



Borehole

51-04-05

Log Event A

Borehole Information

Farm : <u>TX</u>	Tank : <u>TX-104</u>	Site Number : <u>299-W15-130</u>
N-Coord : <u>41,616</u>	W-Coord : <u>76,022</u>	TOC Elevation : <u>670.09</u>
Water Level, ft :	Date Drilled : <u>11/12/1971</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>100</u>	

Borehole Notes:

This borehole was drilled in November 1971 and completed to a depth of 100 ft. The 6-in. casing in the borehole is assumed to be schedule-40 steel tubing with a wall thickness of 0.280 in. The top of the borehole casing is assumed to be even with the ground surface. The SGLS was able to reach a depth of 97.5 ft. There is no mention in the drilling log of the casing being perforated or grout in the borehole.

Equipment Information

Logging System : <u>1</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>04/1996</u>	Calibration Reference : <u>GJPO-HAN-5</u>	Logging Procedure : <u>P-GJPO-1783</u>

Log Run Information

Log Run Number : <u>1</u>	Log Run Date : <u>4/10/1996</u>	Logging Engineer: <u>Mike Widdop</u>
Start Depth, ft.: <u>97.5</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>56.5</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>4/11/1996</u>	Logging Engineer: <u>Mike Widdop</u>
Start Depth, ft.: <u>57.5</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>4/11/1996</u>	Logging Engineer: <u>Mike Widdop</u>
Start Depth, ft.: <u>80.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>65.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>



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Analysis Information

Analyst : E.P. Baumgartner

Data Processing Reference : P-GJPO-1787

Analysis Date : 8/11/1996

Analysis Notes :

Three logging runs were conducted in this borehole with the SGLS. Two runs were required to complete the log of this borehole; an extra logging run was conducted as a quality assurance check. The field verification spectra recorded immediately before and after the survey operation met the acceptance criteria established for the peak shape and system efficiency, confirming the SGLS system was operating within specifications. The energy calibration and peak-shape calibration from these verification spectra were used to establish the 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.

A depth overlap, where data were collected by separate logging runs at the same depth, occurred in this borehole between depths of 56.5 and 57.5 ft. In addition, the log of the depth interval between 65 and 80 ft was repeated. The concentrations of the man-made (Co-60) and the natural radionuclides (K-40, U-238, Th-232) were calculated where they occur in both the original and repeated log segments. The calculated concentrations using the two separate data sets were within the statistical uncertainty of the measurements, indicating very good repeatability of the radionuclide concentration measurements.

Comparison of the radionuclide concentrations in the rerun interval, calculated using data from the original and repeat logging runs, indicated that during the original logging run the sensor was 1.5 ft lower than the indicated depth; measured concentrations using data from the original run had to be lowered by 1.5 ft in order to match the concentrations measured during the rerun. The logging engineer reported that the depth indicator was working properly during the rerun, but that the reported depths were high during the original run. However, the reported depths for the original run were only 1/2 ft too high, not the 1 1/2 ft-offset required to properly match the rerun and original comparison plot. Possible causes of this depth discrepancy and recommendations for system monitoring and procedure scrutiny are discussed in Nonconformance Report N-96-42 to be issued in October 1996.

Man-made radionuclides Cs-137, Co-60, and processed U-238 and U-235 were detected in significant concentrations at different locations in the borehole. Cs-137 was detected continuously from the ground surface to a depth of 22.5 ft. The highest measured Cs-137 concentration within this zone was about 8 pCi/g. Cs-137 was not detected below a depth of 22.5 ft, except at the very bottom of the borehole. Co-60 was detected continuously between depths of 60 and 62.5 ft and from 67.5 to 78.5 ft. The maximum Co-60 concentration value was 14.6 pCi/g at a depth of 70.5 ft.

Processed U-235 was detected from 50.5 to 51.5 ft with concentration values less than 4 pCi/g. Processed U-238 was detected continuously from 49.5 to 51.5 ft with a maximum concentration value of about 38 pCi/g and at 46 ft with a concentration value of 19 pCi/g.

The K-40 log has a steep increase at 50 ft.

Details regarding the interpretation of the data for this borehole are presented in the Tank Summary Data Report for tank TX-104.



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Log Plot Notes:

Separate log plots show the man-made (e.g., Cs-137) and the naturally occurring radionuclides (e.g., K-40, U-238, and Th-232). The natural radionuclides can be used for lithologic interpretations. The headings of these plots identify the energy peak for the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainty for the calculated concentrations at the 95-percent confidence level. The minimum detection level (MDL) is shown by open circles on the plots. 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 radionuclides, the naturally occurring radionuclides, the total gamma count derived from the SGLS and a Tank Farm gross gamma log. The gross gamma plot displays the most recent available digital data, with no attempt to adjust the depths to coincide with the SGLS data.

A separate plot is included which compares the measured concentrations of Co-60 and the naturally occurring radionuclides over the rerun or repeated log interval. The radionuclide concentrations shown were calculated using the separate data sets provided by the original and rerun logging runs.