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## Beneficial Use Byproduct Hazardous Waste Determination

### How Can I Demonstrate That a Beneficial Use Byproduct is Not a Hazardous Waste?

According to OAC Rule 3745-599-05, prior to applying for any beneficial use individual or general beneficial use permit, you must demonstrate that the beneficial use byproduct is not a hazardous waste as defined in Ohio Revised Code (ORC) Chapter 3734.01, Ohio Administrative Code (OAC) Rule 3745-50-10(A), and OAC Rule 3745-51-03. There are three ways to perform this demonstration: 1) through generator knowledge, 2) by using the Toxicity Characteristic Leaching Procedure 1311 (TCLP) analysis, or 3) a total metals analysis. Once you complete the required hazardous waste demonstration, you will not need to repeat this process unless there is a significant change in your drinking water treatment process as defined in OAC Rule 3745-91-01.

#### Generator Knowledge

You may use some or all of the following information when using generator knowledge for determining that your waste is not a hazardous waste: 1) a facility-specific process flow diagram or narrative description of the process generating the waste, 2) a list of all ingredients or materials used in the process, 3) the chemical makeup of all ingredients or materials used in the process that generates the waste, 4) data obtained from literature regarding waste produced from a similar process using the same ingredients and/or materials, and 5) Material Safety Data Sheet (MSDS) of material used for treating raw water. Please refer to the [Generator Knowledge](#) guidance document for assistance in using this method of determination.

#### TCLP Analysis

TCLP analysis is the regulatory standard for demonstrating that any waste is not a hazardous waste. There are several TCLP constituents (including organic compounds) listed in the Appendix of OAC Rule 3745-51-11 that could be considered a hazardous waste, however, you are not likely to encounter such constituents in most beneficial use byproducts (drinking water treatment material, Lake Erie Dredge, foundry sand, and biosolids incinerator ash). For beneficial use permits, you may only be required to run TCLP analysis on the beneficial use byproduct for the eight Resource Conservation Recovery Act (RCRA) metals. If your beneficial use byproduct has ever been disposed at a municipal solid waste landfill, your beneficial use byproduct was analyzed for the eight RCRA metals and is not a hazardous waste. You may submit this analysis to demonstrate that your beneficial use byproduct is not hazardous. The eight RCRA metals are listed in Table 1 below.

## Total Metals Analysis

The total metals analysis required for coverage under most beneficial use permits may also be used to demonstrate that the beneficial use byproduct is not a hazardous waste, however, not all eight RCRA metals are included in the constituent tables of most beneficial use permits. Only five of the eight RCRA metals are listed in Table 1 of the Ohio EPA permit BUGPDWTM001. You will also need to include a total metals analysis for mercury, silver, and chromium (total) to capture the required eight RCRA metals. If the total metals analysis of the beneficial use byproduct for the eight RCRA metals demonstrates that none of these metals are present in the beneficial use byproduct, or that these metals are present but at concentrations that are at least 15% below the RCRA regulatory levels (regulatory levels are less than 20 times the TCLP values for the eight RCRA metals), then the TCLP analysis does not need to be run to demonstrate that the beneficial use byproduct is not a hazardous waste. Table 1 below shows the regulatory TCLP values for the eight RCRA metals. When you analyze your beneficial use byproduct for total metals, the results should show that the concentration for each metal listed in Table 1 is much lower than the *TCLP 20 x Totals* column.

Metal	TCLP 20 x Totals (mg/kg)	TCLP (mg/L)	15% Below RCRA Levels (mg/kg)
Silver	100	5	85
Arsenic	100	5	85
Barium	2,000	100	1700
Cadmium	20	1	17
Chromium	100	5	85
Mercury	4	0.2	3.4
Lead	100	5	85
Selenium	20	1	17

Table 1: RCRA Metals

The hazardous waste program was set up primarily to govern the disposal of solid and hazardous waste. The beneficial use program was set up to reduce the use of raw materials and to reduce the amount of wastes going to landfills by beneficially using waste materials that are produced in high volumes but have low toxicity. The constituent limits in the beneficial use program are not comparable to the constituent limits set forth in the RCRA program. The beneficial use program uses U.S. EPA Regional Screening Levels (RSLs) for Resident Soil to set constituent limits for land application. The values listed in Table 2 are based on constituents in soil media. These risk-based screening levels are derived from equations combining exposure assumptions with

chemical-specific toxicity values. RSLs are based upon human health risk and do not address potential regulatory, ecological, or agricultural risks. Arsenic, cadmium, copper, nickel, lead, selenium, and zinc are phytotoxic metals and RSLs should not be used to set limits in beneficial uses that include plant growth. For beneficial uses involving land application for agriculture purposes or soil blends for home gardens, DMWM uses U.S. EPA 503<sup>1</sup> monthly average limits for metals that are toxic to plants. U.S. EPA 503 limits were developed using highly conservative assumptions and worst-case exposure data to ensure protection of public health and the environment. For beneficial uses involving land application at industrially zoned sites, DMWM uses U.S. EPA RSLs for Industrial Soils.

Metal	U.S. EPA 503 (mg/kg)	U.S. EPA RSLs Resident Soil (mg/kg)	U.S. EPA RSLs Industrial Soil (mg/kg)
Silver	N/A	390	5,100
Arsenic	41	0.39	1.6
Barium	N/A	15,000	190,000
Cadmium	39	70	800
Chromium	N/A	N/A	N/A
Mercury	17	10	43
Lead	300	400	800
Selenium	100	390	5100

Table 2: Comparison of U.S. EPA 503, RSLs for Resident Soil, and RSLs for Industrial Soil

The values listed in Table 2 for U.S. EPA 503, RSLs for residential soils and RSLs for industrial soils do not satisfy the regulatory requirements for demonstrating that a beneficial use byproduct is not a hazardous waste. Because of this, the generator is required to make the demonstration through generator knowledge, a TCLP analysis, or by using the sample results from the total metals analysis. Again, if the results for any constituent listed in Table 1 are not at least 15 % below the RCRA regulatory levels, you will need to perform the following exercise or run a laboratory analysis on the sample using the TCLP analysis.

### Using the Total Metals Analysis to Determine if a TCLP Analysis is Needed

U.S. EPA publication *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846)*<sup>2</sup>, Section 1.2 of the TCLP analysis does allow for a total metals analysis in lieu of the TCLP extraction.

<sup>1</sup> U.S. EPA 40 Code of Federal Regulations Part 503 *Pollutant Concentrations (Table 3 of 503.13)*

<sup>2</sup> U.S. EPA publication SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846)*, as amended through July 2016.

If a waste is 100 % solid, as defined by the TCLP analysis, then the results of the total metals analysis may be divided by 20 to convert the total results into the maximum leachable concentration. This factor is derived from the 20:1 liquid-to-solid ratio employed in the TCLP analysis. If a waste has filterable liquid, then the concentration of the analyte in each phase (liquid and solid) must be determined. The following equation may be used to calculate this value:

$$\frac{[A \times B] + [C \times D]}{B + [20 \frac{L}{kg} \times D]} = E$$

Where:

- A = Concentration of the analyte in liquid portion of the sample (mg/L)
- B = Volume of the liquid portion of the sample (L)
- C = Concentration of the analyte in solid portion of the sample (mg/kg)
- D = Weight of the solid portion of the sample (kg)
- E = Maximum theoretical concentration in leachate (mg/L)

The value obtained, E, can be used to show that the maximum theoretical concentration in a leachate from the waste should not exceed the concentration specified in the toxicity characteristic (40 CFR 261.24).