



Borehole **20-01-06**

Log Event **A**

**Borehole Information**

Farm : <u>B</u>	Tank : <u>B-101</u>	Site Number : <u>299-E33-274</u>
N-Coord : <u>45,197</u>	W-Coord : <u>52,540</u>	TOC Elevation : <u>654.50</u>
Water Level, ft :	Date Drilled : <u>1/31/1976</u>	

**Casing Record**

Type : <u>Steel-welded</u>	Thickness : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>61</u>	

**Borehole Notes:**

A driller's log was not available for this borehole. Information in Chamness and Merz (1993) locates this borehole in the BX Tank Farm. According to Welty (1988), this borehole was constructed in 1975 to a depth of just 61 ft. The SGLS logging engineer noted a 6-in. casing at the ground surface.

It is assumed that the borehole was constructed with a 6-in. casing. The casing thickness is assumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. pipe.

The top of the casing is the zero reference for the log. The casing lip is approximately even with the ground surface.

**Equipment Information**

Logging System : <u>2</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>04/1997</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>08/25/1997</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>59.5</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>45.0</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>08/26/1997</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>46.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>0.0</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>08/26/1997</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>40.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>25.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>



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**Logging Operation Notes:**

This borehole was logged in three log runs. Two 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 total logging depth achieved by the SGLS was 59.5 ft.

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**Analysis Information**

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Analyst : S.D. Barry

Data Processing Reference : MAC-VZCP 1.7.9

Analysis Date : 04/09/1998

**Analysis Notes :**

The post-field verification for log runs two and three did not meet the acceptance criteria established for peak shape and system efficiency. The rest of the pre- and post-survey field verification spectra met the established criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from these spectra were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

Casing correction factors for a 0.280-in.-thick steel casing (based on a 6-in., schedule-40 pipe) were applied to the entire logged interval during the analysis process.

Shape factor analysis was applied to the SGLS data and provided insights into the distribution of Cs-137 and Co-60 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.

A separate plot is included showing the repeatability of the radionuclide concentration measurements that were calculated from the data sets provided by the original and rerun logging runs.

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

A time-sequence plot of the historical gross gamma log data from 1975 to 1990 is presented with the SGLS log plots. Plots of the observed decay of gamma activity at 50 and 51 ft are also included.



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**Results/Interpretations:**

The man-made radionuclides detected around this borehole were Cs-137, Co-60, and Eu-154. Cs-137 contamination was detected nearly continuously from the ground surface to 7.5 ft, from 11.5 to 15.5 ft, from 27.5 to 36 ft, 44 to 47 ft, and 52 to 59.5 ft (the bottom of the logged interval). Cs-137 was also detected just above the MDL at 18.5, 19, 23, and 38 ft. Co-60 was detected nearly continuously from 50 to 59.5 ft. Eu-154 was measured nearly continuously from 33 to 35 ft.

The K-40 concentrations increase at a depth of approximately 46 ft.

The interval from 25 to 40 ft was relogged as a quality assurance measure. The comparisons between the original log run and the rerun log were generally within the two-sigma uncertainty, indicating the excellent repeatability of the logging measurement.

An analysis of the shape factors associated with applicable segments of the spectra was performed. Interpretations of the shape factors CsSF1, CoSF1, and SF2 are contained in the B-101 Tank Summary Data Report for tank B-101.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank B-101.