2014 AX Farm Re-Baseline, 11-01-07, 299-E25-103 (A6539), Log Data Report

Prepared for the U.S. Department of Energy Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy Office of River Protection under Contract DE-AC27-08RV14800



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2014 AX Farm Re-Baseline

11-01-07 299-E25-103 (A6539) <u>Log Data Report</u>

Borehole Information:

Log Date:	2014-09-15	Filename: A6539_HG-NM_2014-09-15		Site:	AX Farm		
Coordinates (HAN)		$\mathbf{D}\mathbf{T}\mathbf{W}^{1}\left(\mathbf{ft}\right)$:		Dry	DTW	Date:	8/19/2014
North	West	Drill Date		TOC ² Elevation	Total	Depth (ft)	Туре
N/A	N/A	1/31/1975		NA		100	Cable Tool

Casing Information:

		Diameter (in.)				
Casing Type	Stickup (ft)	Outer	Inside	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	0		6	0.280	0	100

Borehole Notes:

The purpose of this logging event is to update the 1996 baseline prior to retrieval activities in AX Farm. No moisture data were acquired during initial logging in 1996 but were acquired during the 2014 logging event. A comparison of manmade radionuclide concentrations from the 1996 and 2014 data is provided. The location of the borehole is indicated on the attached Location Map for AX Farm. A summary of other logging data acquired since 1996 is included in the figure entitled "Hanford Single Shell Tank Farms Borehole Geophysics Summary Sheet."

Borehole information and casing data are as reported in the original log data report contained in the *Tank Summary Data Report for Tank AX-101* (DOE 1997). Casing thickness is derived from published values for schedule 40 steel pipe.

Zero reference is the top of casing that lies approximately at general tank farm ground surface level.

Logging Equipment Information:

Logging System:	Gamma 2R (BR)	Туре:	DHMCA ³ SGLS BR 55% HPGe SGLS
Effective Calibration Date:	03/20/14	Serial No.:	45-TP22010A
Calibration Reference:	HGLP-CC-103, Rev. 1	Logging Procedure:	HGLP-MAN-002, Rev. 1

Logging System:	ED	Туре:	NMLS ⁴	
Effective Calibration Date:	05/15/14	Serial No.:	H370603792	
Calibration Reference:	HGLP-CC-104, Rev. 0	Logging Procedure:	HGLP-MAN-002, Rev. 1	

¹ depth to water inside casing

² top of casing

³ Down-hole Multi-Channel Analyzer

⁴ Neutron Moisture Logging System



HGLP-LDR-792, Rev. 0

SGLS Log Run Information:

Log Run	3	4	5	6	7 Repeat
HEIS Number	1018209	1018210	1018211	1018212	1018213
Date	09/10/14	09/11/14	09/11/14	09/15/14	09/15/14
Logging Engineer	Spatz, McClellan	Spatz, McClellan	Spatz, McClellan	Spatz, Felt	Spatz, Felt
Start Depth (ft)	0.0	19.0	56.0	84.0	5.0
Finish Depth (ft)	20.0	57.0	85.0	99.0	15.0
Count Time (sec)	100	100	100	100	100
Live/Real	R	R	R	R	R
Shield (Y/N)	Ν	Ν	Ν	Ν	Ν
MSA Interval (ft)	0.5	0.5	0.5	0.5	0.5
Log Speed (ft/min)	N/A	N/A	N/A	N/A	N/A
Pre-Verification	1018207_B_ 14910	_B_14911	1018210_B_ 14911	_B_ 1496	1018212_B_ 14915
Start File	D_000000	D_001900	D_005601	D_008400	D_000500
Finish File	D_002000	D_005703	D_008500	D_009902	D_001502
Post-Verification	1018209_A_ 14910	1018211_A_ 14911	_A_ 14911	1018214_A_ 14915	1018214_A_ 14915
Depth Error (in.)	0.0	LOW 1/2	0.0	NA	0.0
Comments	None	None	None	None	None

NMLS Log Run Information:

Log Run	1	2		
HEIS Number	1018488	1018489		
Date	07/18/14	07/18/14		
Logging Engineer	Pope	Pope		
Start Depth (ft)	0.2377	45.2409		
Finish Depth (ft)	99.0272	54.9948		
Count Time (sec)	15	15		
Live/Real	R	R		
Shield (Y/N)	Ν	Ν		
MSA Interval (ft)	NA	NA		
Log Speed (ft/min)	1.0	1.0		
Pre-Verification	20140718EDCAB	20140718EDCAB		
Start File	ED0477.LAS	ED0478.LAS		
Finish File	ED0477.LAS	ED0478.LAS		
Post-Verification	20140718EDCAA	20140718EDCAA		
Depth Return Error (in.)	NA	0.0		
Comments	None	None		



Logging Operation Notes:

File names assigned to DHMCA spectra include the borehole ID, the logging system used, the HEIS number, and the depth (BoreholeID_LoggingSystem_HEISNumber_D_000000.chn). SGLS file names above have been shortened to show depth for simplicity (for example, "D_001500" represents the file at 15 ft).

A centralizer was installed on the Gamma 2R (BR) sonde.

The lowest depth achieved was 99 ft where the sonde unweighted.

Pre- and post-survey verification measurements met the acceptance criteria for the established systems.

Analysis Notes:

A casing correction for a 0.280-in. thick casing was applied to the log data.

SGLS spectra were processed in batch mode in APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated in an EXCEL template identified as 20140320_BR_HiDT.xls using an efficiency function and corrections for casing and dead time as determined by annual calibration.

To assure comparability, 1996 data were reprocessed using the same casing correction as the 2014 data. The efficiency function and dead time correction in place in 1996 were applied during reprocessing. For purposes of comparison with the 2014 data, the 1996 baseline data has been decayed to a common date of September 15, 2014.

Since the original baseline data were acquired in 1996, an improved detection system has been deployed. Detector efficiency is increased and spectral energy peaks used for assay are better defined with improved resolution. These improvements can result in occasional additional detections of manmade radionuclides at concentrations near the MDL that were not evident in the baseline data. These additional detections are therefore not necessarily evidence of contaminant migration.

NMLS data are represented in percent volumetric moisture content.

Results and Interpretations:

The manmade radionuclides Cs-137 and Eu-154 were detected in this borehole. Cs-137 was detected from the top of casing to 12.5 ft, and at a few other intermittent depth locations. The maximum concentration of Cs-137 was found to be 12.2 pCi/g at a depth of 1.0 ft. Eu-154 was detected at 4.0 ft at a concentration of 0.4 pCi/g.

Though detected in the baseline investigation in 1996, Co-60 was not detected in 2014. Co-60 values collected in 1996 decayed to 2014 fall below the Co-60 MDL.

A comparison of the 1996 baseline data with the 2014 data indicates no significant changes (Note: The 1996 log data report incorrectly reported the maximum concentration of Cs-137 at 11 pCi/g. Upon inspection of the data the true maximum Cs-137 concentration detected in 1996 was 21.07 pCi/g).

The neutron moisture log primarily responds to moisture present in the surrounding formation. In general, an increase in count rate reflects an increase in moisture content. Moisture content may increase in sediments of relatively high silt or clay content.

A comparison of the 1975 moisture data with the 2014 moisture data indicates the notable decrease in moisture content at ~60 ft is a feature that has remained unchanged over the past 39 years. The cause of this decrease in moisture content is unknown, but is also seen in nearby boreholes 11-02-10, 11-03-05, and 11-04-01.

The manmade, KUT, and moisture repeat plots indicate that the respective systems were working properly.

HGLP-LDR-792, Rev. 0



List of Plots:

Depth Reference is top of casing.

Borehole 11-01-07 Location in AX Tank Farm Hanford Single Shell Tank Farms Borehole Geophysics Summary Sheet Combination Plot-2014 (0-110 ft) Comparison of Manmade Radionuclides (1996, 2014) (0-110 ft) Manmade Repeat Plot (4-16 ft) Repeat Section of Natural Gamma Logs (4-16 ft) Moisture Repeat Section (45-55 ft)

References:

U.S. Department of Energy (DOE). 1997. *Hanford Tank Farms Vadose Zone, Tank Summary Data Report for Tank AX-101*. GJ-HAN-49. Prepared by MACTEC-ERS for the U.S Department of Energy Albuquerque Operations Office, Grand Junction, Colorado.





Hanford Single Shell Tank Farms Borehole Geophysics Summary Sheet

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Borehole Number (Alias): 11-01-07 (299-E25-103) (A6539)

Borehole Information								
Site: AX Far	m, Tank AX-10 ⁻	1						
Coordinates (HAN Plant): North: 41692			West: 47500			Elevation (ft): 680.00		
Coordinates (WA Plane): North: 13619		1.482 East: 575414.394		Elevation (m): 209.029				
Drill Date: 1/31/1975 Type: Cable			Fool Depth (ft): 99.5			Depth Datum: TOC		
Depth/Water (ft): Dry			D/W Date	W Date: 8/19/14 D/W Reference		: Stoller		
Comments: None.								
		C	Casing	Informatio	n			
Туре	Top(ft)	Bottom (ft)	ID (in)	Thick. (in)	Stickup (ft)	Reference		
Steel	0	100	6	0.28	0	Stoller		
		ļļ		Ļ		<u> </u>		
		L	og Run	Informatio	on			
Log Date	System	Detector	Event	Log int. (ft)	Contractor	Comments		
8/21/1996	SGLS	G1A	NA	0-99.5	MACTEC-ERS	Baseline		
10/9/2002	RAS	Large	A	45-85	Stoller	No Change		
7/18/2014	NMLS	ED	NA	0.24-99.03	Stoller			
9/15/2014	SGLS	BR	NA	0-99.0	Stoller	No Change		



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ı 0

10

20

30

40

50

60

70

80

90

100

110

10¹

.

pCi/g





pCi/g

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pCi/g

10⁻¹

10⁰

10-2

10⁻³





