



Borehole **20-04-06**

Log Event **A**

Borehole Information

Farm : <u>B</u>	Tank : <u>B-104</u>	Site Number : <u>299-E33-221</u>
N-Coord : <u>45,187</u>	W-Coord : <u>52,652</u>	TOC Elevation : <u>655.19</u>
Water Level, ft :	Date Drilled : <u>6/30/1973</u>	

Casing Record

Type : <u>Steel-welded</u>	Thickness, in. : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>135</u>	

Borehole Notes:

Borehole 20-04-06 was drilled in June 1973 to a depth of 135 ft and completed with 6-in. casing. Data from the drilling log and Chamness and Merz (1993) were used to provide borehole construction information. These references do not indicate that the borehole casing was perforated or grouted. The casing thickness is presumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. steel tubing.

Equipment Information

Logging System : <u>1B</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>02/1997</u>	Calibration Reference : <u>GJO-HAN-14</u>	Logging Procedure : <u>P-GJPO-1783</u>

Logging Information

Log Run Number : <u>1</u>	Log Run Date : <u>08/28/1997</u>	Logging Engineer: <u>Bob Spatz</u>
Start Depth, ft.: <u>0.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>9.5</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>
Log Run Number : <u>2</u>	Log Run Date : <u>08/29/1997</u>	Logging Engineer: <u>Bob Spatz</u>
Start Depth, ft.: <u>133.5</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>42.5</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>
Log Run Number : <u>3</u>	Log Run Date : <u>09/02/1997</u>	Logging Engineer: <u>Bob Spatz</u>
Start Depth, ft.: <u>43.5</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>8.5</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>



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Log Run Number :	<u>4</u>	Log Run Date :	<u>09/02/1997</u>	Logging Engineer:	<u>Bob Spatz</u>
Start Depth, ft.:	<u>23.0</u>	Counting Time, sec.:	<u>100</u>	L/R :	<u>L</u> Shield : <u>N</u>
Finish Depth, ft. :	<u>3.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Logging Operation Notes:

This borehole was logged by the SGLS in four log runs. Three log runs were required to log the borehole. An additional log run was performed to repeat an interval of the borehole as a quality check. The top of the borehole casing, which is the zero reference for the SGLS, is approximately even with the ground surface. The total logging depth achieved was 133.5 ft.

Analysis Information

Analyst :	<u>E. Larsen</u>		
Data Processing Reference :	<u>MAC-VZCP 1.7.9</u>	Analysis Date :	<u>12/08/1998</u>

Analysis Notes :

The pre-survey and post-survey field verification for each logging run met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from the accepted calibration spectrum that most closely matched the field data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

A casing correction factor for a 0.280-in.-thick steel casing was applied to the concentration data during the analysis process.

Shape factor analysis was applied to the SGLS data and provides insights into the distribution of Cs-137 contamination and into the nature of zones of elevated total count gamma-ray activity not attributable to gamma-emitting radionuclides.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

The interval between 3 and 23 ft was relogged as a quality assurance measure to establish the repeatability of the radionuclide concentration measurements. A separate log plot showing the radionuclide concentrations that were calculated using separate data sets provided by the original and rerun logging runs is included.



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A plot of the shape factor analysis results is also included. The plot is used as an interpretive tool to help determine the radial distribution of man-made contaminants around the borehole.

Results/Interpretations:

The man-made radionuclides Cs-137 and Co-60 were detected around this borehole. The Cs-137 contamination was measured continuously from the ground surface to 7 ft. Several small zones of Cs-137 contamination were detected between 9 and 20.5 ft. A single occurrence of Co-60 contamination was detected at a depth of 128.5 ft.

Almost all of the U-238 concentration values are absent from the ground surface to 4 ft. The K-40 concentrations increase from 56 to 59.5 ft and remain elevated to the bottom of the logged interval. The U-238 and Th-232 concentrations increase slightly between about 57 and 60 ft.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank B-104.