

A Waste Determination Case Study for an Art College

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Are Waste Determinations Keeping You up at Night?



Hopefully Not!!

- HW determinations are one of the most common violations found during regulatory inspections
- Inaccurate HW determinations typically leads to other violations
- Typically associated with unnecessarily high analytical costs and are too labor intensive
- Usually poorly documented, often ignored

The Right Questions = Compliance +

1. Do I fully understand the process?
2. Have I made maximum use of available information?
3. Is testing necessary?
4. What did the testing reveal?
5. Can procedures be modified to minimize hazardous waste generation?
6. Is determination properly documented?

Case Study: HW Determinations for Ceramics Dept. in an Art College

- Scenario:
 - Recent 2-day EPA RCRA Inspection
 - Faculty & staff had little knowledge of RCRA
 - Open to students 24/7; only 8 hrs under direct supervision
 - Students allowed to bring own products to make glazes
 - No HW determinations available
 - Tight budget
 - Possible 115 types of clays, sand, metal powders and hundreds of recipes of prepared ceramic glazes

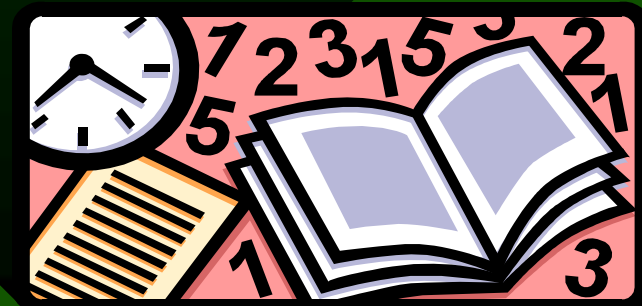
Objective

- Bring Ceramics Department into full compliance with RCRA
- Develop HW determinations for all waste streams, potential discarded products and cleaning operations
- Develop procedures to ensure continual compliance with regulations
- Accomplish objective within limited budget

Waste Determinations - Short Primer

40 CFR 261.11 asks 4 questions:

1. Is the waste excluded?
2. Is the waste generated from a process?
3. Is the waste a discarded commercial chemical product?
4. Does it have any characteristics?



#1: Do I fully understand the process?

- Knowledge of process or chemical products (“The more you know the less you pay.”)
- Raw materials
- Chemical products
- Process waste or by-products

#1: Do I fully understand the process?

- Glazes = clays + sands + metal powders + water
- Some metal powders contained Ba, Cd, Cr, Pb
- Waste determinations required for:
 - 115 clays, sands, metal powders
 - Hundreds of recipes of prepared glazes
 - Cleaning operations



#2: Have I made maximum use of available information?

- Product specifications (% or ppm)
- Review MSDS with discernment (1% = 10,000 ppm; lead TCLP limit = 0.0005%)
- Conversation with manufacturer (don't reinvent the wheel)
- Your experience and knowledge with operations and chemicals



#2: Have I made maximum use of available information?

- Reviewed MSDS of chemicals (115 clays, powders, etc.) used in mixing operations
 - Only 19 Mason Stains contained TCLP metals
 - 3 other metal powders contained TCLP metals
 - 93 remaining chemicals contained no listed hazardous waste or characteristics
- Contact Manufacturer
 - Mason Stain 6202 contained largest chromium concentration (establish as “worst case” Mason Stain)
 - Only TCLP component in Mason Stains was chromium



#3: Is testing necessary?

- Testing – as a last alternative
 - Only chemicals are present or have potential
 - Don't test if concentration is <TCLP limits
 - For sample <0.5% solids; total metal analysis
 - For sample >0.5% solids; if large TCLP metal content, test for TCLP; if small TCLP metal content test for total metals, divide by 20, if result is <75% of TCLP limit then sample will not fail.
 - Use correct sampling & testing procedures, sampling containers and properly complete chain of custody



#3: Is Testing Necessary?

- Tested 4 remaining chemicals for only suspected TCLP metals

Sample	TCLP Metal	Result (mg/L)	Regulatory Limit (mg/L)
6202 Mason Stain	Chromium	9.7	5.0
Barium carbonate powder	Barium	5,250	100
Strontium carbonate powder	Barium	215	100
Chromium oxide powder	Chromium	8.0	5.0

#4: What did the testing reveal?

- Chemicals when discarded are hazardous waste
 - 19 Mason Stains
 - Barium carbonate powder
 - Strontium carbonate powder
 - Chromium oxide powder

Waste determinations for chemical products

- Chemical products requiring determinations
 - ✓ 115 clays, sands, metal powders
 - 1) 22 are a hazardous waste if discarded
 - 2) 93 are not a hazardous waste if discarded
 - ? Hundreds of recipes of prepared glazes
 - ? Cleaning operations

Waste determinations for recipes and cleaning operations

- Prepared glazes made up of sand, clay, metal powders and water
- Determine the maximum concentration of metal-containing powder that can be used without exceeding the TCLP limit
- For example: TCLP for strontium carbonate = 215 mg/L of barium; 100 mg/L is limit
- $100 \div 215 = 46\%$
- Any glaze recipe containing $> 46\%$ of strontium carbonate would fail

#4: What did the testing reveal?

- HW determinations were made by determining maximum recipe concentrations and safe limits



Sample	Maximum Limit	Safe Limit
All Mason Stains	51%	25.5%
Barium carbonate powder	1.9%	0.95%
Strontium carbonate powder	46%	23%
Chrome oxide powder	62%	31%

#5: Can procedures be modified to minimize hazardous waste generation?

- Modify or develop procedures to minimize or prevent hazardous waste generation
 - Limit quantity of hazardous chemical in process
 - Substitute or ban chemicals causing waste to be hazardous
 - Fully utilize hazardous chemicals to prevent the eventual discard of unused chemicals
 - Develop cleaning procedures that minimize hazardous waste generation
 - Monitor expiration dates

#5: Can procedures be modified?

- Ban recipes containing metal powders with low safe limits
 - Barium carbonate powder (0.95% safe limit) no longer allowed
- Develop procedure
 - Identifying the metal powders that have the potential of being a hazardous waste (if discarded or spilled)
 - Allowing only evaluated ingredients to be included in the glaze recipes
 - Limiting the proportion of TCLP metal-containing powders in glaze recipes to avoid the mixing of hazardous waste glazes
 - Adding the percentages of ingredients with safe limits together (for recipes with more than one safe limit ingredient) and compare them to the more stringent safe limit

#6: Is HW determination properly documented?

- Product specifications
- All MSDS
- Written documentation of telephone conversations with manufacturer
- Analytical reports
- Chain of custodies



COLLEGE OF ART
HAZARDOUS WASTE DETERMINATION

Waste Identification

Name of Waste:

Location of waste generation:

Operation(s) generating the waste:

Waste Characterization

Is the waste excluded? ____ Is the waste a commercial chemical product? ____

If yes, list the name of the product and the corresponding waste codes: ____

Is the waste a process waste? ____

If yes, is the waste listed under the waste codes of F001 through F005? ____

If yes, list applicable waste codes: ____

Does the waste contain PCBs in concentrations greater than 50 ppm? ____

Does the waste meet the on-specification waste oil parameters? ____

Does the waste meet any of the following hazardous waste characteristics?

Ignitability: ____ (If yes, indicate flash point in deg F):

Corrosivity: (If yes, indicate pH): Reactivity:

Toxicity: If yes, indicate waste codes):

Classification (check one): ____ Hazardous Waste ____ Non-Hazardous Waste

Waste codes:

Date of determination:

Comments: This waste determined was developed with information provided by the College of Art to St.Germain & Associates, Inc.

See attached MSDS:

Determination performed by: ____

NOTE: All supporting documentation, including MSDS's and chemical analyses (if any) are attached.

Objective Accomplished

- Ceramics Dept. brought into compliance
- Glazes prepared by only trained faculty, staff and students
- Within limited budget
 - Only 4 samples tested for 1 TCLP metal
- By applying the 6 questions we were able to develop HW determinations for all potential waste streams
 - By making HW determinations for 4 metal powders, we were able to make waste determinations for 115 chemical ingredients, hundreds of recipes and associated cleaning operations



Objective Accomplished

- Develop procedures to ensure continual compliance with regulations
 - Procedures developed in summary environmental management plans (SEMPs) for each department to minimize the generation of hazardous waste
 - Responsibilities of each department's Environmental Coordinator to oversee implementation of SEMPs

