

Arsenic Drinking Water Treatment Residuals Workshop

Gregory Helms

EPA Office of Solid Waste

February 28, 2005

RCRA Background

- EPA regulates waste management under the Resource Conservation and Recovery Act (RCRA)
- Under RCRA we define:
 - What is a waste?
 - What is a hazardous waste?
 - Safe handling, treatment, and disposal for hazardous waste, and some other wastes

RCRA Background

- Groundwater contamination is a key waste management concern
- Leach testing has been used in regulatory programs to help determine:
 - What waste is hazardous: listings, delistings, Toxicity Characteristic (TC) regulation
 - What treatment is adequate: Land Disposal Restriction (LDR) treatment requirements
- TCLP is the most used leaching test.

RCRA Background

- TCLP was designed as a screening test to consider conditions that may be present in a MSW landfill that contains decomposing garbage.
 - Acetic acid buffered to pH 5 (initial); 20:1 liquid/solid ratio; particle size reduction to 9.5 mm; equilibrium.
- Co-disposal of industrial solid waste with MSW is considered to be plausible “worst case” waste management.

Technical Issues with TCLP

- TCLP is a screening test that evaluates leaching potential under a single set of environmental conditions:
 - Initially acidic conditions; final conditions were not considered critical, and usually are not known
 - Generally oxidizing environment
- For most metals, leaching is pH dependent; many landfills achieve reducing conditions.

TCLP Leaching and Arsenic

- Several examples of TCLP under-predicting As leaching:
 - K088 (spent aluminum pot liners)
 - Hooper, et.al. 1998: Study of TCLP and other leaching tests, compared with landfill leachate.

Program Issues with TCLP

- **K088 Delisting and BDAT– TCLP** significantly under-predicted K088 arsenic and fluoride leaching at the Reynolds facility, compared with field data.
 - The delisting was revoked,
 - K088 treatment standard was successfully challenged based on the Reynolds experience (Columbia Falls Aluminum v EPA).

TCLP Leach Testing and Iron

- Several examples of oxidized iron binding of metals affecting TCLP results:
 - Addition of steel shot to sandblasting grit;
 - Brass foundries added Fe to spent sands, calling it waste treatment;
 - EPA brought enforcement case; termed addition of iron to waste “impermissible dilution” under the LDR (1998 LDR Phase IV)
 - See Kendall, 2003; Meng et.al 2001, and Townsend et.al, 2004

Alternatives to TCLP

- TCLP is part of the TC regulation (40CFR 261.24).
 - Therefore, for making a TC regulatory determination, there is no alternative to TCLP
 - We have reexamined TCLP over the past several years, and have no plans to replace or revise the test in the TC regulation
- There is also no current plan to revise the TC regulatory level for As.

Alternatives to TCLP

- Water suppliers who's treatment residuals are not TC hazardous, yet still have concerns, can do additional assessment and base disposal decisions on that analysis:
 - Testing can be done using alternative tests (WET, SPLP, ASTM, Kosson Framework)
 - Leach test result can be used in EPA's IWEM model to identify preferred management

Alternatives to TCLP

- IWEM is part of EPA's Industrial D (non-hazardous) waste management guidance:
 - See: <http://www.epa.gov/epaoswer/non-hw/industd/index.htm> for the guidance
 - IWEM will recommend what type of landfill is best for a waste, based on estimated GW transport
 - IWEM input can be any leach testing results
 - IWEM has old MCL as default; can enter “user defined” value (Tier 2 assessment) to base analysis on new MCL.

Alternatives to TCLP

- Listing of As drinking water treatment residuals is not a plausible option:
 - Would likely be opposed by DW suppliers
 - Currently do not have the data to justify such a listing.
 - Do not foresee having the resources for evaluating these residuals to support a listing.

Solutions

- Short Term:
 - Use IWEM and best leach testing data available.
 - Send residuals to well-run landfills

Solutions

- Long Term:
 - Need to better characterize the magnitude of the problem
 - Anticipated volume of As DW treatment residuals
 - As concentration of residuals
 - Geographic distribution of residual generation will allow regional assessment
 - Better leach testing will help
 - Need to compare with other As issues: e.g., CCA treated wood expected to contribute 5000-10,000 tons As per year to landfills.

Solutions

- Waste treatment is usually cost-effective only when required by regulation.
 - Non-haz disposal costs \$20-\$40/ton
 - Treatment costs could be substantially more

EPA Future Direction of Leach Testing

- In considering new approaches to leach testing, the Agency is seeking:
 - Broad applicability (regarding both waste types and management conditions)
 - Consideration of factors affecting leaching
 - Validation in both the lab and field
 - Practical applicability of tests

Additional Questions

- Does TCLP underestimate leaching only for As, or are other metals that can form oxyanions also a problem?
 - Research to date focused on As
 - As seems to be the best example of this problem, but is it the only one?