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MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

Spectral Gamma-Ray Borehole
Log Data Report

Log Event A

Borehole 11-03-07

Borehole Information

Farm : AX	**Tank :** AX-103	**Site Number :** 299-E25-115
N-Coord : 41,691	**W-Coord :** 47,589	**TOC Elevation :** 683.80
Water Level, ft :	**Date Drilled :** 2/28/1975	

Casing Record

Type : Steel-welded	Thickness : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 100	

Borehole Notes:

Equipment Information

Logging System : 2	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 05/1996	**Calibration Reference :** GJPO-HAN-5	**Logging Procedure :** P-GJPO-1783

Log Run Information

Log Run Number : 1	**Log Run Date :** 09/17/1996	**Logging Engineer:** Bob Spatz
Start Depth, ft.: 103.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 26.5	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Log Run Number : 2	**Log Run Date :** 09/18/1996	**Logging Engineer:** Bob Spatz
Start Depth, ft.: 27.5	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 2.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

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Analysis Information

Analyst : E. Larsen

Data Processing Reference : P-GJPO-1787 Analysis Date : 11/27/1996

Analysis Notes :

This borehole was logged in two log runs. The pre- and post-survey field verification spectra met the acceptance criteria established for the peak shape and system efficiency, confirming the SGLS 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.

The man-made radionuclides Cs-137, Co-60, and Eu-154 were identified in this borehole. The presence of Cs-137 was noted continuously from the ground surface (approximately 2 ft below the top of the borehole casing) to a depth of 30 ft. Detectable quantities (less than 1 pCi/g) were also detected intermittently between 33.5 and 40.5 ft. The zones of continuous and intermittent Cs-137 contamination were detected within back-fill material (consisting of medium to coarse sand) that overlies and surrounds the tank. The maximum Cs-137 concentration (about 100 pCi/g) was detected within the upper 10 ft of the borehole.

Concentrations of both Co-60 and Eu-154 were detected continuously between 5 and 8 ft. The highest measured concentrations within this zone were 2 pCi/g of Co-60 at 6 ft and 17 pCi/g of Eu-154 at 6.5 ft.

The presence of Co-60 was indicated by the 1333-keV spectral peak. The presence of Eu-154 was indicated by the 1274-keV spectral peak.

From the top of the berm (2 ft below the top of the borehole casing) to 9 ft, it was not possible to identify most of the 609-keV peaks used to determine the U-238 concentrations. This occurred because high gamma-ray activity associated with the nearby Cs-137 peak (661 keV) created an elevated Compton continuum extending to the 609-keV region, causing the MDL to exceed the measured U-238 concentration.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank AX-103.

Log Plot Notes:

Separate log plots show the man-made radionuclide (Cs-137, Co-60, and Eu-154) 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 of a radionuclide, which 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

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with the SGLS data.

A plot of representative historical gross gamma-ray logs acquired between February 1975 and June 1994 is included. These historical gamma-ray logs can be used to identify the approximate time period in which anomalous gamma-ray acitivity was recognized in the borehole and the logs help determine the approximate rate of decay of individual radionuclides.