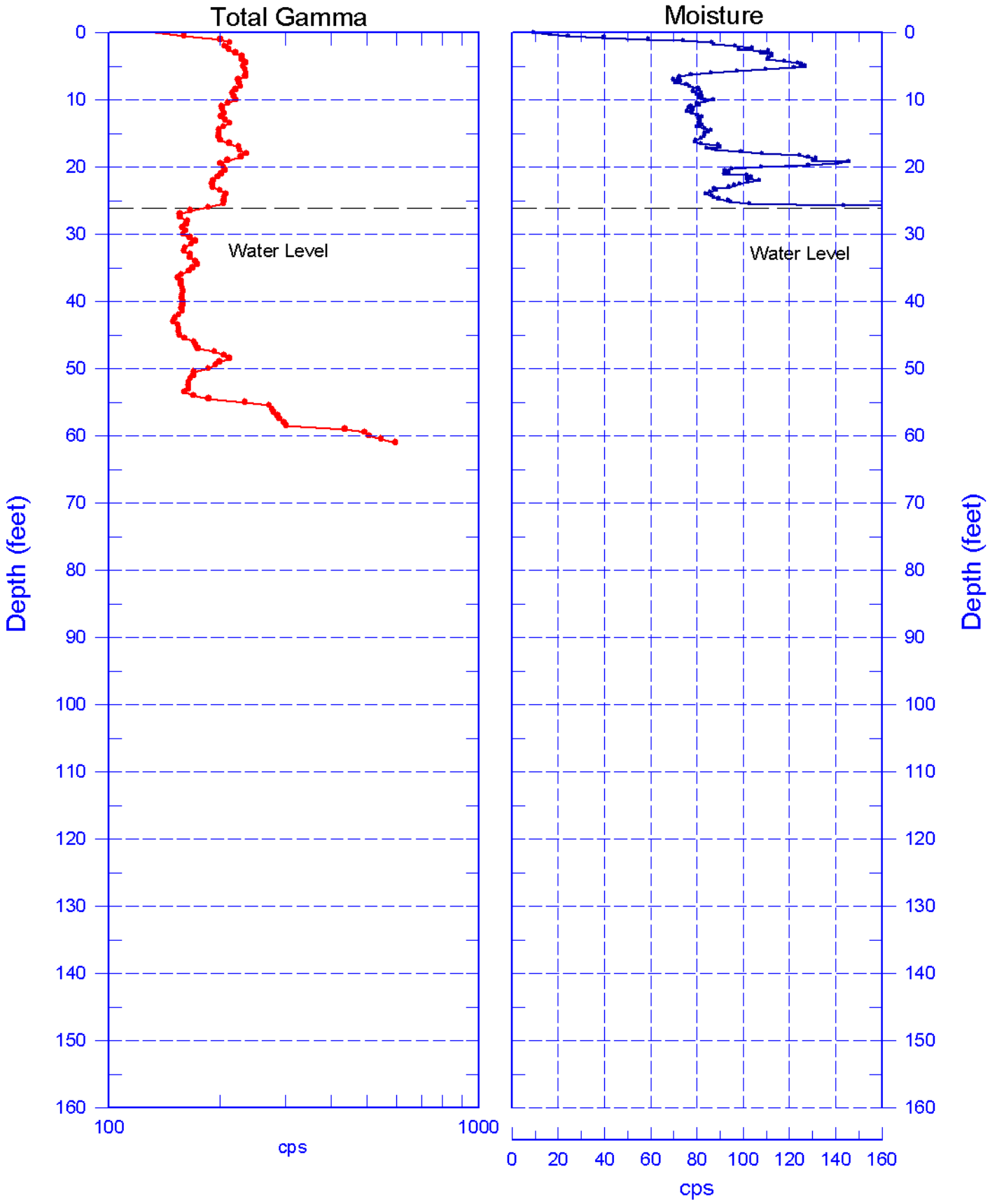
399-2-16 (C6193)
Total Gamma & Dead Time



Reference - Ground Surface

Stoller
Hanford Office

399-2-16 (C6193)
Total Gamma & Moisture



Reference - Ground Surface

Stoller
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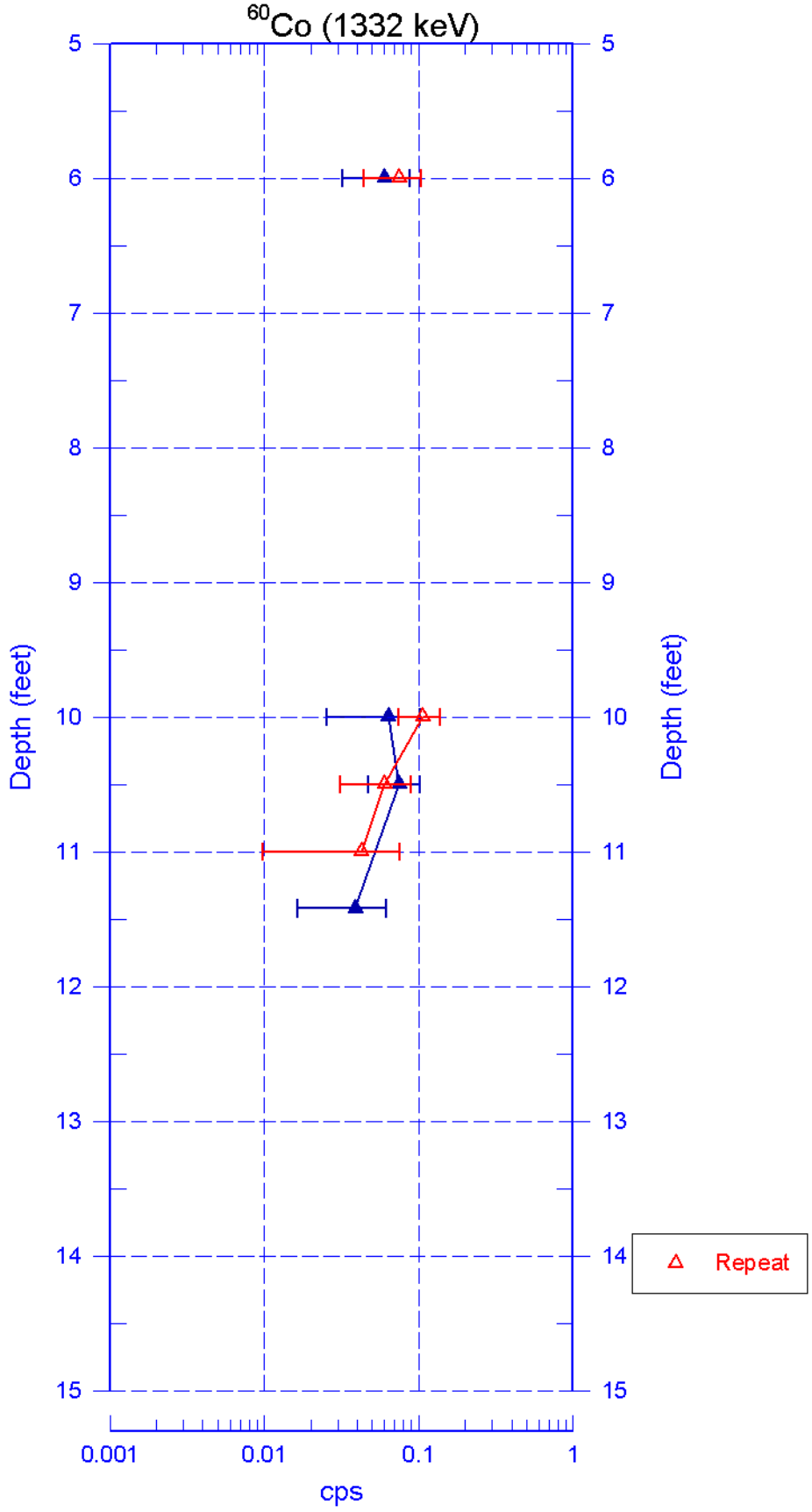
399-2-16 (C6193)
Manmade Repeat Section

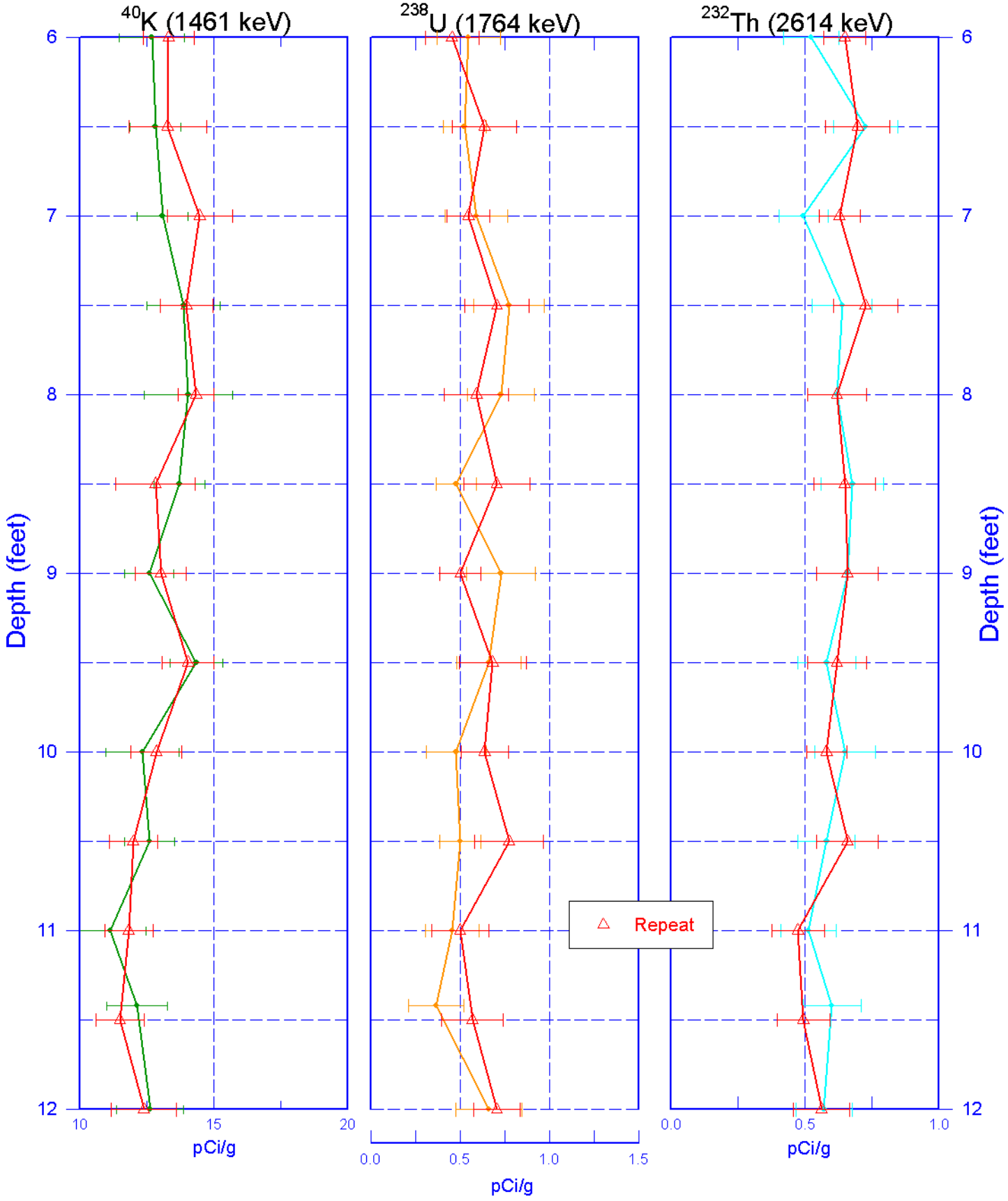


Reference - Ground Surface

Stoller
Hanford Office

399-2-16 (C6193)

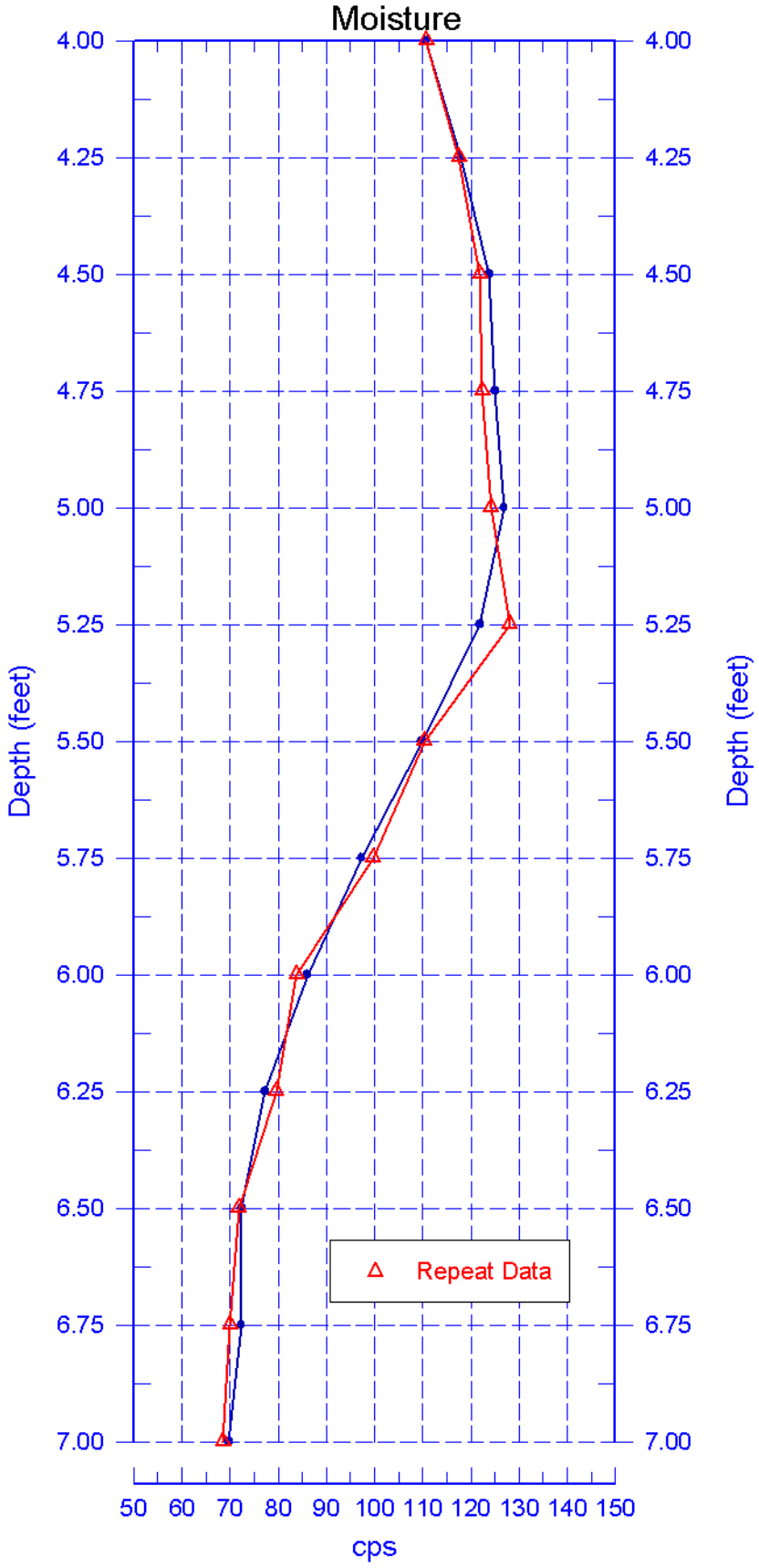
Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

Stoller
Hanford Office

399-2-16 (C6193)
Moisture Repeat Section



Reference - Ground Surface

399-2-17 (C6195)
Log Data Report

Borehole Information:

Borehole:	399-2-17 (C6195)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	27.6	GWL Date:	06/16/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116060.3	594246.1	06/12/08	Unknown	63	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	0.7	7 5/8	6 7/8	3/8	-0.7	59.5

Borehole Notes:

Casing data and total depth were reported by site geologist. Logging engineer measured depth to water with an e-tape. Casing diameters were measured using a steel tape and rounded to the nearest 1/16". The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type: / Serial No.:	60% HPGe SGLS / 47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type: / Serial No.:	NMLS / H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat
Date	06/19/08	06/19/08
Logging Engineer	Pearson	Pearson
Start Depth (ft)	62.0	28.0
Finish Depth (ft)	0.0	22.0
Count Time (sec)	200	200
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.5	0.5
Log Speed (ft/min)	N/A	N/A
Pre-Verification	DL471CAB	DL471CAB
Start File	DL471000	DL471125
Finish File	DL471124	DL471137
Post-Verification	DL471CAA	DL471CAA

Log Run	1	2 Repeat
Depth Return Error (in.)	Low ¼	0
Comments	Fine gain adjustment made before -053	Repeat Section

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat
Date	06/18/08	06/18/08
Logging Engineer	McClellan	McClellan
Start Depth (ft)	0.0	26.75
Finish Depth (ft)	26.75	24.0
Count Time (sec)	15	15
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.25	0.25
Log Speed (ft/min)	N/A	N/A
Pre-Verification	DHF42CAB	DHF42CAB
Start File	DHF42000	DHF42108
Finish File	DHF42107	DHF42119
Post-Verification	DHF42CAA	DHF42CAA
Depth Return Error (in.)	N/A	0.5 high
Comments	None.	Repeat Section

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre- and post-survey verification measurements were acquired in the A mersham KUTh-115 field verifier. Maximum logging depth was 62.2 ft before the sonde un-weighted. A centralizer was installed on the sonde. Due to site-wide "Take Cover" drill, the log includes a 2.5 hour gap between –052 and –053.

NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum logging depth achieved was 26.75 ft, approximately at groundwater level.

Analysis Notes:

Analyst:	LEGLER	Date:	08/04/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre- and post-survey verification spectra met the acceptance criteria for the established system. NMLS pre- and post-survey verification spectra met the acceptance criteria for the established system, but the spectra files DHF42CAB and DHF42CAA had measurements above the upper control limits for counts per second (cps).

A casing correction for a 3/8-in. thick casing was applied from ground surface to 59.5 ft where casing ends, leaving 2.5 ft of open borehole uncorrected. A water correction was also applied during analysis from 27.6 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations. NMLS spectra were processed in batch mode using APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in. inner diameter borehole casing.

Results and Interpretations:

U-235 and U-238 (Pa-234m) were detected sporadically in this borehole. Inspection of the individual spectra at these depths indicates that these detections are statistical fluctuations associated with the processing software and are not considered valid.

The KUT plots indicate good repeatability. The repeat Moisture plot indicates good repeatability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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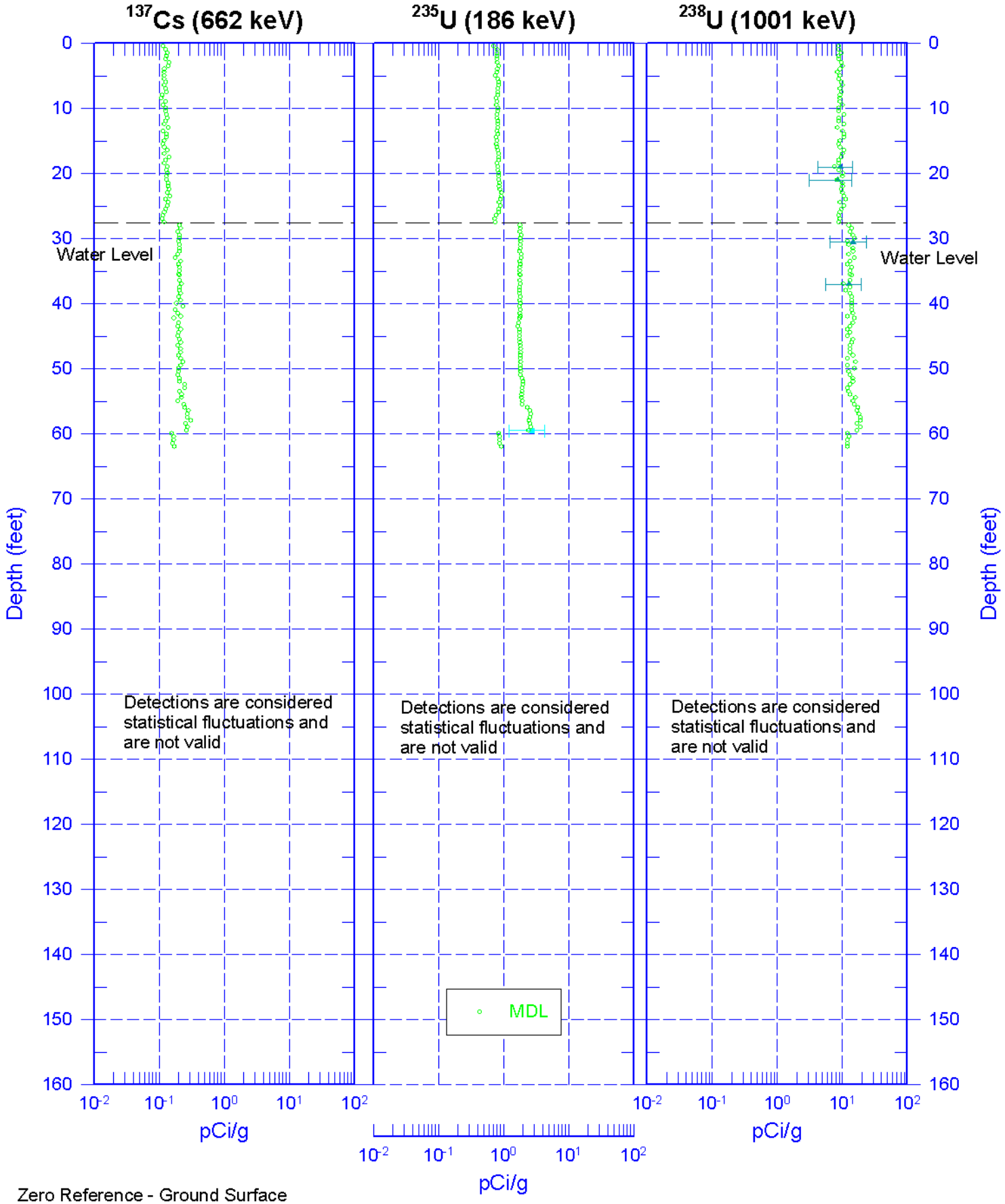
399-2-17 (C6195)
Manmade Radionuclides



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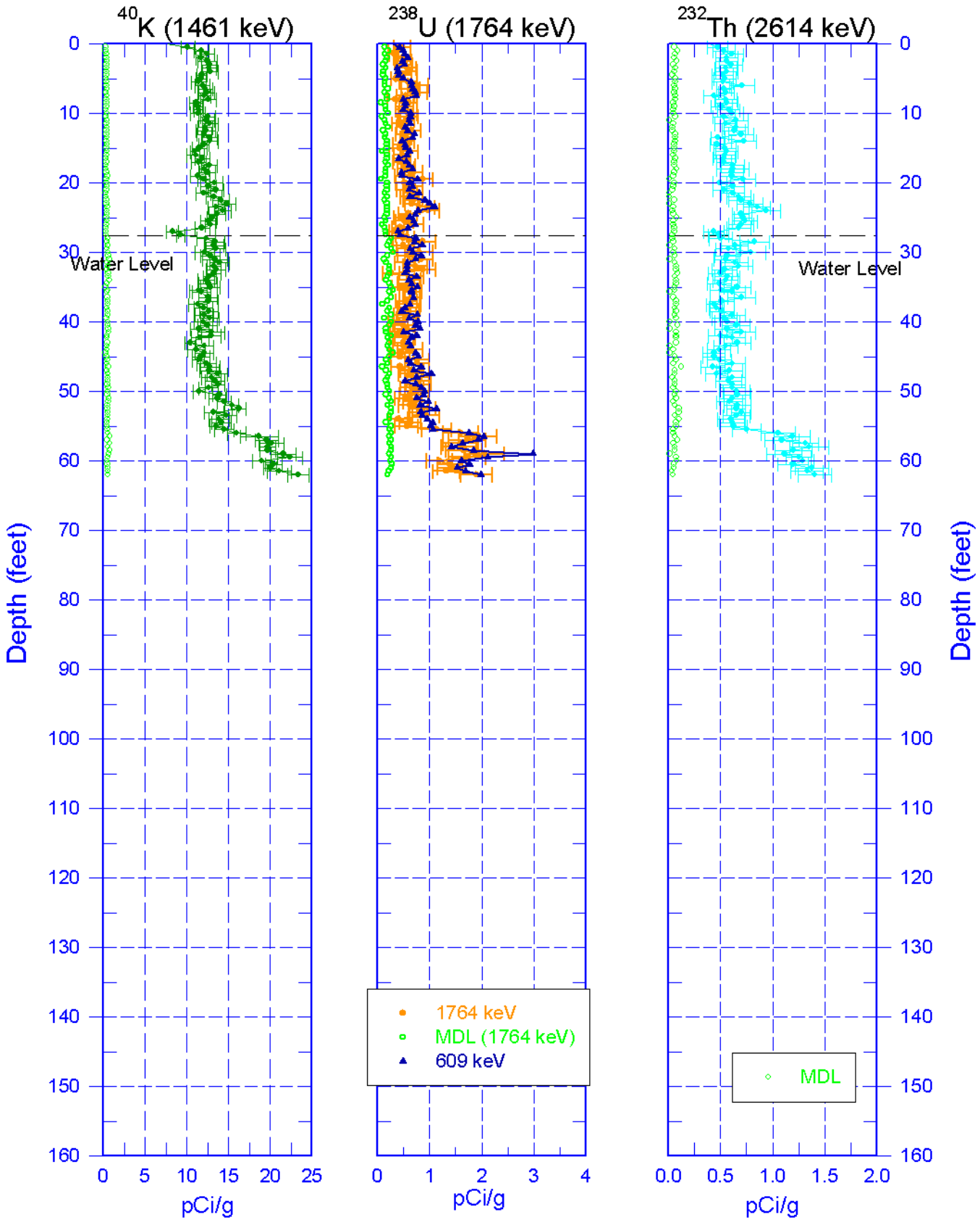
Hanford Office

399-2-17 (C6195)
Natural Gamma Logs



Zero Reference - Ground Surface

Stoller
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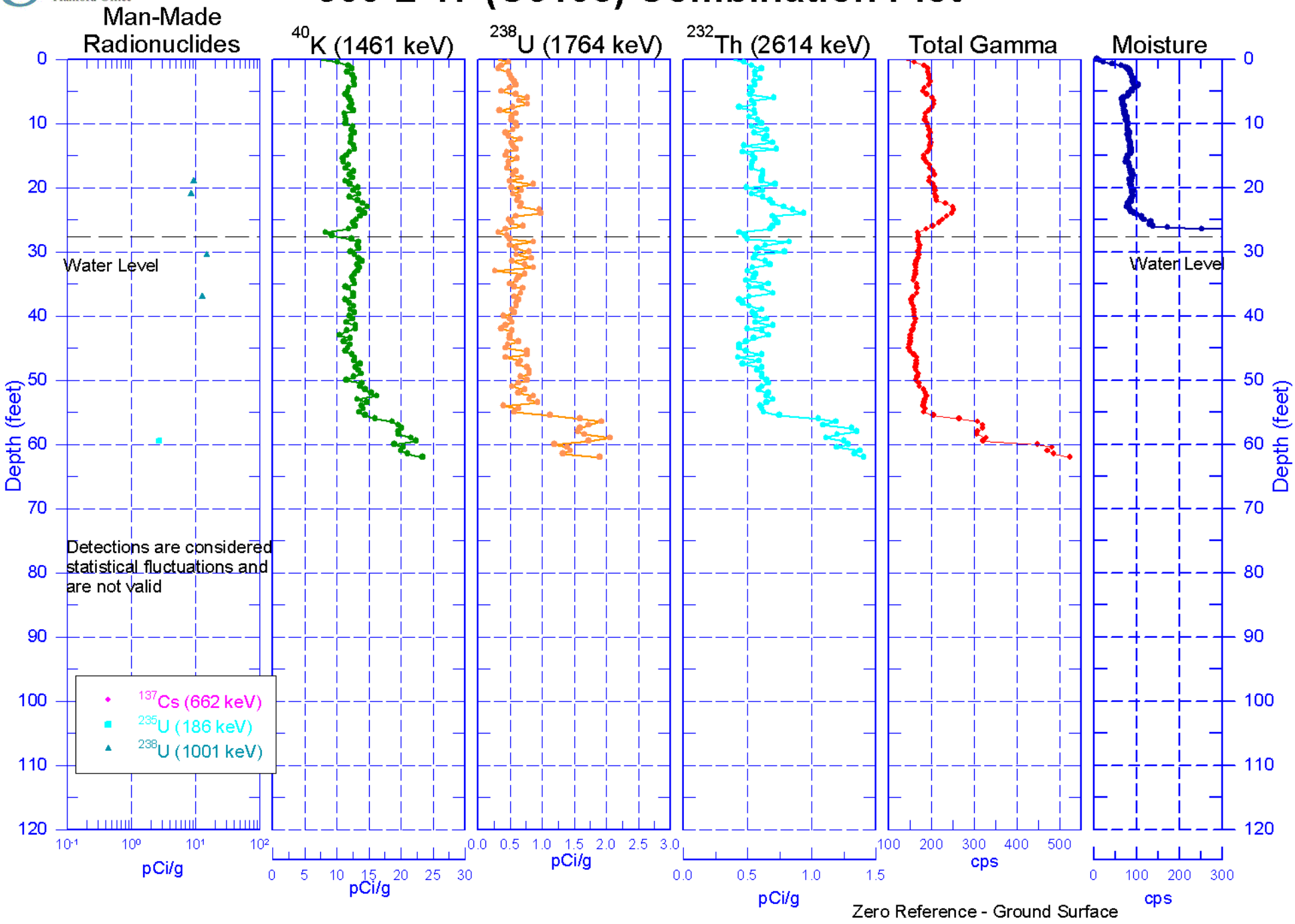
399-2-17 (C6195) Combination Plot



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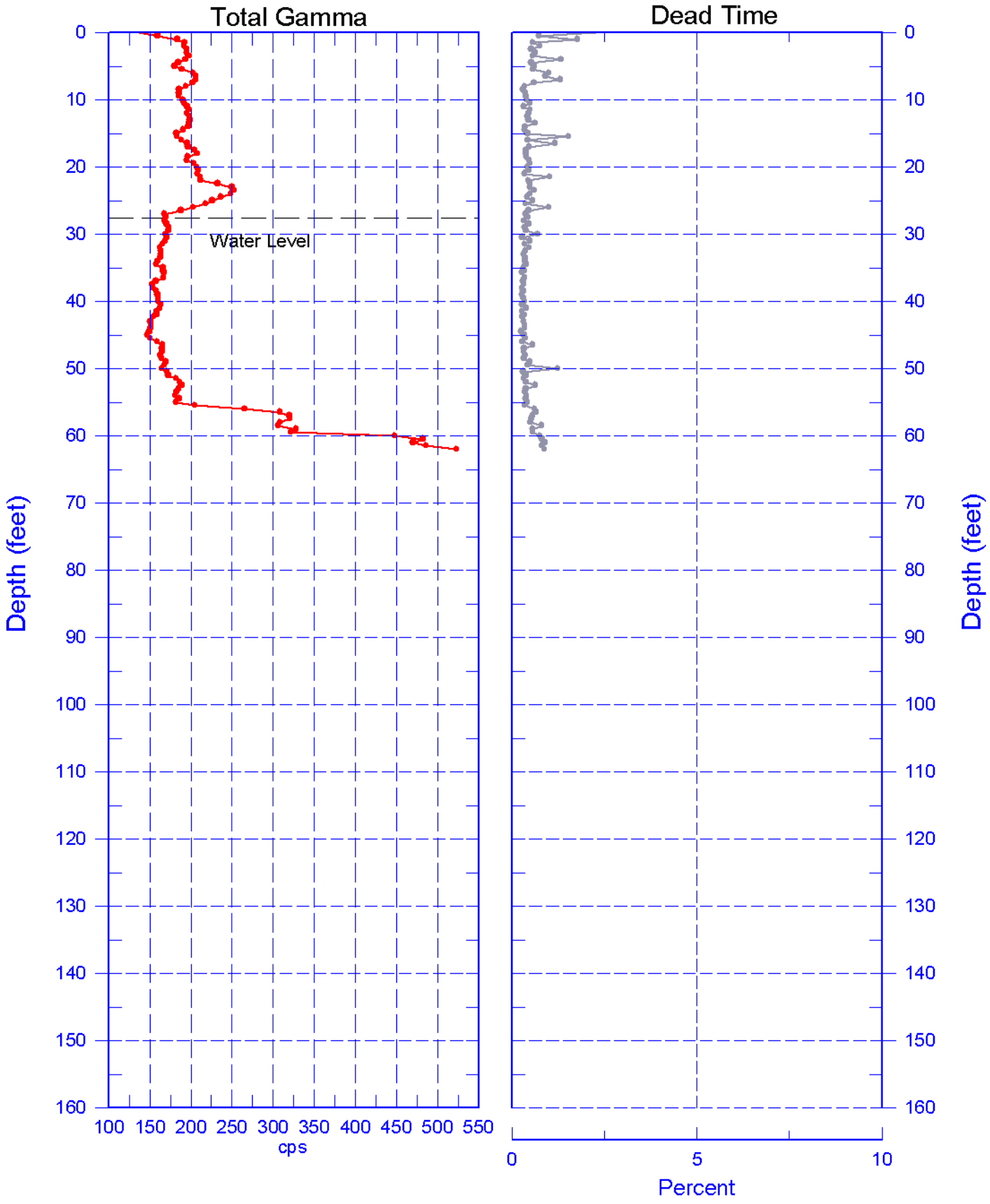
399-2-17 (C6195)
Total Gamma & Dead Time



Reference - Ground Surface

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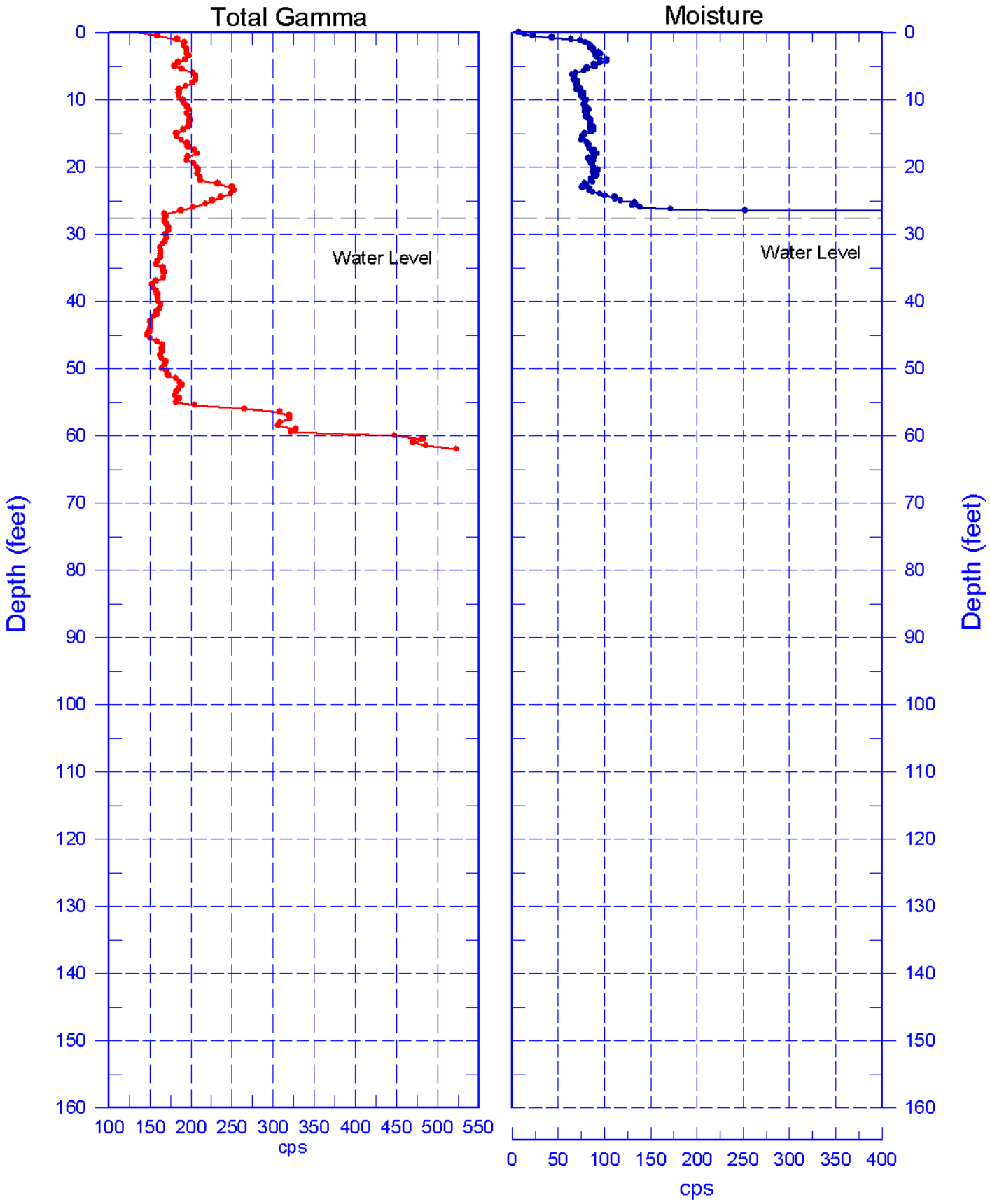
399-2-17 (C6195)
Total Gamma & Moisture



Reference - Ground Surface

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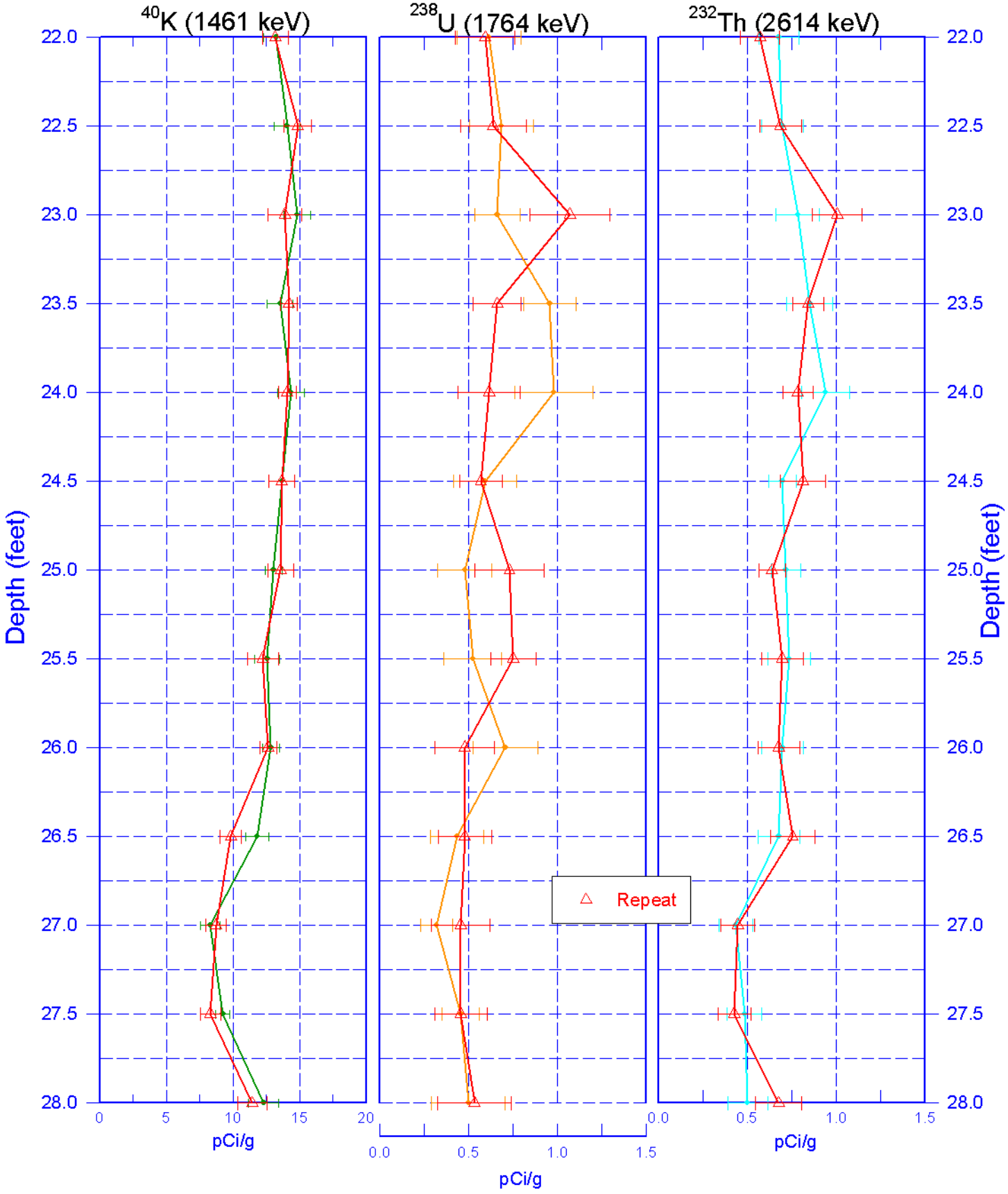
399-2-17 (C6195)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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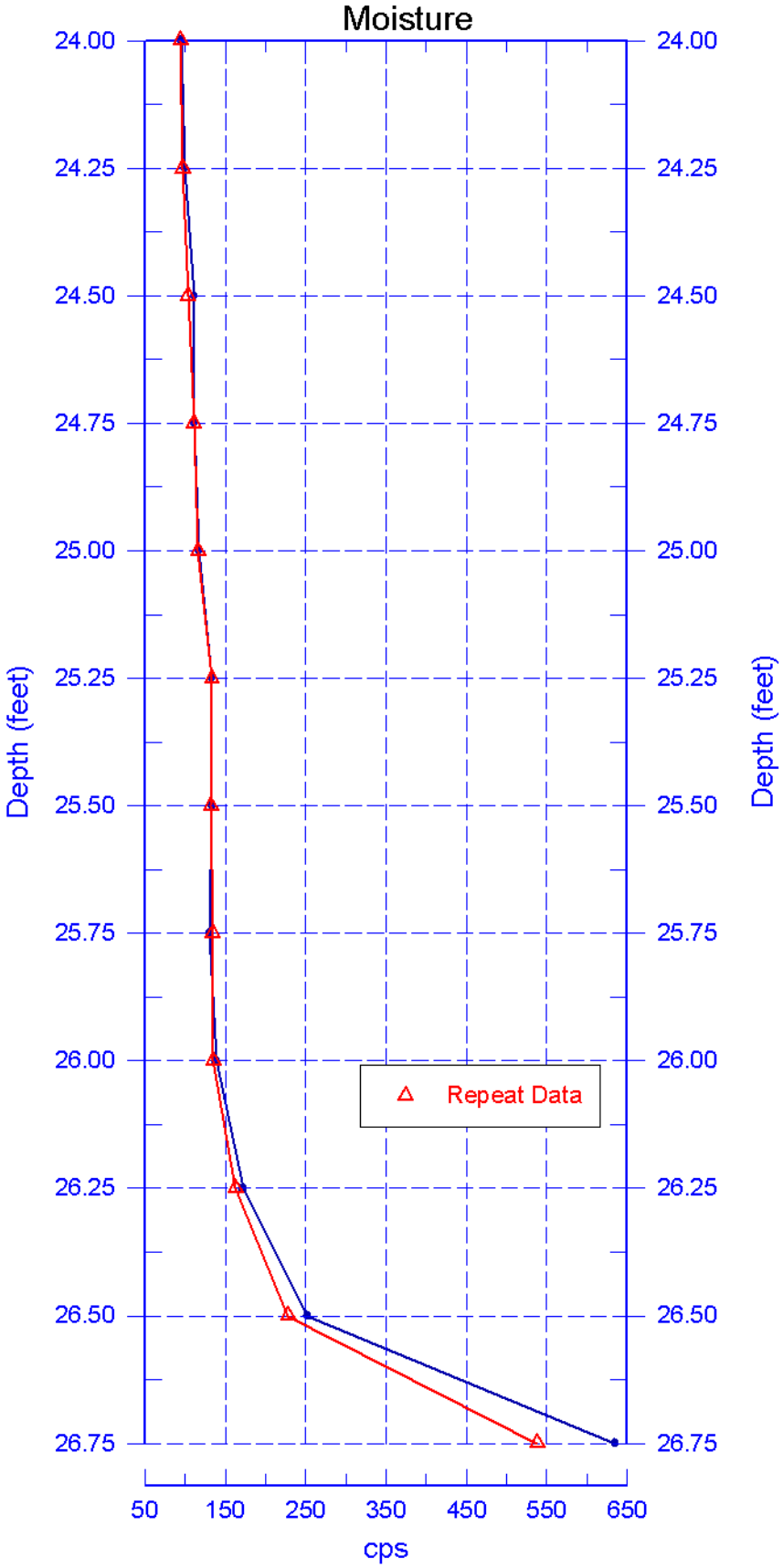
399-2-17 (C6195)
Moisture Repeat Section



Reference - Ground Surface

399-2-18 (C6196)
Log Data Report

Borehole Information:

Borehole:	399-2-18 (C6196)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	27.0	GWL Date:	06/15/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116066.0	594254.2	06/11/08	Unknown	65.0	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	0.5	7 5/8	6 7/8	3/8	-0.5	60

Borehole Notes:

Well site geologist reported casing data and total depth. Logging engineer measured depth to water with an e-tape, and casing diameters using a steel tape and rounding to the nearest 1/16-in.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type: / Serial No.:	60% HPGe SGLS / 47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type: / Serial No.:	NMLS / H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3 Repeat		
Date	06/12/08	06/15/08	06/15/08		
Logging Engineer	Pearson	Pearson	Pearson		
Start Depth (ft)	0.0	64.0	22.0		
Finish Depth (ft)	18.0	17.0	28.0		
Count Time (sec)	200	200	200		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	0.5	0.5	0.5		
Log Speed (ft/min)	N/A	N/A	N/A		
Pre-Verification	DL431CAB	DL441CAB	DL441CAB		
Start File	DL431000	DL441000	DL441095		
Finish File	DL431036	DL441094	DL441107		
Post-Verification	DL431CAA	DL441CAA	DL441CAA		
Depth Return Error (in.)	0	0	¼ low		
Comments	No fine gain adjustment made.	No fine gain adjustments made.	Repeat section.		

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	4	5 Repeat			
Date	06/15/08	6/15/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	0.0	23.0			
Finish Depth (ft)	27.0	26.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	N/A	N/A			
Pre-Verification	DHF12CAB	DHF12CAB			
Start File	DHF12000	DHF12109			
Finish File	DHF12108	DHF12121			
Post-Verification	DHF12CAA	DHF12CAA			
Depth Return Error (in.)	N/A	0			
Comments	None.	Repeat section.			

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. Maximum SGLS logging depth was 64.4 ft before the sonde un-weighted. A centralizer was installed on the sonde. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum NMLS logging depth achieved was 27.0 ft.

Analysis Notes:

Analyst:	LEGLER	Date:	6/25/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

The pre- and post-survey verification spectra met the acceptance criteria for the established systems, but verification files DHF12CAB and DHF12CAA had measurements above the upper control limit for counts per second. A correction for a 3/8-in. thick casing was applied to SGLS data from ground surface to 60 ft, leaving 4.4 ft of open borehole uncorrected. A water correction was also applied from 27 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL worksheet template identified as G4LDec07.xls using efficiency functions, and corrections for casing, dead time, and water as determined by annual calibrations.

Moisture data are presented in counts per second because no calibration data exists for a 6 7/8-in. inner diameter casing.

Results and Interpretations:

Cs-137, U-235, and U-238 (Pa-234m) were detected at several isolated depths throughout this borehole. Inspection of the individual spectra for these radionuclides at the various depths indicates these detections are statistical fluctuations associated with the processing software and are not considered valid.

The KUT plots indicate good repeatability. The moisture plot indicates some variability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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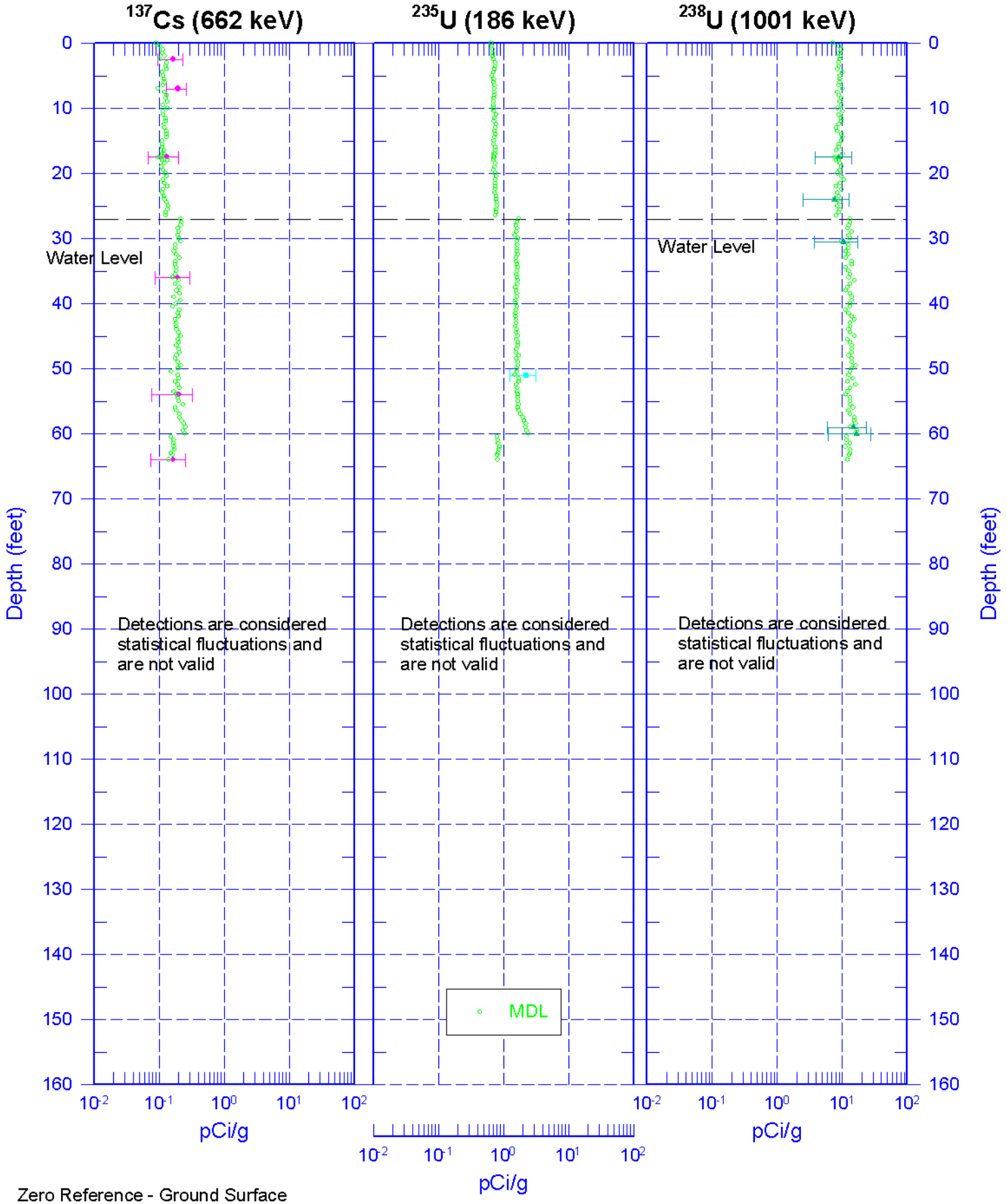
399-2-18 (C6196)
Manmade Radionuclides



Zero Reference - Ground Surface

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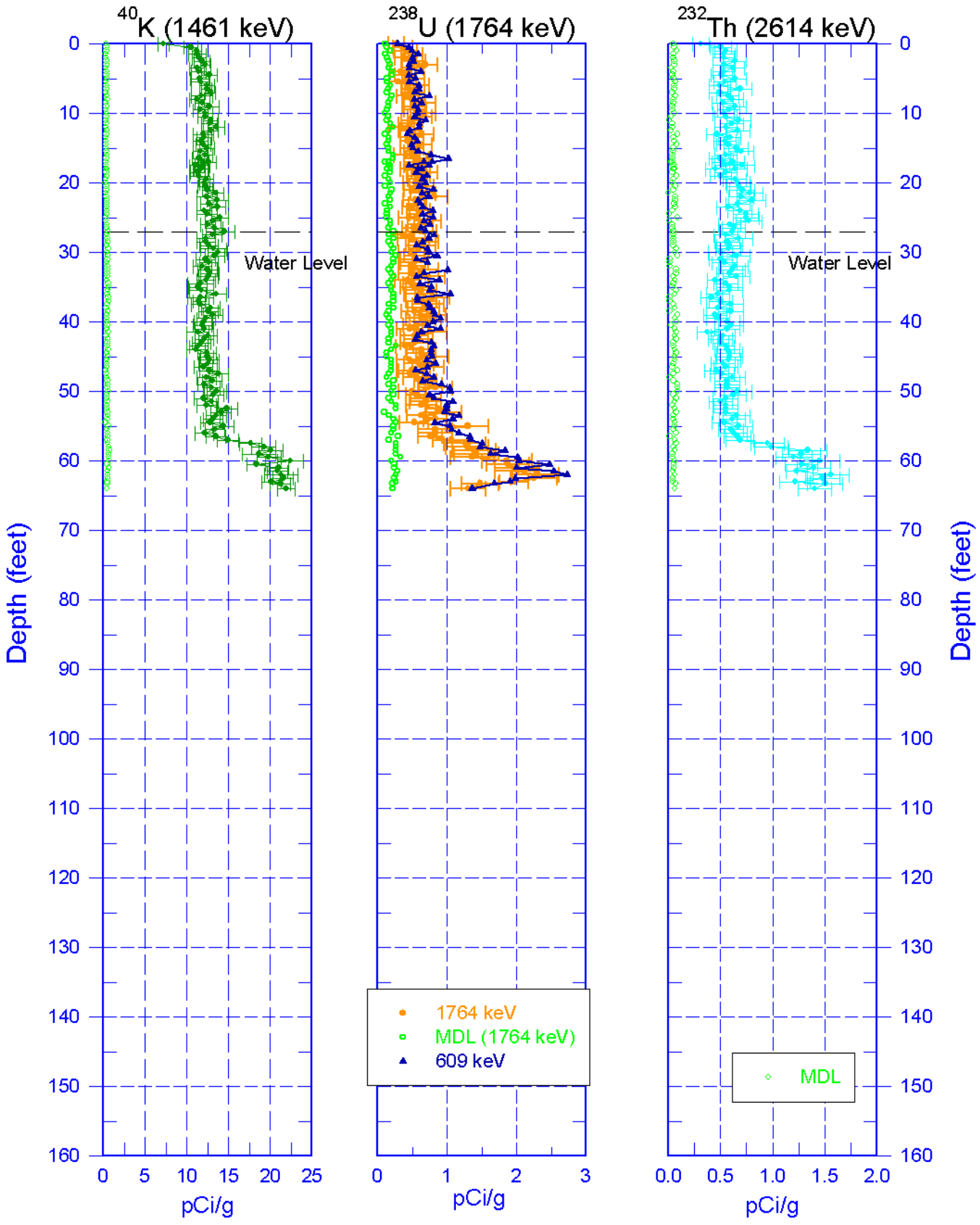
399-2-18 (C6196)
Natural Gamma Logs



Zero Reference - Ground Surface

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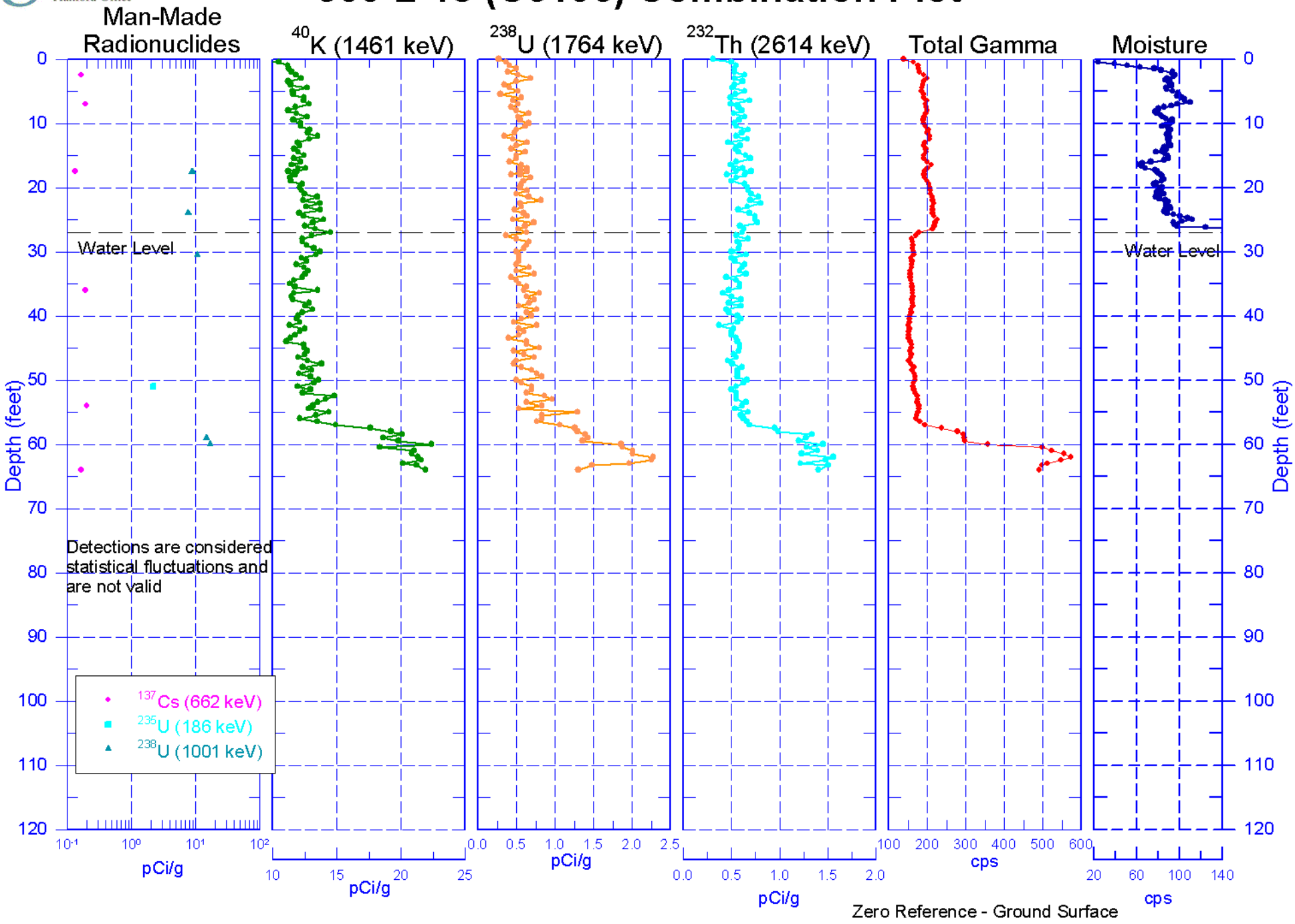
399-2-18 (C6196) Combination Plot



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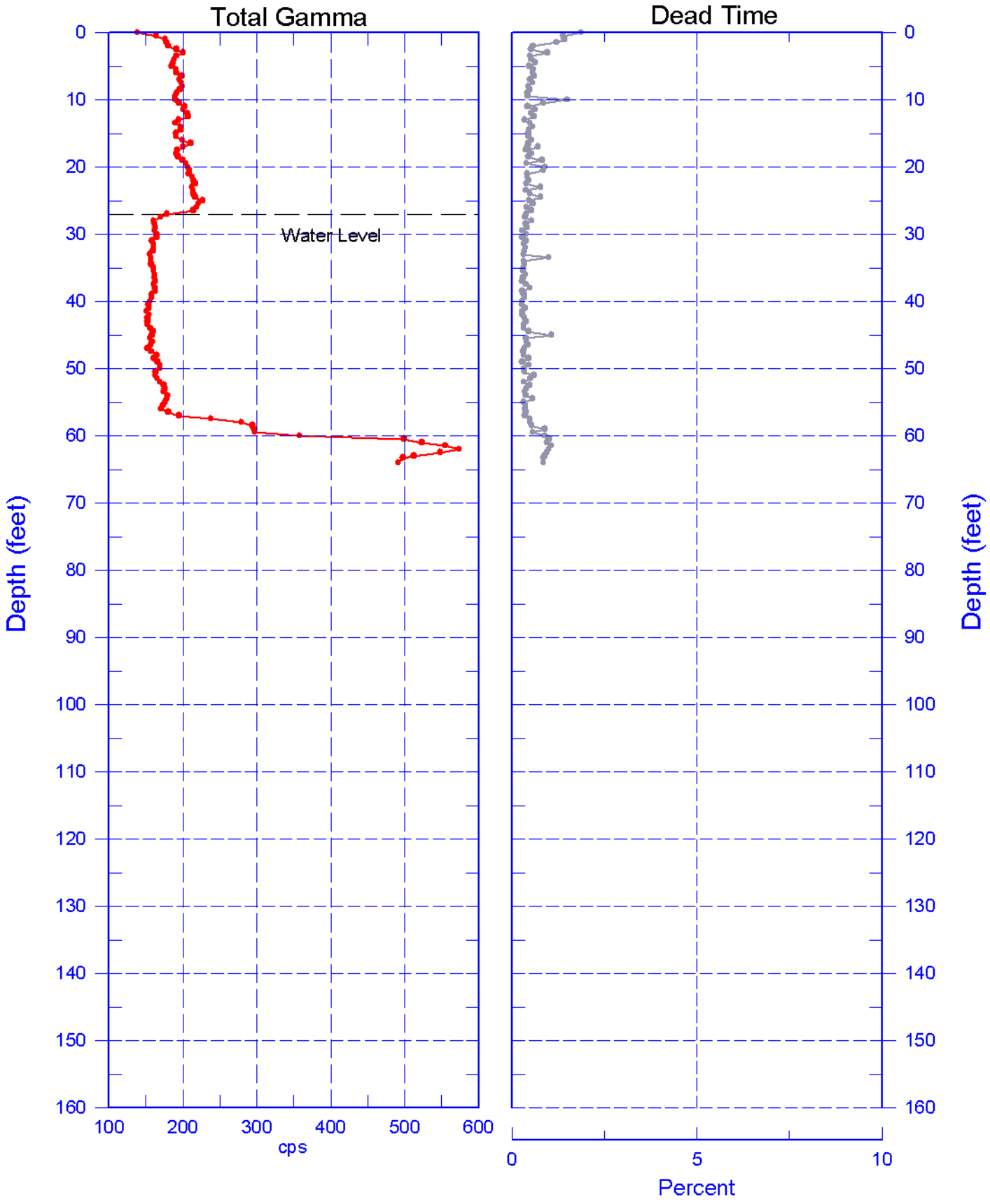
399-2-18 (C6196)
Total Gamma & Dead Time



Reference - Ground Surface

Stoller
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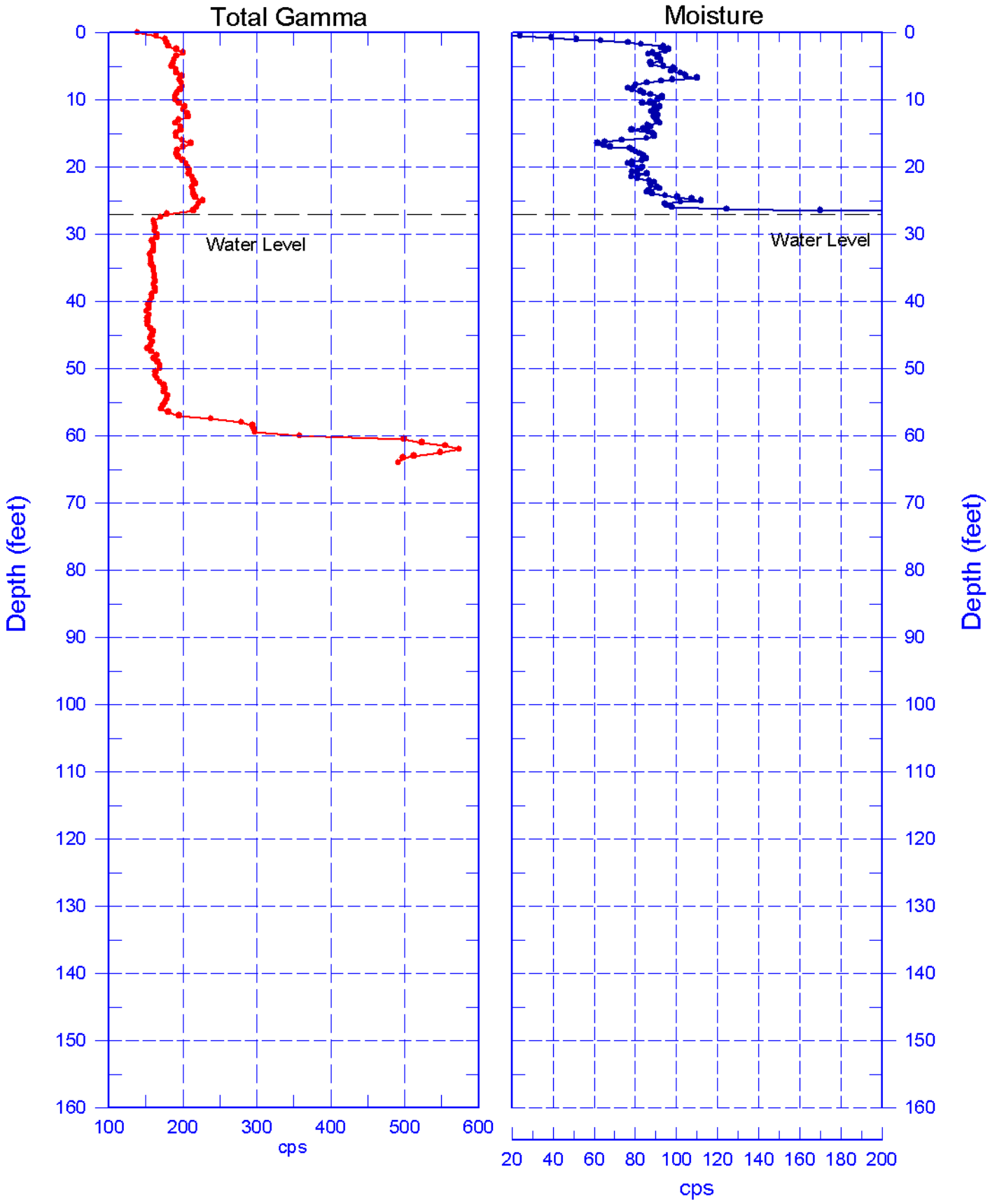
399-2-18 (C6196)
Total Gamma & Moisture



Reference - Ground Surface

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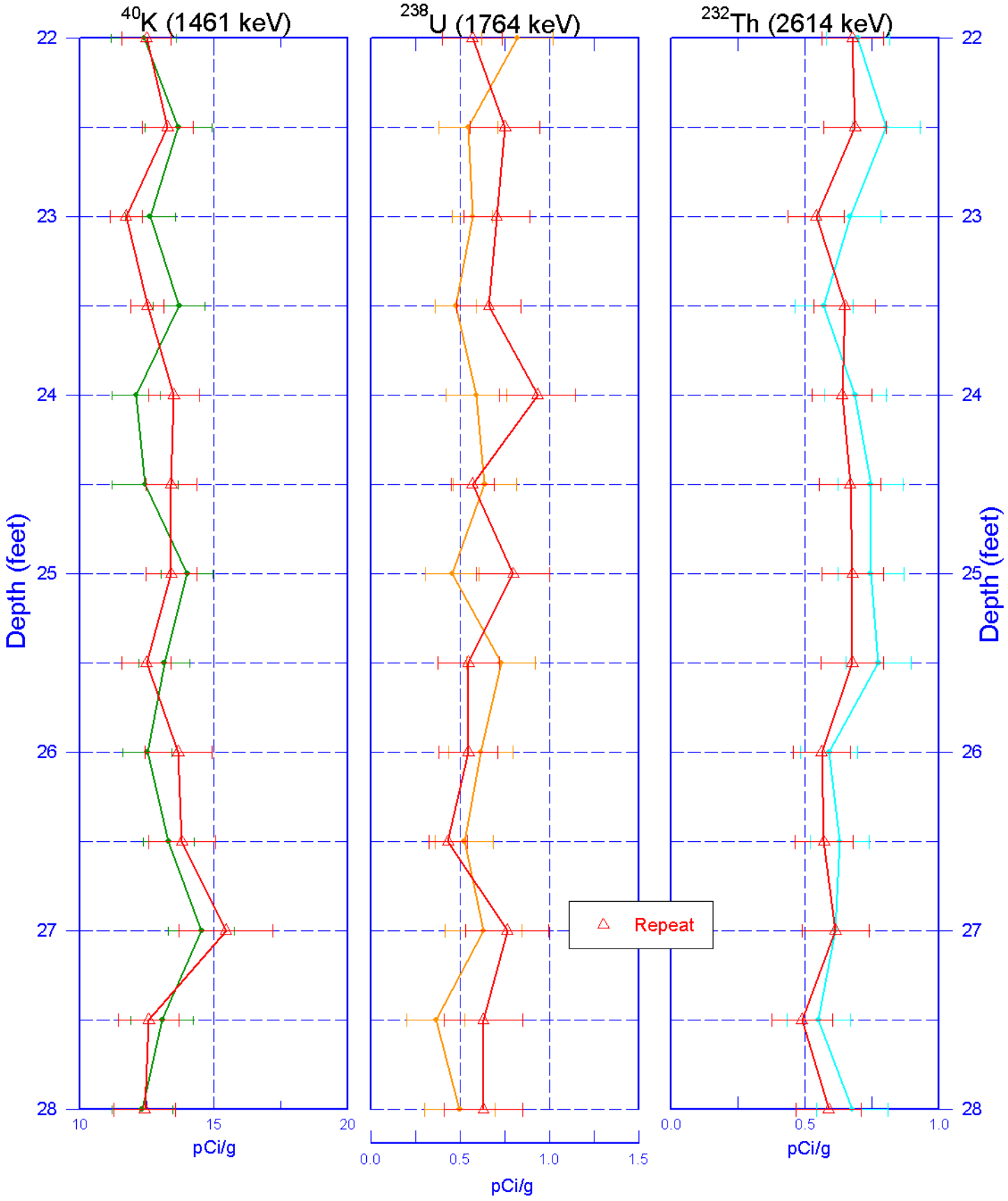
399-2-18 (C6196)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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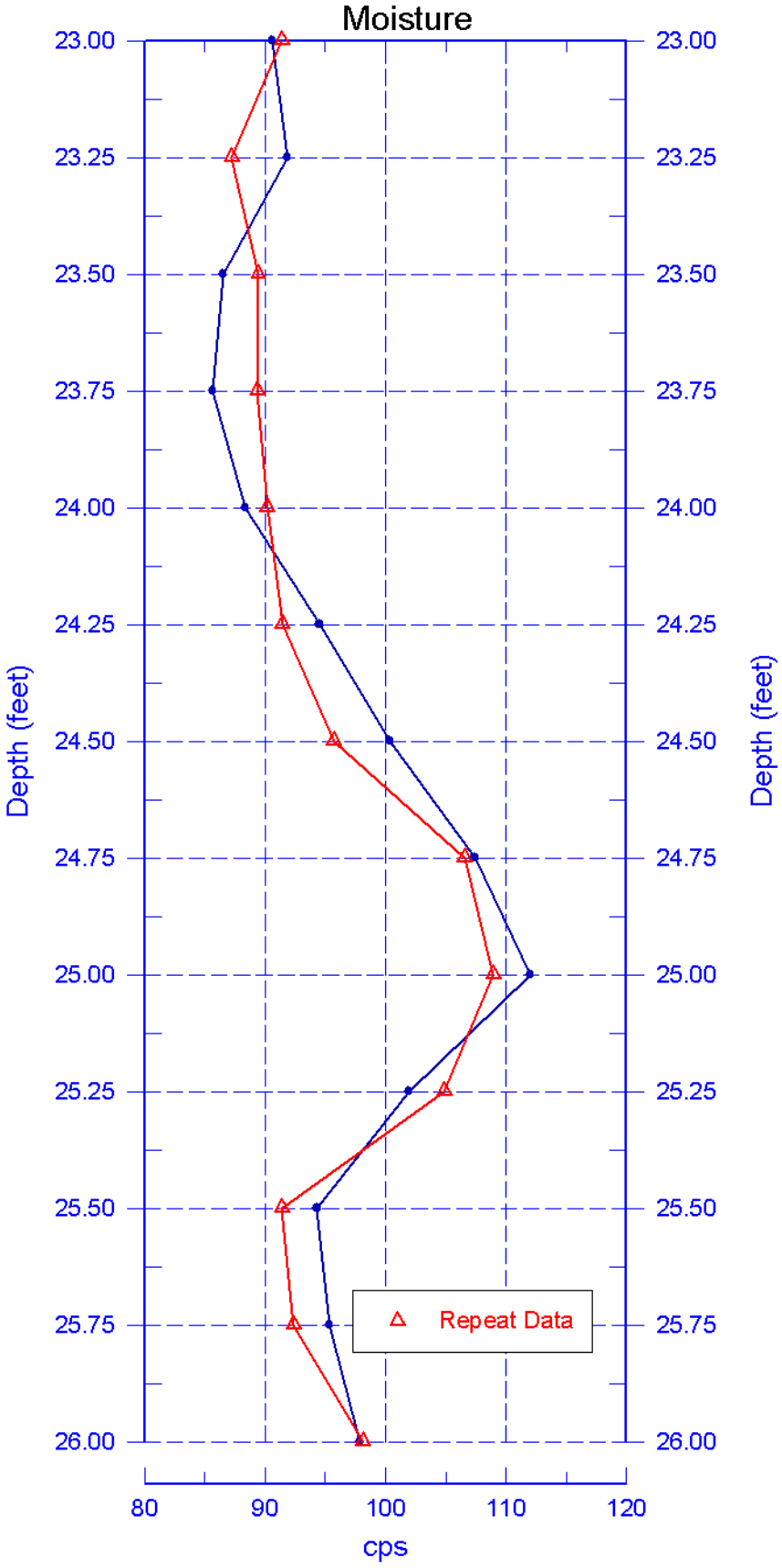
399-2-18 (C6196)
Moisture Repeat Section



Reference - Ground Surface

399-2-19 (C6197)
Log Data Report

Borehole Information:

Borehole:	399-2-19 (C6197)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	23.3	GWL Date:	05/22/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
Unknown	Unknown	05/20/08	Unknown	60.8	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	0.95	7 5/8	6 7/8	3/8	-0.95	60.0

Borehole Notes:

Well site geologist reported depth to bottom, depth to water and depth of casing. Logging engineer measured casing employing a steel tape and rounding to the nearest 1/16-in. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 1 N		Type:	60% HPGe SGLS
			Serial No.:	45TP22010A
Effective Calibration Date:	03/28/08	Calibration Reference:	HGLP-CC-031	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 1 M		Type:	NMLS
			Serial No.:	H340207279
Effective Calibration Date:	05/06/08	Calibration Reference:	HGLP-CC-032	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat
Date	05/22/08	05/22/08
Logging Engineer	McClellan	McClellan
Start Depth (ft)	0.0	4.0
Finish Depth (ft)	59.0	10.0
Count Time (sec)	200	200
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.5	0.5
Log Speed (ft/min)	N/A	N/A
Pre-Verification	AN076CAB	AN076CAB
Start File	AN076000	AN076119
Finish File	AN076118	AN076131
Post-Verification	AN076CAA	AN076CAA
Depth Return Error (in.)	N/A	1.0 high
Comments	Fine gain adjustment made before 089.	No fine gain adjustment made. Repeat Section

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat
Date	05/23/08	05/23/08
Logging Engineer	McClellan	McClellan
Start Depth (ft)	0.0	4.0
Finish Depth (ft)	28.75	10.0
Count Time (sec)	15	15
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.25	0.25
Log Speed (ft/min)	N/A	N/A
Pre-Verification	AM004CAB	AM004CAB
Start File	AM004000	AM004116
Finish File	AM004115	AM004140
Post-Verification	AM004CAA	AM004CAA
Depth Return Error (in.)	N/A	½ high
Comments	None.	Repeat Section

Logging Operation Notes:

Data were collected using Gamma 1, HO 68B-3574. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-118 field verifier. Maximum logging depth was 59.2 ft. before the sonde un-weighted. A centralizer was installed on the sonde. NMLS pre- and post-survey verification measurements were acquired in the AmBe standard.

Analysis Notes:

Analyst:	LEGLER	Date:	7/22/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

The pre- and post-survey verification measurements met the acceptance criteria for the established systems. A correction for a 3/8-in. thick casing was applied to spectral log data (SGLS) from ground surface to total logged depth of borehole. A water correction was also applied from 28.75 ft to total logged depth of borehole.

SGLS spectral were processed in batch mode in APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL template identified as G1NMar08.xls using efficiency functions, and corrections for casing, dead time and water as determined by annual calibrations.

Moisture data are presented in counts per second (cps) because no calibration data exists for a 6 7/8-in. inner diameter casing.

Results and Interpretations:

Cs-137 was detected at 3.5, 6.5, 9.0, 16.5 and 19.0 ft. Inspection of the individual spectra at depths 3.5, 9.0, 16.5, and 19.0 ft indicated that these detections are statistical fluctuations associated with the processing software. At 6.5 ft, the Cs-137 concentration is 0.2 pCi/g.

Co-60 was detected from 6 to 13 ft. The maximum concentration was 0.3 pCi/g at 6.5 ft.

U-235 was detected at 5.0, 14.0, 23.5, 34.0 and 35.5 ft. Inspection of the individual spectra at these depths indicates that these detections are statistical fluctuations associated with the processing software.

U-238 (Pa-234m) was detected at depths 6.5, 32.5, 49.5, and 54.0 ft. Inspection of the individual spectra at these depths indicates that these detections are statistical fluctuations associated with processing software.

The KUT repeat plot indicates good repeatability. The manmade repeat plot for Cs-137 does not repeat as the detection are statistical fluctuations. The moisture repeat plot indicates good variability.

Radon is exhibited from 29 – 59 ft, as shown by an elevated 609 keV energy peak relative to the 1764 keV energy peak.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Manmade Repeat Section
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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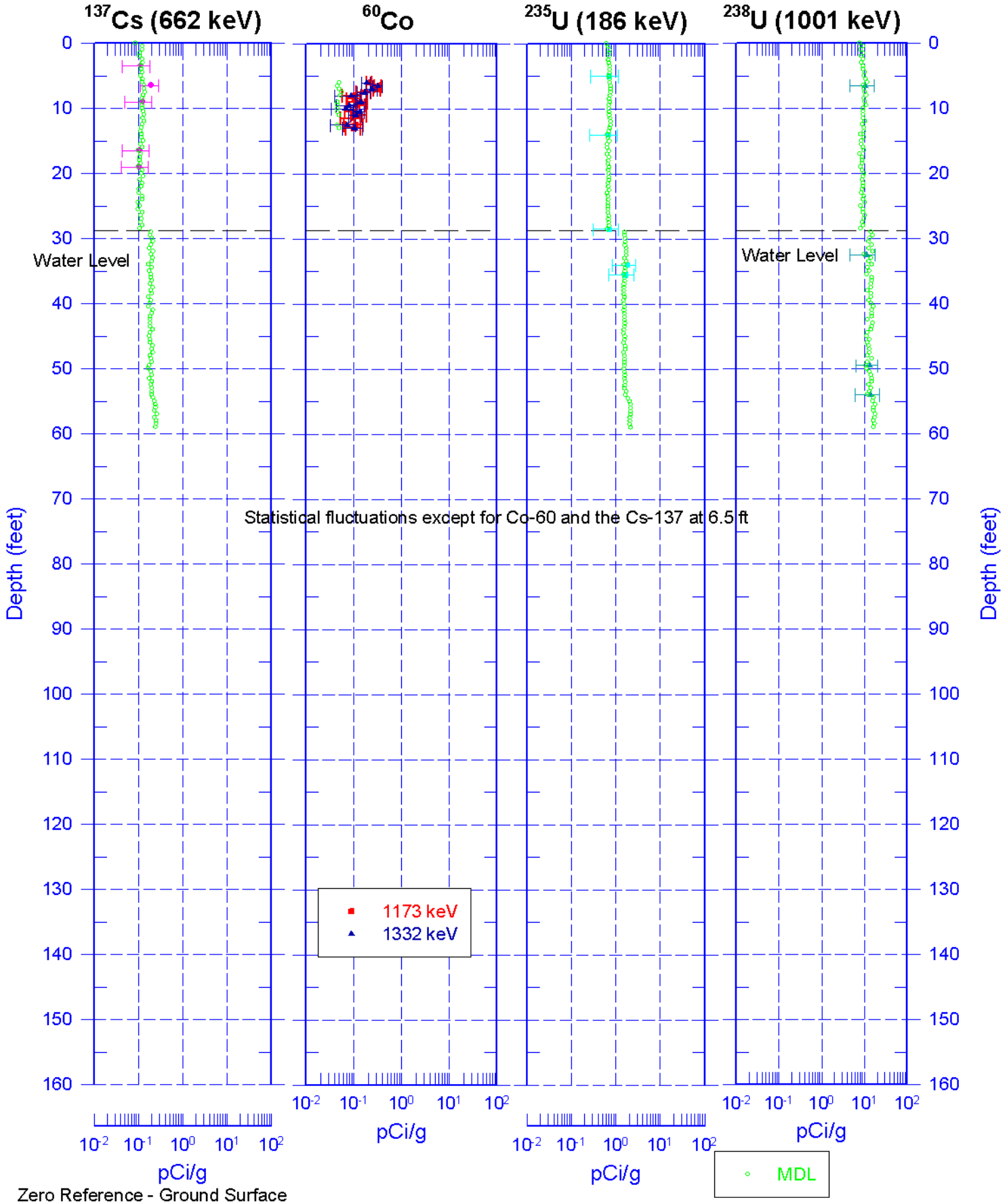
399-2-19 (C6197)
Manmade Radionuclides



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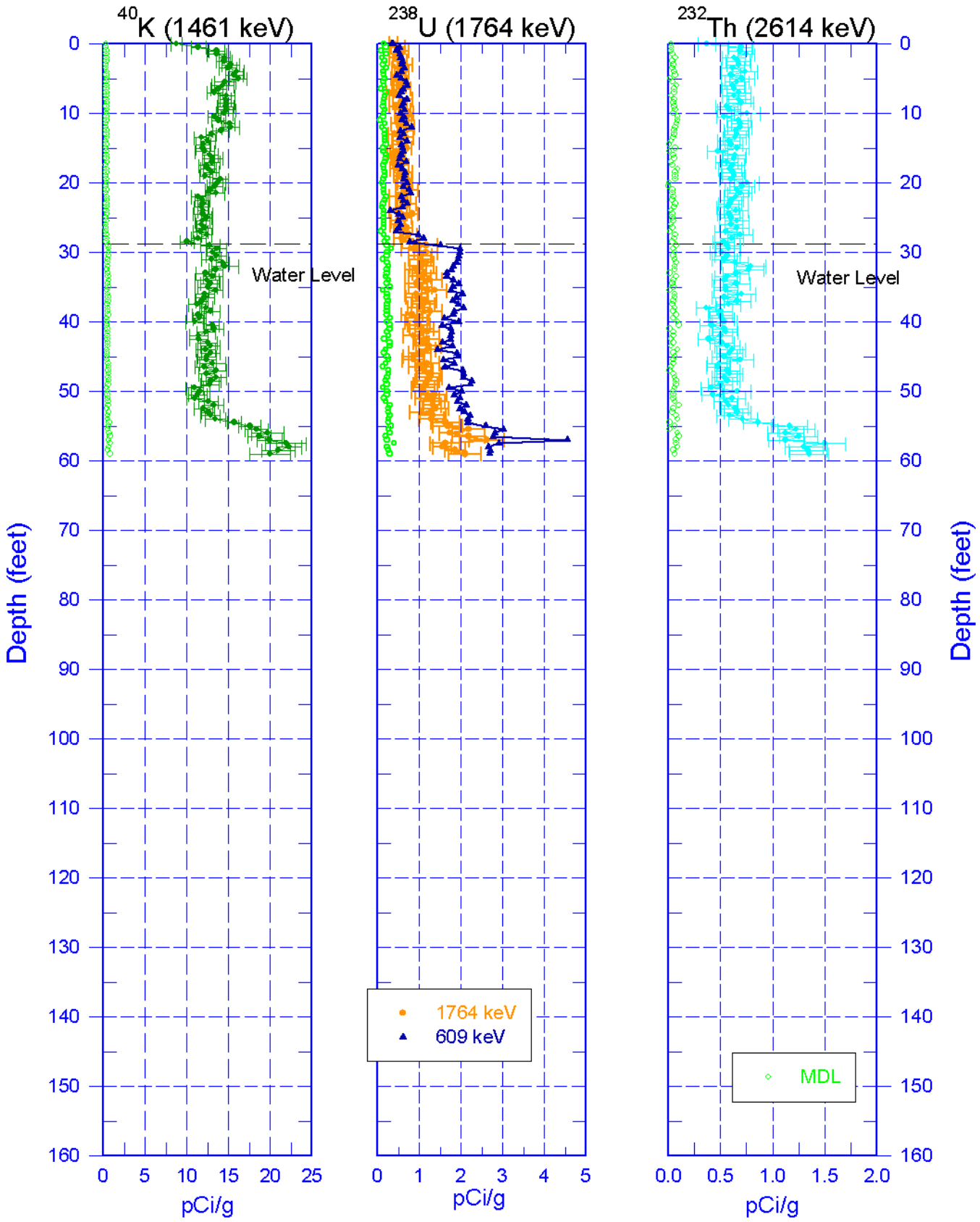
399-2-19 (C6197)
Natural Gamma Logs



Zero Reference - Ground Surface

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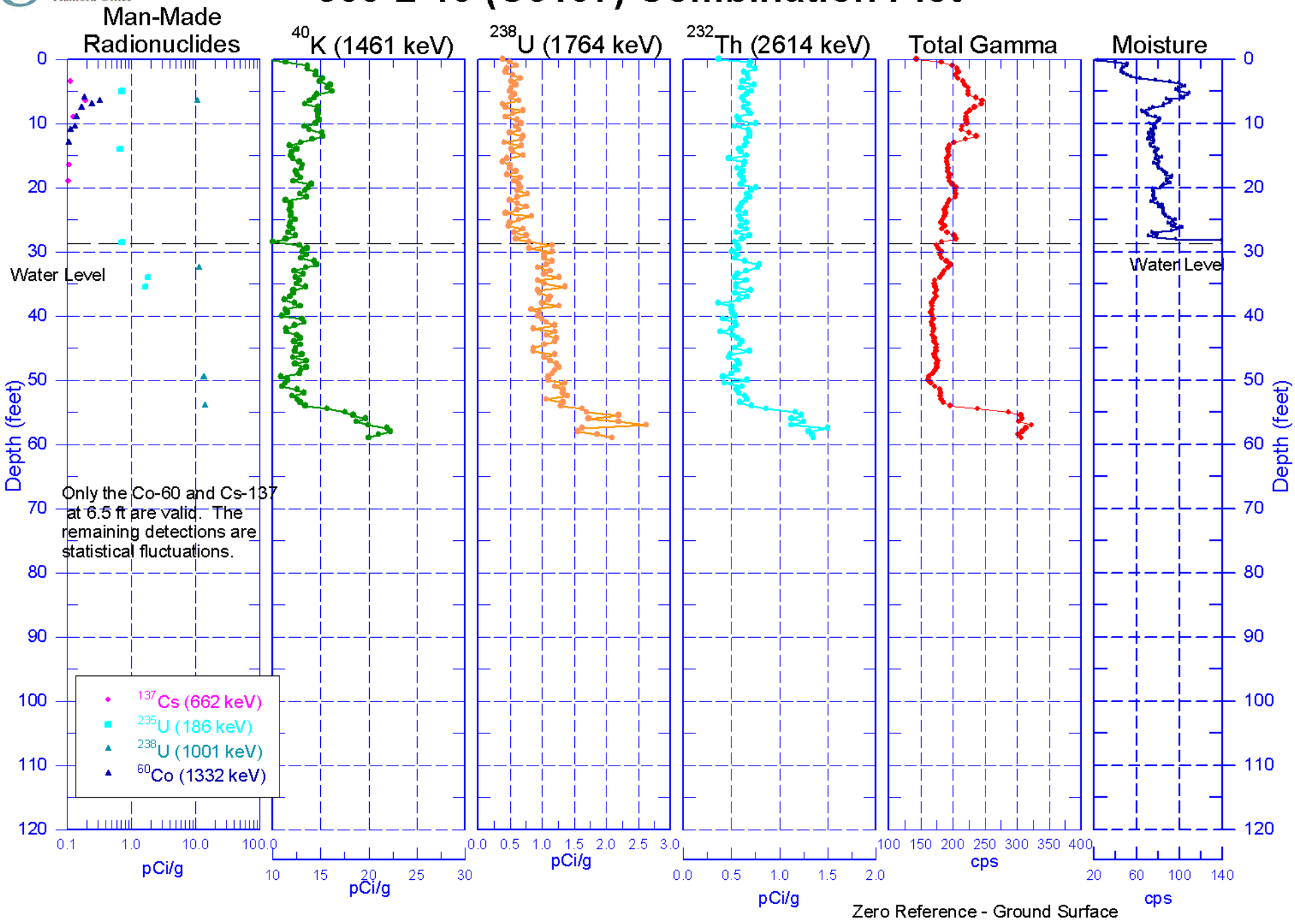
399-2-19 (C6197) Combination Plot



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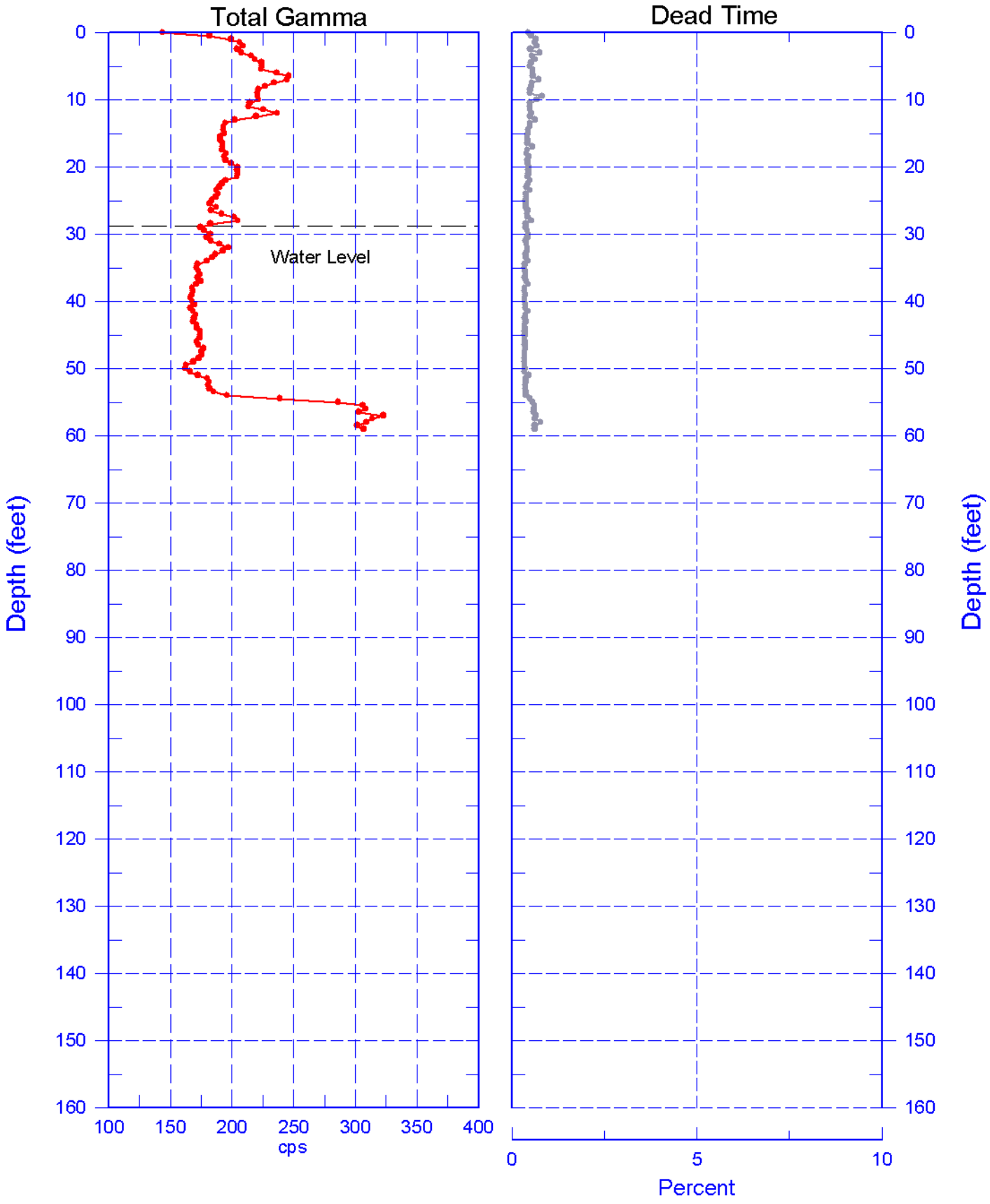
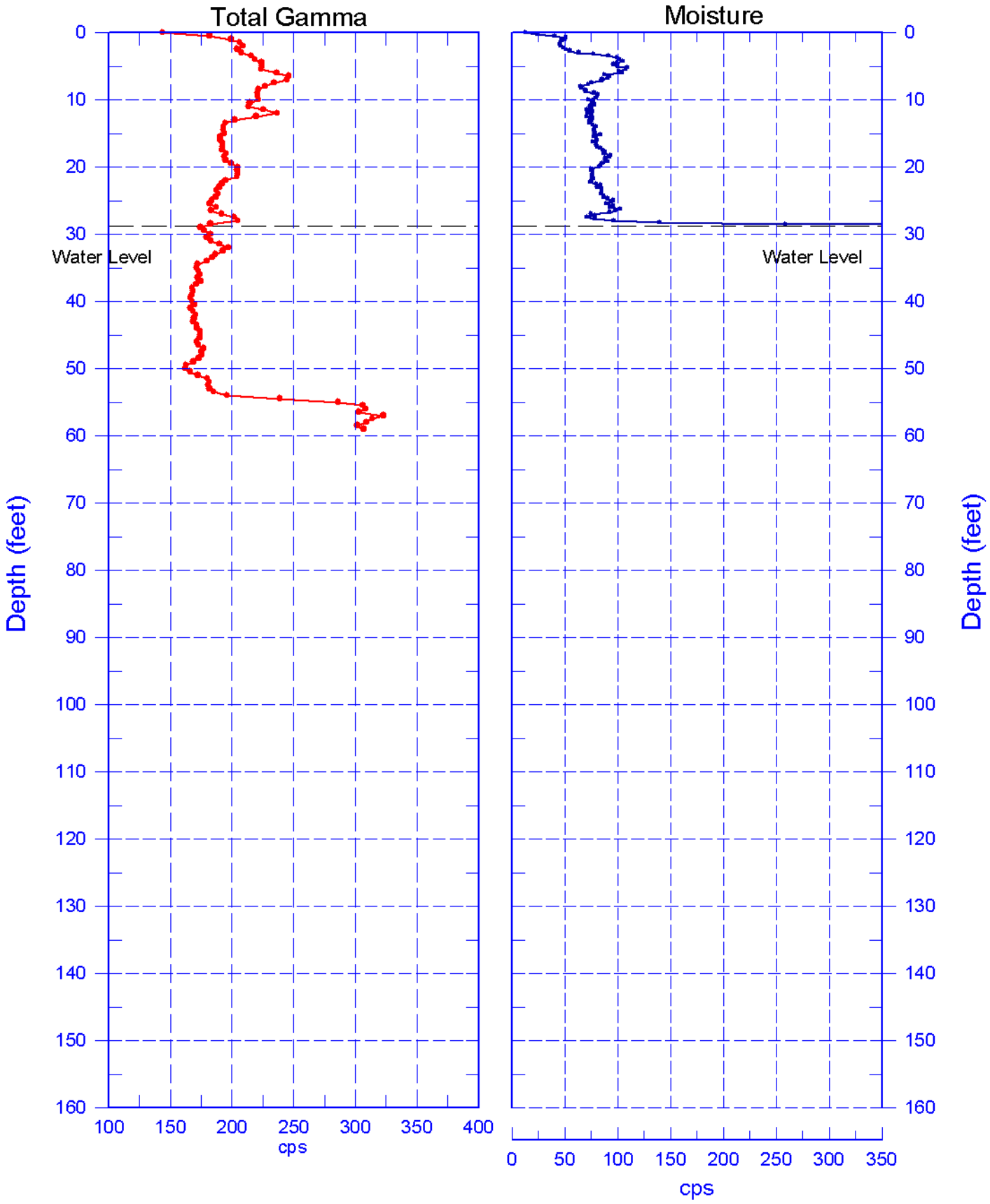
399-2-19 (C6197)
Total Gamma & Dead Time



Reference - Ground Surface

Stoller
Hanford Office

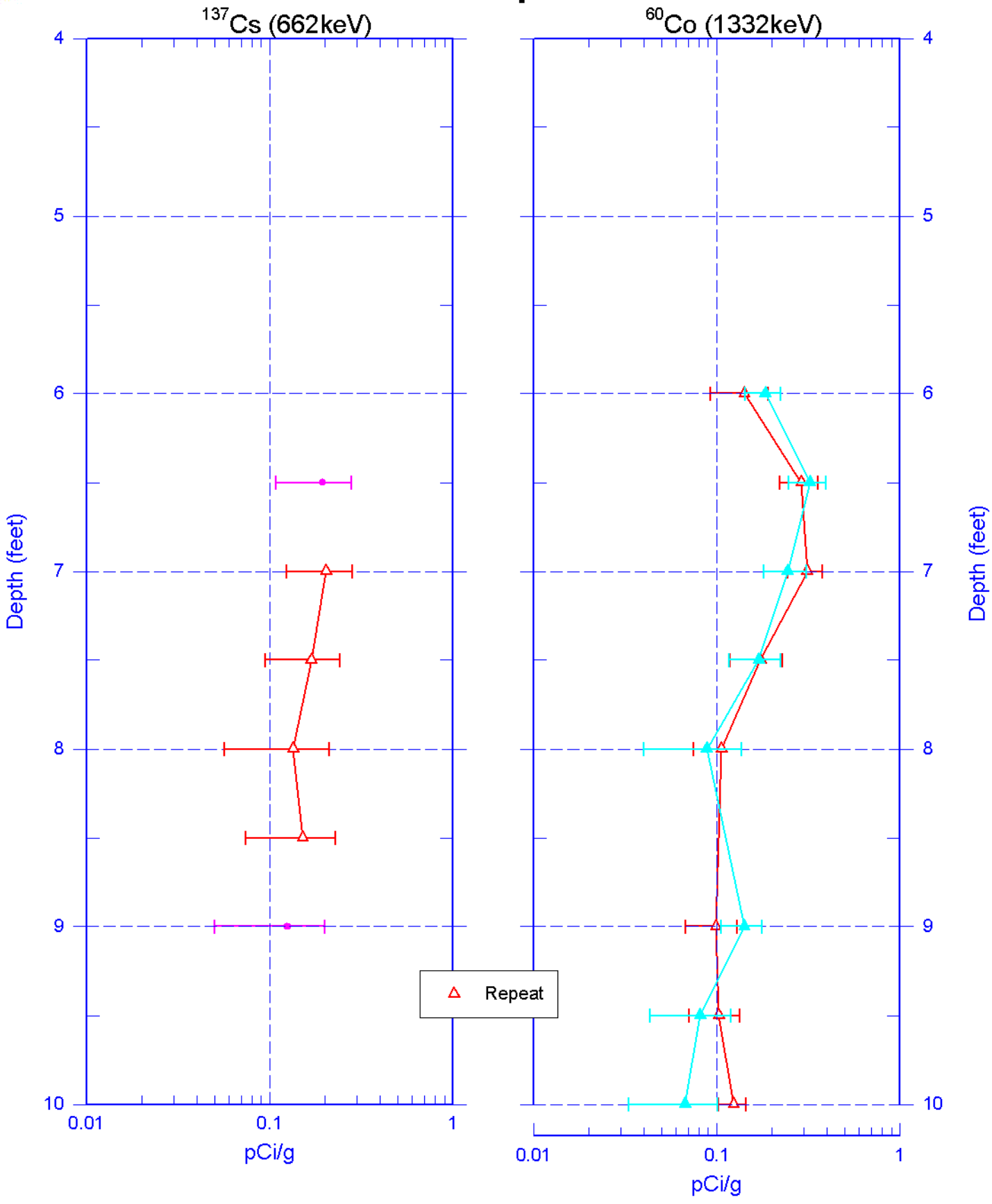
399-2-19 (C6197)
Total Gamma & Moisture



Reference - Ground Surface

Stoller
Hanford Office

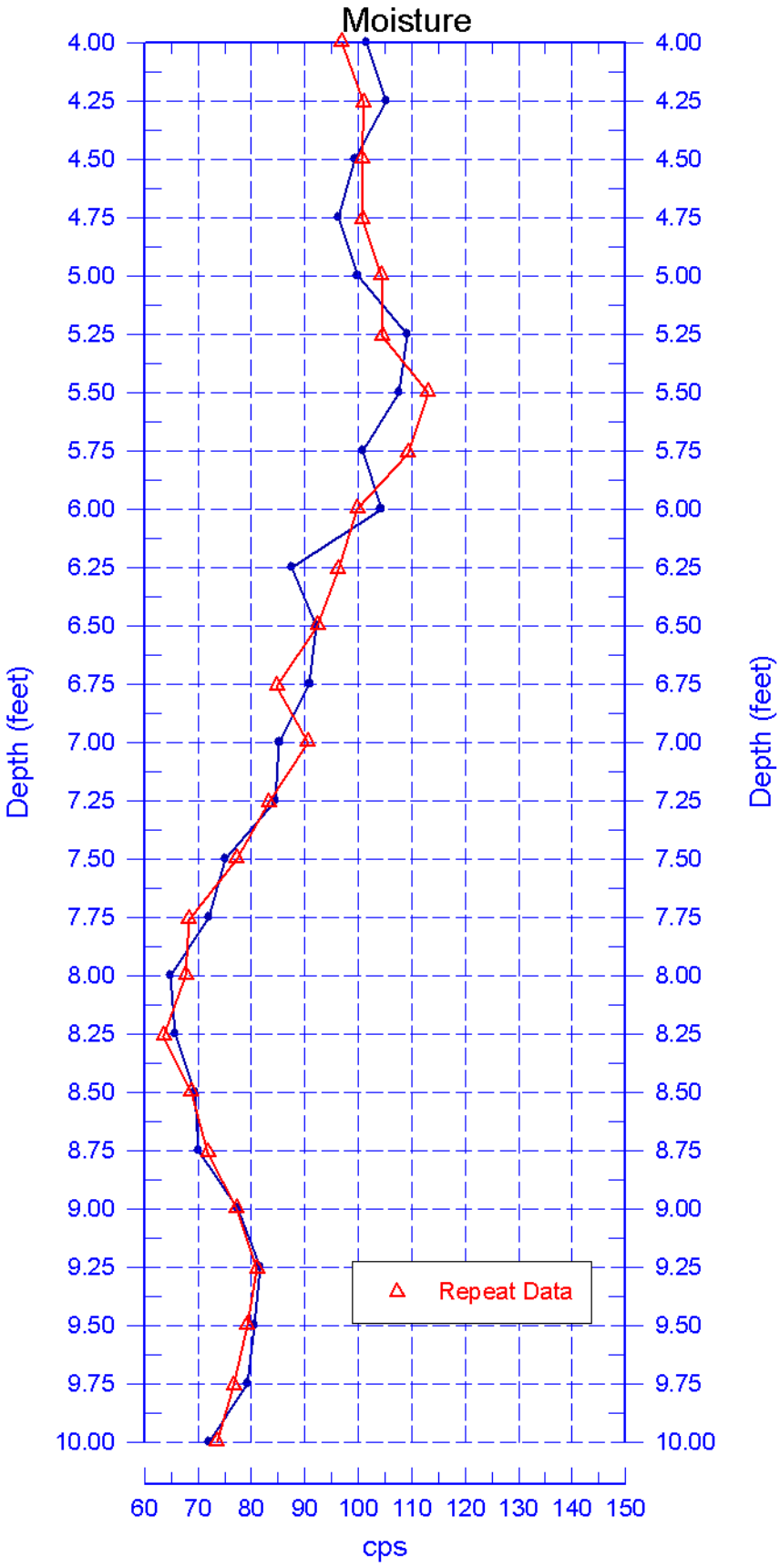
399-2-19 (C6197)
Manmade Repeat Section



Reference - Ground Surface

Stoller
Hanford Office

399-2-19 (C6197)
Moisture Repeat Section



Reference - Ground Surface

399-2-20 (C6198)
Log Data Report

Borehole Information:

Borehole:	399-2-20 (C6198)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	27.9	GWL Date:	06/27/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116077.6	594270.6	06/25/08	Unknown	62	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	0.9	7 5/8	6 7/8	3/8	-0.9	59.7

Borehole Notes:

Casing data and total depth were reported by the site geologist. The logging engineer measured depth to water with an e-tape. Casing diameters were measured using a steel tape and rounded to the nearest 1/16 inch. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type:	60% HPGe SGLS
			Serial No.:	47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type:	NMLS
			Serial No.:	H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	06/27/08	06/28/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	61.0	10.0			
Finish Depth (ft)	0.0	4.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DL541CAB	DL541CAB			
Start File	DL541000	DL541123			
Finish File	DL541122	DL541135			
Post-Verification	DL551CAA	DL551CAA			
Depth Return Error (in.)	0	¼ Low			
Comments	None	Repeat section.			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat			
Date	06/27/08	06/27/08			
Logging Engineer	Pope	Pope			
Start Depth (ft)	0.0	4.0			
Finish Depth (ft)	27.75	10.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DHG12CAB	DHG12CAB			
Start File	DHG12000	DHG12112			
Finish File	DHG12111	DHG12136			
Post-Verification	DHG12CAA	DHG12CAA			
Depth Return Error (in.)	NA	0			
Comments	None	Repeat Section			

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum logging depth for the SGLS was 61.33 ft before the sonde un-weighted. A centralizer was installed on the sonde.

Analysis Notes:

Analyst:	LEGLER	Date:	09/30/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

The pre- and post-survey verification spectra met the acceptance criteria for the established systems. A casing correction for a 3/8-in thick casing was applied to spectral data from ground surface to total logged depth of borehole. A water correction was applied from 27.9 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in inner diameter borehole casing.

Results and Interpretations:

Co-60 was detected at 5.5 and 6 ft, with a maximum concentration of 0.07 pCi/g at 5.5 feet. Cs-137, U-235, and U-238 (Pa-234m) were also detected at various isolated depths, but inspection of the individual spectra indicates that these detections are statistical fluctuations associated with the processing software.

The manmade, KUT and Moisture repeat plots show good repeatability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Manmade Repeat Section
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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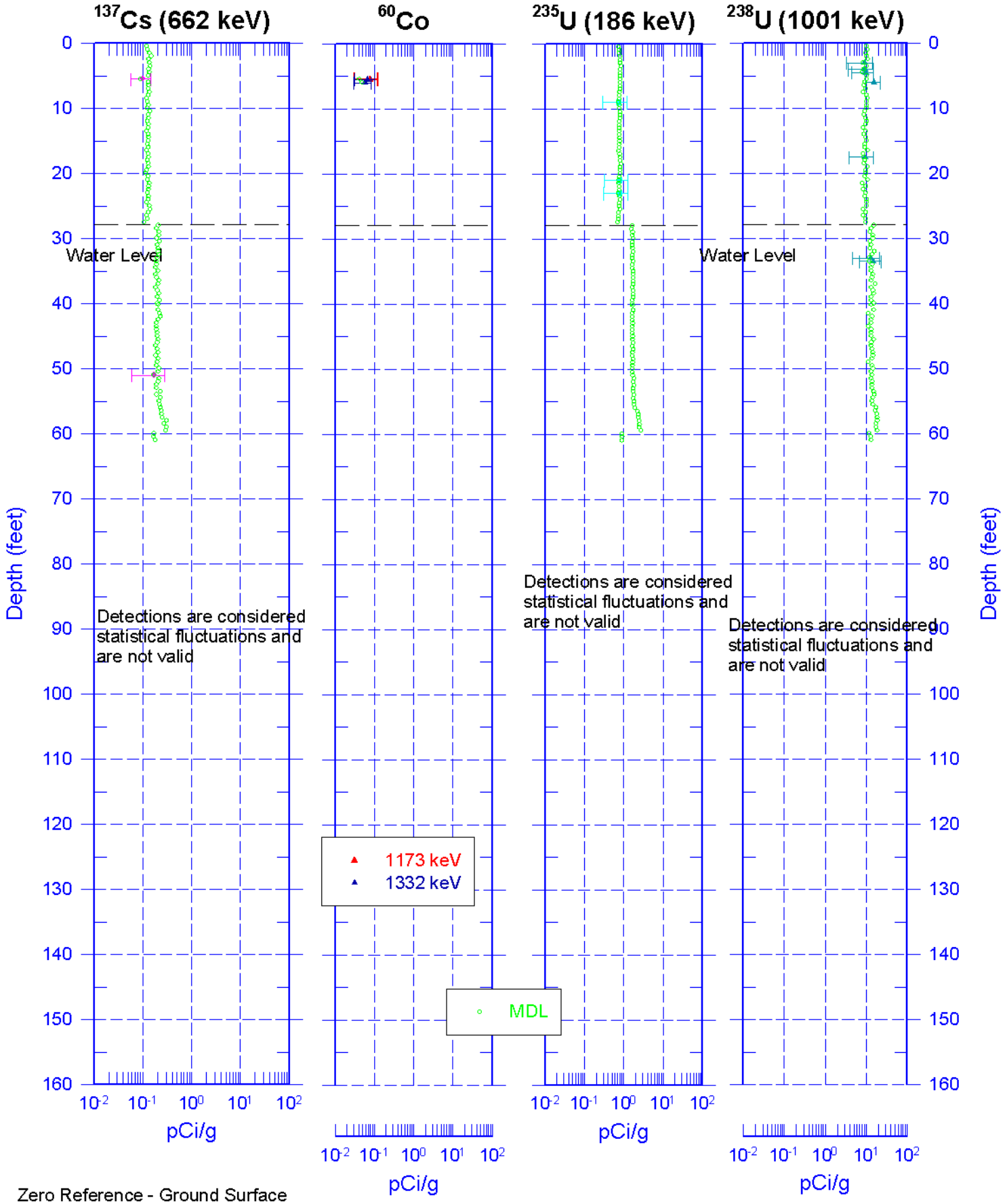
399-2-20 (C6198)
Manmade Radionuclides



Zero Reference - Ground Surface

Stoller
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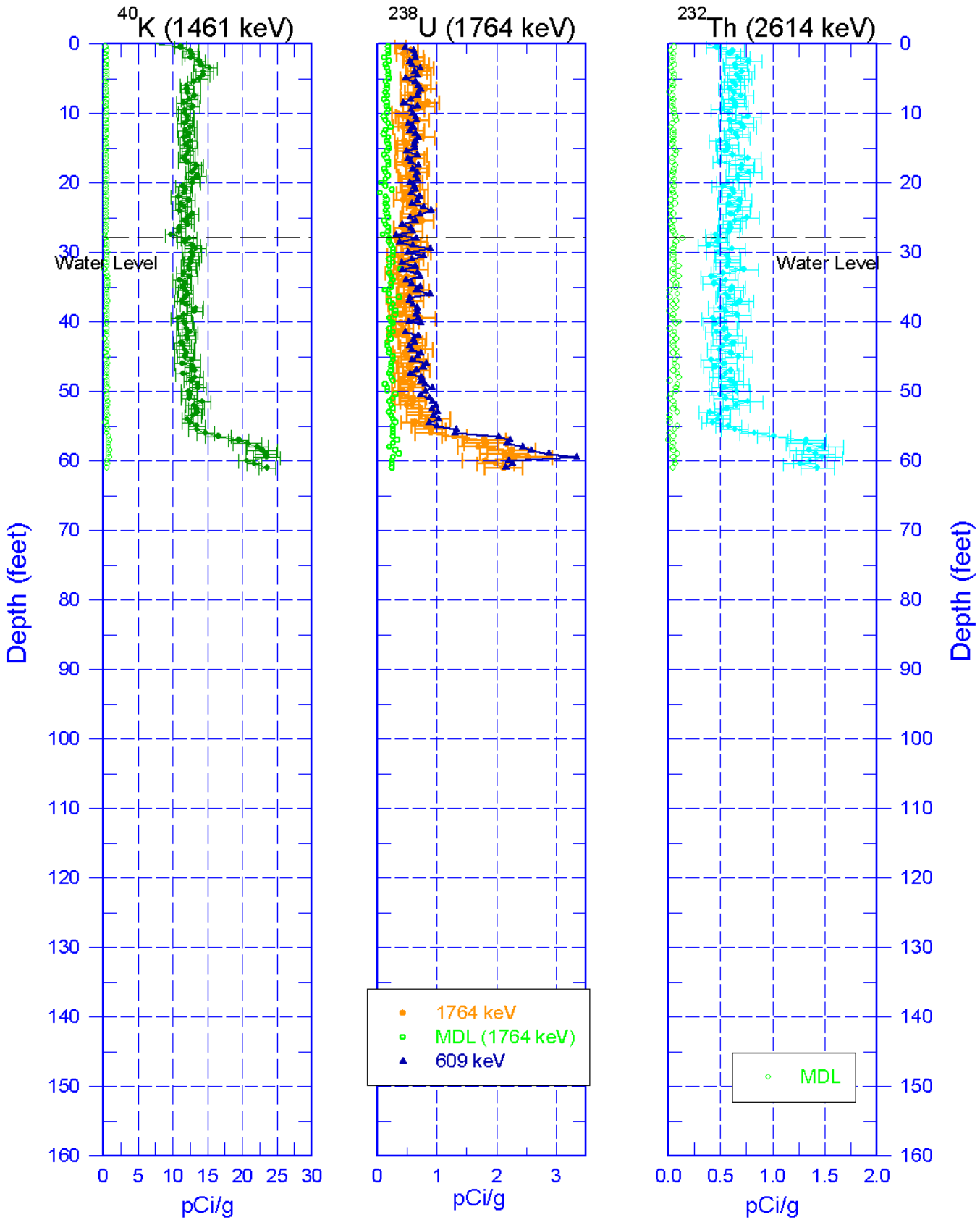
399-2-20 (C6198)
Natural Gamma Logs



Zero Reference - Ground Surface

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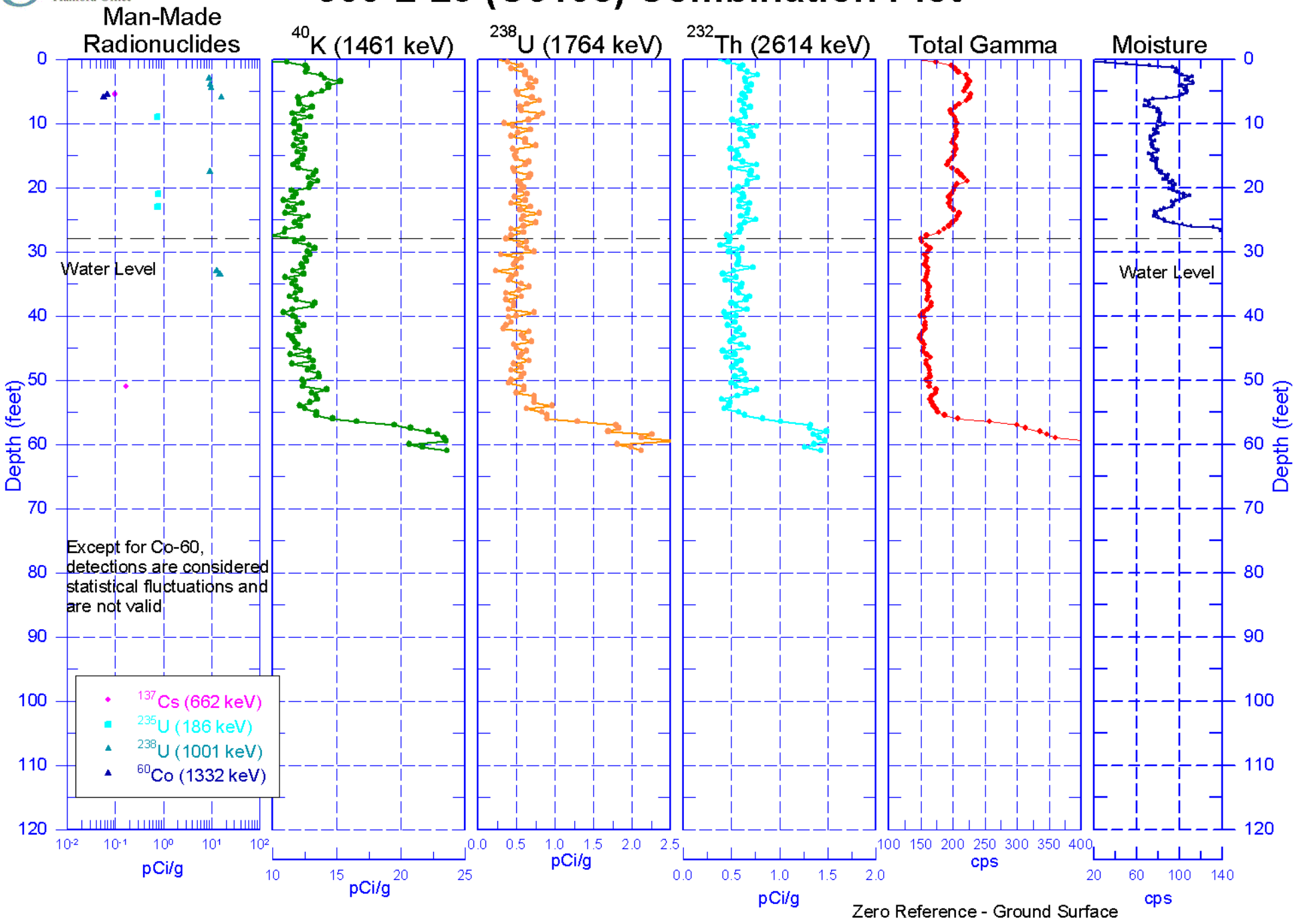
399-2-20 (C6198) Combination Plot



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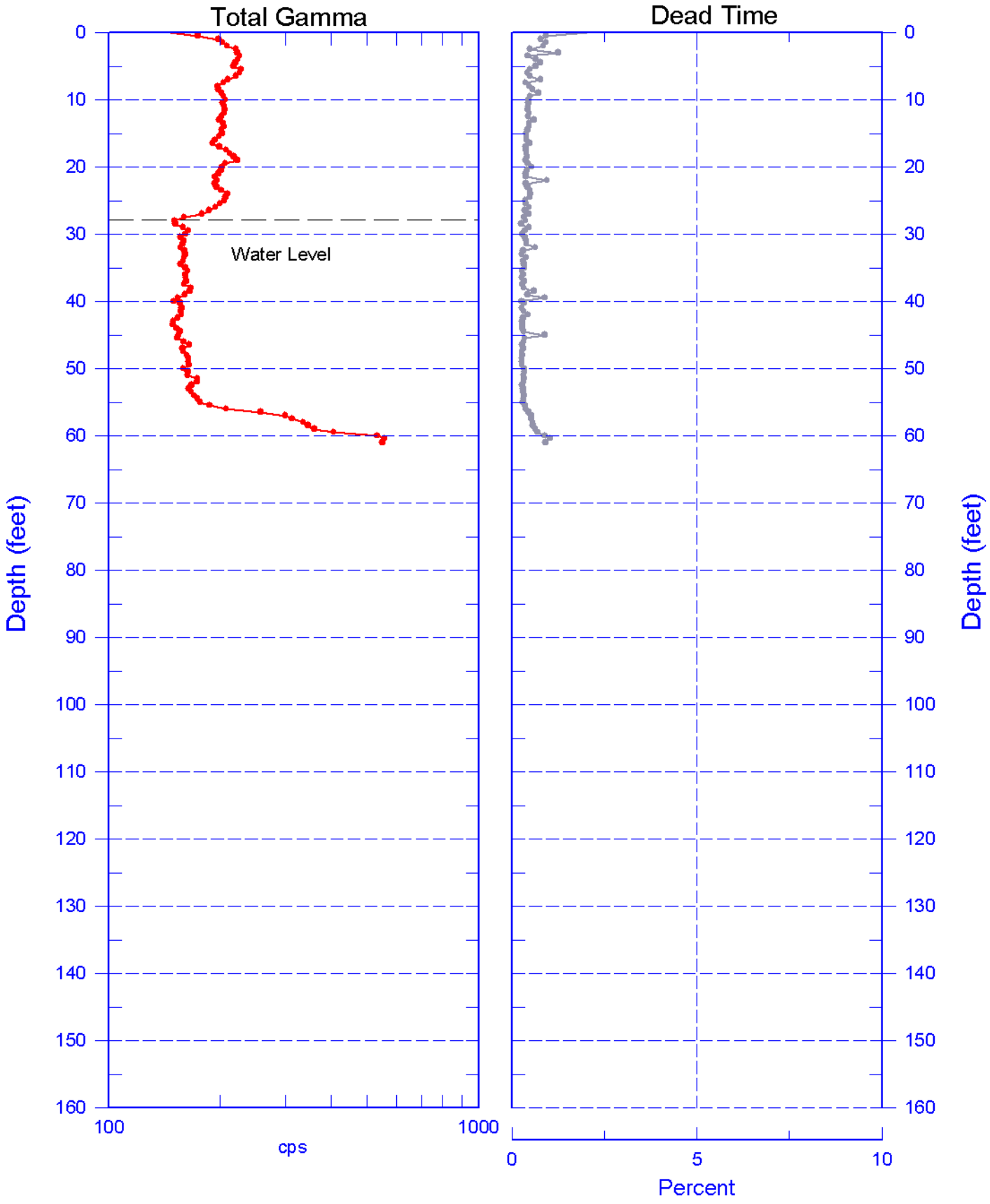
399-2-20 (C6198)
Total Gamma & Dead Time



Reference - Ground Surface

Stoller
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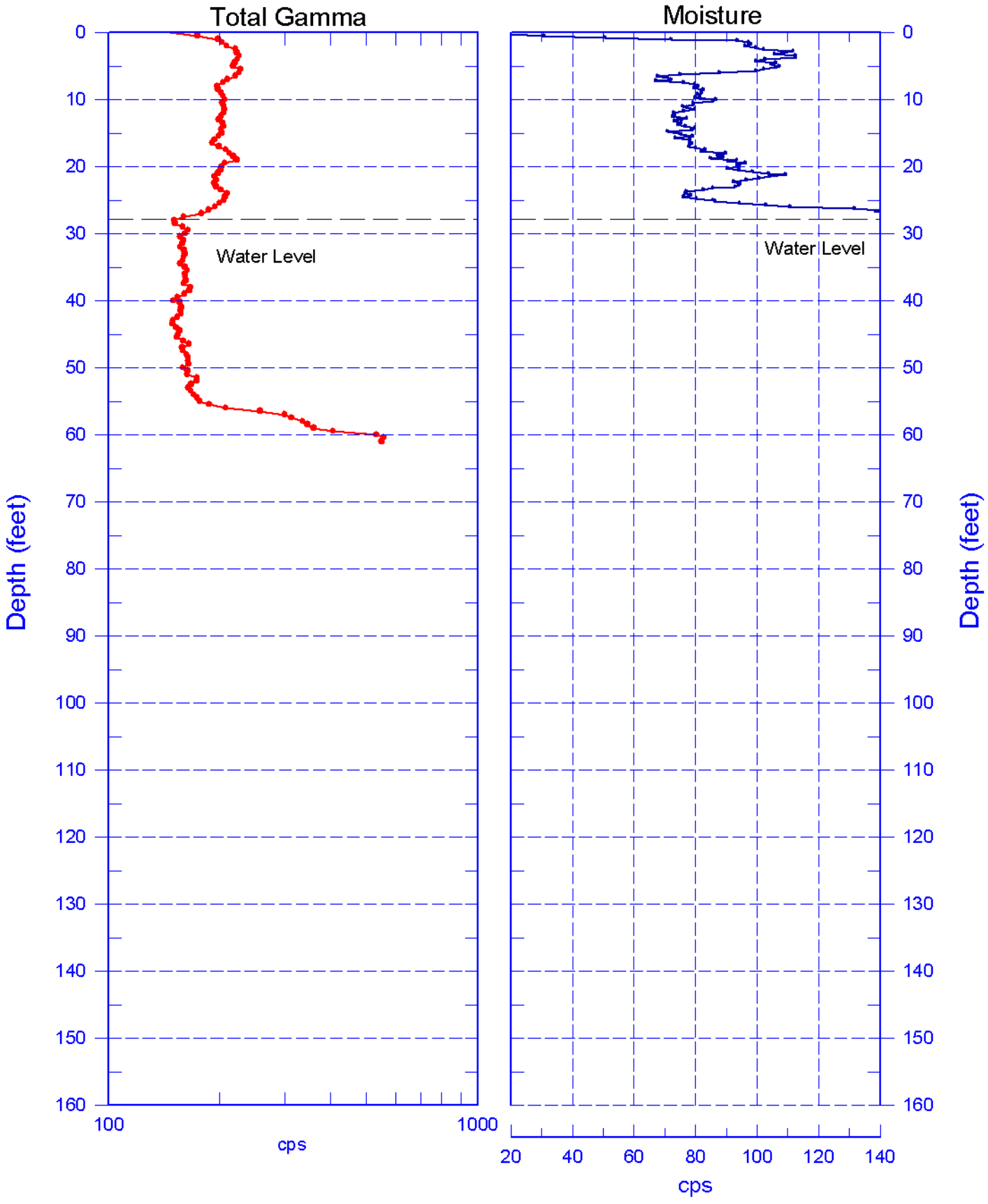
399-2-20 (C6198)
Total Gamma & Moisture



Reference - Ground Surface

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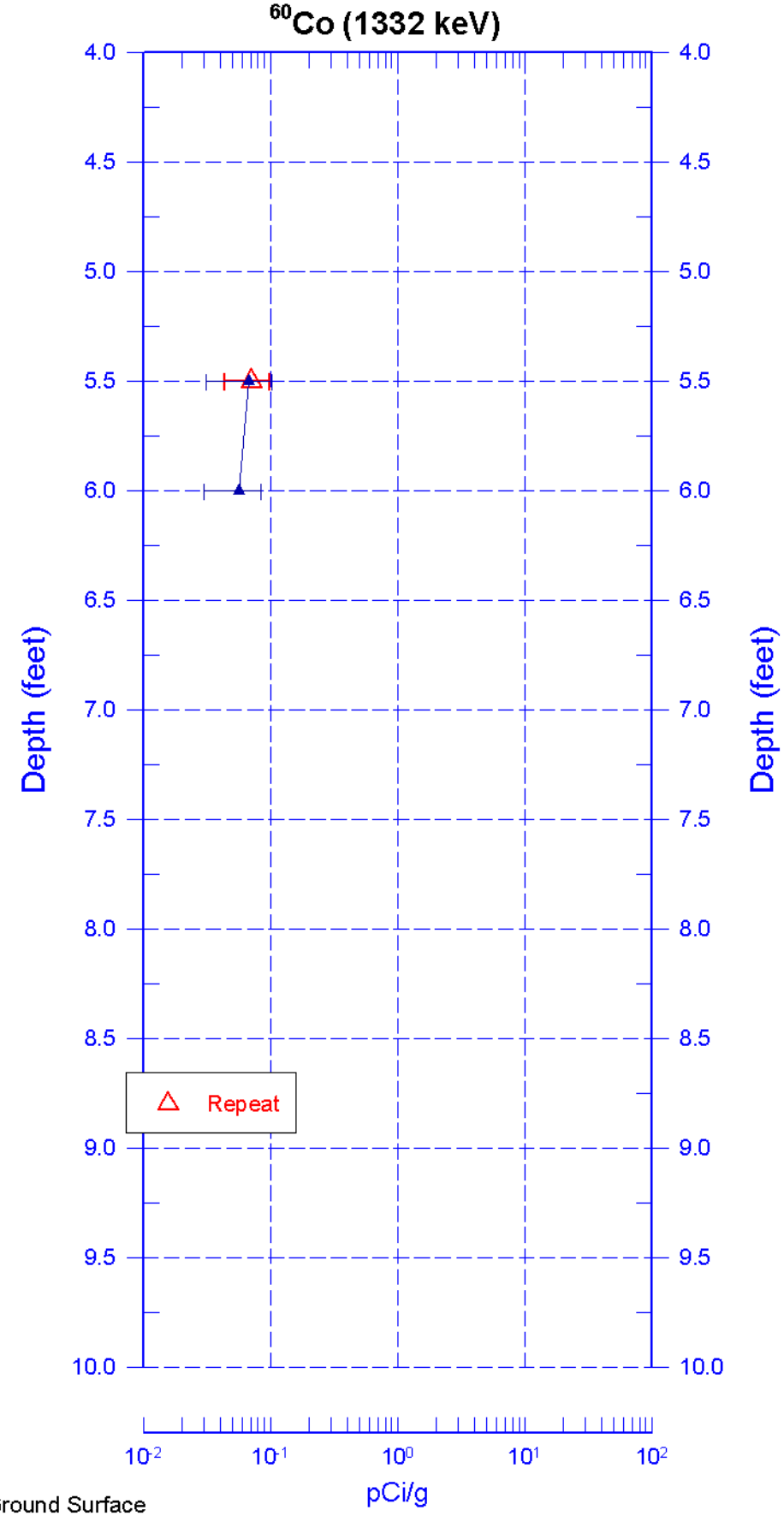
399-2-20 (C6198)
Manmade Repeat Section



Zero Reference - Ground Surface

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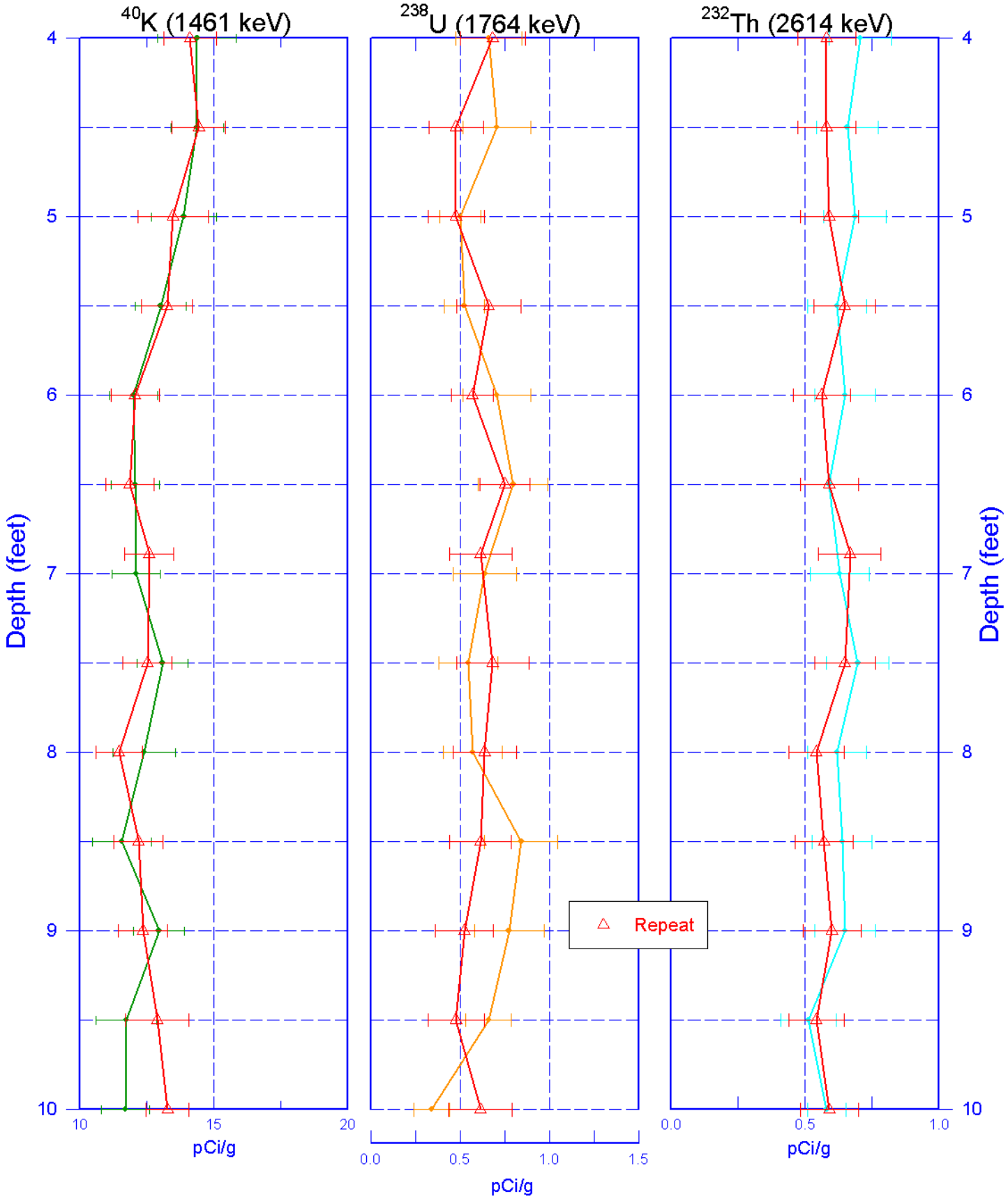
399-2-20 (C6198)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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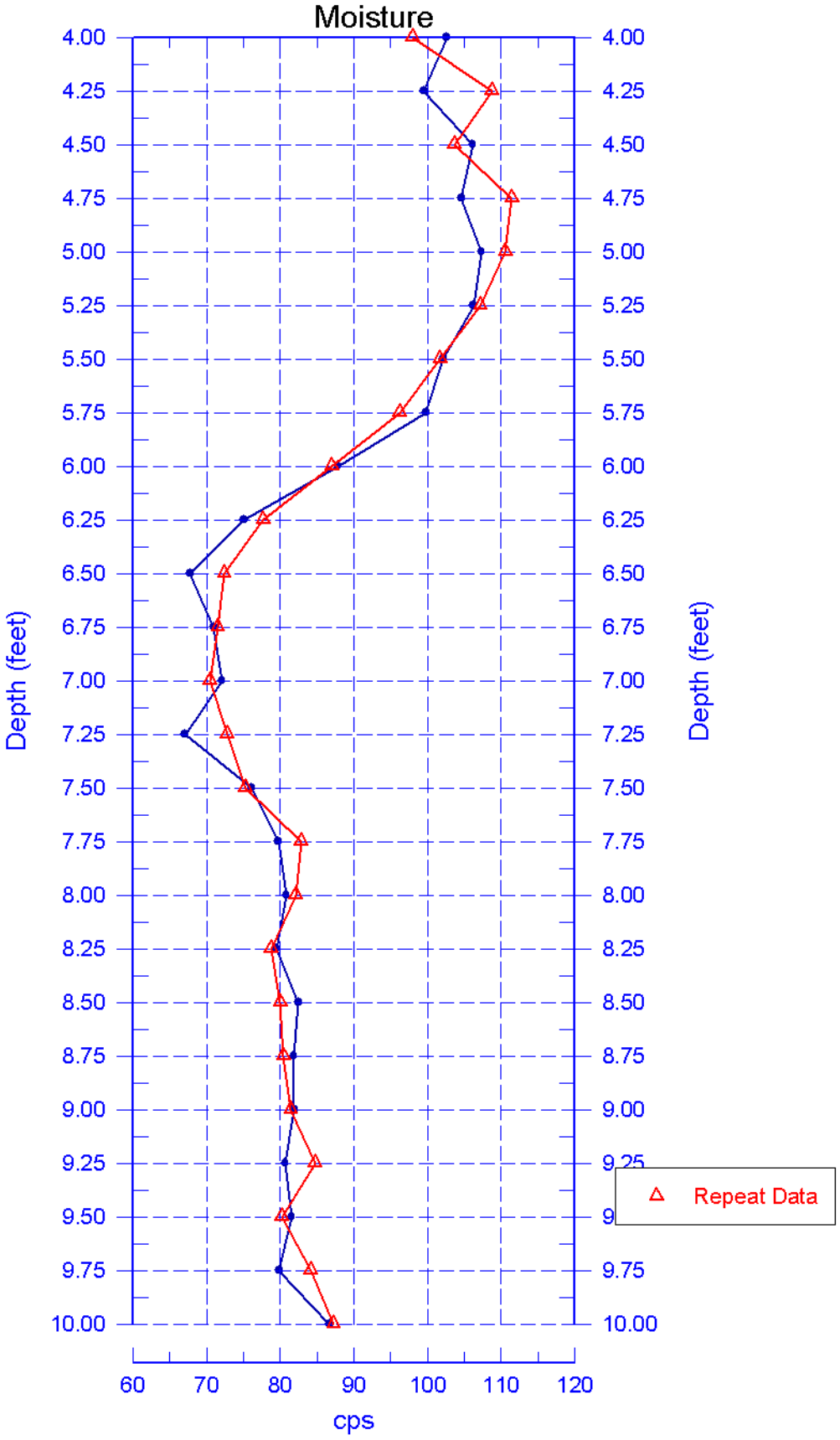
399-2-20 (C6198)
Moisture Repeat Section



Reference - Ground Surface

399-2-21 (C6201)
Log Data Report

Borehole Information:

Borehole:	399-2-21 (C6201)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	26.5	GWL Date:	06/15/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116061.9	594263.3	06/12/08	Unknown	62	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	1.2	7 5/8	6 7/8	3/8	-1.2	58.0

Borehole Notes:

Casing data and total depth was reported by the site geologist. Logging engineer measured depth to water with an e-tape. Casing diameters were measured using a steel tape and rounded to the nearest 1/16". The zero reference was the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type:	60% HPGe SGLS
			Serial No.:	47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type:	NMLS
			Serial No.:	H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat
Date	06/16/08	06/16/08
Logging Engineer	Pearson	Pearson
Start Depth (ft)	62.0	3.0
Finish Depth (ft)	0.0	9.0
Count Time (sec)	200	200
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.5	0.5
Log Speed (ft/min)	N/A	N/A
Pre-Verification	DL451CAB	DL451CAB
Start File	DL451000	DL451125
Finish File	DL451124	DL451137
Post-Verification	DL451CAA	DL451CAA
Depth Return Error (in.)	0	N/A
Comments	No fine gain adjustments made.	Repeat Section

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat
Date	06/15/08	06/15/08
Logging Engineer	Pearson	Pearson
Start Depth (ft)	0.0	3.0
Finish Depth (ft)	26.5	6.0
Count Time (sec)	15	15
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.25	0.25
Log Speed (ft/min)	N/A	N/A
Pre-Verification	DHF22CAB	DHF22CAB
Start File	DHF22000	DHF22107
Finish File	DHF22106	DHF22119
Post-Verification	DHF22CAA	DHF22CAA
Depth Return Error (in.)	N/A	0
Comments	None	Repeat Section

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SLGSL pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. Maximum logging depth was 62.2 ft before the sonde un-weighted. A centralizer was installed on the sonde. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum logging depth achieved was 26.5 ft.

Analysis Notes:

Analyst:	LEGLER	Date:	08/29/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

The SGLS pre- and post-survey verification measurements met the acceptance criteria for the established system, but the verification file DL451CAB had measurements above the upper control limit for counts per second (cps) for the 2615 keV energy line. The NMLS pre- and post-verification measurements met the acceptance criteria for the established system, but the verification file DHF22CAB had measurements above the upper control limit for counts per second (cps). A correction for a 3/8-in. thick casing was applied to spectral log data (SGLS) from ground surface to total logged depth of the borehole. A water correction was also applied from 26.5 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations. NMLS spectra were processed in batch mode in APTEC SUPERVIOR to compile counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls.

Moisture data are presented in counts per second (cps) because no calibration data exists for 6 7/8-in. inner diameter casing.

Results and Interpretations:

Cs-137, U-235, U-238 (Pa-234m), and Co-60 were detected at various depths in this borehole. With the exception of Co-60, inspection of these spectra indicates that these detections are statistical fluctuations associated with the processing software. Co-60 was detected at 7 – 8 ft, with a maximum concentration of 0.9 pCi/g at 7.5 ft.

The KUT plots indicate good repeatability. Moisture plots indicates some variability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Manmade Repeat Section
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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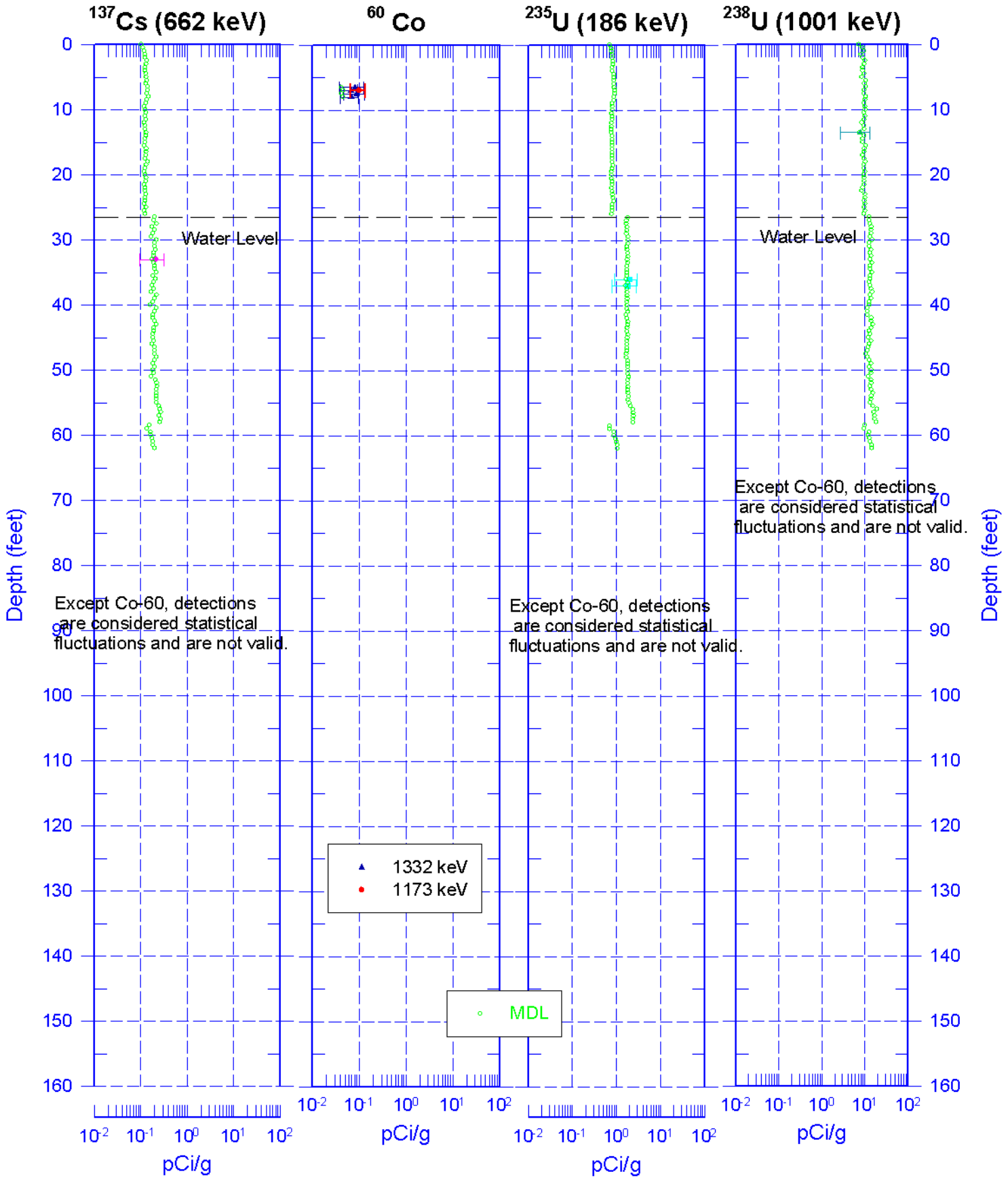
399-2-21 (C6201)
Manmade Radionuclides



Zero Reference - Ground Surface

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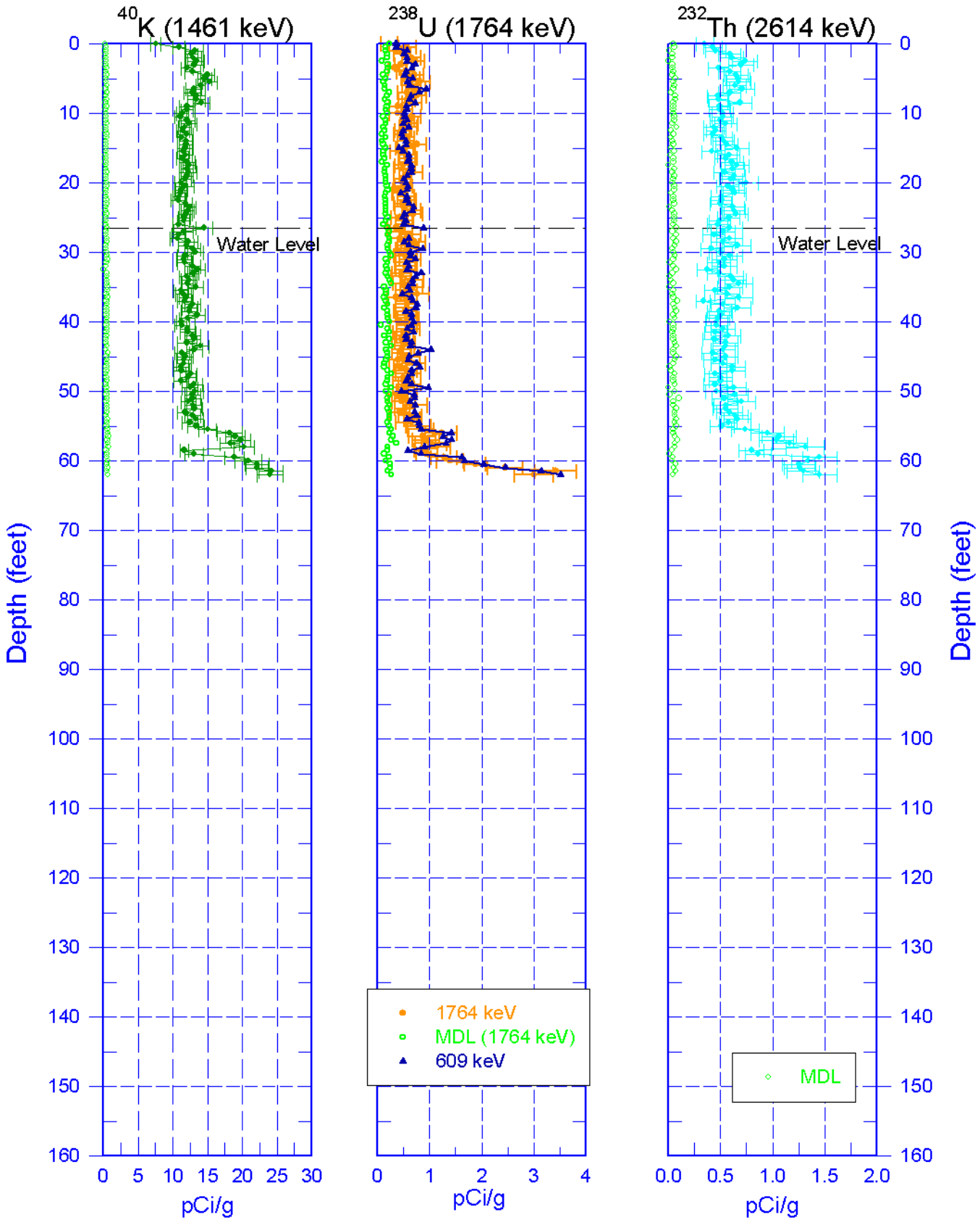
399-2-21 (C6201)
Natural Gamma Logs



Zero Reference - Ground Surface

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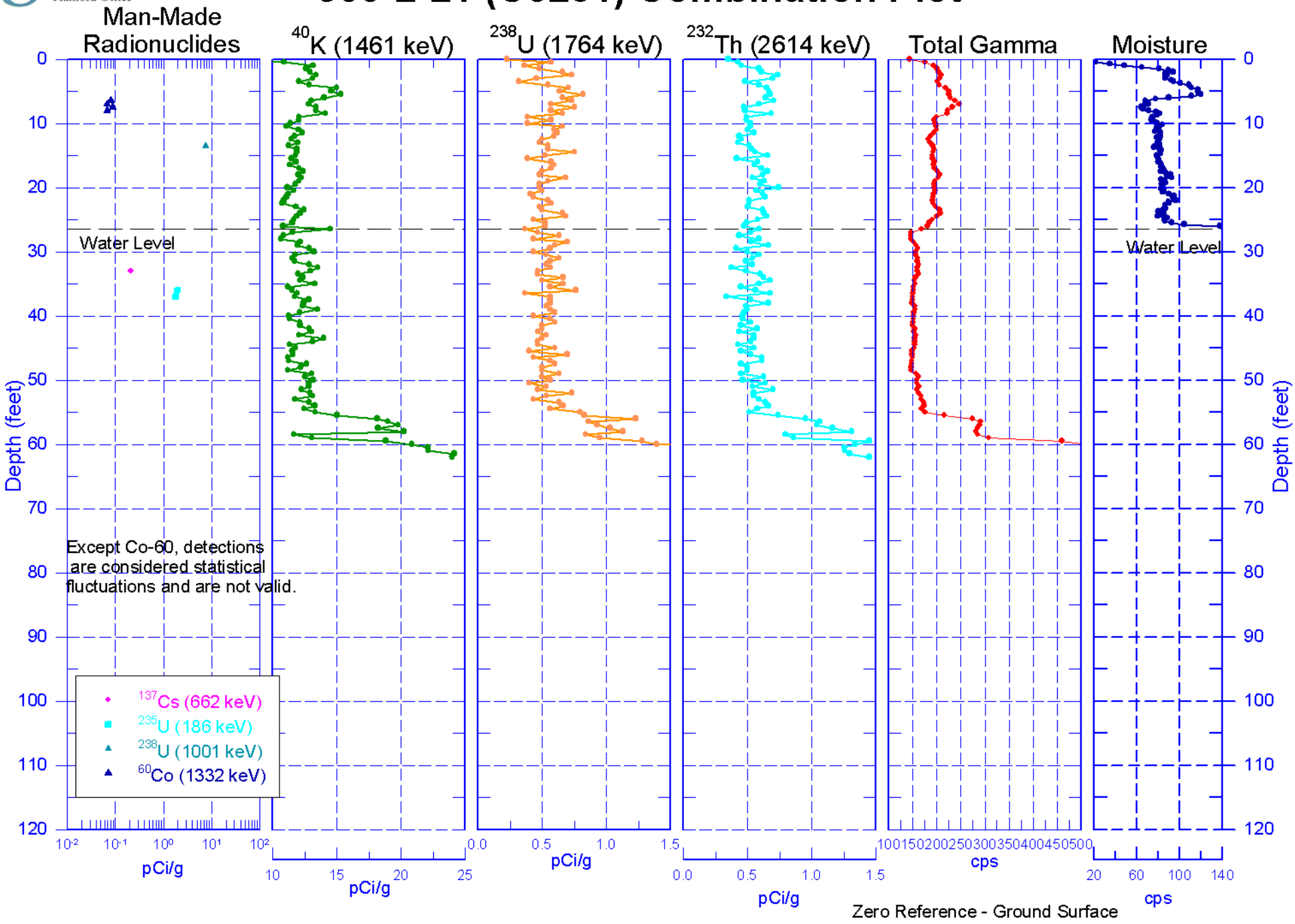
399-2-21 (C6201) Combination Plot



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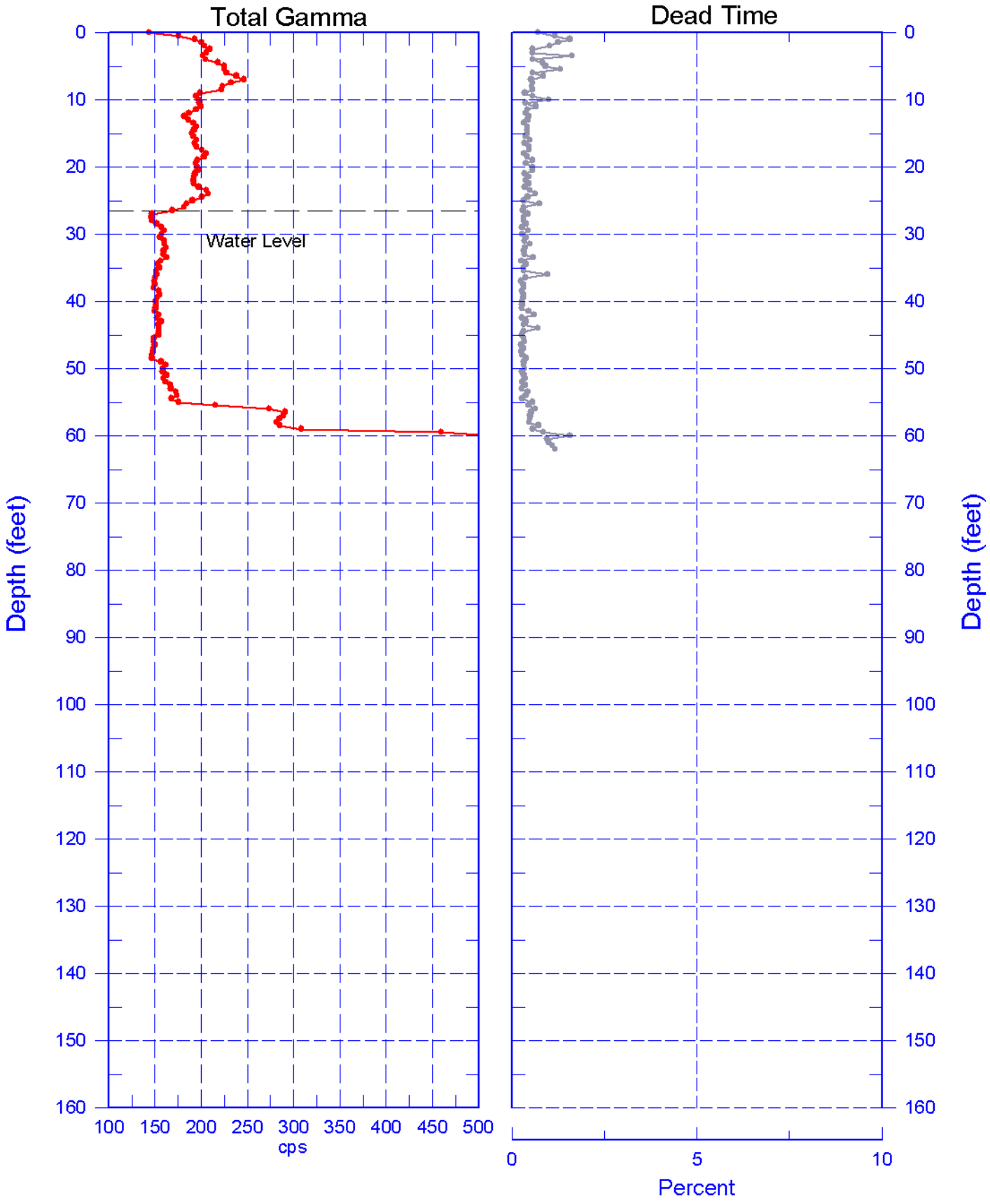
399-2-21 (C6201)
Total Gamma & Dead Time



Reference - Ground Surface

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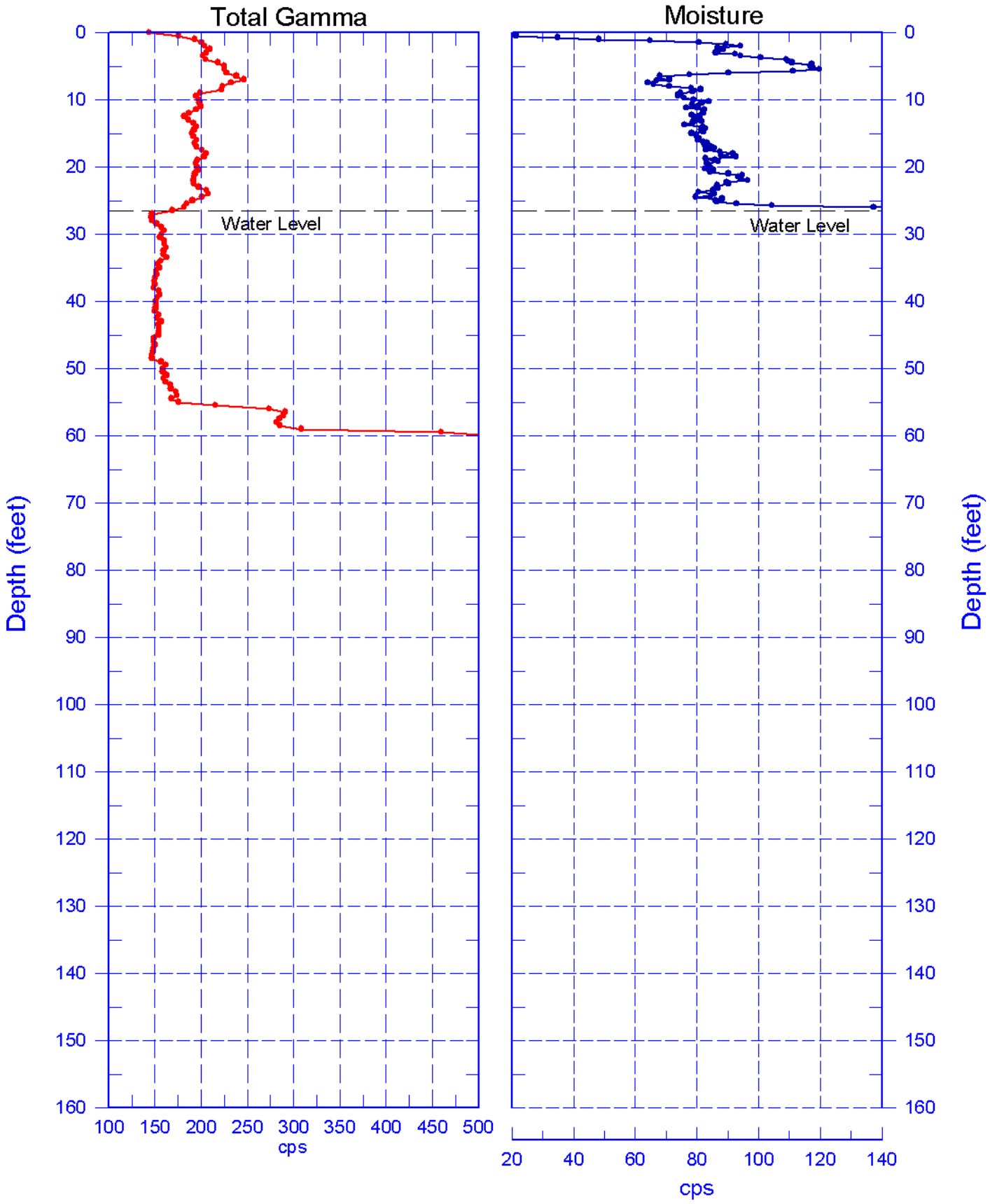
399-2-21 (C6201)
Total Gamma & Moisture



Reference - Ground Surface

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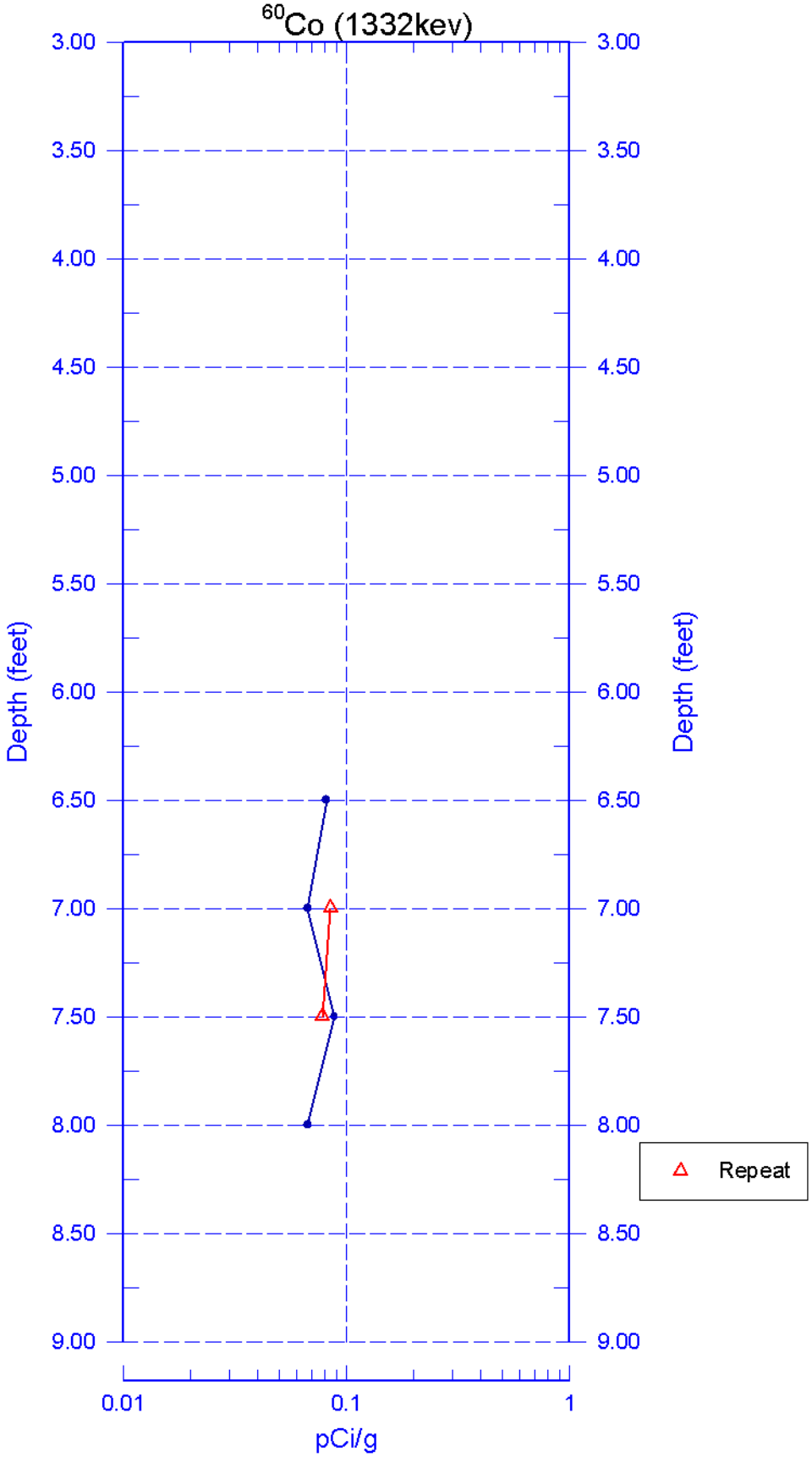
399-2-21 (C6201)
Manmade Repeat Section



Reference - Ground Surface

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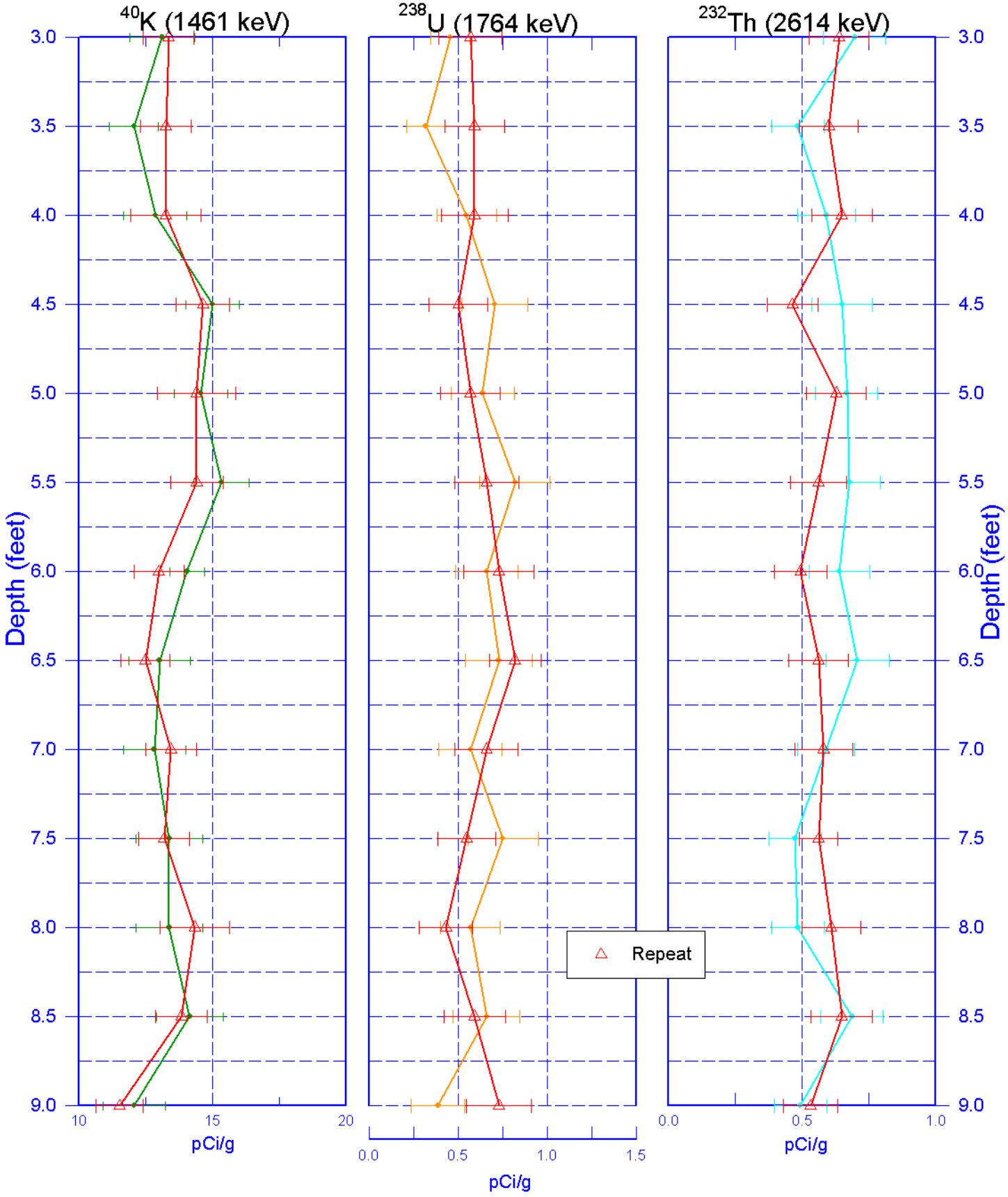
399-2-21 (C6201)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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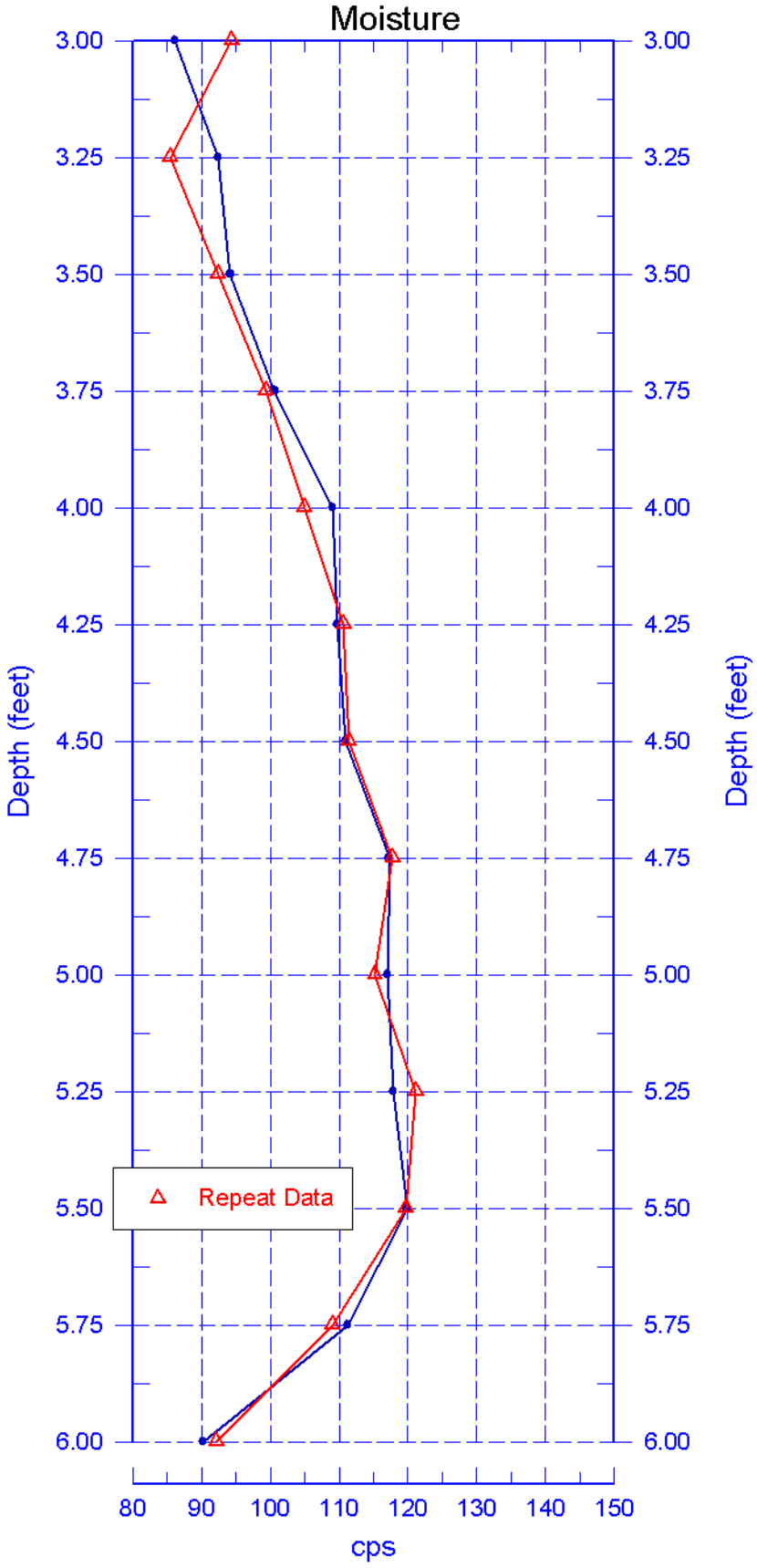
399-2-21 (C6201)
Moisture Repeat Section



Reference - Ground Surface

399-2-22 (C6202)
Log Data Report

Borehole Information:

Borehole:	399-2-22 (C6202)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	30.1	GWL Date:	07/16/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116073.3	594279.7	07/08/08	Unknown	65	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	0.8	7 5/8	6 7/8	3/8	-0.8	60.0

Borehole Notes:

Casing data and total depth were reported by the site geologist. The logging engineer measured depth to water with an e-tape. Casing diameters were measured using a steel tape and rounded to the nearest 1/16 inch. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type:	60% HPGe SGLS
			Serial No.:	47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type:	NMLS
			Serial No.:	H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	07/17/08	07/17/08			
Logging Engineer	McClellan	McClellan			
Start Depth (ft)	63.0	8.0			
Finish Depth (ft)	0.0	2.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DL641CAB	DL641CAB			
Start File	DL641000	DL641127			
Finish File	DL641126	DL641139			
Post-Verification	DL641CAA	DL641CAA			
Depth Return Error (in.)	½ low	NA			
Comments	Fine gain adjusted before -125	Repeat Section			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat			
Date	07/16/08	07/16/08			
Logging Engineer	McClellan	McClellan			
Start Depth (ft)	0.0	30.25			
Finish Depth (ft)	30.25	27.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DHH12CAB	DHH12CAB			
Start File	DHH12000	DHH12122			
Finish File	DHH12121	DHH12135			
Post-Verification	DHH12CAA	DHH12CAA			
Depth Return Error (in.)	NA	0			
Comments	None	Repeat Section			

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum logging depth for the SGLS was 63.4 feet. before the sonde un-weighted. A centralizer was installed on the sonde.

Analysis Notes:

Analyst:	LEGLER	Date:	10/06/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

The SGLS pre- and post-survey verification spectra met the acceptance criteria for the established system, but the verification file DL641CAA had measurements above the upper control limit for the Full Width at Half Maximum (fwhm) for the 2615 keV energy line. The NMLS pre- and post-survey verification spectra met the acceptance criteria for the established system.

A casing correction for a 3/8-in thick casing was applied for depths up to 59.5 ft, where casing ends leaving 3.5 ft of open borehole uncorrected. The Borehole Data Sheet lists the casing depth as 60 ft, but data from the Total Gamma and KUT plots indicated that the casing ends at 59.5 ft.

A water correction was also applied from 30.1 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in inner diameter borehole casing.

Results and Interpretations:

Cs-137 was detected at 4 ft, 6 to 6.5 ft, and 41 feet. Inspection of the individual spectra indicates that detections at 4 and 41 ft are caused by statistical fluctuations associated with processing software. Maximum concentration for detections was 0.13 pCi/g at 6 feet.

Co-60 was detected at 5.5 – 7 ft, with a maximum concentration of 0.22 pCi/g at 6.5 ft.

U-235 and U-238 (Pa-234m) were also detected in this borehole at various isolated depths, but further inspection of the individual spectra indicates that these detections are statistical fluctuations associated with the processing software.

The neutron moisture data from 14.5 to 18.25 ft exhibits unusually erratic behavior, dropping to a low of 24 cps at 18 feet. This could indicate low moisture content such as a void next to the casing or an intermittent failure of the detector at these depths.

The manmade, KUT and Moisture repeat plots indicate good repeatability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Manmade Repeat Section
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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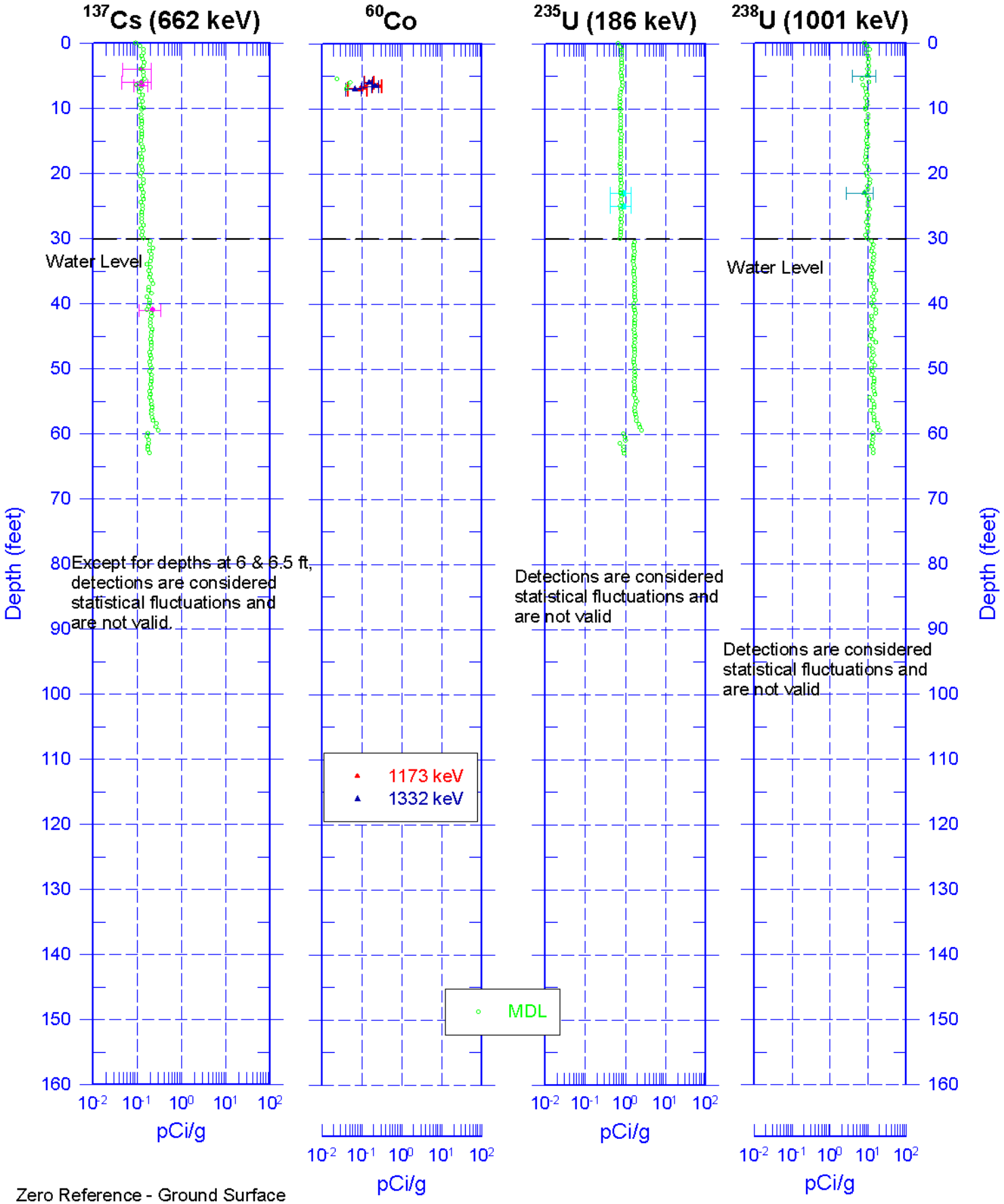
399-2-22 (C6202)
Manmade Radionuclides



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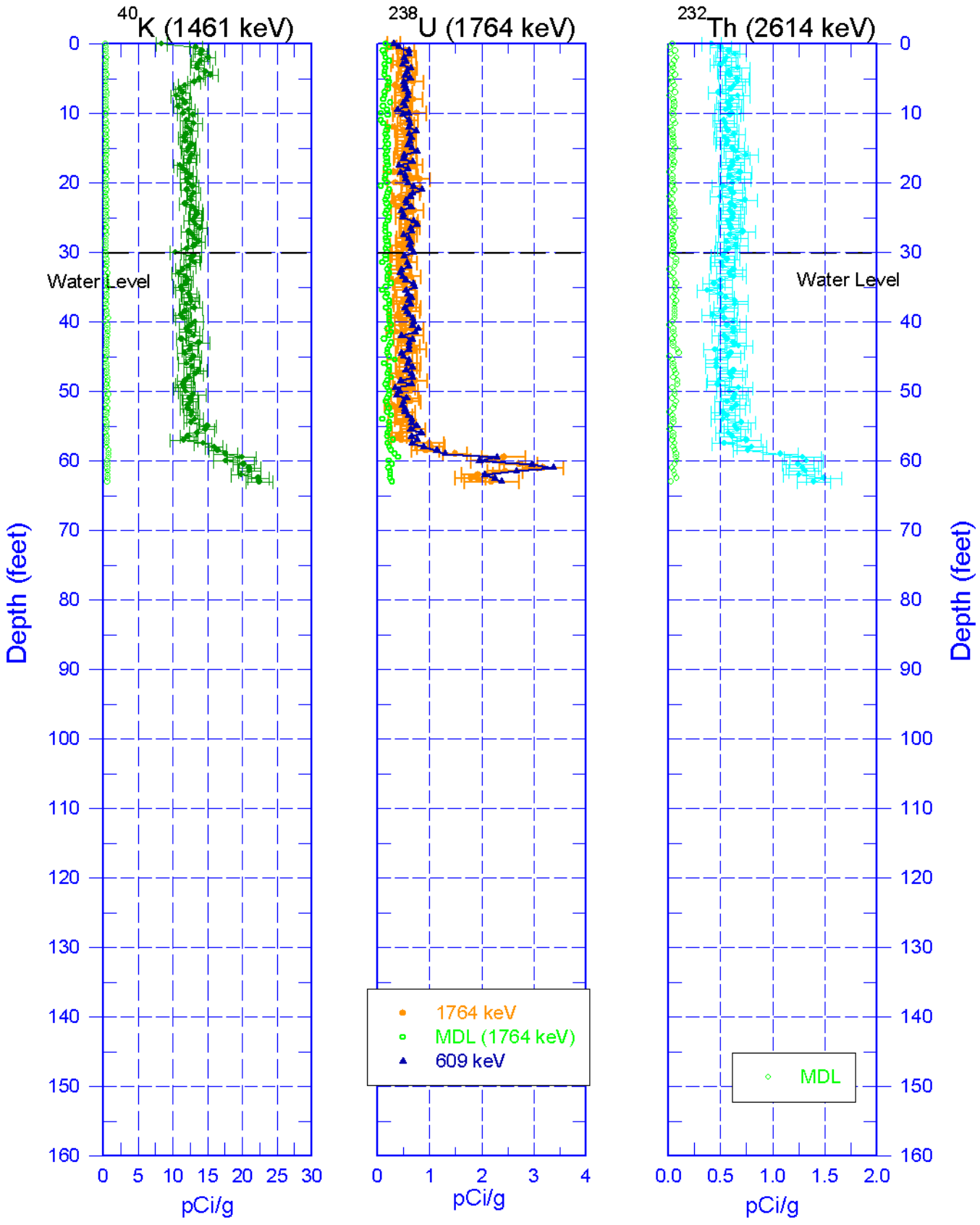
399-2-22 (C6202)
Natural Gamma Logs



Zero Reference - Ground Surface

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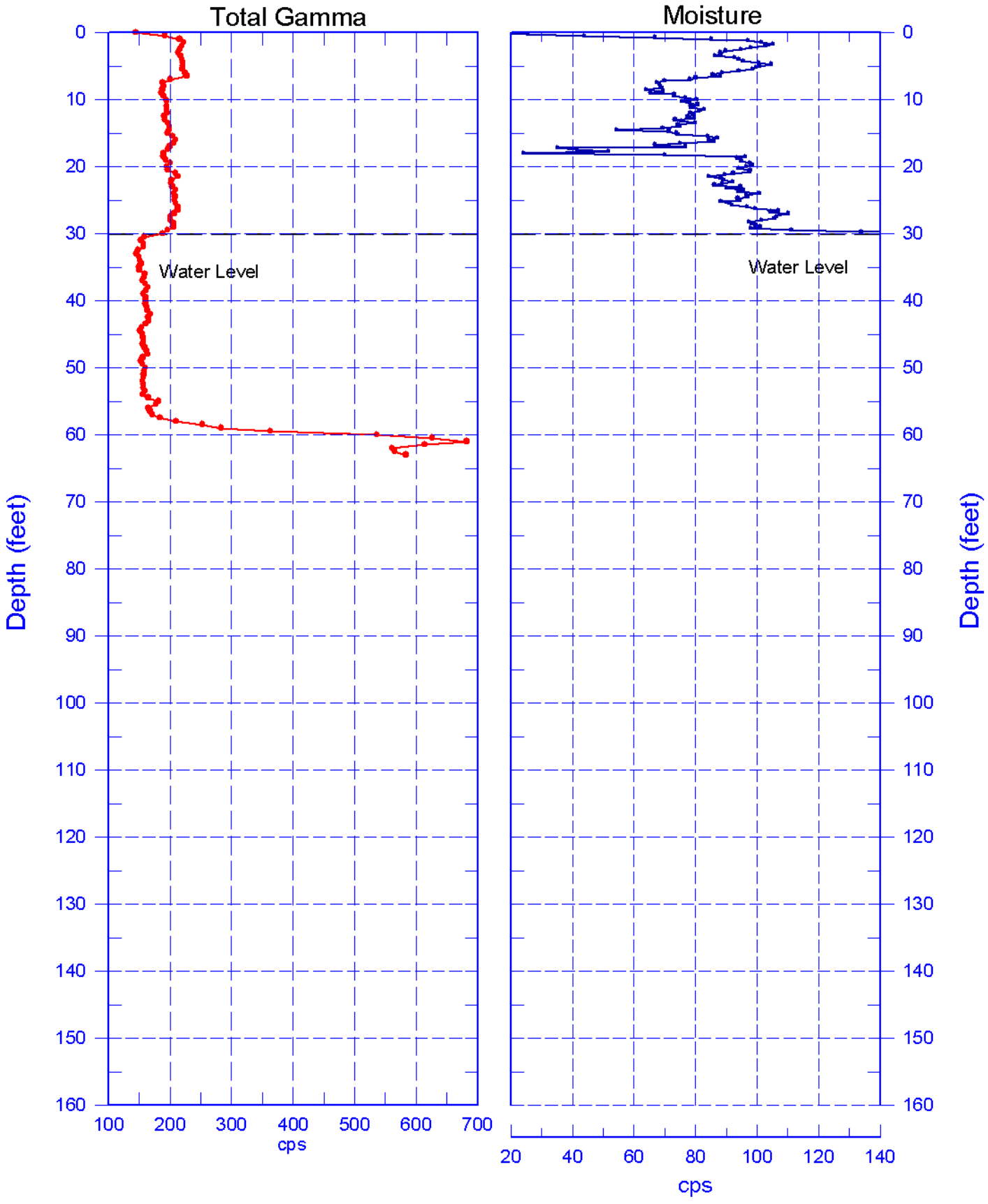
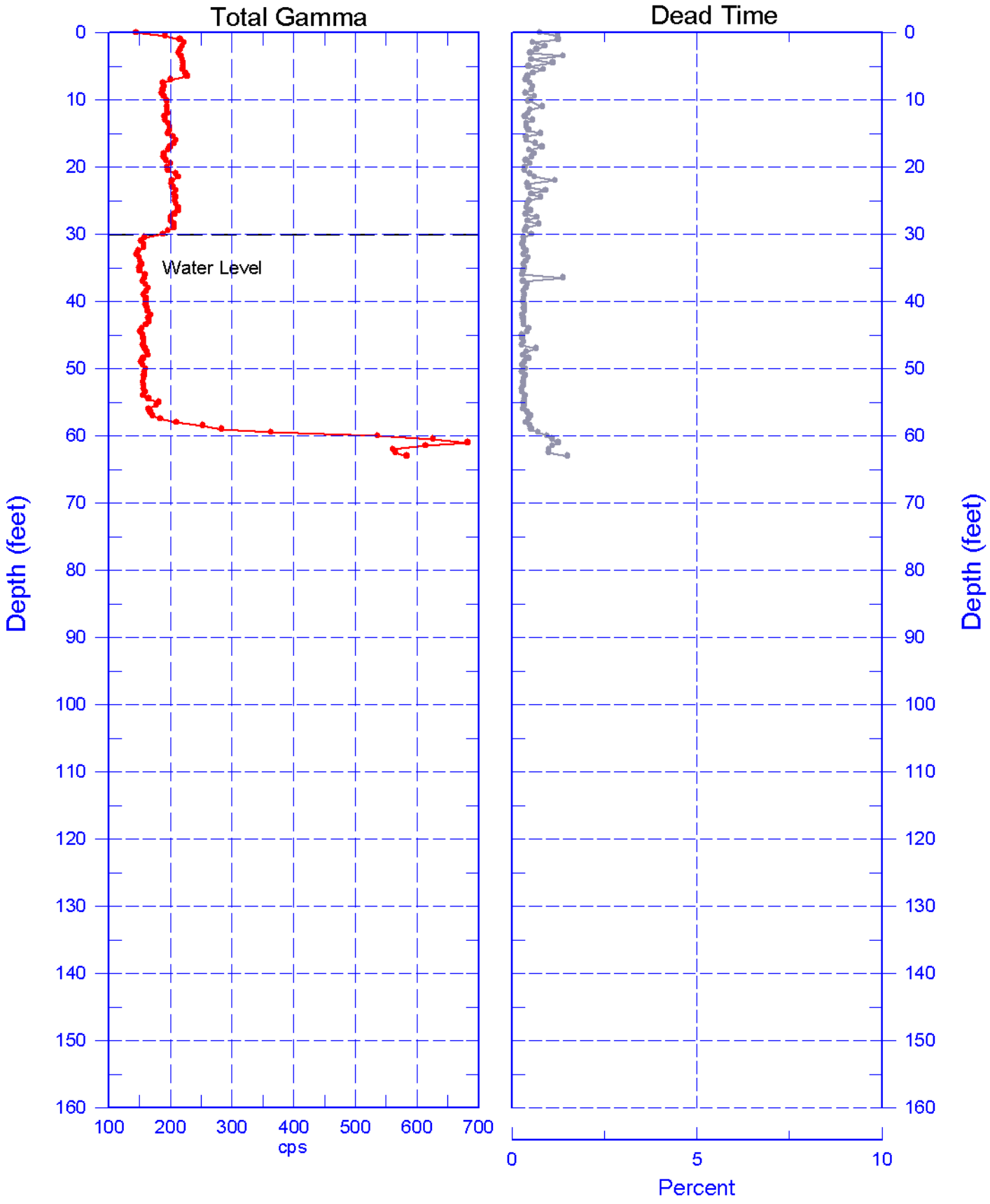
399-2-22 (C6202)
Total Gamma & Moisture



Reference - Ground Surface

Stoller
Hanford Office

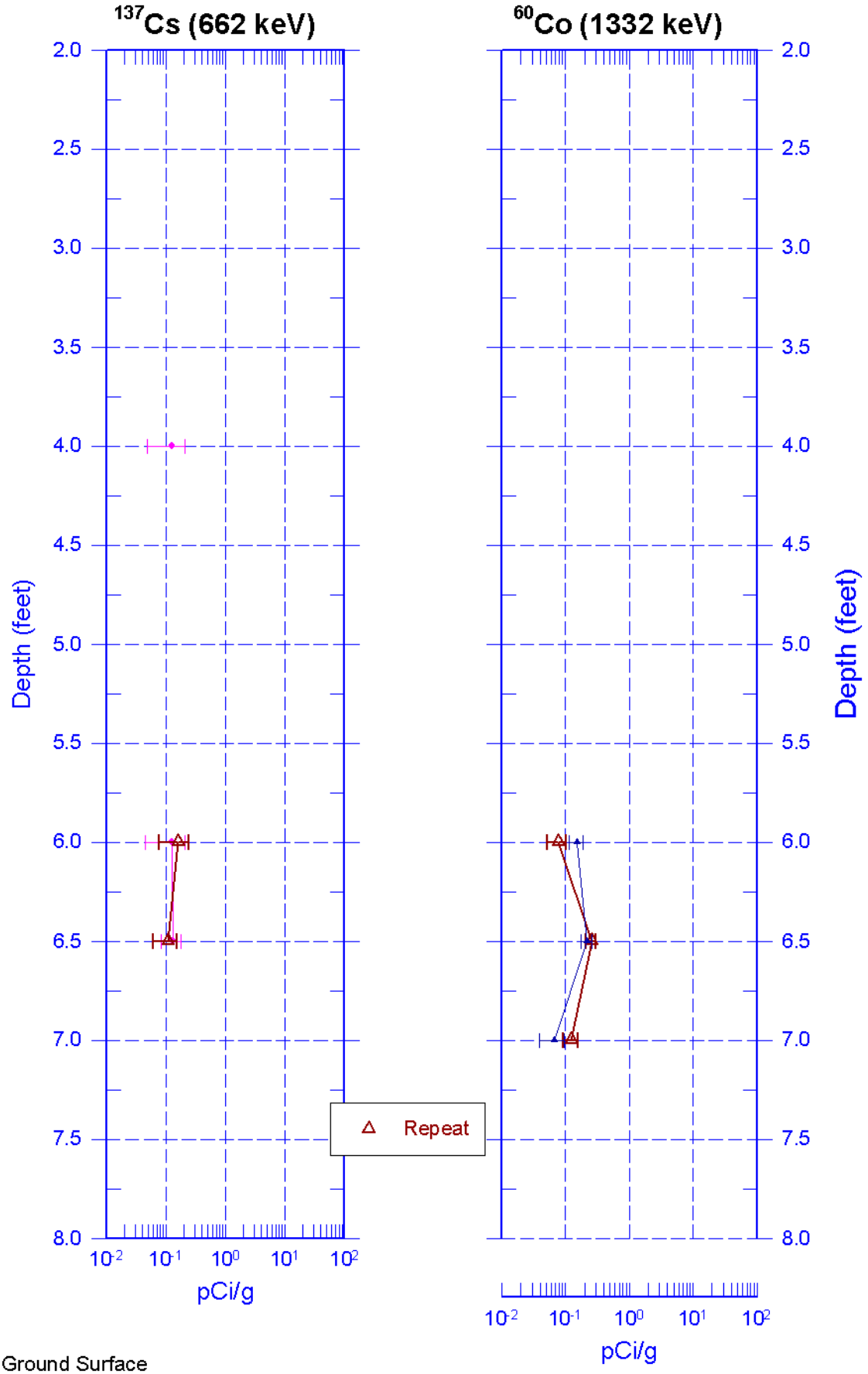
399-2-22 (C6202)
Total Gamma & Dead Time



Reference - Ground Surface

Stoller
Hanford Office

399-2-22 (C6202)
Manmade Repeat Section

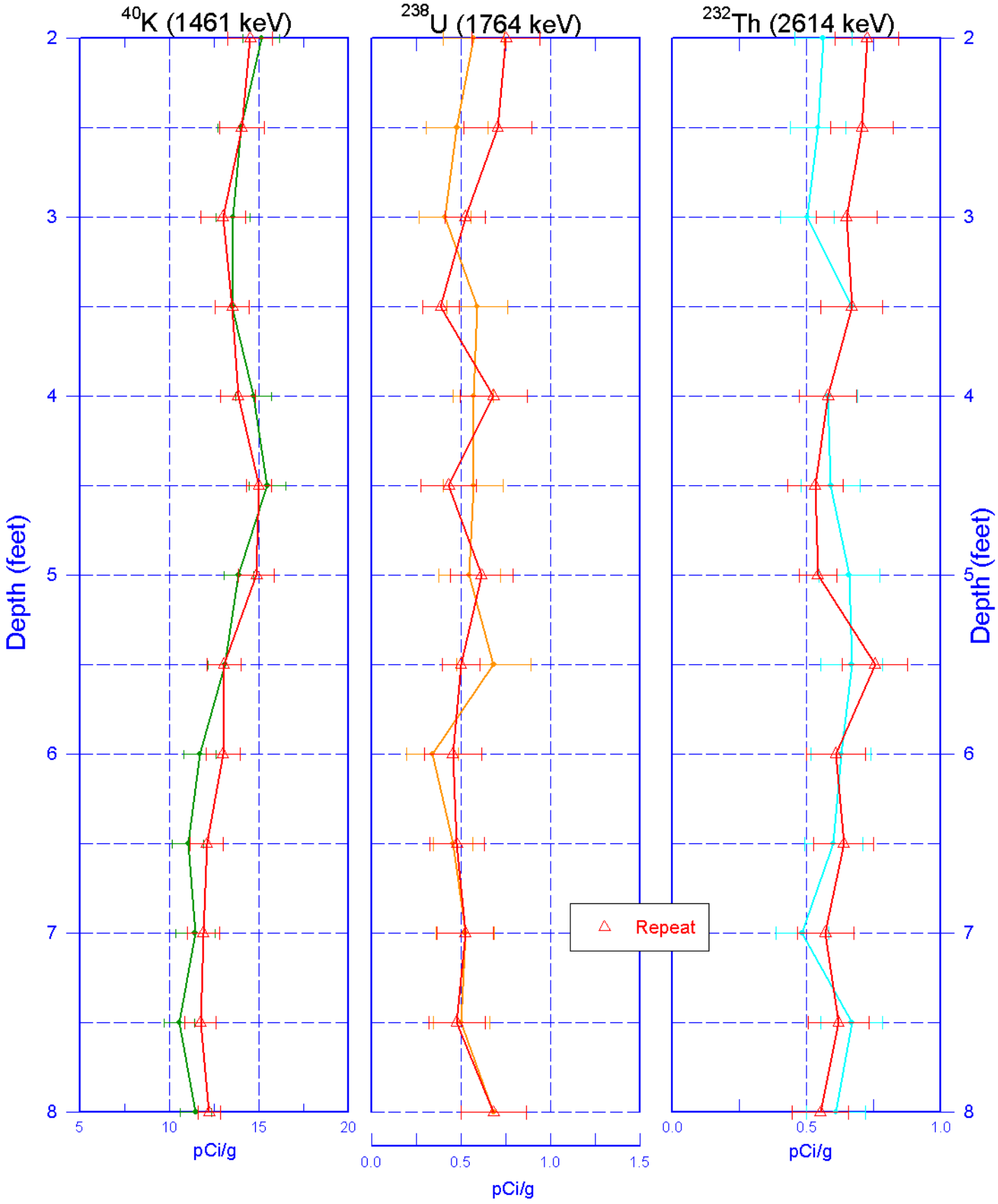


Zero Reference - Ground Surface

Stoller
Hanford Office

399-2-22 (C6202)

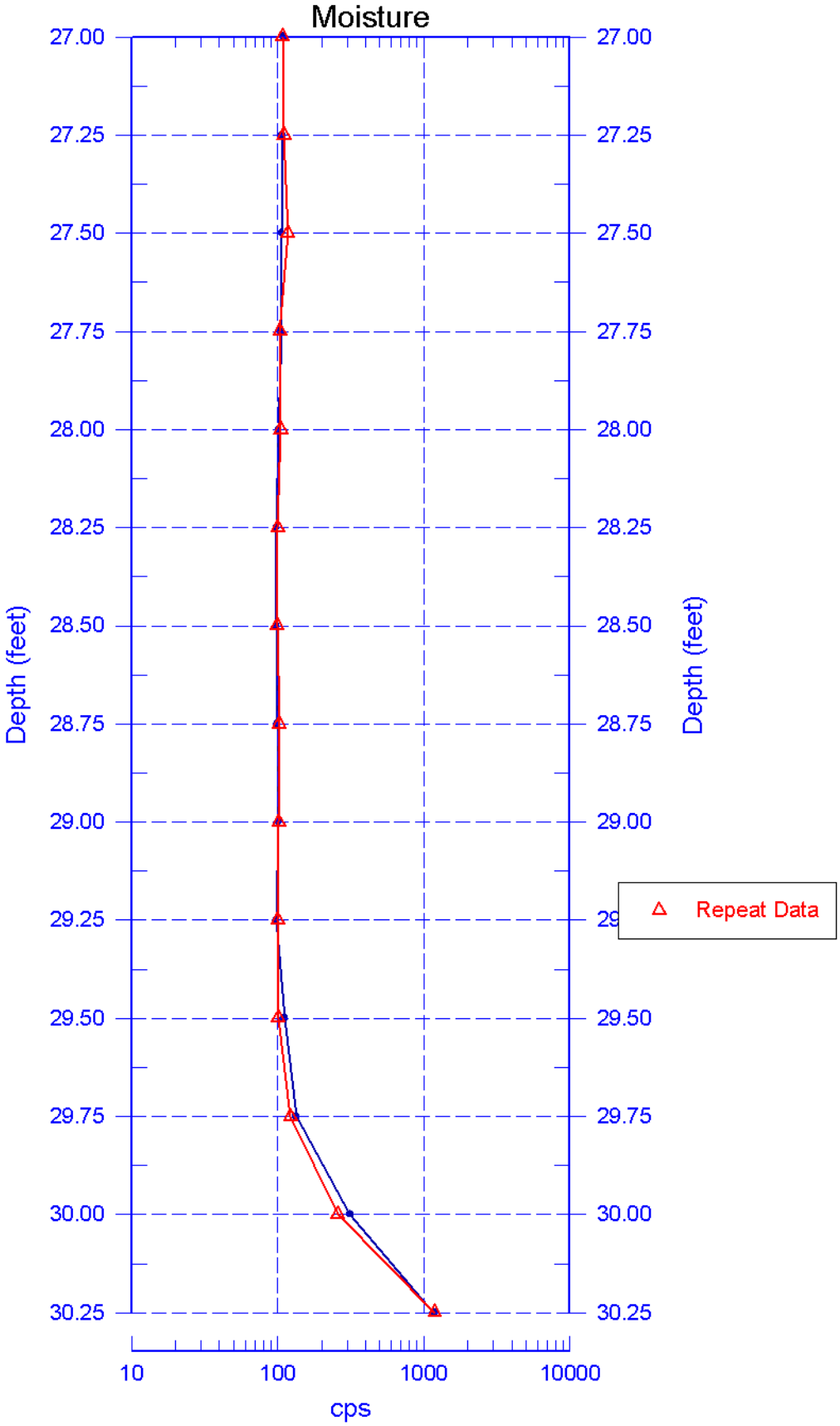
Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

Stoller
Hanford Office

399-2-22 (C6202)
Moisture Repeat Section



Reference - Ground Surface

399-2-23 (C6207)
Log Data Report

Borehole Information:

Borehole:	399-2-23 (C6207)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	27.7	GWL Date:	07/09/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116057.6	594272.4	07/08/08	Unknown	59	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	2.2	7 5/8	6 7/8	3/8	-2.2	57.8

Borehole Notes:

Casing data and total depth were reported by the site geologist. The logging engineer measured the depth to water with an e-tape. Casing diameters were measured using a steel tape and rounded to the nearest 1/16 inch. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type:	60% HPGe SGLS
			Serial No.:	47TP32211A
Effective Calibration Date:	12/31/2007	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type:	NMLS
			Serial No.:	H310700352
Effective Calibration Date:	11/06/2007	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	07/09/08	07/09/08			
Logging Engineer	McClellan	McClellan			
Start Depth (ft)	58.0	8.0			
Finish Depth (ft)	0.0	2.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DL591CAB	DL591CAB			
Start File	DL591000	DL951117			
Finish File	DL591116	DL591129			
Post-Verification	DL591CAA	DL591CAA			
Depth Return Error (in.)	0.0	NA			
Comments	None	Repeat Section			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat			
Date	07/10/08	07/10/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	0.0	1.0			
Finish Depth (ft)	28.0	4.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DHG62CAB	DHG62CAB			
Start File	DHG62000	DHG62113			
Finish File	DHG62112	DHG62125			
Post-Verification	DHG62CAA	DHG62CAA			
Depth Return Error (in.)	NA	0.0			
Comments	None	Repeat Section			

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum logging depth for the SGLS was 58.5 ft before the sonde un-weighted. A centralizer was installed on the sonde.

Analysis Notes:

Analyst:	LEGLER	Date:	10/08/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

The SGLS pre- and post-survey verification spectra met the acceptance criteria for the established system, but the verification file DL591CAA had measurements above the upper control limit for the Full Width at Half Maximum (fwhm) for the 1461 keV energy line. NMLS pre- and post survey verification spectra met the acceptance criteria for the established system.

A casing correction for a 3/8-in thick casing was applied for depths up to 57.8 ft, where casing ends leaving 0.2 ft of open borehole uncorrected. A water correction was also applied from 27.7 ft to total logged depth of the borehole.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in inner diameter borehole casing.

Results and Interpretations:

Cs-137 was detected at 11 ft, 12.5 ft, 13-16.5 ft, 18.5 ft, 48.5, and 55 ft, with the maximum concentration of 0.22 pCi/g at 14.5 feet. Inspection of the individual spectra indicates that detections at 11 ft, 48.5 ft and 55 ft, are statistical fluctuations associated with the processing software and are not valid.

Co-60 was detected at 6 –18.5 ft with a maximum concentration of 0.36 pCi/g at 13.5 feet.

U-235 and U-238 (Pa-234m) were detected at several isolated depths throughout this borehole, but inspection of the individual spectra indicates that these detections are statistical fluctuations associated with the processing software.

The KUT, Moisture and manmade repeat plots indicate good repeatability.

Below the 54 ft depth, a probable lithologic change occurs, which is indicated by the increased KUT concentrations and the Total Gamma count rates.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Manmade Repeat Section
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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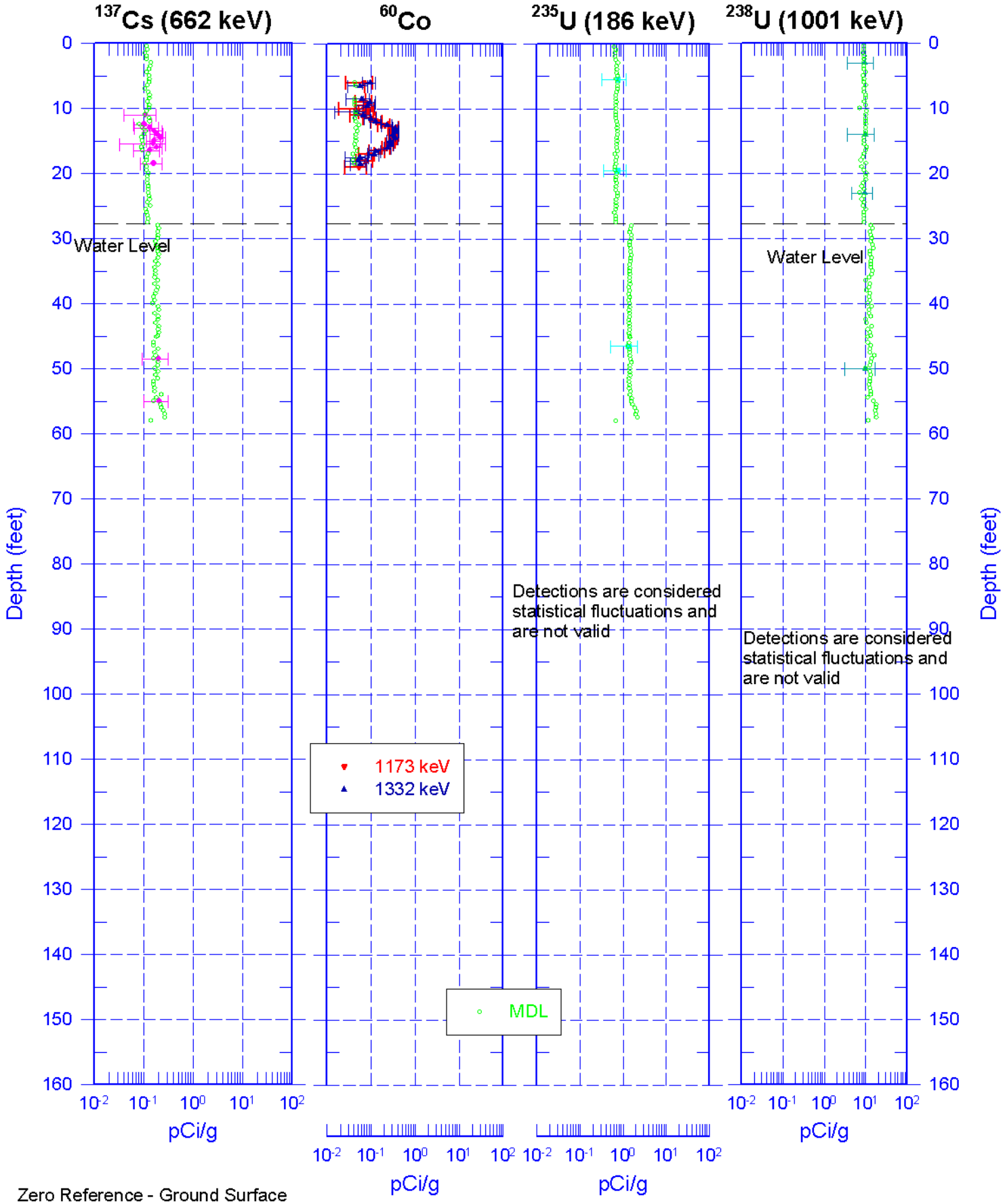
399-2-23 (C6207)
Manmade Radionuclides



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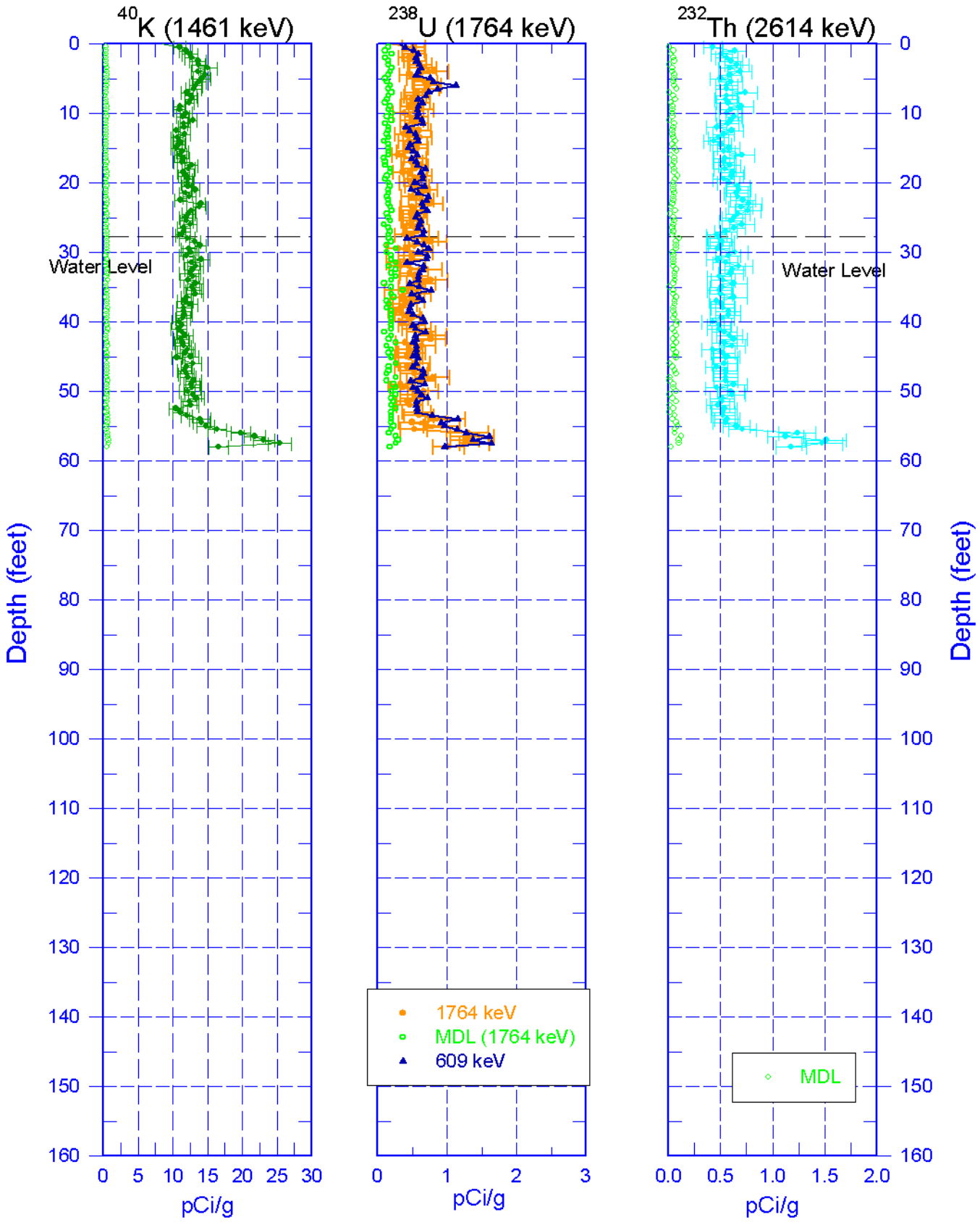
399-2-23 (C6207)
Natural Gamma Logs



Zero Reference - Ground Surface

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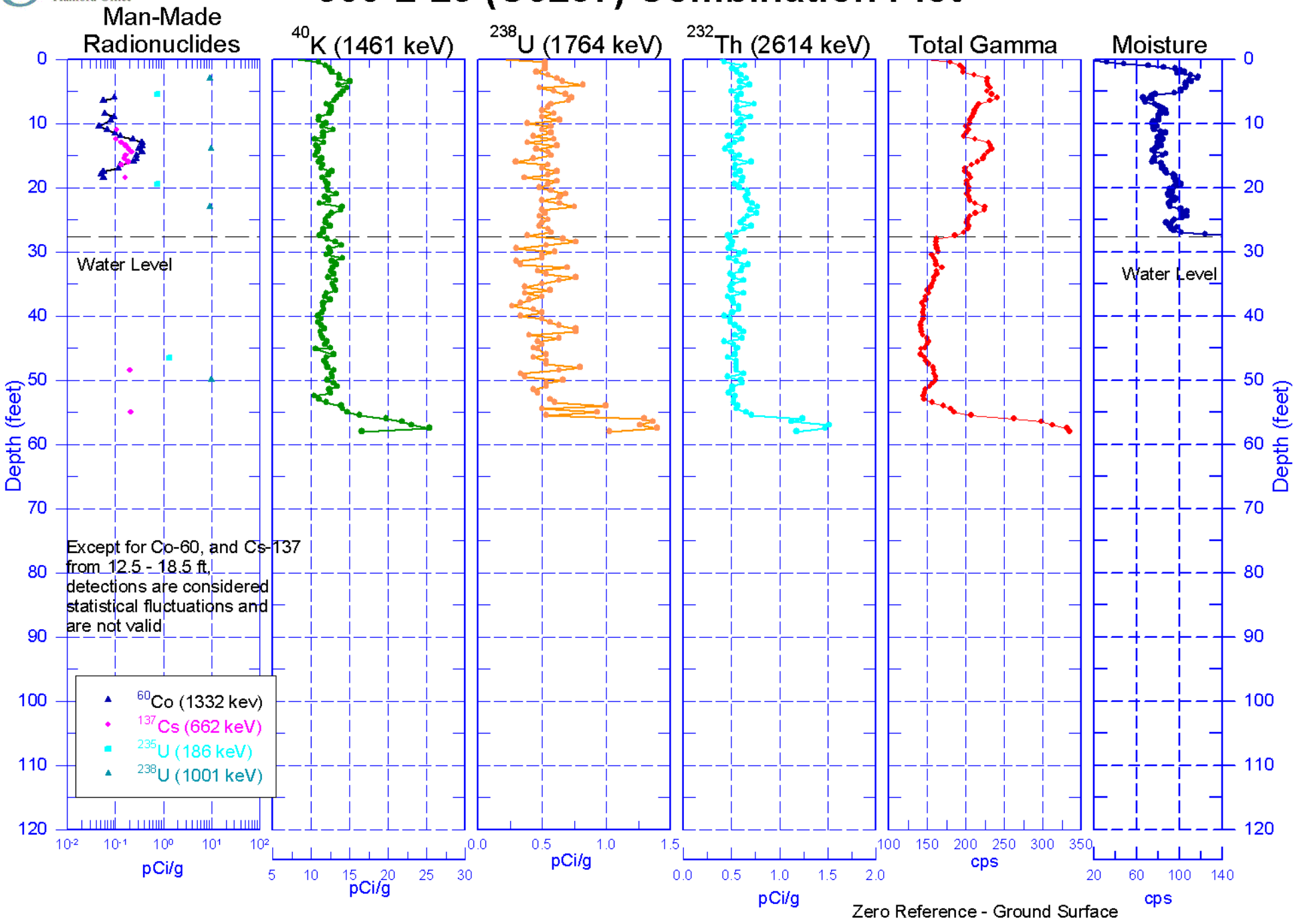
399-2-23 (C6207) Combination Plot



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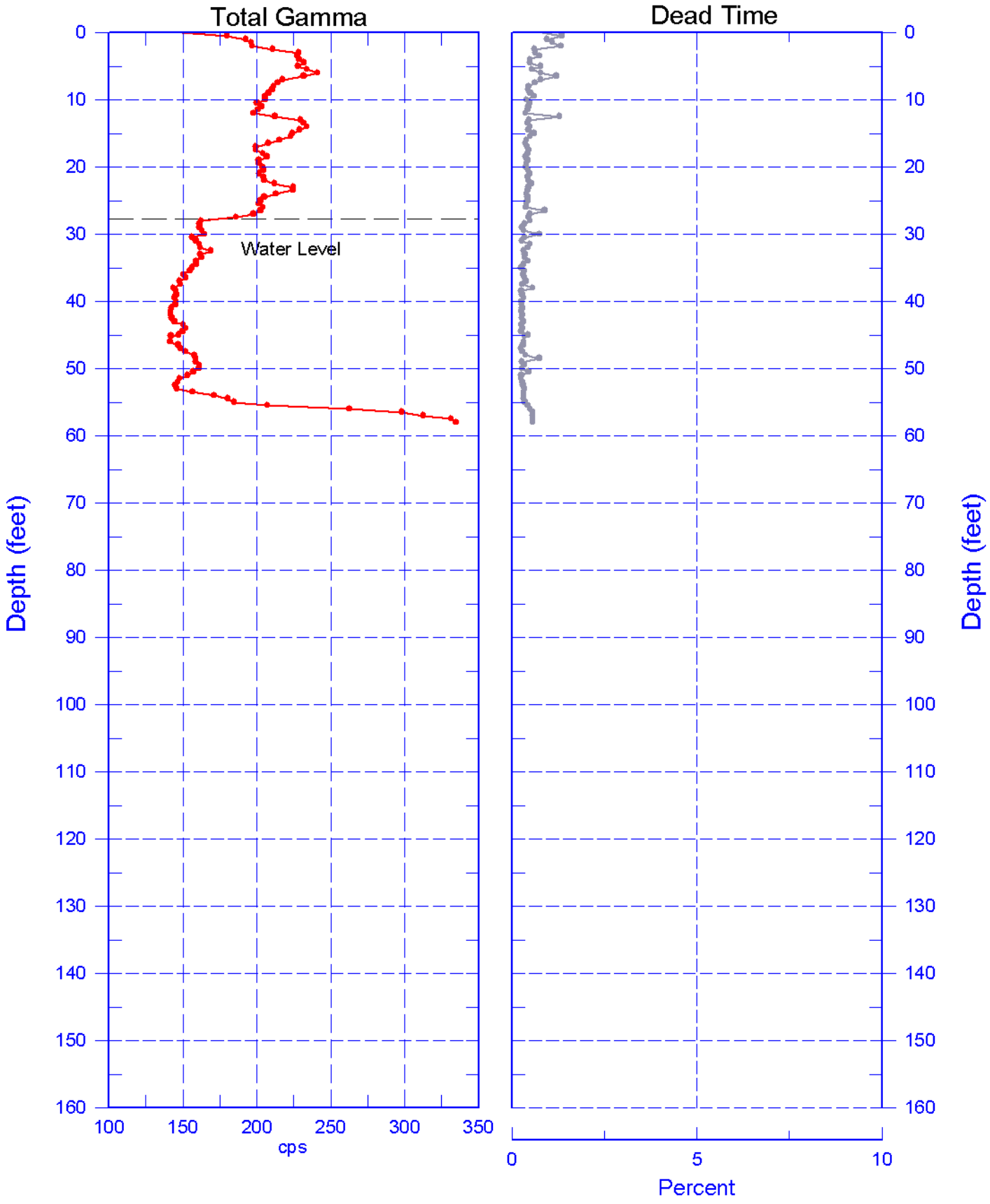
399-2-23 (C6207)
Total Gamma & Dead Time



Reference - Ground Surface

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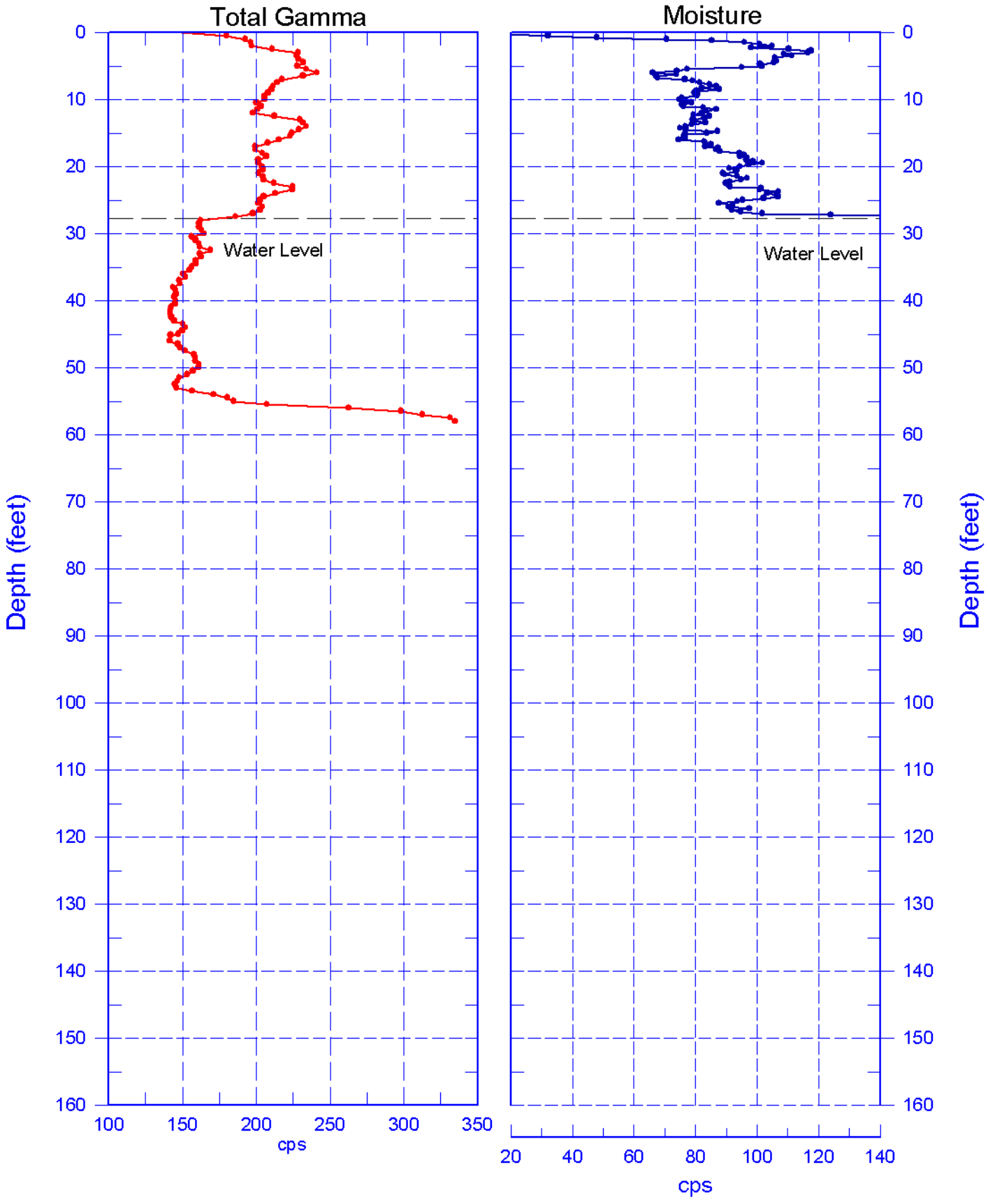
399-2-23 (C6207)
Total Gamma & Moisture



Reference - Ground Surface

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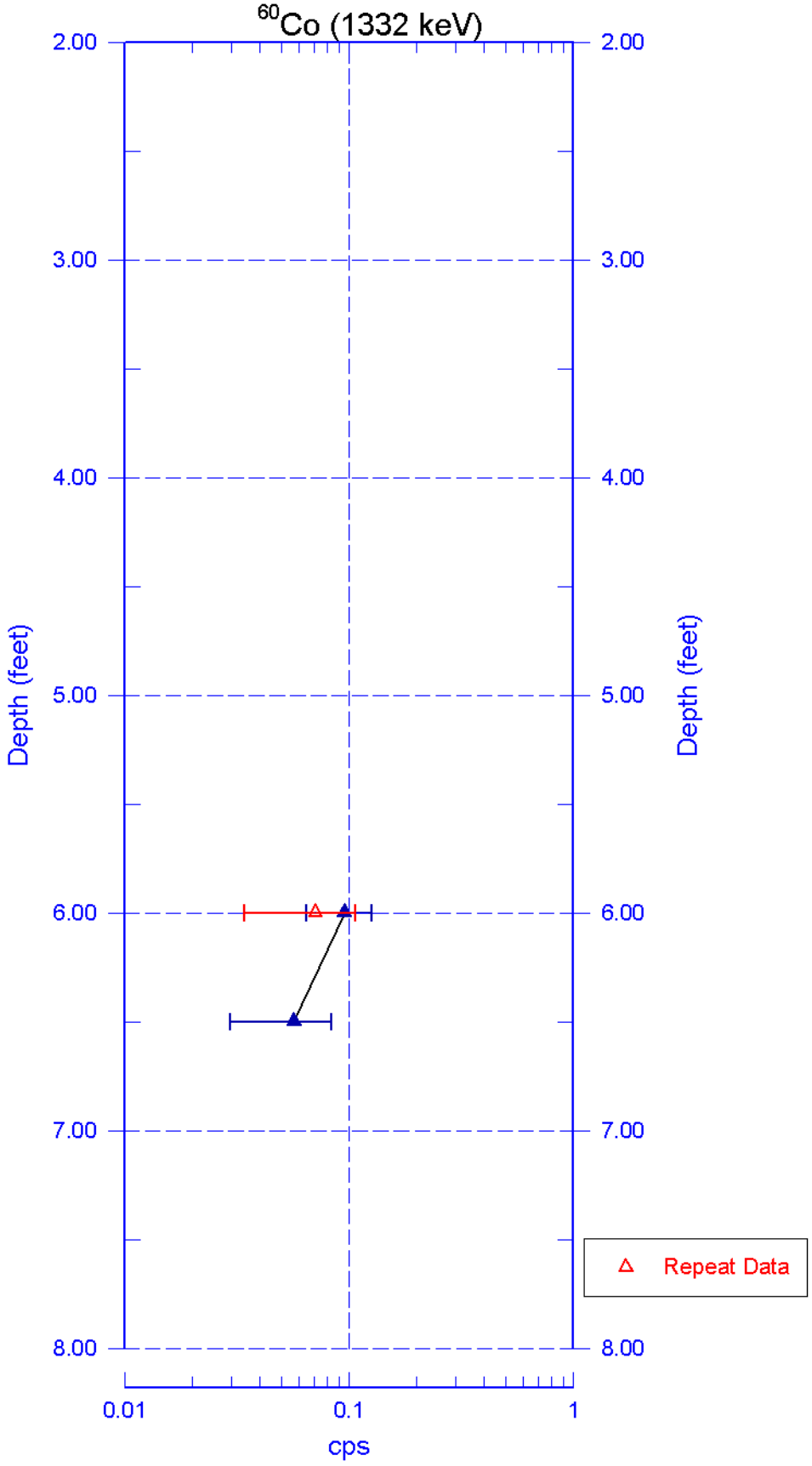
399-2-23 (C6207)
Manmade Repeat Section



Reference - Ground Surface

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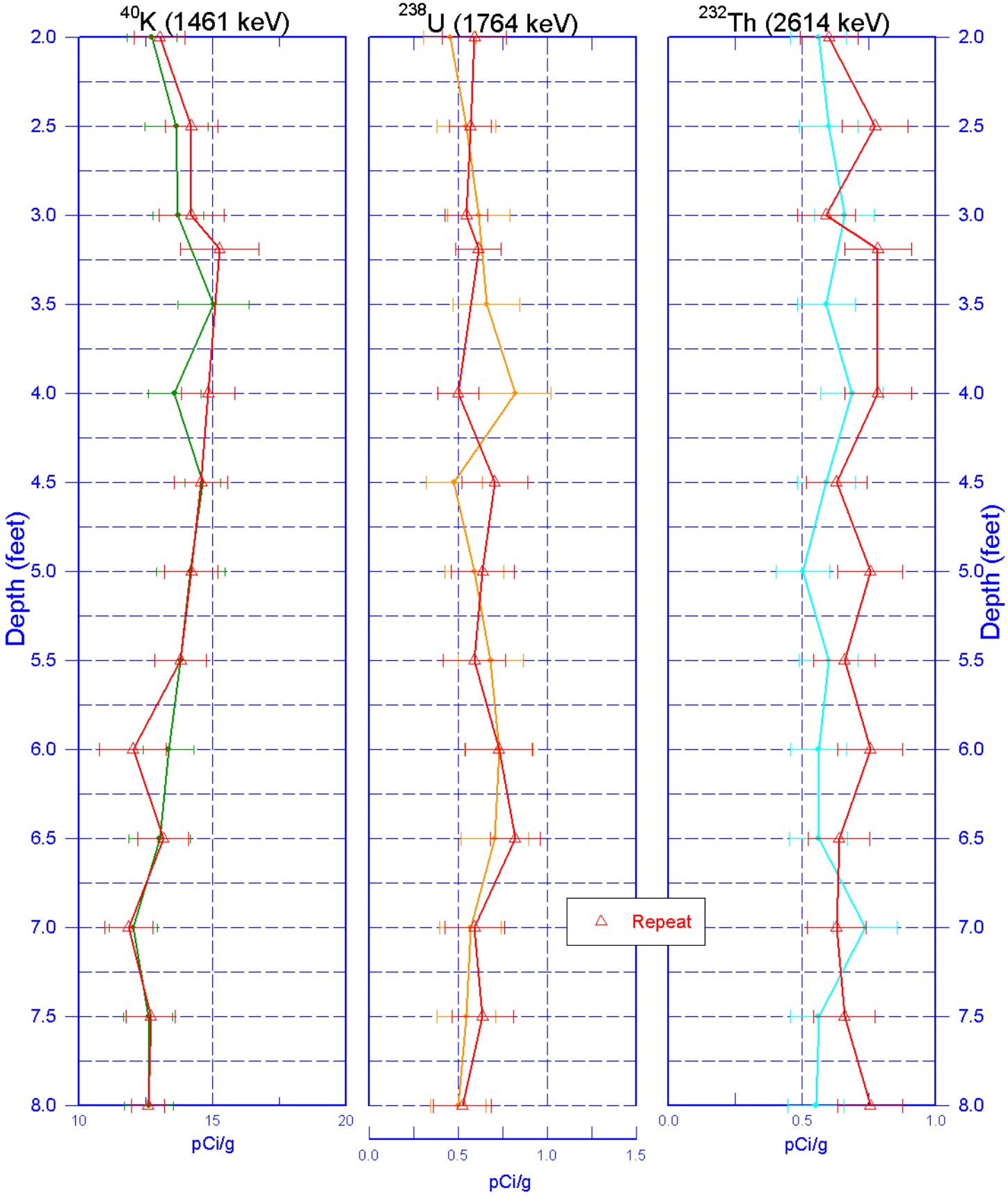
399-2-23 (C6207)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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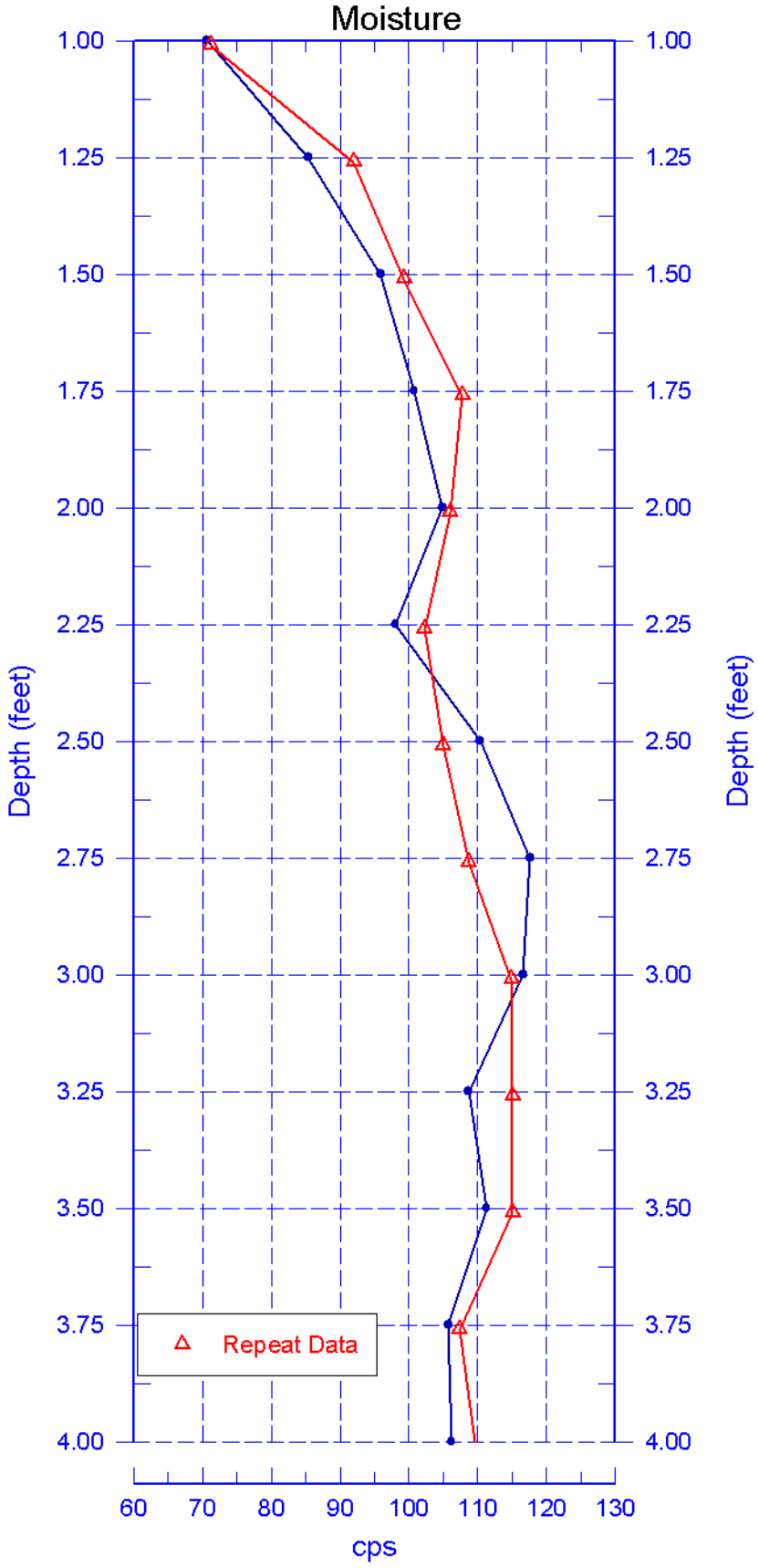
399-2-23 (C6207)
Moisture Repeat Section



Reference - Ground Surface

399-2-24 (C6208)
Log Data Report

Borehole Information:

Borehole:	399-2-24 (C6208)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	26.3	GWL Date:	06/03/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116063.3659	594280.564	06/02/08	Unknown	67.5	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	2.5	7 5/8	6 7/8	3/8	-2.5	63.2

Borehole Notes:

Well site geologist reported depth to bottom, depth to water and depth of casing. Logger measured the casing diameter using a steel tape and rounding to the nearest 1/16-in. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 1 N		Type: / Serial No.:	60% HPGe SGLS / 45TP22010A
Effective Calibration Date:	03/28/08	Calibration Reference:	HGLP-CC-031	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 1 M		Type: / Serial No.:	NMLS / H340207279
Effective Calibration Date:	05/06/08	Calibration Reference:	HGLP-CC-032	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3 Repeat
Date	06/03/08	06/04/08	06/04/08
Logging Engineer	McClellan	McClellan	McClellan
Start Depth (ft)	0.0	50.0	64.0
Finish Depth (ft)	51.0	65.0	57.5
Count Time (sec)	200	200	200
Live/Real	R	R	R
Shield (Y/N)	N	N	N
MSA Interval (ft)	0.5	0.5	0.5
Log Speed (ft/min)	N/A	N/A	N/A
Pre-Verification	AN079CAB	AN080CAB	AN080CAB
Start File	AN079000	AN080000	AN080031
Finish File	AN079102	AN080030	AN080044
Post-Verification	AN079CAA	AN080CAA	AN080CAA
Depth Return Error (in.)	0	N/A	0
Comments	No fine gain adjustment made.	No fine gain adjustment made.	No fine gain adjustment made. Repeat section

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	4	5 Repeat
Date	06/04/08	06/04/08
Logging Engineer	McClellan	McClellan
Start Depth (ft)	0.0	26.25
Finish Depth (ft)	26.5	20.0
Count Time (sec)	15	15
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.25	0.25
Log Speed (ft/min)	N/A	N/A
Pre-Verification	AM006CAB	AM006CAB
Start File	AM006000	AM006107
Finish File	AM006106	AM006132
Post-Verification	AM006CAA	AM006CAA
Depth Return Error (in.)	N/A	1.5 high
Comments	None	Repeat section.

Logging Operation Notes:

Data were collected using Gamma 1, HO 68B-3574. Spectral log data (SGLS) pre- and post-survey verification measurements were acquired in the Amersham KUTh-118 field verifier. Neutron moisture pre- and post-survey verification measurements were acquired in the AmBe standard. Maximum logging depth was 65.0 ft. before the sonde un-weighted. A centralizer was installed on the sondes.

Analysis Notes:

Analyst:	LEGLER	Date:	6/24/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

The pre- and post-survey verification spectra met the acceptance criteria for the established systems. A correction for a 3/8-in. thick casing was applied to SGLS from ground surface to 63.2 ft, leaving 1.8 ft of open borehole uncorrected. A water correction was also applied from 26.3 ft to total logged depth.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL worksheet template identified as G1NMar08.xls using efficiency functions and corrections for casing, dead time, and water as determined by annual calibrations.

Moisture data are presented in counts per second because no calibration data exists for a 6 7/8-in. inner diameter casing.

Results and Interpretations:

Cs-137, Co-60, U-238 (Pa-234m), and U-235 were detected at several isolated depths in this borehole. Co-60 was detected at 0.12 pCi/g at 6.5 ft. Inspection of the individual spectra for the other isotopes at the various depths indicates these detections are statistical fluctuations and are not valid.

A fine grain sediment layer can be found at around 23 ft, as seen by an increase in the total gamma and natural U-238 (1764keV) plots.

The KUT and Moisture plots indicate good repeat ability.

Depth to groundwater is reported to be 33 ft in the Logging Request Tracking Sheet (no date provided). Log data collected on 6/03/08 and 6/04/08 indicate depth to ground water is approximately 26.3 ft. The depth to groundwater appears to fluctuate with changes in the river level.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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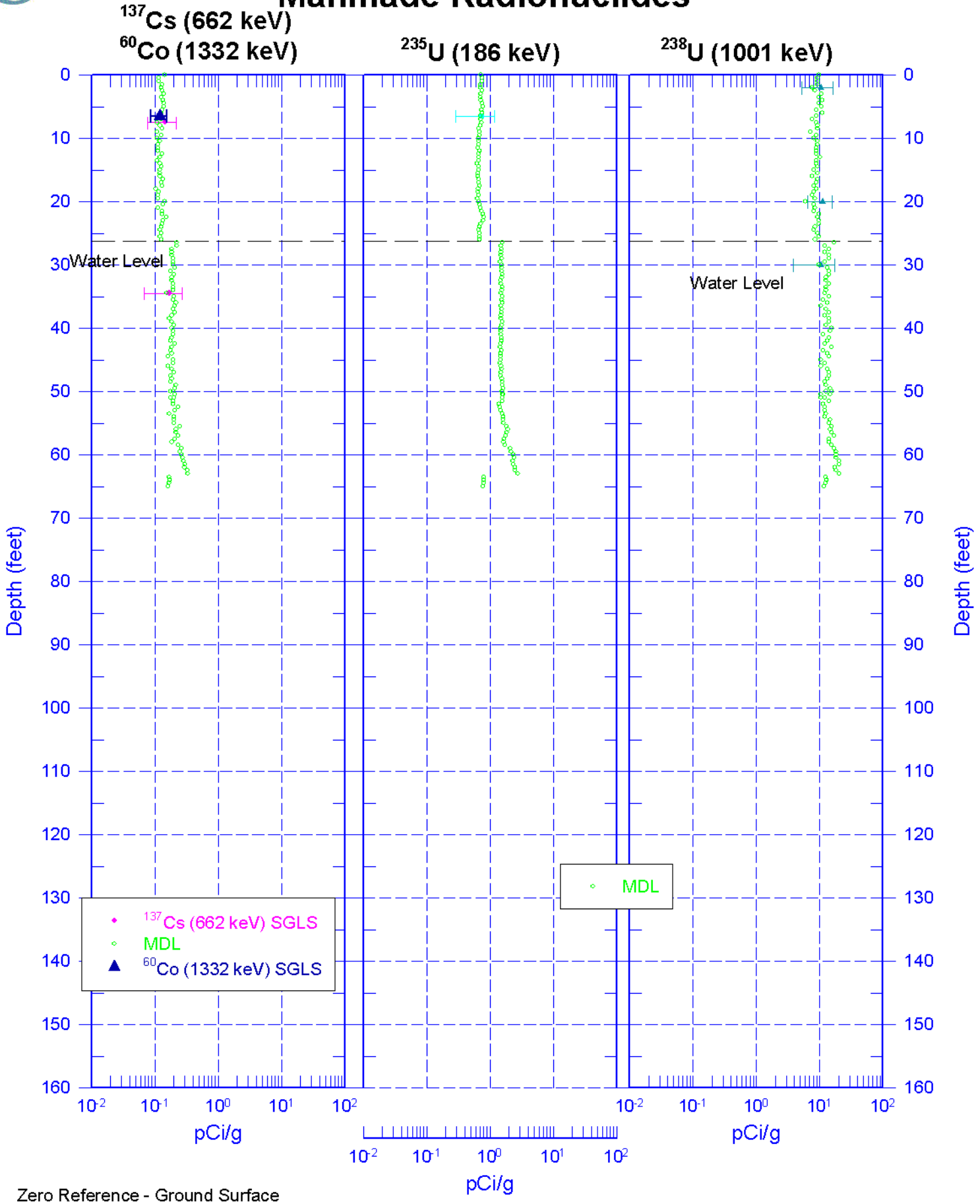
399-2-24 (C6208)
Manmade Radionuclides



Zero Reference - Ground Surface

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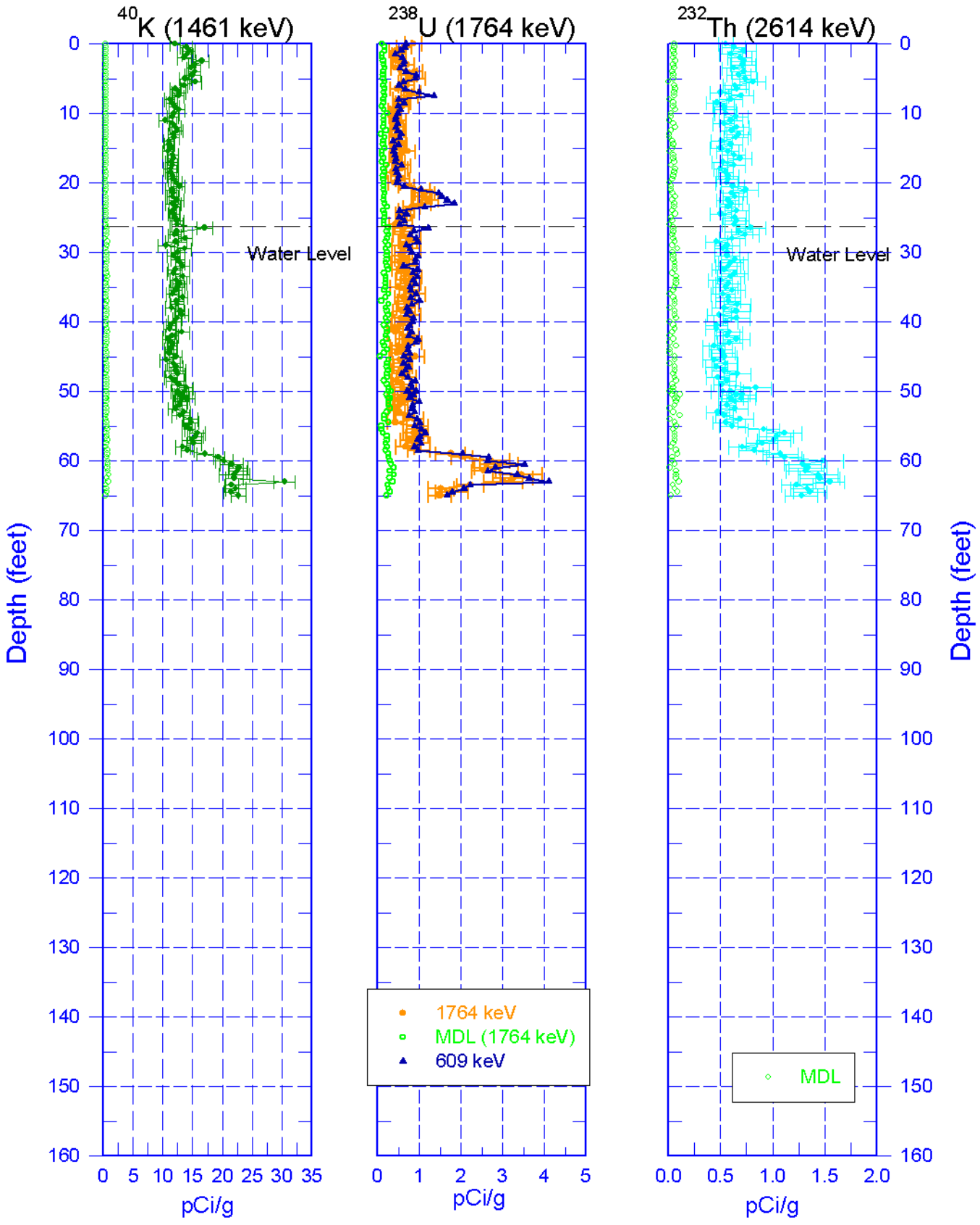
399-2-24 (C6208)
Natural Gamma Logs



Zero Reference - Ground Surface

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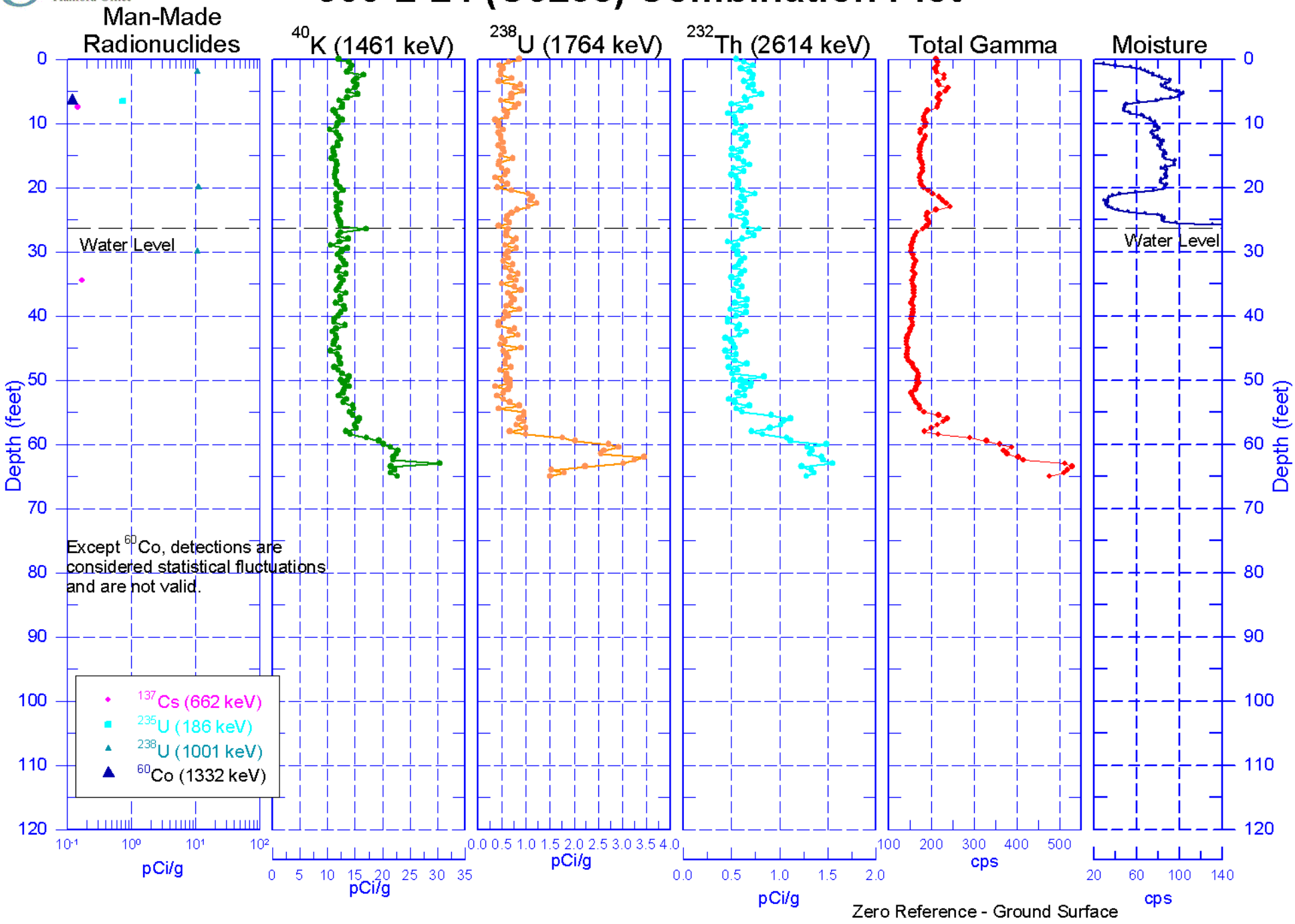
399-2-24 (C6208) Combination Plot



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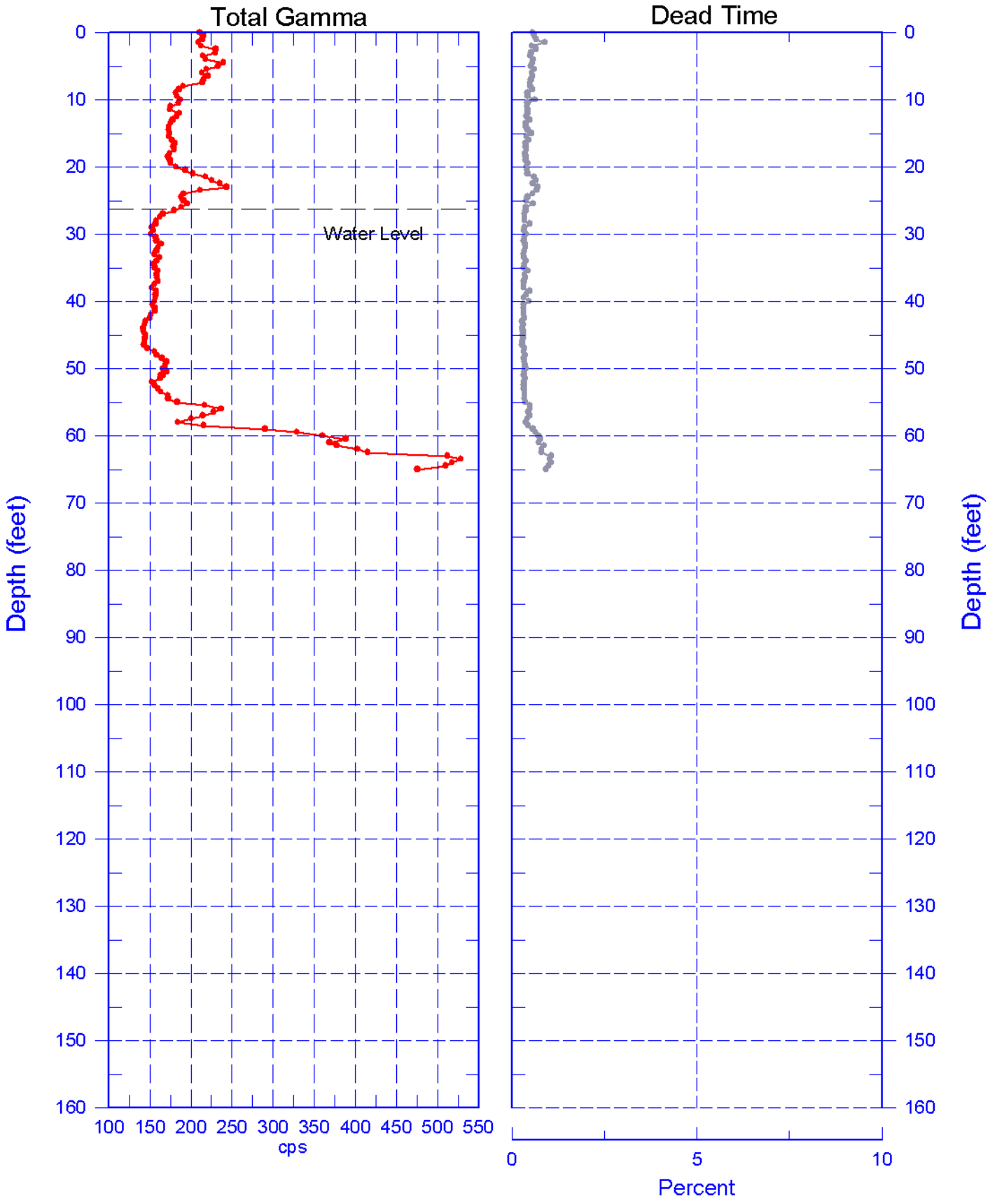
399-2-24 (C6208)
Total Gamma & Dead Time



Reference - Ground Surface

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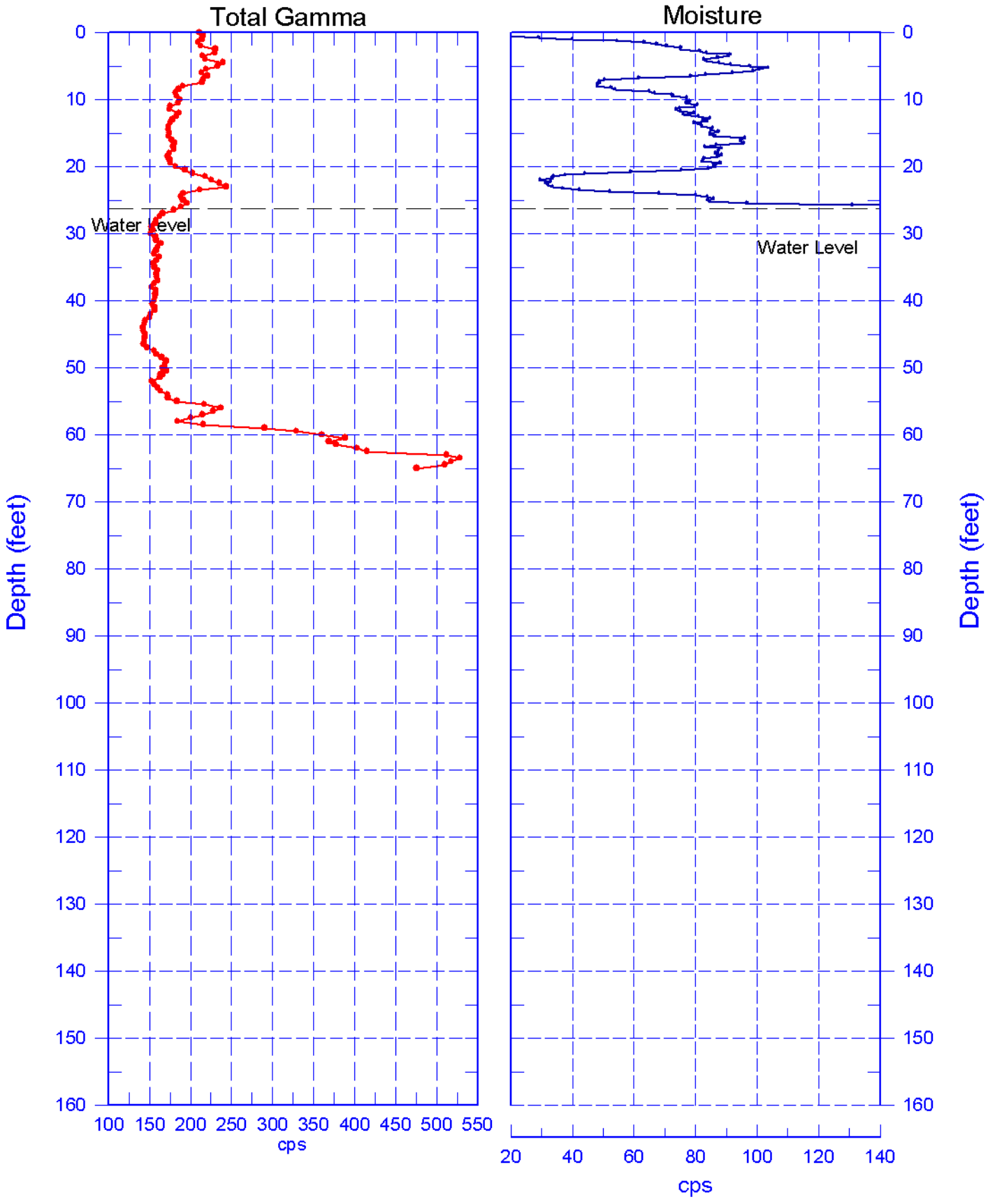
399-2-24 (C6208)
Total Gamma & Moisture



Reference - Ground Surface

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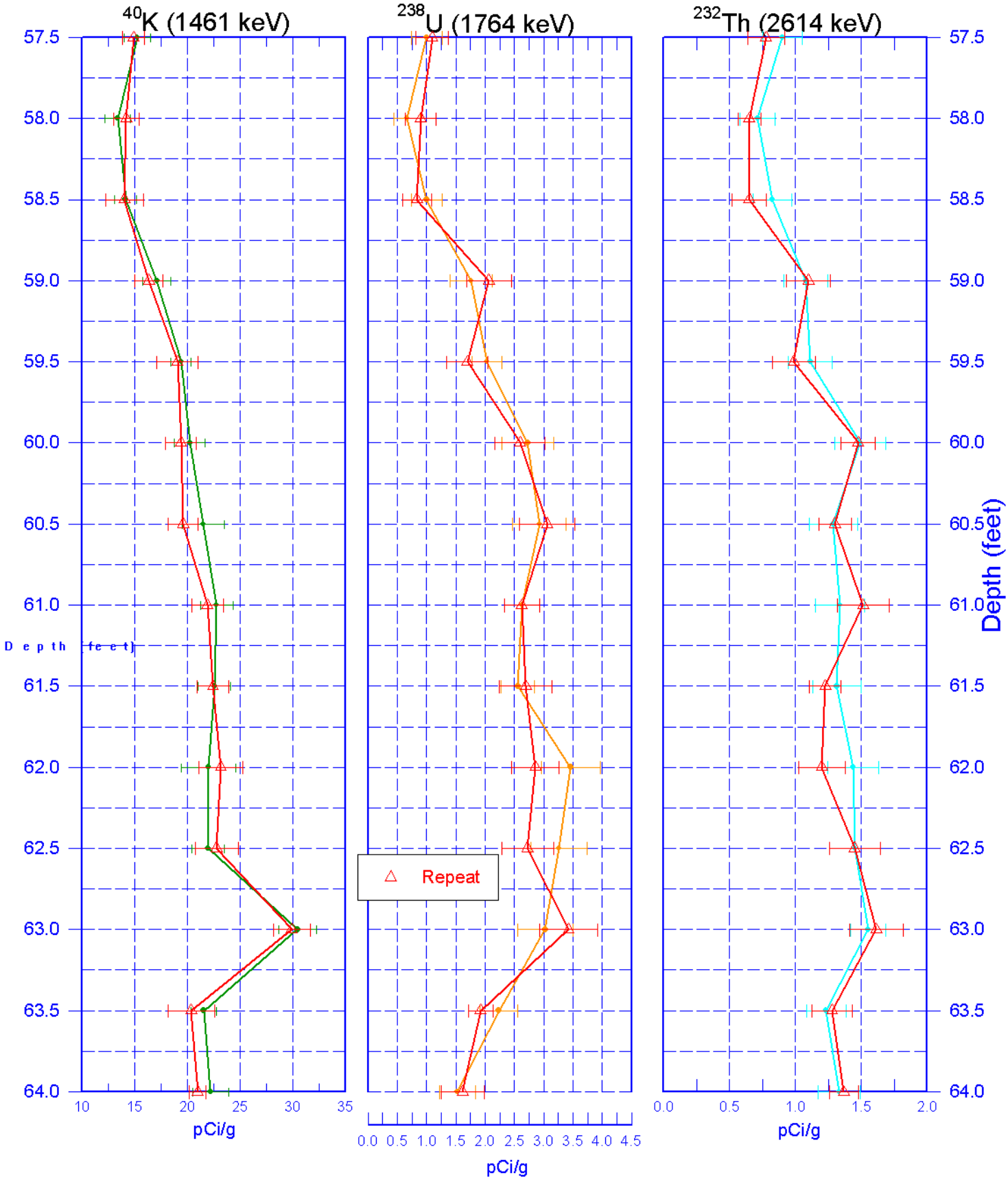
399-2-24 (C6208)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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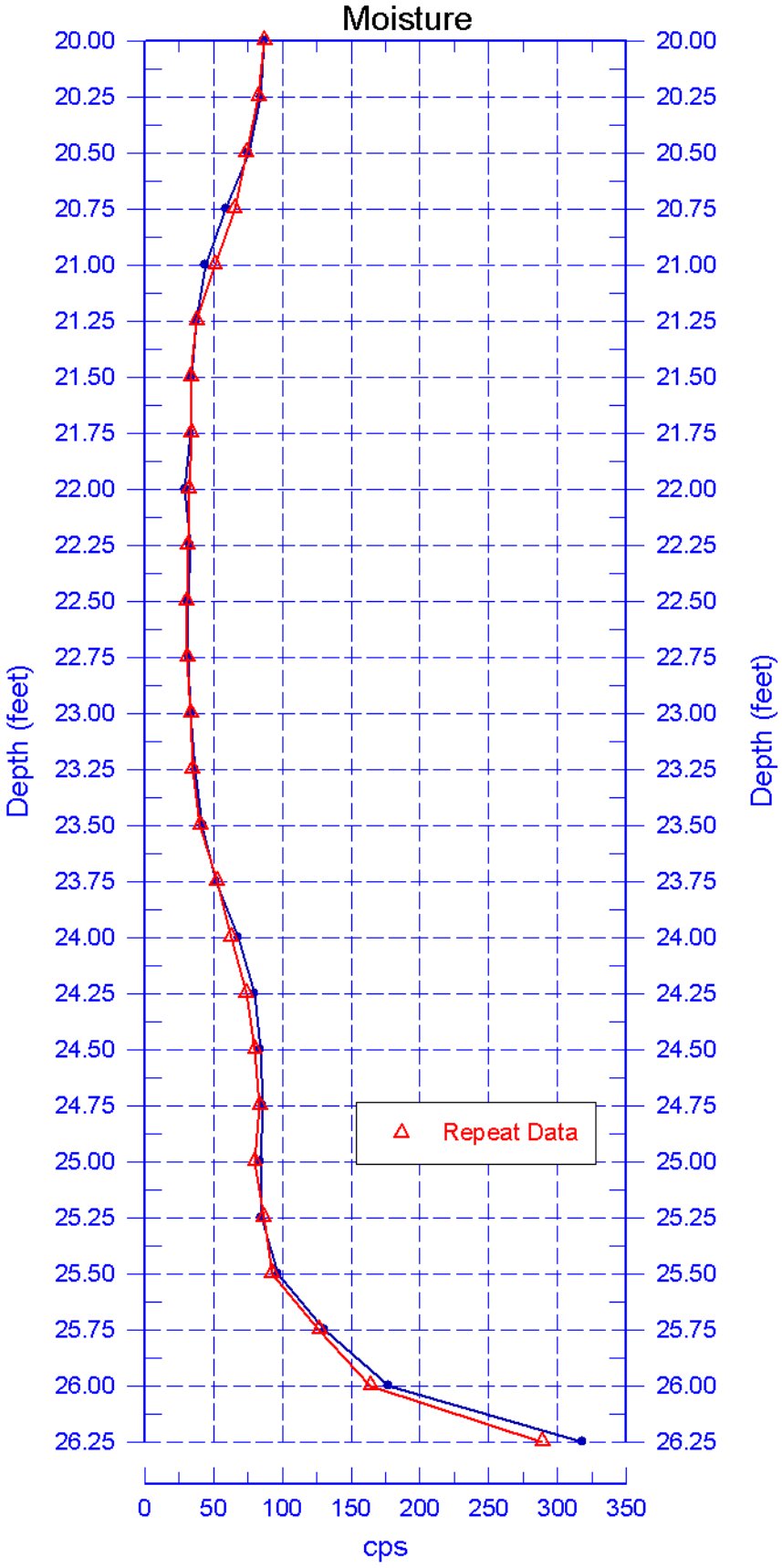
399-2-24 (C6208)
Moisture Repeat Section



Reference - Ground Surface

399-2-25 (C6209)
Log Data Report

Borehole Information:

Borehole:	399-2-25 (C6209)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	31.5	GWL Date:	07/22/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116008	594269	07/22/08	Unknown	170	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	1.3	9 3/4	8 5/8	5/8	-1.3	60.0
Threaded Steel	3.5	7 5/8	6 7/8	3/8	-3.5	120.0
Threaded Steel	3.5	6	5 1/4	3/8	-3.5	167.0

Borehole Notes:

Drill site geologist reported casing and total depth information. Casing diameters were measured using a steel tape and rounded to the nearest 1/16-in. An e-tape was employed to measure depth-to-water.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type: Serial No.:	60% HPGe SGLS 47TP32211A
Effective Calibration Date:	12/31/2007	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type: Serial No.:	NMLS H310700352
Effective Calibration Date:	11/06/2007	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat	5	6 Repeat	7
Date	07/22/08	07/23/08	07/24/08	07/24/08	07/27/08
Logging Engineer	Pearson/Pope	Pearson/Pope	McClellan	McClellan	Pearson
Start Depth (ft)	61.5	20.0	124.0	67.0	169.5
Finish Depth (ft)	0	14.0	60.0	61.0	120.0
Count Time (sec)	200	200	200	200	200
Live/Real	R	R	R	R	R
Shield (Y/N)	N	N	N	N	N
MSA Interval (ft)	0.5	0.5	0.5	0.5	0.5
Log Speed (ft/min)	NA	NA	NA	NA	NA
Pre-Verification	DL681CAB	DL681CAB	DL691CAB	DL691CAB	DL701CAB
Start File	DL681000	DL681124	DL691000	DL691129	DL701000
Finish File	DL681123	DL681136	DL691128	DL691141	DL71099
Post-Verification	DL681CAA	DL681CAA	DL691CAA	DL691CAA	DL701CAA
Depth Return Error (in.)	Low 2.75	Low 0.25	NA	Low 2.0	NA

Log Run	1	2 Repeat	5	6 Repeat	7
Comments	None	Repeat section. Re-zeroed detector at start.	None	Repeat section	None

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	8 Repeat				
Date	07/27/08				
Logging Engineer	Pearson				
Start Depth (ft)	130.0				
Finish Depth (ft)	125.0				
Count Time (sec)	200				
Live/Real	R				
Shield (Y/N)	N				
MSA Interval (ft)	0.5				
Log Speed (ft/min)	NA				
Pre-Verification	DL701CAB				
Start File	DL701100				
Finish File	DL701110				
Post-Verification	DL701CAA				
Depth Return Error (in.)	Low 2.0				
Comments	None				

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat			
Date	07/22/08	07/22/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	0	4.0			
Finish Depth (ft)	31.5	7.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DHH42CAB	DHH42CAB			
Start File	DHH42000	DHH42127			
Finish File	DHH42126	DHH42139			
Post-Verification	DHH42CAA	DHH42CAA			
Depth Return Error (in.)	NA	0			
Comments	None	Repeat section			

Logging Operation Notes:

SGLS and NMLS data were both collected using Gamma 4, HO 68B-3573. Three logging events took place, each after a different casing depth was reached.

SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. Maximum SGLS logging depth achieved was 169.5 ft or approximately 2.5 ft below casing. A centralizer was installed on the sonde.

Analysis Notes:

Analyst:	R. SPATZ	Date:	10/08/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

Pre- and post-survey verification spectra for the SGLS and NMLS met the acceptance criteria for the established systems.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time, and water as determined by annual calibrations.

Analyses of log data suggest slight discrepancies with field reports of depth-to-water and casing depth. Corrections of log data were applied according to the analysis assumptions in the tables below.

Casing One

Top (ft)	Bottom (ft)	T (in)	ID (in)	Comments
0	31.0	0.625	N/A	No water correction
31.5	59.0	0.625	8.625	GWL reported @ 31.5 ft; no adjustment made Casing bottom reported @ 60.0 ft; adjusted to 59.0 ft
59.5	62.5	0	0	No adjustment made; open hole interval

T = casing thickness used to calculate energy-dependent casing correction factor
ID = casing inside diameter used to calculate energy-dependent water correction factor

Casing Two

Top (ft)	Bottom (ft)	T (in)	ID (in)	Comments
60.0	121.5	0.375	6.875	Casing bottom reported @ 120.0 ft; adjusted to 121.5 ft
122.0	124.0	0	0	No adjustment made; open hole interval

Casing Three

Top (ft)	Bottom (ft)	T (in)	ID (in)	Comments
120.0	167.0	0.375	5.25	Casing bottom reported @ 167.0 ft; no adjustment
167.5	169.5	0	6	Water correction; from 0 to 6-in.; open hole interval

Open hole and overlap data were removed from log plots to take away interpretation ambiguities and make the log plots more consistent. Log plot adjustments were applied according to the table below.

Casing	Top (ft)	Bottom (ft)	Log Run	Comments
1	60.0	62.5	1	Data removed from log plots
2	122.0	124.0	5	
3	120.0	121.5	7	

Results and Interpretations:

U-238 (Pa-234m) was detected from 4.0 to 5.5 feet. The maximum concentration detected was 16.9 pCi/g at both the 4.0 and 4.5 ft depths.

Cs-137, U-235, and U-238 (Pa-234m) were detected sporadically in this borehole. Inspection of the individual spectra at these depths indicates that these detections with the exception of Pa-234m between 4.0 and 5.5 ft are statistical fluctuations are not considered valid. No Co-60 was detected.

Between the depths of 55.0 and 67.0 ft, and between 122.0 and 130.0 ft, and below the 160.0 ft depth, are probable lithologic changes, which are indicated by the changes in KUT concentrations and Total Gamma count rates.

Increased concentrations of natural uranium occur between 124.0 and 128.0 ft, which are shown on the Natural Gamma Log Plots.

The KUT and Moisture plots both indicate good repeatability.

List of Log Plots:

Depth Reference is ground surface
Manmade Radionuclides
Natural Gamma Logs
Combination Plot (2 pages)
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs (3 pages)
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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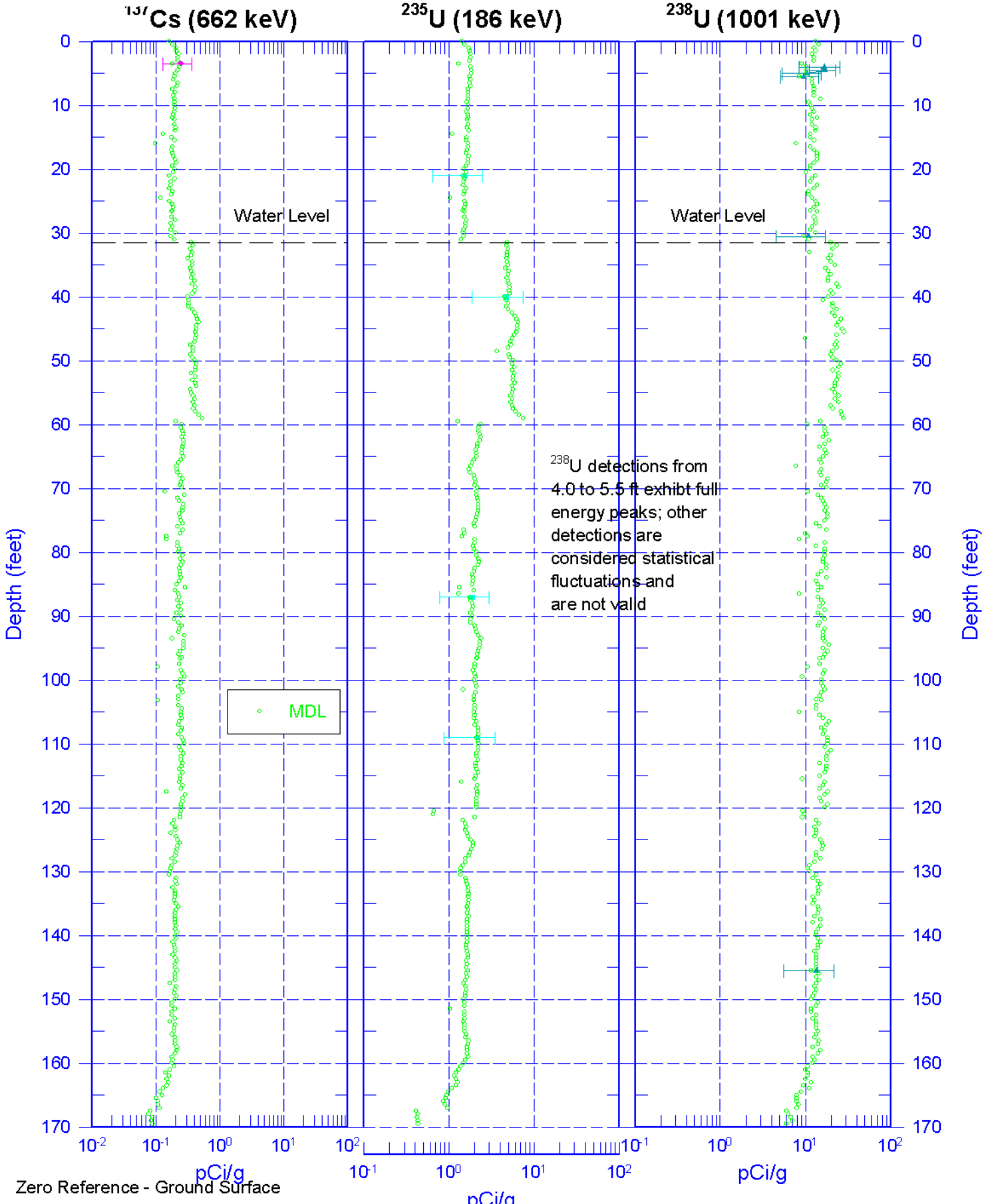
399-2-25 (C6209)
Manmade Radionuclides



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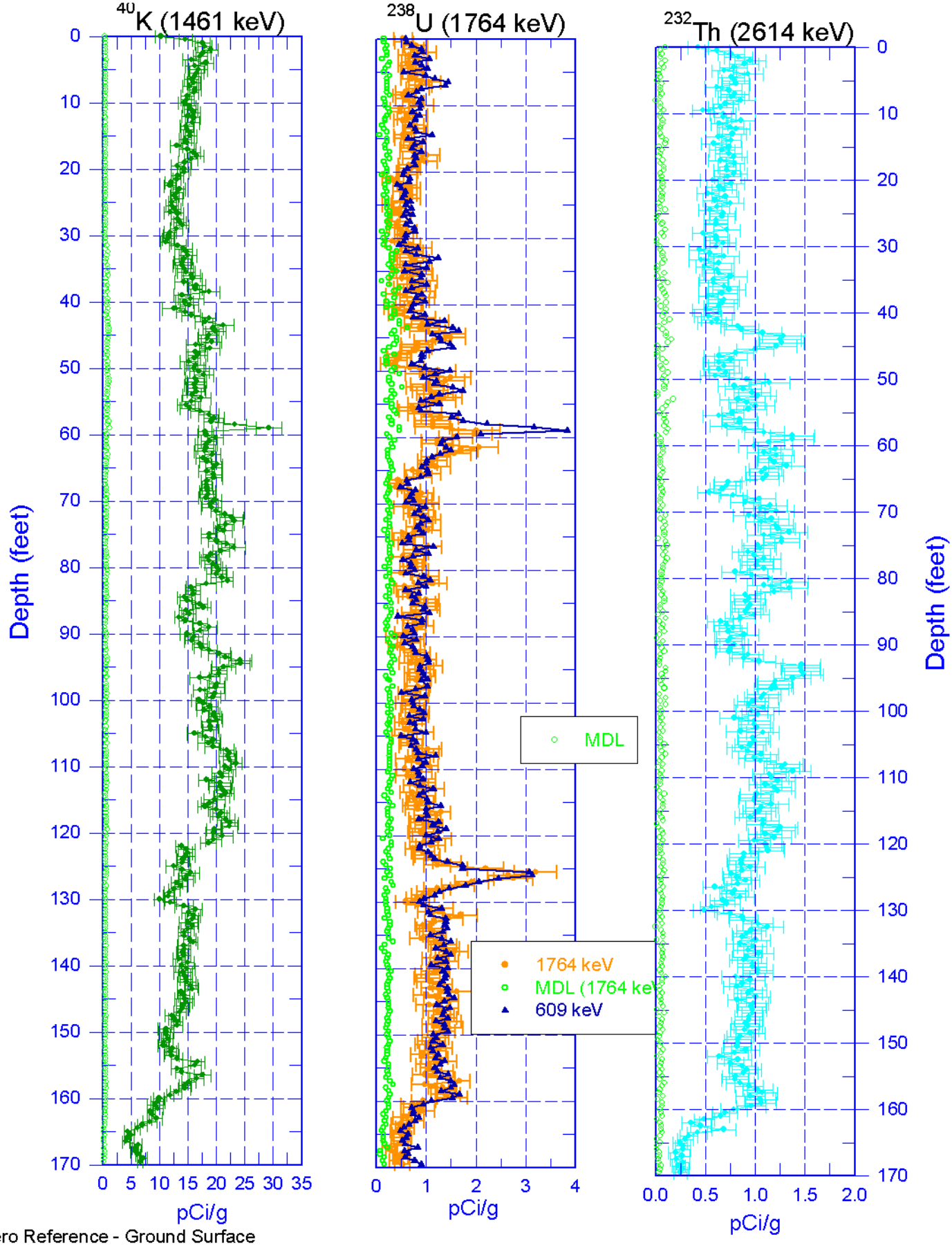
399-2-25 (C6209)
Natural Gamma Logs



Zero Reference - Ground Surface

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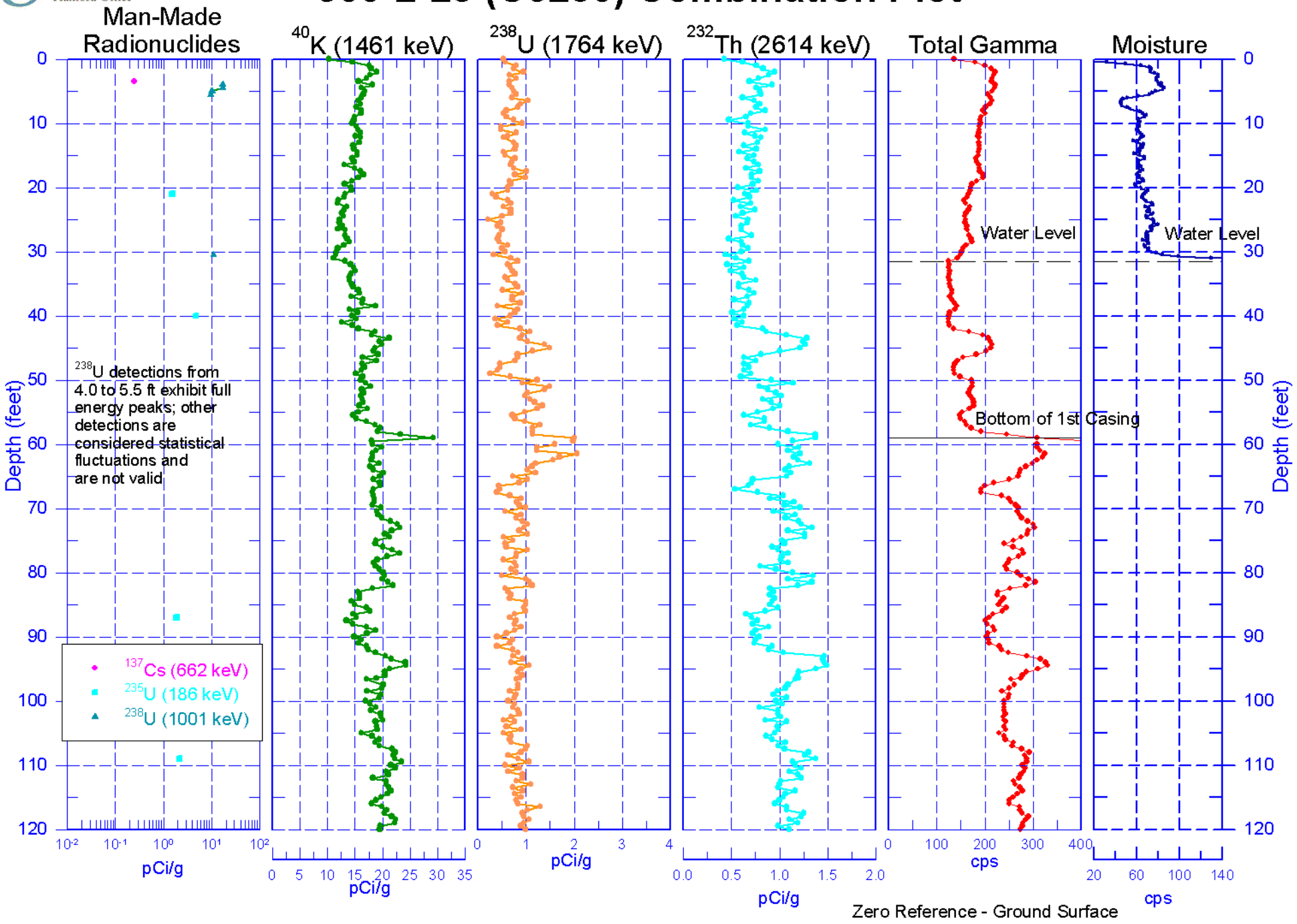
399-2-25 (C6209) Combination Plot



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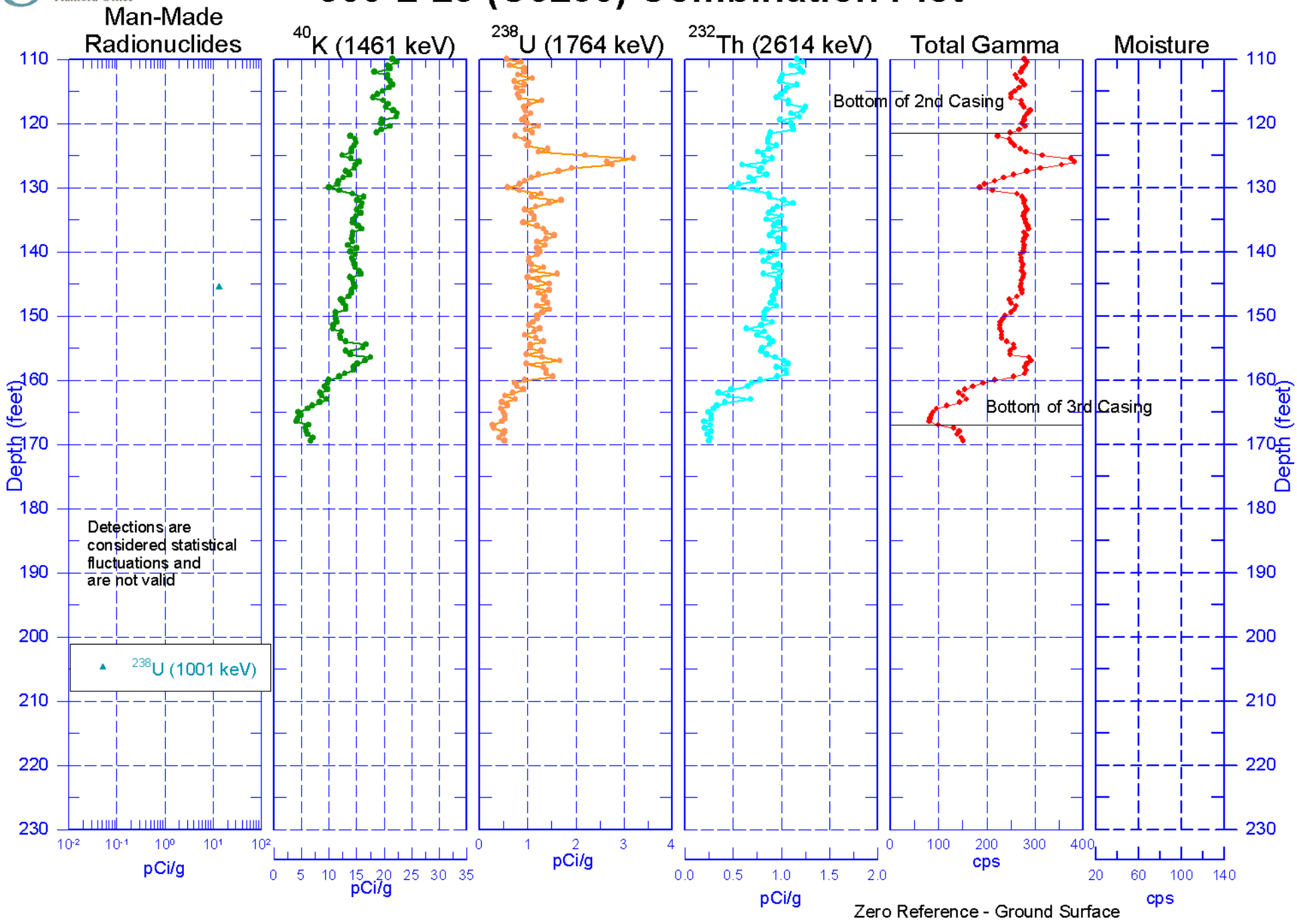
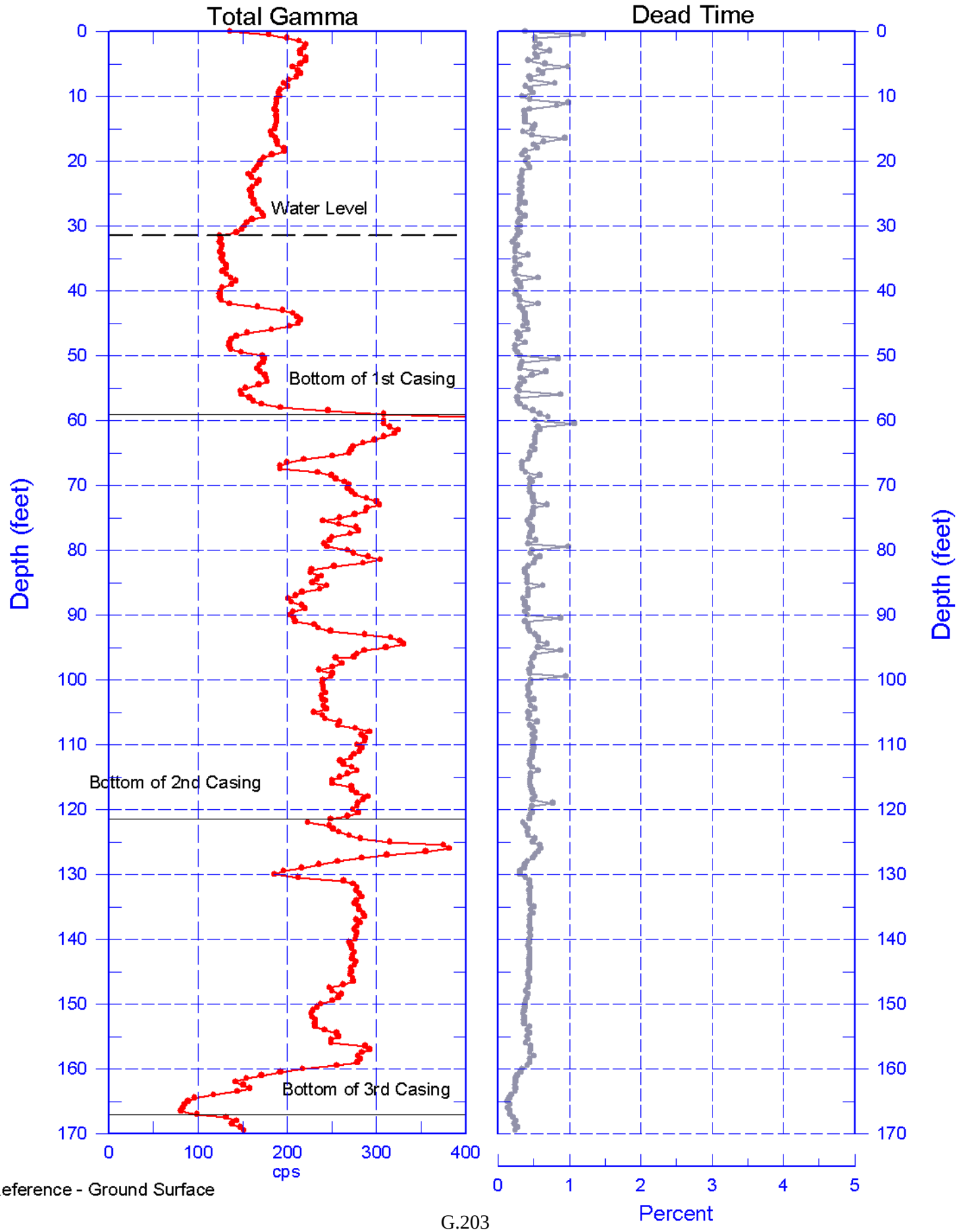
399-2-25 (C6209) Combination Plot



Stoller
Hanford Office

399-2-25 (C6209)
Total Gamma & Dead Time



Reference - Ground Surface

Stoller
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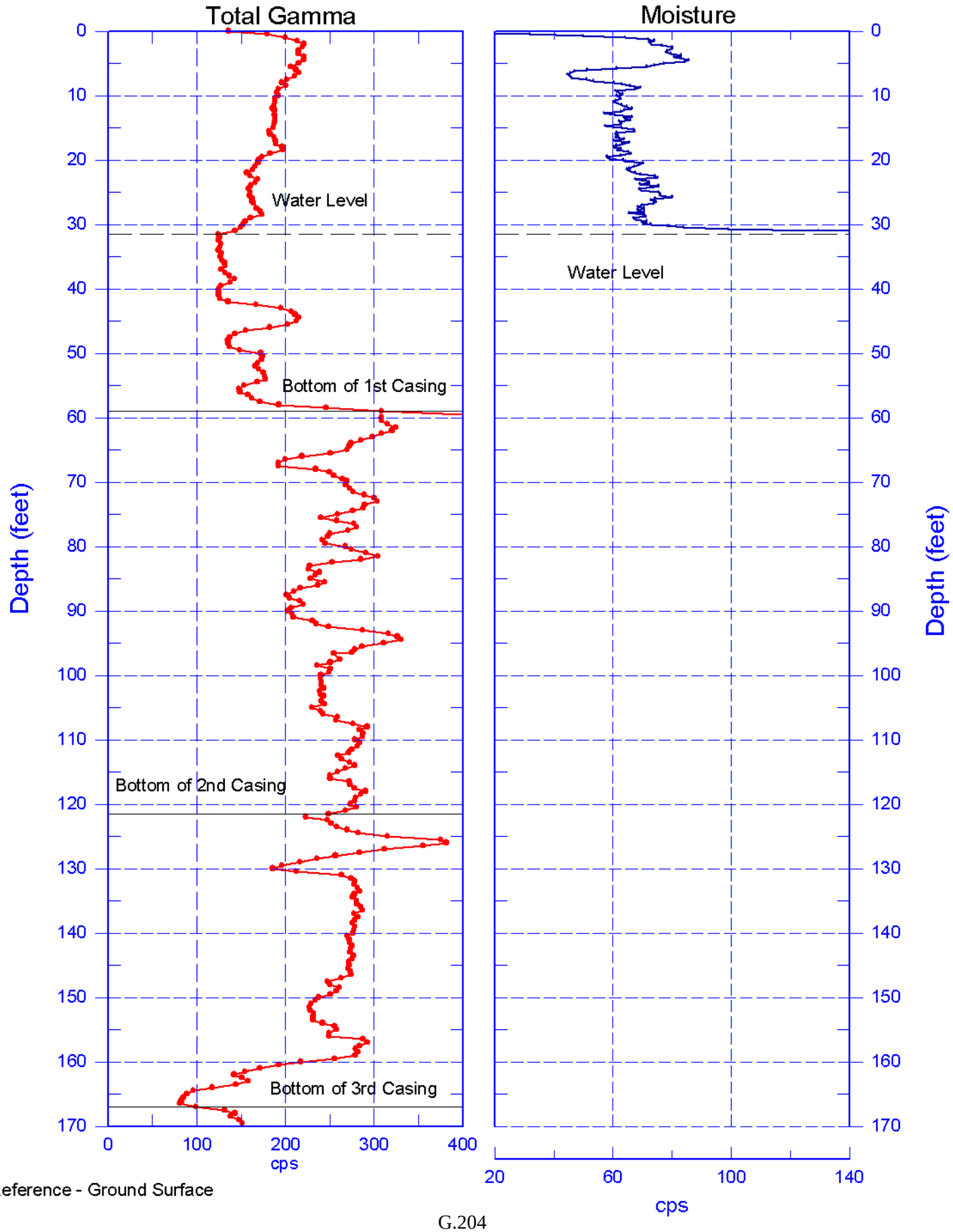
399-2-25 (C6209)
Total Gamma & Moisture

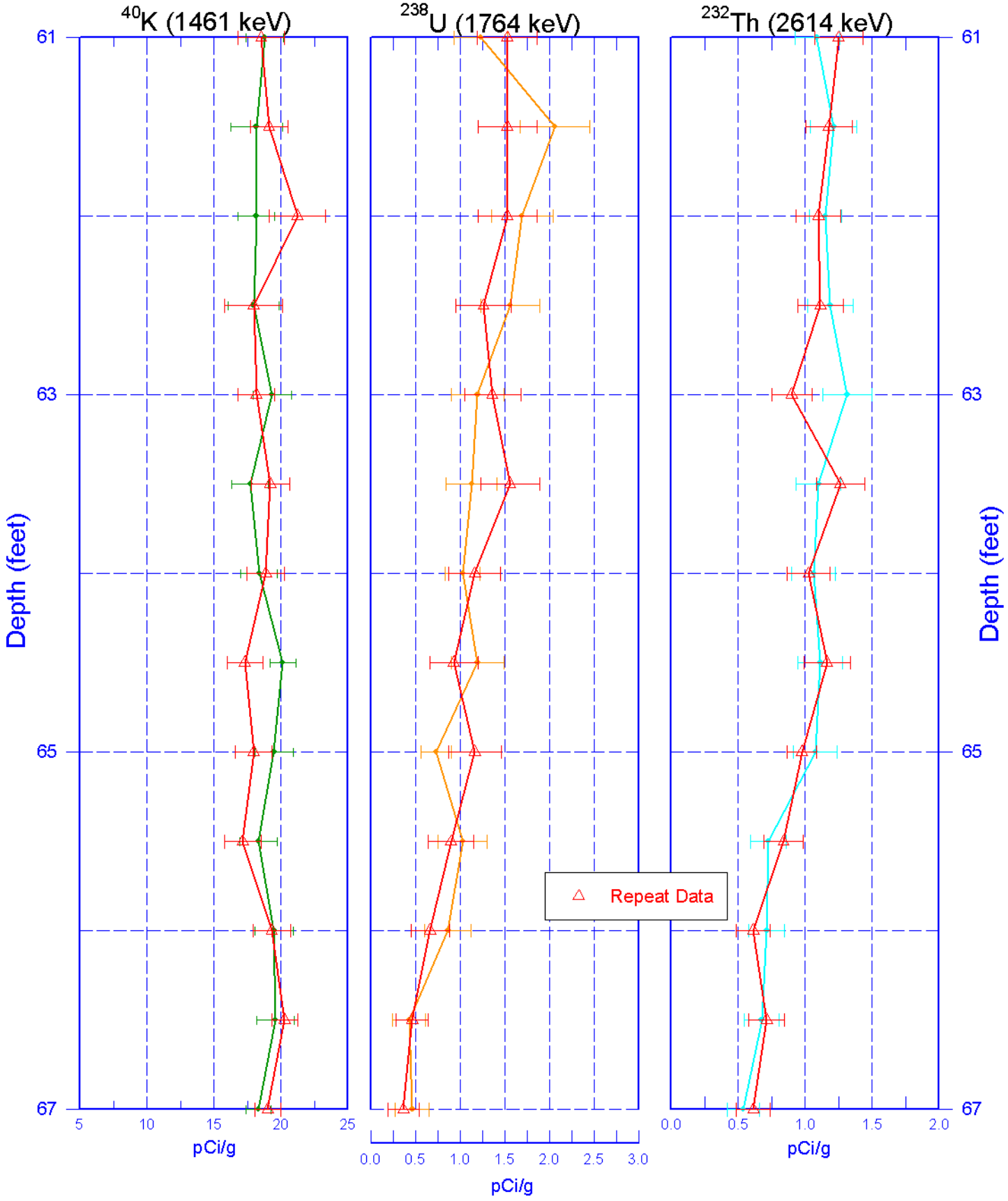


Reference - Ground Surface

Stoller
Hanford Office

399-2-25 (C6209)

Repeat Section of Natural Gamma Logs

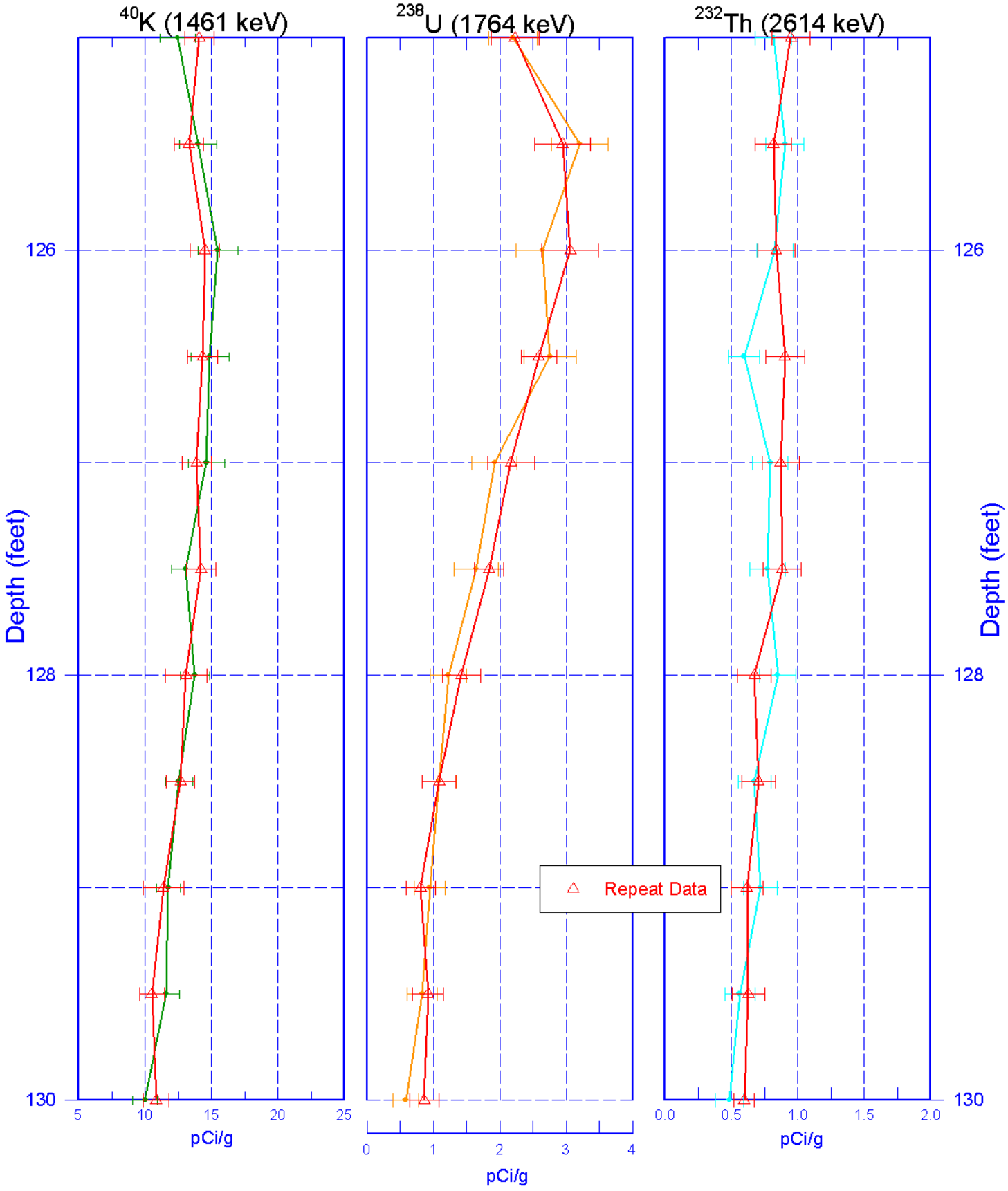


Zero Reference - Ground Surface

Stoller Hanford Office

399-2-25 (C6209)

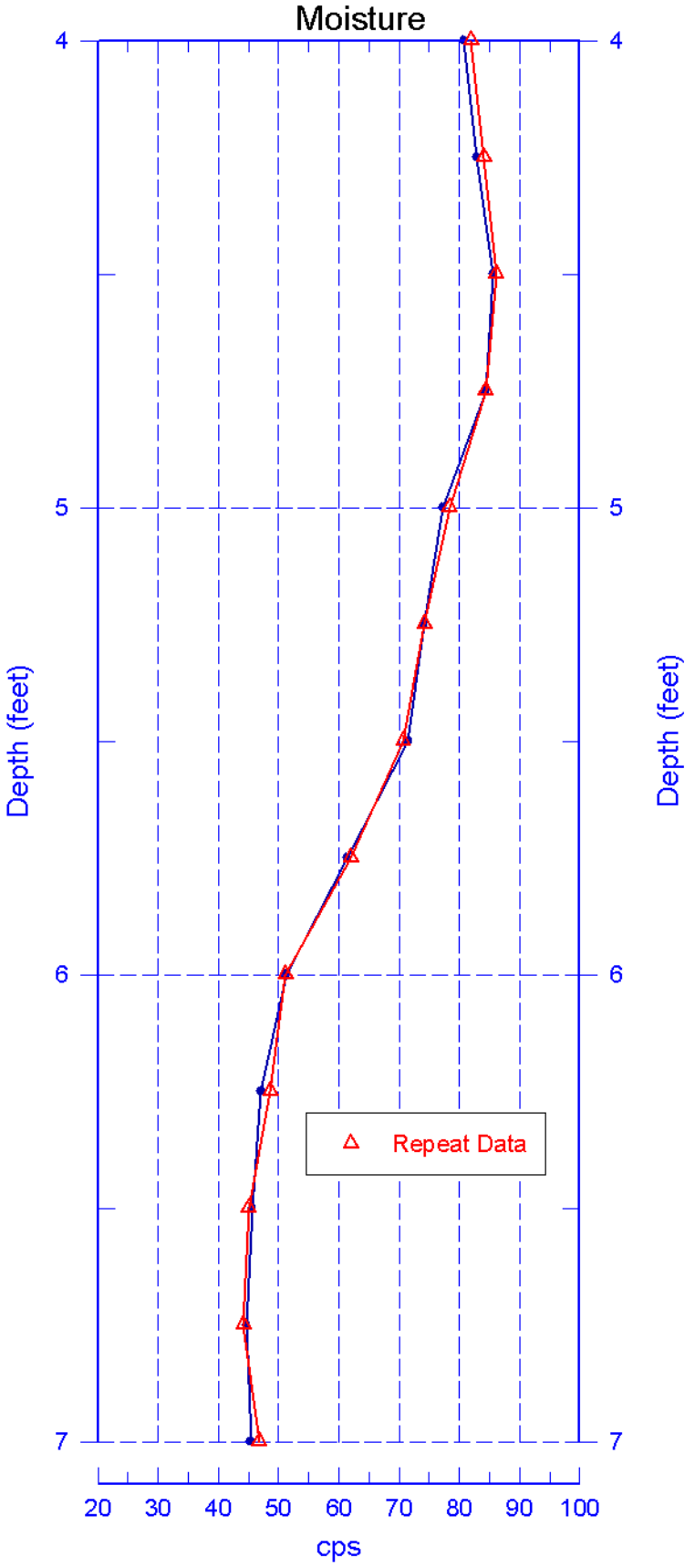
Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

Stoller
Hanford Office

399-2-25 (C6209)
Moisture Repeat Section



Reference - Ground Surface

399-2-26 (C6210)
Log Data Report

Borehole Information:

Borehole:	399-2-26 (C6210)		Site:	300-FF-5	
Coordinates		GWL[1] (ft):	27.6	GWL Date:	6/26/2008
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116081.1	594243.7	6/24/2008	unknown	62	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	0.4	7 5/8	6 7/8	3/8	-0.4	60.0

Borehole Notes:

Casing data and total depth was reported by the site geologist. Casing diameter was measured using a steel tape and rounded to the nearest 1/16-inch. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type: Serial No.:	60%HPGe SGLS 47TP32211A
Effective Calibration Date:	12/31/2007	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	6/26/08	6/26/08			
Logging Engineer	PEARSON	PEARSON			
Start Depth (ft)	61.0	12.0			
Finish Depth (ft)	0.0	6.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	NA	NA			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DL521CAB	DL521CAB			
Start File	DL521000	DL521123			
Finish File	DL521122	DL521135			
Post-Verification	DL521CAA	DL521CAA			
Depth Return Error (in.)	0	NA			
Comments	Fine gain adjustment made at –087 and -120	Repeat Section			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	1	2 Repeat			
Date	6/26/08	6/26/08			
Logging Engineer	PEARSON	PEARSON			
Start Depth (ft)	0.0	27.5			
Finish Depth (ft)	27.5	24.5			

Log Run	1	2 Repeat			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	NA	NA			
MSA Interval (ft)	0.25	0.25			
ft/min	NA	NA			
Pre-Verification	DHF92CAB	DHF92CAB			
Start File	DHF92000	DHF92117			
Finish File	DHF92110	DHF92123			
Post-Verification	DHF92CAA	DHF92CAA			
Depth Return Error (in.)	NA	0			
Comments	None	Repeat section.			

Logging Operation Notes:

The SGLS data were acquired 6/26/2008 with the Gamma 4L, HO 68B-3573 logging system. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. A centralizer was installed on the sonde. Maximum logging depth was 61.23 feet before the sonde was un-weighted.

The Neutron Moisture data were acquired 6/26/2008 with Gamma 4H, HO 68B-3573 logging system. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. A centralizer was installed on the sonde. Maximum logging depth was 27.5 feet before water was encountered.

Analysis Notes:

Analyst:	SPINNER	Date:	9/16/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

The SGLS and NMLS pre- and post-survey verifications spectra met acceptance criteria.

A casing correction was applied for a 3/8 inch welded steel casing from 0 to 60 feet, leaving the remaining two feet of the borehole uncorrected. A water correction was applied from 27.6 feet to end of logging depth.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calculations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8 inch inner diameter borehole casing.

Results and Interpretations:

The Man-Made Radionuclides, U-235 and U-238 were detected in the logging survey. These isolated peaks were individually inspected and determined to be statistical fluctuations and are not valid.

The behavior of the neutron moisture log at 16.25 feet and 16.5 feet is suspect. The count rate dropped to 2.47 cps at 16.25 feet and 3.27 cps at 16.5 feet. This is consistent with log response at zero moisture content. It is also possible that the detector experienced a brief failure at these intervals.

The Natural Gamma (KUT) plot and the Moisture Repeat plot indicate good repeatability.

List of Log Plots:

Depth Reference is ground surface.

Manmade Radionuclides
Natural Gamma Logs
Combination Plot (0-120 feet), with Moisture
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs (6–12 ft)
Moisture Repeat Section (24.5-27.5 ft.)

[1] GWL – groundwater level
[2] TOC – top of casing

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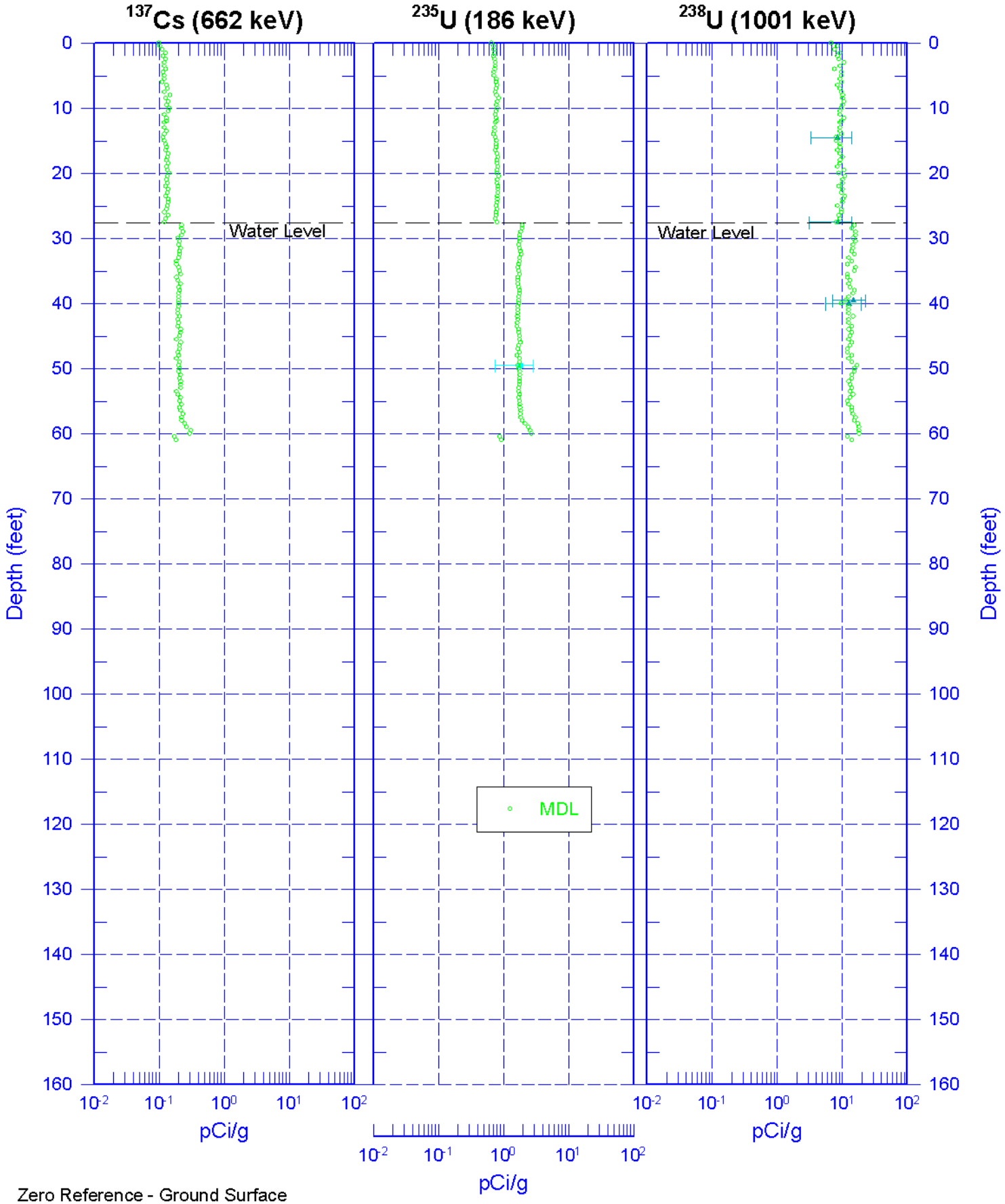
399-2-26 (C6210)
Manmade Radionuclides



Zero Reference - Ground Surface

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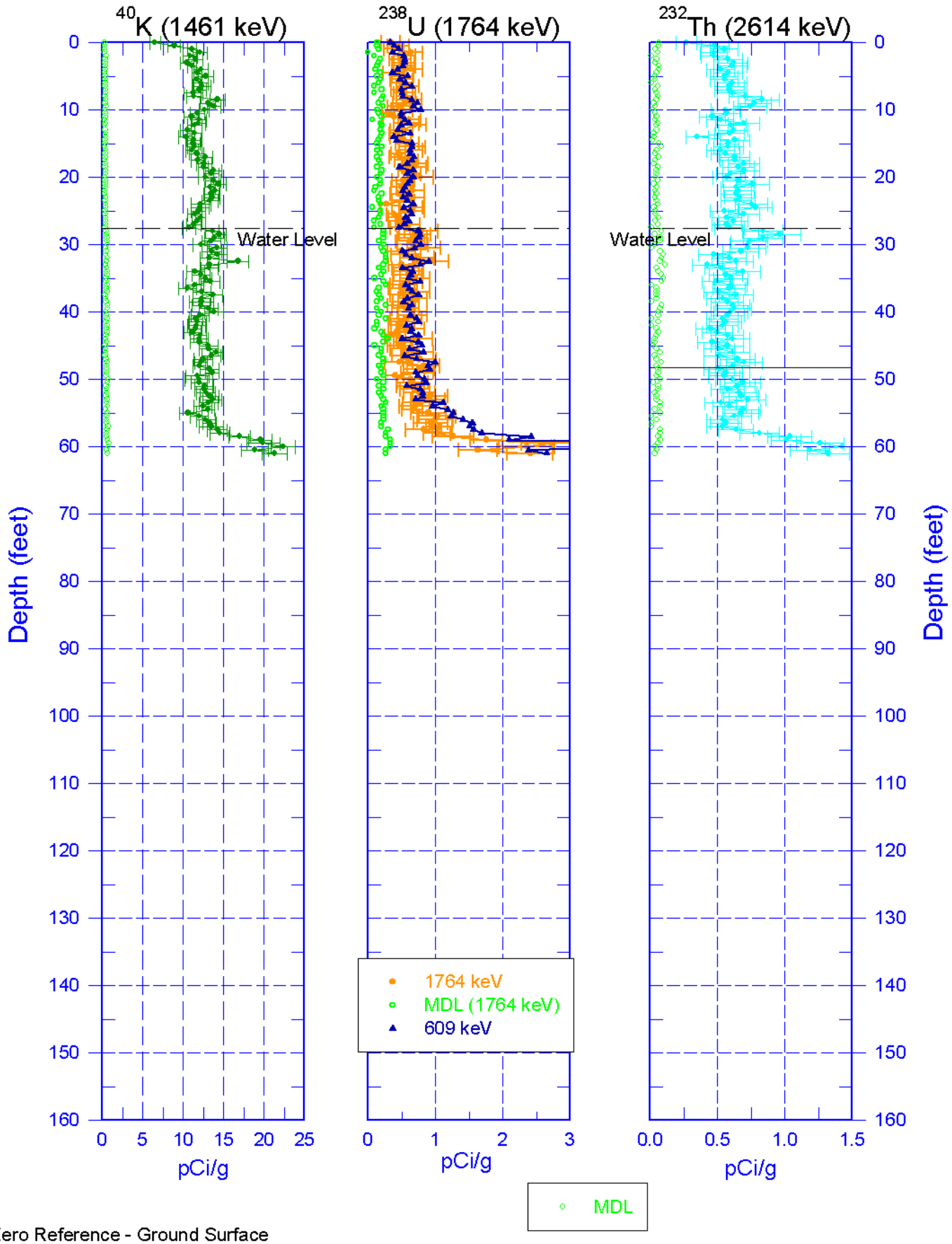
399-2-26 (C6210)
Natural Gamma Logs



Zero Reference - Ground Surface

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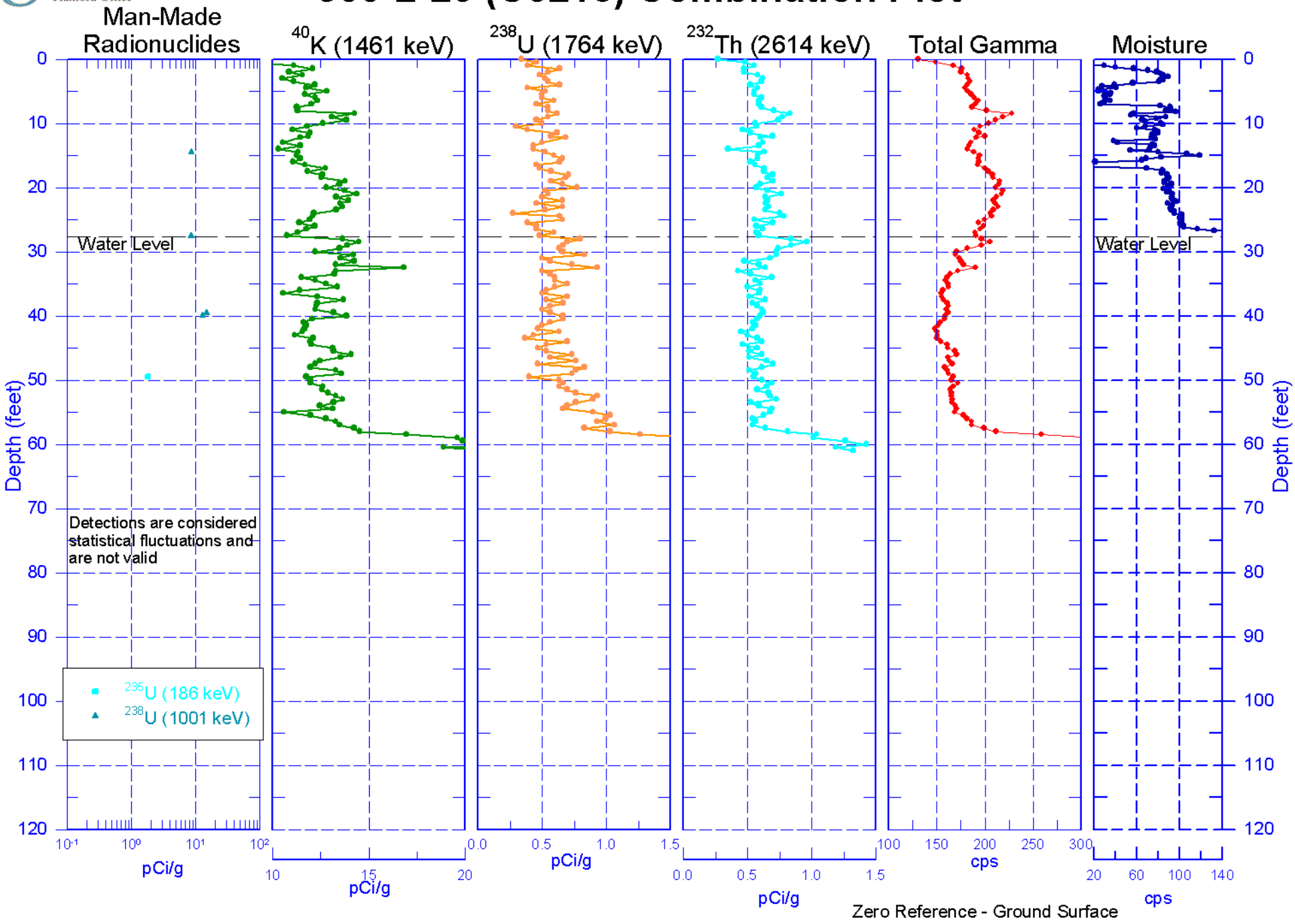
399-2-26 (C6210) Combination Plot



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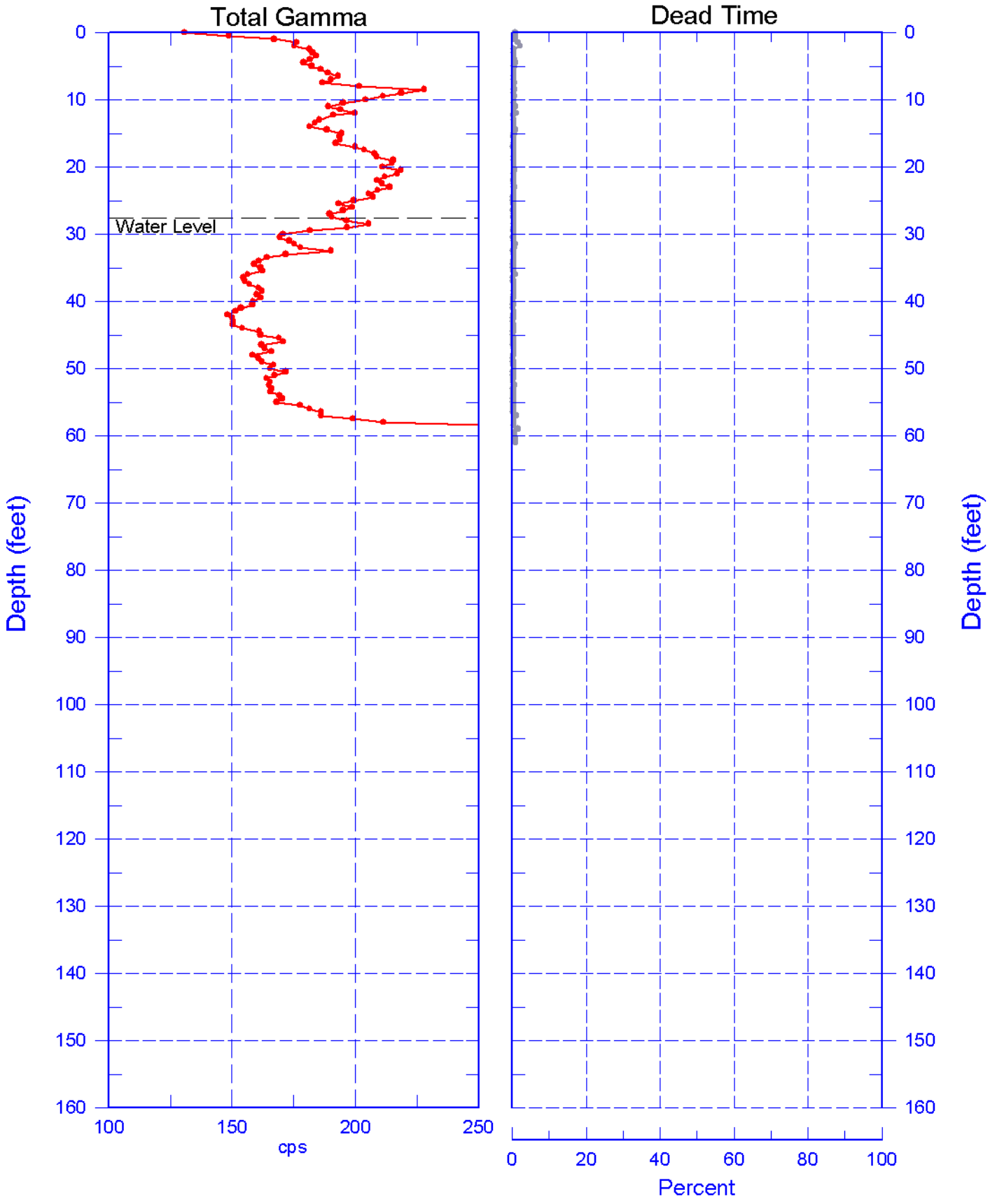
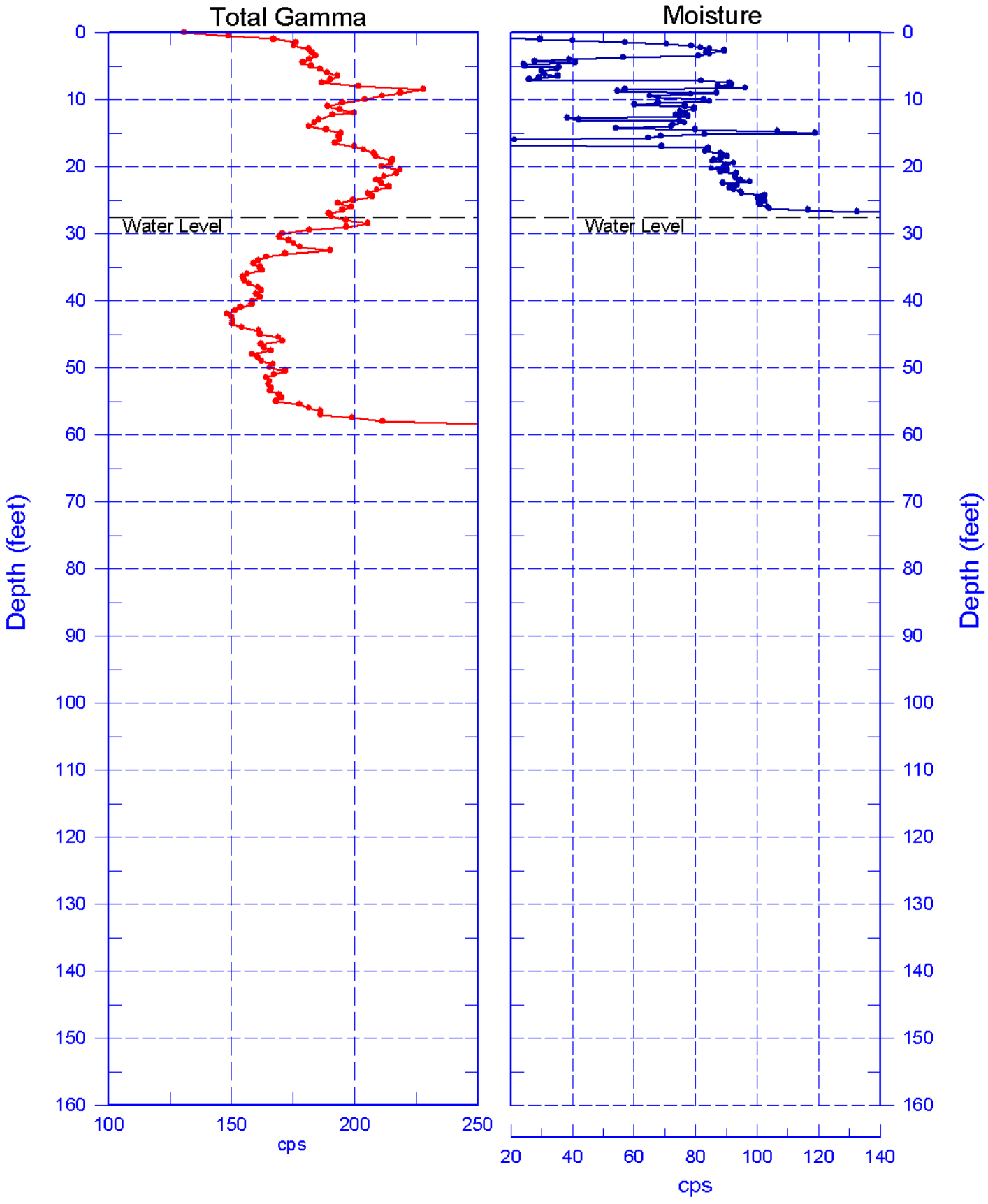
399-2-26 (C6210)
Total Gamma & Dead Time



Reference - Ground Surface

Stoller
Hanford Office

399-2-26 (C6210)
Total Gamma & Moisture



Reference - Ground Surface

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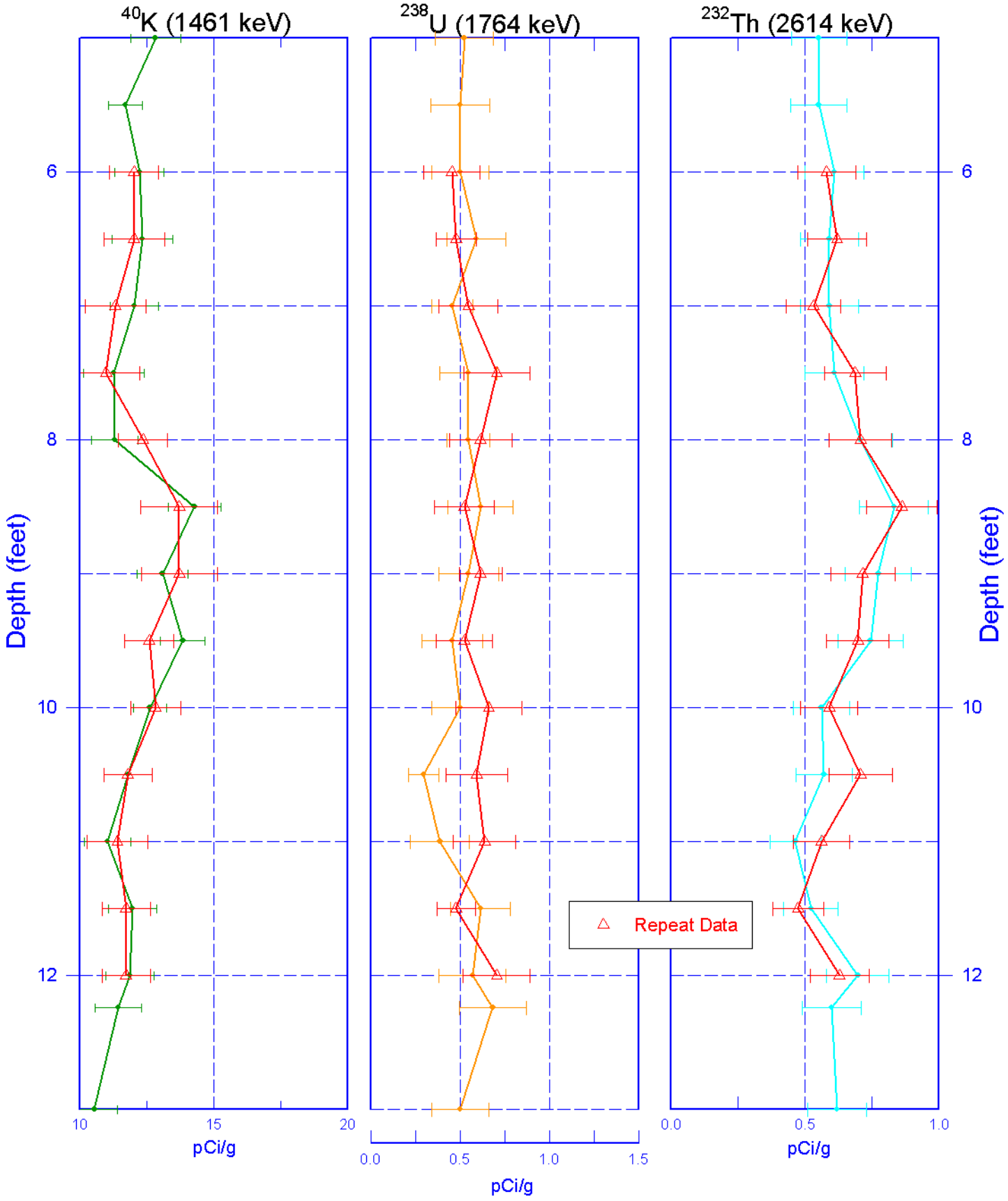
399-2-26 (C6210)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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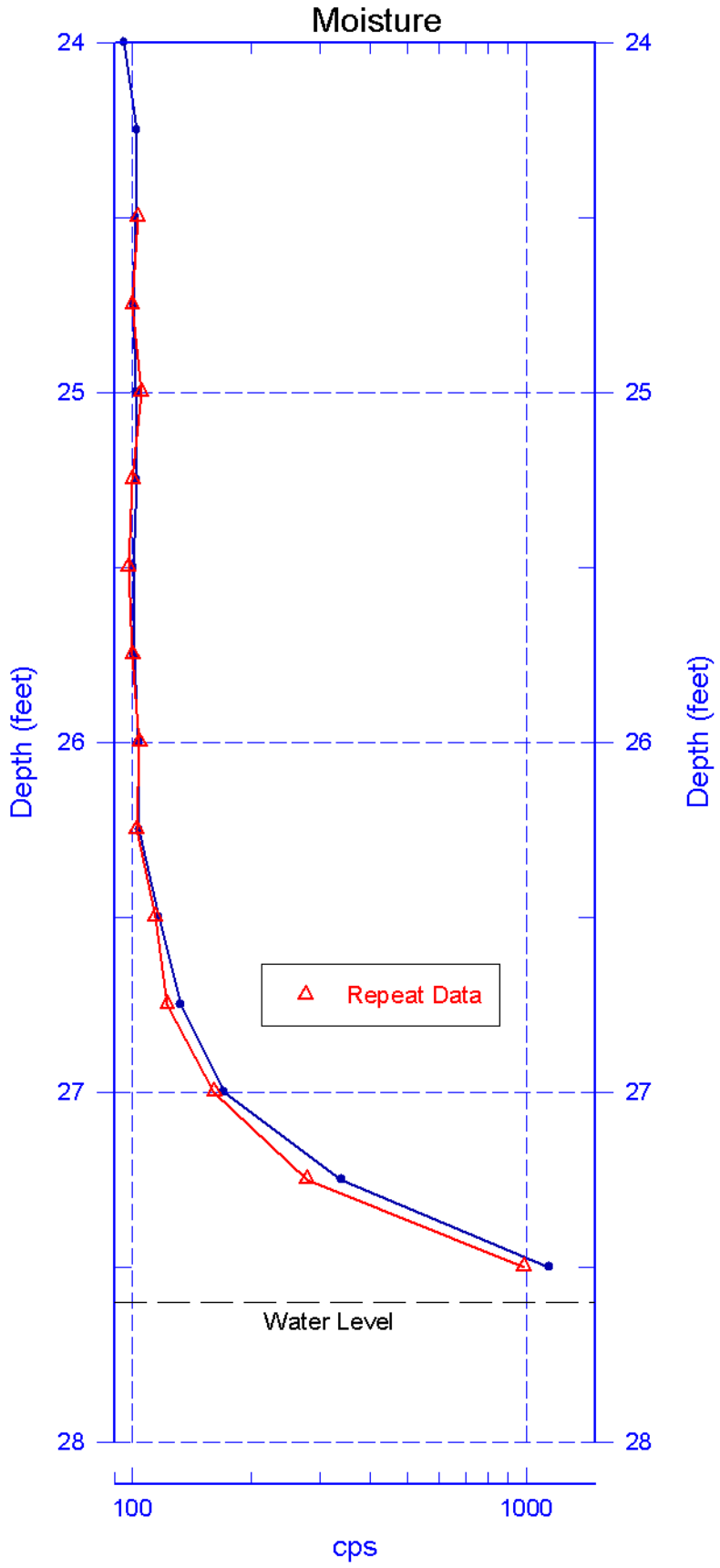
399-2-26 (C6210)
Moisture Repeat Section



Reference - Ground Surface

399-2-31 (C6218)
Log Data Report

Borehole Information:

Borehole:	399-2-31 (C6218)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	27.3	GWL Date:	06/24/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116067.2	594273.6	06/18/08	Unknown	63	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	1.2	7 5/8	6 7/8	3/8	-1.2	59

Borehole Notes:

Casing data and total depth are reported by the site geologist. The logging engineer measured depth to water with an e-tape. Casing diameters were measured using a steel tape and rounded to the nearest 1/16 inch. Zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type:	60% HPGe SGLS
			Serial No.:	47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type:	NMLS
			Serial No.:	H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	06/24/08	06/24/08			
Logging Engineer	McClellan	McClellan			
Start Depth (ft)	62.0	8.0			
Finish Depth (ft)	0.0	2.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	N/A	N/A			
Pre-Verification	DL501CAB	DL501CAB			
Start File	DL501000	DL501125			
Finish File	DL501124	DL501137			
Post-Verification	DL501CAA	DL501CAA			
Depth Return Error (in.)	0.25 low	N/A			
Comments	No fine gain adjustments made.	Repeat Section			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat			
Date	06/24/08	06/24/08			
Logging Engineer	McClellan	McClellan			
Start Depth (ft)	0.0	27.25			
Finish Depth (ft)	27.25	24.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	N/A	N/A			
Pre-Verification	DHF72CAB	DHF72CAB			
Start File	DHF72000	DHF72110			
Finish File	DHF72109	DHF72123			
Post-Verification	DHF72CAA	DHF72CAA			
Depth Return Error (in.)	N/A	1.0 high			
Comments	None	Repeat Section			

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum logging depth for the SGLS was 62 ft before the sonde un-weighted. A centralizer was installed on the sonde.

Analysis Notes:

Analyst:	LEGLER	Date:	05/22/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

Pre- and post-survey verification spectra met the acceptance criteria for the established systems.

A casing correction for a 3/8-in. thick casing was applied to spectral data during analysis for depths up to 59 ft, where casing ends, leaving 3 ft of open borehole uncorrected. A water correction was also applied during analysis from 27.3 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in. inner diameter borehole casing.

Results and Interpretations:

Cs-137 was detected at 6 ft, 13.5 – 16.5 ft, 18.0, 20.0, 41.0 and 51.5 ft. Inspection of the individual spectra indicate that detections at 51.5 and 41.0 ft are statistical fluctuations associated with the processing software and are not considered valid.

Co-60 was detected at 5.5 – 6.5 ft, and 13.5 - 19.0 ft.

U-235 was detected at 6.0 ft.

U-238 (Pa-234m) was detected at 6.0-6.5 ft and 33.5 ft. Inspection of the individual spectra indicates that the detection at 33.5 ft is a statistical fluctuation associated with the processing software and is not considered valid.

The KUT and moisture plots show good repeatability.

List of Log Plots:

Depth Reference is top ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Manmade Radionuclides Repeat Section
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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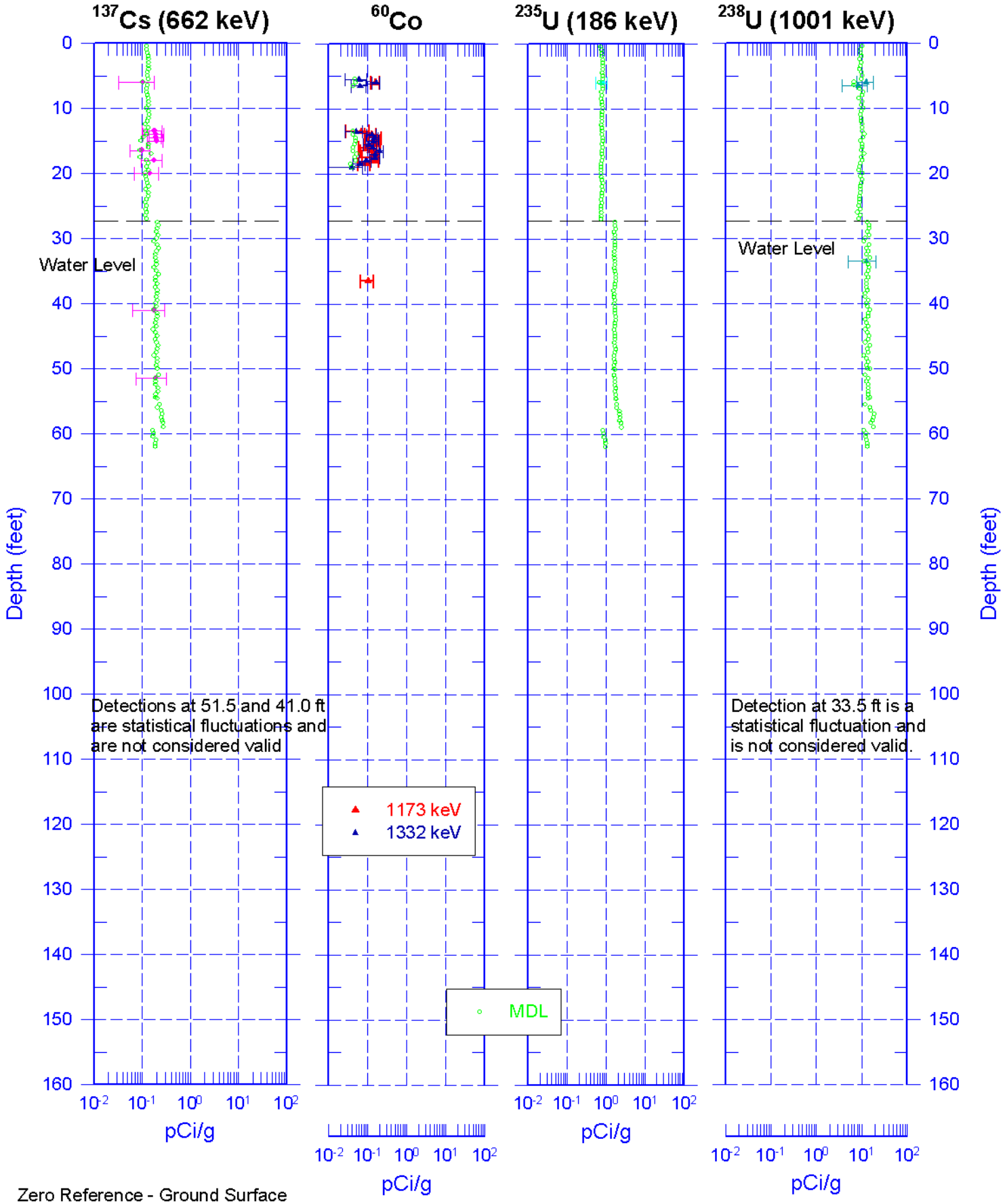
399-2-31 (C6218)
Manmade Radionuclides



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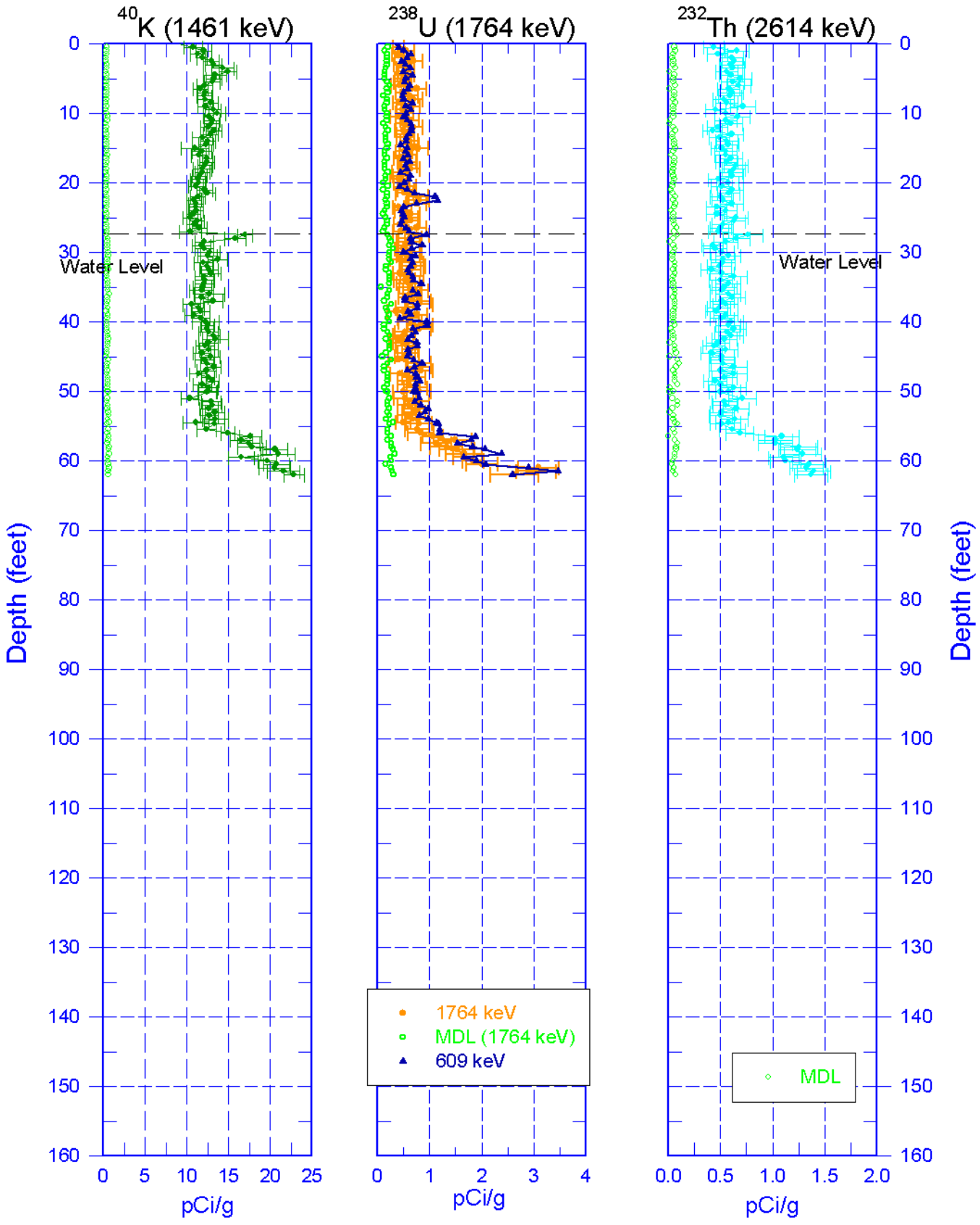
399-2-31 (C6218)
Natural Gamma Logs



Zero Reference - Ground Surface

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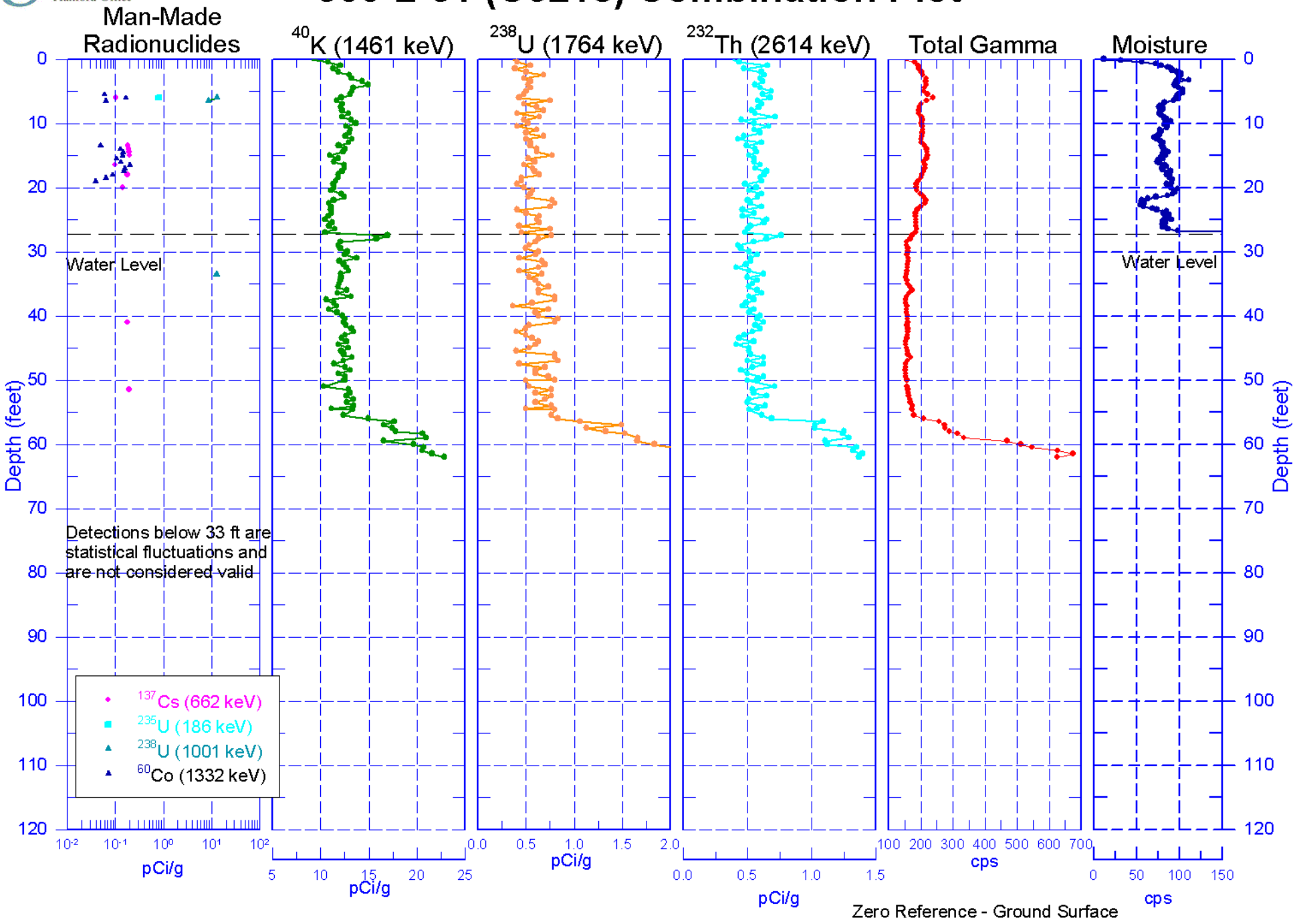
399-2-31 (C6218) Combination Plot



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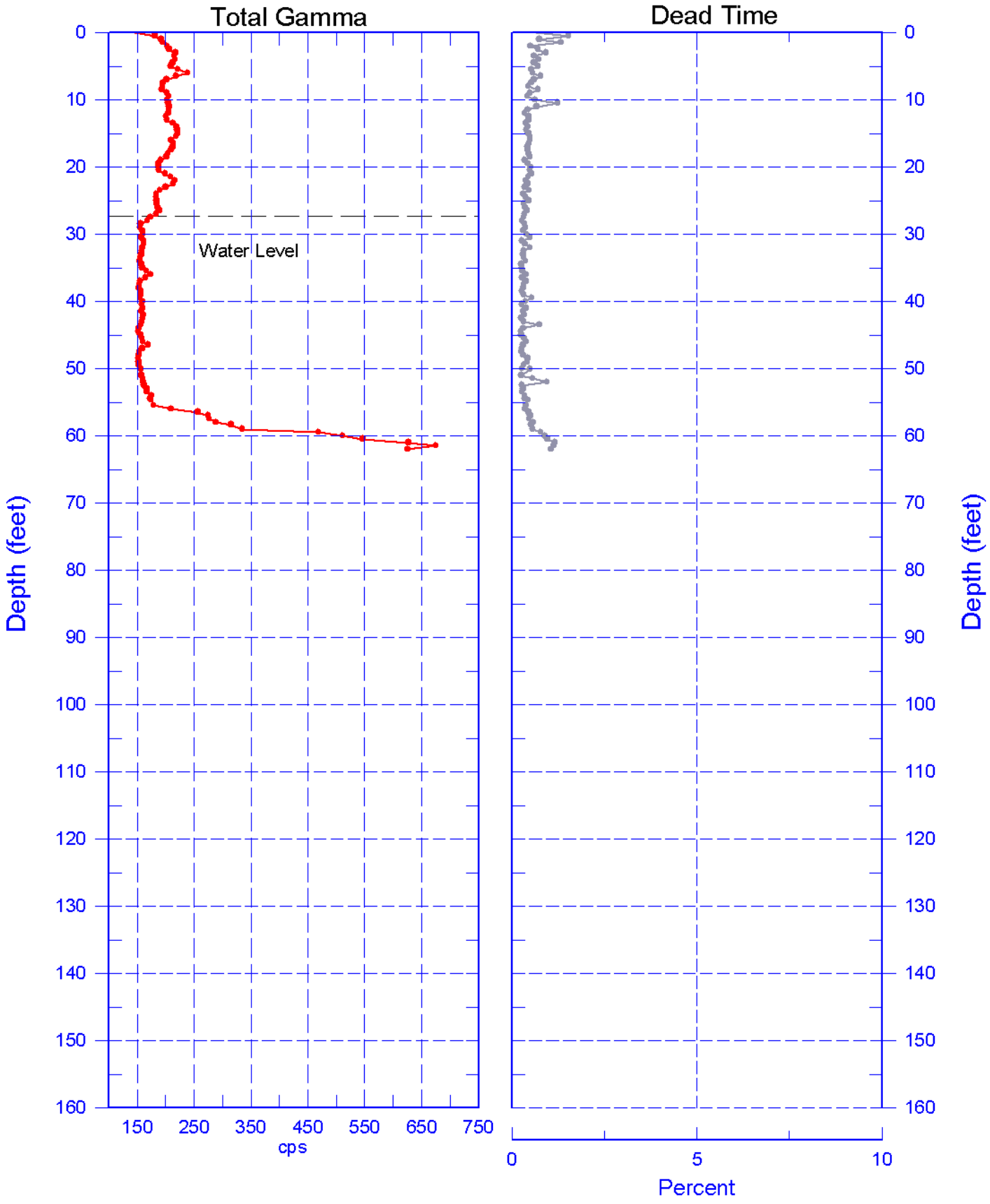
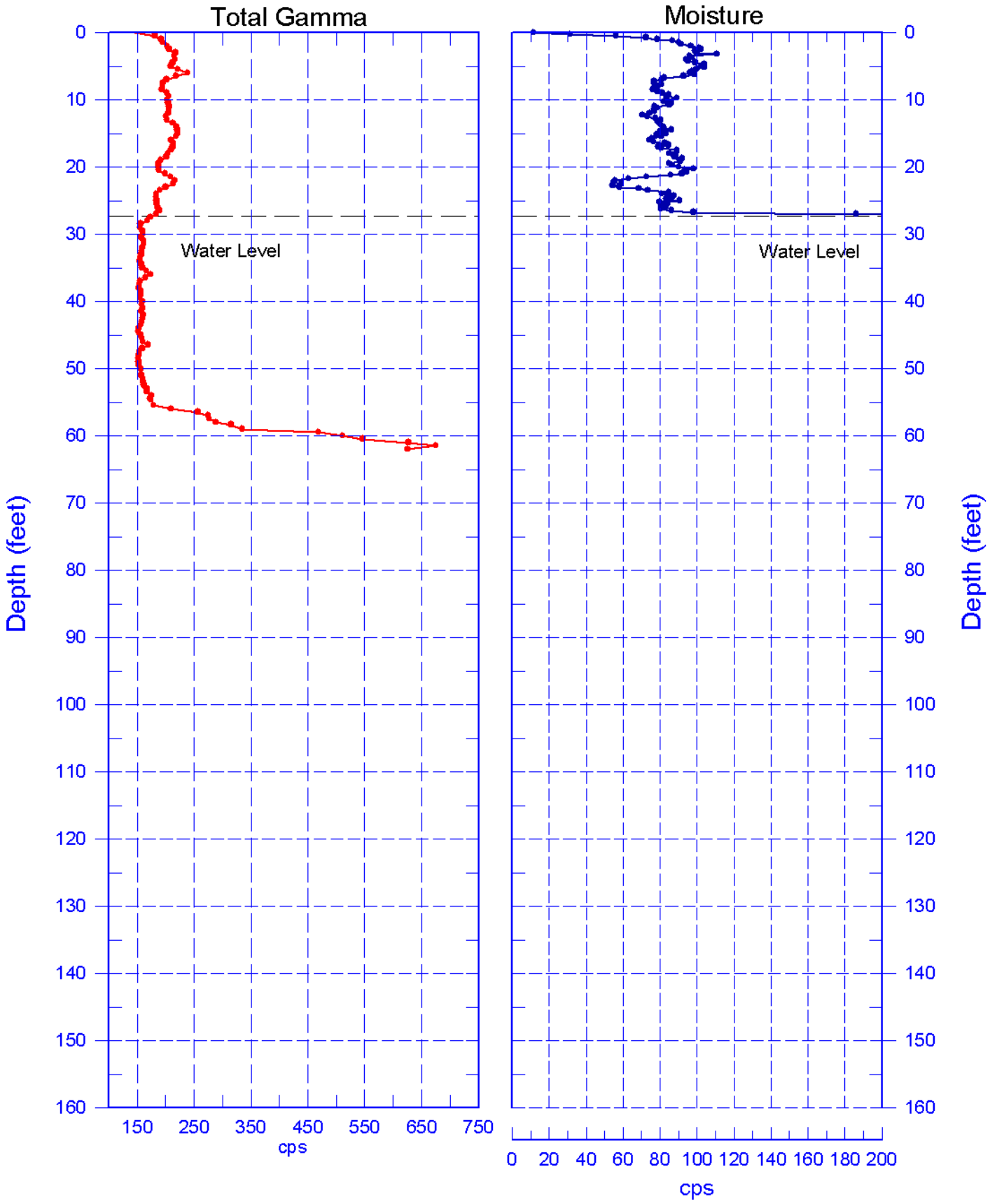
399-2-31 (C6218)
Total Gamma & Dead Time



Reference - Ground Surface

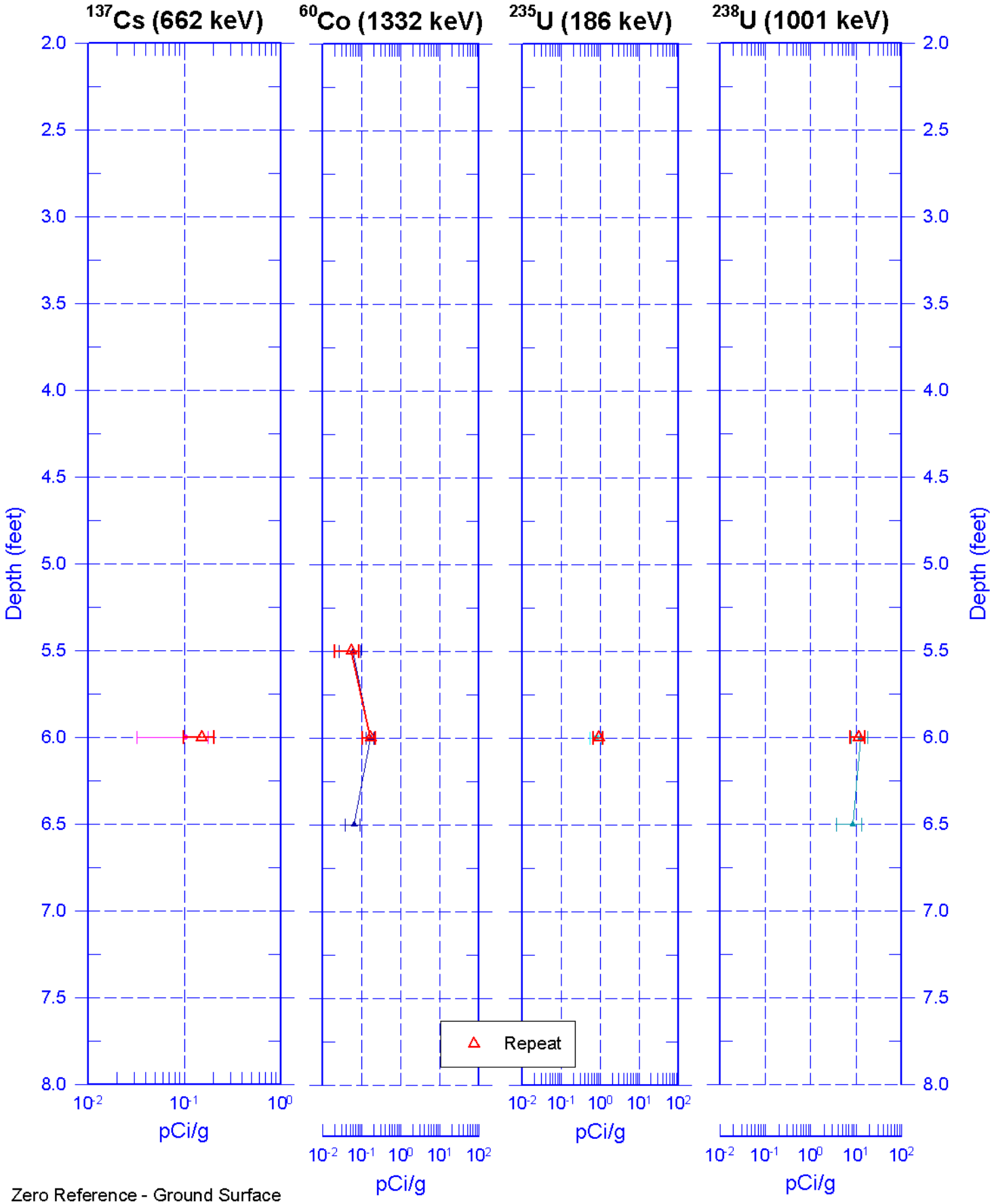
Stoller
Hanford Office

399-2-31 (C6218)
Total Gamma & Moisture



Reference - Ground Surface

399-2-31 (C6218)
Manmade Radionuclides Repeat Section

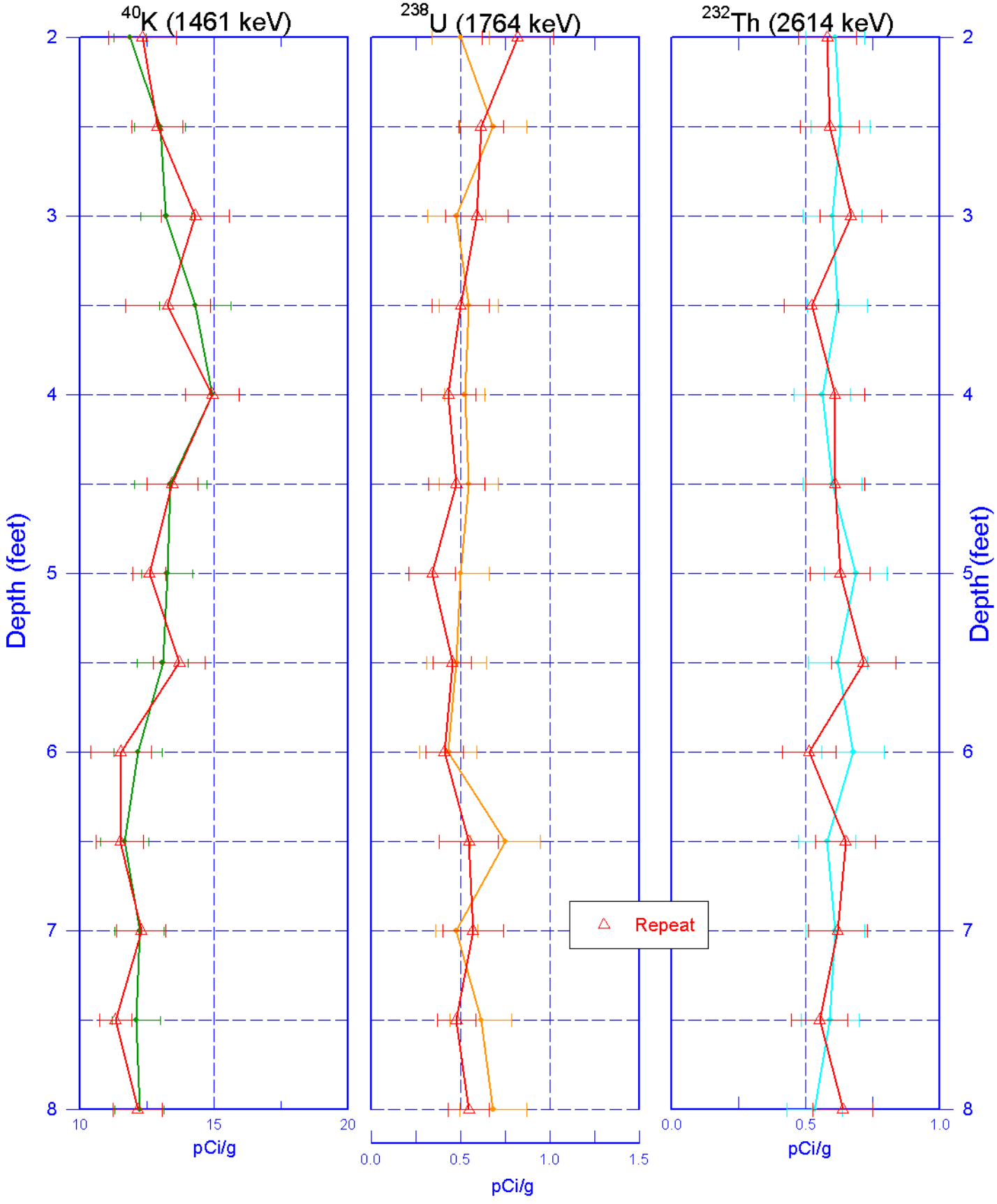


Zero Reference - Ground Surface

Stoller
Hanford Office

399-2-31 (C6218)

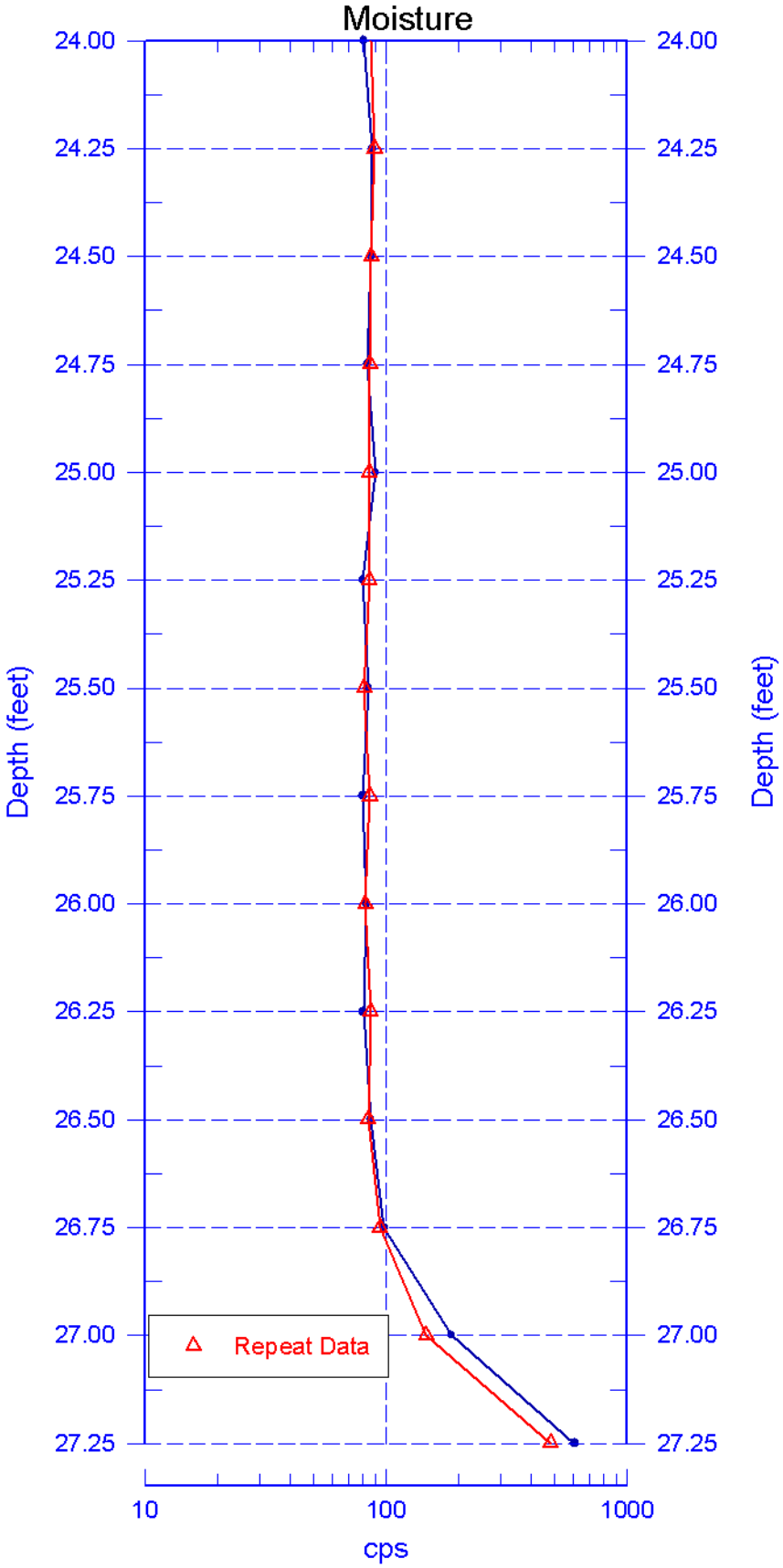
Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

Stoller
Hanford Office

399-2-31 (C6218)
Moisture Repeat Section



Reference - Ground Surface

399-3-23 (C6194)
Log Data Report

Borehole Information:

Borehole:	399-3-23		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	29.2	GWL Date:	07/12/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116054.6	594237.9	07/10/08	Unknown	65.0	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	3.1	7 5/8	6 7/8	3/8	-3.1	57.7

Borehole Notes:

Drill site geologist reported casing information and total depth. An e-tape was employed to measure depth-to-water.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type: / Serial No.:	60% HPGe SGLS / 47TP32211A
Effective Calibration Date:	12/31/2007	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type: / Serial No.:	NMLS / H310700352
Effective Calibration Date:	11/06/2007	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	07/13/08	07/13/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	64.0	14.0			
Finish Depth (ft)	0	8.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DL631CAB	DL631CAB			
Start File	DL631000	DL631129			
Finish File	DL631128	DL631141			
Post-Verification	DL631CAA	DL601CAA			
Depth Return Error (in.)	0	0			
Comments	Gain adjustment DL631117	Repeat section			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat			
Date	07/13/08	07/13/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	0	11.0			
Finish Depth (ft)	29.5	14.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DHH02CAB	DHH02CAB			
Start File	DHH02000	DHH02119			
Finish File	DHH02118	DHH02131			
Post-Verification	DHH02CAA	DHH02CAA			
Depth Return Error (in.)	NA	0			
Comments	None	Repeat section			

Logging Operation Notes:

SGLS and NMLS data were both collected using Gamma 4, HO 68B-3573.

SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. Maximum SGLS logging depth achieved was 64.4 ft or approximately 6.7 ft below casing before the sonde un-weighted. A centralizer was installed on the sonde.

NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum logging depth achieved was 29.5 ft, at approximately groundwater level. A centralizer was installed on the sonde.

Analysis Notes:

Analyst:	R. SPATZ	Date:	10/08/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

Pre- and post-survey verification spectra for both SGLS and NMLS met the acceptance criteria for the established systems.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time, and water as determined by annual calibrations.

NMLS spectra were processed in batch mode using APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in. inside diameter borehole casing.

Analyses of log data suggest slight discrepancies with field reports of depth-to-water and casing depth. Corrections of log data were applied according to the analysis assumptions in the table below.

Top (ft)	Bottom (ft)	T (in)	ID (in)	Comments
0	29.4	0.375	N/A	No water correction
29.5	57.0	0.375	6.875	GWL reported @ 29.2 ft; adjusted to 29.5 ft Casing bottom reported @57.7 ft; adjusted to 57.0 ft
57.1	TD	0	0	No adjustment made

T = casing thickness used to calculate energy-dependent casing correction factor
ID = casing inside diameter used to calculate energy-dependent water correction factor

Results and Interpretations:

U-235 and U-238 (Pa-234m) were detected sporadically in this borehole. Inspection of the individual spectra at these depths indicates that these detections are statistical fluctuations associated with the processing software and are not considered valid. No Cs-137 or Co-60 was detected.

Between 10.0 and 12.5 ft, and below the 54.0 ft depth, probable lithologic changes occur, which is shown by the fluctuating KUT concentrations and increased Total Gamma count rates. The KUT and Moisture plots both indicate good repeatability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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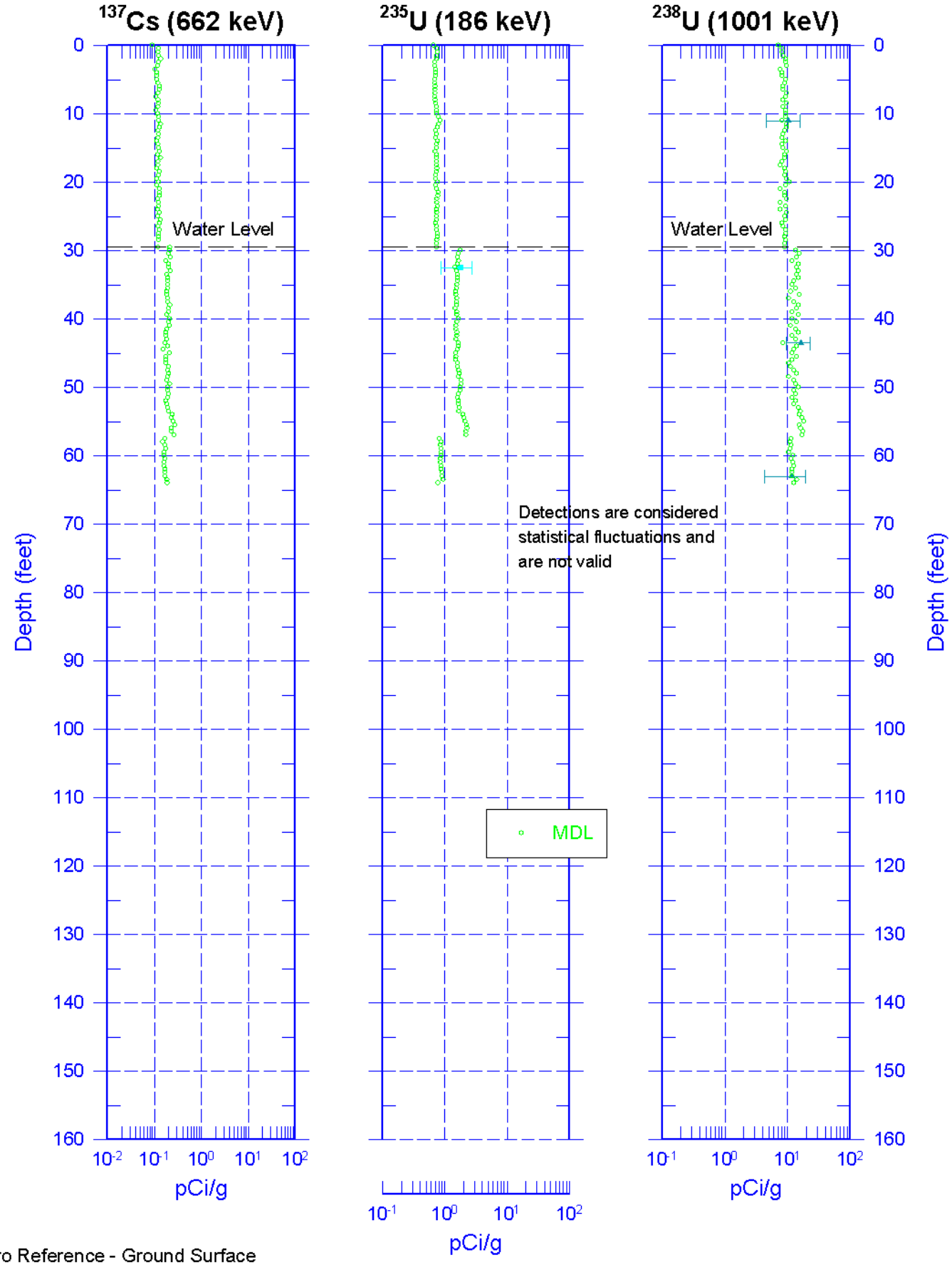
399-3-23 (C6194)
Manmade Radionuclides



Zero Reference - Ground Surface

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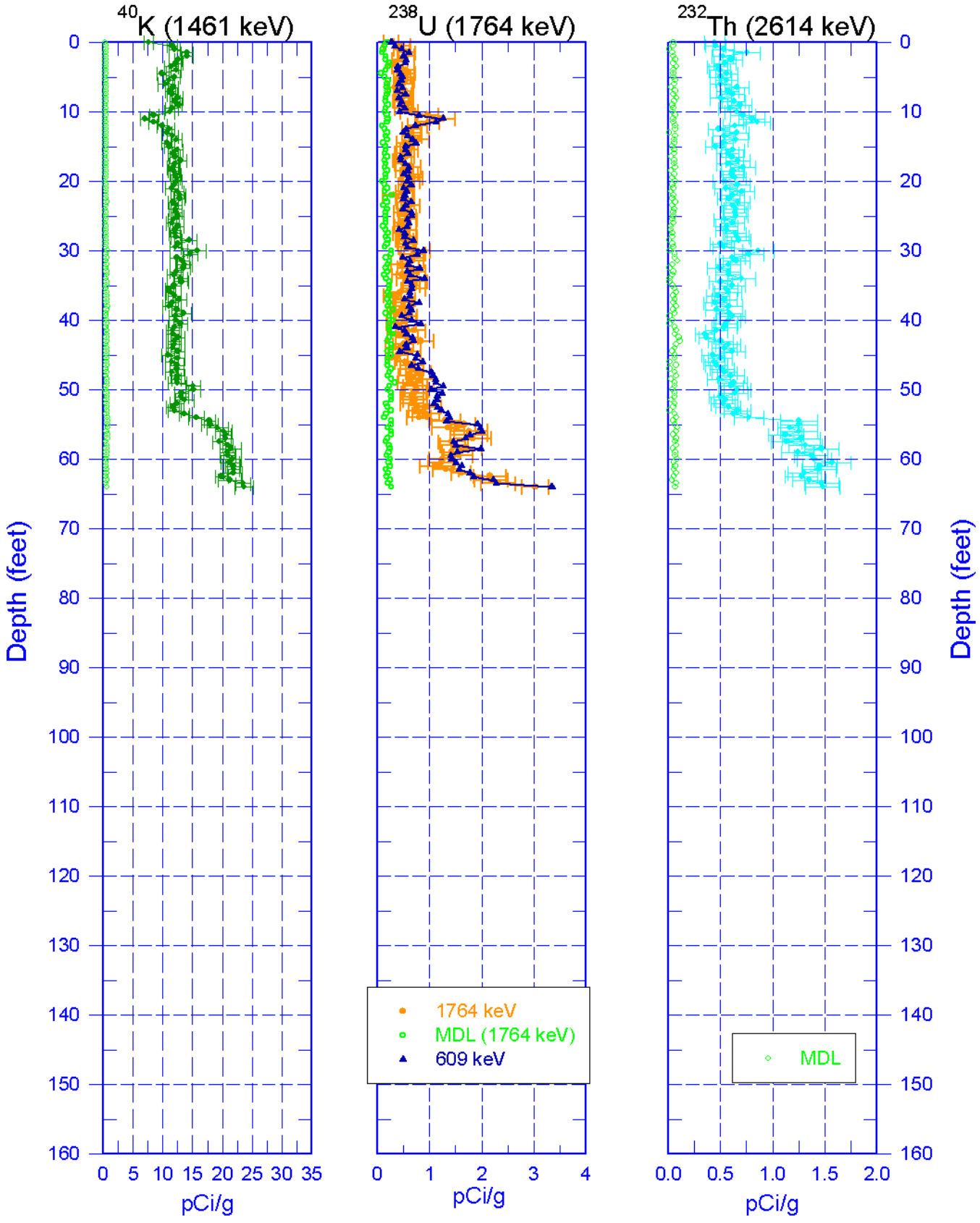
399-3-23 (C6194)
Natural Gamma Logs



Zero Reference - Ground Surface

Stoller
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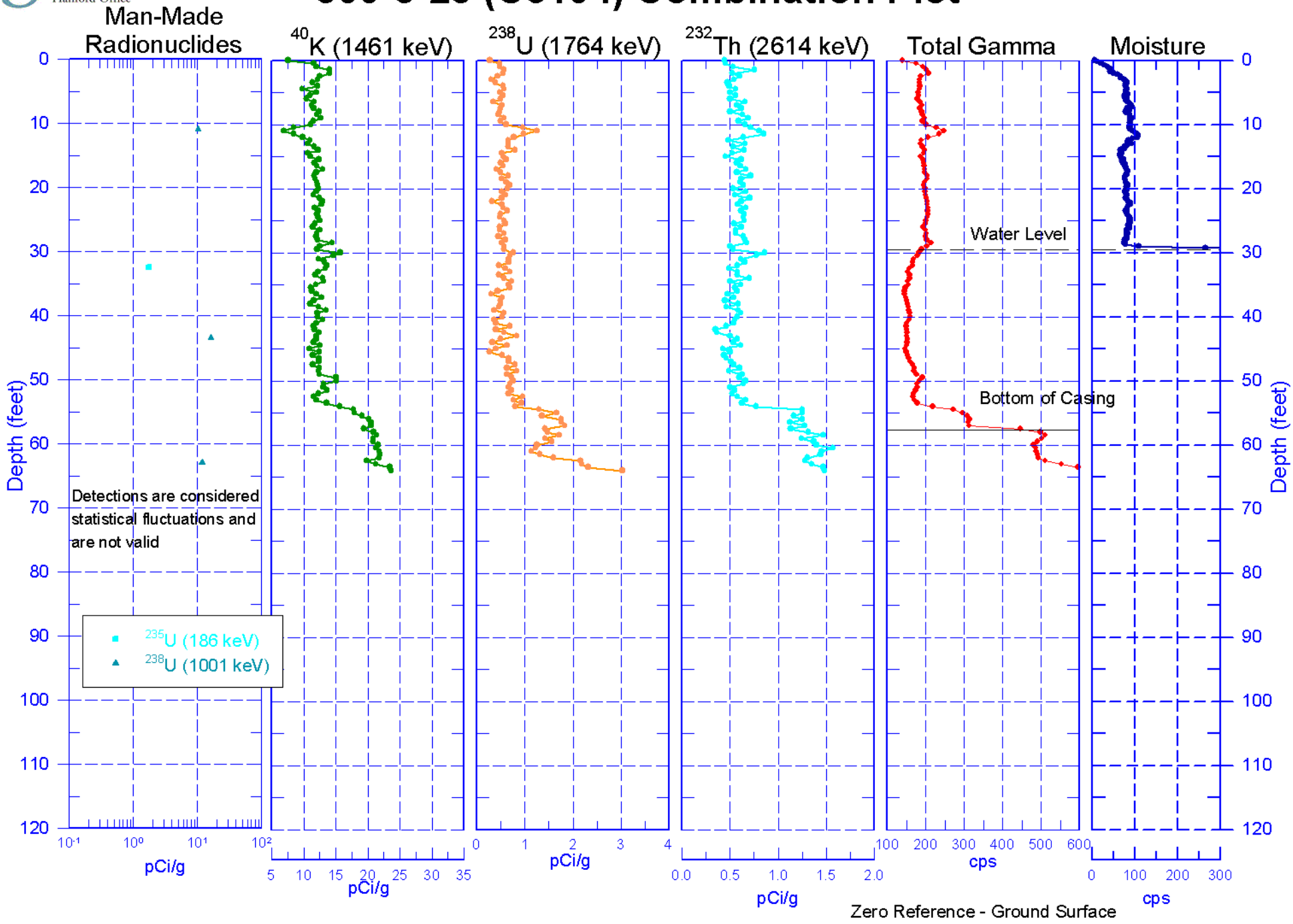
399-3-23 (C6194) Combination Plot



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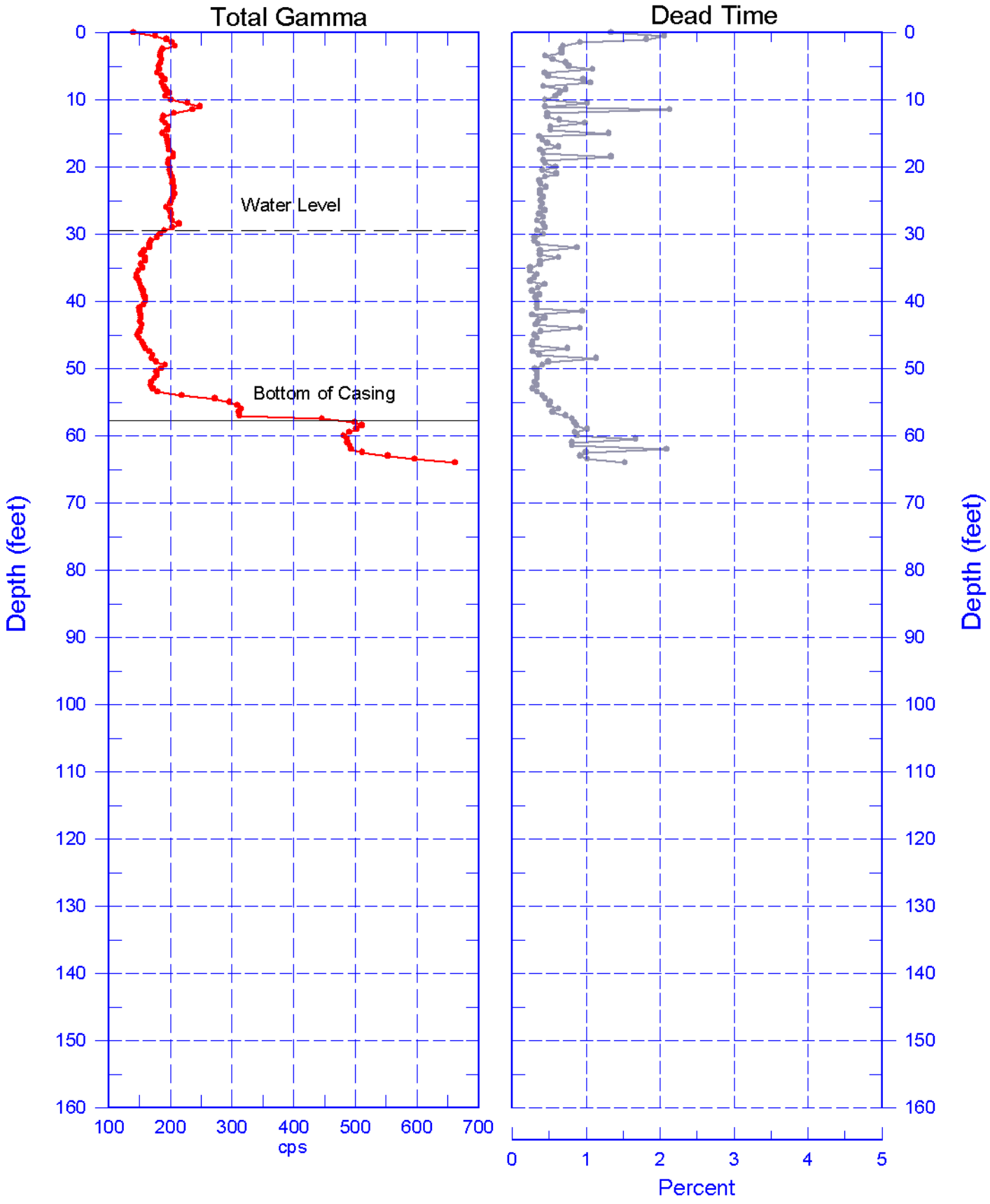
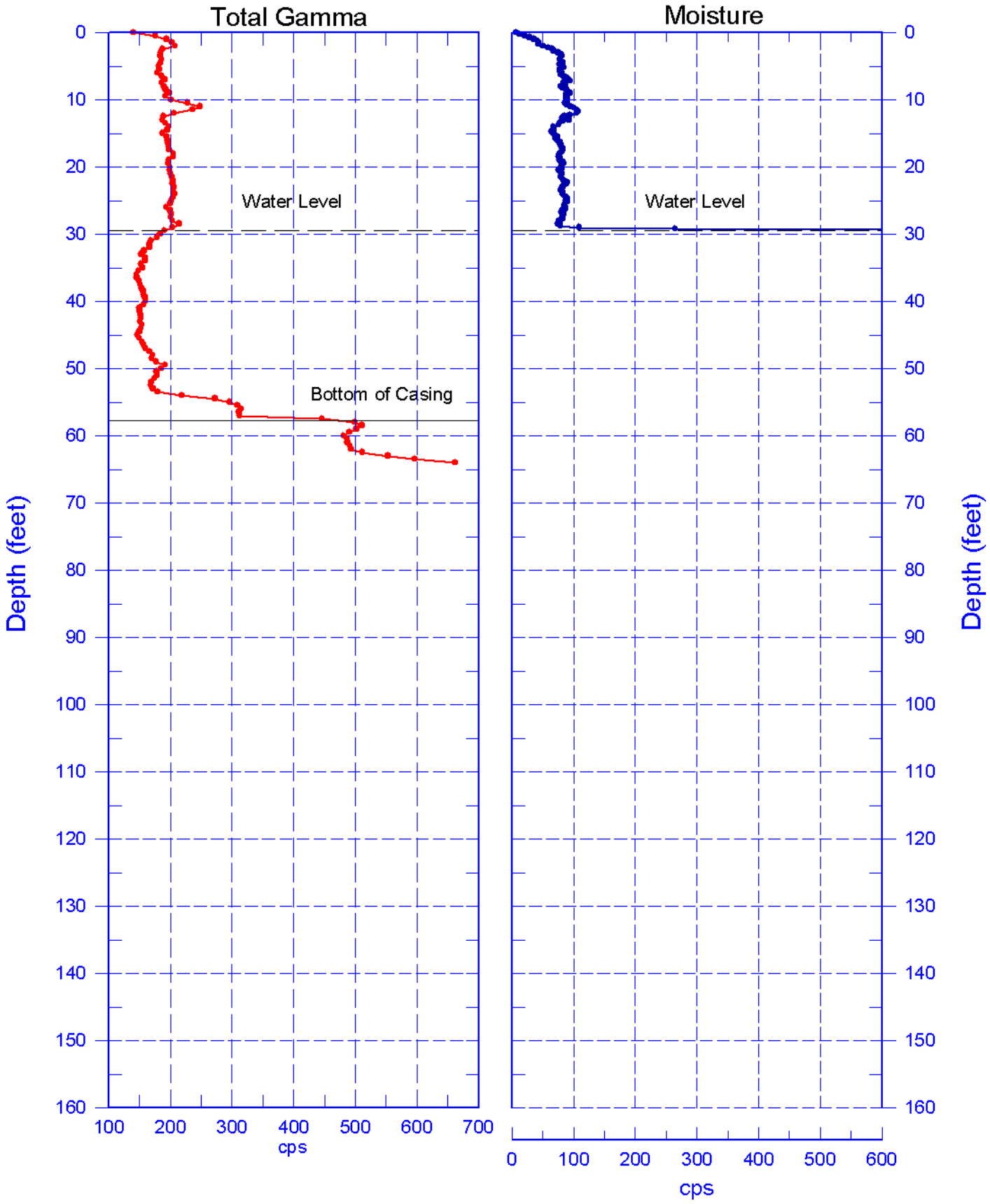
399-3-23 (C6194)
Total Gamma & Dead Time



Reference - Ground Surface

Stoller
Hanford Office

399-3-23 (C6194)
Total Gamma & Moisture



Reference - Ground Surface

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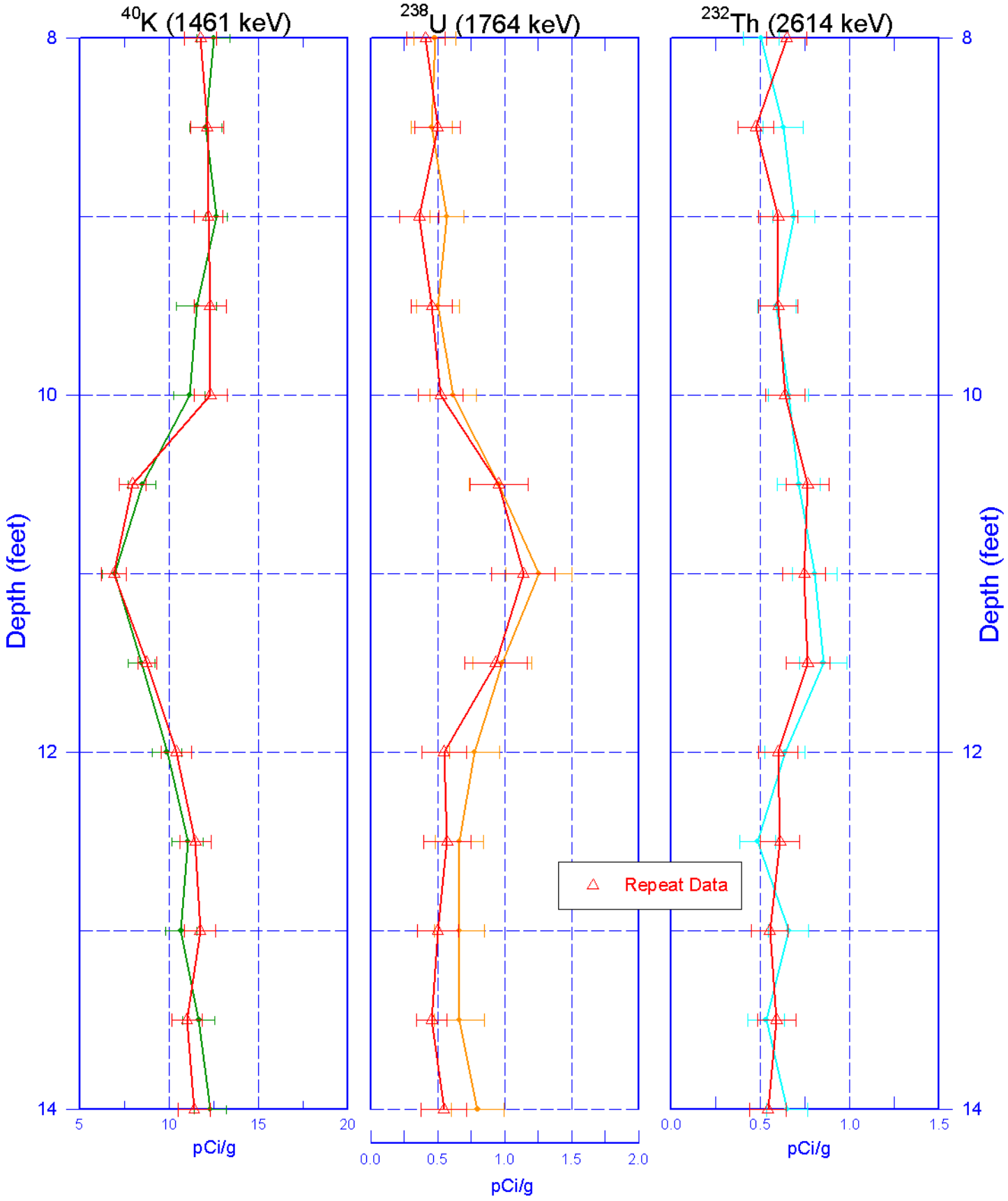
399-3-23 (C6194)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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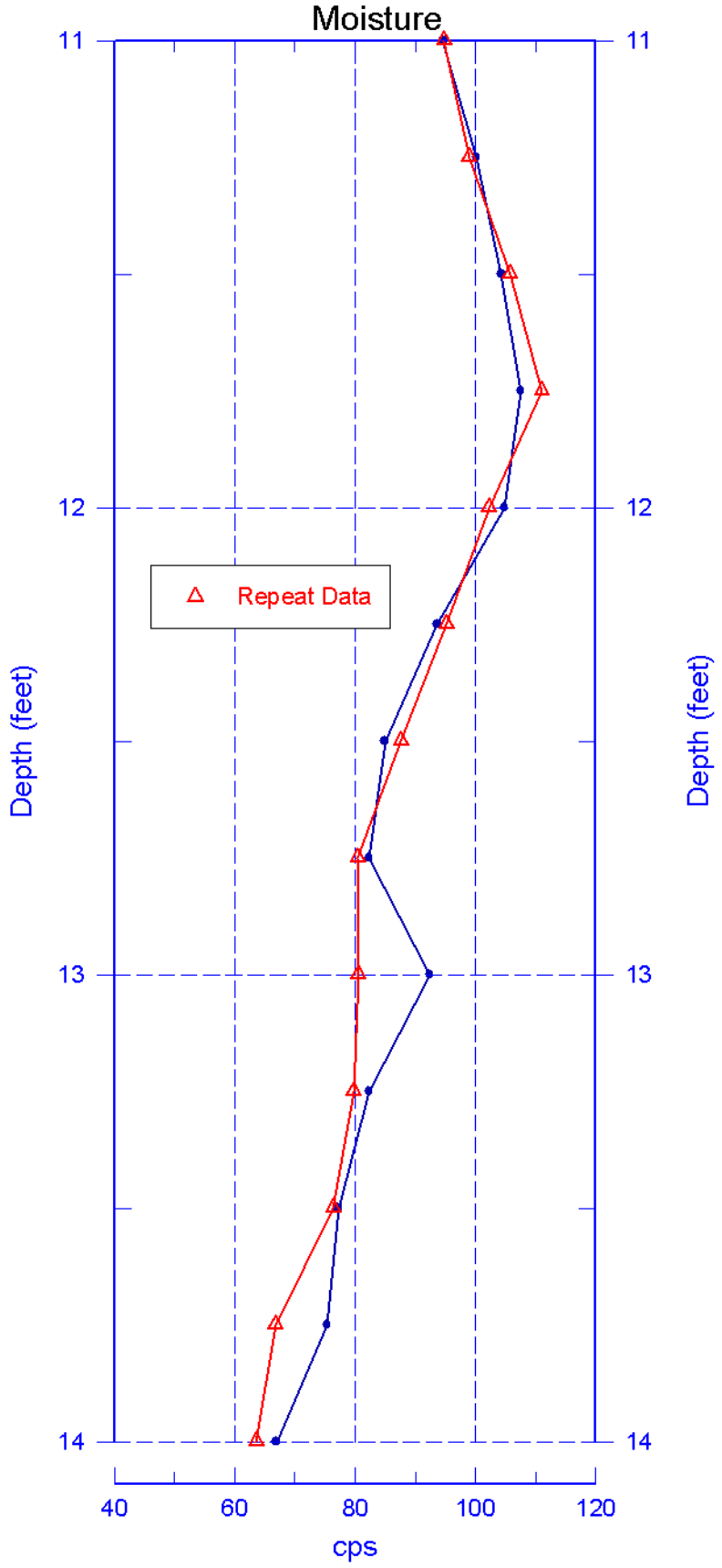
399-3-23 (C6194)
Moisture Repeat Section



Reference - Ground Surface

399-3-24 (C6199)
Log Data Report

Borehole Information:

Borehole:	399-3-24 (C6199)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	29	GWL Date:	7/11/2008
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116044.6	594238.7	7/10/2008	Unknown	65	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	2.6	7 7/8	6 7/8	3/8	2.6	58

Borehole Notes:

Casing data and total depth was reported by the site geologist. Casing diameters were measured by the logging engineer using a steel tape and rounded to the nearest 1/16 inch. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type: / Serial No.:	60% HPGE SGLS / 47TP32211A
Effective Calibration Date:	12/31/2007	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002; Rev. 0	

Logging System:	Gamma 4 H		Type: / Serial No.:	NMLS / H310700352
Effective Calibration Date:	11/06/2007	Calibration Reference:	HGLP-CC-021, Rev. 0	
		Logging Procedure:	HGLP-MAN-002; Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	07/12/08	07/12/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	64.0	6.0			
Finish Depth (ft)	0.0	12.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	NA	NA			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DL621CAB	DL621CAB			
Start File	DL621000	DL621129			
Finish File	DL621128	DL621141			
Post-Verification	DL621CAA	DL621CAA			
Depth Return Error (in.)	½ low	0			
Comments	Repeat Section	None			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	1	2 Repeat			
Date	7/12/2008	7/12/2008			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	0.0	10.0			
Finish Depth (ft)	29.0	13.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	NA	NA			
MSA Interval (ft)	0.25 ft	0.25 ft			
ft/min	NA	NA			
Pre-Verification	DHG92CAB	DHG92CAB			
Start File	DHG92000	DHG92117			
Finish File	DHG92116	DHG92129			
Post-Verification	DHG92CAA	DHG92CAA			
Depth Return Error (in.)	NA	¼ high			
Comments	None	Repeat section.			

Logging Operation Notes:

The SGLS data were acquired 7/12/2008 with the Gamma 4L, HO 68B-3573 detector. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. A centralizer was installed on the sonde. Maximum logging depth was 64.2 feet before the sonde was un-weighted.

The Neutron Moisture data were acquired 7/12/2008 with Gamma 4H, HO 68B-3573 detector. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. A centralizer was installed on the sonde. Maximum logging depth was 29.0 feet before water was encountered.

Analysis Notes:

Analyst:	L SPINNER	Date:	09/10/2008	Reference:	GJO-HGLP 1.6.3, Rev. 0

The SGLS and NMLS pre- and post-survey verifications spectra met acceptance criteria.

A casing correction for a 3/8-inch casing was applied for the eight inch threaded steel casing from 0 to 58 feet, leaving seven feet of the remaining borehole uncorrected. A water correction was applied from 29 feet to end of logging depth.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calculations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8 inch inner diameter borehole casing.

Results and Interpretations:

Cs –137, U-235 and U-238 (Pa-234m) were identified by the routine processing software at various depth intervals. Additional scrutiny of the individual spectra indicated no valid energy peaks and the detections are considered statistical fluctuations.

Co-60 was detected at 0.07pCi/g at 13.5 feet. This detection is valid and the 1333 keV energy peak is corroborated by the Co-60 energy peak at 1173 keV.

The variations in the Natural Gamma Logs may indicate a stratigraphy change at 53 feet.

The Natural Gamma Logs (KUT) and the Moisture Repeat plot indicate good repeatability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot (0-120 feet), with Moisture
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs (6–12 ft)
Moisture Repeat Section (10–13 ft.)

[1] GWL – groundwater level
[2] TOC – top of casing

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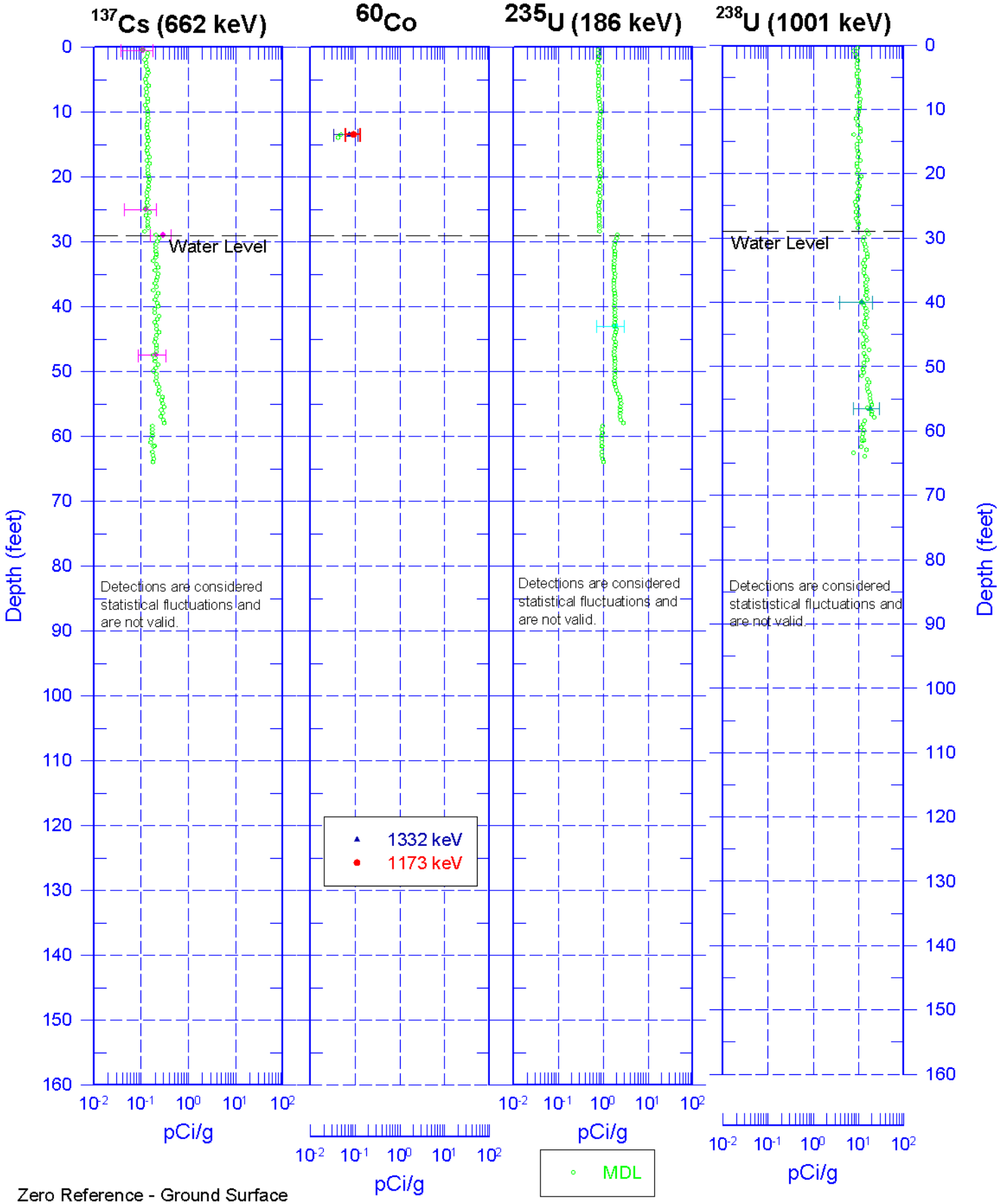
399-3-24 (C6199)
Manmade Radionuclides



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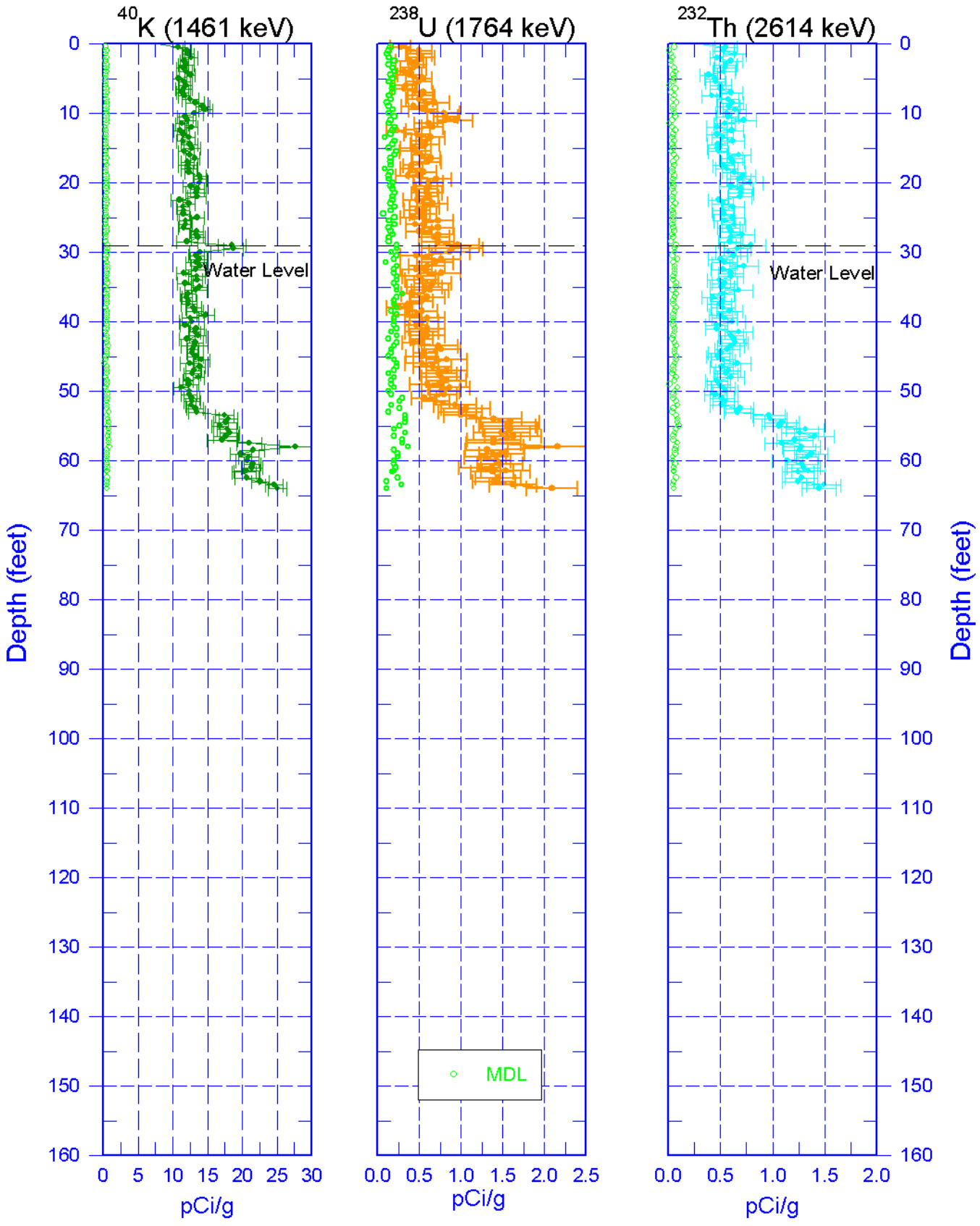
399-3-24 (C6199)
Natural Gamma Logs



Zero Reference - Ground surface

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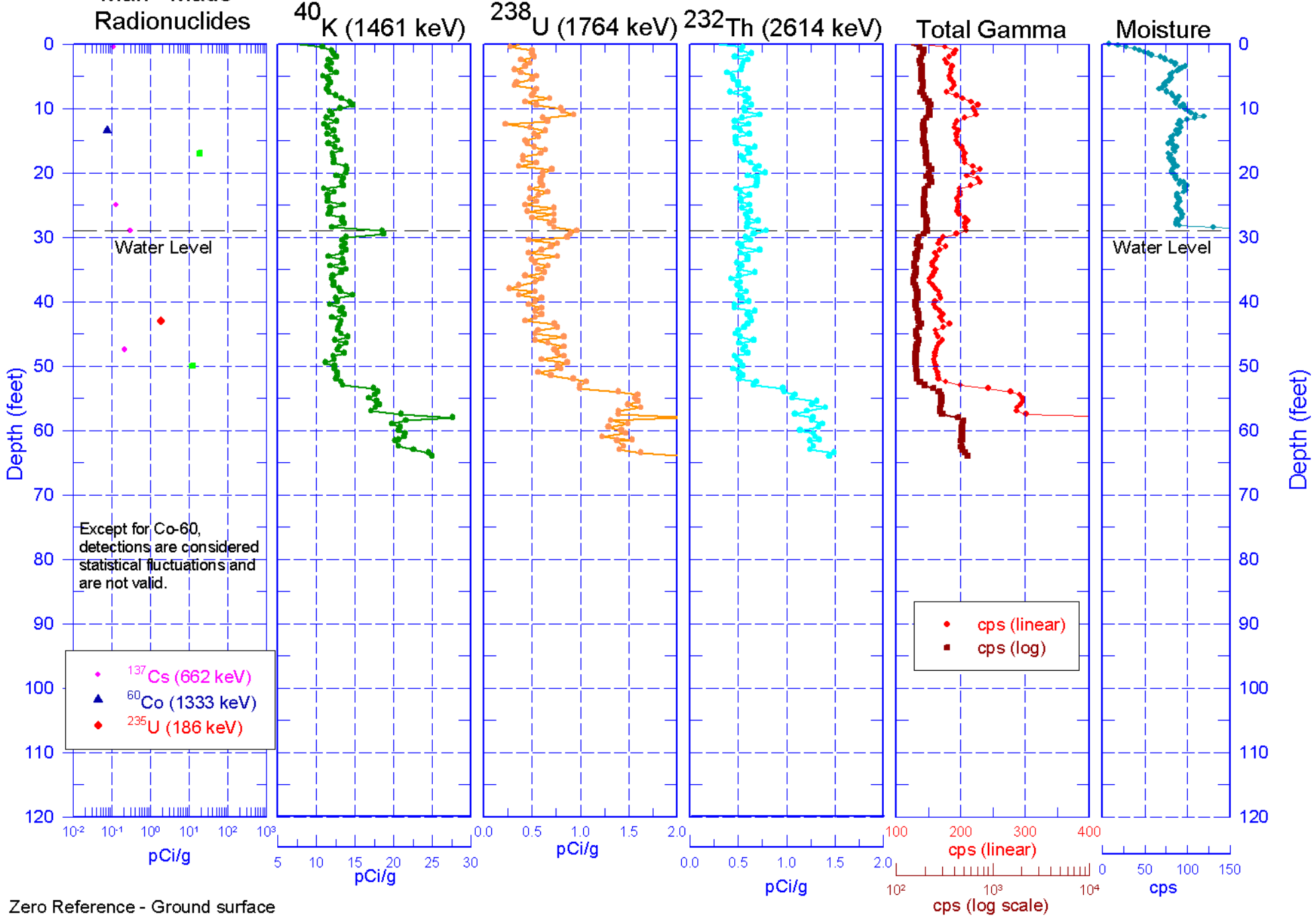
399-3-24 (C6199) Combination Plot (0-120 ft.)



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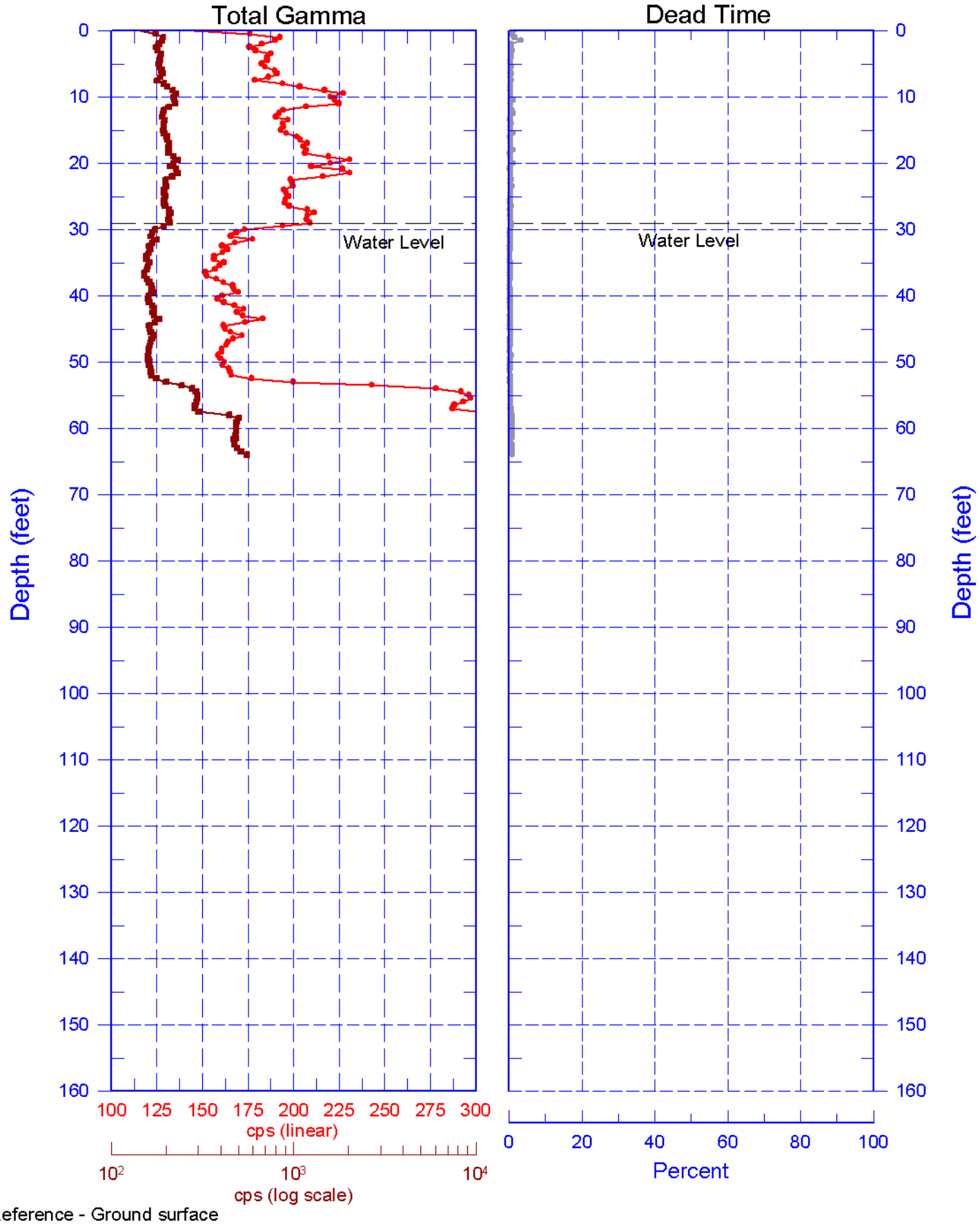
399-3-24 (C6199)
Total Gamma & Dead Time



Reference - Ground surface

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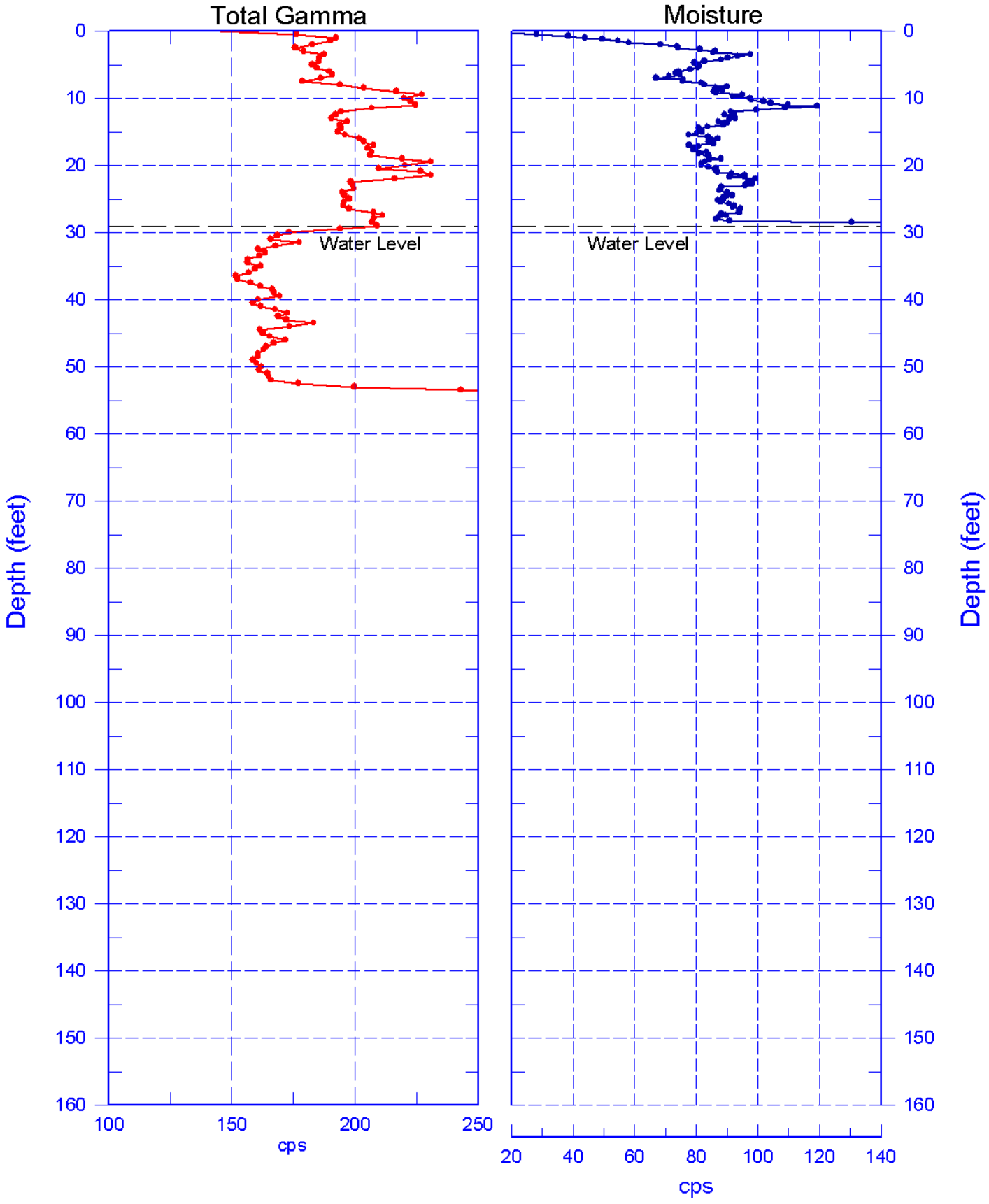
399-3-24 (C6199)
Total Gamma & Moisture



Reference - Ground Surface

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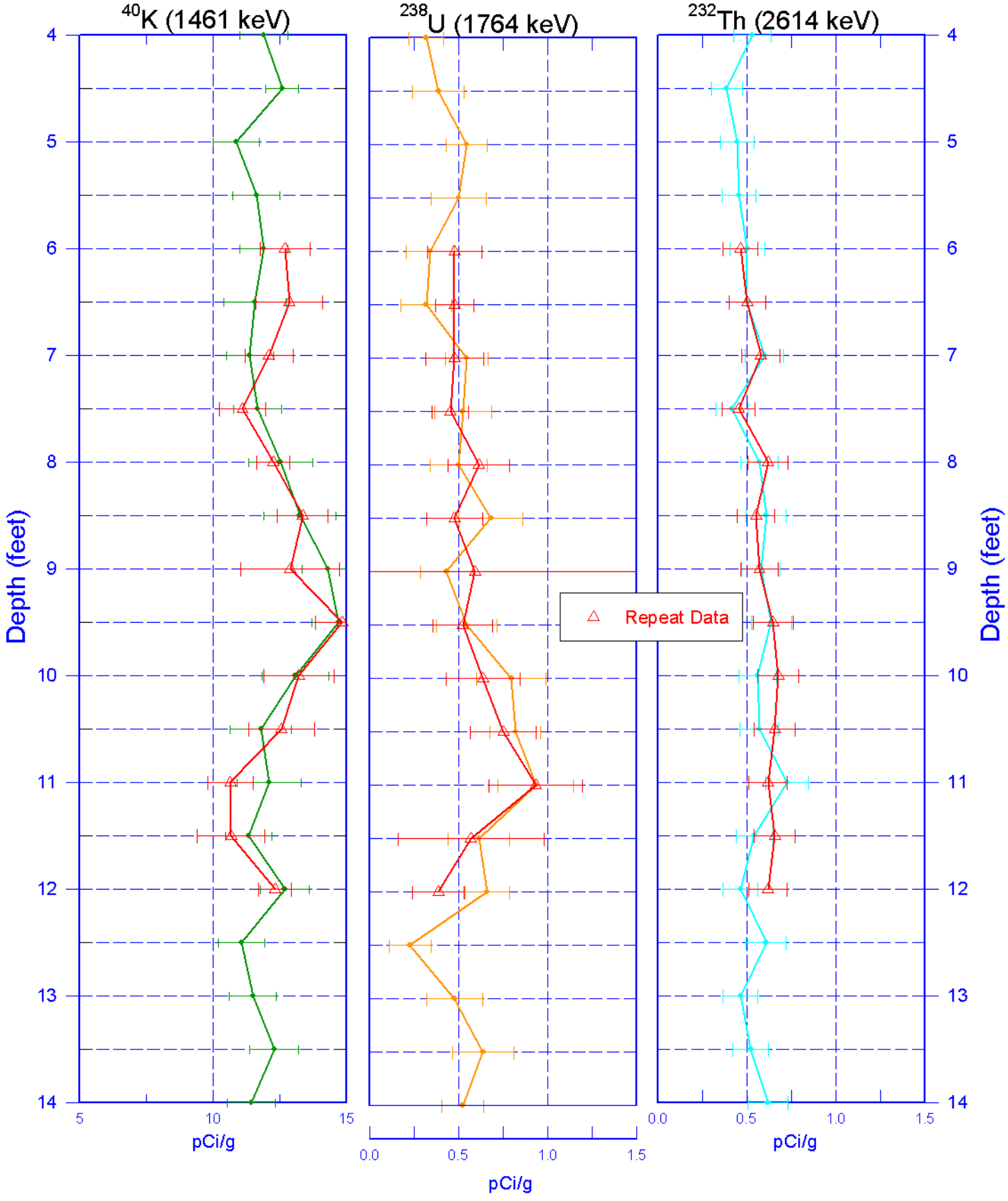
399-3-24 (C6199)

Repeat Section of Natural Gamma Logs (6-12 ft.)



Zero Reference - Ground surface

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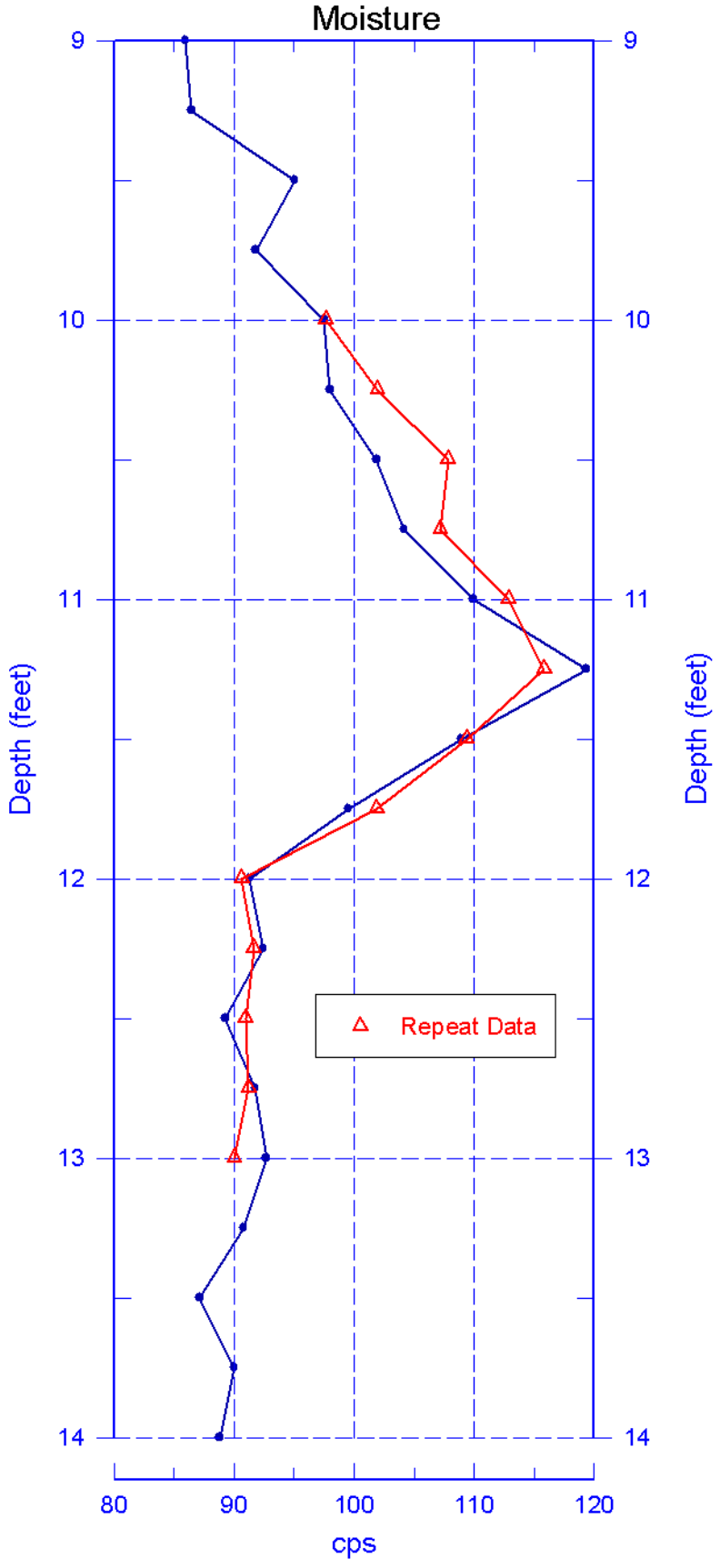
399-3-24 (C6199)
Moisture Repeat Section



Reference - Ground Surface

399-3-25 (C6200)
Log Data Report

Borehole Information:

Borehole:	399-3-25 (C6200)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	14.5	GWL Date:	06/20/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116056.1	594255.1	06/17/08	Unknown	65	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	3.2	7 5/8	6 7/8	3/8	-3.2	61

Borehole Notes:

Casing data, and total depth reported by site Geologist. Logging engineer measured depth to water using an e-tape. Casing diameters were measured using a steel tape and rounded to the nearest 1/16-inch.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type:	SGLS
			Serial No.:	47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type:	NMLS
			Serial No.:	H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	06/20/08	06/20/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	60.0	9.0			
Finish Depth (ft)	0.0	15.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	N/A	N/A			
Pre-Verification	DL481CAB	DL481CAB			
Start File	DL481000	DL481121			
Finish File	DL481120	DL481133			
Post-Verification	DL481CAA	DL481CAA			
Depth Return Error (in.)	0.5 high	0			
Comments	No fine gain adjustment made.	Repeat Section			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	1	2 Repeat			
Date	06/20/08	06/20/08			
Logging Engineer	McClellan	McClellan			
Start Depth (ft)	0.0	14.5			
Finish Depth (ft)	14.5	12.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	N/A	N/A			
Pre-Verification	DHF52CAB	DHF52CAB			
Start File	DHF52000	DHF52059			
Finish File	DHF52058	DHF52069			
Post-Verification	DHF52CAA	DHF52CAA			
Depth Return Error (in.)	N/A	0			
Comments	None	Repeat Section			

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre – and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. Maximum logging depth for the SGLS was 60.0 ft before the sonde un-weighted. A centralizer was installed on the sonde. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier.

Analysis Notes:

Analyst:	LEGLER	Date:	09/12/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

The SGLS pre- and post-survey verification measurements met the acceptance criteria for the established system. The NMLS pre- and post-survey verification measurements met the acceptance criteria for the established system but the file, DHF52CAB, had measurements above the upper control limit for counts per second (cps). A casing correction for a 3/8-inch thick casing was applied to spectral (SGLS) log data from ground surface to total logged depth of borehole. A water correction was also applied from 14.5 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual energy peaks and to determine count rates. Concentrations were calculated with an EXCEL template identified as G4LDec07.xls using efficiency functions and corrections for casing, dead time and water as determined by annual calibrations.

Moisture data is presented in counts per second (cps) because no calibration data exists for a 6-7/8 inch inner diameter casing.

Results and Interpretations:

Cs-137, U-235, and U-238 (Pa-234m) were detected at several isolated depths throughout this borehole. Inspection of the individual spectra for these radionuclides at the various depths indicates these detections are statistical fluctuations associated with the processing software and are not considered valid.

The KUT plots indicate good repeatability. The moisture plot indicates good repeatability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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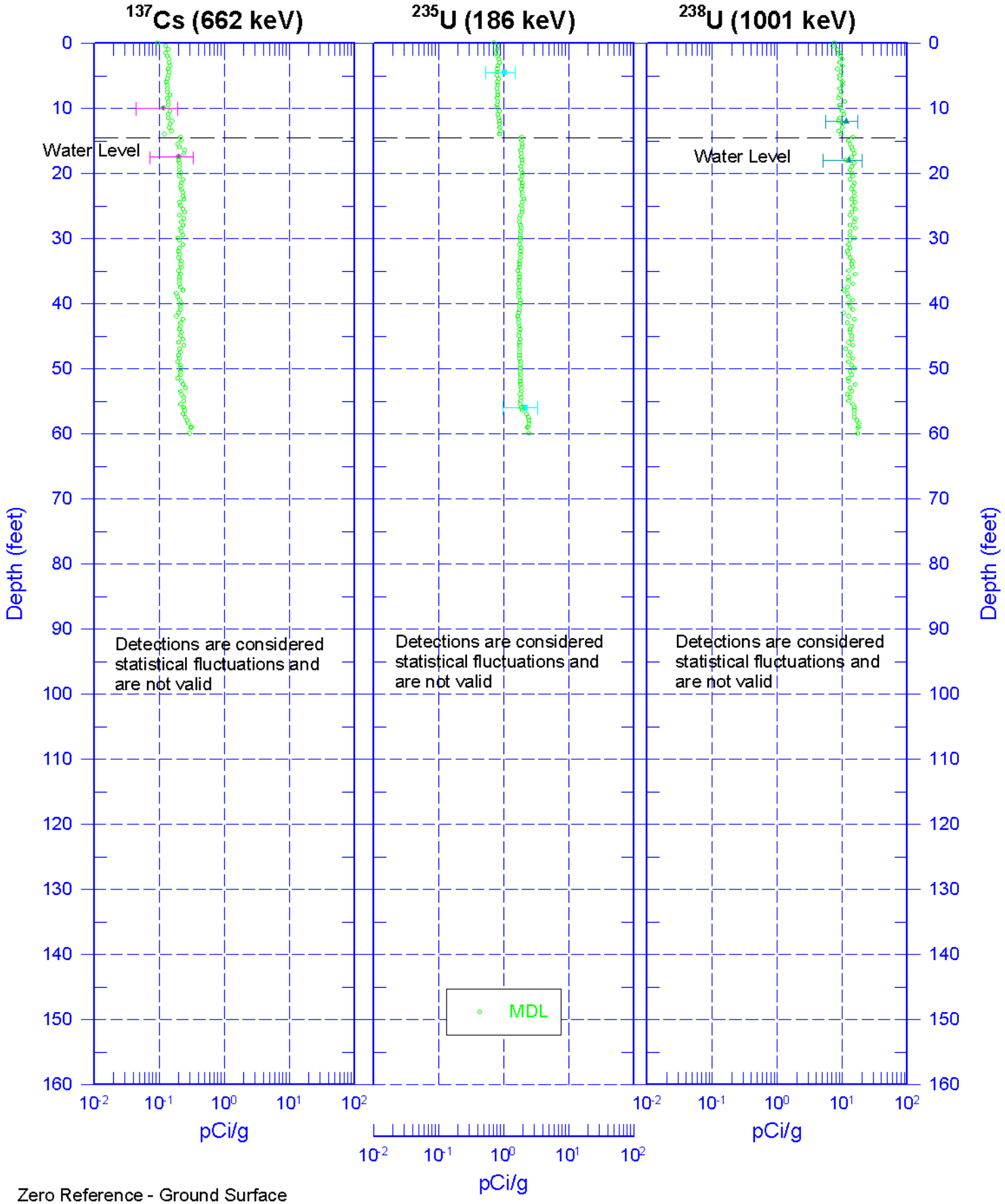
399-3-25 (C6200)
Manmade Radionuclides



Zero Reference - Ground Surface

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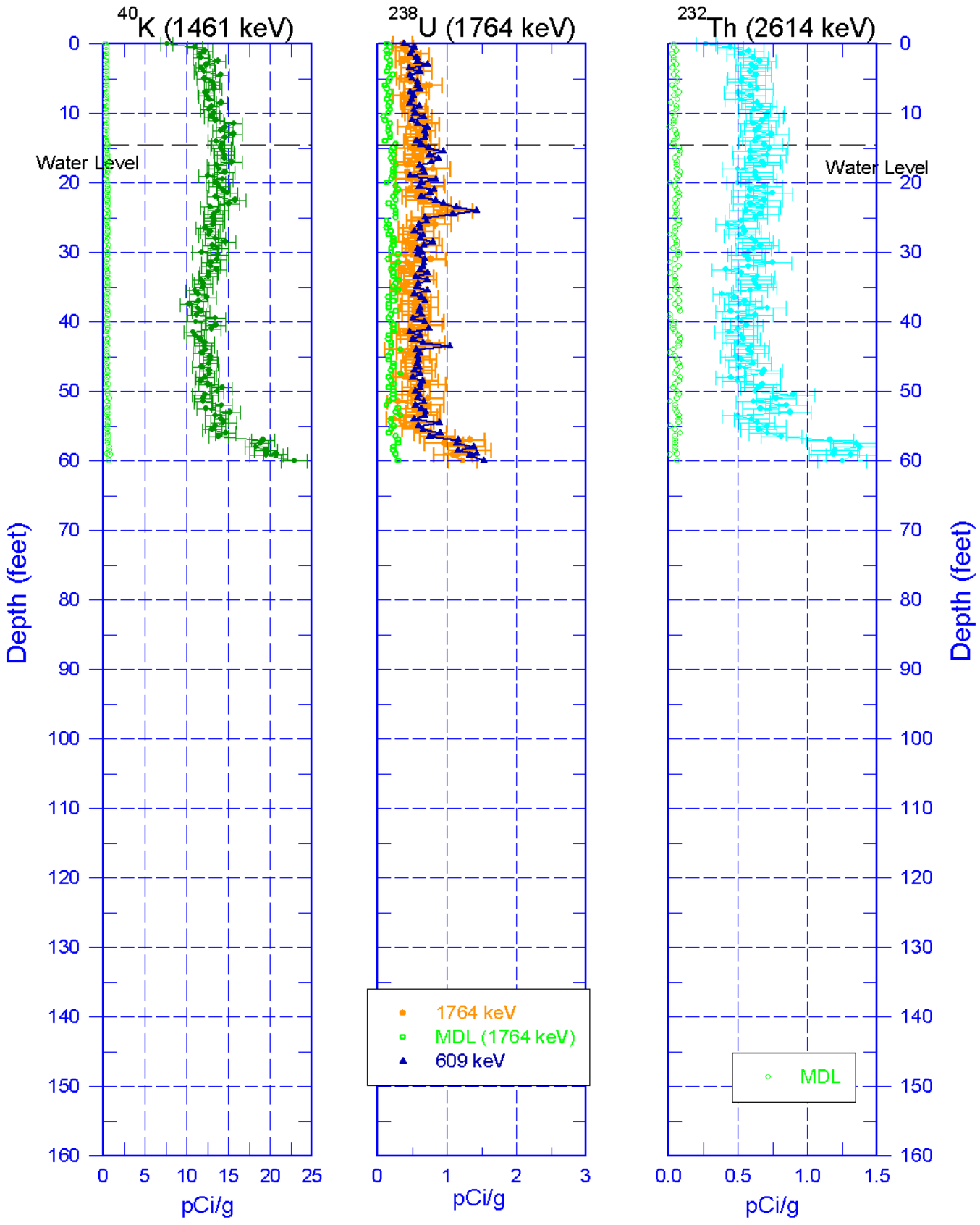
399-3-25 (C6200)
Natural Gamma Logs



Zero Reference - Ground Surface

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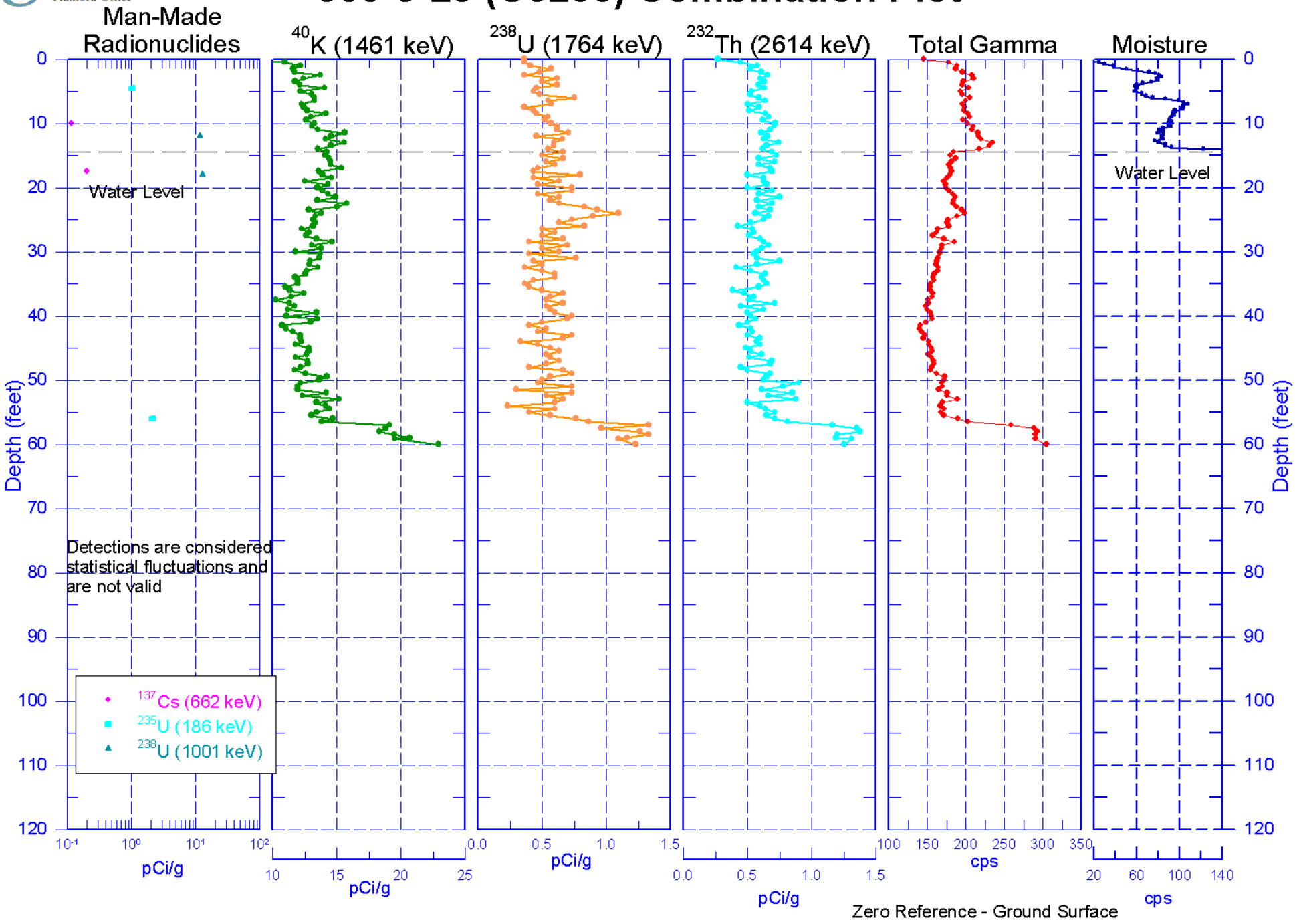
399-3-25 (C6200) Combination Plot



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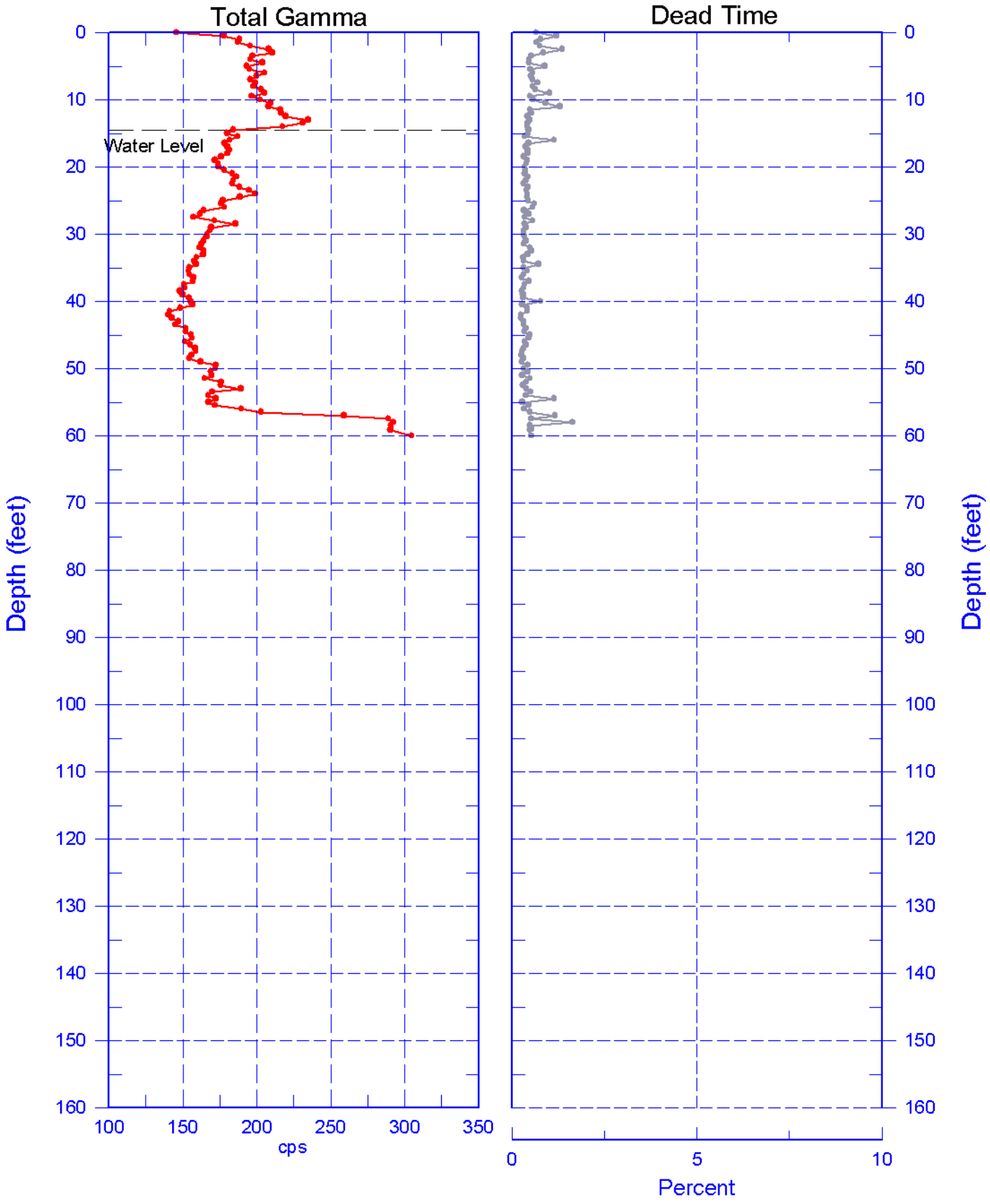
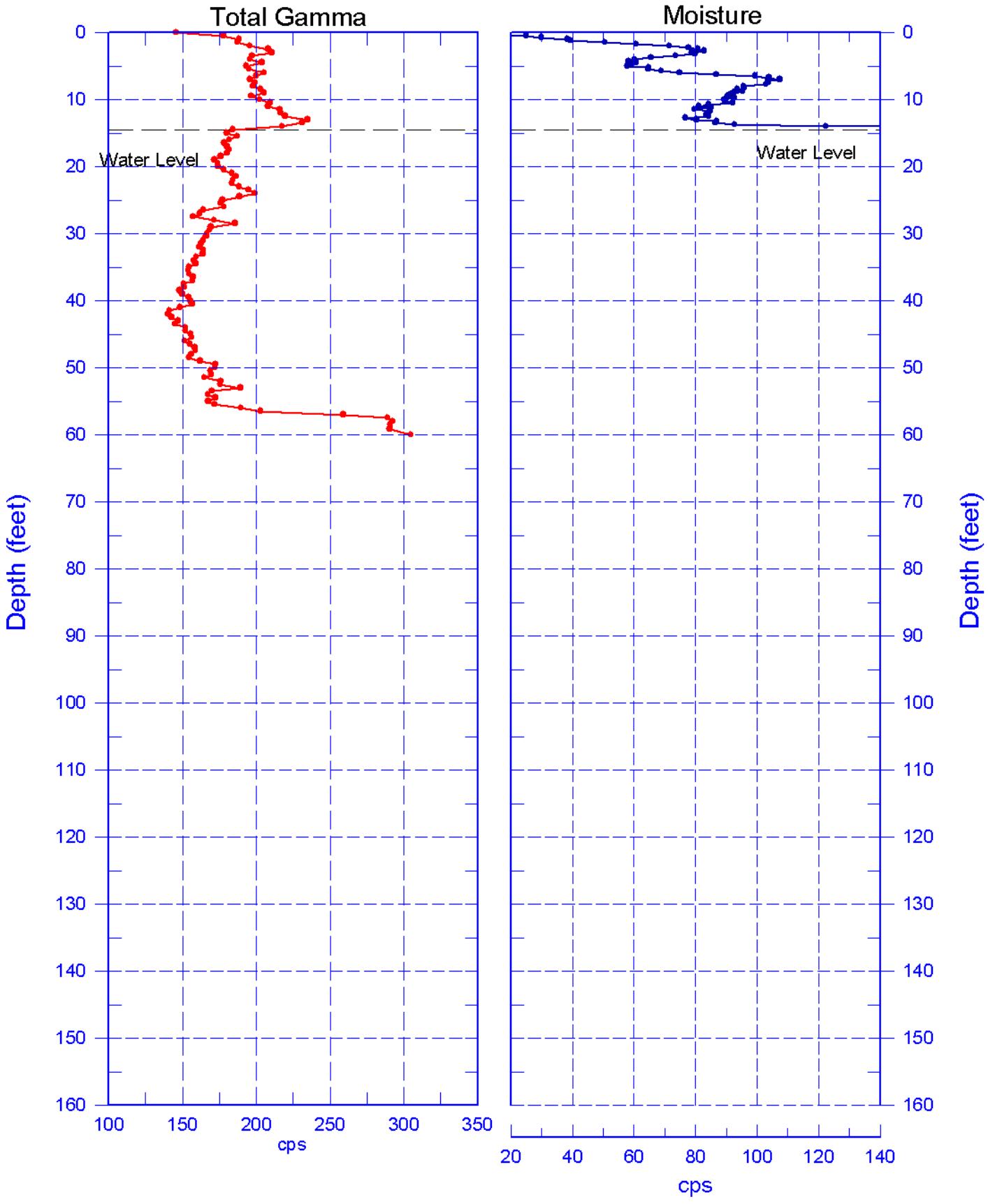
399-3-25 (C6200)
Total Gamma & Dead Time



Reference - Ground Surface

Stoller
Hanford Office

399-3-25 (C6200)
Total Gamma & Moisture



Reference - Ground Surface

Stoller
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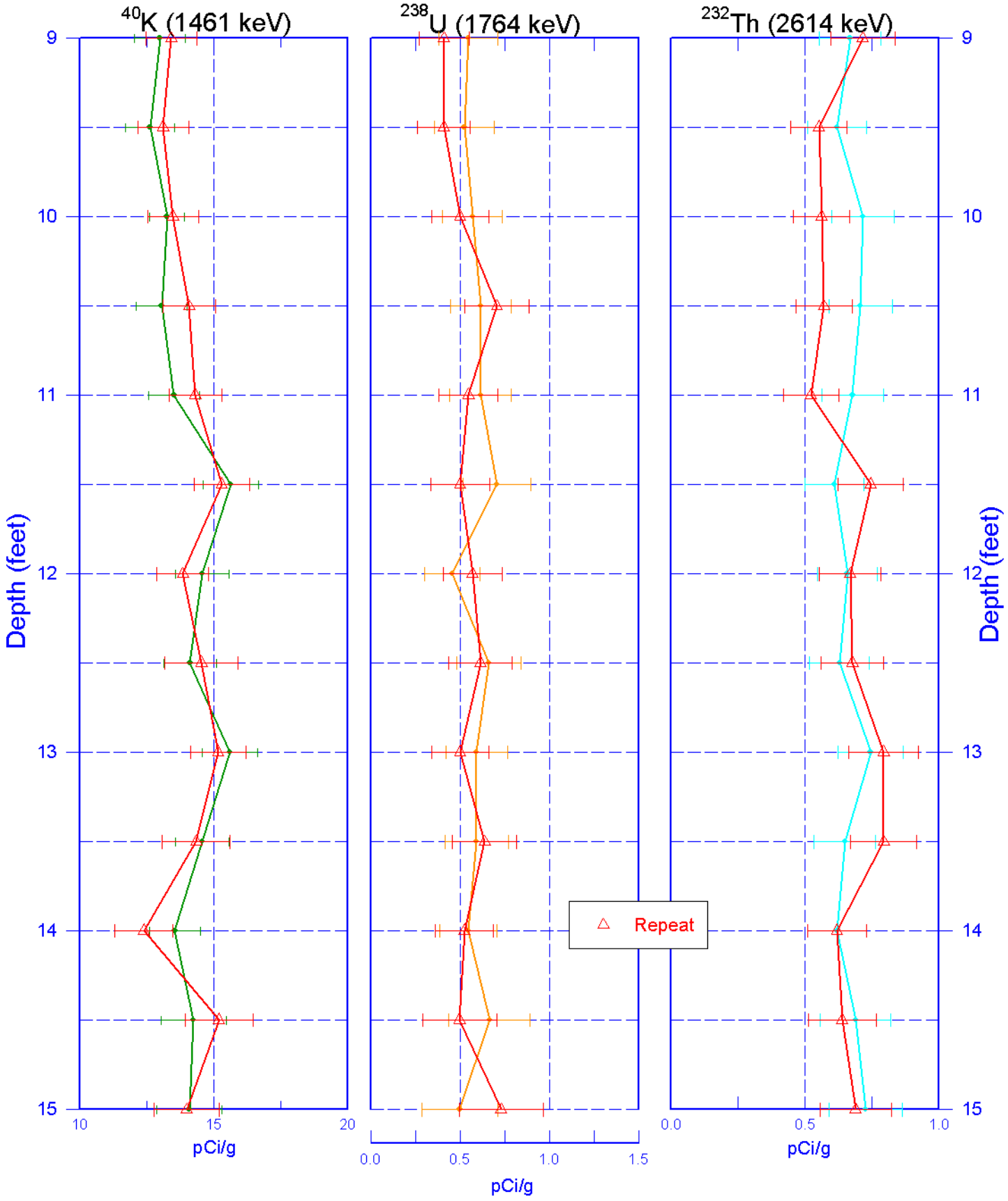
399-3-25 (C6200)

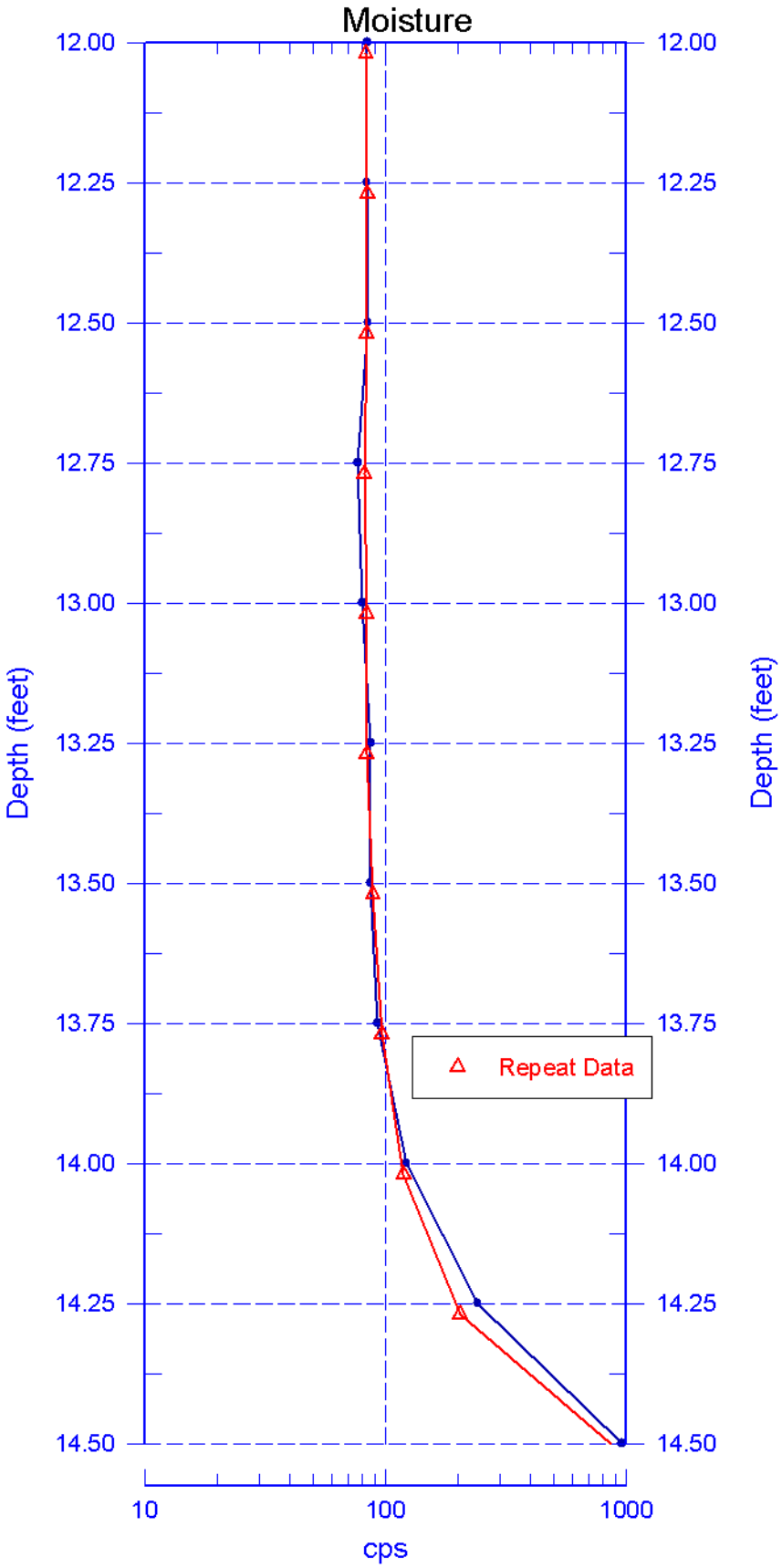
Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

Stoller
Hanford Office

399-3-25 (C6200)
Moisture Repeat Section



Reference - Ground Surface

399-3-26 (C6203)
Log Data Report

Borehole Information:

Borehole:	399-3-26 (C6203)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	31.7	GWL Date:	05/16/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116034.6871	594239.606	05/16/08	Unknown	66.0	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	3.90	7 5/8	6 7/8	3/8	-3.9	56.8

Borehole Notes:

Well site geologist reported depth to bottom, depth to water and depth of casing. Logging engineer measured casing diameter employing a steel tape and rounding to the nearest 1/16-in. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 1 N		Type: / Serial No.:	60% HPGe SGLS / 45TP22010A
Effective Calibration Date:	03/28/08	Calibration Reference:	HGLP-CC-031	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 1 M		Type: / Serial No.:	NMLS / H340207279
Effective Calibration Date:	05/06/08	Calibration Reference:	HGLP-CC-032	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat
Date	05/19/08	05/19/08
Logging Engineer	McClellan	McClellan
Start Depth (ft)	0.0	60.0
Finish Depth (ft)	60.0	54.0
Count Time (sec)	200	200
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.5	0.5
Log Speed (ft/min)	N/A	N/A
Pre-Verification	AN074CAB	AN074CAB
Start File	AN074000	AN074121
Finish File	AN074120	AN074133
Post-Verification	AN074CAA	AN074CAA
Depth Return Error (in.)	N/A	0
Comments	Fine gain adjustment made before –063 & -103.	No fine gain adjustment made. Repeat Section

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat
Date	05/20/08	05/20/08
Logging Engineer	McClellan	McClellan
Start Depth (ft)	0.0	29.25
Finish Depth (ft)	29.25	26.0
Count Time (sec)	15	15
Live/Real	R	R
Shield (Y/N)	N	N
MSA Interval (ft)	0.25	0.25
Log Speed (ft/min)	N/A	N/A
Pre-Verification	AM002CAB	AM002CAB
Start File	AM002000	AM002118
Finish File	AM002117	AM002131
Post-Verification	AM002CAA	AM002CAA
Depth Return Error (in.)	N/A	0.5 high
Comments	None	Repeat Section

Logging Operation Notes:

Data were collected using Gamma 1, HO 68B-3574. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-118 field verifier. Maximum logging depth achieved was 60.0 ft. A centralizer was installed on the sondes. NMLS pre- and post-survey verification measurements were acquired in the AmBe standard.

Analysis Notes:

Analyst:	LEGLER	Date:	6/24/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

The pre- and post-survey verification met the acceptance criteria for the established systems. A casing correction for a 3/8-in. thick casing was applied to spectral log data (SGLS) from ground surface to 56.8 ft, leaving 3.2 ft of open borehole uncorrected.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL worksheet template identified as G1NMar08.xls using efficiency functions and corrections for casing, dead time and water as determined by annual calibrations.

Moisture data are presented in counts per second (cps) because no calibration data exist for a 6 7/8-in. inner diameter casing.

Results and Interpretations:

Cs-137 and U-238 (Pa-234m) were detected at several depths in this borehole. Inspection of the individual spectra at these depths indicates that these detections are statistical fluctuations and are not valid. Plots of the MDLs for manmade radionuclides (Cs-137, U-235, and U-238) are provided.

Depth to groundwater was reported to be 31.7 ft on 5/16/08. However, log data collected on 5/19/08 (SGLS) and 5/20/08 (NMLS) indicate a depth to ground water of approximately 29.5 ft. The depth to groundwater appears to fluctuate with the level of the river.

A fine grain sediment layer can be seen at around 15 ft, as seen by an increase in total gamma, and reflected in the K-40 and U-238 plots.

The KUT and Moisture plots indicate good repeatability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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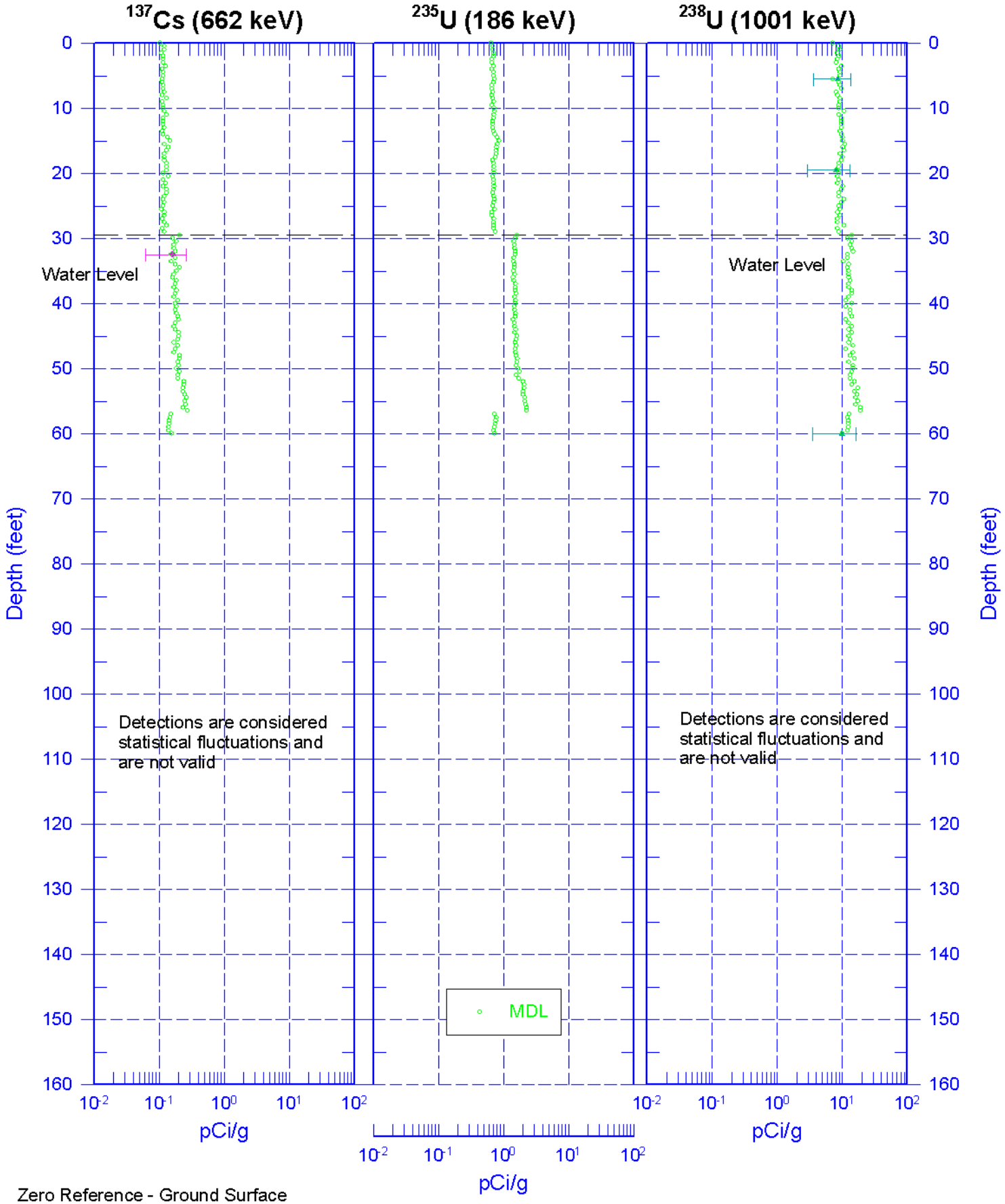
399-3-26 (C6203)
Manmade Radionuclides



Zero Reference - Ground Surface

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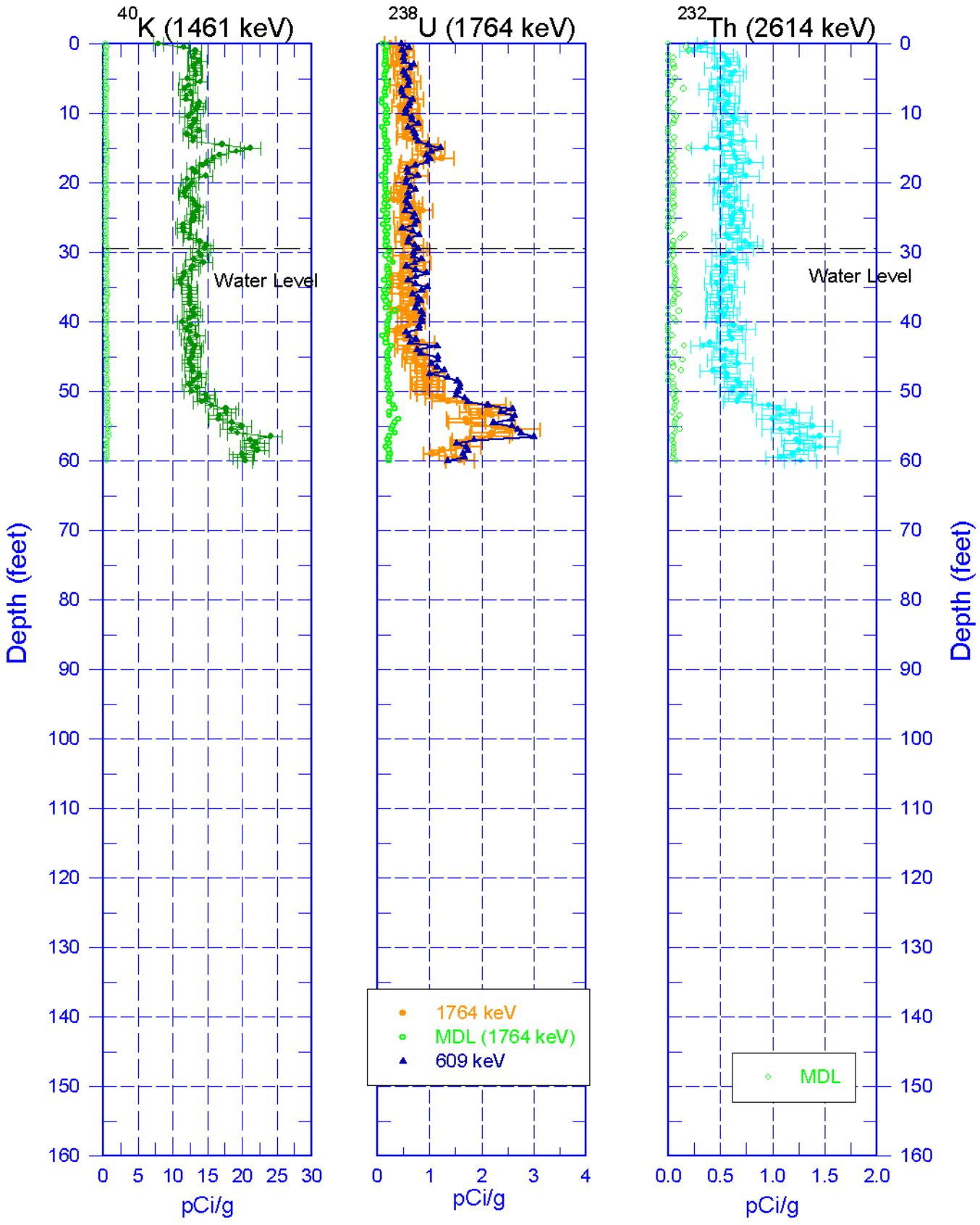
399-3-26 (C6203)
Natural Gamma Logs



Zero Reference - Ground Surface

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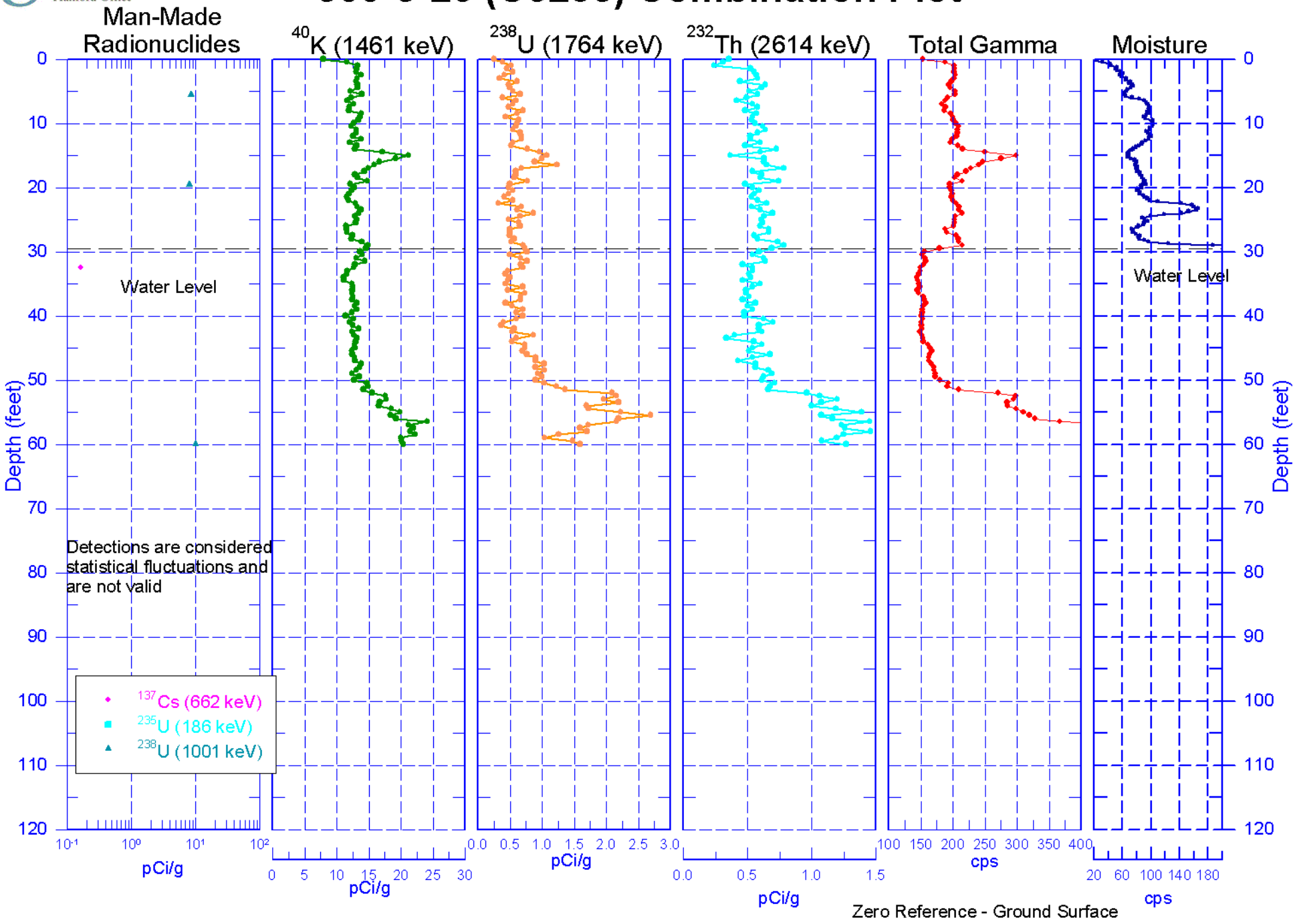
399-3-26 (C6203) Combination Plot



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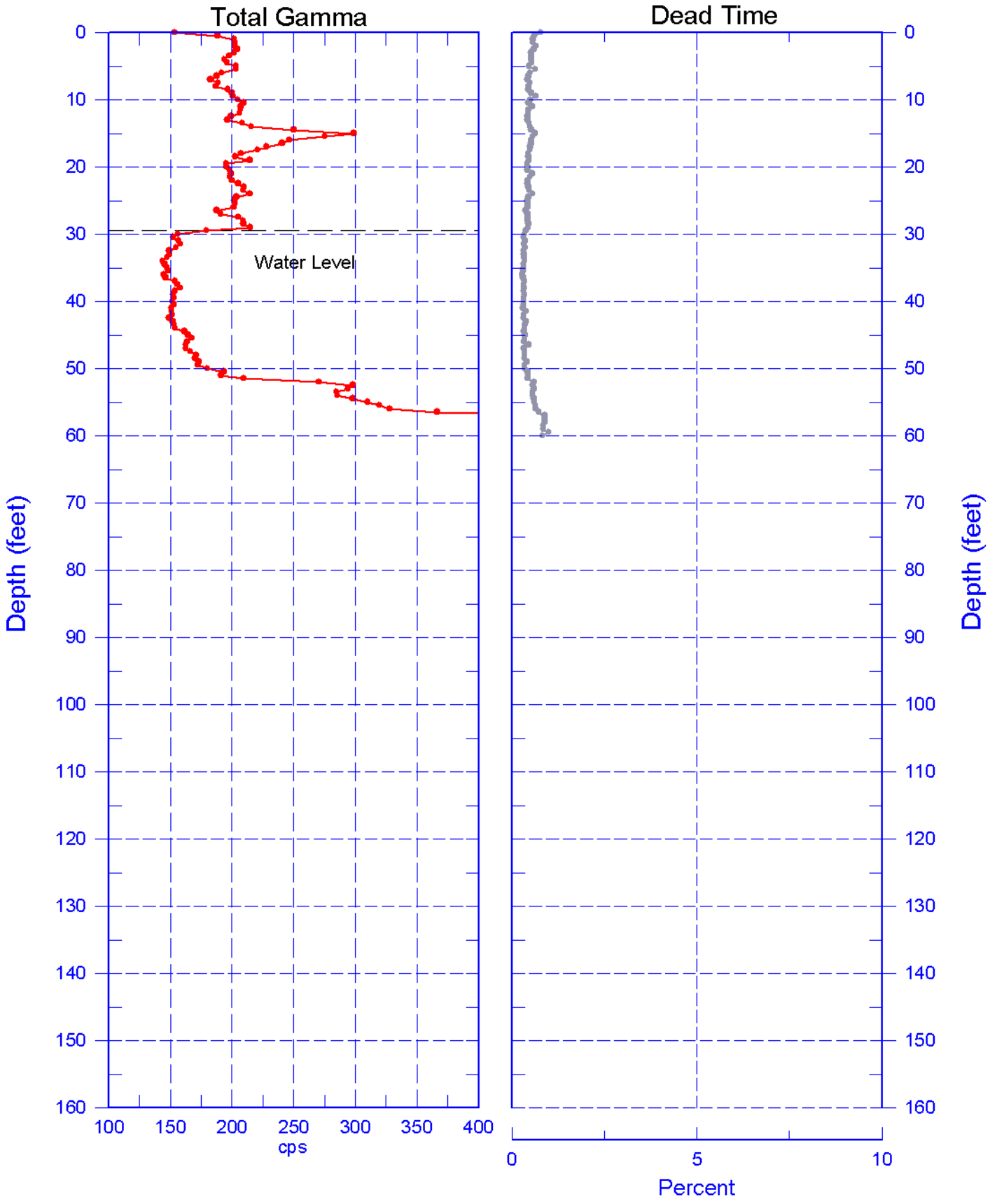
399-3-26 (C6203)
Total Gamma & Dead Time



Reference - Ground Surface

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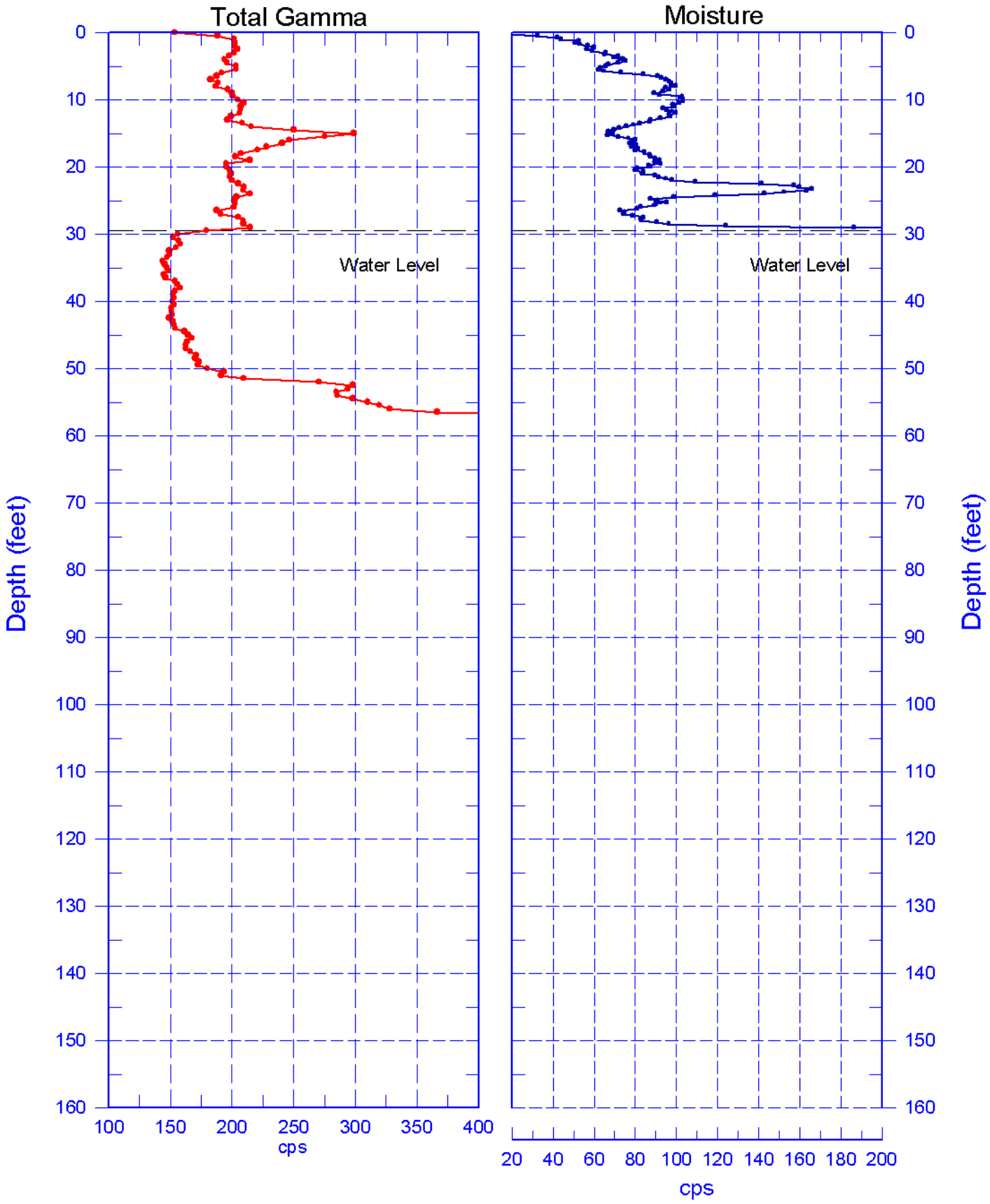
399-3-26 (C6203)
Total Gamma & Moisture



Reference - Ground Surface

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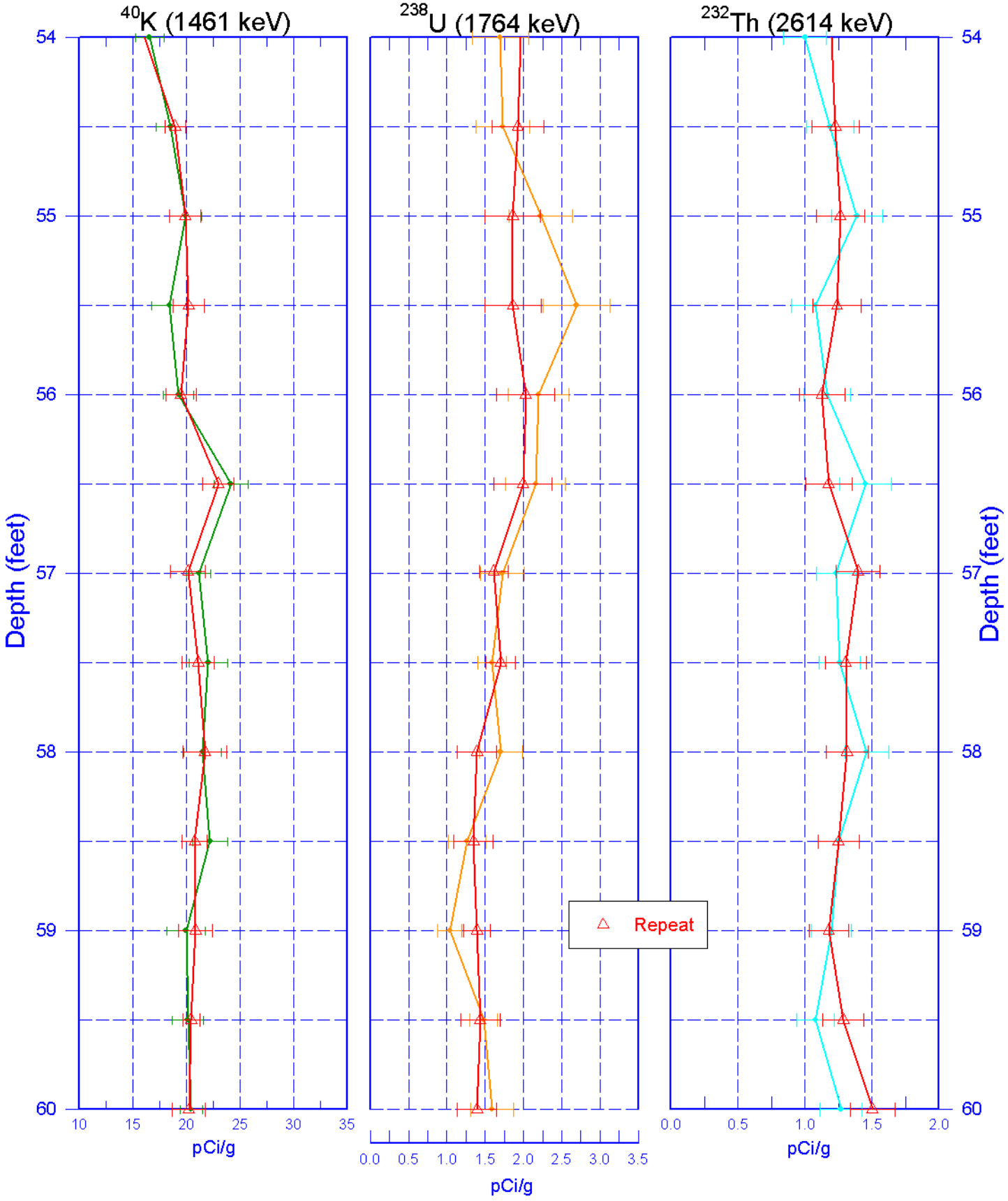
399-3-26 (C6203)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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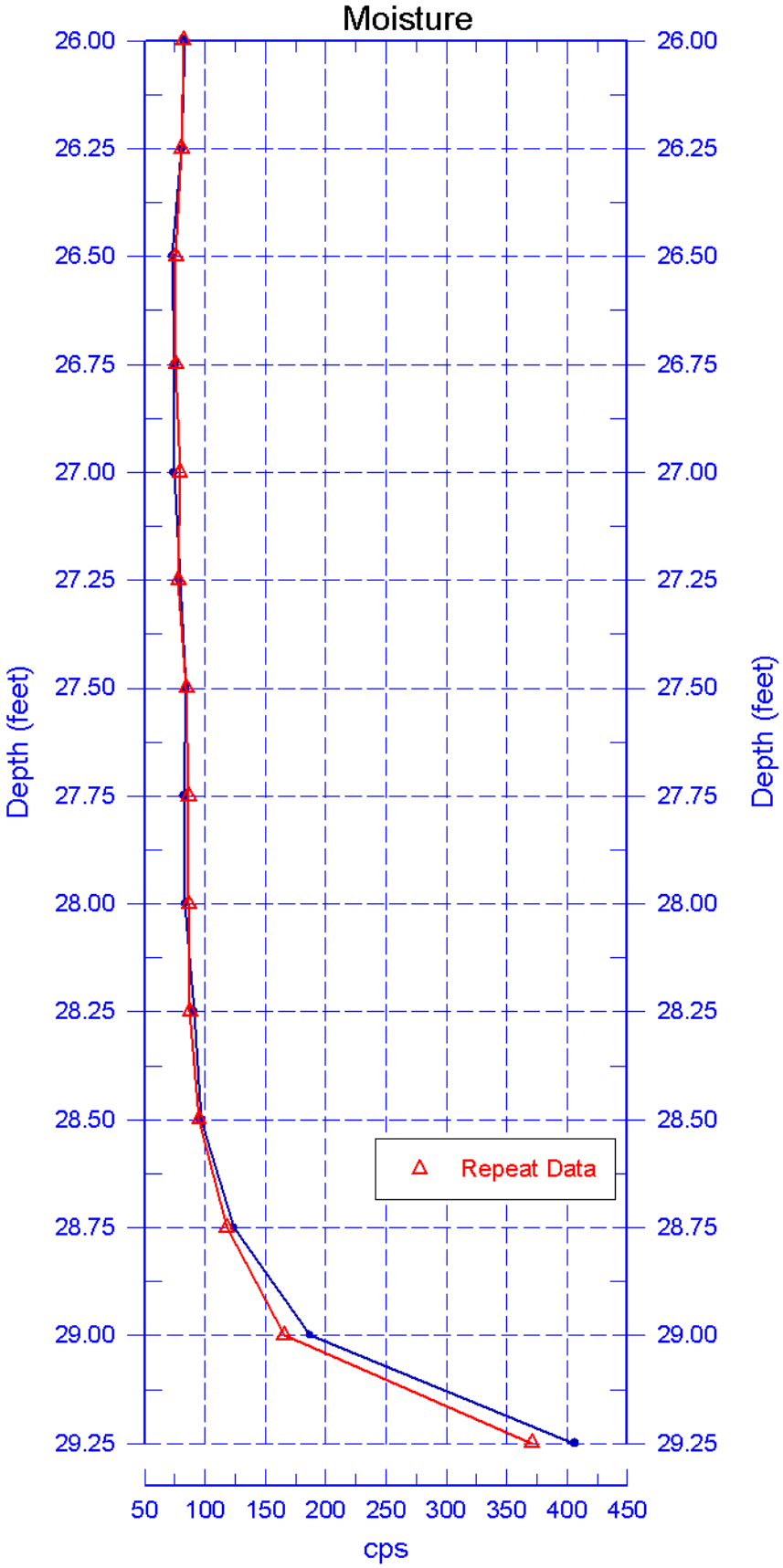
399-3-26 (C6203)
Moisture Repeat Section



Reference - Ground Surface

399-3-27 (C6204)
Log Data Report

Borehole Information:

Borehole:	399-3-27 (C6204)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	27.7	GWL Date:	07/10/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116040.4	594247.8	07/09/08	Unknown	62	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	3.7	7 5/8	6 7/8	3/8	-3.7	57.0

Borehole Notes:

Casing data and total depth were reported by the site geologist. The logging engineer measured depth to water with an e-tape. Casing diameters were measured using a steel tape and rounded to the nearest 1/16 inch. The zero reference is the ground surface.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type:	60% HPGe SGLS
			Serial No.:	47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type:	NMLS
			Serial No.:	H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	07/11/08	07/11/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	59.5	15.0			
Finish Depth (ft)	0.0	9.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DL611CAB	DL611CAB			
Start File	DL611000	DL611120			
Finish File	DL611119	DL611132			
Post-Verification	DL611CAA	DL611CAA			
Depth Return Error (in.)	0	0			
Comments	Adjusted gain after DL611064	Repeat Section			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat			
Date	07/11/08	07/11/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	0.0	8.0			
Finish Depth (ft)	28.0	11.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DHG82CAB	DHG82CAB			
Start File	DHG82000	DHG82113			
Finish File	DHG82112	DHG82125			
Post-Verification	DHG82CAA	DHG82CAA			
Depth Return Error (in.)	NA	¼ high			
Comments	None	Repeat Section			

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum logging depth for the SGLS was 59.8 ft before the sonde un-weighted. A centralizer was installed on the sonde.

Analysis Notes:

Analyst:	LEGLER	Date:	10/15/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

The SGLS pre- and post-survey verification spectra met the acceptance criteria for the established system. The NMLS pre- and post-survey verification spectra met the acceptance criteria for the established system, but the verification file DHG82CAA had measurements above the upper control limit for counts per second (cps).

Analyses of log data suggest slight discrepancies with field reports of depth to water and casing depth. Corrections of log data were applied according to the analysis assumptions in the table below.

Top (ft)	Bottom (ft)	T (in)	ID (in)	Comments
0	28.4	3/8	6 7/8	No water correction
28.5	56.4	3/8	6 7/8	GWL reported @ 27.7 ft; adjusted to 28.5 ft
56.5	TD[3]	0	6 7/8	Casing depth reported @ 57 ft; adjusted to 56.5ft

T = casing thickness used to calculate energy-dependent casing correction factor
ID = casing inside diameter used to calculate energy-dependent water correction factor

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in. inner diameter borehole casing.

Results and Interpretations:

Cs-137, U-235, and U-238 (Pa-234m) were detected at various isolated depths throughout this borehole. Inspection of the individual spectra indicates that these detections are statistical fluctuations associated with the processing software.

Co-60 was detected at 10.5 – 13.5 ft, and 16.0 feet. Inspection of the individual spectra indicates that the detections at 16.0 ft are statistical fluctuations associated with the processing software. The maximum concentration was 0.61 pCi/g at 11.5 ft.

The Manmade, KUT and Moisture repeat plots indicate good repeatability.

Below the 51 ft depth, a probable lithologic change occurs, which is indicated by the increased KUT concentrations and the Total Gamma count rates.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Manmade Repeat Section
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing
[3] TD – total depth

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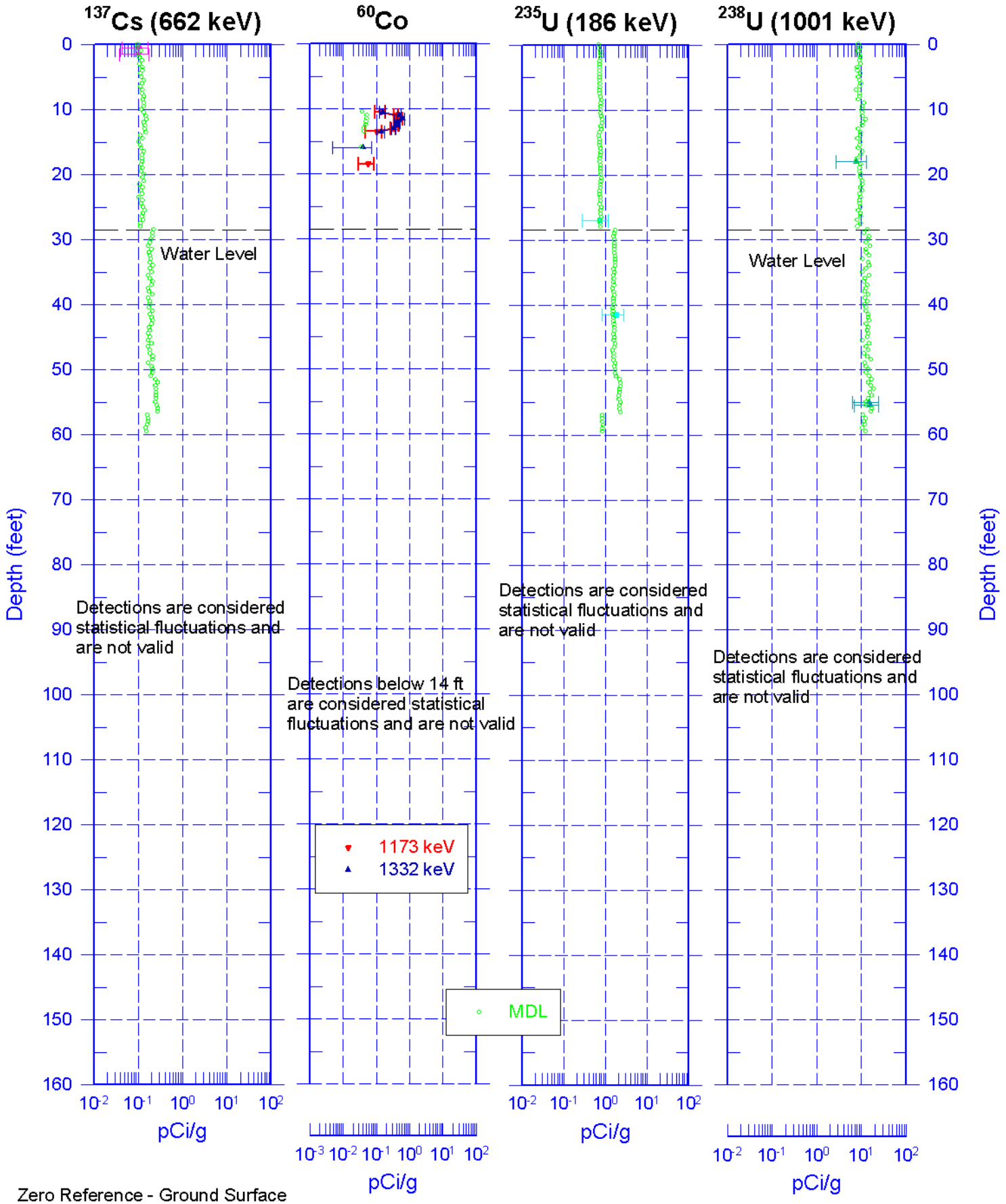
399-3-27 (C6204)
Manmade Radionuclides



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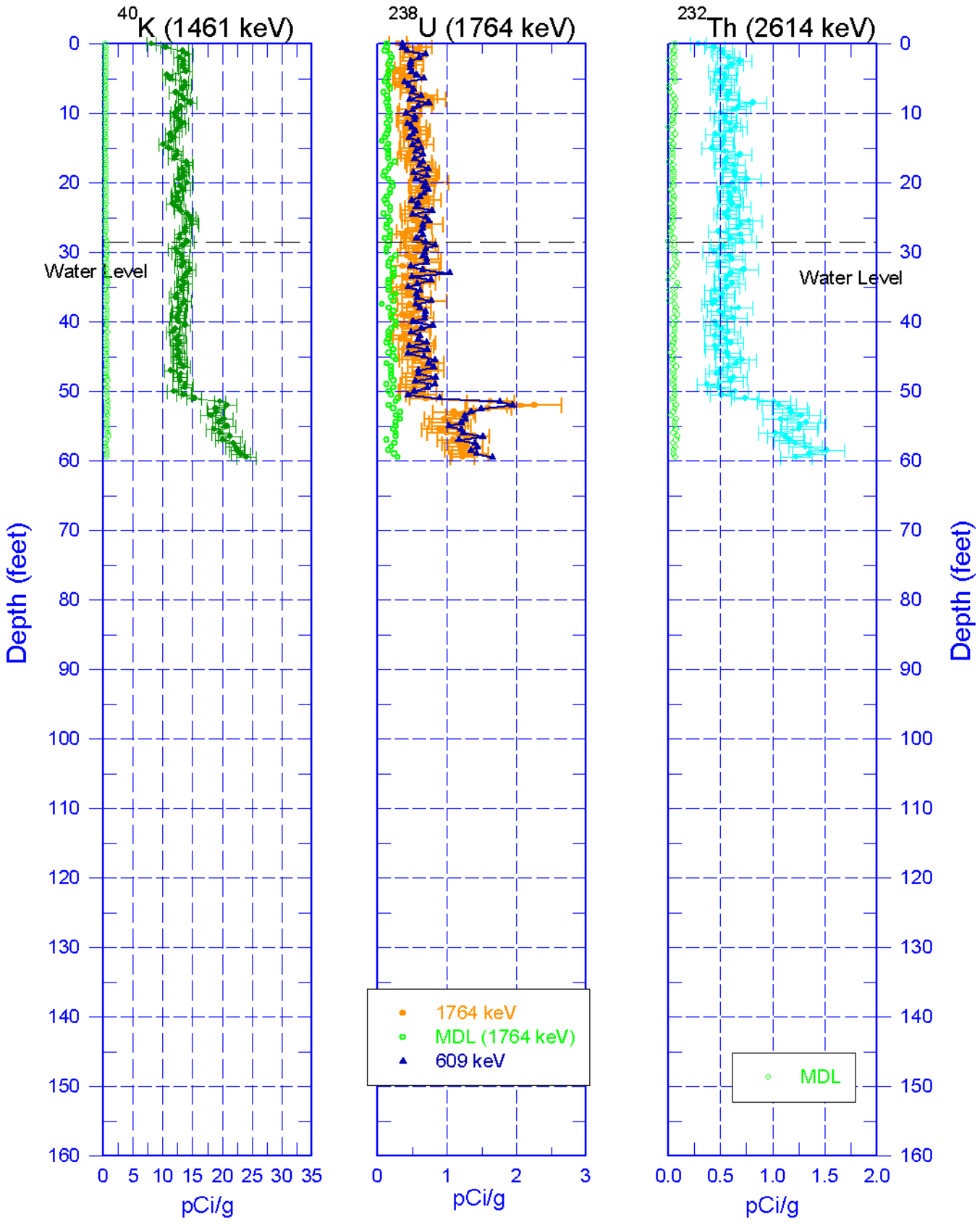
399-3-27 (C6204)
Natural Gamma Logs



Zero Reference - Ground Surface

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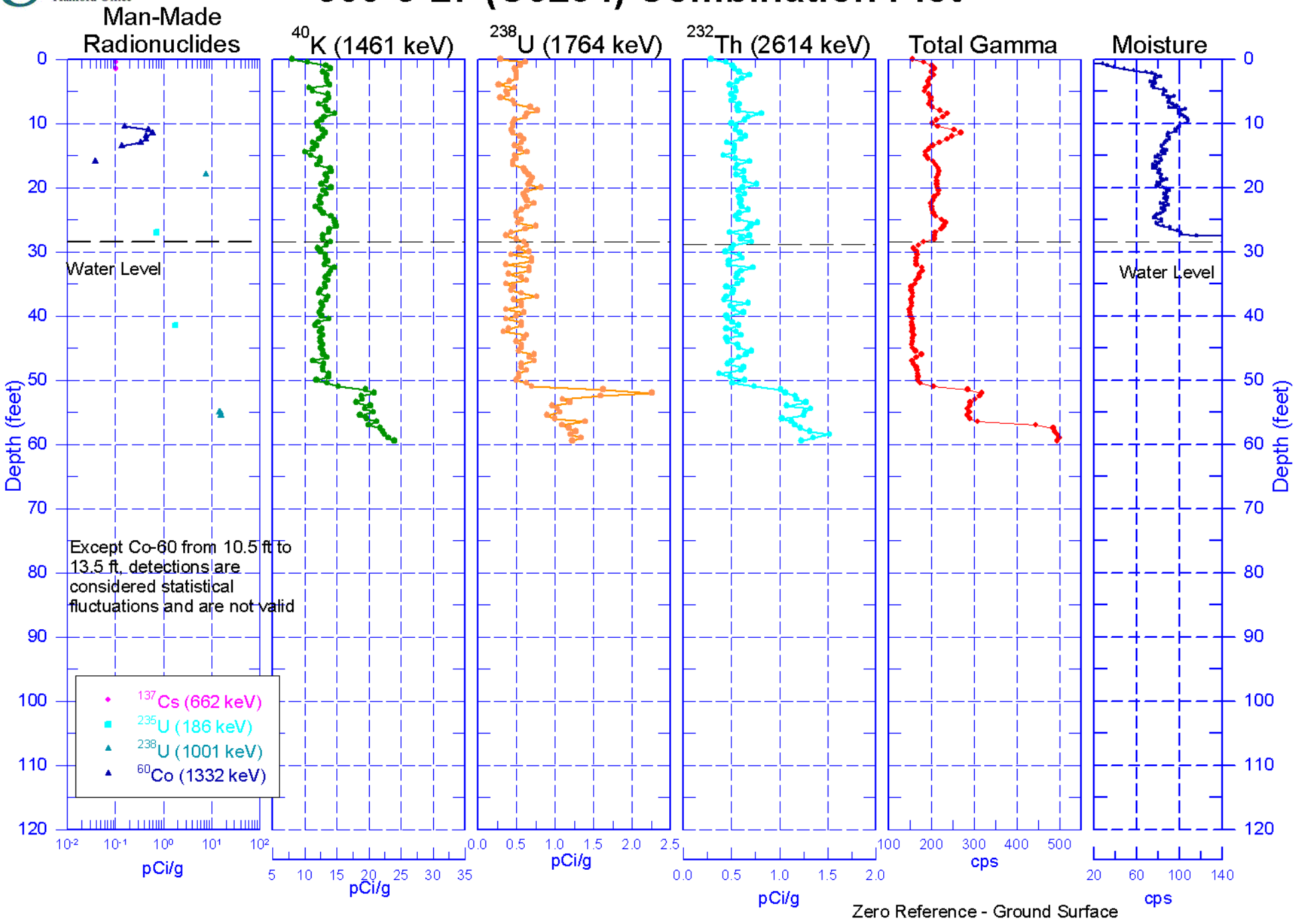
399-3-27 (C6204) Combination Plot



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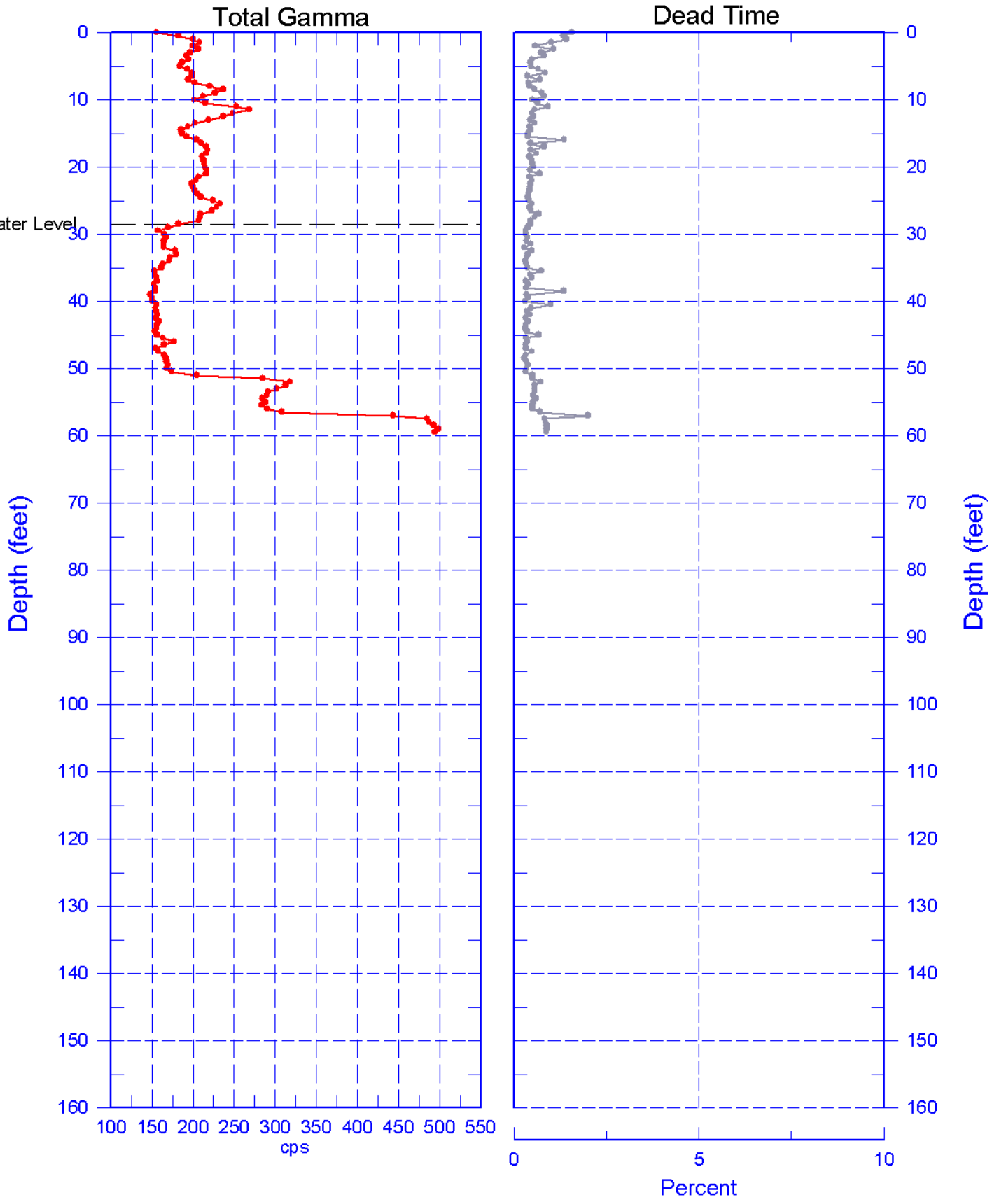
399-3-27 (C6204)
Total Gamma & Dead Time



Reference - Ground Surface

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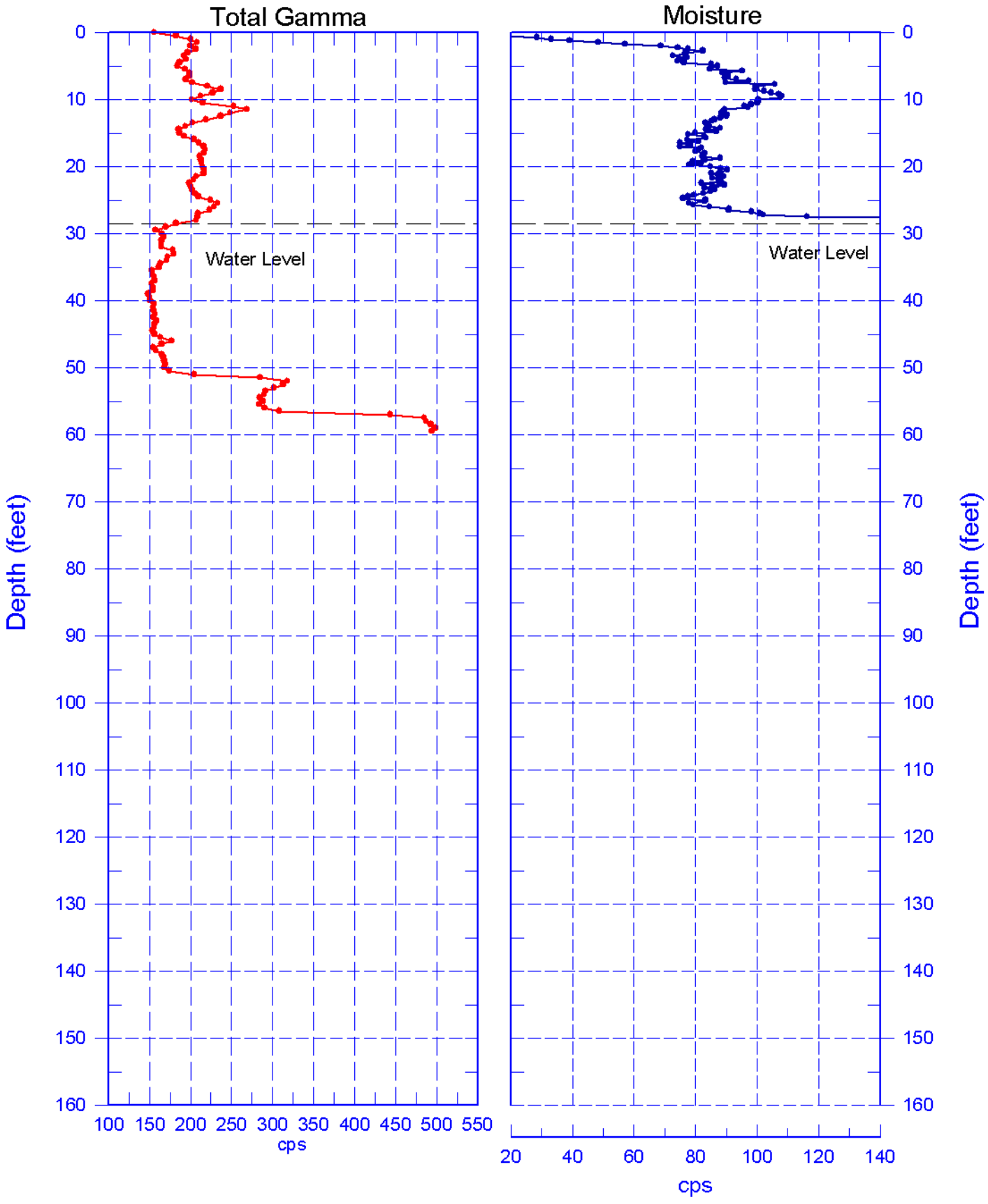
399-3-27 (C6204)
Total Gamma & Moisture



Reference - Ground Surface

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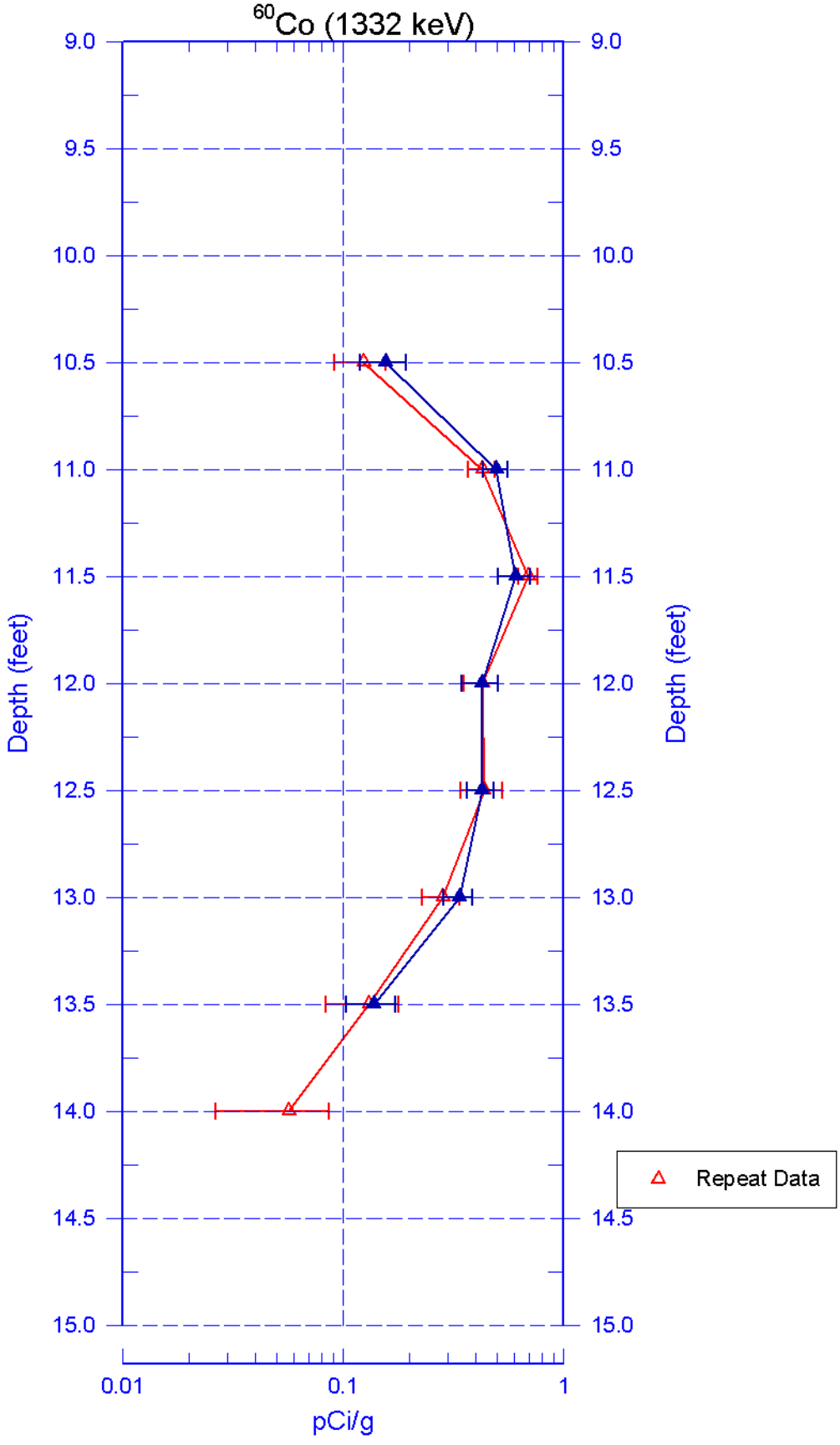
399-3-27 (C6204)
Manmade Repeat Section



Reference - Ground Surface

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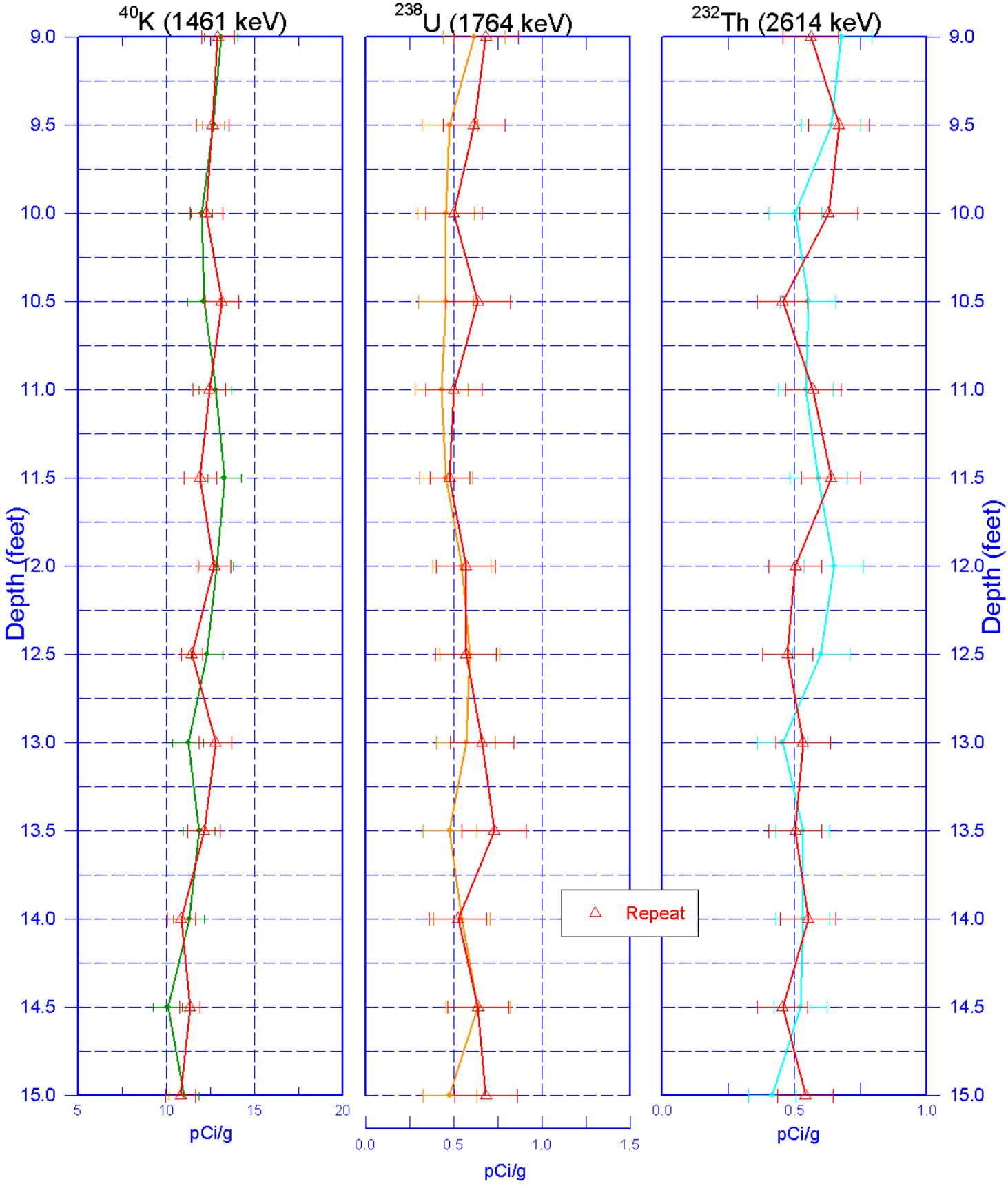
399-3-27 (C6204)

Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

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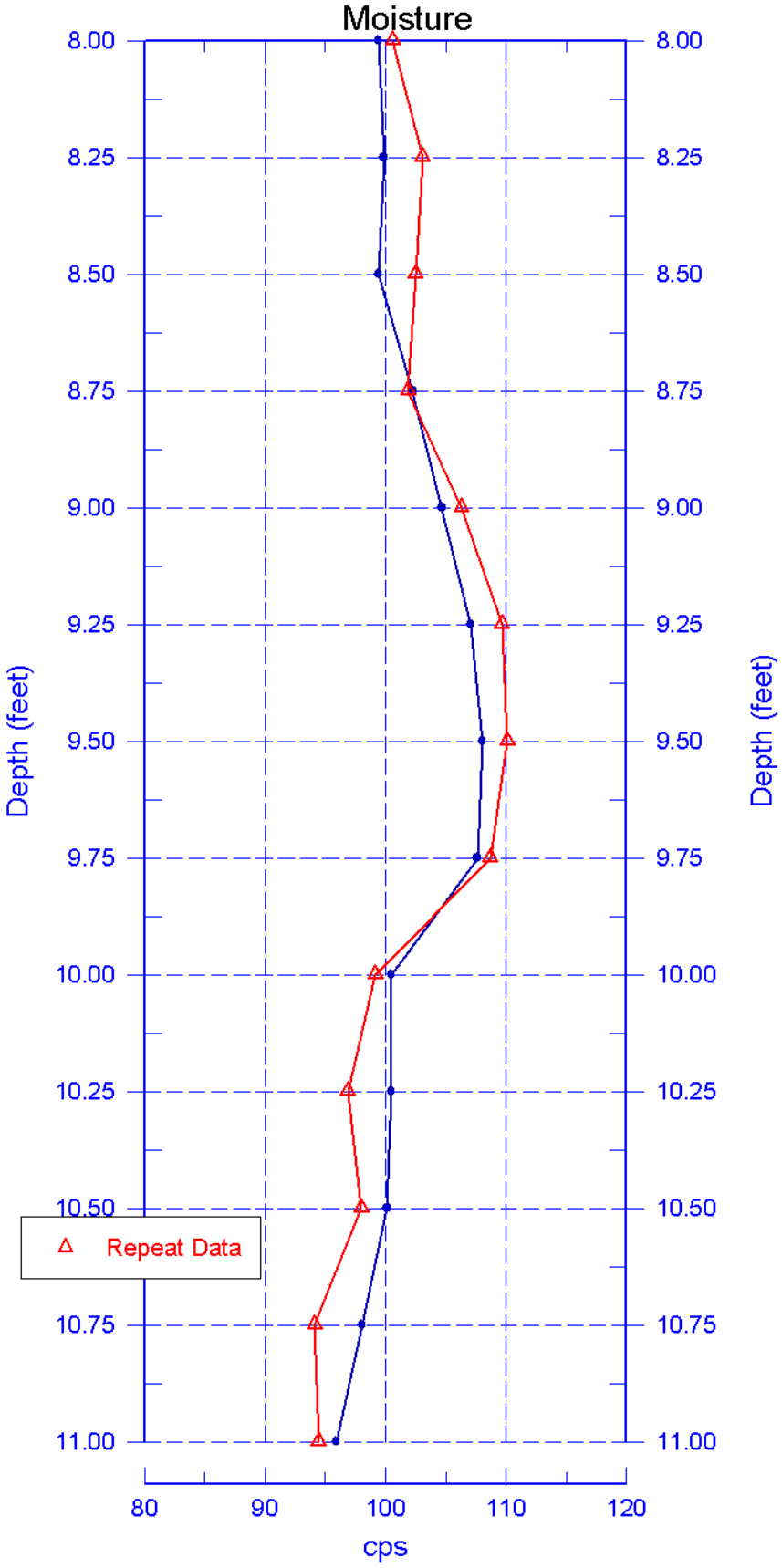
399-3-27 (C6204)
Moisture Repeat Section



Reference - Ground Surface

399-3-28 (C6205)
Log Data Report

Borehole Information:

Borehole:	399-3-28		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	30.3	GWL Date:	07/10/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116046.2	594256.0	07/09/08	Unknown	64.5	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	0.8	7 5/8	6 7/8	3/8	-0.8	59.0

Borehole Notes:

Drill site geologist reported casing information and total depth. An e-tape was employed to measure depth-to-water.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type:	60% HPGe SGLS
			Serial No.:	47TP32211A
Effective Calibration Date:	12/31/2007	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type:	NMLS
			Serial No.:	H310700352
Effective Calibration Date:	11/06/2007	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	07/10/08	07/10/08			
Logging Engineer	McClellan	McClellan			
Start Depth (ft)	63.5	60.0			
Finish Depth (ft)	0	54.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DL601CAB	DL601CAB			
Start File	DL601000	DL601128			
Finish File	DL601127	DL601140			
Post-Verification	DL601CAA	DL601CAA			
Depth Return Error (in.)	0	¼ high			
Comments	None	Repeat section			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat			
Date	07/10/08	07/10/08			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	0	25.0			
Finish Depth (ft)	30.25	28.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DHG72CAB	DHG72CAB			
Start File	DHG72000	DHG72122			
Finish File	DHG72121	DHG72134			
Post-Verification	DHG72CAA	DHG72CAA			
Depth Return Error (in.)	0	¼ high			
Comments	None	Repeat section			

Logging Operation Notes:

SGLS and NMLS data were both collected using Gamma 4, HO 68B-3573.

SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. Maximum SGLS logging depth achieved was 63.7 ft or approximately 4.7 ft below casing before the sonde un-weighted. A centralizer was installed on the sonde.

NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum logging depth achieved was 30.25 ft, at approximately groundwater level. A centralizer was installed on the sonde.

Analysis Notes:

Analyst:	R. SPATZ	Date:	10/08/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

Pre- and post-survey verification spectra for both SGLS and NMLS met the acceptance criteria for the established systems.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time, and water as determined by annual calibrations.

NMLS spectra were processed in batch mode using APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in inside diameter borehole casing.

Analyses of log data suggest slight discrepancies with field reports of depth-to-water and casing depth. Corrections of log data were applied according to the analysis assumptions in the table below.

Top (ft)	Bottom (ft)	T (in)	ID (in)	Comments
0	29.9	0.375	N/A	No water correction
30.0	59.5	0.375	6.875	GWL reported @ 30.3 ft; adjusted to 30.0 ft Casing bottom reported @59.0 ft; adjusted to 59.5 ft
59.6	TD	0	0	No adjustment made

T = casing thickness used to calculate energy-dependent casing correction factor
ID = casing inside diameter used to calculate energy-dependent water correction factor

Results and Interpretations:

Cs-137, U-235, and U-238 (Pa-234m) were detected sporadically in this borehole. Inspection of the individual spectra at these depths indicates that these detections are statistical fluctuations associated with the processing software and are not considered valid. No Co-60 was detected.

Below the 55.0 ft depth, a probable lithologic change occurs, which is shown by the increased KUT concentrations and Total Gamma count rates. The KUT and Moisture plots both indicate good repeatability.

List of Log Plots:

Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

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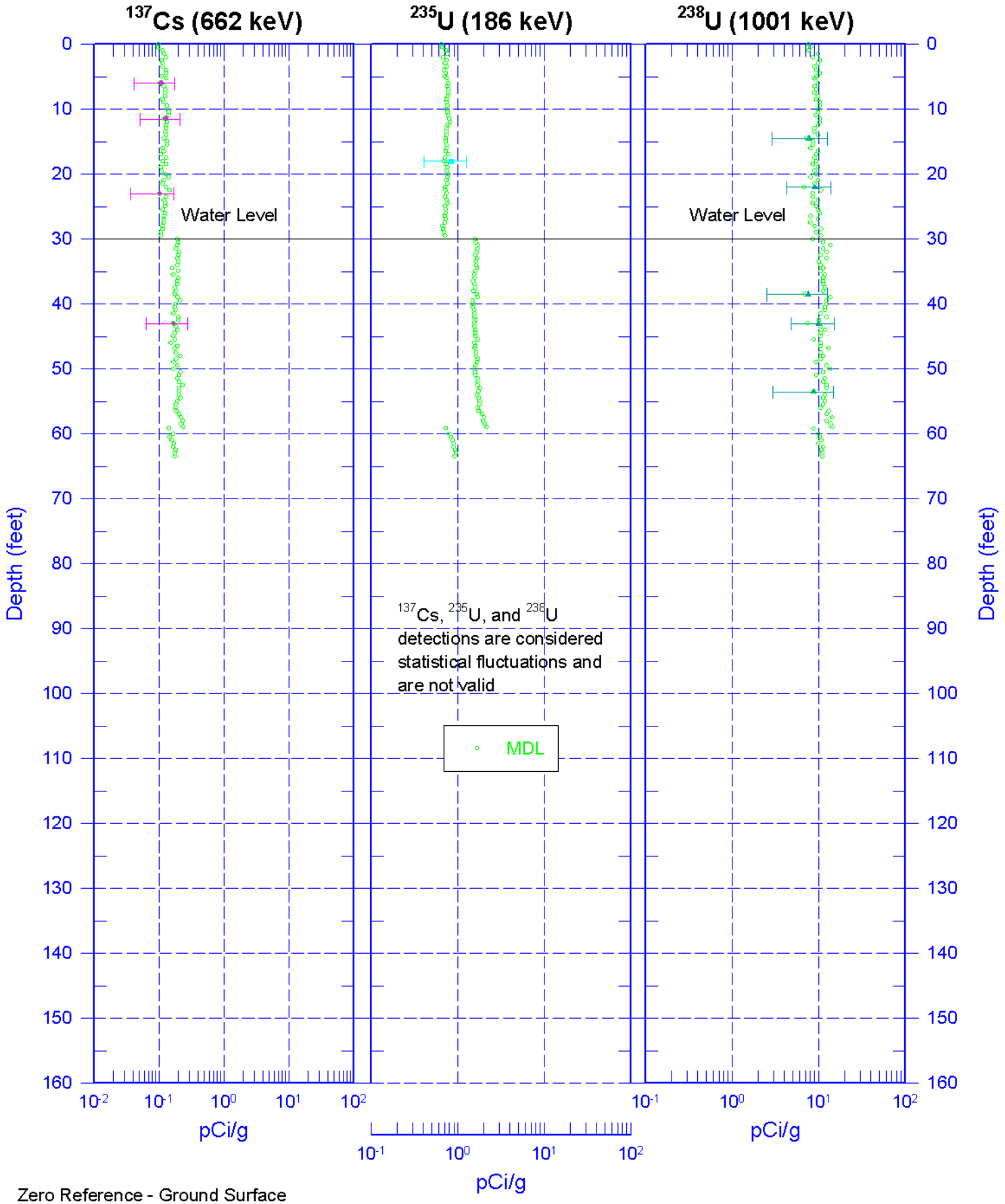
399-3-28 (C6205)
Manmade Radionuclides



Zero Reference - Ground Surface

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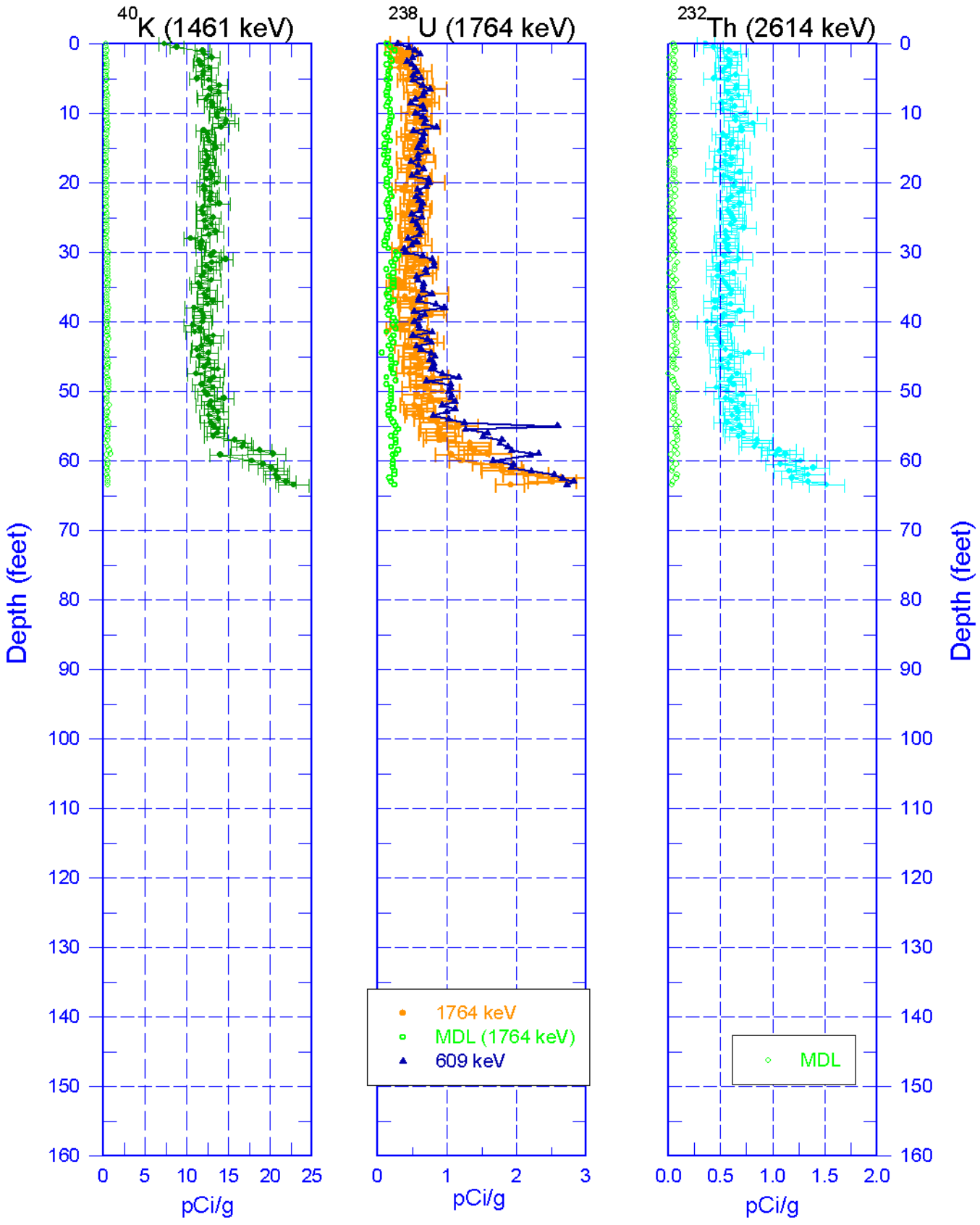
399-3-28 (C6205)
Natural Gamma Logs



Zero Reference - Ground Surface

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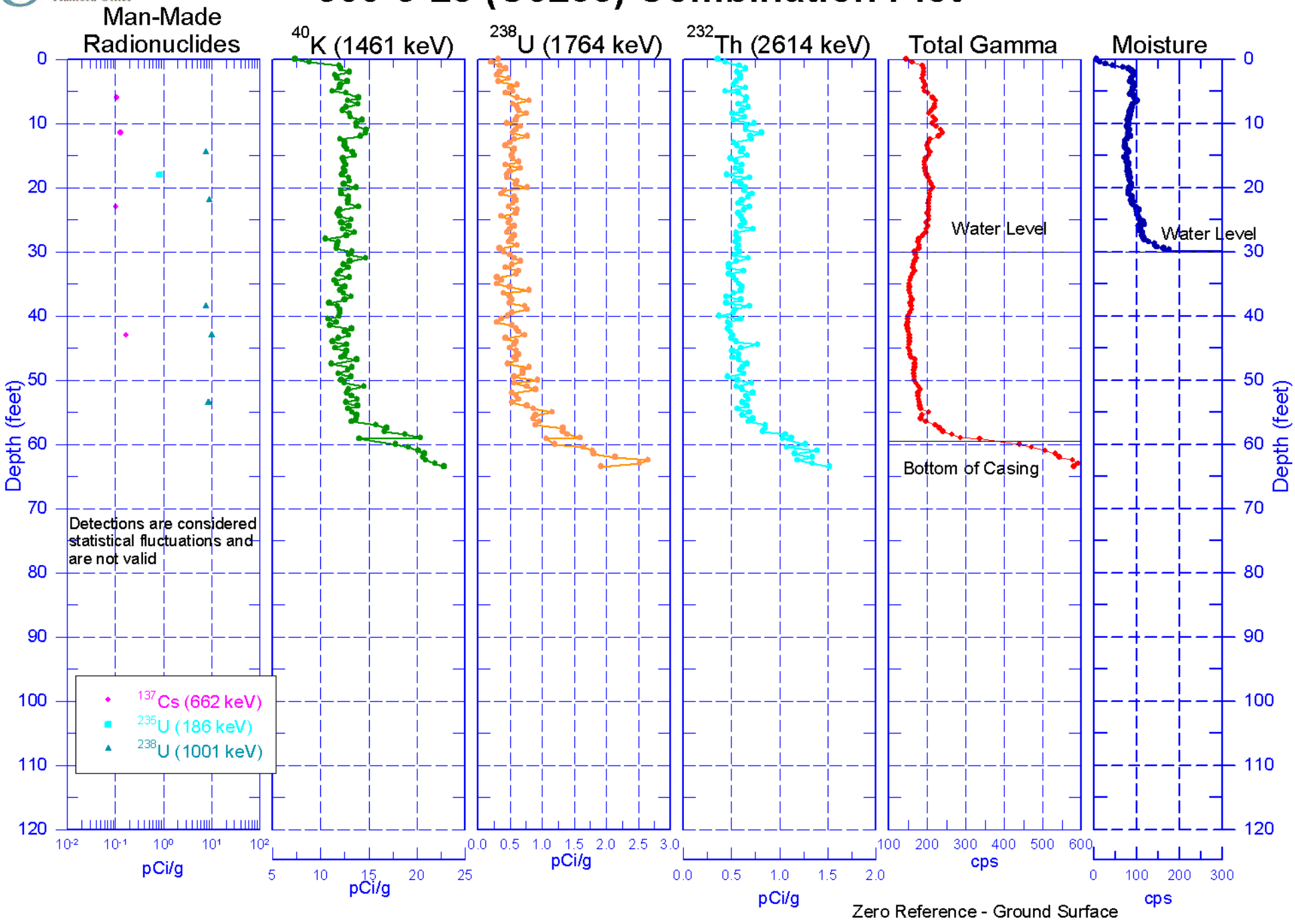
399-3-28 (C6205) Combination Plot



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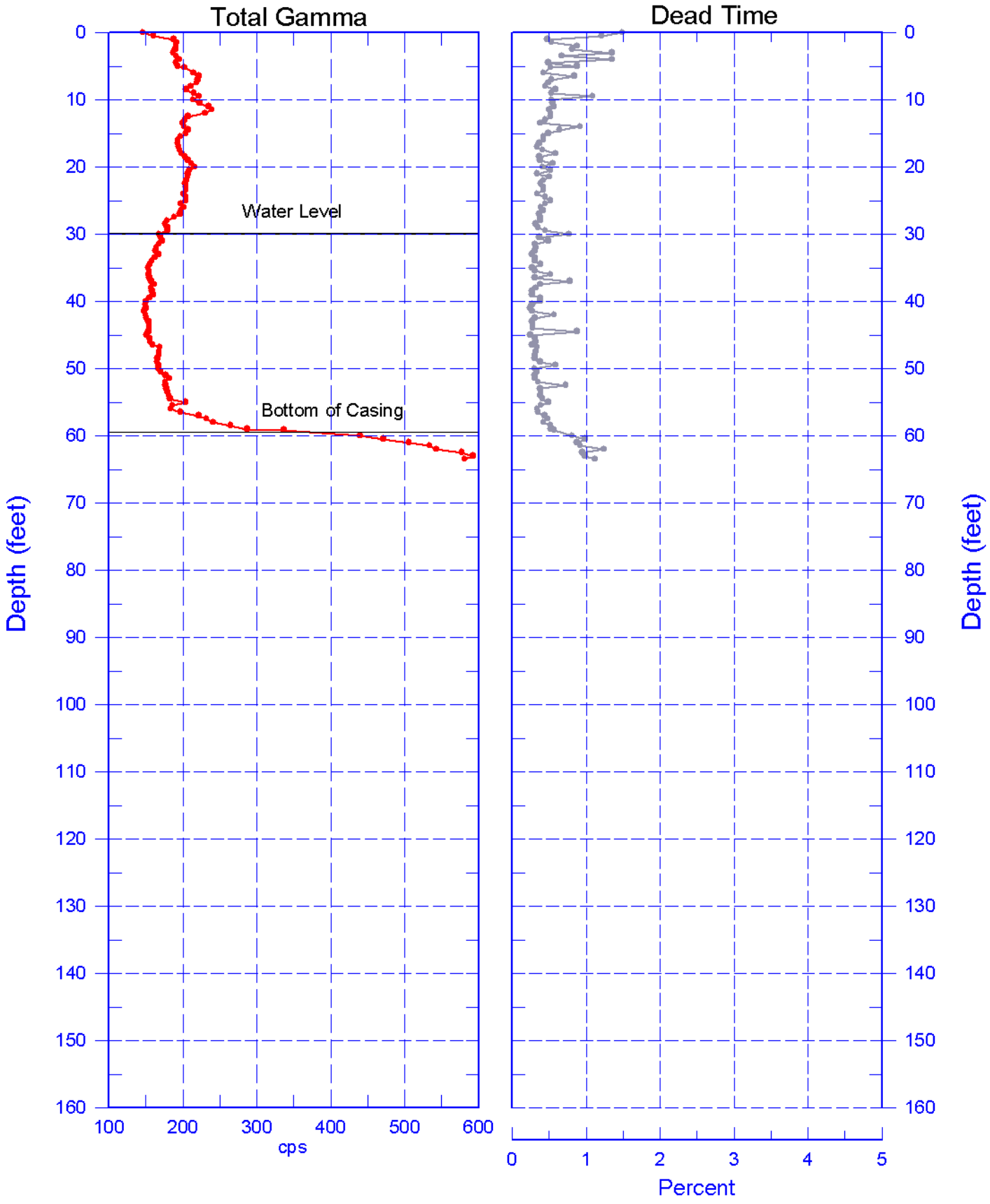
399-3-28 (C6205)
Total Gamma & Dead Time



Reference - Ground Surface

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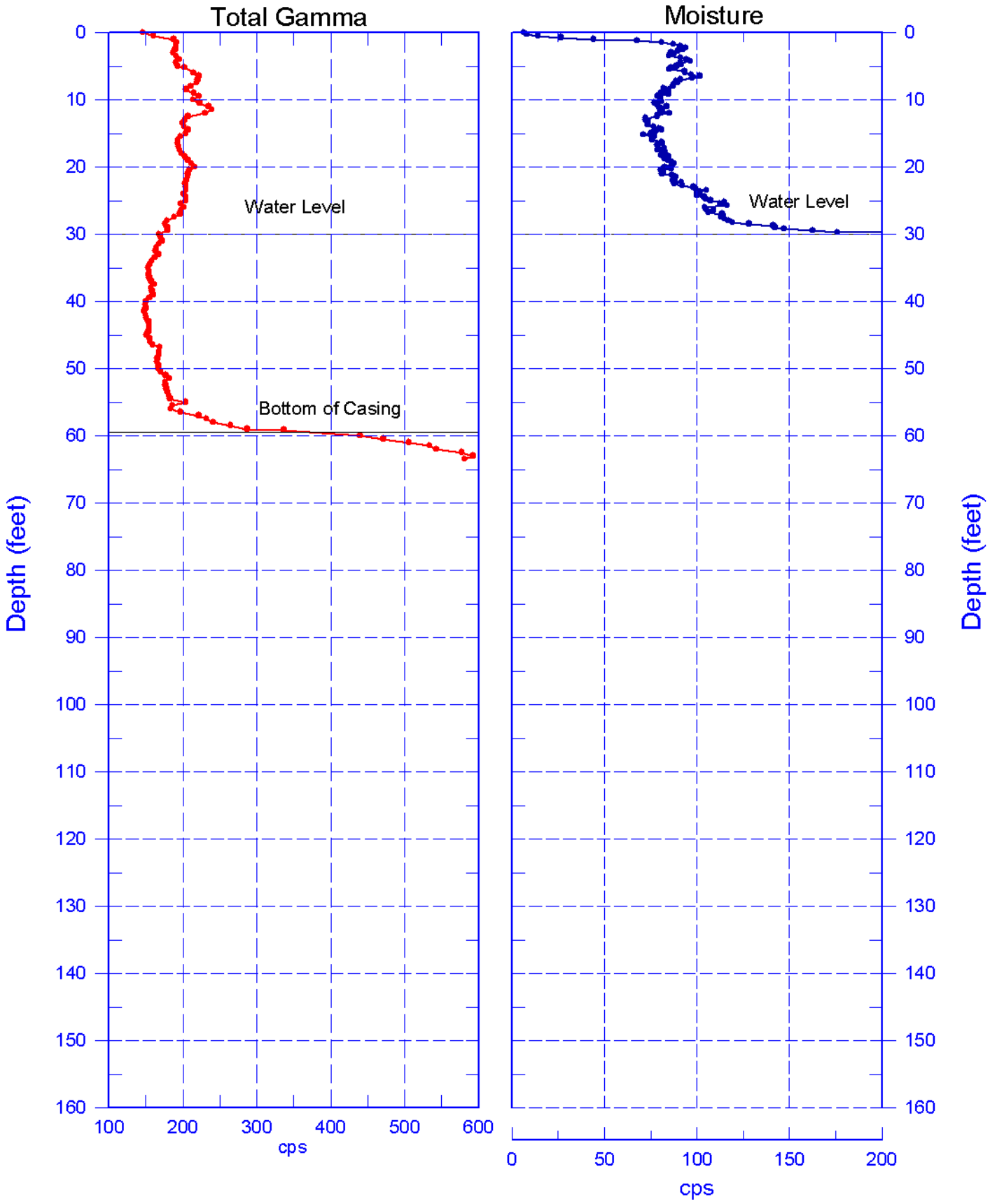
399-3-28 (C6205)
Total Gamma & Moisture

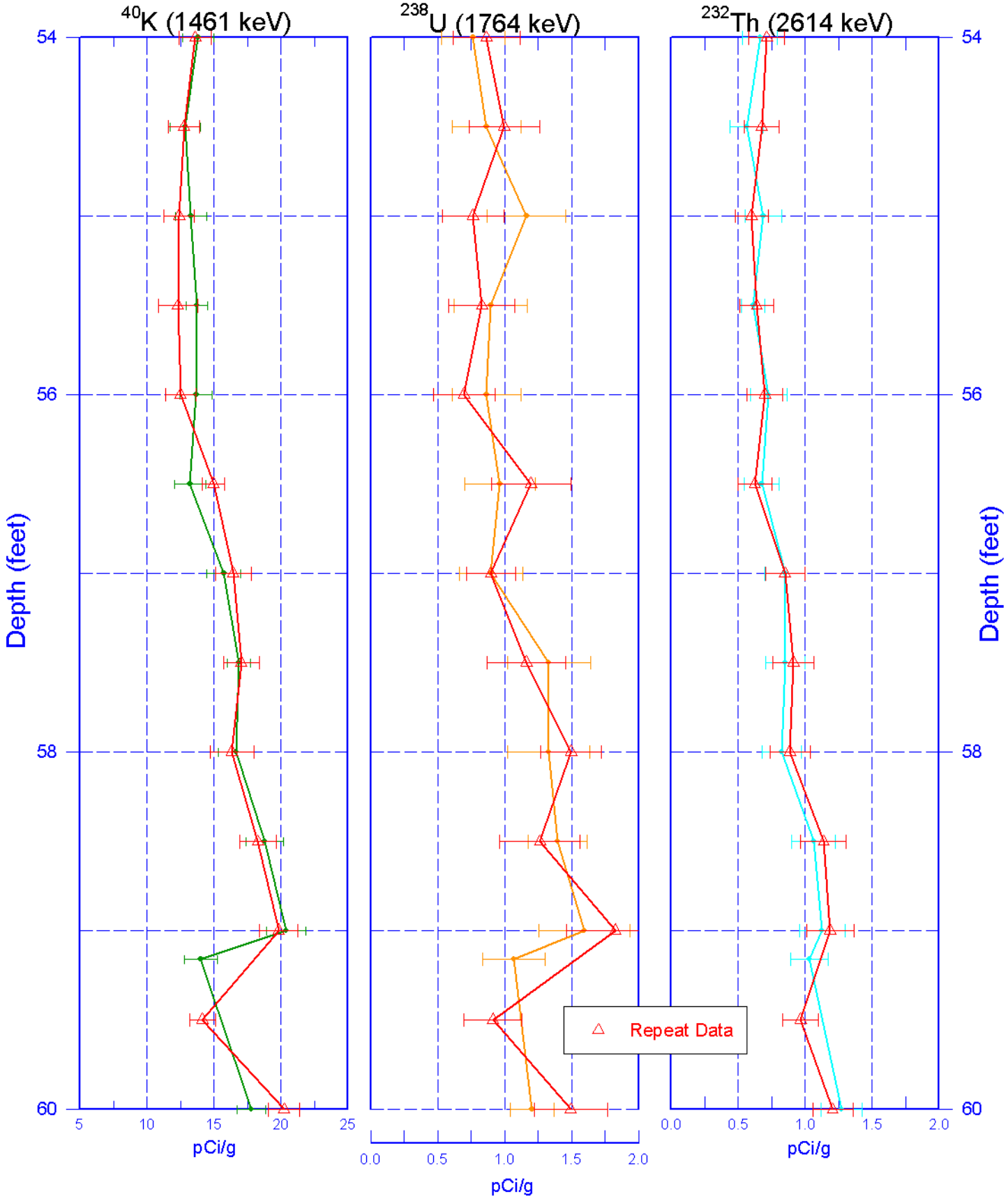


Reference - Ground Surface

Stoller
Hanford Office

399-3-28 (C6205)

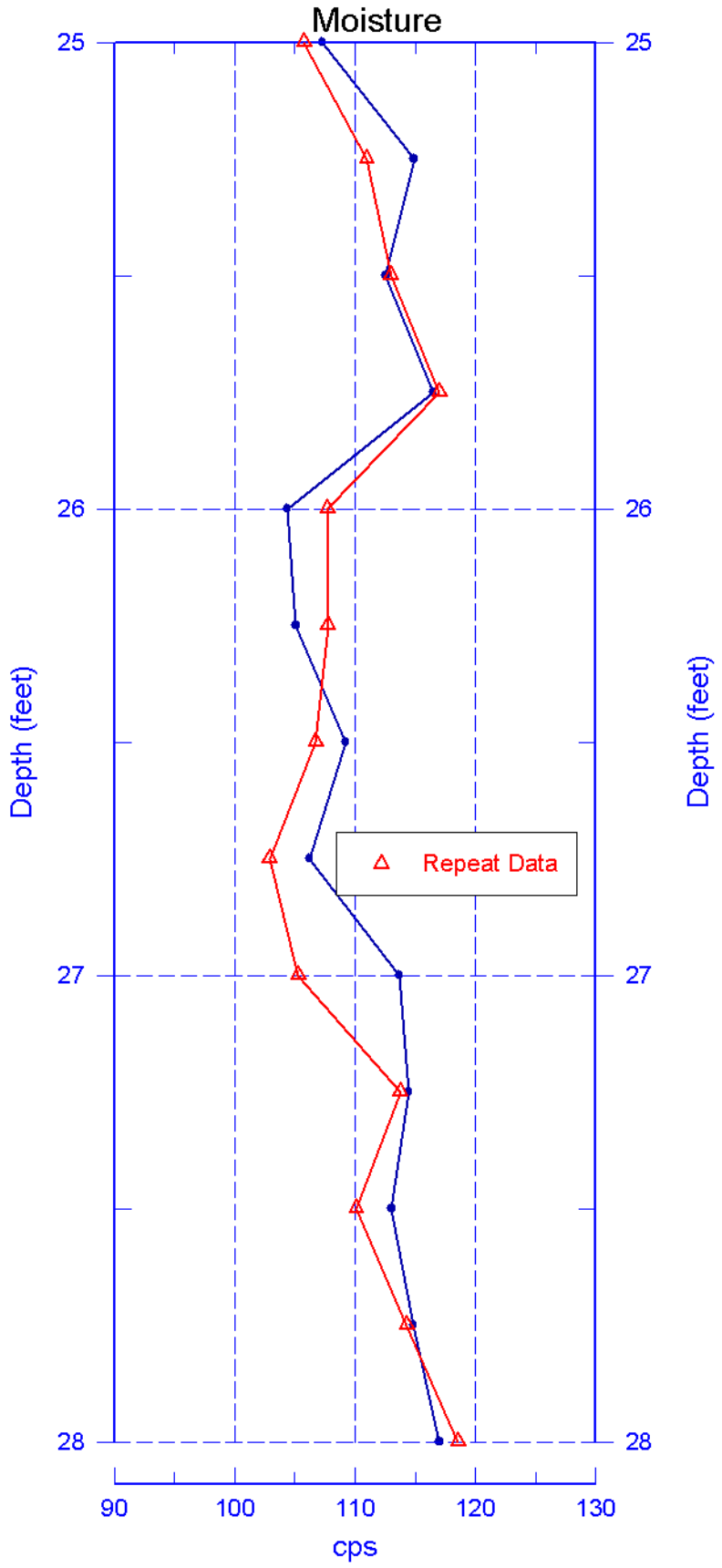
Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

Stoller
Hanford Office

399-3-28 (C6205)
Moisture Repeat Section



Reference - Ground Surface

399-3-29 (C6206)
Log Data Report

Borehole Information:

Borehole:	399-3-29		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	26.4	GWL Date:	07/02/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116051.9	594264.2	06/30/08	Unknown	64.0	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded Steel	2.4	7 5/8	6 7/8	3/8	-2.4	58.2

Borehole Notes:

Drill site geologist reported casing information and total depth. An e-tape was employed to measure depth-to-water.

Logging Equipment Information:

Logging System:	Gamma 4 L		Type: / Serial No.:	60% HPGe SGLS / 47TP32211A
Effective Calibration Date:	12/31/2007	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type: / Serial No.:	NMLS / H310700352
Effective Calibration Date:	11/06/2007	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	07/01/08	07/01/08			
Logging Engineer	McClellan	McClellan			
Start Depth (ft)	60.0	12.0			
Finish Depth (ft)	0	6.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DL571CAB	DL571CAB			
Start File	DL571000	DL571121			
Finish File	DL571120	DL571133			
Post-Verification	DL571CAA	DL571CAA			
Depth Return Error (in.)	0	0			
Comments	None	Repeat section			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat			
Date	07/02/08	07/02/08			
Logging Engineer	McClellan	McClellan			
Start Depth (ft)	0	8.0			
Finish Depth (ft)	26.25	5.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DHG42CAB	DHG42CAB			
Start File	DHG42000	DHG42106			
Finish File	DHG42105	DHG42118			
Post-Verification	DHG42CAA	DHG42CAA			
Depth Return Error (in.)	0	NA			
Comments	None	Repeat section			

Logging Operation Notes:

SGLS and NMLS data were both collected using Gamma 4, HO 68B-3573.

SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. Maximum SGLS logging depth achieved was 60.3 ft or approximately 2 ft below casing before the sonde un-weighted. The 5.8 ft of reported open hole below casing was not reached. A centralizer was installed on the sonde.

NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. Maximum logging depth achieved was 26.25 ft, at approximately groundwater level. A centralizer was installed on the sonde.

Analysis Notes:

Analyst:	R. SPATZ	Date:	10/08/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

Pre- and post-survey verification spectra for the SGLS met the acceptance criteria for the established systems.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time, and water as determined by annual calibrations.

Pre-survey verification spectra for the NMLS met the acceptance criteria. Post-survey verification was slightly above criteria but well below HASQARD limits for the established system. NMLS spectra were processed in batch mode using APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-in. inside diameter borehole casing.

Analyses of log data suggest slight discrepancies with field reports of depth-to-water and casing depth. Corrections of log data were applied according to the analysis assumptions in the table below.

Top (ft)	Bottom (ft)	T (in)	ID (in)	Comments
0	25.9	0.375	N/A	No water correction
26.0	58.2	0.375	6.875	GWL reported @ 26.4 ft; adjusted to 26.0 ft Casing bottom reported @58.2 ft; no adjustment made
58.3	TD	0	0	No adjustment made

T = casing thickness used to calculate energy-dependent casing correction factor
ID = casing inside diameter used to calculate energy-dependent water correction factor

Results and Interpretations:

Cs-137, U-235, and U-238 (Pa-234m) were detected sporadically in this borehole. Inspection of the individual spectra at these depths indicates that these detections are statistical fluctuations associated with the processing software and are not considered valid.

Co-60 was detected continuously between the depths of 9.0 and 13.5 ft. and once at 20.5 ft just above the MDL. The maximum concentration detected was 0.18 pCi/g at the 10.5 ft depth.

Below the 53.0 ft depth, a probable lithologic change occurs, which is shown by the increased KUT concentrations and Total Gamma count rates. The KUT and Moisture plots both indicate good repeatability.

List of Log Plots:

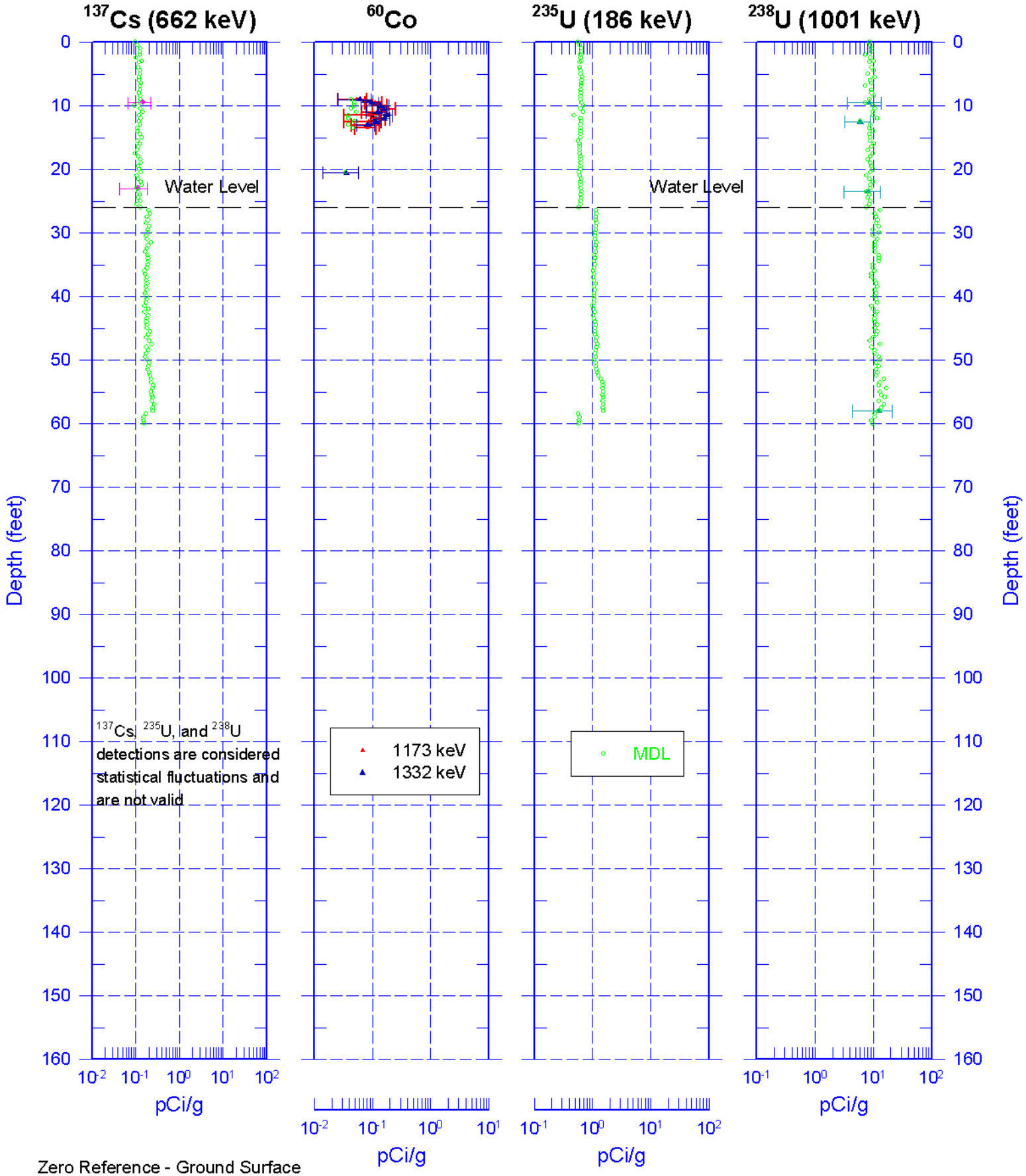
Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

Stoller
Hanford Office

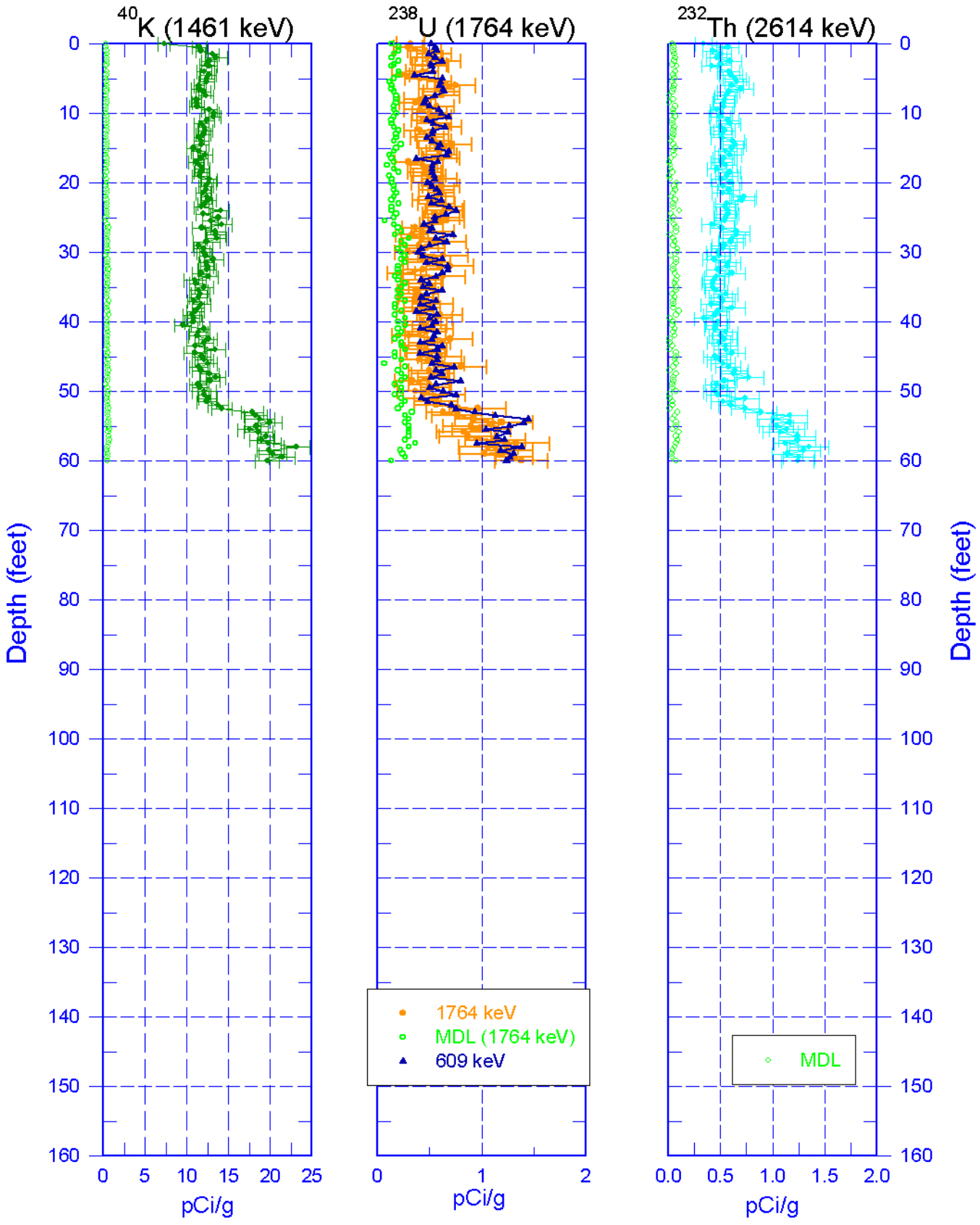
399-3-29 (C6206)
Manmade Radionuclides



Zero Reference - Ground Surface

Stoller
Hanford Office

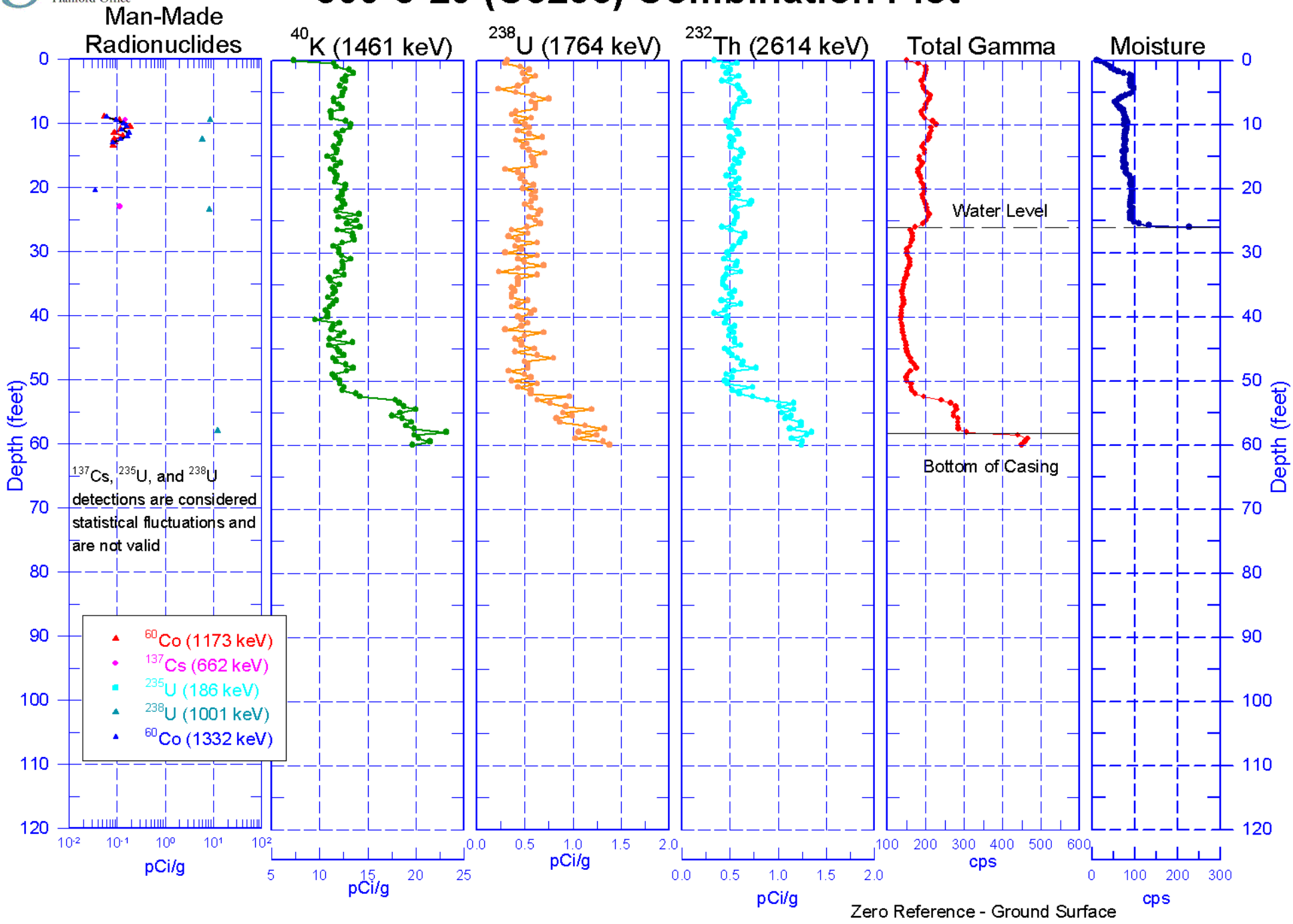
399-3-29 (C6206)
Natural Gamma Logs



Zero Reference - Ground Surface

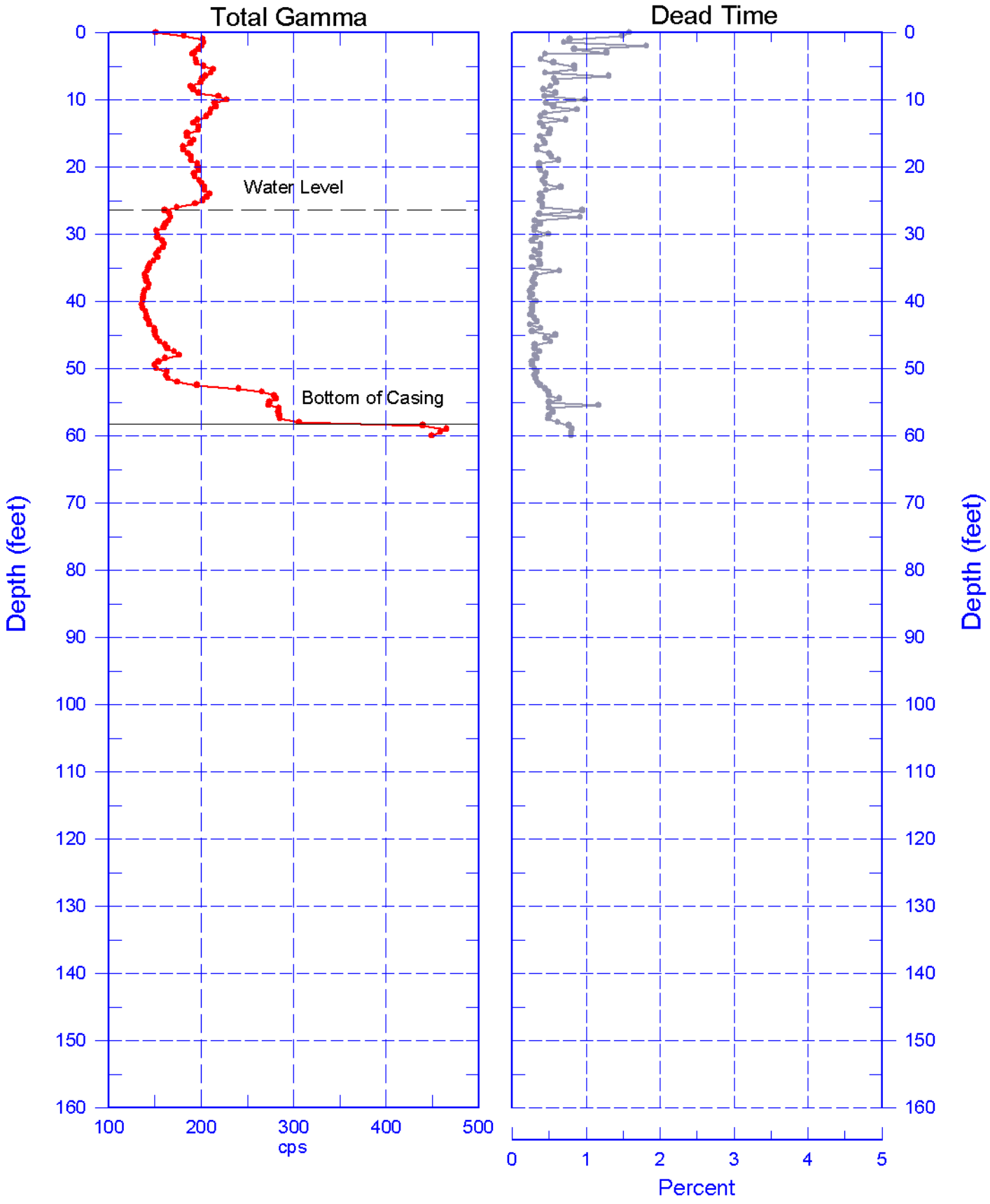
Stoller
Hanford Office

399-3-29 (C6206) Combination Plot



Stoller
Hanford Office

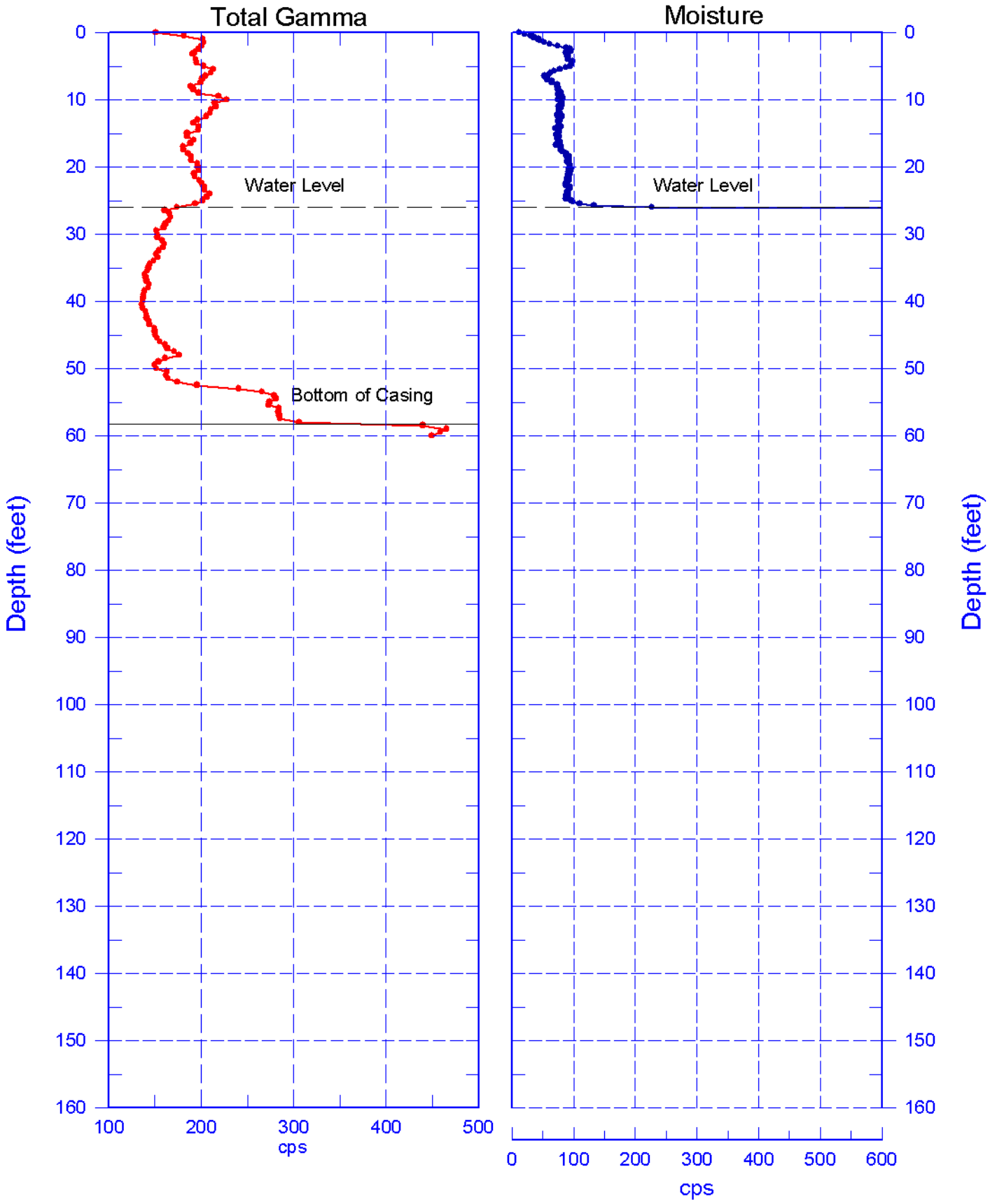
399-3-29 (C6206)
Total Gamma & Dead Time



Reference - Ground Surface

Stoller
Hanford Office

399-3-29 (C6206)
Total Gamma & Moisture

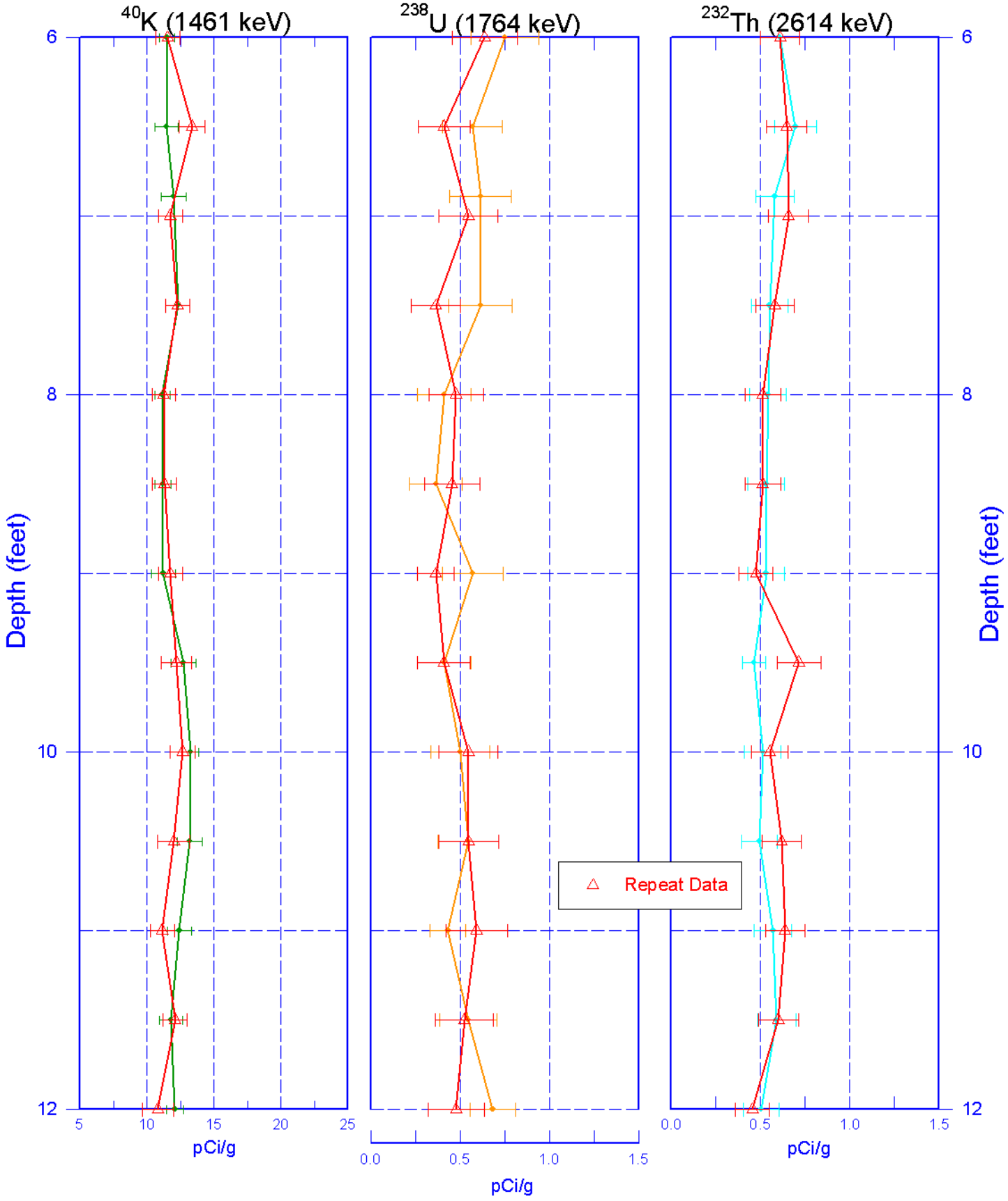


Reference - Ground Surface

Stoller
Hanford Office

399-3-29 (C6206)

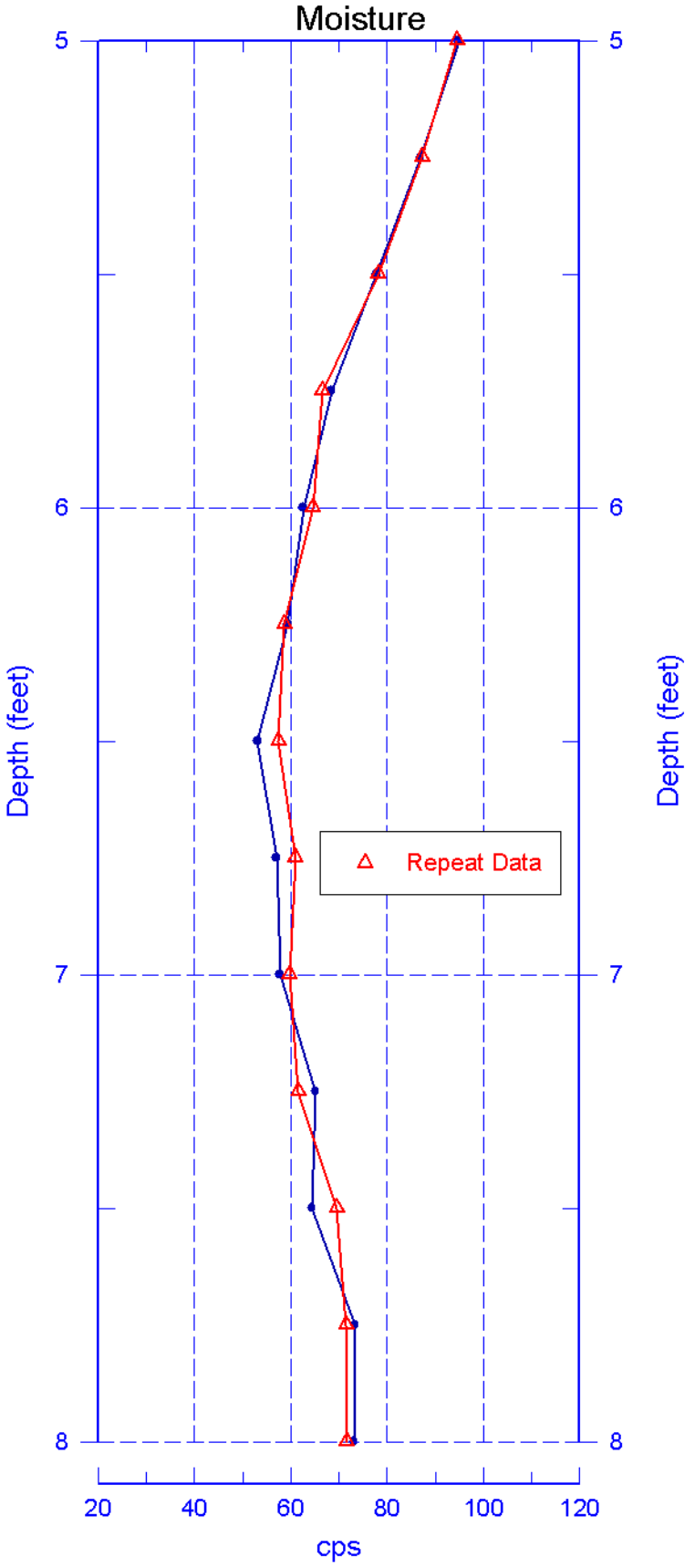
Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

Stoller
Hanford Office

399-3-29 (C6206)
Moisture Repeat Section



Reference - Ground Surface

399-3-31 (C6214)
Log Data Report

Borehole Information:

Borehole:	399-3-31 (C6214)		Site:	300-FF-5	
Coordinates (WA St Plane)		GWL[1] (ft):	28.1	GWL Date:	06/25/08
North (m)	East (m)	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
116048.3	594246.6	06/23/08	Unknown	63	Sonic

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	0.8	7 5/8	6 7/8	3/8	-0.8	60.0

Borehole Notes:

Casing data and total depth were reported by the site geologist. The logging engineer measured the depth to water with an e-tape. Casing diameters were measured using a steel tape and rounded to the nearest 1/16 inch. The zero reference is the ground surface

Logging Equipment Information:

Logging System:	Gamma 4 L		Type:	60% HPGe SGLS
			Serial No.:	47TP32211A
Effective Calibration Date:	12/31/07	Calibration Reference:	HGLP-CC-027	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Logging System:	Gamma 4 H		Type:	NMLS
			Serial No.:	H310700352
Effective Calibration Date:	11/06/07	Calibration Reference:	HGLP-CC-021	
		Logging Procedure:	HGLP-MAN-002, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 Repeat			
Date	06/25/08	06/25/08			
Logging Engineer	McClellan	McClellan			
Start Depth (ft)	63.0	6.0			
Finish Depth (ft)	0.0	12.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.5	0.5			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DL511CAB	DL511CAB			
Start File	DL511000	DL511127			
Finish File	DL511126	DL511139			
Post-Verification	DL511CAA	DL511CAA			
Depth Return Error (in.)	0.5 low	NA			
Comments	No fine gain adjustment made.	Repeat Section.			

Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	3	4 Repeat			
Date	06/25/08	06/25/08			
Logging Engineer	McClellan	McClellan			
Start Depth (ft)	0.0	28.0			
Finish Depth (ft)	28.0	25.0			
Count Time (sec)	15	15			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	0.25	0.25			
Log Speed (ft/min)	NA	NA			
Pre-Verification	DHF82CAB	DHF82CAB			
Start File	DHF82000	DHF82113			
Finish File	DHF82112	DHF82125			
Post-Verification	DHF82CAA	DHF82CAA			
Depth Return Error (in.)	NA	0			
Comments	None	Repeat Section			

Logging Operation Notes:

Data were collected using Gamma 4, HO 68B-3573. SGLS pre- and post-survey verification measurements were acquired in the Amersham KUTh-115 field verifier. NMLS pre- and post-survey verification measurements were acquired in the standard field verifier. SGLS maximum logging depth was 63.14 ft before the sonde un-weighted. A centralizer was installed on the sonde.

Analysis Notes:

Analyst:	LEGLER	Date:	09/23/08	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre- and post-survey verification spectra met the acceptance criteria for the established system. NMLS pre- and post-survey verification spectra met the acceptance criteria for the established system, but the spectra files DHF82CAB and DHF82CAA had measurements for counts per second (cps) above the upper control limit.

A casing correction for a 3/8-in thick casing was applied to spectral data during analysis for depths up to 59.5 ft, where casing ends, leaving 3.5 ft of open borehole uncorrected. The Borehole Data Sheet lists the casing depth as 60 ft, but data from the Total Gamma and KUT plots indicate that the casing ends at 59.5 ft.

A water correction was also applied from 28.1 ft to total logged depth of borehole.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual peaks and count rates. Concentrations were calculated using an EXCEL template identified as G4LDec07.xls using an efficiency function and corrections for casing, dead time and water as determined by annual calibrations. NMLS spectra were processed in batch mode in APTEC SUPERVISOR to identify counts. Count rates were calculated using an EXCEL template identified as G4HNov07.xls. NMLS data are presented in counts per second (cps), because no calibration data is available for a 6 7/8-inch inner diameter borehole casing.

Results and Interpretations:

Co-60 was detected at 9 – 11 ft, with a maximum concentration of 0.41 pCi/g at 10 ft.

U-235 was detected at 10.5 ft, but inspection of the spectra indicates that this detection is a statistical fluctuation associated with the processing software.

U-238 (Pa-234m) was detected at 53.5 ft, but inspection of the spectra indicates that this detection is a statistical fluctuation associated with the processing software.

The KUT, moisture and manmade plots showed good repeatability

List of Log Plots:

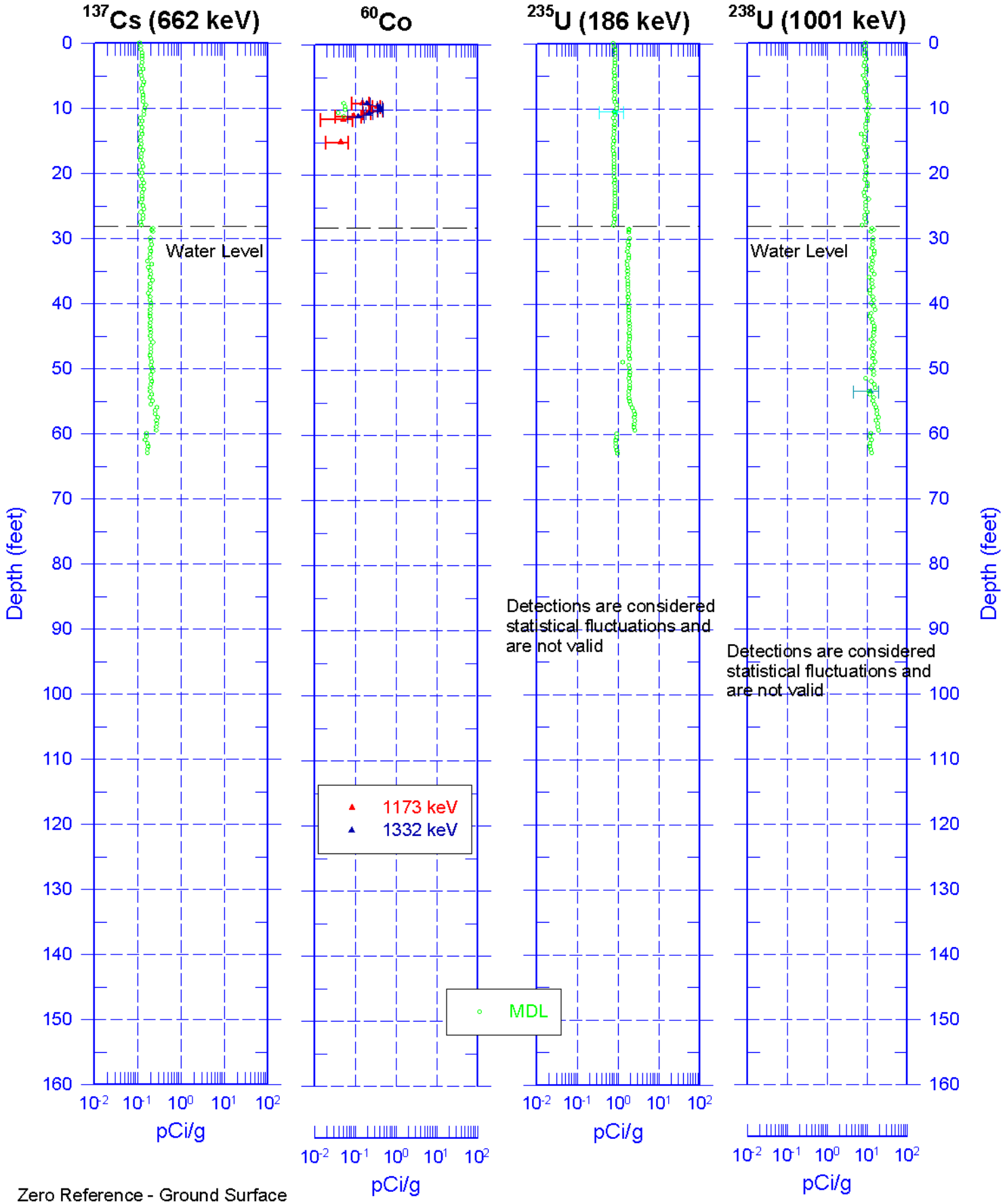
Depth Reference is ground surface

Manmade Radionuclides
Natural Gamma Logs
Combination Plot
Total Gamma & Dead Time
Total Gamma & Moisture
Manmade Repeat Section
Repeat Section of Natural Gamma Logs
Moisture Repeat Section

[1] GWL – groundwater level
[2] TOC – top of casing

Stoller
Hanford Office

399-3-31 (C6214)
Manmade Radionuclides



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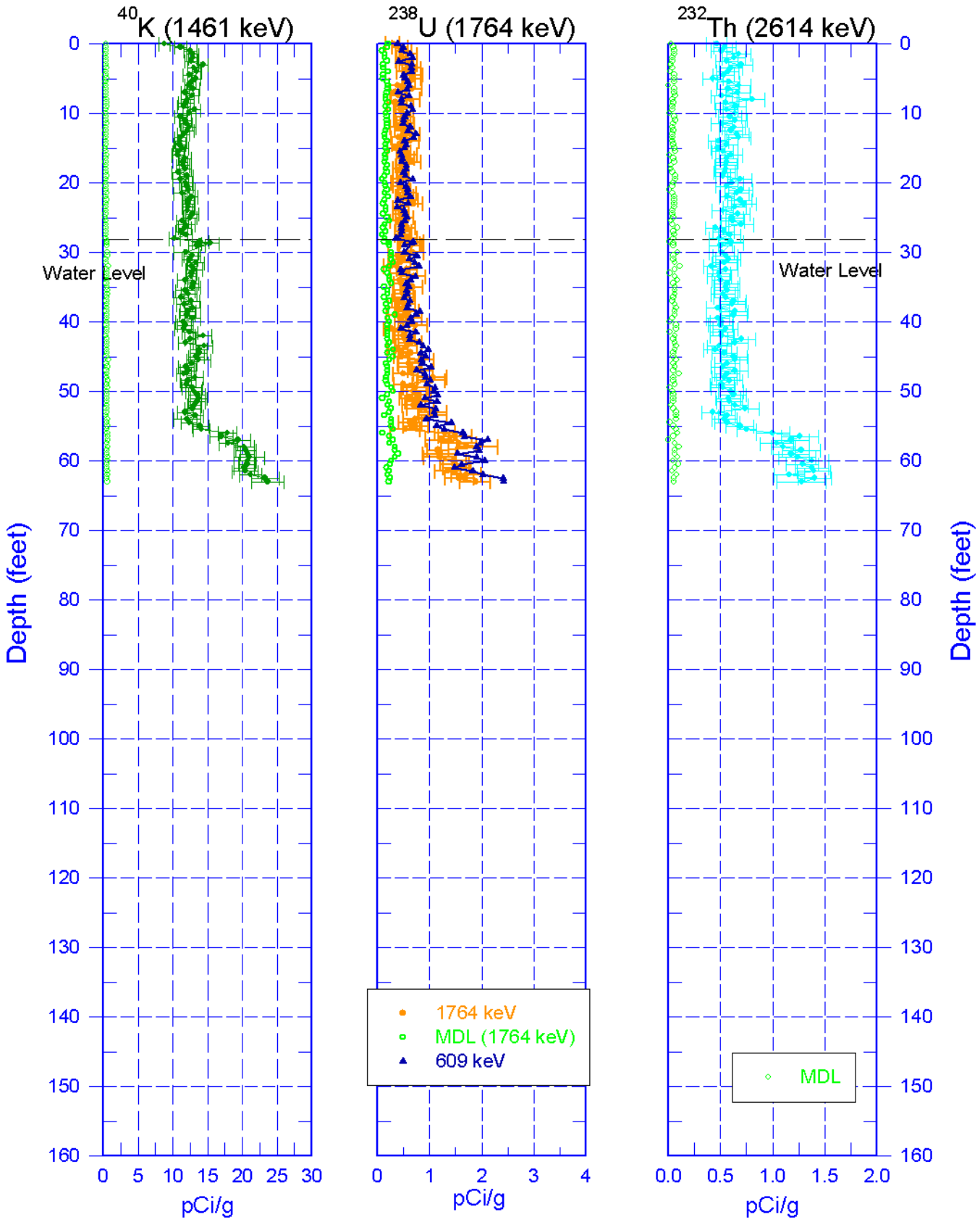
Hanford Office

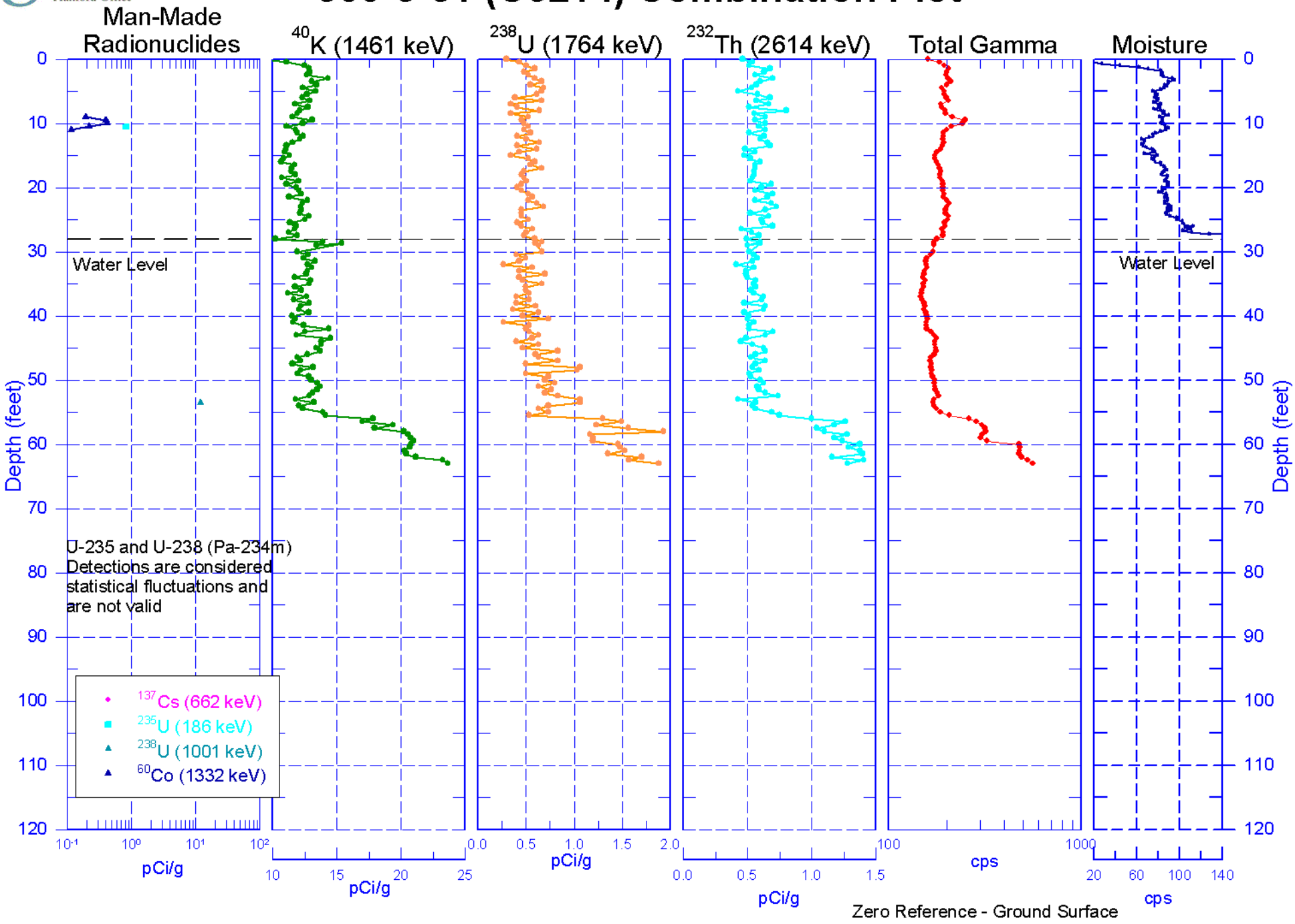
399-3-31 (C6214)
Natural Gamma Logs



Zero Reference - Ground Surface

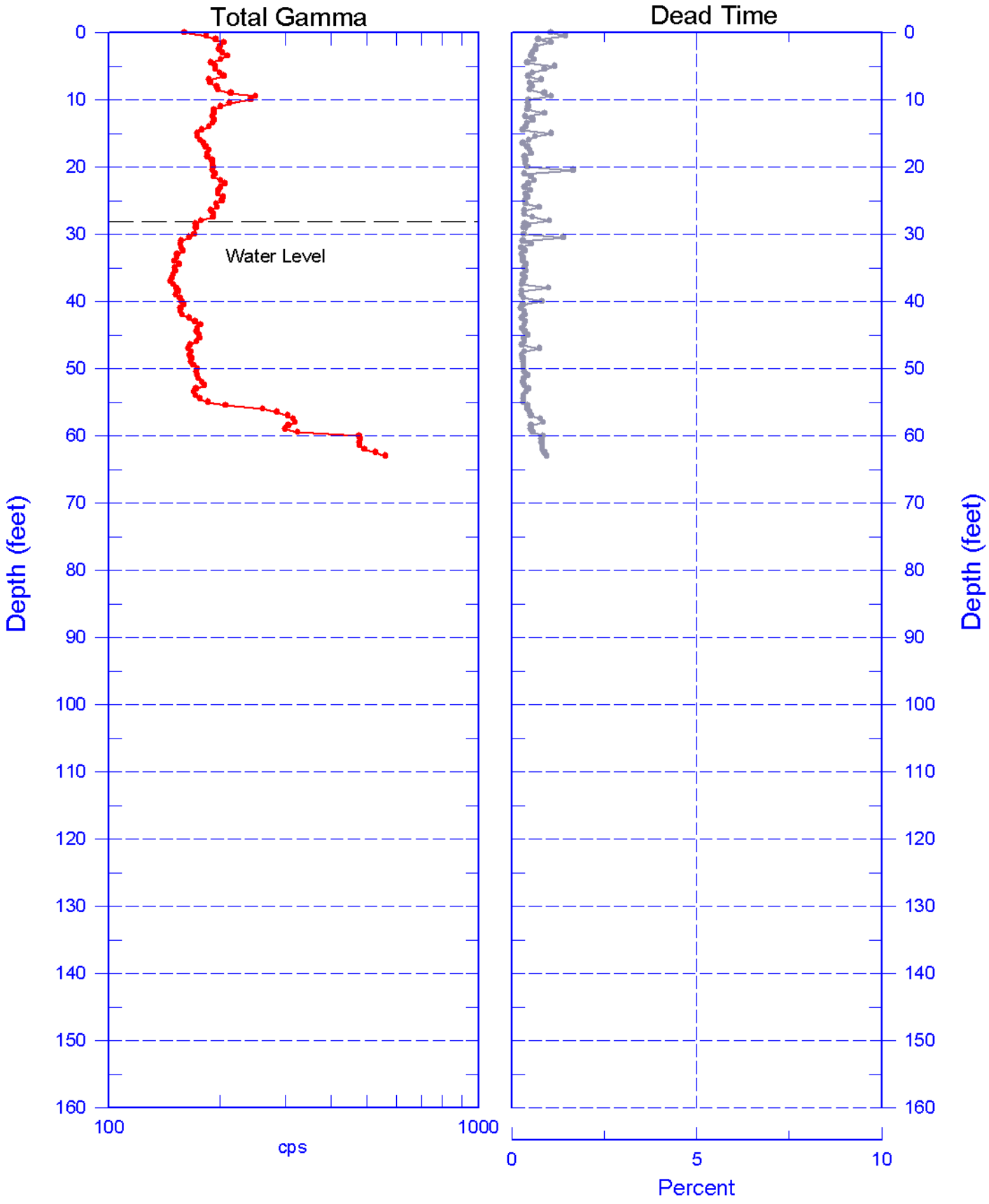
Stoller
Hanford Office

399-3-31 (C6214) Combination Plot



Stoller
Hanford Office

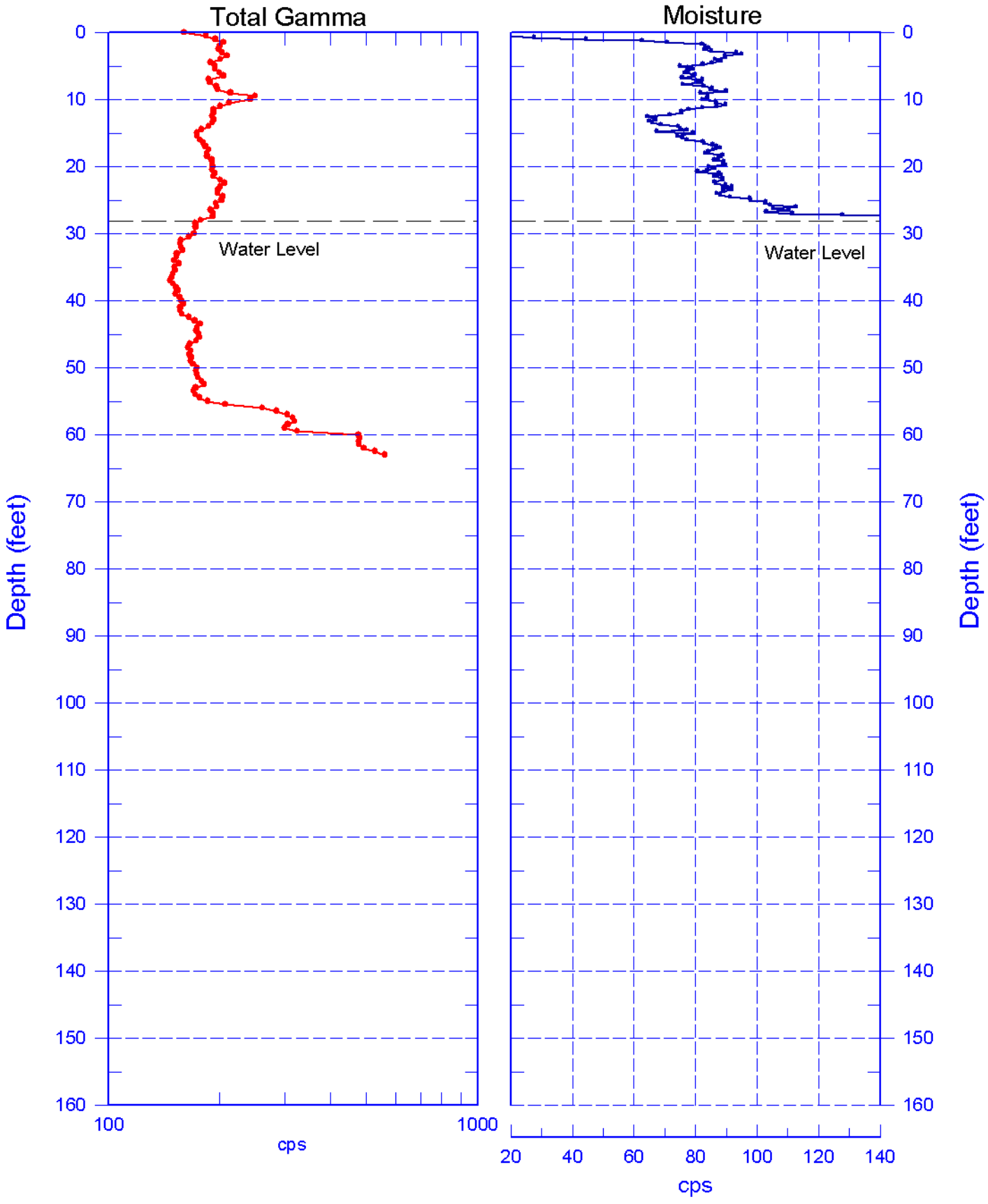
399-3-31 (C6214)
Total Gamma & Dead Time



Reference - Ground Surface

Stoller
Hanford Office

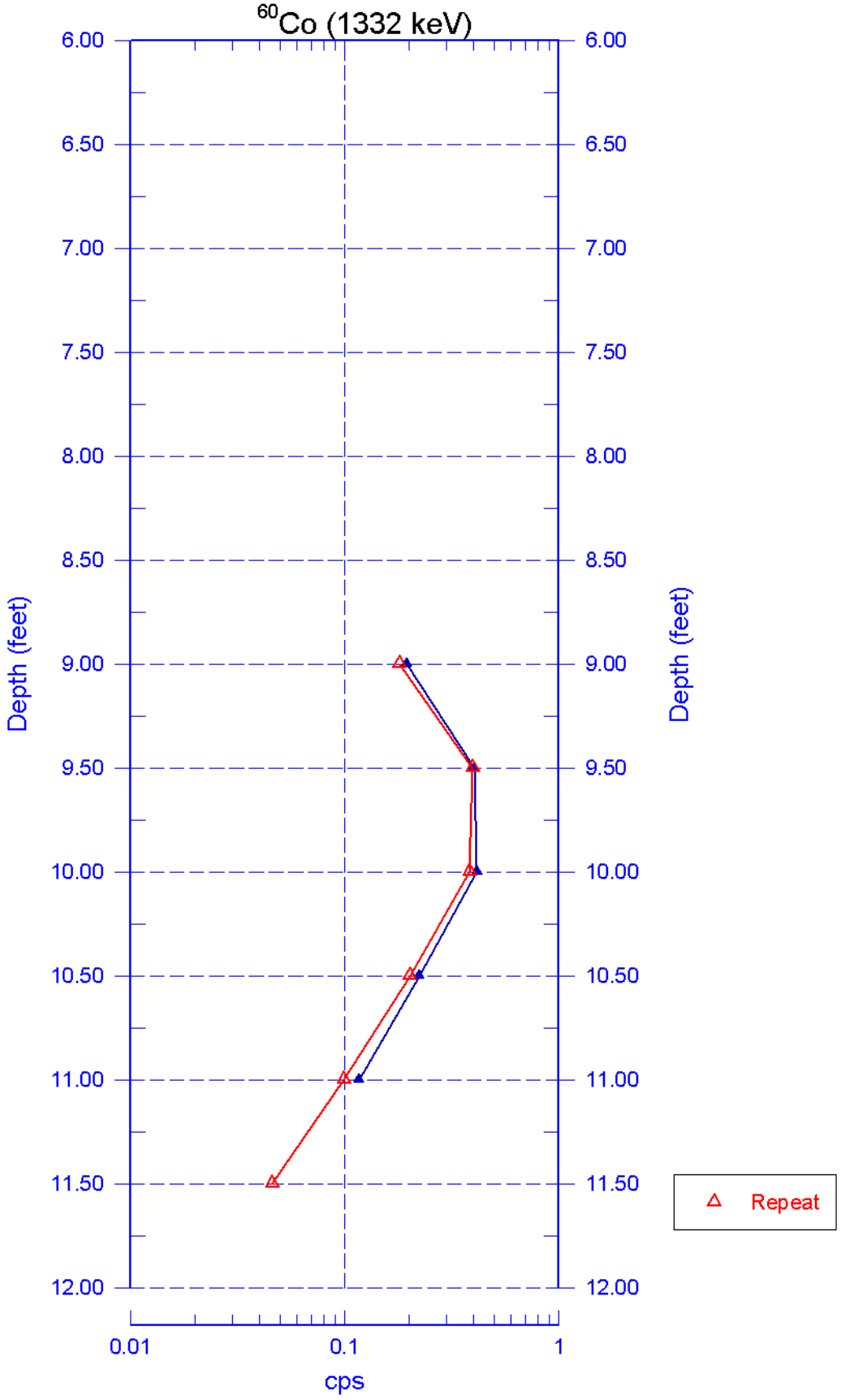
399-3-31 (C6214)
Total Gamma & Moisture



Reference - Ground Surface

Stoller
Hanford Office

399-3-31 (C6214)
Manmade Repeat Section

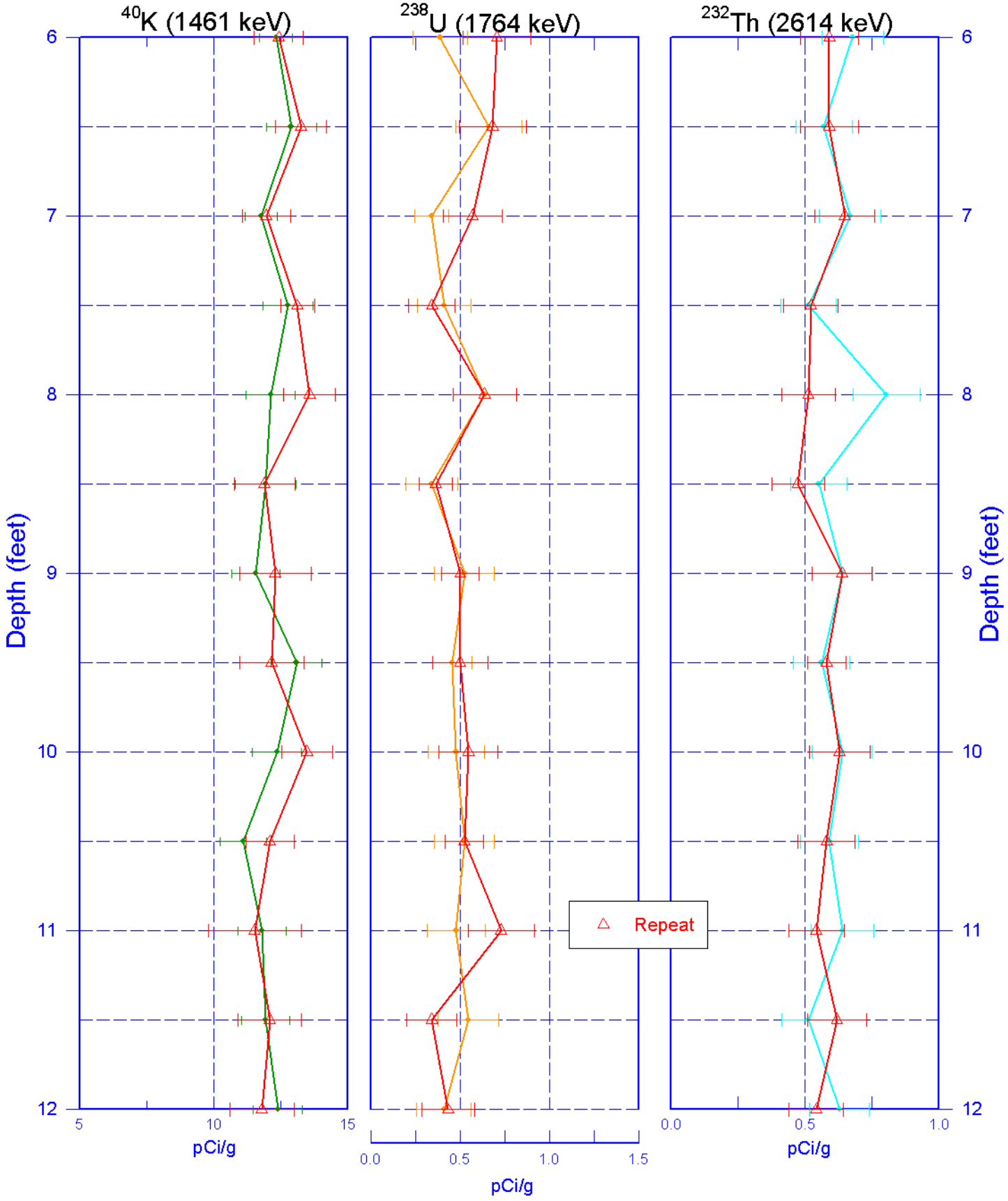


Reference - Ground Surface

Stoller
Hanford Office

399-3-31 (C6214)

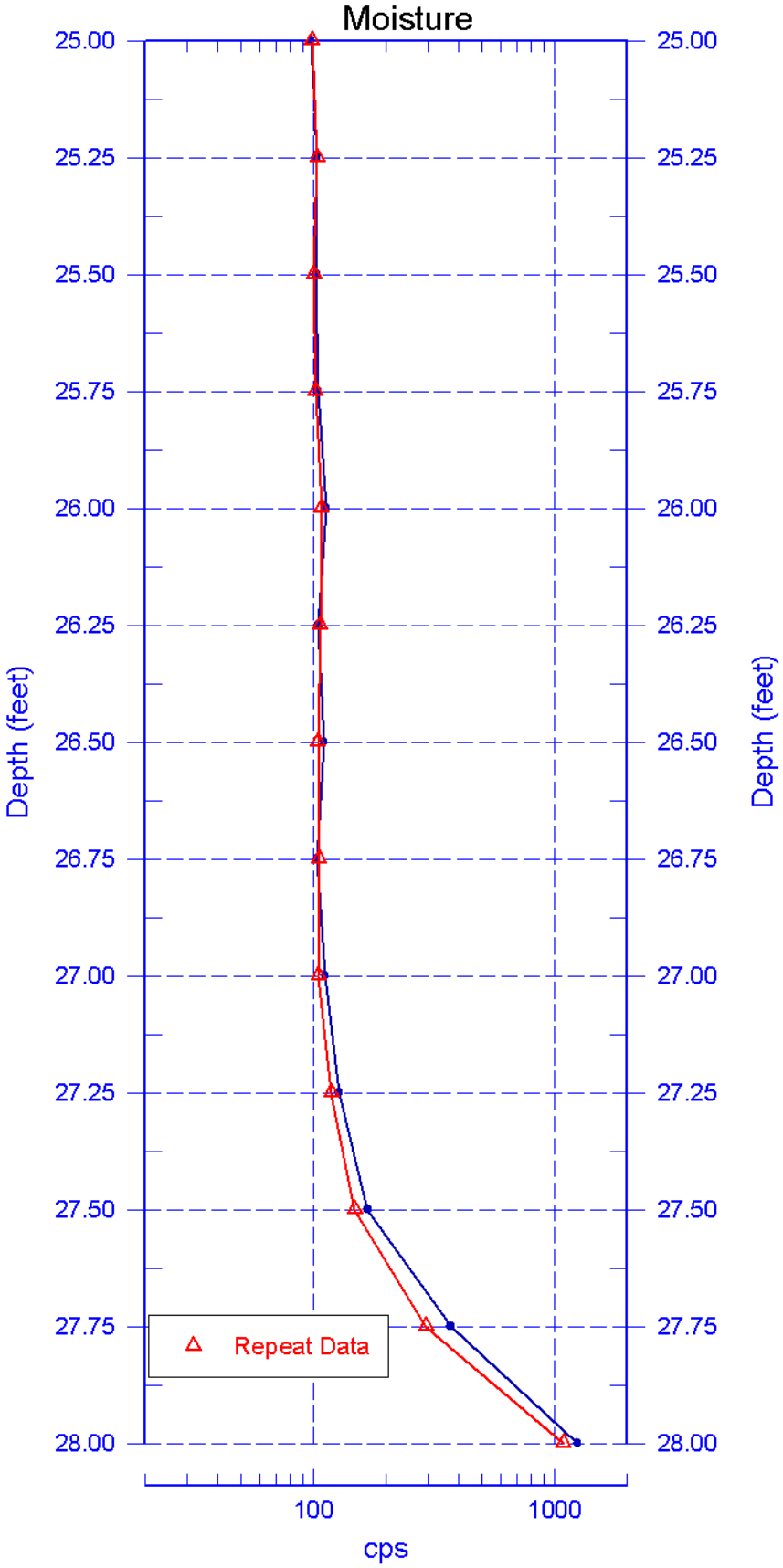
Repeat Section of Natural Gamma Logs



Zero Reference - Ground Surface

Stoller
Hanford Office

399-3-31 (C6214)
Moisture Repeat Section



Reference - Ground Surface

Appendix H

Survey Reports

SURVEY DATA REPORT				Request No. 084-456
Project No.	Title: 300A IFC Wells C6184 thru C6218 Final Survey			File No. 3AT10R28
Job No. MEH1NF123456-0010-CA10	Prepared By Larry A Henke	Date 9/18/08	Reviewer SAW	Page 1 of 36

DESCRIPTION OF WORK	DISTRIBUTION	SDR	PLOT	DWG
Obtained Coordinates on C/L Casing and Elevations on 35 Wells. Stamped a "X" on the North Edge of the Outer Protective Mon Casing.	Survey File	OR		
	D.D. Blankenship	1		
	S.H. Worley	1		
Equipment Used: Trimble 5800 GPS Receiver.	C.S. Wright	1		
Horizontal Coordinate System: WCS83S/91 (Meters)	B.J. Howard	1		
Trimble DiNi 12 Digital Level	G.G. Kelty	1		
Vertical Datum: NAVD88 (Meters)	L.C. Sumner	1		

SURVEY RESULTS AND COMMENTS

Distribution Continued: S. C. Adams 1

SEE ATTACHED WELL SURVEY DATA REPORTS

NOTE: This Survey was performed under the supervision of a Licensed Professional Land Surveyor registered in the State of Washington.

WELL SURVEY DATA REPORT

Project:	**Prepared By:** Larry A Henke **Company:** FGG
Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6184 (399-2-7)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

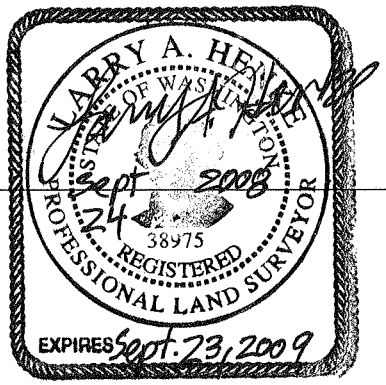
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6184	399-2-7	594235.20	116084.49		Center of Casing
				114.812	Top Pump Base plate. N. Edge
				114.909	Top Lid Frame at Stamped "X", N. Edge
				114.910	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



Surveyor Statement:
I, Larry A. Henke, a Professional Land Surveyor registered in the State of Washington (Registration No. 38975), hereby certify that this report is based on a field survey performed in September, 2008 under my direct supervision, and that the data contained here is true and correct.

Original to:
Distribution by DIS:

WELL SURVEY DATA REPORT

Project:	**Prepared By:** Larry A Henke **Company:** FGG
Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6185 (399-2-8)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

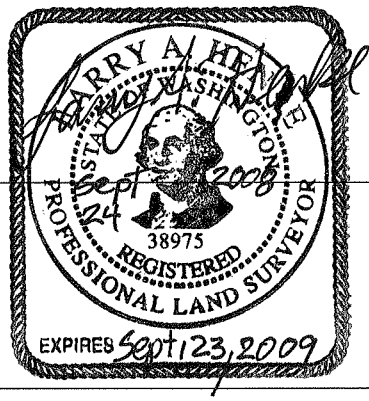
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6185	399-2-8	594243.48	116090.31		Center of Casing
				114.812	Top Pump Base plate. N. Edge
				114.923	Top Lid Frame at Stamped "X", N. Edge
				114.925	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



Surveyor Statement:
I, Larry A. Henke, a Professional Land Surveyor registered in the State of Washington (Registration No. 38975), hereby certify that this report is based on a field survey performed in September, 2008 under my direct supervision, and that the data contained here is true and correct.

Original to:
Distribution by DIS:

WELL SURVEY DATA REPORT

Project:	**Prepared By:** Larry A Henke **Company:** FGG
Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6186 (399-2-9)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

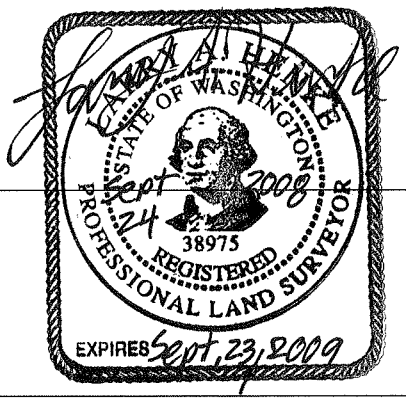
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6186	399-2-9	594237.72	116089.72		**Center of Casing**
				114.772	**Top Pump Base plate. N. Edge**
				114.907	**Top Lid Frame at Stamped "X", N. Edge**
				114.908	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



Surveyor Statement:
I, Larry A. Henke, a Professional Land Surveyor registered in the State of Washington (Registration No. 38975), hereby certify that this report is based on a field survey performed in September, 2008 under my direct supervision, and that the data contained here is true and correct.

Original to:
Distribution by DIS:

WELL SURVEY DATA REPORT

Project:	**Prepared By:** Larry A Henke **Company:** FGG
Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6187 (399-2-10)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

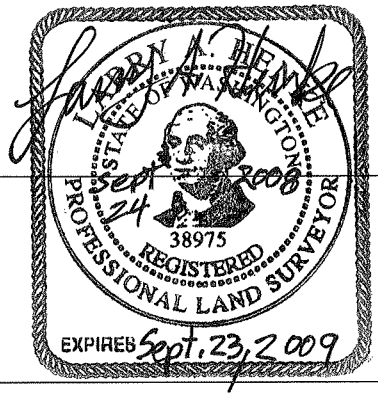
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6187	399-2-10	594234.56	116094.49		**Center of Casing**
				114.892	**Top Pump Base plate. N. Edge**
				114.960	**Top Lid Frame at Stamped "X", N. Edge**
				114.958	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6188 (399-2-11)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

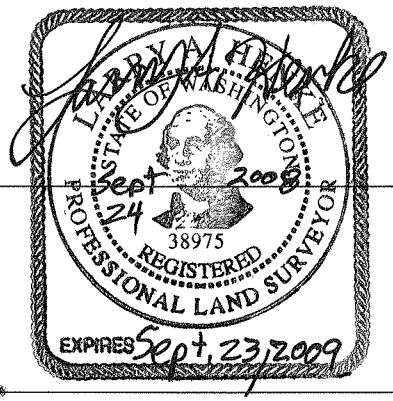
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6188	399-2-11	594236.25	116074.49		**Center of Casing**
				114.871	**Top Pump Base plate. N. Edge**
				114.967	**Top Lid Frame at Stamped "X", N. Edge**
				114.963	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6189 (399-2-12)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

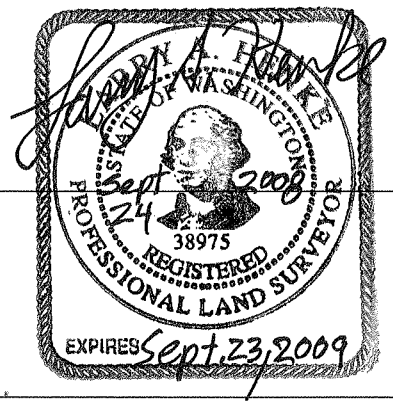
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6189	399-2-12	594252.45	116086.01		**Center of Casing**
				114.739	**Top Pump Base plate. N. Edge**
				114.862	**Top Lid Frame at Stamped "X", N. Edge**
				114.855	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6190 (399-2-13)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

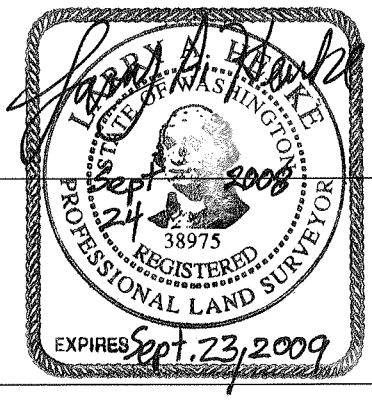
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6190	399-2-13	594237.15	116064.59		**Center of Casing**
				114.813	**Top Pump Base plate. N. Edge**
				114.960	**Top Lid Frame at Stamped "X", N. Edge**
				114.958	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6191 (399-2-14)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

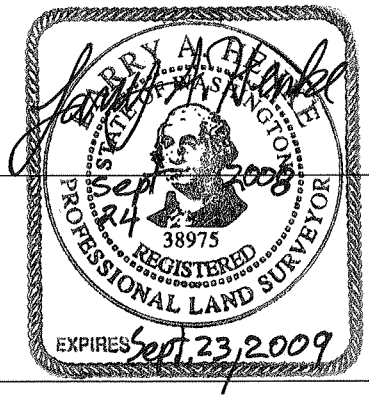
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6191	399-2-14	594245.30	116070.17		Center of Casing
				114.741	Top Pump Base plate. N. Edge
				114.838	Top Lid Frame at Stamped "X", N. Edge
				114.834	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6192 (399-2-15)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

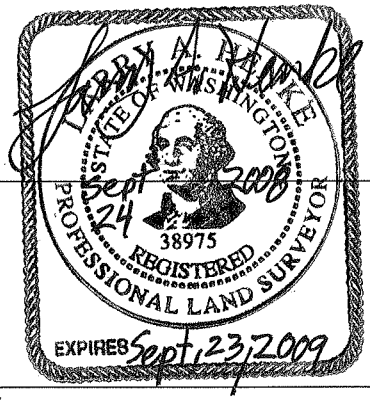
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6192	399-2-15	594253.30	116076.02		**Center of Casing**
				114.781	**Top Pump Base plate. N. Edge**
				114.885	**Top Lid Frame at Stamped "X", N. Edge**
				114.880	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6193 (399-2-16)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

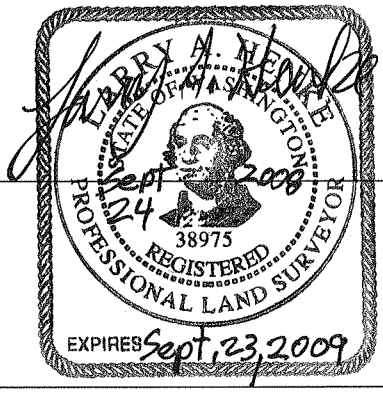
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6193	399-2-16	594261.55	116081.92		**Center of Casing**
				114.691	**Top Pump Base plate. N. Edge**
				114.796	**Top Lid Frame at Stamped "X", N. Edge**
				114.797	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6194 (399-3-23)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

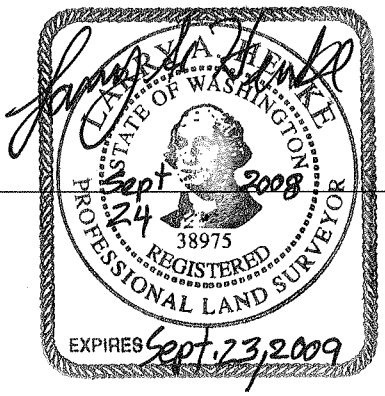
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6194	399-3-23	594237.90	116054.72		**Center of Casing**
				114.940	**Top Pump Base plate. N. Edge**
				115.020	**Top Lid Frame at Stamped "X", N. Edge**
				115.014	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6195 (399-2-17)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

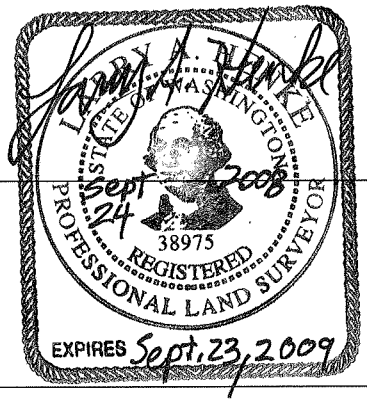
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6195	399-2-17	594246.11	116060.29		**Center of Casing**
				114.763	**Top Pump Base plate. N. Edge**
				114.885	**Top Lid Frame at Stamped "X", N. Edge**
				114.870	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6196 (399-2-18)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

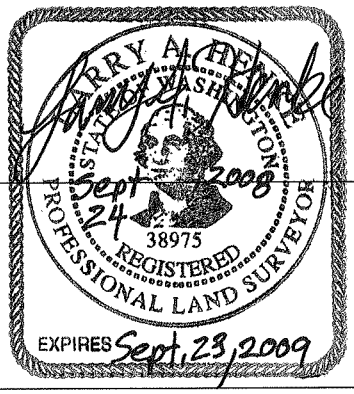
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6196	399-2-18	594254.15	116066.13		**Center of Casing**
				114.733	**Top Pump Base plate. N. Edge**
				114.861	**Top Lid Frame at Stamped "X", N. Edge**
				114.862	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6197 (399-2-19)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

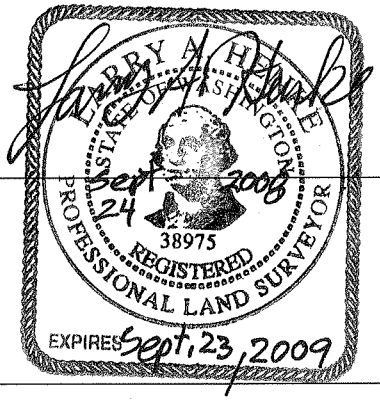
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6197	399-2-19	594262.72	116071.76		**Center of Casing**
				114.746	**Top Pump Base plate. N. Edge**
				114.868	**Top Lid Frame at Stamped "X", N. Edge**
				114.866	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6198 (399-2-20)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

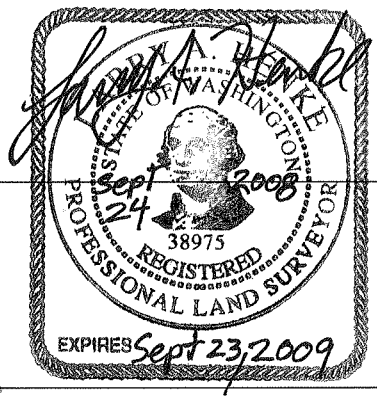
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6198	399-2-20	594270.58	116077.64		**Center of Casing**
				114.794	**Top Pump Base plate. N. Edge**
				114.879	**Top Lid Frame at Stamped "X", N. Edge**
				114.886	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6199 (399-3-24)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

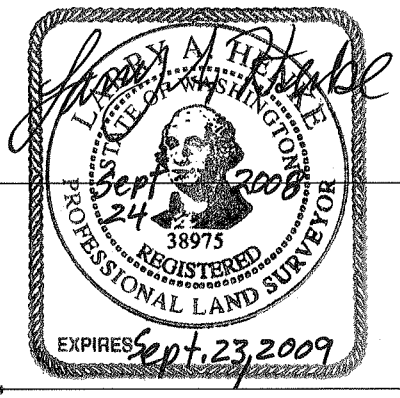
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6199	399-3-24	594238.80	116044.60		**Center of Casing**
				114.886	**Top Pump Base plate. N. Edge**
				114.978	**Top Lid Frame at Stamped "X", N. Edge**
				114.978	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6200 (399-3-25)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

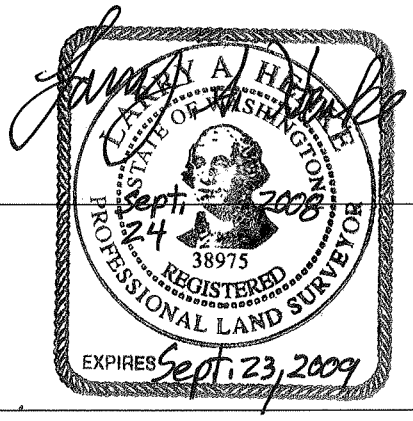
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6200	399-3-25	594255.11	116056.03		**Center of Casing**
				114.754	**Top Pump Base plate. N. Edge**
				114.875	**Top Lid Frame at Stamped "X", N. Edge**
				114.875	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



Surveyor Statement:
I, Larry A. Henke, a Professional Land Surveyor registered in the State of Washington (Registration No. 38975), hereby certify that this report is based on a field survey performed in September, 2008 under my direct supervision, and that the data contained here is true and correct.

Original to:
Distribution by DIS:

WELL SURVEY DATA REPORT

Project:	**Prepared By:** Larry A Henke **Company:** FGG
Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6201 (399-2-21)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

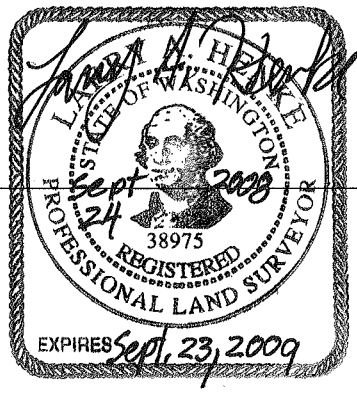
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6201	399-2-21	594263.30	116061.90		**Center of Casing**
				114.721	**Top Pump Base plate. N. Edge**
				114.837	**Top Lid Frame at Stamped "X", N. Edge**
				114.840	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6202 (399-2-22)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

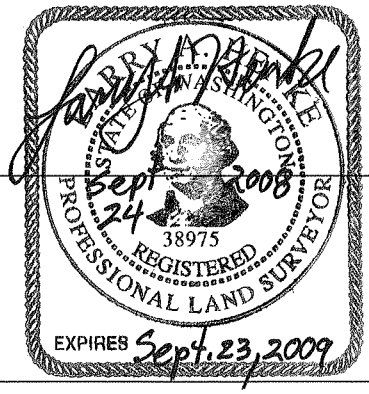
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6202	399-2-22	594279.68	116073.37		**Center of Casing**
				114.806	**Top Pump Base plate. N. Edge**
				114.871	**Top Lid Frame at Stamped "X", N. Edge**
				114.870	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6203 (399-3-26)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

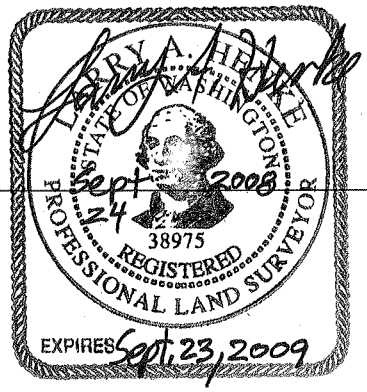
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6203	399-3-26	594239.81	116034.77		**Center of Casing**
				114.863	**Top Pump Base plate. N. Edge**
				114.988	**Top Lid Frame at Stamped "X", N. Edge**
				114.986	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6204 (399-3-27)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

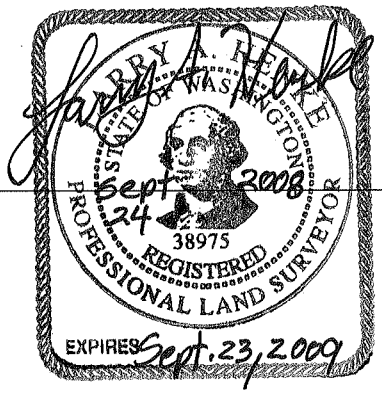
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6204	399-3-27	594247.94	116040.66		**Center of Casing**
				114.848	**Top Pump Base plate. N. Edge**
				114.936	**Top Lid Frame at Stamped "X", N. Edge**
				114.930	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6205 (399-3-28)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

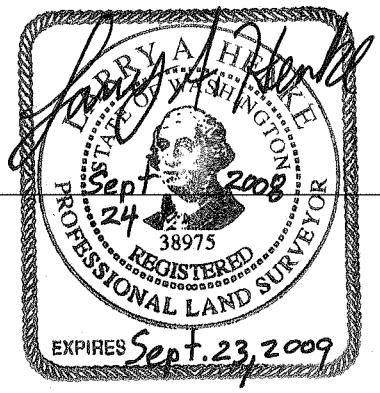
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6205	399-3-28	594256.10	116045.98		Center of Casing
				114.803	Top Pump Base plate. N. Edge
				114.909	Top Lid Frame at Stamped "X", N. Edge
				114.900	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6206 (399-3-29)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6206	399-3-29	594264.27	116051.97		**Center of Casing**
				114.830	**Top Pump Base plate. N. Edge**
				114.903	**Top Lid Frame at Stamped "X", N. Edge**
				114.898	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
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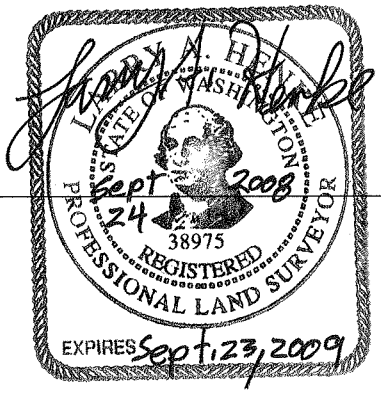

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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6207 (399-2-23)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

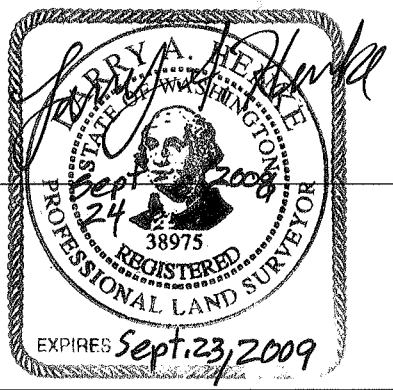
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6207	399-2-23	594272.27	116057.59		**Center of Casing**
				114.805	**Top Pump Base plate. N. Edge**
				114.875	**Top Lid Frame at Stamped "X", N. Edge**
				114.875	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6208 (399-2-21)	**Horizontal Datum:** NAD83(91) **Vertical Datum:** NAVD88 **Units:** METERS **Hanford Area Designation:** 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

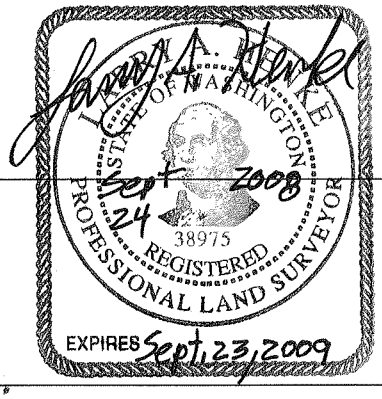
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6208	399-2-21	594280.67	116063.29		**Center of Casing**
				114.761	**Top Pump Base plate. N. Edge**
				114.889	**Top Lid Frame at Stamped "X", N. Edge**
				114.889	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6209 (399-2-25)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

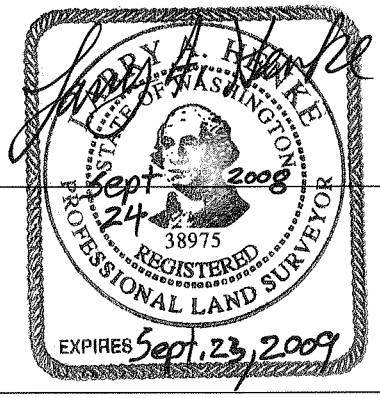
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6209	399-2-25	594269.21	116088.06		**Center of Casing**
				114.931	**Top Pump Base plate. N. Edge**
				115.534	**Top Lid Frame at Stamped "X", N. Edge**
				115.638	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6210 (399-2-26)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6210	399-2-26	594243.95	116081.03		**Center of Casing**
				114.838	**Top Pump Base plate. N. Edge**
				114.922	**Top Lid Frame at Stamped "X", N. Edge**
				114.915	Brass Survey Marker

Notes:

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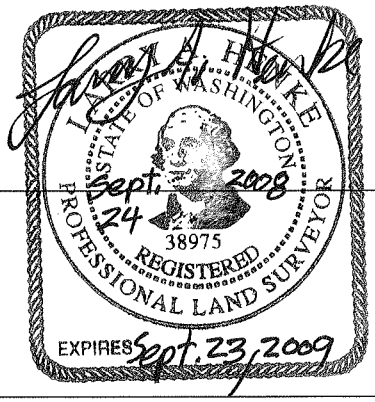

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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6211 (399-2-27)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

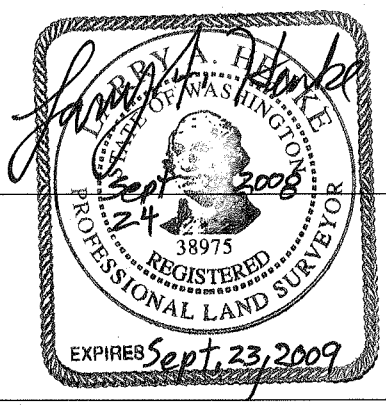
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6211	399-2-27	594244.12	116078.15		**Center of Casing**
				114.785	**Top Pump Base plate. N. Edge**
				114.899	**Top Lid Frame at Stamped "X", N. Edge**
				114.896	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6212 (399-2-28)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6212	399-2-28	594246.41	116079.99		**Center of Casing**
				114.740	**Top Pump Base plate. N. Edge**
				114.859	**Top Lid Frame at Stamped "X", N. Edge**
				114.855	Brass Survey Marker

Notes:

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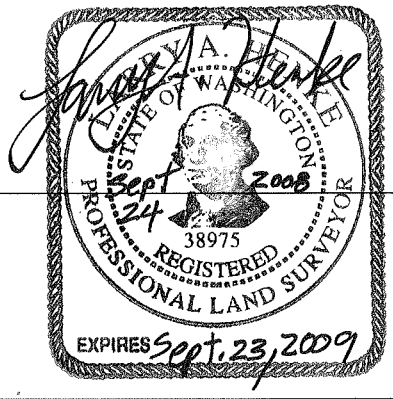

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Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6213 (399-3-30)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6213	399-3-30	594246.32	116051.35		Center of Casing
				114.791	Top Pump Base plate. N. Edge
				114.879	Top Lid Frame at Stamped "X", N. Edge
				114.876	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
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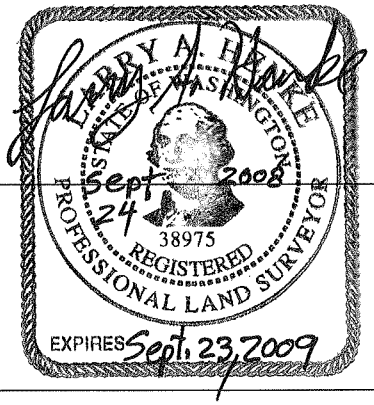

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Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6214 (399-3-31)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6214	399-3-31	594246.73	116048.27		**Center of Casing**
				114.787	**Top Pump Base plate. N. Edge**
				114.887	**Top Lid Frame at Stamped "X", N. Edge**
				114.886	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
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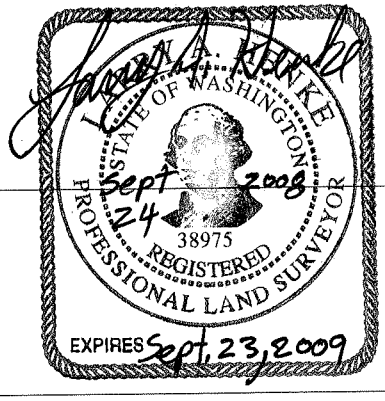

Surveyor Statement:
I, Larry A. Henke, a Professional Land Surveyor registered in the State of Washington (Registration No. 38975), hereby certify that this report is based on a field survey performed in September, 2008 under my direct supervision, and that the data contained here is true and correct.

Original to:
Distribution by DIS:

WELL SURVEY DATA REPORT

Project:	**Prepared By:** Larry A Henke **Company:** FGG
Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6215 (399-3-32)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6215	399-3-32	594249.07	116050.05		**Center of Casing**
				114.746	**Top Pump Base plate. N. Edge**
				114.884	**Top Lid Frame at Stamped "X", N. Edge**
				114.878	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL

Surveyor Statement:
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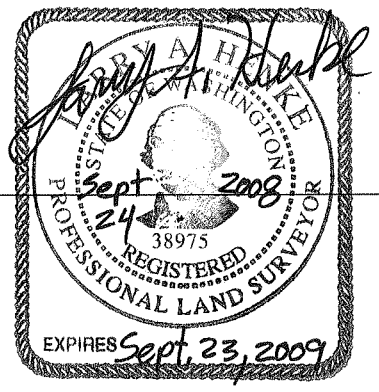

Original to:
Distribution by DIS:

WELL SURVEY DATA REPORT

Project:	**Prepared By:** Larry A Henke **Company:** FGG
Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6216 (399-2-29)	**Horizontal Datum:** NAD83(91) **Vertical Datum:** NAVD88 **Units:** METERS **Hanford Area Designation:** 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6216	399-2-29	594270.82	116068.13		**Center of Casing**
				114.792	**Top Pump Base plate. N. Edge**
				114.889	**Top Lid Frame at Stamped "X", N. Edge**
				114.891	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



Surveyor Statement:
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Original to:
Distribution by DIS:

WELL SURVEY DATA REPORT

Project:	**Prepared By:** Larry A Henke **Company:** FGG
Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6217 (399-2-30)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

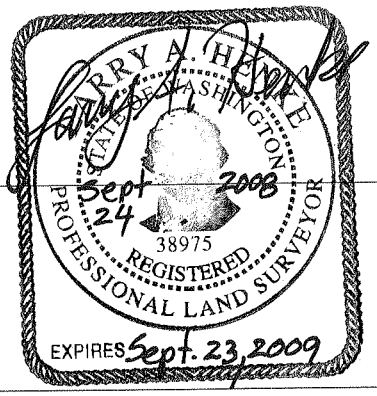
Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6217	399-2-30	594271.18	116065.52		**Center of Casing**
				114.827	**Top Pump Base plate. N. Edge**
				114.914	**Top Lid Frame at Stamped "X", N. Edge**
				114.913	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Original to:
Distribution by DIS:

WELL SURVEY DATA REPORT

Project:	**Prepared By:** Larry A Henke **Company:** FGG
Date Requested: 8/19/08	**Requestor:** Chris Wright (FH)
Date of Survey: 9/18/08	**Surveyor:** Larry A Henke (FGG)
ERC Point of Contact:	**Survey Co. Point of Contact:** Neil Fastabend (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C6218 (399-2-31)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: N-323 (FGG), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60(FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C6218	399-2-31	594273.58	116067.24		**Center of Casing**
				114.788	**Top Pump Base plate. N. Edge**
				114.894	**Top Lid Frame at Stamped "X", N. Edge**
				114.894	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



Surveyor Statement:
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Original to:
Distribution by DIS:

Appendix I

Chip Tray Photographs

399-2-10 (C6187) Depth (feet below ground surface)	
0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 26 *(Rip-up Clast)*	
26 - 35	
35 - 40	
42 - 56	
56 - 61	
61 - 65 *(TD = 65 feet)*	

399-2-11 (C6188) Depth (feet below ground surface)	
0 - 5	
5 - 10	
10 - 15	
15 - 25	
25 - 29.5	
29.5 - 32 *(rip-up clast)*	
32 - 45	
45 - 55.5	
55.5 - 61	
61 - 65 *(TD = 65 feet)*	

399-2-12 (C6189)

Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
30 - 40	
40 - 45	
45 - 51	
51 - 52	
52 - 59.5	
59.5 - 65 *(TD=65 feet)*	

399-2-13 (C6190) Depth (feet below ground surface)			
0 - 5		54 - 58.8	
5 - 10		58.8 - 62.6 *(TD = 62.6 feet)*	
10 - 15			
15 - 20			
20 - 25			
25 - 30			
30 - 35			
35 - 40			
40 - 44 *(Rip-up Clast)*			
44 - 54			

399-2-14 (C6191)

Depth (feet below ground surface)

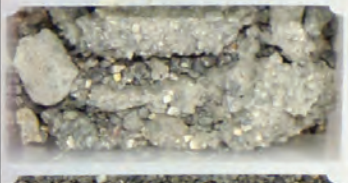
0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
30 - 35	
35 - 40	
40 - 45	
45 - 50	
50 - 52	
55 - 57.5	
57.5 - 58.5 *(TD = 58.5 feet)*	

399-2-15 (C6192)
Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
30 - 35	
35 - 46	
46 - 50	
50 - 52	
52 - 58	
58 - 61.5 *(TD = 61.5 feet)*	

399-2-16 (C6193) Depth (feet below ground surface)	
0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
35 - 40	
40 - 45	
45 - 54	
54 - 62 *(TD = 62 feet)*	

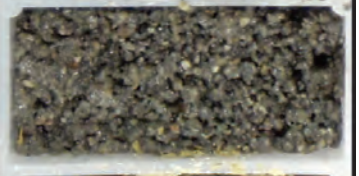
399-2-17 (C6195)
Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 19	
25 - 30	
30 - 35	
35 - 40	
45 - 50	
50 - 56.5	
56.5 - 59.5	
59.5 - 63 *(TD = 63 feet)*	

399-2-18 (C6196)

Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 21	
21 - 22.5 *(Rip-up Clast)*	
22.5 - 25.5	
25.5 - 30.5	
30.5 - 35	
55 - 45	
45 - 50	
50 - 55	
55 - 60	
60 - 65 *(TD = 65 feet)*	

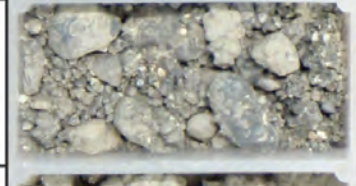
399-2-19 (C6197) Depth (feet below ground surface)	
0 - 5	
5 - 10	
10 - 15	
30 - 31.5	
31.5 - 33 *(Rip-up Clast)*	
33 - 45	
45 - 50	
50 - 54	
54 - 55	
58 - 60.8 *(TD = 60.8 feet)*	

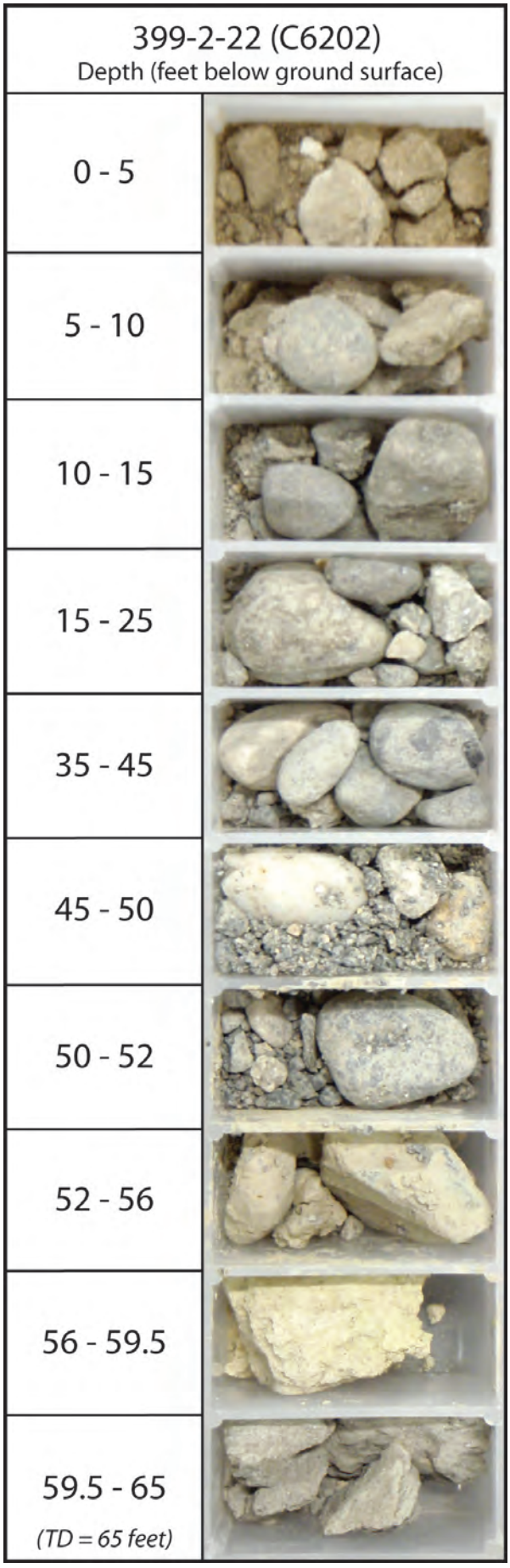
399-2-20 (C6198)

Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
30 - 35	
35 - 40	
40 - 45	
45 - 54	
54 - 56	
56 - 59	
59 - 62 *(TD = 62 feet)*	

399-2-21 (C6201)
Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 20	
25 - 30	
30 - 35	
35 - 40	
45 - 50	
50 - 55	
55 - 57	
57 - 60 *(TD = 61.7 feet)*	


399-2-22 (C6202)
Depth (feet below ground surface)
0 - 5
5 - 10
10 - 15
15 - 25
35 - 45
45 - 50
50 - 52
52 - 56
56 - 59.5
59.5 - 65
(TD = 65 feet)

399-2-23 (C6207) Depth (feet below ground surface)	
0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 35	
35 - 45	
50 - 55	
55 - 60	
TD = 60 feet	

399-2-24 (C6208)
Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
30 - 35	
35 - 40	
40 - 45	
45 - 50 *(Rip-up Clast)*	

50 - 55	
55 - 60	
60 - 65	
65 - 67.5 *(TD = 67.5 feet)*	

399-2-25 (C6209)
Depth (feet below ground surface)

0 - 5		49 - 49.5	
5 - 10		53 - 60	
10 - 15		62.5 - 70	
15 - 20		70 - 71	
20 - 25		71 - 75	
25 - 30		75 - 80	
35 - 39		80 - 85	
39 - 43		85 - 90	
45 - 47.5		90 - 95	
47.5 - 49		95 - 100	

399-2-25 (C6209) Cont...

Depth (feet below ground surface)

100 - 105	
105 - 110	
115 - 121	
121 - 128	
128 - 130	
130 - 135	
135 - 140	
140 - 145	
145 - 150	
150 - 155	
155 - 162	
162 - 163	
163 - 168	
168 - 170 *(TD=171 feet)*	

399-2-26 (C6210)
Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
30 - 35 *(Rip-up Clast)*	
35 - 40	
40 - 45	
50 - 57	
57 - 60.5	
60.5 - 62 *(TD = 62 feet)*	

399-2-27 (C6211) Depth (feet below ground surface)	
0 - 5	
5 - 10	
10 - 15	
15 - 25	
25 - 35	
35 - 45	
55 - 57.5	
57.5 - 61	
61 - 63.5	
TD = 63.5 feet	

399-2-28 (C6212)

Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
30 - 35	
35 - 40	
45 - 50	
50 - 55	
56.5 - 61	
61 - 65 *(TD = 65 feet)*	

399-2-29 (C6216)

Depth (feet below ground surface)

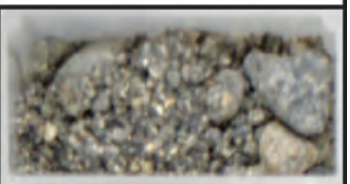
0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
30 - 35	
35 - 45	
45 - 50	
50 55.5	
55.5 - 58	
58 - 61.5 *(TD=61.5 feet)*	

399-2-30 (C6217)
Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
35 - 40	
45 - 47	
47 - 52 *(Rip-up Clast)*	
52 - 55	
59 - 60 *(TD = 64 feet)*	

399-2-31 (C6218)

Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
30 - 35	
35 - 40	
40 - 45	
45 - 50	
50 - 55.5	
55.5 - 58	
58 - 63 *(TD = 63 feet)*	

399-2-7 (C6184) Depth (feet below ground surface)	
0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
30 - 35	
35 - 53.5	
53.5 - 59	
59 - 62 *(TD = 62 feet)*	

399-2-8 (C6185)

Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25 *(rip-up clast)*	
25 - 35	
35 - 38	
38 - 41 *(rip-up clast)*	
41 - 48.5	
48.5 - 50.5	
50.5 - 57	
57 - 60 *(TD=60 feet)*	

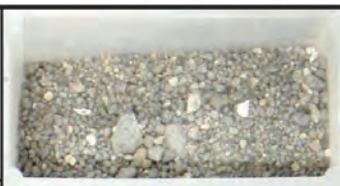
399-2-9 (C6186)
Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
30 - 35	
35 - 40	
40 - 45	
45 - 50	
50 - 54	
54 - 54.8 *(rip-up clast)*	
54.8 - 58	
58 - 59.5	
59.5 - 60.5	
60.5 - 65 *(TD=65 feet)*	

399-3-23 (C6194) Depth (feet below ground surface)	
0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 35	
35 - 45	
45 - 50.5	
50.5 - 52.5	
52.5 - 65 *(TD = 65 feet)*	

399-3-24 (C6199) Depth (feet below ground surface)	
0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 35	
35 - 45	
45 - 54	
54 - 55	
55 - 65 *(TD = 65 feet)*	

399-3-25 (C6200)
Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
20 - 25	
25 - 30	
30 - 35	
35 - 40	
40 - 44.5	
44.5 - 45 *(Rip-up Clast)*	
50 - 57.5	
57.5 - 60	
60 - 65 *(TD = 65 feet)*	

399-3-26 (C6203)

Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 20.5	
20.5 - 22 *(Rip-up Clast)*	
22 - 26	
26 - 35	
35 - 40	
40 - 45	
45 - 50	
50 - 55	
55 - 60	
60 - 66 *(TD = 66 feet)*	

399-3-27 (C6204) Depth (feet below ground surface)	
0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 35	
35 - 45	
45 - 48	
48 - 50.5	
50.5 - 62 *(TD = 62 feet)*	

399-3-28 (C6205)

Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
30 - 35	
35 - 40	
45 - 50	
50 - 55	
56.5 - 61	
61 - 64.5 *(TD = 64.5 feet)*	

399-3-29 (C6206) Depth (feet below ground surface)	
0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 35	
35 - 45	
45 - 52	
52 - 53	
53 - 64 *(TD = 64.5 feet)*	

399-3-30 (C6213)

Depth (feet below ground surface)

0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
30 - 35	
35 - 40	
40 - 45	
45 - 55.5	
55.5 - 57	
57 - 61.5 *(TD = 61.5 feet)*	

399-3-31 (C6214) Depth (feet below ground surface)	
0 - 5	
5 - 10	
10 - 15	
15 - 20	
20 - 25	
25 - 30	
30 - 35	
35 - 40	
40 - 45	
55.5 - 61 *(TD = 63 feet)*	

399-3-32 (C6215) Depth (feet below ground surface)	
0 - 5	
5 - 10	
15 - 20	
25 - 28	
28 - 29 *(Rip-up Clast)*	
29 - 35	
45 - 55	
56 - 58	
58 - 62	
TD = 63 feet	