Ohio Environmental Protection Agency

Division of Materials and Waste Management
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FOUNDRY SAND BENEFICIALLY USED IN SOIL BLENDS, SOIL-LESS POTTING MEDIA, AND BIORETENTION SOILS

The purpose of this document is to provide guidance on the Application for the General Permit BUGPFS01, the beneficial use of foundry sand as a soil blend, in soil-less potting media, and in bioretention soils.

Who is the Applicant?

In general, the Applicant is the individual that applies for coverage under the general permit by submitting a Notice of Intent (NOI) form. The Applicant can be the generator of the foundry sand, or it can be a third party such as a distributor or soil blender, or it could be the end user.

Who is the Permittee?

The Applicant becomes the Permittee when the Applicant receives written notification from the Director that coverage under the general permit is granted.

What else do I need to submit in addition to the NOI form?

Each application package shall include your sampling plan, the sample results (including a Tier I data reporting package from the laboratory), a statistical evaluation of the sample results, and a check for $200.

What if you want to beneficially use foundry sand from more than one generator?

There is no limit to the number of foundry sand generators that you can include in your coverage for this general permit. The fee is still $200, but you must fill out an NOI Form and submit sampling and analysis results for each facility (generator) producing foundry sand.

Can the generator of foundry sand apply for this general permit?

Yes. The generator can analyze its foundry sand and submit an NOI. The generator can distribute the foundry sand to a third party who is required to operate under the conditions of the foundry sand permit.

Eligibility

Only foundry sand that is generated by iron (gray and ductile), steel, or aluminum foundries using silica sand with chemical or clay binders is eligible for beneficial use under General Permit BUGPSFS01 provided they are not a hazardous waste as defined by ORC Chapter 3734.01, OAC Rule 3745-50-10(A), and OAC Rule 3745-51-03.

According to General Permit BUGPSFS01 and Ohio Administrative Code Rule 3745-599-05, prior to applying for a beneficial use permit, you must demonstrate through generator knowledge and/or through a quantitative evaluation, that the foundry sand is not a hazardous waste.

For assistance in understanding how to demonstrate through generator knowledge that your foundry sand is not a hazardous waste, please refer to this document.
http://www.epa.state.oh.us/portals/32/pdf/GeneratorKnowledge6.pdf

The Applicant may submit TCLP data that has been used to demonstrate the foundry sand is not a hazardous waste. There is only one method that can be used to determine if a waste is below the regulatory level for a characteristically hazardous waste, that is TCLP Method 1311. If the total RCRA metal constituent level is less than 20 times the TCLP value found in OAC rule 3745-51-24 you are not required to conduct the TCLP analysis.

Sampling and Analysis

Ohio EPA requires representative sampling of any waste material proposed for beneficial use. The general permits were designed to allow as much flexibility as possible in determining the number of samples necessary for representative sampling. Not every waste stream or situation is the same, therefore, it is impossible to predict the number of samples required to demonstrate that a beneficial use byproduct meets a 95% Upper Confidence Level (UCL) for each constituent and is less than the limits set forth in Table 1. US EPA's Test Methods for Evaluating Solid Waste (SW-846 for evaluating piles of wastes) is a good reference tool. It explains different methods and strategies of representative sampling.

Table 1

Constituent[1]	Totals Analysis (mg/kg)
Aluminum (Al)	77000
Antimony (Sb)	31
Barium (Ba)	15000
Cadmium (Cd)	39
Copper (Cu)	1500
Iron (Fe)	55000
Lead (Pb)	300
Selenium (Se)	100
Zinc (Zn)	2800

The following are suggestions to assist you in devising your sampling plan to demonstrate that your foundry sand meets the constituent limits in Table 1.

a. The reported detection limit for your sample analysis should be less than the limit specified for each constituent in Table 1.
b. The storage method and pile size of the foundry sand can affect the number of foundry sand samples required to demonstrate the 95% UCL for each constituent and that each constituent is less than the limit in Table 1.

[1] Al, Sb, Ba, Fe: US EPA Regional Screening Levels, Residential Soil; Cd, Cu, Pb, Se, Zn: US EPA 40 Code of Federal Regulations Part 503 Pollutant Concentrations (Table 3 of 503.13).

c. It may be appropriate to screen the foundry sand prior to collecting grab samples. When setting up your sample collection, you should set up a 3-D sampling grid of the entire pile.

d. If the foundry sand pile is too large to obtain a sample from the top and bottom of the pile, then it may be more appropriate to remove a manageable amount of foundry sand from the pile and representatively sample the amount removed.

e. Foundry sand that has been stored as a product should be homogeneous enough that 3-5 samples should be adequate to demonstrate the SFS meets a 95% UCL of the mean for each constituent without exceeding the limits specified in Table 1.

f. For historical piles of foundry sand, the sampling and analysis strategy may require more extensive sampling analysis to meet a 95% UCL of the mean for each constituent without exceeding the limits specified in Table 1. It may be acceptable to take 12-15 grab samples from at least three equally divided depths of a pile of foundry sand (i.e. 3-dimensional sampling grid) to demonstrate the foundry sand meets a 95% UCL of the mean for each constituent without exceeding the limits specified in Table 1. Or, if you have foundry sand that has not been stored as a product, more extensive sampling and analysis may be required, or it may be more appropriate for you to apply for an individual permit.

g. A statistical evaluation is necessary for decision makers to have a level of confidence that the beneficial use of the foundry sand will be protective of human health and the environment. A 95% UCL is one way to provide this level of confidence.

    i. A sample calculation for the 95% UCL is provided in Appendix A.

    ii. You can also download free software from US EPA that will calculate the 95% UCL for you. https://www.epa.gov/sites/production/files/2016-05/documents/proucl_5.1_fact_sheet.pdf

h. The current lab cost associated with each sample is approximately $100 for the list of constituents in Table 1. Ask the lab to give you the analytical results with a copy of the Tier I Data Report. A list of the Tier I Data Report requirements is provided in Appendix B.

i. Remember to submit your sample plan, the sampling results, the Tier I data report, and the statistical evaluation with the NOI.

APPENDIX A: Example calculation of the 95% UCL for a normal mean

Ten samples of material are taken to demonstrate that the material meets the beneficial use standards in Table 1. The samples are obtained using a simple random sampling design. 95% UCL must be obtained for each constituent tested. Analysis of the samples for lead generated the following results: 160, 175, 210, 220, 230, 240, 245, 270, 310, and 380 ppm. The limit for lead is 300 ppm.

Step 1: Mean and standard deviation calculation

Assuming a normal model is acceptable (using the Shapiro-Wilk test) the mean and standard deviation should be calculated. The mean and standard deviation can be obtained using statistical software or by hand using the following equations.

Mean: $\frac{\text{Sum of data}}{\text{Total number of data points}} = Mean$

$$\frac{(160+175+210+220+230+240+245+270+310+380)}{10} = \mathbf{244}\boldsymbol{ppm}$$

Standard deviation for a sample:

1. Subtract the Mean from each data point and square the result.
2. Then divide the sum of those squared differences by the number of data points minus 1.
3. Then take the square root of that number to obtain the standard deviation.

$\sqrt{[((160-224)^2+(175-224)^2+(210-224)^2+(220-224)^2+(230-224)^2+(240-224)^2+(245-224)^2+(270-224)^2+(310-224)^2+(380-224)^2)/(10-1)]}$ = ***64.4 ppm***

Step 2: T-value and 95% UCL calculation.

1. Find your T-Value from the following table for the number of samples taken.

# of samples minus 1 (n-1)	T Value for 95% UCL	# of samples minus 1 (n-1)	T Value for 95% UCL
1	6.314	11	1.796
2	2.920	12	1.782
3	2.353	13	1.771
4	2.132	14	1.761
5	2.015	15	1.753
6	1.943	16	1.746
7	1.895	17	1.740
8	1.860	18	1.734
9	1.833	19	1.729
10	1.812	20	1.725

2. The UCL is calculated as follows:

UCL= $Mean + \left(T\ Value * \frac{Standard\ Deviation}{\sqrt{\#\ of\ samples}}\right) = 244 + 1.833 * \frac{64.4}{\sqrt{10}} \approx \mathbf{281\_ppm}$

Step 3: Compare 95% UCL to Table 1.

Compare the 95% UCL calculated in Step 3 to the limit in the Table of constituents for that specific constituent. Because the UCL (281 ppm) is less than the limit in the table (300 ppm). By showing that the 95% UCL for the sample is less than 300ppm limit, we can conclude with at least 95 % confidence that the mean concentration of the constituent in the material is less than 300ppm.

APPENDIX B: Tier I Data Report Requirements

1. Site name and Project Manager or Applicant sample control number;
2. Name of Project Manager or Applicant;
3. Field sample numbers cross-referenced to associated laboratory sample numbers (i.e., Contractor and subcontractor(s);
4. Project narrative (a.k.a. case narrative) describing tests used by the Contractor or subcontractor(s);
5. Sample results with units, method detection limits (MDL), reporting limits (RL) and dates (i.e. receipt, preparation, and analysis), as well as, surrogates and quality control (QC) limits for all organic tests,
6. Bench sheets (Note: for characteristic testing only, such as TCLP.)
7. QC narrative discussing QC outliers and corrective actions taken by the Contractor or subcontractor(s).
8. QC samples, including preparation and analysis dates, results, units, and QC limits (where applicable), [Note: Contractor or subcontractor(s) must include blanks, laboratory control spikes, duplicates, spikes, and surrogates for QC samples.]
9. Copy of a completed chain-of-custody form;
10. Copy of cooler receipt form, and;
11. Signed statement by either the Laboratory Manager, Quality Assurance Manager, or Project Manager attesting to the validity of the analytical results.