



Borehole **21-10-03**

Log Event **A**

**Borehole Information**

Farm : <u>BX</u>	Tank : <u>BX-110</u>	Site Number : <u>299-E33-223</u>
N-Coord : <u>45,400</u>	W-Coord : <u>53,505</u>	TOC Elevation : <u>656.80</u>
Water Level, ft :	Date Drilled : <u>9/30/1973</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>100</u>	

**Borehole Notes:**

Borehole 21-10-03 was drilled in September 1973 to a depth of 100 ft and completed with 6-in. casing. The casing thickness is presumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. steel tubing. A driller's log was not available for this borehole, so data from Chamness and Merz (1993) were used to provide construction information. Chamness and Merz (1993) do not indicate that the borehole was grouted or perforated. The top of the casing, which is the zero reference for the SGLS, is about 0.5 ft below 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-13</u>	Logging Procedure : <u>P-GJPO-1783</u>

**Log Run Information**

Log Run Number : <u>1</u>	Log Run Date : <u>08/05/1997</u>	Logging Engineer: <u>Bob Spatz</u>
Start Depth, ft.: <u>0.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>R</u> Shield : <u>N</u>
Finish Depth, ft. : <u>29.5</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>08/06/1997</u>	Logging Engineer: <u>Bob Spatz</u>
Start Depth, ft.: <u>28.5</u>	Counting Time, sec.: <u>100</u>	L/R : <u>R</u> Shield : <u>N</u>
Finish Depth, ft. : <u>41.0</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>08/06/1997</u>	Logging Engineer: <u>Bob Spatz</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>45.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>



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Log Event A

Log Run Number :	<u>4</u>	Log Run Date :	<u>08/06/1997</u>	Logging Engineer:	<u>Bob Spatz</u>
Start Depth, ft.:	<u>99.0</u>	Counting Time, sec.:	<u>100</u>	L/R :	<u>L</u> Shield : <u>N</u>
Finish Depth, ft. :	<u>84.5</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Log Run Number :	<u>5</u>	Log Run Date :	<u>08/06/1997</u>	Logging Engineer:	<u>Bob Spatz</u>
Start Depth, ft.:	<u>76.5</u>	Counting Time, sec.:	<u>100</u>	L/R :	<u>L</u> Shield : <u>N</u>
Finish Depth, ft. :	<u>53.5</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Log Run Number :	<u>6</u>	Log Run Date :	<u>08/07/1997</u>	Logging Engineer:	<u>Bob Spatz</u>
Start Depth, ft.:	<u>85.0</u>	Counting Time, sec.:	<u>100</u>	L/R :	<u>R</u> Shield : <u>N</u>
Finish Depth, ft. :	<u>76.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Log Run Number :	<u>7</u>	Log Run Date :	<u>08/07/1997</u>	Logging Engineer:	<u>Bob Spatz</u>
Start Depth, ft.:	<u>54.5</u>	Counting Time, sec.:	<u>100</u>	L/R :	<u>R</u> Shield : <u>N</u>
Finish Depth, ft. :	<u>44.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

**Analysis Information**

Analyst :	<u>D.L. Parker</u>		
Data Processing Reference :	<u>MAC-VZCP 1.7.9</u>	Analysis Date :	<u>12/01/1997</u>

**Analysis Notes :**

This borehole was logged by the SGLS in seven log runs. Four of the log runs were run in real time because of high activity in certain regions of the borehole. The pre- and post-survey field verification spectra met the acceptance criteria established for the peak shape and detector efficiency, confirming that the SGLS was operating within specifications. 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 were applied during analysis.

The man-made radionuclides detected around this borehole were Cs-137 and Co-60. The presence of Cs-137 was measured almost continuously from the ground surface to the bottom of the logged interval, except in the regions of high dead time. Regions of excessive dead time occurred from 7 to 39 ft, 45.5 to 51.5 ft, and 81 to 82.5 ft. Co-60 contamination was detected continuously from 40.5 to 44.5 ft and intermittently from 57 to 70 ft. The presence of Co-60 could not be determined in the zones of excessive dead time.

An analysis of the shape factors associated with applicable segments of the spectra was performed. The shape factors provide insights into the distribution of the Cs-137 contamination and into the nature of zones of elevated total count gamma-ray activity not attributable to gamma-emitting radionuclides.



Borehole

21-10-03

Log Event A

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Reports for tanks BX-107 and BX-110.

**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 plot of the spectrum shape factors is included. The plot is used as an interpretive tool to help determine the radial distribution of man-made contaminants around the borehole.

A plot of historical gross gamma data from 1980 to 1994 is also included. Graphs of the rate of decay of gamma activity at 45 and 80 ft are also included for the Tank Summary Data Report for tank BX-110.