MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

Spectral Gamma-Ray Borehole Log Data Report

Log Event A

Borehole 20-00-01

Borehole Information

Farm : B	**Tank :** B	**Site Number :** 299-E33-53
N-Coord : 45,508	**W-Coord :** 52,615	**TOC Elevation :** 646.40
Water Level, ft :	**Date Drilled :** 12/31/1944	

Casing Record

Type :	Steel-welded	Thickness, in. :	0.365	ID, in. :	10
Top Depth, ft. :	0	Bottom Depth, ft. :	150		
Type :	Steel-welded	Thickness, in. :	0.406	ID, in. :	12
Top Depth, ft. :	0	Bottom Depth, ft. :	50		

Cement Bottom, ft. : 151 **Cement Top, ft. :** 150

Borehole Notes:

Borehole 20-00-01 was drilled in December 1944 to a depth of 151 ft. According to available records, this borehole was constructed with a 10-in. casing placed inside a 12-in. casing from the ground surface to 50 ft and only a 10-in. casing was installed from 50 to 151 ft. The 10-in. casing was perforated from 50 to 151 ft at an interval of six perforations per foot. A plug consisting of half a sack of grout was placed at the bottom of the 10-in. casing. Data from the drilling log and Chamness and Merz (1993) were used to provide borehole construction information. The casing thickness is presumed to be 0.365 in. for the 10-in. casing and 0.406 for the 12-in. casing on the basis of the published thicknesses for schedule-40, 10-in. and 12-in. steel tubing, respectively. Therefore, the combined thickness of the double-cased interval from 0 to 50 ft is 0.771 in. A casing correction factor for 0-65 in. casing was used during data reduction, which will result in slightly lower calculated concentrations of the radionuclides. A correction for 0.365-in. casing was used for the interval from 50 ft to the bottom of the borehole.

The total depth of this borehole was determined to be 100.5 ft using a measuring tape. The specific reason the depth of the measuring tape did not reach the depth of the recorded drilling depth is unknown. Sediments may have entered the borehole casing through perforations and caused obstruction, or the casing may have collapsed at about 100 ft.

Equipment Information

Logging System : 2B	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 11/1997	**Calibration Reference :** GJO-HAN-20	**Logging Procedure :** MAC-VZCP 1.7.10-1

Logging Information

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Log Run Number :	1	**Log Run Date :**	11/19/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	100.0	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	23.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Log Run Number :	2	**Log Run Date :**	11/20/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	0.0	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	24.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Logging Operation Notes:

This borehole was logged by the SGLS in two log runs. The top of the borehole casing, which is the zero reference for the SGLS, is even with the ground surface. However, this borehole is located at the bottom of a slope on the north side of the tank farm and is approximately 5 ft lower in elevation than the rest of the tank farm. The total logging depth achieved was 100.0 ft.

Analysis Information

Analyst : P.D. Henwood

Data Processing Reference : MAC-VZCP 1.7.9 Analysis Date : 02/22/1999

Analysis Notes :

The pre-survey and post-survey field verification for the 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 0.65-in.-thick steel casing was applied to the data derived from the double-cased interval from 0 to 50 ft to determine the radionuclide concentration data during the analysis process; a 0.365-in. casing thickness was used for the interval from 50 to 100 ft.

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.

Results/Interpretations:

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The man-made radionuclide Cs-137 was the only contaminant detected around this borehole. The Cs-137 contamination was detected almost continuously throughout the borehole at varying concentrations that were generally less than 10 pCi/g. Concentrations exceeding 10 pCi/g were measured at depths of about 1 and 58 ft with maximum concentrations of 72 and 57 pCi/g, respectively. Shape factor analysis is not useful for the double-cased interval from 0 to 50 ft in depth and has questionable validity in the perforated interval from 50 to 100 ft. However, it is postulated that the contamination is localized to the casing throughout the borehole and is probably the result of contamination that has migrated downward along the outside of the casing and has adsorbed to thin layers of finer-grained sediments.

The K-40 concentrations increase at about 37 ft, representing the transition from the backfill material to the undisturbed Hanford formation sediments. The elevated U-238 concentrations above 24 ft are probably the result of different log runs on different days where the concentrations of radon have increased.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank B-106.