



Foundry Waste Classification Guidelines

Office of Land Quality

(317) 234-6965 • (800) 451-6027

www.idem.IN.gov

100 N. Senate Ave., Indianapolis, IN 46204

FOUNDRY WASTE CLASSIFICATION GUIDELINES

A waste classification must be issued by Indiana Department of Environmental Management (IDEM) when a foundry wishes to:

- dispose of **foundry wastes** (restricted waste) into a restricted waste site.
- use **foundry sand** in accordance with Indiana's law allowing the use of foundry sand (IC 13-19-3-7).

A waste classification does not need to be issued from IDEM when a foundry wishes to:

- dispose of **foundry wastes** in a municipal solid waste landfill as a nonhazardous solid waste in accordance with Indiana's Solid Waste Land Disposal Facilities Rule (329 IAC 10).
- dispose or use **foundry wastes** outside of Indiana.

Foundries generate several waste streams. This guidance is specifically for nonhazardous wastes. **Foundry wastes** may include foundry sands, slag, refractory, baghouse dust, and pattern shop waste. The term **foundry sand** is used in Indiana regulations that govern the use of foundry sand. For this purpose, **foundry sand** is generally accepted as molding sand and core sand. Baghouse dust from sand handling systems if made up of only fine sand particles may be used under IC 13-19-3-7. Baghouse dust from other processes such as furnace emissions, grinding, or shot blasting may not be used under the statute.

A particular classification level is assigned to a waste based upon a complete and thorough waste characterization, including a well-planned representative sampling program. IDEM staff have prepared this waste classification guideline to describe how to sample and analyze foundry wastes as required under **329 IAC 10-9-4**.

Foundry wastes may be disposed as nonhazardous solid waste in any permitted municipal solid waste landfill designed and operated in accordance with the *Solid Waste Land Disposal Facilities* rule (329 IAC 10) without obtaining a waste classification. However, if the waste is to be sent to a restricted waste site or used, it must be tested and classified according to 329 IAC 10-9-4. Additional testing is required for use in land application or as a soil amendment. The additional testing requirements can be found in IDEM Guidance titled "Use of Foundry Sand in Land Application and as a Soil Amendment" (ID No. WASTE-040-NPD).

Please note that the restricted waste site classification, (Type I, II, III, and IV), must be certified in writing by the IDEM.

Prior to obtaining a waste classification, generators of solid waste are responsible for maintaining information on their wastes as required under 329 IAC 10-7.2. That rule references the hazardous waste determination found in Indiana's Hazardous Waste Management rules (329 IAC 3.1) as well as other characteristics that may affect disposal at a permitted land disposal facility. 329 IAC 10-7.2 includes an evaluation for Polychlorinated Biphenyls, asbestos, pesticides, or any other risk posed during handling use or disposal of a waste. It should also be noted that the agency

retains authority to ask for any other information relevant to compliance with Indiana’s environmental regulations. Wastes that are determined to be nonhazardous and do not contain Polychlorinated Biphenyls, asbestos, or pesticide residues regulated by the Federal Insecticide, Fungicide, Rodenticide Act (FIFRA) may be evaluated for a **Waste Classification**.

The waste classification is used to determine restricted waste site disposal requirements and identify potential risks for legitimate use applications.

This guidance has been developed by Office of Land Quality staff to assist foundries in the waste classification process. Since every generating facility is unique, some factors or situations may not be addressed in this guidance document. Any questions about the requirements outlined in this guidance should be discussed with Industrial Waste Section staff at 317/234-6951.

A copy of all applicable statutes (IC 13) and rules (329 IAC 10 and 329 IAC 3.1) may be obtained through the Internet at <http://iga.in.gov/>. Guidance regarding foundry sand storage, foundry sand use, and making a hazardous waste determination may be obtained through the Internet at <https://www.in.gov/idem/resources/nonrule-policies/effective-nonrule-policies/> or by calling Industrial Waste Section Staff at 317/234-6951. A list of referenced and related rules and guidance can be found at the end of this guidance.

A. Generator Responsibilities for Waste Information

329 IAC 10-7.2 lists generator responsibilities for collecting information on wastes they generate. This information is used to determine how a waste may be properly disposed in a permitted disposal facility or processed in a permitted processing facility. The waste determination must specifically look at hazardous waste (characteristic and listed), asbestos, PCBs, heat or capability of generating heat, or any other risk that a particular waste may present. It should also be noted that the agency retains authority to ask for any other information relevant to compliance with Indiana’s environmental regulations. This determination may be based on testing or use of generator knowledge. **Information must be collected on individual waste streams.**

Hazardous Waste Determination

State and Federal regulations require generators of solid waste to make a hazardous waste determination (40 CFR 262.11, adopted under 329 IAC 3.1-6). To make this determination, generators must do one or more of the following for each separate waste stream:

- Identify the process that generated the waste (Is it a “listed” waste?),
- Apply knowledge of typical waste composition and/or
- Conduct waste testing or analysis.

NOTE: Some solid wastes may be excluded from hazardous waste regulations (see 40 CFR 261). Even if you have determined that your waste is excluded from hazardous waste regulation, you need to re-evaluate your status periodically to verify that conditions affecting the composition of your waste have not changed. Some excluded wastes may exhibit hazardous waste characteristics.

Hazardous Waste Listing Determination

If you find that your waste is not excluded from hazardous waste regulations, then you must determine if the waste meets one or more of the hazardous waste **listing** descriptions found in 40 CFR 261.31, 261.32 and 261.33. The lists

include wastes from non-specific sources [termed “F- listed wastes,” such as F002 wastes, spent halogenated solvents (i.e., perchloroethylene, trichloroethylene, methylene chloride.)] The hazardous waste listings also include wastes from specific sources, K-listed wastes, such as K062 waste, spent pickle liquor from the steel finishing industries. The third group of hazardous waste listings includes discarded unused commercial chemical products, off-specification products and spill residues of such products (i.e., P- and U- listed wastes.) While there are no source specific listings for foundries, if another listed waste (such as an F-listed waste) is mixed with another waste, the mixture is considered a hazardous waste.

Hazardous Waste Characteristic Determination

If the waste is not listed, you must determine if it exhibits any of the four **characteristics** of a hazardous waste: **ignitability**, **corrosivity**, **reactivity**, and **toxicity**. This evaluation involves testing the waste or using knowledge of the process or materials used to produce the waste.

A waste is **ignitable** if it is a liquid and its flash point is less than 140^o F (60^o C). A waste also may be defined as ignitable if it is an oxidizer or an ignitable compressed gas as defined by the U.S. Department of Transportation (DOT) regulations in 49 CFR Part 173, or if it has the potential to ignite under standard temperature and pressure and burn persistently and vigorously once ignited. Wastes that are ignitable are classified as EPA Hazardous Waste Code D001.

Examples of ignitable wastes include certain spent solvents such as some mineral spirits. Guidance titled “Ignitable Solid Hazardous Waste” is available for further assistance.

A waste is **corrosive** if it is aqueous and its pH is less than or equal to 2 or greater than or equal to 12.5. A waste also is corrosive if it is a liquid and it corrodes steel at a rate of more than 0.25 inches per year under conditions specified in EPA Test Method 1110. Corrosive wastes are designated as EPA Hazardous Waste Code D002. Examples of corrosive wastes include spent sulfuric acid and concentrated waste sodium hydroxide solutions that have not been neutralized.

A waste exhibits **reactivity** if it is unstable and explodes or produces fumes, gases, and vapors when mixed with water or under other conditions such as heat or pressure. A waste also may be defined as reactive if it is a forbidden explosive or a Class A or Class B explosive as defined in 49 CFR Part 173. Wastes that exhibit the characteristic of reactivity are classified as EPA Hazardous Waste Code D003. Examples of reactive wastes include certain cyanide or sulfide-bearing wastes.

The **toxicity characteristic** of a waste is determined by having a laboratory analyze an extract of the waste using the Toxicity Characteristic Leaching Procedure. The results of the analysis are compared to the regulatory thresholds of 40 constituents, primarily heavy metals, organic compounds, and pesticide/herbicides. If the extract from the TCLP procedure contains levels of any of the 40 constituents at or above regulatory thresholds, the waste is considered a hazardous waste. Wastes that exhibit the toxicity characteristic are classified as EPA Hazardous Waste Codes D004 through D043. Examples of toxic wastes may include wastewater treatment sludges, wastes from organic chemical manufacturing and pesticide/herbicide wastes.

You can meet general waste analysis requirements using several methods or combinations of methods. The preferred method for hazardous waste characteristics is to conduct sampling and analysis of the waste as this method is more accurate and defensible than other options. (The procedures and equipment for both obtaining and analyzing samples are described in Appendices I and II of 40 CFR Part 261.)

When conducting analysis, a **representative** sample from each waste stream is required. **A representative sample is defined as a sample of a universe or whole that can be expected to exhibit the average properties of the universe or whole.** Guidance regarding methods for statistical determination of a valid number of samples, sampling

methods, sampling strategies and applicable sampling equipment are found in Chapter 9 of “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods” SW-846, 3rd Edition. It is recommended that you prepare a sampling and analysis plan prior to sample collection and testing. Examples of information that should be included in a sampling and analysis plan are found in this document (see Section E).

Other Constituents (asbestos, PCBs, heat or capability of generating heat, or other risks)

Evaluation for these constituents is required by 329 IAC 10-7.2. As with the hazardous waste determination process outlined above, generator knowledge or analysis may be used to determine the presence and/or concentration of any of these constituents. If a constituent is not present, analysis is not required. Asbestos may be found in building materials such as building siding or insulation and is usually not found in typical foundry waste streams. PCBs may be found in hydraulic or dielectric fluids. PCBs may be found in foundry wastes if the scrap source includes items such as engine blocks and electrical equipment. If other unique risks are known to the generator, they must also be evaluated. The generator must identify and quantify any other risks. **Upon completion of a waste determination, if the foundry wastes are nonhazardous and don't contain other regulated constituents, they may be disposed as a solid waste in accordance with 329 IAC 10.**

B. Waste Classification

Prior to obtaining a waste classification, **Waste Information** as required by 329 IAC 10-7.2 must be completed. **Complete waste information documentation must be submitted with any request for waste classification. Classification must occur if the foundry wastes:**

- **will be disposed at a restricted waste site;**
- **are to be excluded from the provisions of Indiana's solid waste rules as a type IV waste; or**
- **are to be used in accordance with IC 13-19-3-7 (foundry sand only).**

In order to obtain waste classification of restricted waste site Type I, II, III, or IV, the waste must be evaluated in accordance with 329 IAC 10-9-4. Waste that is classified may be disposed in a restricted waste site (see Section H). 329 IAC 10-9-4 (o) lists the test methods and constituent lists for wastes that will be disposed in a restricted waste site. A waste classification stating the restricted waste site type (I, II, III or IV) must be issued by IDEM prior to submitting an application for a restricted waste facility permit of those types. The waste classification must be kept current as long as disposal occurs at the facility. Questions regarding the restricted wastesite facility permit application and/or permit process may be directed to staff of the Solid Waste Permit Management Section at 317/233-2711.

If the foundry sand will be used in accordance with IC 13-19-3-7, the foundry sand must meet Type III criteria and the generator must obtain a waste classification and keep it current as long as the foundry sand is used. IDEM has the authority to grant case-by-case approvals for Type I or Type II foundry sand or for other foundry wastes [329 IAC 10-3-1 (16)]. Other uses not specified under the statute may also be considered for case-by-case approval. In most cases, IDEM will require the completion of a waste classification. If an alternative test method is desired, IDEM approval of the alternative method is required. Questions regarding use of foundry sand may be directed to staff of the Industrial Waste Section at 317/308-3103.

Foundry sand that meets Type IV criteria are excluded from the provisions of the Solid Waste Rules in accordance with 329 IAC 10-3-4. Please note that several restrictions to the placement and control requirements are also found in 329 IAC 10-3-4. Foundry sands receiving a Type IV waste classification are also eligible for use under the statute.

The restricted waste site type may be determined through sampling and analysis or by applying the generator's knowledge. "Generator knowledge" is discussed in the next section (see Section C).

For analytes where the use of generator knowledge is not possible, or appear as constituents of the waste stream, testing must occur. This involves taking a statistically valid number of representative samples of the individual waste streams, testing the individual waste streams using acceptable methods, and applying a statistical analysis to determine a waste type (see Section F). The restricted waste site type is determined by the upper confidence limit for the constituent limit in the highest category. The calculation is based on the 90% confidence limits. For example, if the upper confidence limit for lead is in the Type III range, but all other constituents (barium, cadmium, chromium, phenols, etc.) are in the Type IV range, the overall classification will be Type III.

C. Generator Knowledge

Indiana's Solid and Hazardous Waste Rules allow use of generator knowledge as part of the waste determination process [329 IAC 10-2-78.1 and 262.11 (c)(2)]. In fact, generator knowledge is crucial in evaluating listed wastes. Generator knowledge is defined under 329 IAC 10-2-78.1 as:

"... the relevant, accurate and reliable information available to or developed by the generator about a waste that allows a person to determine the correct regulatory status of that waste. This information may include, but is not limited to the following categories of information:

- (1) Information provided by the manufacturer or supplier of the materials used in the process.*
- (2) Information provided in reference materials.*
- (3) Information describing the process generating the waste.*
- (4) Information describing the materials used in the process that generates the waste.*
- (5) Information describing principles of science, including chemistry and physics, applied to the raw materials and process used*
- (6) Information developed through prior testing of the waste."*

To save time and money on unnecessary testing, the generator may determine which analytes can be excluded or which analytes need to be tested using generator knowledge, if applicable. Generator knowledge may render testing unnecessary for certain analytes, provided that specific circumstances are met, such as adequate proof that the analyte in question is neither introduced into, nor generated by the process producing the waste.

Note: Material Safety Data Sheets (MSDS) are only required to list ingredients that comprise 1% or more of the material it addresses. This level of reporting is inadequate to ascertain the constituent levels in the wastes to be characterized. The threshold values listed in Tables I and II contained in this guidance are typically well below 1% of the waste. Therefore, the MSDS should be viewed in a supporting fashion and not as the sole means of providing generator knowledge.

For cases where generator knowledge is incomplete, unprovable or indicates the presence of regulated analytes, sampling and analysis must occur to meet waste classification requirements. Prior to sampling and analysis for waste classification purposes, a Sampling and Analysis Plan (SAP) should be prepared and may be submitted to IDEM for review.

D. Request for Waste Classification

A formal request for waste classification must be sent to the Industrial Waste Section. Please note that the same

laboratory documentation and sampling information listed in **Sections E, F, and G** are to be provided with all analyses. Restricted waste classifications (Types I, II, III, and IV) will be certified in writing by the IDEM in accordance with 329 IAC 10-9-4 (k).

The following information and results must be submitted to IDEM in order to obtain a waste classification:

A narrative description of the process.

Raw materials used to generate the waste.

Volume and frequency of disposal (for wastes going to a restricted waste site).

Documentation used to make the waste determination.

Complete waste sampling and laboratory analysis documentation including all laboratory analyses and Quality Assurance/Quality Control (QA/QC) information as enumerated in Chapter 1, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" SW-846, 3rd Edition, and/or the "Guidance to the Performance and Presentation of Analytical Chemistry Data" (available from IDEM).

A signed statement attesting that the information provided is true and accurate that states, "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further certify that I am authorized to submit this information." [As required by 329 IAC 10-9-4 (j)]

Please note that wastes cannot be officially classified as Type II, III, or IV without adequate generator knowledge or completion of the analytical requirements outlined in the previous sections. IDEM staff will conduct an inspection to verify information submitted as part of the request.

Request for Renewal

It is the generating facility's responsibility to maintain a current waste classification. As stated earlier, a current waste classification is required for disposal in a restricted waste site or for use under IC 13-19-3-7.

In accordance with 329 IAC 10-9-4 (e)(2), resampling must occur every two (2) years, whenever the process changes or according to a schedule specified by the commissioner for the purposes of maintaining a waste classification. The expiration date on the waste classification usually corresponds with the schedule for resampling unless there is a change to the process. Indiana Statute allows IDEM to issue new permits for up to five (5) years [IC 13-15-3-2 (a)]. Foundries may expect initial requests to be granted for two (2) years to five (5) years depending on site specific conditions. Those conditions include variability of the process, consistency of raw materials, overall facility compliance and disposition of the foundry sand. Please note that resampling for hazardous waste determination purposes may not be necessary if there has been no change to the process or the raw materials used. If the characteristics of the foundry sand or the process generating the waste changes, IDEM may revoke or suspend a waste classification until resampling has been conducted.

Indiana Statute allows for continued operation under a permit provided a timely and sufficient renewal request is submitted. Under IC 13-15-3-6 (a), the permit does not expire until IDEM makes a final decision on the application. No time frame is specified for waste classification renewal. Therefore, the agency will consider the following as a timely and sufficient renewal request:

Ninety (90) days: A renewal request which includes either a proposed sampling and analysis plan (SAP) or all items listed under Section D must be requested ninety (90) days prior to expiration. Please see Section E for more information about the SAP content.

One-hundred twenty (120) days: The generating facility may request IDEM to reduce or waive testing requirements. Such a request must be submitted 120 days prior to the expiration. IDEM will consider the following in reducing or waiving testing requirements:

- variability of the generating process and raw materials
- consistency of previous analytical results
- facility compliance rates

IDEM reserves the right to refuse any request to reduce or waive testing and may require a full documentation (generator knowledge and/or analytical results) for waste determination and waste classification purposes. If timely renewal is not made, the waste classification will expire. No extensions will be granted.

A new waste classification will be issued upon completion of all requirements. If the waste does not remain within the concentration limits for that restricted waste site type, a new waste classification will be issued indicating the new restricted waste site type.

E. Sampling Description/Sampling and Analysis Plan

Samples taken for hazardous waste determination purposes must be “representative” according to federal regulations (40 CFR 261.24). Additionally, Indiana’s Solid Waste Rule requires sufficient documentation of representative sampling for waste classification purposes [329 IAC 10-9-4 (i)]. Both of these regulations can be satisfied with a sampling description.

Although a sampling description would meet minimum regulatory requirements, IDEM staff have observed that preparation of a more comprehensive sampling and analysis plan (SAP) can assist the generator, laboratory, IDEM and other personnel involved in the process. ***Chapter 1 and Chapter 9 of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW- 846, 3rd Edition, is an excellent source of information on sampling and analysis. This document is used by IDEM staff in SAP preparation. It should also be used by the generator as a source of information in preparing a SAP.*** The generator of a waste prepares a SAP prior to sample collection and testing. This SAP may be submitted to Industrial Waste Compliance Section staff for review. A SAP should be used by laboratory and facility personnel as a reference during all phases of sample collection and analysis to ensure communication of standards and methods. Occasionally, problems are encountered during sampling or testing and portions of the SAP are not followed. Any deviation from the prescribed sampling and/or analysis may be noted in sampling logs, chain of custody sheets, or laboratory reports and then submitted with the request for waste classification.

Examples of the types of information to be included in the SAP are:

- sample collection methods,
- sampling equipment,
- sampling equipment decontamination procedures (when applicable),
- site map illustrating collection points,
- description of processes generating the wastes,
- MSDS, raw material specifications, or similar data illustrating the materials used in the processes,
- the calculations used in determining a statistically valid number of samples for characterization,
- volumes of individual waste streams,

- analytical method number(s),
- detection limits.

F. Sampling

This section contains several subsections related to sampling. Including:

- Generating Events
- Determination of Correct Number of Samples
- Individual Waste Stream Sampling
- Resampling

Note: Multiple waste stream compositing is no longer allowed in accordance with 329 IAC 10-9-4 (m).

Generating Events

For waste classification purposes, samples must be collected from separate generating events to ensure that the ordinary range of variation in waste materials is captured. Generating events are considered independent processes using a different batch of the same raw material. To illustrate and clarify the concept of separate generating events, consider the following example. Foundry "A" took delivery of a batch of scrap metal, raw sand and chemical binders to be used in the process. All the foundry wastes (molding sand, cores, shakeout sand, etc.) generated during this time were from **the same generating event**. When the shipments of raw materials were used up, the next shipment of raw materials were prepared for the process. When the second batch of materials were being used, the process and the waste streams generated were the same, but the wastes were from **a separate generating event**. If the raw materials come into the process on a more or less continuous basis, this is less well defined and may be determined by the storage capacity at the facility and the rate of use. A reasonable assumption in this case is that a one (1) week time lapse between collecting samples from the same waste stream ensures sampling from separate generating events for most foundries.

Number of Samples

To determine the restricted waste site Type (I, II, III, or IV), sampling and analysis of a statistically valid number of samples is required unless generator knowledge can be used (see Section C).

Methods for statistical determination of a valid number of samples, recommended sampling methods, sampling strategies, and applicable sampling equipment are found in Chapter 9 of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" SW-846, 3rd Edition. Over the years, IDEM staff have reviewed analytical results from foundries and found that some foundry wastes can be variable. IDEM recommends following the statistical evaluation in Chapter 9 of SW-846 for both waste determinations and waste classifications. Should the generator desire, technical assistance may be provided by IDEM, Office of Land Quality, Industrial Waste Section. **Please note that three sample sets are the accepted minimum number for waste classification purposes if generator knowledge is not used.** A proper standard deviation calculation cannot be performed on less than three sample results. The standard deviation calculation is integral to the statistical analysis that the analytical results are subjected to in both the waste determination and waste classification processes. If you have questions about using generator knowledge to reduce the number of samples, please contact Industrial Waste Section staff at 317/234-6951.

Individual Waste Stream Sampling

Individual samples must be collected from each waste stream for waste determination purposes. Each waste stream must also be evaluated separately for waste classification purposes [329 IAC 10-9-4 (m)]. Please be reminded that a waste classification is only necessary for use under Indiana Statute, disposal in a restricted waste site, or as specifically directed by IDEM.

Usually, a sample is taken either as a grab sample or a composite sample. IDEM recommends composite sampling for individual waste streams. A composite is a sample made up of many separate subsamples of the individual waste stream.

To illustrate and clarify the concept of individual composite samples, consider the following example:

Foundry "A" identified three individual waste streams: molding sand, cores and shake out sand. Based on prior knowledge Foundry "A" determined that three composite samples for each waste stream would be appropriate. Foundry "A" also found that a one week time lapse between sampling events would guarantee sampling from separate generating events because raw materials were shipped on a continuous basis and their storage capacity would allow them to operate for a week if shipments stopped. Foundry "A" determined a sampling point for each waste stream. Then, Foundry "A" collected samples at a sampling point every 5 minutes, for 30 minutes as the wastes passed by on a conveyor system. This resulted in seven small, equally sized subsamples from the waste stream. The subsamples collected from this point were mixed together after collection was completed. In mixing the subsamples together, Foundry "A" formed a composite sample for an individual waste stream. Foundry "A" decontaminated their sampling equipment, went to the next sample collection point, and repeated the sampling and compositing process. The same steps were followed with the third waste stream. The composite samples were sent to the laboratory for analysis. One week after the first sampling event, Foundry "A" repeated the entire process. The second set of samples was sent to the laboratory for analysis. One week after that, the third and final composite sample set was taken. The last set of composite samples from each waste stream was sent to the laboratory for analysis. Foundry "A" has collected three composite samples for each individual waste stream, each taken during separate generating events.

Resampling

Note: Resampling is required whenever the process generating the waste changes in accordance with 329 IAC 10-9-4 (e)(2).

G. Analysis

Two separate subsections follow for analysis for the purpose of **Waste Determination** and **Waste Classification**:

Waste Determination Analysis

As stated earlier, if generator knowledge is insufficient, inconclusive or indicates a need to perform testing, analysis must occur for the purposes of waste determination.

Also as stated earlier, information must be collected on individual waste streams. 329 IAC 10-9-4 (o) specifies the required extraction methods, constituents for analysis, and the analytical methods, The complete list of TCLP constituents and regulatory limits are found in 40 CFR 261.24, Table 1 and in **Table III** of this document. Testing is not required for any constituents not introduced or created during the process. For example, the TCLP list includes several herbicides and pesticides that are not used by industry or created in the manufacturing process. Those pesticides and herbicides can be eliminated from consideration for testing.

Waste Classification Analysis

329 IAC 10-9-4 (o) specifies the required extraction methods, constituent for analysis and the analytical methods for waste classification purposes. The commissioner may accept additional or alternative testing methods if the test methods provide an equivalent level of accuracy and reliability per 329 IAC 10-9-4 (l).

329 IAC 10-9-4 contains the constituent concentration for each restricted waste site type. This information is also included in **Table I and Table II** of this guidance.

As with the procedures for waste determinations, testing for analytes listed in Table I will be performed using TCLP extraction procedures or totals analysis. In specific cases, totals testing for metals may be acceptable in lieu of TCLP testing. Totals testing may be accepted only when the 90% single-tailed upper confidence limits derived from Student's *t* analysis for all observed constituent levels are below twenty (20) times the TCLP regulatory threshold for each constituent. Regardless of whether TCLP or total levels are analyzed, the same parameters require testing.

Testing for analytes in Table II will be performed using Leaching Method (Neutral) extraction procedures. Leaching Method (Neutral) is an extraction procedure that is performed in the same manner as TCLP, with two major differences. These differences are that no acidification of the sample occurs, and the extraction fluid is deionized water instead of a buffered acidic aqueous solution. Please note that testing for Table II constituents is not required for Type I restricted wastes. IDEM will issue a Type I waste classification based on the waste determination data (see Section A).

A note concerning common analytical errors: Notice that the pH measurement listed in Table II is the pH of the Neutral Leach extract, measured and documented immediately at the end of the 18 hour extraction period. Please advise the laboratory to include adequate documentation to ensure the pH was measured using this method. It is also important to complete the analysis within the holding time and to provide the chain of custody documentation.

After any testing, the data set obtained from the waste determination and classification analyses as well as supporting documentation must be submitted to the IDEM. IDEM personnel will review the data validation documentation. If the data is considered valid and usable, IDEM personnel will perform a Student's *t* statistical analysis on the data (using standard error calculations). The 90% upper confidence limit generated as a result of this manipulation will be compared to the regulatory thresholds listed in Table I, and/or Table II to determine the waste classification [329 IAC 10-9-4 (k)]. The method and mathematical formulas for performing the Student's *t* statistical analysis are found in Chapter 9 of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" SW-846, 3rd Edition.

The generator may perform the statistical analyses using the above model, however, IDEM's findings will be used to determine the restricted waste type.

H. Waste Classification and Disposal

IDEM staff will notify the facility, in writing, of the classification of its waste(s) after reviewing the analyses and accompanying information in accordance with 329 IAC 10-9-4 (k). This includes waste classification renewals. **Once the waste classification has been issued**, the generator has the following options:

- **Type I, II, III, and IV** waste may be disposed of in restricted waste sites permitted for that waste type or better. For example, a Type II waste may be disposed of in a Type I or II landfill but a Type I waste may only be disposed of in a Type II landfill.

- **Type III** foundry sand is also eligible for use in accordance with IC 13-19-3-7; no IDEM approval is required once the waste classification is issued provided IDEM guidance for use is followed. Please note that any use at a permitted landfill may require a modification to the landfill's permit.
- Materials which are certified as **Type IV** by IDEM do not require permitted waste disposal sites. However, there are restrictions on Type IV disposal locations and disposal control requirements, set forth in **329 IAC 10-3-4**.

Note: All nonhazardous foundry wastes may be disposed in a Municipal Solid Waste Landfill as a nonhazardous solid waste in accordance with Indiana's Solid Waste Land Disposal Facilities Rule (329 IAC 10) without obtaining a waste classification.

Titles of Rules and Guidance

Rules

- Solid Waste Land Disposal Facilities Rule (329 IAC 10)
- Hazardous Waste Management Permit Program (329 IAC 3.1)

Guidance

- "Storage of Type III Foundry Sands Prior to Legitimate Use" (ID No. WASTE-0027-NPD)
- "Use of Foundry Sands in Accordance with House Enrolled At 1541" (ID No. WASTE-0028- NPD)
- "Use of Foundry Sand in Land Application and as a Soil Amendment" (ID No. WASTE-040-NPD)
- "Understanding the Hazardous Waste Determination Process"
https://www.in.gov/idem/waste/files/hw_determination_process.pdf
- "Solid and Hazardous Waste Programs Analytical Deliverable Requirements: Supplemental Guidance"
https://www.in.gov/idem/waste/files/resource_sw_data_deliverable_reqs.pdf

Table I.

Parameters and Classification Ranges using TCLP Methods Parameter Concentrations

(mg/l)

	Type I	Type II	Type III	Type IV
Arsenic	<5.0	≤1.3	≤0.50	≤0.05
Barium	<100	≤25	≤10	≤1.0
Cadmium	<1.0	≤0.25	≤0.10	≤0.01
Chromium	<5.0	≤1.3	≤0.50	≤0.05
Lead	<5.0	≤1.3	≤0.50	≤0.05
Mercury	<0.2	≤0.05	≤0.02	≤0.002
Selenium	<1.0	≤0.25	≤0.10	≤0.01

Table II.

Parameters and Classification Ranges for the Leaching Method (Neutral) Parameter Concentrations

(mg/l)

	Type I	Type II	Type III	Type IV
Chlorides	*	≤6,300	≤2,500	≤250
Copper	*	≤6.3	≤2.5	≤.25
Cyanide (Total)	*	≤5.0	≤2.0	≤0.20
Fluoride	*	≤35	≤14	≤1.4
Iron	*	*	≤15.0	≤1.5
Manganese	*	*	≤.50	≤.05
Nickel	*	≤5.0	≤2.0	≤.20
Phenols	*	≤7.5	≤3.0	≤.30
Sodium	*	≤6,300	≤2,500	≤250
Sulfate	*	≤6,300	≤2,500	≤250
Sulfide (Total)	*	≤13.0	≤5.0	≤1.0
Total Dissolved Solids	*	≤12,500	≤5,000	≤500
Zinc	*	≤63	≤25	≤2.5
pH (Standard Units)	*	≥4.0-≤11.0	≥5.0-≤10.0	≥6.0-≤9.0

* Testing is not required

Table III
Parameters and Regulatory Limits Using TCLP Methods

EPA HAZ. WASTE NO.	CHARACTERISTIC/CONTAMINANTS	REG. LEVEL (mg/L)
D004	Arsenic	5.0
D005	Barium	100.0
D018	Benzene	0.5
D006	Cadmium	1.0
D019	Carbon Tetrachloride	0.5
D020	Chlordane	0.03
D021	Chlorobenzene	100.0
D022	Chloroform	6.0
D007	Chromium	5.0
D023	O-Cresol	200.0
D024	M-Cresol	200.0
D025	P-Cresol	200.0
D026	Cresol	200.0
D016	2,4-D	10.0
D027	1,4 -Dichlorobenzene	7.5
D028	1,2 - Dichloroethane	0.5
D029	1,1 - Dichloroethylene	0.7
D030	2,4 - Dinitrotoluene	0.13
D012	Endrin	0.02
D031	Heptachlor (and its Hydroxide)	0.008
D032	Hexachlorobenzene	0.13
D033	Hexachlorobutadiene	0.5
D034	Hexachloroethane	3.0
D008	Lead	5.0
D013	Lindane	0.4
D009	Mercury	0.2
D014	Methoxychlor	10.0
D035	Methyl Ethyl Ketone	200.0
D036	Nitrobenzene	2.0
D037	Pentachlorophenol	100.0
D038	Pyridine	5.0
D010	Selenium	1.0
D011	Silver	5.0
D039	Tetrachloroethylene	0.7
D015	Toxaphene	0.5
D040	Trichloroethylene	0.5
D041	2,4,5 - Trichlorophenol	400.0
D042	2,4,6 - Trichlorophenol	2.0
D017	2,4,5 - TP (Silvex)	1.0
D043	Vinyl Chloride	0.2