12/6 94

ABSTRACT

Determination of Toxic Metal Concentrations in TA-50 Wastewater Treatment Sludge

Juan C. Corpion
Chemical and Mixed Waste Science Group (CST-5)
Los Alamos National Laboratory, Los Alamos, New Mexico

Beginning in 1987, partly as a result of the determination by the U.S. Environmental Protection Agency that mixed waste was subject to regulatory authority under the Resource Conservation and Recovery Act (RCRA), the Los Alamos National Laboratory (LANL) began collecting samples of filter press sludge generated from the low-level wastewater treatment facility (LLWTF) at Technical Area 50, Building 1. The LLWTF treats radioactively-contaminated wastewater from operations throughout LANL. The facility employs a conventional process that chemically precipitates metals dissolved in wastewater. The purpose of the process is to generate a liquid effluent that has been significantly reduced in total dissolved solids including radioactive and nonradioactive metals. This effluent is subject to a National Pollution Discharge Elimination System permit under the Clean Water Act and discharges to Mortandad Canyon.

A lesser by-product of this process is the generation of filter press sludge which consists of concentrated radioactive and nonradioactive metals. The concentration factor of the LLWTF is about 1,000:1 to 10,000:1. Therefore, the presence of toxic metals potentially regulated by RCRA as characteristic hazardous waste in LLWTF filter press sludge is roughly 1,000 to 10,000 times greater than the amount of toxic metals introduced into the facility.

LLWTF filter press sludge is accumulated in 2 to 6 week intervals and consists of a mixture of concentrated radioactive and nonradioactive metals in a ferric sulfate matrix. This waste is placed into 55-gallon Department of Transportation approved steel drums lined with polyethylene liners and capped with a few inches of Portland cement.

Each batch of LLWTF filter press sludge has been analyzed for toxic metals prior to capping with Portland cement since 1987. Analyses from 1987 through 1990 were performed using total metal extractions. From 1991 to present, the Toxicity Characteristic Leaching Procedure (TCLP) has been used. The difference between a total metal extraction and TCLP is a 20:1 dilution factor incorporated into the TCLP when analyzing for solid state materials such as LLWTF filter press sludge. In addition, data from 1987 through 1990 will show values which are higher than those using the TCLP, because the methodology for total metals analysis leaches all available metals rather than

TR

removing only those metals that are mobile in the existent media. The total metals analysis actually represents a more conservative analytical methodology that the TCLP because LANL did not take credit for the binding capacity of the media. Appendix II of 40 CFR §261, which discusses the scope and application of the TCLP, explicitly contains the validity of LANL's analytical method.

A review of analytical data from samples of LLWTF filter press sludge collected during the 1990s shows that concentrations of the eight toxicity characteristic metals, arsenic (As), barium (Ba), cadmium (Cd), chromium (Cr), lead (Pb), mercury (Hg), selenium (Se), and silver (Ag), have never exceeded the regulatory level in 40 CFR §261.24. (see table below) Therefore, LLWTF filter press sludge contained in the 308 barrels generated from October 1992 to April 1993 and disposed at Technical Area 54, Area G, pit 37 do not contain regulatory concentrations of toxic metals, based on TCLP analysis.

Analytical Results from Sludge Generated at Technical Area 50, Building 1

Sample Date	Concentration Detected in Parts Per Million							
	Ag	As	Ba	Cd	Cr	Hg	Pb	Se
7/7/92	0.0000	0.0020	0.1000	0.0121	0.0066	0.0001	0.0048	0.0127
8/11/92	0.0000	0.0020	1.0000	0.0039	0.0040	0.0001	0.0050	0.0054
9/23/92	*0.0000*	*0.0020*	*0.0000*	*0.0010*	*0.0035*	*0.0001*	*0.0020*	*0.0072*
10/28/92	*0.0000*	*0.0057*	*0.0000*	*0.0014*	*0.0037*	*0.0002*	*0.0022*	*0.0082*
12/10/92	*0.0000*	*0.0060*	*0.0500*	*0.0008*	*0.0025*	*0.0002*	*0.0020*	*0.0020*
1/13/93	*0.0000*	*0.0020*	*0.1450*	*0.0080*	*0.0320*	*0.0003*	*0.0026*	*0.0020*
2/18/93	*0.0000*	*0.0020*	*0.1700*	*0.0075*	*0.0037*	*0.0003*	*0.0020*	*0.0032*
4/28/93	*0.0000*	*0.0020*	*0.2100*	*0.0084*	*0.0353*	*0.0145*	*0.0120*	*0.0086*
9/2/93	0.0000	0.0020	0.3010	0.0330	0.0730	0.0230	0.0730	0.0020
9/16/93	0.0000	0.0070	0.4010	0.0110	0.0450	0.0020	0.0370	0.0026
average	0.0000	0.0034	0.2164	0.0082	0.0208	0.0034	0.0219	0.0058
minimum	0.0000	0.0020	0.0000	0.0002	0.0025	0.0001	0.0020	0.0020
maximum	0.0000	0.0070	1.0000	0.0330	0.0730	0.0230	0.1151	0.0127
regulatory level	5.00	1.00	100.00	1.00	5.00	0.20	5.00	1.00

Data shown in *italics* represent analytical results from LLWTF filter press sludge placed in Technical Area 54, Area G, Pit 37. None of the results from toxicity characteristic metals exceed their respective regulatory levels.