

Opportunity to participate in USGS-DTSC Lead Attribution Study

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Background and Problem

- DTSC manages Lead Acid Battery Recycling Facility Investigation and Cleanup (LABRIC) Program
- Fees collected from consumers for battery recycling
 - Lead acid battery (LAB) Cleanup Fund for legacy battery recycling facilities
- CA Legislature requires:
 - “an area of the state must be reasonably suspected to have been contaminated by the operation of a lead-acid battery recycling facility, based on an investigation, for the LAB Cleanup Fund to be used.”
- Lead attribution methodology needed to distinguish Pb from batteries and other sources:
 - Pb-based paint (pre-1979)
 - Aerially deposited Pb from gasoline (pre-1990s) and aviation fuel (ongoing)
 - Ammunition (firing ranges)
 - Primary smelters
 - Natural background

Study Objective

- Develop a reliable methodology to identify specific sources and forms of Pb contamination in soils and other geological materials

Approach

- Sample Pb source materials and affected soils from various Pb source types
 - Battery breaking
 - Secondary Pb smelting
 - Pb-based paint
 - Aerially deposited lead (ADL) from gasoline (pre-1990s)
 - Aviation Fuel (Avgas)
 - Firing ranges
 - Primary smelters
- 5 source samples and 5 soil samples from each source type (+ 1 replicate)
- Detailed chemical and mineralogical analyses (Pb isotopes, speciation)
- Multiple size fractions

Laboratory Analyses

Analyte(s)	Method	Laboratory	Task
Trace and major elements (60 elements)	ICP-OES-MS after sodium peroxide fusion, nitric acid leach	USGS MRP Contract Lab*	4A
Total C and total S	Infrared detection after combustion (LECO)	USGS MRP Contract Lab*	4A
Carbonate C&	Infrared detection after perchloric acid treatment	USGS MRP Contract Lab*	4A
Element speciation (50 elements)	ICP-OES-MS after 5-stage sequential extraction (see text)	USGS MRP Contract Lab*	4B
Soluble fraction (50 elements)	ICP-OES-MS after deionized water leach	USGS MRP Contract Lab*	4B
Exchangeable fraction (50 elements)	ICP-OES-MS after ammonium acetate leach	USGS MRP Contract Lab*	4B
In vitro Pb bioaccessibility (5 elements)	EPA method 1340	Contract Lab (OSU)#	4B
Pb stable isotopes (total leach and selective leaches TBD)	TIMS	Contract Lab (UNC)^	4C
Mineralogy (false-color images with quantification)	QEMSCAN	Colorado School of Mines	4D
Speciation	XAS (EXAFS, XANES)	SSRL/SLAC (or other beamline)	4E
Grain-size distribution	Laser scattering (Beckman-Coulter)	USGS CAWSC Sed Lab	4F
Mineralogy	Quantitative X-ray Diffraction (QXRD)	USGS GGGSC	4G

Lead-based Paint

	Interior		Exterior		
	%	ppm	%	ppm	Notes - 1
circa 1900 to 1940	50%	500,000	50%	500,000	Pb oxide used as pigment
1940 to 1955	?		?		
1955 through early 1970s	1%	10,000	50%	500,000	1955 voluntary standard by industry for interior paint
1971 law (effective 1978)	1%	10,000	1%	10,000	
?	0.5%	5,000	0.5%	5,000	
1978-2009	0.06%	600	0.06%	600	CSPC regulation, effective Feb. 27, 1978 - last date of manufacture
2009 -	0.009%	90	0.009%	90	Current federal regulation
2000	0.5%	5,000	0.5%	5,000	1.0 mg/cm ² lead on surface

Questions?

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