Log Event A

Borehole # 50-06-08

Borehole Information

Farm :	T	**Tank :**	T-106	**Site Number :**	299-W10-109
N-Coord :	43,514	**W-Coord :**	75,869	**TOC Elevation :**	671.10
Water Level, ft :	111.7	**Date Drilled :**	7/31/1973		

Casing Record

Type :	Steel-welded	Thickness, in. :	0.237	ID, in. :	4
Top Depth, ft. :	0	Bottom Depth, ft. :	123		
Type :	Steel-welded	Thickness, in. :	0.280	ID, in. :	6
Top Depth, ft. :	0	Bottom Depth, ft. :	123		

Cement Bottom, ft. : 123 **Cement Top, ft. :** 0

Borehole Notes:

Borehole 50-06-08 was drilled in July 1973 to a depth of 92 ft with 6-in. casing. Data from the drilling log and Chamness and Merz (1993) were used to provide borehole construction information. In March 1977, the borehole was deepened and the 6-in. casing was extended to a depth of 123 ft. The 6-in. casing was perforated from 0 to 20 ft and 82 to 123 ft. A 4-in. casing liner with a metal cap welded on the bottom was positioned inside the 6-in. casing. Although no information concerning grouting was provided in the drilling log or Chamness and Merz (1993), it is assumed the entire annulus between the 4-in. and 6-in. casings was filled with grout because annular grouting was part of the procedure used during the 1977 campaign to deepen selected T Tank Farm boreholes. The thicknesses of the 4-in. and 6-in. casings are presumed to be 0.237 in. and 0.280 in., respectively, on the basis of the published thickness for schedule-40, 4-in. and 6-in. steel tubing.

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

Log Run Number :	1	**Log Run Date :**	02/10/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	0.0	**Counting Time, sec.:**	200	**L/R :** L **Shield :**	N
Finish Depth, ft. :	5.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Log Run Number :	2	**Log Run Date :**	02/11/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	4.0	**Counting Time, sec.:**	200	**L/R :** L **Shield :**	N
Finish Depth, ft. :	33.5	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Borehole 50-06-08

Log Event A

Log Run Number :	3	**Log Run Date :**	02/11/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	32.5	**Counting Time, sec.:**	200	**L/R :** R	**Shield :** N
Finish Depth, ft. :	43.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a
Log Run Number :	4	**Log Run Date :**	02/11/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	42.0	**Counting Time, sec.:**	200	**L/R :** L	**Shield :** N
Finish Depth, ft. :	57.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a
Log Run Number :	5	**Log Run Date :**	02/12/1998	**Logging Engineer:**	Bob Spatz
Start Depth, ft.:	120.0	**Counting Time, sec.:**	200	**L/R :** L	**Shield :** N
Finish Depth, ft. :	74.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a
Log Run Number :	6	**Log Run Date :**	02/13/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	75.0	**Counting Time, sec.:**	200	**L/R :** L	**Shield :** N
Finish Depth, ft. :	59.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a
Log Run Number :	7	**Log Run Date :**	02/13/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	60.0	**Counting Time, sec.:**	200	**L/R :** R	**Shield :** N
Finish Depth, ft. :	56.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Logging Operation Notes:

This borehole was logged by the SGLS in seven log runs using a 200-s counting time. The top of the borehole casing, which is the zero reference for the SGLS, is approximately flush with the ground surface. The total logging depth achieved was 120.0 ft.

Excessive dead time was encountered from 34 to 42 ft and 56 to 59.5 ft. As a result, log runs three and seven were logged in real time from 32.5 to 43 ft and 56 to 60 ft, respectively. The remainder of the borehole was logged in live time.

Analysis Information

Analyst : E. Larsen

Data Processing Reference : MAC-VZCP 1.7.9 Analysis Date : 07/06/1998

Analysis Notes :

The pre-survey and post-survey field verification for each 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

Borehole 50-06-08

Log Event A

channel-to-energy parameters used in processing the spectra acquired during the logging operation.

This borehole was completed with 4-in.- and 6-in.-diameter casings along the entire logged interval. A casing correction factor for a 0.50-in.-thick steel casing was applied to the concentration data because it most closely matched the 0.517-in. total combined thickness of the 4-in. and 6-in. casings. The entire annulus between the 4-in. and 6-in. casings is most likely filled with grout, making calculation of accurate radionuclide concentrations impossible. However, man-made and natural radionuclides were identified and apparent concentrations are reported.

Approximately 8 ft of water has collected inside the bottom of this borehole. The appropriate water correction factor was not available, so no compensation was applied to the water-filled interval. This resulted in lower reported man-made and natural radionuclide concentration values between 112 and 120 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 estimated 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.

A time-sequence plot of the historical gross gamma log data from 1975 to 1994 is presented with the SGLS log plots. A plot that compares the decay rate of the historical gross gamma data with the calculated decay curves for specific radionuclides is also included.

Results/Interpretations:

The radionuclide concentrations identified in this section are reported as only apparent concentrations and are underestimated. Detector saturation occurred from 34.5 to 40.5 ft. As a result, no usable spectral data were collected along this region of the borehole.

The man-made radionuclides Cs-137, Co-60, Eu-154, Eu-152, and Sn-126 were detected by the SGLS. The Cs-137 contamination was measured continuously from the ground surface to 7.5 ft, 31.5 to 34 ft, and 41 ft to the bottom of the logged interval (120 ft). A few isolated occurrences of Cs-137 were detected between 10 and 23 ft. The Co-60 contamination was measured continuously from 41 ft to the bottom of the logged interval. The Eu-154 contamination was detected nearly continuously from 41 to 90.5 ft. Small zones of continuous Eu-154 were detected from 33 to 33.5 ft and from 93 ft to the bottom of the logged interval. The Eu-152 contamination was measured continuously from 41.5 to 43.5 ft, 45 to 55 ft, at 57 ft, nearly continuously from 61 to 76.5 ft, and 79 to 83.5 ft. A small zone of Sn-126 contamination was detected from 49 to 49.5 ft.

All of the K-40 and Th-232 concentration values are absent from 34 to 41.5 ft. The K-40 concentrations are absent from 49 to 49.5 ft and 57.5 to 59 ft. The Th-232 concentrations are absent from 48.5 to 49.5 ft and 58 to 58.5 ft. All of the U-238 concentrations are absent from 33.5 to 42.5 ft and 48 to 52 ft. Most of the U-238 concentration values are absent between 55 and 86 ft.

Log Event A

Borehole 50-06-08

Increased Th-232 concentrations occur from 83 to 91 ft. Sharply decreased K-40 and Th-232 concentration values occur from 91 to 96 ft and 100 to 103 ft. A sharp peak in the U-238 concentrations occurs from 101 to 103 ft. The K-40 and Th-232 concentration values increase at about 106 ft and generally remain elevated to the bottom of the logged interval.

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