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MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

Spectral Gamma-Ray Borehole
Log Data Report

Log Event A

Borehole 11-01-10

Borehole Information

Farm : AX	**Tank :** AX-101	**Site Number :** 299-E25-131
N-Coord : 41,763	**W-Coord :** 47,511	**TOC Elevation :** 680.00
Water Level, ft :	**Date Drilled :** 1978	

Casing Record

Type : Steel-welded	Thickness : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 73	

Borehole Notes:
This borehole was drilled in 1978. It was driven to 73 ft with 6-in. casing. The casing thickness is presumed to be 0.280 in., on the basis of the published thickness of schedule-40, carbon-steel pipe. The zero reference is the top of the borehole pipe, which is even with the ground surface.

Survey data for this borehole are unavailable. The coordinates and TOC elevation are from DOE/RL-92-04, Rev. 0, "PUREX Aggregate Area Management Study." The location was scaled from drawing H-2-3695. Therefore, the location and elevation of the borehole are only approximately known.

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 :** 08/27/1996	**Logging Engineer:** Alan Pearson
Start Depth, ft.: 74.5	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 16.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Log Run Number : 2	**Log Run Date :** 08/28/1996	**Logging Engineer:** Alan Pearson
Start Depth, ft.: 17.0	**Counting Time, sec.:** 100	**L/R :** R **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 : E. Larsen

Data Processing Reference : P-GJPO-1787 Analysis Date : 10/31/1996

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 that 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. High concentrations of Cs-137 were detected continuously within the the upper 17 ft of the borehole, at relatively lower concentrations from 17.5 to 32.5 ft, and lower intermittent concentrations from 32.5 to 72.5 ft. A zone of extremely high gamma-ray activity that saturated the detector was detected between 0.5 and 3.5 ft; consequently, reliable radiometric assays were not possible in this interval. The Co-60 and Eu-154 contaminants were detected intermittently between the ground surface and 15.5 ft.

The maximum concentration of Cs-137 detected in the near-surface continuous zone was about 4,000 pCi/g. Concentrations of Cs-137 were generally less than 1 pCi/g in the deeper intermittent zone. Co-60 contamination was encountered between 4 and 6.5 ft at concentrations that ranged from <0.1 to 3.5 pCi/g. Eu-154 was encountered between 4 and 15.5 ft at concentrations that ranged from 50 to 330 pCi/g.

The presence of Co-60 was indicated by the 1333-keV spectral peak. The presence of Eu-154 was indicated by the 123-keV spectral peak.

Between the ground surface and about 17 ft, it was not possible to identify any of the 609-keV peaks and only some of the 1460- and 2614-keV peaks used to determine the U-238, K-40, and Th-232 concentrations, respectively. Between 1 and 3 ft, the extremely high gamma-ray activity saturated the detector, making it impossible to detect gamma-ray energies associated with individual radionuclides. Between 3 and 17 ft, high gamma-ray activity associated with the nearby Cs-137 peak (662 keV) created an elevated Compton continuum near the 609-, 1460-, and 2614-keV peaks that caused the MDL to exceed the measurable radionuclide concentrations.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank AX-101.

Log Plot Notes:

Separate log plots show the man-made radionuclides (Cs-137, Co-60, Sb-125, Eu-152, 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

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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.