RUST GEOTECH INC.

Spectral Gamma-Ray Borehole
Log Data Report

Borehole 52-04-10

Log Event A

Borehole Information

Farm : TY	**Tank :** TY-104	**Site Number :** 299-W10-82
N-Coord : 42,549	**W-Coord :** 75,997	**TOC Elevation :** 672.48
Water Level, ft :	**Date Drilled :** 8/31/1952	

Casing Record

Type : Steel-welded	Thickness : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 150	

Borehole Notes:
Drilling of this borehole began in June 1952. The borehole was started with a 20-ft length of surface casing of unknown diameter and was completed in August 1952 to a depth of 150 ft with 6-in.-nominal-diameter carbon-steel casing. Drilling operations were interrupted by mechanical failures. The casing was perforated between depths of 40 and 100 ft. There is no indication that grout was installed in any interval of the borehole.

The casing thickness is presumed to be 0.280 in., on the basis of published thickness for schedule-40, 6-in. steel tubing. The top of the casing is the starting depth for the logs. The elevation of the casing lip (672.5 ft above mean sea level) is about 2.5 ft higher than other casing collars in the area. Appropriate adjustments must be made when relating features on logs of this borehole to similar features on logs of other boreholes in the area.

Equipment Information

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

Log Run Information

Log Run Number : 1	**Log Run Date :** 5/8/1996	**Logging Engineer:** Mike Widdop
Start Depth, ft.: 141.5	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 42.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Log Run Number : 2	**Log Run Date :** 5/9/1996	**Logging Engineer:** Mike Widdop
Start Depth, ft.: 43.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 0.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

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Analysis Information

Analyst : H.D. Mac Lean

Data Processing Reference : P-GJPO-1787 Analysis Date : 2/7/1997

Analysis Notes :

This borehole was logged in two logging runs. The field verification spectra acquired during the pre-survey system check conducted immediately before both of the logging runs failed to meet the acceptance criteria established for the peak shape and system efficiency. A nonconformance report issued in August 1996 (N-96-05) identified the cause of this failure as a power supply malfunction that resulted in a low detector bias voltage being supplied to the logging tool. This malfunction occurred in the mornings during start-up of the cold system because an extra long system warm-up time was required to bring the system to its optimmal operating condition. The nonconformance report also documents that radionuclide concentrations calculated from data collected in the first 2 hours of logging operation could be systematically understated by about 10 percent. Data acquired during initial portion of the second logging run (the upper 30 ft of the borehole) may show a slight discrepancy in repeatability if the borehole is re-logged in the future.

The post-survey field verification spectra for both logging runs passed the acceptance criteria for the peak shape and system efficiency, indicating that the logging system was operating within specification after an extended warm-up period. The energy calibration and peak-shape calibration from the field verification spectra that most closely matched the spectra obtained during the logging run established the channel-to-energy parameters used in processing the spectra acquired during logging. Because of the detector voltage stability problem, the system drifted slightly during the logging operation. While processing logging data, it was necessary to adjust the energy calibration for this drift to maintain proper peak identification.

Casing correction factors for a 0.280-in.-thick steel casing were applied during analysis.

A log overlap, where radionuclide assays were calculated using separate data sets provided by the separate overlapping logging runs, occurred between depths of 43 and 42 ft. The KUT concentrations calculated using the separate data sets were within two standard deviations of the measurements (the two-sigma or 95-percent confidence interval), indicating that the measurements of the gamma-ray energies used to calculate the radionuclide concentrations were repeatable within acceptable limits.

The only man-made radionuclide detected in this borehole was Cs-137. The contaminant was detected from the ground surface to a depth of 1 ft, at 67 ft, from 87 to 87.5 ft, at 99 ft, and at 29.5 ft. The maximum concentration of Cs-137 was about 1 pCi/g at a depth of 1 ft. The measured concentration of all occurrences of Cs-137 below the 1-ft depth were about 0.2 pCi/g, just above the MDL.

The K-40 concentration values increase from a background of about 12 pCi/g above the 50-ft depth to about 18 pCi/g below this depth. There is a slight high in the measured U-238 concentration between depths of 46 and 50 ft. The measured Th-232 and U-238 concentrations increase perceptibly below a depth of about 92 ft. There is a pronounced low in the concentrations of all of the naturally occurring radionuclides between depths of 100 and 115 ft. The U-238 concentrations are anomalously high in the interval from 104 to 106 ft. There is a perceptible decrease in the concentration of all the measured naturally occurring radionuclides below a depth of about 130 ft.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data

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Report for tank TY-104.

Log Plot Notes:

Separate log plots show the concentrations of the man-made radionuclide (Cs-137) and the naturally occurring radionuclides (KUT). 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, in addition to 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.