CITY OF EDINBURG SOLID WASTE MANAGEMENT

PERMIT AMENDMENT APPLICATION

Part IV, Appendix H

SPECIAL WASTE ACCEPTANCE PLAN

Edinburg Regional Disposal Facility

Edinburg, Hidalgo County, Texas

TCEQ Permit MSW-956C

GOLDER ASSOCIATES INC.
Professional Engineering Firm
Registration Number F-2578

INTENDED FOR PERMITTING PURPOSES ONLY

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1.0 INTRODUCTION & PURPOSE

1.1 Objectives of Special Waste Acceptance Plan (SWAP)

This Special Waste Acceptance Plan (SWAP) outlines the process that will be used to review, evaluate, and determine acceptance of all TCEQ-defined special wastes for the facility. This SWAP was developed in accordance with 30 TAC §§330.127(5)(A) and 330.171. This preventive program specifically provides for waste pre-acceptance procedures to assure that a particular waste is nonhazardous and can accepted and disposed pursuant to facility permit conditions, applicable regulations, and operating capabilities to ensure safe and environmentally sound management of the waste. The City has the authority to request any additional documentation, laboratory analysis, and waste sampling exceeding the requirements and guidelines of this SWAP to adequately characterize both waste-specific and site-specific wastes prior to pre-acceptance review. Upon review to determine if the waste is eligible for disposal at the landfill, the City may approve the acceptance of waste; however the City is not obligated nor required to accept any waste.

It is important to note that this SWAP provides the "how to" of the process that will be used to review, evaluate, and determine acceptance of special wastes. This SWAP does not establish the "what" regarding which particular waste streams will or will not be accepted, as those are established elsewhere in the permit. The facility-specific waste streams that are allowed to be accepted are identified in the Part II, Waste Acceptance Plan. In addition to municipal solid waste (MSW), other solid wastes authorized to be accepted include Class 2 and Class 3 non-hazardous industrial solid waste, special waste, and other waste as approved by the TCEQ. The prohibited wastes that shall not be accepted are identified in Part II, Waste Acceptance Plan.

With respect to several major categories of waste streams, the following is noted here for emphasis:

- Regulated hazardous waste will not be accepted (however, household hazardous wastes and hazardous wastes from conditionally exempt small quantity generators are permissible); and
- Class 1 nonhazardous industrial waste (Class 1 waste) as defined in 30 TAC 330.3 (21) will not be accepted (however, solid waste classified as Class 1 waste only because of asbestos content is permissible).

TCEQ Guidance Documents included in Appendix IVH-3 for acceptance and disposal of wastes are as follows:

- RG-003 - Disposal of Special Wastes Associated with the Development of Oil, Gas, and Geothermal Resources
- RG-022 - Guidelines for the Classification & Coding of Industrial & Hazardous Waste
- RG-029 - Special Waste Regulations in Texas
- RG-486 - Disposal of Exempt Waste That Contains Radioactive Material

The remainder of this SWAP describes the procedures that will be in place and used to evaluate, approve and accept special waste for disposal at the facility.

1.2 Special Waste Definitions

30 TAC §330.3(148)

Special waste is any solid waste or combination of solid wastes that because of its quantity, concentration, physical or chemical characteristics, or biological properties requires special handling and disposal to protect the human health or the environment. If improperly handled, transported, stored, processed, or disposed of or otherwise managed, special waste may pose a present or potential danger to the human health or the environment. Special wastes are as defined by 30 TAC §330.3(148) and include the following:

Table IVH-1: Special Waste Definitions

Special Waste	Citation
Hazardous waste from conditionally exempt small-quantity generators that may be exempt from full controls under 30 TAC §335, Subchapter N	30 TAC §330.3(148)(A)
Class 1 industrial nonhazardous waste	30 TAC §330.3(148)(B)
Untreated medical waste	30 TAC §330.3(148)(C)
Municipal wastewater treatment plant sludges, other types of domestic sewage treatment plant sludges, and water-supply treatment plant sludges	30 TAC §330.3(148)(D)
Septic tank pumpings	30 TAC §330.3(148)(E)
Grease and grit trap wastes	30 TAC §330.3(148)(F)
Wastes from commercial or industrial wastewater treatment plants; air pollution control facilities; and tanks, drums, or containers used for shipping or storing any material that has been listed as a hazardous constituent in 40 CFR Part 261, Appendix VIII but has not been listed as a commercial chemical product in 40 CFR §261.33(e) or (f)	30 TAC §330.3(148)(G)
Slaughterhouse wastes	30 TAC §330.3(148)(H)
Dead animals	30 TAC §330.3(148)(I)
Drugs, contaminated foods, or contaminated beverages, other than those contained in normal household waste	30 TAC §330.3(148)(J)
Pesticide (insecticide, herbicide, fungicide, or rodenticide) containers	30 TAC §330.3(148)(K)
Discarded materials containing asbestos	30 TAC §330.3(148)(L)
Incinerator ash	30 TAC §330.3(148)(M)
Soil contaminated by petroleum products, crude oils, or chemicals in concentrations of greater than 1,500 milligrams per kilogram total petroleum hydrocarbons; or contaminated by constituents of concern that exceed the concentrations listed in Table 1 of 30 TAC §335.521(a)(1)	30 TAC §330.3(148)(N)
Used oil	30 TAC §330.3(148)(O)
Waste from oil, gas, and geothermal activities subject to regulation by the Railroad Commission of Texas when those wastes are to be processed, treated, or disposed of at a solid waste management facility authorized under this chapter	30 TAC §330.3(148)(P)

Special Waste	Citation
Waste generated outside the boundaries of Texas that contains any industrial waste; any waste associated with oil, gas, and geothermal exploration, production, or development activities; or any item listed as a special waste	30 TAC §330.3(148)(Q)
Lead acid storage batteries	30 TAC §330.3(148)(R)
Used-oil filters from internal combustion engines	30 TAC §330.3(148)(S)

1.3 Prohibited Wastes

30 TAC §330.15(e)

The following waste as identified in 30 TAC §330.15(e) are prohibited and will not be accepted at the facility:

Table IVH-2: Prohibited Wastes

Special Waste	Citation
A lead acid storage battery shall not be intentionally or knowingly offered by a generator or transporter for disposal at an MSW landfill or incinerator, and/or shall not be intentionally or knowingly accepted for disposal.	30 TAC §330.15(e)(1)
Do-it-yourself used motor vehicle oil shall not be intentionally or knowingly offered by a generator or transporter for disposal at an MSW landfill or MSW incinerator, either by itself or mixed with other solid waste, and/or shall not be intentionally or knowingly accepted for disposal. It is an exception if the mixing/commingling is incidental to, and the unavoidable result of, the mechanical shredding of motor vehicles, appliances, or other items of scrap, used, or obsolete metals.	30 TAC §330.15(e)(2)
Used oil filters from internal combustion engines will not be intentionally or knowingly accepted for disposal at this facility except as provided in 30 TAC §330.171(d).	30 TAC §330.15(e)(3)
Whole used or scrap tires will not be intentionally or knowingly accepted for disposal unless processed prior to disposal in a manner acceptable to the TCEQ or otherwise approved by the agency (e.g., variance). Scrap tires identified during landfill operations and generated through maintenance will be accumulated on site by placing them in containers or trailers prior to shipment. The total quantity of tires will not exceed 500 scrap tires (or weight equivalent tire pieces) on the ground, or 2,000 scrap tires in containers. Tire containers will be kept on landfill property, but the location of the containers will vary to allow operational flexibility, ease of access, and safe landfill operations. Tires and tire pieces stored outside of buildings at the site will be monitored for vectors at least once every two weeks. Manifests will be used for shipment of scrap tires offsite.	30 TAC §330.15(e)(4)
Refrigerators, freezers, air conditioners, and any other items containing chlorinated fluorocarbons (CFC) will not be knowingly accepted for disposal unless all the CFC contained in that item is captured and sent to an approved CFC disposal site or recycling facility. If the CFC is not removed from the item, then the whole item must be sent to an approved CFC disposal site. Such items that enter the facility with ruptured lines or holes in the CFC unit will not be accepted unless the generator or transporter	30 TAC §330.15(e)(5)

Special Waste	Citation
provides written certification that the CFC has been evacuated from the unit and that it was not knowingly allowed to escape into the atmosphere.	
Liquids Restrictions. The following wastes are prohibited from disposal: (a) Bulk or non-containerized liquid waste will not be accepted for disposal unless the waste is household waste other than septic waste. (b) Containers holding liquid waste shall not be accepted for disposal unless: (i) The container is a small container similar in size to that normally found in household waste; (ii) The container is designated to hold liquids for use other than storage; or (iii) The waste is household waste.	30 TAC §330.15(e)(6)
Regulated hazardous waste as defined in 30 TAC §330.3.	30 TAC §330.15(e)(7)
Polychlorinated biphenyls (PCB) wastes, as defined under 40 Code of Federal Regulations Part 761.	30 TAC §330.15(e)(8)
Radioactive materials as defined in 30 TAC §336, except as authorized in 30 TAC §336 or that are subject to an exemption of the Department of State Health Services.	30 TAC §330.15(e)(9)

1.4 Wastes Not Requiring Prior Written Approval

30 TAC §§330.171(c), 330.171(d), 330.173(c), 330.173 (i), & 330.173(j)

Receipt of the following wastes does not require the waste-specific or site-specific review detailed in the §2.0 Special Waste Evaluation Program of this SWAP. Specifically, the wastes identified in Table IVH-3, Wastes Not Requiring Prior Written Approval will be accepted for disposal at the facility without the necessity for any waste-specific or site-specific approvals. They will be managed at the facility in accordance with the techniques set forth in 30 TAC §§330.171(c), 330.171(d), 330.173(c), 330.173 (i), & 330.173(j) and this SWAP, including the waste handling and disposal criteria identified in Appendix IVH-1, Waste-Specific Special Waste Management Procedures.

Appendix IVH-1, Waste Specific Special Waste Management Procedures provides a concise description of the waste-specific management procedures for the categories of special waste specifically identified in 30 TAC §330.3(148) as well as for other categories of solid waste mentioned in 30 TAC §§330.171, 330.173 and 330.15(e). The intent of Appendix IVH-1, Waste Specific Special Waste Management Procedures is to provide a user-friendly format to readily identify common categories of special waste and other solid waste and the requirements that apply for its acceptance process and management. Specifically, the second row of each table entry on Appendix IVH-1 (entitled “Evaluation Method”) indicates whether each given special waste category requires prior written waste-specific or site-specific authorization before disposal, or not. It also indicates whether the Special Waste Evaluation Program described in §2.0, Special

Waste Evaluation Program of this SWAP is applicable to each listed special waste or other solid waste category.

Table IVH-3: Special Waste Not Requiring Prior Written Approval

Category of Special Waste	Citation
Medical wastes that have not been treated in accordance with the procedures specified in 30 TAC §326 (only if authorized by the Executive Director when a situation exists that requires disposal of untreated medical wastes in order to protect the human health and the environment from the effects of a natural or man-made disaster).	30 TAC §330.171(c)(1)
Dead animals and/or slaughterhouse waste.	30 TAC §330.171(c)(2)
Regulated asbestos-containing material (RACM) as defined in 40 CFR §61.	30 TAC §330.171(c)(3)
Nonregulated asbestos-containing materials (non-RACM)	30 TAC §330.171(c)(4)
Empty containers that have been used for pesticides, herbicides, fungicides, or rodenticides.	30 TAC §330.171(c)(5)
Municipal hazardous waste from a conditionally exempt small quantity generator (CESQG), provided the amount of waste does not exceed 220 pounds (100 kilograms) per month per generator.	30 TAC §330.171(c)(6)
Sludge, grease trap waste, grit trap waste, or liquid wastes from municipal sources (only if the material has been, or is to be, treated or processed and the treated/processed material passes the Paint Filter Liquids Test and is certified to contain no free liquids; it may be accepted for on-site processing/solidification at the liquid waste stabilization area prior to disposal).	30 TAC §330.171(c)(7)
Used oil filters from internal combustion engines (only if properly crushed/processed and offered for disposal by a household generator).	30 TAC §330.171(d)
Wastes that are Class 1 only because of asbestos content.	30 TAC §330.173(c)
Class 2 industrial solid waste that does not interfere with facility operation.	30 TAC §330.173(i)
Class 3 industrial solid waste that does not interfere with facility operation.	30 TAC §330.173(j)

1.5 Waste-Specific and/or Site-Specific Waste Acceptance

30 TAC §§330.171(b), 330.171(b)(1), & 330.171(b)(6)

The acceptance of a special waste as defined in §1.2, Special Waste Definitions and Table IVH-1, Special Waste Definitions, excluding those special wastes identified in §1.3, Prohibited Wastes and Table IVH-2, Prohibited Wastes, and any special wastes that are not specifically identified in §1.4, Wastes Not Requiring Prior Written Approval will require prior written approval from the TCEQ's Executive Director (or authorized designee). Such approvals for acceptance and/or disposal of special waste will be waste-specific and/or site-specific. The TCEQ may revoke an authorization to accept a particular special waste if the City does not maintain compliance with these rules or conditions imposed in the authorization to accept special waste.

2.0 SPECIAL WASTE EVALUATION PROGRAM

2.1 Overview

The Special Waste Evaluation Program (SWEP) obligations described in this section of the SWAP are not applicable to the acceptance of municipal solid waste or any special waste or other materials authorized for disposal under 30 TAC §330.171(c)-(d) and §330.173(c) and (i)-(j) as discussed in §1.4, Wastes Not Requiring Prior Written Approval and Table IVH-3, Wastes Not Requiring Prior Written Approval.

In accordance with 30 TAC §§330.15, 330.127(5)(A), §§330.171-330.173, and §§335.503-335.505, the City has developed this SWEP program to prevent the receipt of hazardous waste, PCB waste, unauthorized Class 1 waste, and other prohibited wastes at the landfill. This proactive policy, in conjunction with random inspections on incoming loads, minimizes the potential that hazardous or otherwise unacceptable waste will be transported to the site for disposal. Implementation of the program provides protection from the potential dangers that a particular special waste could pose to employees, the public, or the environment through improper management and serves as a screening mechanism that minimizes the potential of these prohibited waste streams entering the landfill.

2.2 Request for Approval to Accept Other Types of Special Waste

30 TAC §§330.171(b)(2) & 330.171b(5)

Other categories or types of special waste that are not identified in Appendix IVH-1, Waste Specific Special Waste Management Procedures must receive prior written waste-specific and/or site-specific approvals from the TCEQ's Executive Director prior to acceptance. The TCEQ may authorize the receipt of such other special waste with a written concurrence from the City; however, the City is not required to accept the waste.

After the TCEQ's written approval has been received for a particular "other" type of special waste, the subsequent acceptance review process for the same type of special waste will follow this SWEP. Handling and disposal of each particular "other" type of special waste authorized for acceptance by the TCEQ will be in accordance with the conditions included in the TCEQ authorization for that type of waste.

Requests for approval to accept special wastes must be submitted by the generator to the TCEQ or to the facility with an approved plan and must include, but are not limited to, the following:

2.2.1 Special Waste Characteristics

30 TAC §330.171(b)(2)(A)

A complete description of the chemical and physical characteristics are required including laboratory analyses and information about a waste and the process which generates that waste as discussed in §3.0,

Analytical Information of this SWAP. The description must also include a statement as whether or not the waste is a Class 1 industrial waste as defined in 30 TAC §330.3 and the quantity and rate at which each waste is produced and/or the expected frequency of disposal.

2.2.2 Hazardous Waste Determination and Class 1 Waste Determination

30 TAC §330.171(b)(2)(B)

In addition to a Class 1 determination pursuant to 30 TAC §335.505, a hazardous waste determination pursuant to 30 TAC §335.504 as required by 30 TAC §335.6(c) will be performed for the special wastes offered for disposal at the landfill. Regulated hazardous waste (excluding household hazardous waste and hazardous wastes from conditionally exempt small quantity generators) and Class 1 industrial wastes (except wastes that are Class 1 only because of their asbestos content) are prohibited for acceptance. Records of determination will be maintained in the SOR either electronically and/or in hardcopy format as discussed in §5.0, Documentation and Recordkeeping of this SWAP and will be made available for review at the request of TCEQ.

2.2.3 Handling Procedures

30 TAC §330.171(b)(2)(C)

An operational plan containing the proposed procedures for handling waste and listing required protective equipment for operating personnel and on-site emergency equipment is required to accompany the request. Handling and disposal of the special waste authorized for acceptance by the TCEQ will be in accordance with the conditions included in the TCEQ authorization for that type of waste.

2.2.4 Contingency Plan

30 TAC §330.171(b)(2)(D)

A contingency plan outlining responsibility for containment and cleanup of any accidental spills occurring during the delivery and/or disposal operation is required to accompany the request. The contingency plan will be implemented for the containment and cleanup of any accidental spill of the waste.

2.3 Special Waste Acceptance Process

Prior to acceptance of any waste for disposal, information provided by the generator is screened to determine if the wastes meet the definition of "Special Waste." Should any waste be identified as a special waste the customer is required to state the characteristics and origin of the special waste proposed for disposal, if not already provided. In addition, if the waste is not readily identifiable, the generator will be required to provide other pertinent information regarding the waste that might aid in its identification. The following process is completed before waste is accepted:

- The generator provides documentation of the nature of the waste stream to the landfill by submitting the Generator's Waste Profile (GWP) and the waste classification checklist provided in TCEQ's RG-022, Guidelines for the Classification and Coding of industrial and Hazardous Wastes, and any required laboratory analyses data to support classification. Submittals which may be electronic or hardcopy in form or other similar documentation (an example Generator Waste Profile Form that may be used is provided in Appendix H-2). The customer may be required to provide laboratory analyses data for the waste stream intended for disposal. If the generator is an industrial facility that is required to have specific waste codes assigned, whether self-assigned, TCEQ-assigned, or EPA-assigned, documentation used to assign the waste classifications must be provided for review. Dependent on the waste stream, sufficient documentation may be available in the GWP. Form documents for submittal are:
  - Appendix H-2, GWP
  - Appendix H-3, RG-022
- The Director of Solid Waste Management (DSWM) or designee will review the electronic or hardcopy GWP and all information provided by the generator. This process may include an electronic review of certain standardized (express) profiles. The DSWM or designee implements the Special Waste Acceptance Plan including the review and approval for the acceptance of special waste.

Pre-acceptance review will ensure that the analytical information when applicable meets the requirements, TCEQ approval is given when appropriate, the necessary conditions/limitations on managing the waste are assigned, and if the waste is eligible for disposal at the landfill. If the waste is deemed eligible, an approval is granted, an expiration date is assigned, and all information is routed to the designated customer service representative. The customer will be informed of all conditions/limitations that apply to managing the special waste. The customer must comply with all conditions/limitations specified by the City.

3.0 ANALYTICAL INFORMATION

The laboratory analyses that will be required for review is dependent upon the type of waste stream to be disposed. Analytical data used to make a determination regarding a waste will use an EPA or TCEQ approved methodology and laboratory. Proper analytical results or equivalent information (i.e., 40 CFR §262.11 allows generator's knowledge of the waste and process generating the waste) must be obtained to ensure that the facility is not managing hazardous waste or other prohibited wastes. The generator is responsible for ensuring that a sample is representative of the waste stream and is analyzed in accordance with the appropriate methodology and laboratory prior to submitting the data for review.

Information about a waste and the process which generates that waste will be used to evaluate or assist in the evaluation of a special waste. Examples of such information include, but are not limited to, Material Safety Data Sheets (MSDS), manufacturers' literature, analytical results (e.g., an analysis may demonstrate that the potential constituents of concern are not present in the waste and therefore could not leach above the levels of concern), knowledge of how the waste was generated (e.g., a filter was used in painting

operations and therefore does not contain any pesticides), and other such information generated in conjunction with a particular waste generation activity or process.

- When using "process knowledge" to address one or more special waste evaluation criteria, the requirements of 30 TAC §335.511 shall be followed.
- In addition to above, all information that is used to evaluate special wastes shall be documented in accordance with 30 TAC §335.513.

Analytical reports and/or sampling documentation must clearly identify the generator and/or customer, description of the material sampled and analyzed, sample collection date and location, and when analyses were conducted.

The reference of methods employed must accompany the analytical data and be EPA/TCEQ approved method(s), as applicable. Laboratory QA/QC information must accompany the data submitted and may include sample handling, containerization and preservation techniques, chain of custody records, data on standards, duplicate analyses, spikes and blanks, and other pertinent statistical information.

Special waste that is delivered to the facility for disposal will receive a visual QA/QC inspection to verify contents and nature of waste. This inspection will take place either at the gatehouse or at the working face while the waste is being unloaded by personnel trained in prohibited waste identification. Should visual inspection detect unusual characteristics, additional QA/QC will be performed or the load will be rejected.

Waste containing free liquids as determined using the Paint Filter Liquids Test (EPA Method 9095: Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, EPA Publication No. SW-846) will not be accepted for direct disposal unless it is: (i) bulk or noncontainerized liquid waste that is household waste other than septic waste, or leachate or gas condensate derived from the facility and managed/disposed of in accordance with the Part III, Site Development Plan or (ii) containerized liquid waste that is in a small container similar in size to that normally found in household waste, in a container that is designed to hold liquids for use other than storage, or that is household waste. Other than these exceptions, if a waste contains free liquids or is otherwise not certified as passing the Paint Filter Test, it will not be accepted for direct disposal, but is allowed to be accepted for on-site solidification/processing, provided that the waste is an approved waste stream and that it is processed in accordance with the approved operational procedures included in §8.2.2, On-Site Liquid Waste Processing of this SWAP.

4.0 WASTE APPROVAL UPDATES

The GWP for special wastes will be assigned an expiration date not to exceed three years unless otherwise required or approved by the TCEQ. The City of Edinburg requires the generator/customer to provide notification and additional process and/or chemical analysis data in the event there are changes in the process from which the waste is produced. At a minimum, all special waste streams approved and accepted

for disposal will be reevaluated prior to the expiration date or if the generator submits additional information after a process change, to include an electronic review if there is no change in process or additional information. Updated analytical data for representative samples collected within recent year may be requested but may not be required for the renewal if the generator certifies that there has not been a change in process.

5.0 DOCUMENTATION AND RECORDKEEPING

Shipping documentation for profiled wastes that arrive at Edinburg Regional Disposal Facility for management is provided to the facility upon arrival. Waste specific information included in the GWP, including any special handling or other requirements is also made available to the facility, hard copy and/or electronically. If the waste and associated documentation is missing, incomplete, or the characteristics of the waste are questionable, all discrepancies must be resolved prior to acceptance of the waste, as outlined in §6.0, Waste Discrepancies and Rejected Loads of this SWAP. All necessary and required paperwork relating to the acceptance of special waste will be maintained in the site operating record either electronically and/or in hardcopy format, and will be furnished upon request to the TCEQ Executive Director and must be made available for inspection/review by the TCEQ Executive Director. Refer to Appendix IVH-2, Example Generator Waste Profile (GWP) Form for an example of a GWP. As the result of potential future revisions, the format and/or information contained in the GWP may change.

6.0 WASTE DISCREPANCIES AND REJECTED LOADS

Gatehouse personnel screen all industrial generators to ensure that all special waste represented by the GWP has been identified and that all required paperwork, approvals, and documentation are in place. If any associated documentation is missing, incomplete, or the characteristics of the waste are questionable, all discrepancies must be resolved prior to acceptance of the waste. In the event the discrepancies cannot be resolved, the waste load will be rejected. All waste discrepancies must be resolved before a waste can be accepted for disposal.

In the event that the description or physical characteristics of a waste being received at the facility differs from that of an approved waste stream or if previously unidentified waste is suspected, the load will be stopped and the generator/customer will be asked to provide additional process knowledge and/or chemical analysis data in order to determine the proper identity of the waste. That information will be reviewed and approved by the facility, the Director of Solid Waste Management (DSWM), or their designee for acceptance or rejection, depending on the nature of the discrepancy (e.g. administrative versus waste composition issues). Copies of the discrepancy resolution, including updated or missing documentation, will be maintained by the site in accordance with §5.0, Documentation and Recordkeeping of this SWAP.

Should an incident occur where hazardous waste, PCB wastes, radioactive or other prohibited wastes are suspected or discovered, the waste will not be authorized for disposal but will instead be rejected or isolated

until the material can be adequately identified to determine the proper disposition/remediation of the material and the appropriate handling procedures. During this identification process, the generator/customer will be contacted to determine the identity of the material. If the material is determined to be hazardous waste or contain regulated levels of PCB or radioactive material, the TCEQ will be notified of the incident and the planned disposition/remediation of the material. The proper disposition/remediation of the prohibited hazardous, PCB, or radioactive waste will be specific to the waste and will be implemented upon TCEQ concurrence and approval.

7.0 TRAINING OF PERSONNEL AND WASTE SCREENING

In addition to the implementation of this SWAP, which provides for specific and detailed pre-acceptance procedures to prevent the receipt of hazardous waste, PCBs, and other prohibited wastes, appropriate facility personnel will receive training to recognize potential hazardous waste, PCBs, or other prohibited wastes. The City provides in-house training to key site personnel, gatehouse personnel and field personnel. This in-house training is function specific and may include Subtitle D requirements, state specific requirements, regulations and procedures, waste recognition and/or waste screening requirements and procedures for acceptable and unacceptable wastes, definition and identification of special wastes, hazardous waste, PCB wastes or other prohibited waste, and the requirements and procedures of this SWAP. Appropriate landfill operations personnel will be trained in the proper use of PPE and on-site emergency equipment. Proper PPE includes a work uniform, work boots, and safety vest. Additional PPE may include Tyvek (or equivalent) suit or coveralls, hardhat, hearing protection, gloves, and safety glasses as conditions warrant. Documentation and a record of all training provided to key facility personnel will be maintained on site in the site operating record and available for inspection.

This required training allows for the monitoring of waste streams as they enter the facility, as well as during disposal, under the supervision of properly trained site personnel. Upon arrival at the site, appropriate gatehouse personnel screen all industrial customers to ensure that all special waste represented by the GWP has been identified and that all required paperwork, approvals, and documentation are in place. In the event that the description or physical characteristics of a waste being received at the landfill differ from that of an approved waste stream, or if a previously unidentified waste is suspected, the load will be stopped and the generator will be required to provide additional process and/or chemical analysis data in order to determine the proper identity of the waste. Upon arrival at the working face and during the unloading of an industrial customer's waste, appropriate field personnel screen the waste for signs of any waste that may exhibit signs of being hazardous or otherwise prohibited waste.

Household hazardous wastes are exempt from regulation under 40 CFR 261.4(b)(1) and under 30 TAC §335.401-335.419. Notwithstanding this exemption, shipments of residential waste can be screened and visually monitored for hazardous wastes other than those contained in normal household waste upon arrival

at the gatehouse and during unloading at the working face or citizen's collection station by the appropriate gatehouse and field personnel.

During the waste screening process by the appropriate field and gatehouse personnel, items to consider and look for may include the type of transport vehicle, signs of liquids or leaking liquids, strange odors, non-household size containers, smoke, vapors, unusual color or content, unusual compaction, excessive liquids, powders or abnormal products, unusual or prohibited signage or labeling, and body language of driver (i.e., suspicious or nervous appearance or actions).

Should an incident occur where hazardous waste, PCB waste prohibited from Subtitle D land disposal, or other prohibited wastes are suspected or discovered, the waste will not be authorized for disposal but will instead be isolated until the material can be adequately identified to determine the proper disposition/remediation of the material and the appropriate handling procedures. During this identification process, the facility will make a reasonable attempt to determine the identity of the generator of the material.

If the generator is identified, they will be contacted to determine the identity of the material. If the material is determined to be a non-acceptable waste for the facility, the waste will be returned to the generator for proper disposal. The proper disposition/remediation of the prohibited waste will be specific to the waste.

If the generator cannot be identified, the facility will take reasonable steps to determine the identity of the material. If the material is determined to be a hazardous waste, PCB waste, or other prohibited material, the TCEQ will be notified of the incident and the planned disposition/remediation of the material. The facility will make the necessary arrangements for proper disposition/remediation of the waste.

8.0 OPERATIONAL PROCEDURES

8.1 Arrival Acceptance Procedures

Special waste delivered to the landfill for disposal will be checked against the pre-acceptance information to match the contents and nature of waste. The gate attendant will monitor the loads by observing the vehicle, and/or inspecting the load, and/or questioning the driver concerning the origin of the waste. Additional QA/QC may include pH testing, ignitability testing, and paint filter testing. If conducted, QA/QC results will be recorded and referenced by manifest document number and maintained in the site operating records. Wastes requiring special handling are diverted to the appropriate special management area.

8.2 Special Waste Handling Procedures

8.2.1 General

Special wastes approved for receipt at this facility and accepted in accordance with the procedures described in the SWAP will be managed in accordance with the handling and disposal criteria provisions

applicable to that waste as presented in Appendix IVH-1, Waste Specific Special Waste Management Procedures. In general, special wastes will be handled and disposed of at the site in a similar manner as municipal solid waste. The special waste will off-loaded from transport trucks and disposed of at the appropriate unloading area/working face identified in the SOP based on how the waste is classified (e.g., MSW working face, regulated asbestos-containing material (RACM) disposal area, liquids stabilization area). The special waste will then be placed and spread using standard landfill equipment listed in the SOP. Specific handling/disposal procedures for certain wastes will be in accordance with the TCEQ regulations governing their proper disposal and as described further in Appendix IVH-1, Waste Specific Special Waste Management Procedures of this SWAP. For emphasis, the subsections below identify wastes of a certain type or composition that require specific handling and disposal procedures.

8.2.2 On-Site Liquid Waste Processing

30 TAC §330.171(b)(3)

The facility is authorized to perform on-site liquid waste processing. Liquid wastes will be directed to the on-site liquid stabilization processing area prior to being disposed of in the landfill.

8.2.3 Odorous Wastes and Potentially Dusty/Windblown Wastes

The facility will follow the Odor Management Plan presented in §4.14, Odor Management Plan of the SOP. Wastes with strong odors (such as dead animals, slaughterhouse wastes, sewage sludges, etc.), will be covered immediately upon disposal. These wastes may be placed in a select area of the working face to facilitate covering them immediately. See Appendix IVH-1, Waste Specific Special Waste Management Procedures of this SWAP for specific cover requirements that apply to dead animals and slaughterhouse wastes.

Potentially dusty (or otherwise prone to becoming windblown/airborne) special wastes will be transported and unloaded so as to minimize the potential for airborne particles. This includes positioning windbreaks at the working face, placing the dusty/windblown-prone special waste in contingency trenches or requiring the generator to containerize the waste. If needed, personnel may be required to wear personal protective equipment (PPE).

8.2.4 Asbestos Waste (RACM)

RACM will be managed, handled, and disposed of at the facility in accordance with the provisions and requirements of the Regulated Asbestos Containing Material Handling Plan (Appendix IVG of the SOP).

9.0 CONTINGENCY PROCEDURES

For incidental spills that do not pose a threat to waters of the state, operations staff will contain and clean up the spill using appropriate equipment at the direction of the landfill manager. For solids, site staff will

use shovels, brooms, and/or heavy equipment to pick up spilled materials. For liquids, typical cleanup materials would include oil dry, absorbent pads, or other available materials to contain the spilled material. Spill cleanup kits are maintained on site. Pumps might also be used, when appropriate, to transfer liquid material from the spill area into containers.

For larger spills, or where there is potential for the waste to impact waters in the state, the landfill manager will assess the situation and determine the appropriate means to contain and collect the material. If spilled material threatens to impact storm water discharge from the site, the landfill manager will use booms or diversionary dikes, or excavate holes or pits as needed to contain the spilled material. Equipment typically available for spill response includes excavators, backhoes, dozers, pumps, and haul trucks. In the event of a spill that cannot be picked up using handheld tools, this equipment will be used as needed to contain and collect spilled material. For larger spills of liquid wastes that cannot be adequately cleaned up with on-site equipment, an emergency cleanup contractor or vacuum truck company will be contacted to assist with cleaning up the spill. Once the liquids are removed, a visual inspection of the spill area will be made, and soils observed to be potentially impacted will be over-excavated and disposed with the collected material.

APPENDIX IVH-3

TCEQ GUIDANCE DOCUMENTS

RG-003

DISPOSAL OF SPECIAL WASTES ASSOCIATED WITH THE DEVELOPMENT OF OIL, GAS, AND GEOTHERMAL RESOURCES

TCEQ REGULATORY GUIDANCE

Waste Permits Division
RG-003 • September 2006

Disposal of Special Wastes Associated with the Development of Oil, Gas, and Geothermal Resources

This document provides recommendations for the management of special wastes associated with the exploration, development, or production of oil, gas, or geothermal resources that are regulated by the Railroad Commission of Texas (RRCT) and that are being disposed of in landfills permitted by the Municipal Solid Waste (MSW) Permits Section of the Texas Commission on Environmental Quality (TCEQ) in accordance with Title 16, Texas Administrative Code, Section 3.30, and 30 TAC 330.3(148)(P). Some of the special wastes listed below require written authorization for disposal. Column 5 details the requirements for special waste disposal.

Description of Waste Items	RCRA Exempt per 40 CFR Part 261.4(b)(5) (see Note 1)	RRCT Authority Required for Disposal in TCEQ Landfill?	Treatment or Testing Recommended (see Note 2)	TCEQ Approval Required Prior to Disposal / Other Options
Asbestos-containing material	No Subject to specific regulations	Yes	Comply with Federal & State regulations for removal & disposal	No per §330.171(c)
Bags (empty), paper	No	No	None	No
Brush & vegetation from clearing land, uncontaminated	No	No	None	No / Disposal in Type IV landfill, compost facility
Buckets, detergent (empty)	No	No	None	No / Recycle
Buckets, grease (empty)	No	No	None	No / Recycle
Concrete, contaminated from compressor stations, oil, or gas facilities	No	Yes	Test for COCs on a case-by-case basis	Yes
Concrete, uncontaminated	No	No	None	No / Disposal in Type IV landfill
Containers (empty)	No	No	None	No / Recycle
Drill cuttings	Yes	Yes	Test for COCs on a case-by-case basis	Yes
Barrels, drums, 5-gallon buckets (empty)	No	No	None	No / Recycle
Fiberglass tanks & pipe (empty)	No	No	Clean, cut or shred	No
Filters—amine, dehydration, glycol	Yes	Yes	Drain, air dry for 48 hrs., test for TPH & benzene	Yes
Filters—cooling tower	Yes (No, if generated in transportation)	Yes	Drain, air dry for 48 hrs., test for chromium	Yes
Filters—saltwater	Yes	Yes	Drain, air dry for 48 hrs., test for pH, TPH, & chlorides	Yes
Filters— waste oil (1) entire unit is inside	No	Yes	Separate parts, recycle oil & metal parts	Yes

Description of Waste Items	RCRA Exempt per 40 CFR Part 261.4(b)(5) (see Note 1)	RRCT Authority Required for Disposal in TCEQ Landfill?	Treatment or Testing Recommended (see Note 2)	TCEQ Approval Required Prior to Disposal / Other Options
metal container				
(2) replaceable fiber or paper filter inside unit	No	Yes	Drain for at least 24 hrs., recycle, waste-to-energy, test for lead & benzene	Yes
Iron sponge	Yes	Yes	Allow to oxidize completely to prevent combustion	Yes
Office trash, routine	No	No	None	No / Recycle
Metal plates, pipes, cable	No	No	None	No / Recycle
Molecular sieves	Yes	Yes	Cool in non-hydrocarbon, inert atmosphere; hydrate in ambient air for 24 hrs., test for TPH & benzene	Yes
Muds—drilling	Yes	Yes	Test for barium, TPH, & BTEX; treatment to reduce hydrocarbons may be required	Yes
Muds—sacks of unused drilling mud	No	Yes	Return to vendor, use at other sites	Yes
Muds—unused additives	No	Yes	MSDS, test for barium	Yes
"Pigging waste" from gathering lines in primary field operations	Yes	Yes	MSDS for corrosion inhibitors, test for TPH, benzene, RCRA metals, & NORM	Yes
"Pigging waste" from transmission lines	No	Yes	MSDS for corrosion inhibitors, TPH, benzene, & arsenic	Yes
Pipe scale & other deposits removed from piping & equipment	Yes (No, if generated in transportation)	Yes	Test for TPH, RCRA metals, & NORM	Yes
Pipe dope, unused	No	Yes	MSDS (may contain lead), re-use if possible	Yes
Plastic pit liners	Yes	Yes	Decontaminate	No
Pumps, valves, etc.	No	No	Test for NORM	No / Recycle
Rags & gloves, soiled	No	No	None	No
Sand—produced during exploration	Yes	Yes	Test for TPH, benzene, & NORM	Yes
Soil—containing crude oil hydrocarbon	Yes (No, if generated in transportation)	Yes	Test for TPH & benzene	Yes
Soil—containing lube oil hydrocarbons	No	Yes	Test for cadmium, chromium, lead, TPH, benzene, PCBs	Yes
Sulfur—ferrous elemental sulfur & soil contaminated with sulfur	No	Yes	Recover sulfur	Yes
Sorbent pads—crude oil & other exempt wastes	Yes	Yes	Test for TPH & benzene	Yes
Sorbent pads—lube oil & other nonexempt wastes	No	Yes	Test for TPH & benzene	Yes
Tank seals—rubber	No	Yes	Allow to drain	Yes / Recycle

Description of Waste Items	RCRA Exempt per 40 CFR Part 261.4(b)(5) (see Note 1)	RRCT Authority Required for Disposal in TCEQ Landfill?	Treatment or Testing Recommended (see Note 2)	TCEQ Approval Required Prior to Disposal / Other Options
Tower packing	No	Yes	Test for chromium	Yes / Recycle
Water-treatment backwash solids	Yes	Yes	Test for RCRA metals & NORM	Yes
Wooden pallets, uncontaminated	No	No	None	No / Disposal in Type IV landfill

1. The scope of the RCRA exemption for oil and gas wastes is limited to drilling fluid and cuttings, produced water, and other waste unique or intrinsic to exploration and production in "primary field operations." Guidance for determining whether an oil and gas waste is exempt or nonexempt, including the definition of "primary field operations," is available in the Railroad Commission's manual, *Interim Guidance for Statewide Rule 98* (available online at <www.rrc.state.tx.us/divisions/og/swr98/index.html>). Oil and gas waste is always nonexempt when generated in transportation operations (i.e., downstream of primary field operations).
2. A less expensive alternative to the toxicity characteristic leaching procedure (TCLP) analysis is a total constituent analysis. If a total (i.e., total lead, total benzene, etc.) exceeds the example limits listed below or exceeds 20 times the TCLP limit for a Class 2-like waste, then the TCLP must be performed and the TCLP results must not exceed the stated limits for disposal in a standard MSW Type I landfill unit. For TCLP results that exceed the example limits listed below but do not exceed a hazardous limit, the waste may be authorized for disposal into an MSW Type I landfill with a Class 1 industrial waste unit. More TCLP limits can be found on Table 1, Appendix 1 of 30 TAC 335 Subchapter R:

Constituent	Total Limit (mg/kg)	MSW Type I TCLP Limit (mg/L)	Hazardous Waste TCLP Limit (mg/L)
Benzene	10	0.5	0.5
Arsenic	36	1.8	5.0
Barium	2,000	100	100
Cadmium	10	0.5	1.0
Chromium	100	5.0	5.0
Lead	30	1.5	5.0
Mercury	4	0.2	0.2
Selenium	20	1.0	1.0
Silver	100	5.0	5.0

There are additional constituent analyses that can limit the options for disposal into an MSW Type I landfill unit:

a. TPH < 1,500 mg/kg may be disposed of in a standard MSW Type I landfill unit.
b. TPH ≥ 1,500 mg/kg may be disposed of in an MSW Type I landfill with a Class 1 industrial unit as specified in 30 TAC 330.171(b)(4).
c. PCBs ≥ 50 mg/kg may not be disposed of in an MSW Type I landfill unit, unless authorized by the USEPA as specified in 40 Code of Federal Regulations Part 761.
d. NORM concentrations must be below 30 picocuries per gram for disposal in an MSW Type I landfill unit as specified in 25 TAC 289.259(d)(1)(A).

Explanation of Acronyms:

BTEX benzene, toluene, ethylbenzene, and xylene
COC constituents of concern
MSDS material safety data sheet
MSW municipal solid waste
NORM naturally occurring radioactive materials
PCBs polychlorinated biphenyls
RCRA Resource Conservation and Recovery Act
RRCT Railroad Commission of Texas
TCEQ Texas Commission on Environmental Quality
TCLP Toxicity Characteristic Leaching Procedure
TPH total petroleum hydrocarbons

Regulatory References:

16 TAC 3.30

30 TAC 330.3(148) and 330.171

30 TAC 335.505(1) and 335.521(a)(1)

40 CFR 261.4(b)(5)

RG-022

GUIDELINES FOR THE CLASSIFICATION & CODING OF INDUSTRIAL & HAZARDOUS WASTE

GUIDELINES

FOR THE

CLASSIFICATION

AND

CODING

OF

INDUSTRIAL

AND

HAZARDOUS WASTES

TEXAS COMMISSION ON
ENVIRONMENTAL QUALITY

WASTE PERMITS DIVISION

RG-022 Revised 11/14

GUIDELINES FOR THE CLASSIFICATION AND CODING OF INDUSTRIAL AND HAZARDOUS WASTES

THIS IS A GUIDANCE DOCUMENT AND SHOULD NOT BE INTERPRETED AS A REPLACEMENT TO THE RULES.
The rules for classifying and coding industrial wastes and hazardous wastes may be found in 30 Texas Administrative Code (TAC) Sections (§§) 335.501-.521 (Subchapter R).

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RG-022
Texas Commission on Environmental Quality

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Chapter 1

Introduction

Who Should Read This Booklet

The main purpose of this guidance document is to help generators of industrial and hazardous waste follow state and federal requirements on

- classifying and coding these wastes,
- keeping proper records, and
- notifying the Texas Commission on Environmental Quality (TCEQ) about the wastes, when required.

Specifically, this document gives guidance on the regulations in Title 30 of the Texas Administrative Code (TAC), Chapter 335, Subchapter R (Waste Classification). The rules in Subchapter R apply both to wastes generated in Texas and to those generated outside the state and sent to Texas for treatment, storage, and/or disposal. Correct and timely compliance with the regulations on industrial and hazardous wastes helps to protect the state's environment and safeguard the health of Texas citizens.

Waste Classes

Figure 1-1 shows the main categories of hazardous and nonhazardous waste. The following paragraphs give brief descriptions of these categories—important terms that will be used throughout this booklet. (For more details, see the classification checklist in Chapter 3 and the definitions in Chapter 8.)

Hazardous Waste

A hazardous waste is one that is listed as such by the U.S. Environmental Protection Agency (EPA) or that exhibits one or more hazardous characteristics (also as specified by the EPA). Hazardous wastes are threatening to human health and the environment.

Listed Hazardous Waste

EPA lists over 400 wastes as hazardous. For more information see Part I-A of the checklist in Chapter 3.

Characteristically Hazardous Waste

Waste that displays one or more of four hazardous characteristics:

- ignitability (easily flammable—for example, solvents);
- reactivity (capable of rapid chemical reaction–for example, peroxides);
- corrosivity (highly acidic or alkaline, able to dissolve metals or burn the skin–for example, hydrochloric acid or sodium hydroxide); and
- toxicity (a waste that can release toxic constituents into the environment—for example, lead-based paint).

For more information on hazardous characteristics, see Part I-B of the checklist in Chapter 3.

Nonhazardous Waste

Any industrial waste that is not listed as hazardous and does not have hazardous characteristics. (Class 1 nonhazardous industrial waste can include certain levels of constituents and specified properties that, at higher levels, might otherwise render the waste hazardous—see Part II of the checklist in Chapter 3.)

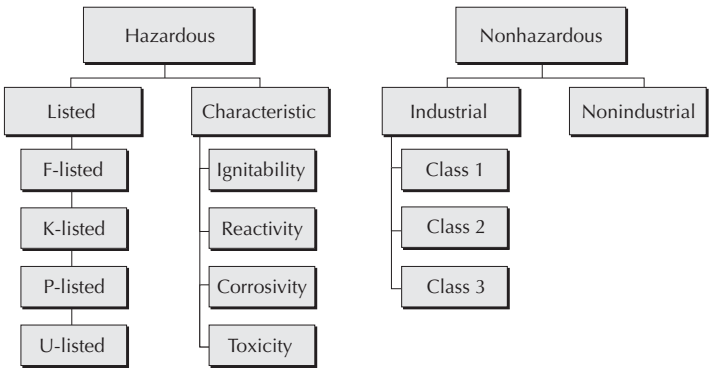
Industrial versus Nonindustrial Wastes

Industrial wastes result from (or are incidental to) operations of industry, manufacturing, mining, or agriculture—for example, wastes from power generation plants, manufacturing facilities, and laboratories serving an industry. *Nonindustrial wastes*, by contrast, come from sources such as schools, hospitals, churches, dry cleaners, most service stations, and laboratories serving the public.

Nonhazardous Industrial Waste

In this grouping, ***Class 1*** waste is considered potentially threatening to human health and the

Figure 1-1. Hazardous and Nonhazardous Wastes



environment if not properly managed, because of the constituents and properties this class can include. Therefore, there are special handling requirements for Class 1 wastes. An example is water contaminated with ethylene glycol.

Examples of ***Class 2*** wastes include waste-activated sludge from biological wastewater treatment. ***Class 3*** includes materials such as demolition debris—for example, bricks—that are insoluble, do not react with other materials, and do not decompose. Class 2 and 3 wastes are often accepted by local landfills. However, a Class 2 or 3 designation does not mean that the waste is incapable of causing harm in every management (or mismanagement) situation.

What This Booklet Explains How to Do

After you have worked through this booklet (and that includes consulting the rules referred to in it), you will be able to accomplish the following tasks:

- **Identify *which wastes* you must classify, code, and notify** the TCEQ about. Chapter 2 introduces a key concept—"waste streams"— that helps you decide these points.
- **Classify your waste.** Chapter 3 gives you a step-by-step approach for putting your waste into one of four categories: either *hazardous* waste or *nonhazardous* industrial waste Classes 1, 2, or 3.
- Know what kind of information (either from **process knowledge** about your facility's operation or from **analytical testing**) that you must **document** and keep on **file** (Chapter 4).
- **Understand the 8-character Texas waste code**. Chapter 5 explains the components of the waste code:
  - 4-character ***sequence number*** (may be a number, letters, or a combination; generally, identifies a particular waste or where it came from);
  - 3-digit ***form*** code; and
  - 1-character classification (from Chapter 3).
- **Know how to notify TCEQ** about your wastes and **which TCEQ form** to use (Chapter 6).

Some Things This Booklet Does NOT Cover

Non*hazardous *Non*industrial Waste.** The rules in 30 TAC Chapter 335, ***do NOT apply to **nonhazardous** waste generated by **nonindustrial** facilities.

Selective Coverage of Chapter 335

Also, please be aware that this guidance document only covers 2 subchapters (A and R) of 30 TAC Chapter 335, which contains 18 subchapters in all. This booklet covers only classification and coding, documentation you must create and keep on file, and notifications you must send to TCEQ (and the forms to use for that purpose). This booklet is not a substitute for the complete rules themselves. (You can obtain your own copies of the full, official state rules from the TCEQ's publications unit. Ways to contact this unit are listed under the heading "TCEQ and EPA Forms" in Chapter 6.)

Classification versus Risk Reduction

There is an important distinction between (1) classifying your wastes; and (2) meeting the ***risk reduction standards,*** which are set forth in 30 TAC Chapter 335, Subchapter S. Here are the most common situations where the risk reduction standards apply:

- a facility that handled industrial wastes is being closed;
- a site where unauthorized discharge of wastes occurred is being cleaned up.

If you are involved in a situation like these, you need to inform yourself about the risk reduction standards. The guidance document you are now reading does not cover this topic. (Again, you can obtain a copy of Subchapter S, and other information, from the TCEQ publications unit—see the heading "TCEQ and EPA Forms" in Chapter 6.)

Who Are "You" in This Booklet?

Throughout this guidance document, generators of industrial and/or hazardous wastes will be referred to as "generator," "generators," or—for a more direct way of writing—simply as "you." Also, 30 TAC Chapter 335, Subchapter R, will be referred to as "these rules" or "the rules." Finally, "this booklet," "this document," or "this guidance document" refers to *Guidelines for the Classification and Coding of Industrial and Hazardous Wastes*, TCEQ Publication Number RG-022—the booklet you are now reading.

Chapter 2

"Waste Streams"–A Key Concept

When the preceding chapter mentioned that this booklet will instruct you on how to classify, code and report about wastes, a question that naturally might have come to your mind is "***How*** do I know which wastes must be classified, coded, and reported?" (The general answer is that you must perform these processes on all hazardous wastes and nonhazardous industrial wastes.)

In discussing this point, federal regulators use the term *waste stream,* in both of the following senses: First, it can mean the total flow of all waste from homes, businesses, and industry. Second, within this total flow, smaller "waste streams" can be distinguished—for example, "the residential waste stream," "the recyclable waste stream," and others.

Similarly, within the overall flow of waste from your ordinary operations or processes, a number of particular waste streams can be identified. For example if your process ordinarily produces a hazardous acidic waste, and at some point you neutralize that waste, these are two separately identifiable "waste streams."

Each waste stream—the acidic waste and the neutralized waste, in this example–must be identified by an 8-character Texas waste code, which identifies the waste stream as a separate entity and gives information about its origin, general nature, and hazardous status. (Chapters 3 through 5 go into the details of how this 8-character code is arrived at.)

Table 2-1 gives examples of some situations in which the waste flow from an operation or process can produce more than one waste stream, each of which must be classified and coded; and an example of a situation that does *not* result in more than one waste stream. For specific guidance on specific waste streams, contact the TCEQ.

In general, whenever you have or suspect the existence of an additional, distinct waste stream, you must determine its classification (Chapter 3), arrive at a Texas waste code for it (Chapter 5), and in most cases notify TCEQ about the additional waste stream (Chapter 6—which also gives details about some of the exceptions to the requirements for notification: for example, a slight change or variation in a waste stream's composition may not require notification.)

Table 2-1. An Operation's Overall Waste Flow Can Produce Multiple "Waste Streams"

IF you have WASTES that are …	AND they come from PROCESSES that are …	THEN the wastes are considered …
different	similar	**different** "waste streams"—for example, a sludge removed from an electroplating vat is not the same waste stream as a liquid removed from an electroplating vat.
similar	different	**different** "waste streams"—for example, methylene chloride used in a paint- stripping operation is not the same waste stream as methylene chloride used in laboratory analysis.
similar	similar	**the same** "waste stream"—for example, a site may have several paint booths that perform the same activities with the same materials, and each produces drop cloth waste. These drop cloth wastes, from the various locations at this site, could be considered one waste stream as long as they were all classified the same (for more on classification, see Chapter 3).
altered physically or chemically by treatment	N/A	**different** "waste streams"—for example, if a sludge is dewatered, it may produce two new waste streams, one a solid and the other a liquid.

Chapter 3

Waste Classification Checklist

This chapter provides a checklist to help you classify your hazardous waste and your nonhazardous industrial waste. For an overview of these types of waste, refer back to Figure 1-1 in Chapter 1; for more details, refer to 30 TAC Chapter 335 Subchapter R Sections 335.501–508. (You can obtain your own copy of state rules from the TCEQ publications unit; ways to contact this unit are listed under the heading "TCEQ and EPA Forms" in Chapter 6.)

Process Knowledge vs. Analytical Testing

In determining a waste stream's classification, a generator may use *process knowledge* and/or *analytical testing*. Process knowledge is the owner or operator's knowledge about how the facility operates, how a waste was produced and handled, and other information based on operating experience. Analytical testing is information about a waste from laboratory analysis.

In the checklist, the nonhazardous classification criteria that could involve analytical testing have been marked with an *. This marking **does not** mean that analytical testing is the only way to evaluate these criteria. If sufficient process knowledge is available, little or no analysis may need to be performed. You should evaluate whether you have enough process knowledge about the waste to classify it or whether analytical testing is needed.

Documentation

Regardless of whether you rely on process knowledge or opt for analytical testing, you must fully document the information used in making your waste classification. **A completed checklist does not qualify as full documentation**. Documentation should be in a written and/or electronically stored format that is reasonably accessible and easily reproducible. For details on documentation requirements, see Chapter 4.

Part I. Hazardous Waste Determination

All waste generators should work through Part I of this checklist. In this part you will determine whether your waste is hazardous because (a) it is listed as hazardous by EPA or (b) it displays characteristics that EPA says make it hazardous.

In federal regulatory language, the first step in classifying your waste is called "making a *hazardous waste determination*." The definition of hazardous waste, based upon the Resource Conservation and Recovery Act (RCRA), is found in Title 40 of the Code of Federal Regulations (CFR), Part 261.

This TCEQ guidance document reflects the hazardous waste definition in the *Federal Register* as of July 1, 2004. If that definition changes, the generator is still responsible for making an accurate hazardous waste determination in accordance with the latest regulations—instead of with what is printed in this guidance document.

IF the answer to any of the questions in Part I is "Yes,"
THEN the waste is hazardous.

Possible *Exclusions* from Hazardous Classification

Under certain conditions, some types of wastes are excluded from being considered hazardous (40 CFR Sections 261.3–4). Generators may wish to review these exclusions before working through Part I of this checklist.

Part I-A. *Listed* Hazardous Waste Determination

The EPA lists some 400 hazardous wastes.

Information to Help You Make This Determination

Descriptions of listed waste are found in 40 CFR Part 261, Subpart D, Sections 261.31–33. These wastes are often referred to as follows:

- "F" listed waste (waste from nonspecific sources, Section 261.31);
- "K" listed waste (wastes from specific sources, Section 261.32);
- "P" listed waste (unused acutely hazardous off-specification materials as well as container residues and spill residues of these materials, Section 261.33);
- "U" listed waste (unused toxic hazardous off-specification materials as well as container residues and spill residues of these materials, Section 261.33).

QUESTION: Is the waste a listed hazardous waste, or is it mixed with or derived from one? ☐ Yes ☐ No

Part I-B. *Characteristic* Hazardous Waste Determination

Wastes may be hazardous if they display any of four characteristics: ignitability, corrosiveness, reactivity, or toxicity.

Information to Help You Make This Determination

Ignitability

Wastes that are hazardous because they may ignite include the following:

- Liquid wastes (other than those aqueous waste containing less than 24 percent alcohol by volume) that have a flash point less than 60°C (140°F). (The test method is the Pensky-Martens closed cup tester, using the test method specified in ASTM Standard D-93-79 or D-93-80, or a Setaflash closed cup tester, using the test method specified in ASTM Standard D-3278-78.)
- Nonliquid wastes that, under standard temperature and pressure, are capable of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burn so vigorously and persistently that they create a hazard.
- Wastes that meet the definition of an ignitable compressed gas (see 49 CFR Section 173.300).
- Wastes that meet the definition of an oxidizer (see 49 CFR Section 173.151).

QUESTION: Is the waste ignitable according to 40 CFR Section 261.21? ☐ Yes ☐ No

Corrosiveness

Wastes that are hazardous because they are corrosive include the following:

- aqueous wastes with a pH of 2 units or below or of 12.5 units or above;
- liquid wastes that corrode steel at a rate greater than 6.35 mm (0.250 inches) per year.

QUESTION: Is the waste corrosive according to 40 CFR Section 261.22? ☐ Yes ☐ No

Reactivity

A waste is considered reactive if it meets any of the following conditions:

- It is capable of detonation or explosive decomposition or reaction
  - at standard temperature and pressure,
  - if subjected to a strong ignition source, or
  - if heated under confinement.
- When mixed with water, it is
  - potentially explosive,
  - reacts violently, or
  - generates toxic gases or vapors.
- If a cyanide or sulfide-bearing waste is exposed to pH conditions between 2 and 12.5, it can generate enough toxic gases, vapors, or fumes to present a danger to human health or the environment. Generally, if a waste generates **250** ppm or more of reactive cyanides or **500** ppm or more of reactive sulfides, it is considered a reactive waste. (It should be noted that these levels of reactive compounds are just guidance. Each waste must be evaluated for reactivity on a case-by-case basis).
- It is normally unstable and readily undergoes violent change without detonating.
- It is a forbidden explosive (as defined in 49 CFR 173.51, or a Class A explosive as defined in 49 CFR 173.53).
- It is a Class B explosive (see 49 CFR Section 173.88).

QUESTION: Is the waste reactive according to 40 CFR Section 261.23? ☐ Yes ☐ No

Toxicity

A waste is toxic if the toxicity characteristic leaching procedure (TCLP) shows that a representative sample from the waste contains one or more constituents at or above the levels listed in Table 3-1. The TCLP is described in EPA Method 1311 (SW-846).

QUESTION: Is the waste toxic according to 40 CFR Section 261.24? ☐ Yes ☐ No

Table 3-1. TCLP Regulatory Levels

arsenic —5.0 mg/l	1,4-dichlorobenzene — 7.5 mg/l	nitrobenzene — 2.0 mg/l
barium — 100.0 mg/l	1,2-dichloroethane — 0.5 mg/l	pentachlorophenol — 100.0 mg/l
benzene — 0.5 mg/l	1,1-dichloroethylene — 0.7 mg/l	pyridine — 5.0 mg/l
cadmium — 1.0 mg/l	2,4-dinitrotoluene — 0.13 mg/l	selenium — 1.0 mg/l
carbon tetrachloride — 0.5 mg/l	endrin — 0.02 mg/l	silver — 5.0 mg/l
chlordane — 0.03 mg/l	heptachlor (and its epoxide) — 0.008 mg/l	tetrachloroethylene — 0.7 mg/l
chlorobenzene — 100.0 mg/l	hexachlorobenzene — 0.13 mg/l	toxaphene — 0.5 mg/l
chloroform — 6.0 mg/l	hexachlorobutadiene — 0.5 mg/l	trichloroethylene — 0.5 mg/l
chromium — 5.0 mg/l	hexachloroethane — 3.0 mg/l	2,4,5-trichlorophenol — 400.0 mg/l
o-cresol — 200.0 mg/l	lead — 5.0 mg/l	2,4,6-trichlorophenol — 2.0 mg/l
m-cresol — 200.0 mg/l	lindane — 0.4 mg/l	2,4,5-TP (Silvex) — 1.0 mg/l
p-cresol — 200.0 mg/l	mercury — 0.2 mg/l	vinyl chloride — 0.2 mg/l
cresol — 200.0 mg/l	methoxychlor — 10.0 mg/l	
2,4-D — 10.0 mg/l	methyl ethyl ketone — 200.0 mg/l	

Review of Checklist Part I: Hazardous Waste

IF the answer to any of the preceding questions in Part I is "Yes,"
THEN the waste is HAZARDOUS; PROCEED to Chapter 4.

IF the answers are "No" to all the preceding questions,
AND the waste is NONINDUSTRIAL,
THEN STOP here.

IF the answers are "No" to all of the preceding questions,
AND the waste is INDUSTRIAL,
THEN PROCEED to Part II.

Part II: Nonhazardous Industrial Waste Classes 1 & 2

The determination in this part of the checklist applies only to nonhazardous industrial waste—see Figure 1-1 in Chapter 1. (This part of the checklist is based on regulations found in 30 TAC Sections 335.505–06 and 335.508).

IF the answer to any of the **un-numbered** questions in this part of the checklist is "Yes,"
THEN the nonhazardous industrial waste is a Class 1 waste.

IF all the answers to the **un-numbered** questions in this part are "No,"
THEN the industrial waste is a Class 2 waste.

Generator's Self-Classification

QUESTION: Has the generator chosen to classify its nonhazardous waste as Class 1? ☐ Yes ☐ No

Container Waste

IF the waste is a container, greater than 5 gallons in holding capacity, which has held

- a hazardous substance (as defined in 40 CFR Part 302 and listed in Appendix A of this guidance document),
- a hazardous waste (including acutely hazardous wastes),
- a Class 1 waste, and/or
- a material that would be classified as a hazardous or Class 1 waste if disposed of,

THEN answer questions 1 and 2. *(Please note that containers that have held acutely hazardous wastes must be triple-rinsed before they can be classified as empty).*

IF these conditions are not present in your situation,
THEN proceed to the next un-numbered question.

1. Has the container had all its residues removed? ☐ Yes ☐ No
2. Has the container been rendered unusable? ☐ Yes ☐ No

QUESTION: Are ***any*** of the answers to questions (1) or (2) above "NO"? ☐ Yes ☐ No

Regulated Asbestos-Containing Material (RACM)

(See Chapter 8, Definition of Terms, for information on RACM.)

QUESTION: Does the waste contain asbestos material identified as RACM, as defined in 40 CFR Part 61? * ☐ Yes ☐ No

Polychlorinated Biphenyls (PCBs)

QUESTION: Is the waste contaminated by a material that originally contained 50 or more parts per million (ppm) total PCBs? * ☐ Yes ☐ No

QUESTION: Does the waste contain 50 or more ppm PCBs?* ☐ Yes ☐ No

Petroleum Substance Waste

1. Is your waste specifically identified as a *petroleum substance* (see Chapter 8, Definitions of Terms) or contaminated with a material identified as a petroleum substance waste? ☐ Yes ☐ No
2. Does the waste contain more than 1,500 ppm total petroleum hydrocarbons (TPH)? ☐ Yes ☐ No

QUESTION: Are the answers to **both** of the numbered questions above "Yes"? (If one or both of the answers are "No," enter "No" for this question.) ☐ Yes ☐ No

"New Chemical Substance"

See "new chemical substances wastes" in Chapter 8, Definitions and Terms, for a description of how this particular type of waste may be classified as Class 2 or 3.

QUESTION: Is the waste from the production of a "new chemical substance," as defined by the federal Toxic Substances Control Act, 15 U.S.C.A. Section 2602(9)? ☐ Yes ☐ No

Out-of-State Origin

See "wastes generated out-of-state" in Chapter 8, Definitions of Terms, for details on how this particular type of waste may be classified as Class 2 or 3.

QUESTION: Is the waste generated outside Texas? ☐ Yes ☐ No

Constituent Levels and Specified Properties for Nonhazardous Industrial Class 1 Wastes

QUESTION: If the waste is a liquid, does it have a flash point of less than 65.6^{O}C (150^{O}F)? * ☐ Yes ☐ No

QUESTION: Is the waste a solid or semi-solid that—under conditions normally encountered in storage, transportation, and disposal—

- is liable to cause fires through friction or through retained heat from manufacturing or processing; or
- can be ignited readily, and when ignited burns so vigorously and persistently as to create a serious hazard? ☐ Yes ☐ No

QUESTION: Is the waste a semi-solid or solid that, when mixed with an equivalent weight of ASTM Type II laboratory distilled or deionized water, produces a solution with a pH of 2 or less or 12.5 or more? ☐ Yes ☐ No
(***Exception:*** for solidified, stabilized, encapsulated, or otherwise chemically bound wastes, an exception is provided in 30 TAC Section 335.505(3)) *

QUESTION: Does the waste leach Class 1 toxic constituents at or above the levels listed in Table 1, Appendix 1 of 30 TAC Chapter 335 Subchapter R when submitted to the toxicity characteristic leaching procedure (TCLP)? * ☐ Yes ☐ No
(For a copy of Table 1, Appendix 1, see Appendix C of this guidance document.)

(Where matrix interferences of the waste cause the Practical Quantitation Limit (PQL) of the specific analysis to be greater than the Maximum Concentration listed in Table 1, Appendix 1 of 30 TAC Chapter 335 Subchapter R, then the achievable PQL becomes the Maximum Concentration, provided that the generator maintains documentation that satisfactorily demonstrates to the TCEQ that lower levels of quantitation of a sample are not possible.)

A satisfactory demonstration includes the results from the analysis of the waste for that specific constituent by a laboratory using an appropriate method found in *Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods* (EPA SW-846); *Methods or Chemical Analysis of Water and Wastes* (EPA-600 series); *Standard Methods for the Examination of Water and Wastewater*; *American Society for Testing and Materials (ASTM) Standard Methods*; or an equivalent method approved by the TCEQ.

Lack of Class 2 or 3 Information

QUESTION: Is information lacking that demonstrates the waste belongs in Class 2 or 3? ☐ Yes ☐ No

Review of Checklist Part II: Class 1 or 2 Nonhazardous Industrial Waste

IF	the answer to any of the preceding **un-numbered** questions in Part II is "Yes,"
THEN	the nonhazardous industrial waste is a Class 1 waste.
PROCEED	to Chapter 4.

IF	the answers are "No" to all the preceding **un-numbered** questions in Part II,
THEN	the industrial waste is a Class 2 waste.
PROCEED	to Chapter 4.

IF	the answers are "No" to all of the preceding **un-numbered** questions in Part II,
AND	the industrial generator wishes to evaluate the waste for a possible Class 3 status,
THEN PROCEED	to Part III.

Part III: Nonhazardous Industrial Class 3 Waste

This part of the checklist applies only to nonhazardous, industrial waste that does not meet the definition of a Class 1 waste and is not specifically identified as a Class 2 waste. (The corresponding regulations for this part of the checklist can be found in 30 TAC Sections 335.507 and 335.508.)

Part III-A. Initial Determinations for Class 3 Status

IF the answer to any of the following questions in Part III-A is "Yes,"
THEN the nonhazardous, industrial waste ***cannot*** be considered a Class 3 waste.

Containers

QUESTION: Is the waste an empty container? ☐ Yes ☐ No

Medical Waste

(For a definition, see "medical wastes" in Chapter 8.)

QUESTION: Is the waste a medical waste regulated under 30 TAC Chapter 330, Subchapter Y? ☐ Yes ☐ No

Distilled Water Leaching Test

QUESTION: When subjected to the 7-day distilled water leaching test, does the waste leach constituents at or above the maximum contaminant levels listed in Table 3, Appendix 1 of 30 TAC Chapter 335, Subchapter R? * ☐ Yes ☐ No
(Table 3 is reproduced in Appendix D of this guidance document.)

Toxicity Characteristic Leaching Procedure

QUESTION: When submitted to the toxicity characteristic leaching procedure (TCLP), does the waste leach Class 1 toxic constituents listed in Table 1, Appendix 1 of 30 TAC Chapter 335 Subchapter R at or above their detection levels? * ☐ Yes ☐ No
(The list of Class 1 toxic constituents is reproduced in Appendix E of this guidance document.)

Exclusion: Excluded from this list of Class 1 toxic constituents are those addressed in the previous question (that is, constituents identified in Table 3, Appendix 1 of 30 TAC Chapter 335 Subchapter R).

Petroleum Hydrocarbons

QUESTION: Does the waste contain detectable levels of petroleum hydrocarbons (Method 1005)? * ☐ Yes ☐ No

Polychlorinated Biphenyls (PCBs)

QUESTION: Does the waste contain detectable levels of PCBs? * ☐ Yes ☐ No

Decomposition

QUESTION: Is the waste readily decomposable? ☐ Yes ☐ No

Review of Checklist Part III-A: Class 3 Nonhazardous Industrial Waste

IF the answer to any of the preceding questions in Part III-A is "Yes,"
THEN the nonhazardous, industrial waste ***cannot*** be considered a Class 3 waste.

IF all the answers to the preceding questions in Part III-A are "No,"
THEN proceed to Part III-B to continue the waste's evaluation for possible Class 3 status.

Part III-B: Final Determinations for Class 3 Status

Inertness

QUESTION: Is the waste inert? (Inertness refers to chemical inactivity of an element, a compound, or a waste.) ☐ Yes ☐ No

Insolubility

QUESTION: Is the waste essentially insoluble? ☐ Yes ☐ No
(***Note***: wastes that contain liquids are *NOT* considered insoluble.)

Review of Checklist Part III

IF the answer to any question under Part III-B is "No,"
THEN the nonhazardous, industrial waste ***cannot*** be considered a Class 3 waste.

IF all the answers to the questions in Part III-A are "No,"
AND all the answers to the questions in Part III-B are "YES,"
THEN the nonhazardous industrial waste is a Class 3 waste.

Part IV. Variance from Waste Classification

The TCEQ may determine, on a case-by-case basis, the merits of a variance request for a specific nonhazardous classification. The burden of justifying the need for a variance is on the requestor. The requestor must submit information sufficient to clearly indicate the issues involved, the reason(s) for the request, and both the positive and negative impacts that may result from the granting of the variance. (The regulations corresponding to these types of variance requests can be found in 30 TAC Section 335.514, Variance from Waste Classification Provisions.)

* **As a reminder**, these characteristics need not necessarily be addressed by analytical testing. A generator may be able to address them through process knowledge. For more information on process knowledge, please see Chapter 4 of this guidance document.

Chapter 4

Process Knowledge, Analytical Testing, and Documentation Requirements

Introduction

Now that you know how to classify your wastes, you are ready to compile supporting documentation. Documentation should support the classification and coding of a waste stream. You must properly document each waste stream generated by the facility, and keep that documentation for at least three years after the waste is no longer generated, stored, or recycled or until the site is closed.

The regulations on documentation requirements can be found in 30 TAC Section 335.9 (Record Keeping and Annual Reporting Procedures Applicable to Generators), Section 335.70 (Record Keeping), Section 335.510 (Sampling Documentation), Section 335.511 (Use of Process Knowledge), and Section 335.513 (Documentation Required).

The TCEQ randomly audits a portion of waste stream *notifications* (see Chapter 6) in order to ensure proper classification and coding of waste in Texas. When the TCEQ sends you a request for information for the purpose of an audit, you must send the agency the information that you have gathered to make your hazardous waste determination/waste classification. Please use Chapter 4 as a guide to compiling supporting documentation for each waste stream generated at your facility.

Process Knowledge

If process knowledge is used in classifying a waste, that knowledge must be documented and kept on file for three years. Process knowledge must be in writing or stored in some electronic form. It cannot be stored solely in someone's mind. The process knowledge must support a generator's reasoning about why the waste has been given a particular classification. It must also support the generator's reasoning about why a particular test method was not performed.

The following are some examples of process knowledge that may assist in classifying waste:

- description of the waste;
- date of initial waste generation;
- a detailed description of the process generating the waste (that is, identification of chemicals or other materials in the process that generated the waste stream (including any potential breakdown products);
- manufacturer's literature such as Material Safety Data Sheets—MSDSs (although they were not created for the purpose of determining Texas waste classification, and do not contain information on all constituents found in a product, MSDSs may be helpful);
- full description of activities that generated the waste stream;
- identification of potential contaminants; and
- other documentation generated in conjunction with the particular process.

Analytical Data

If a generator uses analytical data to classify a waste, the data must be supported by documentation of the sampling procedure and the analytical testing. The following lists specify information that must be maintained when analytical data is used for classification purposes.

Sampling Procedures

The following procedures must be documented:

- dates of sample collection;
- description of the site and/or unit from which the sample was taken, including sampling locations;
- the method and equipment used for sampling;
- a description of the sampling techniques, including collection, containerization, and preservation; and
- rationale—that is, supporting reasons—for the sampling plan (why the number, type, and location of samples taken accurately represent the waste stream being characterized).

Analytical Testing

Documentation of analytical testing must include the following:

- Analytical **results** (including quality control data).
- Analytical **methods** (including any preparatory methods).
- The **detection limits** for each analysis.
- **Name of laboratory** performing the analysis.
- **Chain of custody**—documentation tracking the condition of the waste containers. For example, were the waste containers and their seal intact or broken upon arrival at the laboratory? Were the containers full, half-full, or empty? Did all the containers arrive at the laboratory or just a partial shipment?
- Documentation that satisfactorily demonstrates that lower levels of *quantitation* are not possible (this is only necessary when the waste media causes the *Estimated Quantitation Limit* (EQL) of a Class 1 toxic constituent (as listed in Appendix E of this guidance document) to be greater than the concentration listed (*matrix interference*). (Terms in italics are explained in Chapter 8.)

Classification Checklist

Although the checklist in Chapter 3 can be used to help classify industrial and hazardous waste, a generator should support the checklist's "yes" or "no" responses with process knowledge and/or analytical data. A completed checklist by itself is not sufficient documentation to submit to the TCEQ in response to a random audit of classification.

For example, a generator answers "no" to the question "Is the waste ignitable according to 40 CFR Section 261.21?" You can support this response by submitting process knowledge, analytical data, or both. If process knowledge is used, it must be **specific**. A general statement such as "the waste is not ignitable" would not be sufficient.

Instead, you should document specific actions you took and their results, such as (1) reviewed all constituents that may be present in the waste; (2) determined that each constituent present in the waste does not meet the definition of an ignitable waste; and (3) determined that the process generating the waste does not introduce any ignitable characteristics to the waste stream. You should keep copies of your documentation demonstrating that the constituents in the waste stream would not cause the waste to exhibit the characteristic of ignitability.

Rule of Thumb about Documentation

Remember that documentation should demonstrate why a waste has been given a particular classification. Here's a good rule of thumb: if someone else can review your classification documentation, using the published criteria and/or the checklist, and arrive at the same classification you did, then you have probably done a good job of compiling supporting documentation for a waste classification. On the other hand, if someone reviews your classification and still has unanswered questions, then you may want to gather additional documentation (from process knowledge and/or analytical data) to support your classification of that waste stream.

Chapter 5

Texas Waste Code Formula

Chapter 5 describes the 8-digit Texas waste code that identifies each of your waste streams. (Part of the information to complete this waste code comes from the waste determination process (described in Chapter 3) and from the documentation you must compile and keep on hand (described in Chapter 4).)

The formula for the Texas waste code is given in Figure 5-1. The rules corresponding to this formula can be found in 30 TAC Section 335.503 (Waste Classification and Waste Coding Required).

Sequence Number

Although called a sequence "number," this part of the code may contain a mix of numbers and letters—alphanumeric; and sometimes it may consist of letters alone. Various types of 4-digit sequence numbers are used in the Texas waste code.

- An **arbitrary and unique 4-digit number from 0001 to 9999** (no alpha characters), which is assigned by the generator when adding a waste stream to Texas facility's *Notice of Registration* (see Chapter 6, Notification Requirements). Once assigned to a particular waste stream, a sequence number **cannot be reassigned** to another waste stream. Generators need not sequentially assign sequence numbers to a facility's waste streams.
- A **4-digit alphanumeric number** assigned by the TCEQ (under the **one-time shipment program**) to wastes generated by unregistered generators within Texas. (Spill waste not managed under the Emergency Response Program may be handled in this manner.)
- **"SPIL"** to be assigned only by the Emergency Response Team of the Field Operations Division **for spill wastes regulated under the Emergency Response Program.**
- **"OUTS"** to be used for **wastes generated outside of Texas**.
- **"CESQ"** to be used by **municipal hazardous and industrial CESQGs** (Conditionally Exempt Small-Quantity Generators).
- **"TSDF"** (treatment, storage, and disposal facilities), to be used by facilities that (1) receive and consolidate a waste stream with other like waste streams (thus not changing the form or composition of the waste); or (2) store a received waste without treating or changing its form or composition. This sequence number does not apply to wastes that are treated or altered in some other way. The "TSDF" designation is to be used only by **facilities that store and/or accumulate waste** from more than one site for subsequent shipment to a treatment or disposal facility.

Form Code

The second series of numbers found in the Texas waste code is the "form code." The list of form codes as well as flowcharts that depict the choosing of a form code can be found in Appendix G.

Form codes are broken down into 10 major categories. They are Lab Packs, Inorganic Liquids, Organic Liquids, Inorganic Solids, Organic Solids, Inorganic Sludges, Organic Sludges, Inorganic Gases, Organic Gases, and Plant Trash. The various form codes and corresponding descriptions can be found under these categories in Appendix G.

In determining a waste stream's form code, TCEQ recommends that the generator first determine the major category into which the waste stream fits. Then review all the form code descriptions in that category to determine which code or codes best describe your waste stream. From this narrowed-down list, choose a form code for the waste stream.

Classification

The waste stream's classification completes the Texas waste code. As Figure 5-1 showed, this part of the Texas waste code will be "H" or "1", "2", or "3".

Stop! Are You about to Misclassify a Waste?

Table 5-1 provides additional information about using certain combinations of form and class codes.

Figure 5-1. Components of a Texas Waste Code

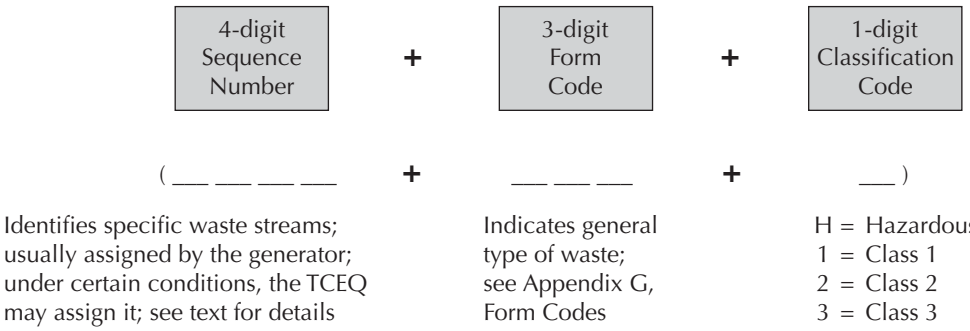


Table 5-1. Questions to Ask about Some Combinations of Coding and Classification

IF the waste is …	AND you assigned form codes …	Are you sure about a classification of …
Any Class 3 waste	Any form code	*Class 3?* (You must submit all supporting documentation)
Asbestos solids, debris, slurry, sludge, etc.	311, 515	*Class 2?* (Wastes that contain regulated asbestos-containing material are Class 1)
Oils	205, 206[a]	*Class 2?* (Wastes that contain more than 1,500 ppm total petroleum hydrocarbons are Class 1)
PCB-containing materials	297, 298, 394, 395, 396, 397, 398, 399, 494, 495, 496, 497, 498, 499, 598, 599, 698, 699	*Class 2?* (Wastes that contain 50 ppm or more PCBs are Class 1)
Petroleum-containing materials	205, 206[a], 296, 489, 510, 603, 606, 695, 696	(Petroleum substance wastes that contain more than 1,500 ppm total petroleum hydrocarbons are Class 1)
Plant trash	902 and 999[b]	*Hazardous, Class 1, or Class 3?* (Only wastes that are Class 2 may be given a form code for plant trash)
Spent lead acid batteries	309[c]	Hazardous

[a] If your waste oil is nonhazardous, is managed under 40 CFR 279 and 30 TAC 324, and is recycled 100 percent, then do not add to your Notice of Registration (the central record that the TCEQ compiles from waste notifications you send in—see Chapter 6, Notification Requirements and Forms).

[b] Only form codes 902 and 999 may be used.

[c] If all your lead acid batteries are managed under the "universal waste" rule in 40 CFR Part 273, then do not add to your Notice of Registration.

Chapter 6

Notification Requirements and Forms

This chapter describes forms and supporting documentation you must send to the TCEQ to notify the agency about waste streams that you generate. The regulations on notification can be found in 30 TAC Section 335.6 (Notification Requirements), Section 335.502 (Conversion to New Waste Notification and Classification System), Section 335.508 (Classification of Specific Industrial Solid Wastes), Section 335.509 (Waste Analysis), and Section 335.513 (Documentation Required).

Notifications about Industrial or Hazardous Waste

You must submit information about industrial or hazardous wastes no later than 90 days after the waste's initial generation and before handling, shipment, or disposal; use TCEQ form 00002 or the TCEQ State of Texas Environmental Electronic Reporting System (STEERS) software. (For information on obtaining TCEQ forms and how to access the STEERS information, see this chapter's section "TCEQ and EPA Forms.")

Please Note: All Large-Quantity Generators (LQG) **must** use STEERS to update their Notice of Registration (NOR). This requirement, effective December 15, 1997, is found in 30 TAC Section 335.6(b). Therefore, if you are a LQG and you need to update your NOR to replace inactivated waste code, please do so using STEERS.

The TCEQ uses the information submitted on these forms to create a record called the ***Notice of Registration***, which contains site-specific waste management information about industrial and municipal hazardous waste generators in Texas.

Notifications about New Chemical Substance Waste

For a Class 2 or Class 3 waste generated as the result of the production of a "new chemical substance" (see Chapter 8, Definitions of Terms), you must follow the instructions below:

- Give the TCEQ notice that the waste is from the production of a "new chemical substance."
- Submit all supporting reasons and documentation used in that waste's classification.
- Manage nonhazardous waste from the production of a "new chemical substance" as a Class 1 waste, unless you can provide appropriate analytical data and/or process knowledge demonstrating that the waste meets the definition of a Class 2 or Class 3, and the TCEQ concurs. (For definitions of Class 2 and 3, see Chapter 8 and the classification checklist in Chapter 3.)
- If you have not received concurrence or denial from the TCEQ within 120 days from the date of your request for review, you may manage the waste according to the requested classification, but you must give the TCEQ 10 working days written notice before managing the waste as a Class 2 or a Class 3.

Notifications about Class 2 and Class 3 Out-of-State Waste

If you want to ship a nonhazardous waste into Texas, it is automatically considered a Class 1 waste (and expected to be managed as such) unless

- you request the TCEQ to review your waste classification documentation supporting a lower classification such as Class 2 or 3; and
- the TCEQ concurs with the lower classification.

After concurrence from the TCEQ you must comply with the lower classification's requirements on shipping, record keeping, and disposal of the waste. If, after review of your documentation, the TCEQ disagrees with your waste classification, you must continue managing the nonhazardous waste as Class 1 waste.

Notifications about Other Industrial and Hazardous Wastes from out of State

Please note the following special requirements for the documentation of industrial and hazardous waste that is imported to Texas from foreign countries and other U.S. states.

- If out-of-state generators and importers of record want to bring hazardous waste into Texas, they must have an EPA Identification number. Generators and importers who do

not have this ID number must obtain one from the EPA, using EPA Form 8700-12.
- Out-of-state generators or importers of record must fill out a Uniform Hazardous Waste Manifest (TCEQ-00311) and place their EPA ID number in Box 1 of this form.
- In Box B of the Uniform Hazardous Waste Manifest, use one of the generic numbers for identifying the country or state of origin. For example: F0061 for hazardous and or nonhazardous industrial waste imported from Mexico, D0022 for Louisiana (Appendix H gives these codes). For more information about manifesting imported industrial and hazardous waste, see 40 CFR 262.60 and 30 TAC 335.76 (d).
- OUTS must be used as the 4-digit sequence number of the Texas waste code in Box I of the manifest.

Notifications about Alternate Analytical Methods

Generators who propose an alternate analytical method must validate their alternate method by demonstrating that it is equal to or superior in accuracy, precision, and sensitivity to the corresponding EPA-approved methods for analytical testing given in *Standard Methods for the Examination of Water and Wastewater,* SW-846, and EPA-600/4-79/020.

In making this demonstration, the generator must provide the TCEQ, at a minimum, the following documentation:

- a full description of the proposed method (including all equipment and reagents to be used);
- a description of type of waste and *waste matrices* to be analyzed (for definitions of terms in italics, see Chapter 8);
- comparative results of the proposed method and corresponding SW-846 or *ASTM* method;
- a complete assessment of interferences with the proposed method (see, for example, *matrix interference* in Chapter 8);
- a description of quality control procedures; and
- additional information as needed and/or requested by the TCEQ to adequately review the proposed alternate method.

TCEQ and EPA Forms

How to Order

Notification forms can be obtained in several ways:

- Contact the TCEQ regional office near you.
- On the Internet go to <www.tceq.texas.gov> and select the "Forms" link. Access the Forms Database and type in the form number. (The instructions for form TCEQ-00002 are in a separate download file).
- Fax your order to 512-239-4488, or order forms by voice at 512-239-0028, the TCEQ's publications unit. Be sure to give the form ***numbers*** that you want; this information will help the TCEQ get the correct form to you as quickly as possible.

How to Access STEERS

State of Texas Environmental Electronic Reporting System (STEERS) information, including an application package, can be obtained as follows:

- on the Internet, go to <https://www3.tceq.texas.gov/steers>; or
- call the STEERS Help Line at 512-239-6925.

Currently Available Forms

Notification forms available at the time of this printing include the following:

- The hazardous or industrial waste **"Initial Notification Form,"** used for initial notification about a site, and adding a waste stream to your Notice of Registration (see Chapter 6) or when recording a 6-digit waste code into one or more 8-digit waste codes. (form number: **TCEQ-00002**)
- The **"Hazardous or Industrial Waste Management Unit Form,"** used when adding information about a waste management unit to a Notice of Registration. (form number: **TCEQ-00002**)
- The **"Uniform Hazardous Waste Manifest,"** used by generators and transporters of hazardous waste and by owners or operators of hazardous waste treatment, storage, and disposal facilities for both inter- and intrastate transportation. (form number: **TCEQ-00311**–Only order form available on the Web)
- The **"One-Time Shipment Request … for Shipment of Class 1, 2, 3 and EPA Hazardous Waste,"** used by unregistered generators, not by generators that already have a site's Notice of Registration. (form number: **TCEQ-00757**)
- The EPA **"Notification of Regulated Waste Activity"** form, used when notifying EPA of a federally regulated hazardous waste activity—for example, the generation of hazardous waste. (form number: **EPA 8700-12**–Available on the Web as part of TCEQ-00002)

Chapter 7

Management of Mechanical Shredding Wastes

The regulations on mechanical shredding waste can be found in 30 TAC Section 335.508 (Classification of Specific Industrial Solid Wastes).

Wastes generated by the mechanical shredding of automobiles, appliances, or other items of scrap, used, or obsolete metals are handled according to the provisions of the Texas Solid Waste Disposal Act, Health and Safety Code, Section 361.019 (Vernon Pamphlet 1992), until the TCEQ develops specific standards for the classification of this waste and ensures adequate disposal capacity.

These provisions say that you can dispose of mechanical shredding wastes in a municipal landfill facility authorized to accept Class 1 and 2 industrial solid wastes, if the shredding waste:

- contains no free liquids, and
- is not a hazardous waste.

As mentioned earlier, TCEQ may establish other requirements.

Chapter 8

Definitions of Terms

For readers' convenience, this chapter gives the full version of some abbreviations and brief descriptions of some important terms used in this guidance document. Full, official definitions can be found in the sources cited. Nothing in this chapter takes the place of any definitions in laws, rules, or regulations.

Acutely hazardous wastes (40 Code of Federal Regulations (CFRs) Parts 261.31–33 and subject to the exclusion established in 40 CFR Part 261.5: EPA hazardous waste numbers F020, F022, F023, F026, and F027)—A subset of *listed hazardous waste*s that carry the "H" code; they are considered very harmful to human health and the environment.

ASTM—American Society for Testing and Material

CFR—Code of Federal Regulations

Characteristically hazardous waste (40 CFR Part 261 Subpart C)—Any waste that exhibits the characteristics of ignitability, corrosivity, reactivity, and/or toxicity as defined by the EPA in 40 CFR Part 261 Subpart C. These are often referred to as the "D" wastes. (Also see Chapter 3 of this guidance document.)

Class 1 waste [30 TAC Section 335.1(14)]—Any waste or mixture of waste that, because of its concentration or physical or chemical characteristics is toxic; corrosive; flammable; a strong sensitizer or irritant; a generator of sudden pressure by decomposition, heat, or other means; or may pose a substantial present or potential danger to human health or the environment when improperly processed, stored, transported, disposed of, or otherwise managed. (The checklist in Chapter 3 takes you through the process of distinguishing hazardous waste from nonhazardous Class 1 waste.)

Class 2 waste [30 TAC Section 335.1(15)]—Any individual waste or combination of waste that cannot be described as hazardous waste or as nonhazardous Class 1 or Class 3 waste.

Class 3 waste [30 TAC Section 335.1(16)]—Waste that is *inert* and *essentially insoluble* (see definitions of terms in italics), usually including but not limited to materials such as rock, brick, glass, dirt, certain plastics, rubber, and similar materials that are not readily decomposable.

Classification code (30 TAC Section 335.503)—This last digit of the Texas waste code represents the classification of the waste stream. The letter H represents hazardous wastes; and the number 1, 2, or 3 represents nonhazardous industrial waste Class 1, 2, or 3.

Conditionally Exempt Small-Quantity Generator (30 TAC Section 335.78)—Generators of less than 100 kg (220 lbs) per month of hazardous waste, or less than 1 kg (2.2 lbs) per month of *acutely hazardous waste* (see description of term in italics in this chapter).

Essential insolubility (30 TAC Section 335.507)**—** Is established when using:

- the Seven-Day Distilled Water Leachate Test, and the extract from the sample of waste does not leach greater than the Maximum Contaminant Level listed in Appendix 1, Table 3 of 30 TAC Chapter 335, Subchapter R;
- the test methods described in 40 Code of Federal Regulations Part 261, Appendix II, and the extract from the sample of waste does not exhibit detectable levels of the constituents found in Appendix 1, Table 1 of 30 TAC Chapter 335, Subchapter R;
- an appropriate test method, and a representative sampling of the waste does not exhibit detectable levels of total petroleum hydrocarbon (TPH); ("Petroleum substance wastes" are not subject to 30 TAC's subsection on essential insolubility.)
- an appropriate test method, and a representative sampling of the waste does not exhibit detectable levels of polychlorinated biphenyls (PCBs).

Form code (30 TAC Section 335.503)—This code describes the general type of waste stream. It consists of three numbers, the 5th, 6th, and 7th digits in the Texas waste code (see Figure 5-1 in Chapter 5). More than one form code may apply to a particular waste stream.

Hazardous substance (30 TAC Section 335.508)—Any substance designated as "hazardous" in 40 CFR Part 302 (Table 302.4) including, but not limited to, waste designated as hazardous in the Resource Conservation Recovery Act (RCRA).

Hazardous waste (40 CFR 261.3.)—The EPA defines a waste as hazardous if it exhibits one or more of four hazardous "characteristics," or if it is one of several hundred wastes "listed" as hazardous. For details, see Chapters 1 and 3 of this guidance document.

Hazardous waste determination (30 TAC Section 335.504)—An evaluation of a waste to determine whether it meets the RCRA definition of a hazardous waste.

Inert (30 TAC Section 335.507)—Inertness refers to the chemical inactivity of an element, compound, or waste. Ingredients added to mixtures chiefly for the purposes of bulk and/or weight are normally considered inert.

Listed hazardous wastes (40 CFR Part 261 Subpart D)—Specific wastes that have been identified by the EPA as hazardous. These are often referred to as the "F" wastes (waste from nonspecific sources); "K" wastes (wastes from specific sources); "P" wastes (acutely hazardous off-specification materials, container residues, and spill residues of these materials); and "U" wastes (toxic, hazardous off-specification materials, container residues, and spill residues).

A waste is considered hazardous if

- it is listed in 40 CFR Part 261 Subpart D, or
- is mixed with or derived from a waste listed there, and
- has not been provided a particular exclusion from the definition of hazardous as provided in 40 CFR Sections 261.3–4.

Matrix interference—Interference with the precision of analytical testing for a particular constituent in a waste stream due to other material(s) in the sample (contamination by carryover). See also waste matrices.

Medical wastes (30 TAC Section 335.508)—Nonhazardous medical wastes that are subject to the provisions of 30 TAC Chapter 330 Subchapter Y are designated as Class 2 wastes. An example of such waste would be needle-bearing syringes from plant infirmaries.

"New chemical substance" waste (30 TAC Section 335.508)—If a nonhazardous industrial waste is generated as a result of the commercial production of a "new chemical substance" as defined by the federal Toxic Substances Control Act, *United States Code Annotated* (U.S.C.A.), Title 15, Section 2602(9), the generator must manage that waste as a Class 1 waste, unless the generator can provide appropriate analytical data and/or process knowledge demonstrating that the waste is Class 2 or Class 3, and the TCEQ concurs. If the generator has not received concurrence or denial from the TCEQ within 120 days from the date of the request for review, the generator may manage the waste according to the requested classification, but not before giving 10 working days written notice to the TCEQ.

Notice of Registration (NOR)—TCEQ term for the information it collects in its database on each hazardous or industrial waste handler: generator, receiver, transporter, and recycler. The NOR includes the facility's physical and mailing addresses, information on waste streams that are generated or handled at the site, a list of individual units at the facility where wastes are managed, and other information. It also contains the state facility identification numbers and the EPA facility number, issued by the TCEQ. The NOR serves to verify the information submitted by each handler. When a generator registers with the TCEQ using form TCEQ-00002, the agency sends back a printout of the information in its database about the site and generator. The handler should keep the NOR current and in on-site files and check it periodically to make sure that it accurately reflects the facility's waste streams and waste management units.

Petroleum-hydrocarbon-containing wastes (30 TAC Section 335.508)—Wastes resulting from the cleanup of leaking underground storage tanks (USTs), which are regulated under 30 TAC Chapter 334 Subchapter K (relating to Petroleum Substance Waste), are not subject to classification under 30 TAC Chapter 335 Subchapter R (Waste Classification).

Petroleum substance—A crude oil, or any refined or unrefined fraction or derivative of crude oil, that is a liquid at standard conditions of temperature and pressure. These substances include the following:

- combinations or mixtures of basic petroleum substances, such as crude oils, crude oil fractions, petroleum feedstocks, and petroleum fractions;

- aviation gasolines, aviation jet fuels, distillate fuel oils, residual fuel oils, gas turbine fuel oils, illuminating oils, lubricants, building materials, insulating and waterproofing materials, used oils;
- solvents or a combination or mixture of solvents—except for any listed substance regulated as a hazardous waste under the federal Solid Waste Disposal Act, Subtitle C (*United States Code*, Title 42, Section 6921, et seq.)—that are liquid at standard conditions of temperature (20^{O} centigrade) and pressure (1 atmosphere). Examples include Stoddard solvent, petroleum spirits, mineral spirits, petroleum ether, varnish makers' and painters' naphthas, petroleum extender oils, and commercial hexane.

The following materials are ***not*** considered petroleum substances:

- polymerized materials, such as plastics, synthetic rubber, polystyrene, high- and low- density polyethylene;
- animal, microbial, and vegetable fats;
- food-grade oils;
- hardened asphalt and solid asphaltic materials, such as roofing shingles, roofing felt, hot mix and cold mix; and
- cosmetics.

Practical Quantitation Limits (PQLs)—See quantitation.

Process Knowledge—See examples in Chapter 4 under this subheading.

Quantitation—Generally, measurement of quantity or amounts. The word appears in a number of specialized terms used in waste regulation:

- ***Quantitation Limits*** (QLs) indicate the levels at which measurements can be "trusted."
- ***Practical Quantitation Limits*** (PQLs) and ***Estimated Quantitation Limits*** (EQLs) are levels that are routinely and reliably detected and quantitated in a variety of sample matrices. These are 3 to 5 times the Method Detection Limits (MDLs). (See Chapter 1, SW 846, 1992.)
- ***Method Detection Limits*** (MDLs) take into account the reagents, sample matrix, and preparation steps applied to a sample in specific analytical methods. (See 40 CFR Part 136, Appendix B; Chapter 1, SW 846, July 1992.)

RCRA—Resource Conservation and Recovery Act (amendment to the Solid Waste Disposal Act). Primarily designed to regulate five types of disposal activities: hazardous waste, solid waste, underground storage tanks, oil waste, and medical waste. In this guidance document, any mention of "RCRA" refers to RCRA Subtitle C, which applies to all handlers of hazardous waste, including generators; transporters; and operators of treatment, storage, and disposal (TSDF) facilities. (RCRA, a federal law, covers only whether a solid waste is either hazardous or nonhazardous. Texas regulations further subdivide nonhazardous waste into Classes 1, 2, and 3.)

Regulated asbestos-containing material (RACM) (30 TAC Sections 335.508)—RACM includes the following:

- **friable** asbestos containing more than 1 percent asbestos[1] that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure;
- **nonfriable** asbestos-containing material containing more than 1 percent asbestos as measured by the method found in 40 CFR Part 763, Subpart E, Appendix E, Section 1 that, when dry, *cannot* be crumbled, pulverized, or reduced to powder by hand pressure.
- **Category I** nonfriable asbestos includes packings, gaskets, resilient floor coverings, and asphalt roofing products);
- **Category II** nonfriable asbestos includes transite shingles, transite pipes, and any nonfriable asbestos material not defined as Category I.

Regulated generators (30 TAC Chapter 335 Subchapters A and C)—If you generate the following amounts of waste, you are a regulated generator and must follow regulations in Chapter 335:

Waste Type	Monthly Amount
Class 1	100 kg (220 lbs) or more
hazardous	100 kg (220 lbs) or more
acutely hazardous	1 kg (2.2 lbs) or more

If you generate less than the amounts shown above, you are considered a Conditionally Exempt Small-Quantity Generator and are not subject to regulations requiring notification, manifesting, and fees.

[1]As determined using the method specified in 40 CFR Part 763, Subpart E, Appendix E, Section 1, Polarized Light Microscopy.

Sequence number (30 TAC Section 335.503)—The first 4 digits of the waste code (actually these four characters may be numbers, letters, or a combination of the two). The sequence number is used as an internal numbering system determined by each generator. The number of a waste may range from 0001 to 9999, and can only be used once.

Solid waste (30 TAC Section 335.1 and 40 CFR Section 261.2)—Any discarded material such as garbage; refuse; sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility; or other material including solid, liquid, semisolid, or contained gaseous material resulting from industrial, municipal, commercial, mining, and agricultural operations. Solid wastes include any material that is abandoned by being disposed of; burned or incinerated; or accumulated, stored, or treated before or in lieu of these activities. Certain recycled materials are also considered wastes. Solid wastes are often referred to simply as "wastes." For the complete definition of a "solid waste," please refer to 30 TAC Section 335.1 (Solid Waste).

Specific industrial solid waste (30 TAC Section 335.508)—A nonhazardous waste for which specific classification criteria and/or a form code have been established.

Stabilized wastes (30 TAC Section 335.508)—Wastes that originally exhibit hazardous characteristics can be *stabilized* so that they are no longer hazardous and can meet the criteria for classification as Class 1 or 2 nonhazardous industrial waste. For example a waste containing lead that exhibits the hazardous characteristic of toxicity can be stabilized by mixing with cement in the proper proportion to reduce the toxicity or mobility of contaminants. Depending on the process(es) used, stabilization achieves varying degrees of long-term effectiveness.

Synthetic oils—Oils not derived from crude oil, including those derived from shale, coal, or a polymer-based starting material; and nonpolymeric synthetic fluids that are used as hydraulic fluids and heat transfer fluids, such as those based on phosphate esters, diphenyl oxide, or alkylated benzenes. Synthetic oils are generally used for the same purpose as oils, and they present relatively the same level of hazardousness after use.

TAC—Texas Administrative Code. Title 30 of TAC contains TCEQ rules on industrial solid waste and municipal hazardous waste, among other subjects.

TSDF—Treatment, storage, and disposal facilities.

Universal Waste (30 TAC Section 335.261 and 40 CFR Part 273)—This rule covers five types of waste:

- lamps as described in 40 CFR §273.5, and §335.261(b)(16)(F).
- mercury-containing thermostats as described in 40 CFR 273.4;
- all hazardous waste batteries as described in 40 CFR 273.2;
- some hazardous waste pesticides as described in 40 CFR 273.3;
- paint and paint-related waste as described in §335.262(b);

The rule establishes a reduced set of regulatory requirements for facilities managing universal waste, depending on whether the facility falls into one of four categories:

- small-quantity handler of universal waste (SQHUW),
- large-quantity handler of universal waste (LQHUW),
- transporter of universal waste, or
- final destination facilities.

In addition, the rules establish a petitioning procedure whereby additional wastes may be added to the universal waste rule.

U.S.C.A.—*United States Code Annotated*.

Used oil (30 TAC Section 335.1, 30 TAC Section 324 (relating to used oil), and 40 CFR Part 279 (relating to standards for management of used oil)[2]— Any oil refined from crude oil, or any synthetic oil, that has been used and, from such use, is contaminated by physical or chemical impurities and cannot be used for its intended purpose (that is, it is a spent material).

Used oil fuel includes any fuel produced from used oil by processing, blending, or other treatment.

Waste—Unwanted materials left over from a manufacturing process; refuse from places of human or animal habitation.

[2] Rules applicable to nonhazardous used oil, are found in Chapter 324, state regulations on recyclable used oil, and 40 CFR Part 279, federal regulations on used oil recycling.

Waste code—Also referred to as Texas waste code (30 TAC Section 335.503)—This 8-digit code identifies a waste stream. The first 4 digits are the ***sequence number***, the next 3 digits are the ***form code***, and the last digit is the waste's ***classification*** (sequence number + form code + classification code = waste code). (Some of the "digits" referred to here actually may be letters or a combination of letters and numbers.)

Waste matrices—Water and soil or sediment in which a waste is found.

Wastes generated out-of-state (30 TAC Section 335.508)—All nonhazardous industrial waste generated outside the state of Texas and transported into or through Texas for processing, storage, or disposal is classified as Class 1 unless the waste satisfies the Class 2 or 3 criteria as defined in 30 TAC Sections 335.506–8. A Class 2 or 3 waste determination, accompanied by all supporting process knowledge and analytical data, must be submitted to the TCEQ for approval.

Waste stream (30 TAC Section 335.503)—The total flow of solid waste from homes, businesses, institutions, and manufacturing plants that is recycled, burned, or disposed of in landfills; or segments of that total flow, such as the "residential waste stream" or the "recyclable waste stream." (It should be noted that the terms "waste stream", "solid waste", and "waste" are often used interchangeably by federal and state regulators as well as many members of the regulated community).

Appendix A

Hazardous Substances

Applicability: **Empty Container Class 2 Evaluations**

The following is a listing of materials identified as hazardous substances (40 CFR Table 302.4) in effect at the time of this guideline's printing. (As amended at 57 FR 61492, Dec. 24, 1992; 58 FR 35314, June 30, 1993; 59 FR 31551, June 20, 1994; 60 FR 7824 Feb. 9, 1995). Chemical Abstract Service (CAS) Registry Numbers of the materials are also provided.

Hazardous Substance	CAS Number
Acenaphthene	83329
Acenaphthylene	208968
Acetaldehyde	75070
Acetaldehyde, chloro-	107200
Acetaldehyde, trichloro-	75876
Acetamide, N-(aminothioxomethyl)-	591082
Acetamide, N-9H-fluoren-2-yl-	53963
Acetic acid	64197
Acetic acid (2,4-dichlorophenoxy)-	94757
Acetic anhydride	108247
Acetone	67641
Acetone cyanohydrin	75865
Acetonitrile	75058
Acetophenone	98862
2-Acetylaminofluorene	53963
Acetyl bromide	506967
Acetyl chloride	75365
1-Acetyl-2-thiourea	591082
Acrolein	107028
Acrylamide	79061
Acrylic acid	79107
Acrylonitrile	107131
Adipic acid	124049
Aldicarb	116063
Aldicarb sulfone	1646884
Aldrin	309002
Allyl alcohol	107186
Allyl chloride	107051
Aluminum phosphide	20859738
Aluminum sulfate	10043013
Ametycin (7-amino-9-a-methoxymitosane)	50077
5-(Aminomethyl)-3-isoxazolol	2763964
4-Aminopyridine	504245
Amitrole	61825
Ammonia	7664417
Ammonium acetate	631618
Ammonium benzoate	1863634
Ammonium bicarbonate	1066337
Ammonium bichromate	7789095
Ammonium bifluoride	1341497
Ammonium bisulfite	10192300
Ammonium carbamate	1111780
Ammonium carbonate	506876
Ammonium chloride	12125029
Ammonium chromate	7788989
Ammonium citrate, dibasic	3012655
Ammonium fluoborate	13826830
Ammonium fluoride	12125018
Ammonium hydroxide	1336216
Ammonium oxalate	6009707
Ammonium picrate	131748
Ammonium silicofluoride	16919190
Ammonium sulfamate	7773060
Ammonium sulfide	12135761
Ammonium sulfite	10196040
Ammonium tartrate	14307438
Ammonium thiocyanate	1762954
Ammonium vanadate	7803556
Amyl acetate	628637
iso-	123922
sec-	626380
tert-	625161
Aniline	62533
Anthracene	120127
Antimony	7440360
Antimony pentachloride	7647189
Antimony potassium tartrate	28300745
Antimony tribromide	7789619
Antimony trichloride	10025919
Antimony trifluoride	7783564
Antimony trioxide	1309644
Aroclor 1016	12674112
Aroclor 1221	11104282
Aroclor 1232	11141165
Aroclor 1242	53469219
Aroclor 1248	12672296
Aroclor 1254	11097691
Aroclor 1260	11096825
Arsenic	7440382
Arsenic acid H_3AsO_4	1327522
Arsenic disulfide	1303328
Arsenic pentoxide, As_2O_5	1303282
Arsenic trichloride	7784341
Arsenic trioxide, As_2O_3	1327533
Arsenic trisulfide	1303339
Arsinic acid, dimethyl-	75605
Asbestos	1332214
Auramine	492808
Azaserine	115026
1H-Azepine-1-carbothioic acid, hexahydro-, S-ethyl ester	2212671
Aziridine, 2-methyl	75558
Barium cyanide	542621
Benz[c]acridine	225514

Hazardous Substance	CAS Number
Benzanthracene	56553
Benz[a]anthracene	57976
Benzene	71432
Benzene, dichloromethyl-	98873
Benzene, 2,6-diisocyanato-1-methyl-	91087
Benzene, m-dimethyl	108383
Benzene, o-dimethyl	95476
Benzene, p-dimethyl	106423
Benzenesulfonic acid chloride	98099
Benzene, (trichloromethyl)	98077
Benzidine	92875
Benzo[a]anthracene	56553
1,3-Benzodioxol-4-ol, 2,2-dimethyl-, (Bendiocarb phenol)	22961826
1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate (Bendiocarb)	22781233
Benzo[b]fluoranthene	205992
Benzo(k)fluoranthene	207089
Benzoic acid	65850
Benzoic acid, 2-hydroxy-, compound with (3aS-cis)-1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo-[2,3-b]indol- 5-yl methylcarbamate ester (1:1) (Physostigmine salicylate)	57647
Benzonitrile	100470
Benzo[rst]pentaphene	189559
Benzo[ghi]perylene	191242
Benzo[a]pyrene	50328
p-Benzoquinone	106514
Benzotrichloride	98077
Benzoyl chloride	98884
Benzyl chloride	100447
Beryllium chloride	7787475
Beryllium powder	7440417
Beryllium fluoride	7787497
Beryllium nitrate	13597994
alpha-BHC	319846
beta-BHC	319857
delta-BHC	319868
2,2′-Bioxirane	1464535
Bis(2-chloroethyl) ether	111444
Bis(2-chloroethoxy)methane	111911
Bis(dimethylthiocarbamoyl) sulfide	97745
Bis(2-ethylhexyl) phthalate	117817
Bromoacetone	598312
Bromoform	75252
4-Bromophenyl phenyl ether	101553
Brucine	357573
1-Butanol	71363
2-Butenal	123739
Butyl acetate	123864
iso-	110190
sec-	105464
tert-	540885
n-Butyl alcohol	71363
Butylamine	109739
iso-	78819
sec-	513495
sec-	13952846
tert-	75649
Butyl benzyl phthalate	85687
Butyric acid	107926
iso-Butyric acid	79312

Hazardous Substance	CAS Number
Cadmium	7440439
Cadmium acetate	543908
Cadmium bromide	7789426
Cadmium chloride	10108642
Calcium arsenate	7778441
Calcium arsenite	52740166
Calcium carbide	75207
Calcium chromate	13765190
Calcium cyanide $Ca(CN)_2$	592018
Calcium dodecylbenzenesulfonate	26264062
Calcium hypochlorite	7778543
Captan	133062
Carbamic acid, butyl-, 3-iodo-2-n-butylcarbamate)	55406536
Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl, methyl ester (Benomyl)	17804352
Carbamic acid, 1H-benzimidazol-2-yl, methyl ester	10605217
Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester	101279
Carbamic acid, dimethyl-,1-[(dimethylamino)carbonyl]-5-methyl-1H-pyrazol-3-yl ester	644644
Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H-pyrazol-5-yl ester	119380
Carbamic acid, methyl-, 3-methylphenyl ester	1129415
Carbamic acid, [1,2-phenylenebis-(iminocarbonothioyl)]bis-, dimethyl ester	23564058
Carbamic acid, phenyl-, 1-methylethyl ester (Propham)	122429
Carbamic acid, methylnitroso-, ethyl ester	615532
Carbamic chloride, dimethyl-	79447
Carbamodithioic acid, dibutyl-, sodium salt	136301
Carbamodithioic acid, diethyl-, 2-chloro-2-propenyl ester	95067
Carbamodithioic acid, diethyl-, sodium salt	148185
Carbamodithioic acid, dimethyl-, potassium salt	128030
Carbamodithioic acid, dimethyl-, sodium salt	128041
Carbamodithioic acid, dimethyl-, tetraanhydrosulfide with orthothioselenious acid	144343
Carbamodithioic acid, (hydroxymethyl)methyl-, monopotassium salt	51026289
Carbamodithioic acid, methyl-, monopotassium salt	137417
Carbamodithioic acid, methyl-, monosodium salt	137428
Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro -2-propenyl) ester	2303175
Carbamothioic acid, bis(2-methylpropyl)-, S-ethyl ester	2008415

Hazardous Substance	CAS Number
Carbamothioic acid, butylethyl-, S-propyl ester	1114712
Carbamothioic acid, cyclohexylethyl-, S-ethyl ester	1134232
Carbamothioic acid, dipropyl-, S-ethyl ester (EPTC)	759944
Carbamothioic acid, dipropyl-, S-(phenylmethyl) ester	52888809
Carbamothioic acid, dipropyl-, S-propyl ester	1929777
Carbaryl	63252
Carbofuran	1563662
Carbofuran, phenol	1563388
Carbosulfan	55285148
Carbon disulfide	75150
Carbon oxyfluoride	353504
Carbon tetrachloride	56235
Chlorambucil	305033
Chlordane	57749
Chlorine	7782505
Chlornaphazine	494031
p-Chloroaniline	106478
Chlorobenzene	108907
Chlorobenzilate	510156
p-Chloro-m-cresol	59507
Chlorodibromomethane	124481
Chloroethane	75003
2-Chloroethyl vinyl ether	110758
Chloroform	67663
Chloromethyl methyl ether	107302
2-Chloronaphthalene	91587
2-Chlorophenol	95578
4-Chlorophenyl phenyl ether	7005723
3-Chloropropionitrile	542767
Chlorosulfonic acid	7790945
4-Chloro-o-toluidine, hydrochloride	3165933
Chlorpyrifos	2921882
Chromic acetate	1066304
Chromic acid	11115745
Chromic sulfate	10101538
Chromium	7440473
Chromous chloride	10049055
Chrysene	218019
Cobaltous bromide	7789437
Cobaltous formate	544183
Cobaltous sulfamate	14017415
Copper	7440508
Copper, dimethyldithiocarbamate	137291
Copper cyanide CuCN	544923
Coumaphos	56724
Creosote	8001589
Cresol(s)	1319773
m-Cresol	108394
o-Cresol	95487
p-Cresol	106445
Cumene	98828
Cupric acetate	142712
Cupric acetoarsenite	12002038
Cupric chloride	7447394
Cupric nitrate	3251238
Cupric oxalate	5893663
Cupric sulfate	7758987
Cupric sulfate, ammoniated	10380297
Cupric tartrate	815827
Cyanides	57125
Cyanogen	460195
Cyanogen bromide (CN)Br	506683
Cyanogen chloride	506774
Cyclohexane	110827
Cyclohexanone	108941
2-Cyclohexyl-4,6-dinitrophenol	131895
Cyclophosphamide	50180
2,4-D Acid	94757
2,4-D (isopropyl) Esters	94111
	94791
	94804
	1320189
	1928387
	1928616
Butoxyethl	1929733
	2971382
Isooctyl	25168267
Dichlorophenoxyaceticacid-polyproxybutyl	53467111
Daunomycin	20830813
DDD	72548
DDE	72559
DDT	50293
Diallate	2303164
Diazinon	333415
Dibenzo[a,h]anthracene	53703
1,2-Dibromo-3-chloropropane	96128
Dibutylnitrosoamine	924163
Di-n-butyl phthalate	84742
Dicamba	1918009
Dichlobenil	1194656
Dichlone	117806
Dichlorobenzene	25321226
1,2-Dichlorobenzene	95501
1,3-Dichlorobenzene	541731
1,4-Dichlorobenzene	106467
3,3′-Dichlorobenzidine	91941
Dichlorobromomethane	75274
1,4-Dichloro-2-butene	764410
Dichlorodifluoromethane	75718
1,1-Dichloroethane	75343
1,2-Dichloroethane	107062
1,1-Dichloroethylene	75354
1,2-Dichloroethylene	156605
Dichloroethyl ether	111444
Dichloroisopropyl	108601
Dichloromethoxyethane	111911
Dichloromethyl ether	542881
2,4-Dichlorophenol	120832
2,6-Dichlorophenol	87650
Dichlorophenylarsine	696286
Dichloropropane	26638197
1,1-Dichloropropane	78999
1,3-Dichloropropane	142289
1,2-Dichloropropane	78875
Dichloropropane	8003198
Dichloropropene	26952238
2,3-Dichloropropene	78886
1,3-Dichloropropene	542756

Hazardous Substance	CAS Number
2,2-Dichloropropionic acid	75990
Dichlorvos	62737
Dicofol	115322
Dieldrin	60571
Diethylamine	109897
Diethylarsine	692422
1,4-Diethylenedioxide	123911
O,O-Diethyl S-methyl dithiophosphate	3288582
Diethyl-p-nitrophenyl phosphate	311455
Diethyl-o-phthalate	84662
O,O-Diethyl O-pyrazinyl phosphorothioate	297972
Diethylstilbestrol	56531
Dihydrosafrole	94586
Diisopropylfluorophosphate	55914
3,3′-Dimethoxybenzidine	119904
Dimethylamine	124403
p-Dimethylamino-azobenzene	60117
3,3′-Dimethylbenzidine	119937
1,1-Dimethylhydrazine	57147
1,2-Dimethylhydrazine	540738
alpha,alpha-Dimethylphenethylamine	122098
2,4-Dimethylphenol	105679
Dimethyl phthalate	131113
Dimethyl sulfate	77781
Dinitrobenzene (mixed)	25154545
m-Dinitrobenzene	99650
o-Dinitrobenzene	528290
p-Dinitrobenzene	100254
4,6-Dinitro-o-cresol and salts	534521
Dinitrophenol	25550587
2,5-Dinitrophenol	329715
2,6-Dinitrophenol	573568
2,4-Dinitrophenol	51285
Dinitrotoluene	25321146
3,4-Dinitrotoluene	610399
2,4-Dinitrotoluene	121142
2,6-Dinitrotoluene	606202
Dinoseb	88857
Di-n-octyl phthalate	117840
1,2-Diphenylhydrazine	122667
Diphosphoramide, octamethyl-	152169
Diphosphoric acid, tetraethyl ester	107493
Dipropylamine	142847
Di-n-propylnitrosamine	621647
Diquat	85007
Disulfoton	298044
Dithiobiuret	541537
1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O-[(methylamino) carbonyl]oxime (Tirpate)	26419738
Diuron	330541
Dodecylbenzenesulfonic acid	27176870
Endosulfan	115297
alpha-Endosulfan	959988
beta-Endosulfan	33213659
Endosulfan sulfate	1031078
Endothall	145733
Endrin & metabolites	72208
Endrin aldehyde	7421934
Epichlorohydrin	106898
Epinephrine	51434
Ethanimidiothioic acid, 2-(dimethylamino-N-hydroxy-2-oxo-, methyl ester (A2213)	30558431
Ethanimidiothioic acid, 2-(dimethylamino)-N-[[(methylamino) carbonyl]oxy]-2-oxo-, methyl ester (Oxamyl)	23135220
Ethanimidothioic acid, N,N′-[thiobis[(methylimino) carbonyloxy]] bis-, dimethyl ester (Thiodicarb)	59669260
Ethanol, 2,2′-oxybis-, dicarbamate (Diethylene glycol, dicarbamate)	5952261
Ethion	563122
Ethyl acetate	141786
Ethyl acrylate	140885
Ethylbenzene	100414
Ethyl carbamate	51796
Ethyl cyanide	107120
Ethylenebisdithiocarbamic acid, salts & esters	111546
Ethylenediamine	107153
Ethylenediamine-tetraacetic acid (EDTA)	60004
Ethylene dibromide	106934
Ethylene glycol monoethyl ether	110805
Ethylene oxide	75218
Ethylenethiourea	96457
Ethylenimine	151564
Ethyl ether	60297
Ethyl methacrylate	97632
Famphur	52857
Ferric ammonium citrate	1185575
Ferric ammonium oxalate	2944674
Ferric chloride	7705080
Ferric fluoride	7783508
Ferric nitrate	10421484
Ferric sulfate	10028225
Ferrous ammonium sulfate	10045893
Ferrous chloride	7758943
Ferrous sulfate	7720787
Fluoranthene	206440
Fluorene	86737
Fluorine	7782414
Fluoroacetamide	640197
Fluoroacetic acid, sodium salt	62748
Formaldehyde	50000
Formic acid	64186
Fumaric acid	110178
Furan	110009
Furfural	98011
Glauramine	492808
Glycidylaldehyde	765344
Guanidine, N-methyl-N′-nitro-N-nitroso-	70257
Guthion	86500

Hazardous Substance	CAS Number
Heptachlor	76448
Heptachlor epoxide	1024573
Hexachlorobenzene	118741
Hexachlorobutadiene	87683
Hexachlorocyclohexane (all isomers)	608731
Hexachlorocyclohexane (gamma isomer - Lindane)	58899
Hexachlorocyclopentadiene	77474
Hexachloroethane	67721
Hexachlorophene	70304
Hexachloropropene	1888717
Hexaethyl tetraphosphate	757584
Hydrazine	302012
Hydrazine, 1,2-diethyl-	1615801
Hydrochloric acid	7647010
Hydrocyanic acid	74908
Hydrofluoric acid	7664393
Hydrogen sulfide H_2S	7783064
Hydroperoxide, 1-methyl-1-phenylethyl	80159
Indeno(1,2,3-cd)pyrene	193395
Iron, tris (dimethylcarbamodithioato-S,S′)-	14484641
Isobutyl alcohol	78831
Isodrin	465736
Isophorone	78591
Isoprene	78795
Isopropanolamine dodecylbenzenesulfonate	42504461
Isosafrole	120581
3(2H)-Isoxazolone, 5-(aminomethyl)-	2763964
Kepone	143500
Lasiocarpine	303344
Lead	7439921
Lead acetate	301042
Lead arsenate	7784409
Lead chloride	7758954
Lead fluoborate	13814965
Lead fluoride	7783462
Lead iodide	10101630
Lead nitrate	10099748
Lead phosphate	7446277
Lead stearate	7428480
Lead subacetate	1335326
Lead sulfate	15739807
Lead sulfide	1314870
Lead thiocyanate	592870
Lithium chromate	14307358
Malathion	121755
Maleic acid	110167
Maleic anhydride	108316
Maleic hydrazide	123331
Manganese dimethyldithiocarbamate	15339363
Melphalan	148823
Mercaptodimethur	2032657
Mercuric cyanide	592041
Mercuric nitrate	10045940
Mercuric sulfate	7783359
Mercuric thiocyanate	592858
Mercurous nitrate	10415755
Mercury	7439976
Mercury fulminate	628864
Methacrylonitrile	126987
Methanesulfonic acid, ethyl ester	62500
Methanimidamide, N,N-dimethyl-N′-[3-[[(methylamino)carbonyl] oxylphenyl]-, monohydrochloride	23422539
Methanimidamide, N,N-dimethyl-N′-[2-methyl-4-[[(methylamino) carbonyl]oxy]phenyl]-	17702577
Methanol	67561
Methapyrilene	91805
Methomyl	16752775
Methoxychlor	72435
Methyl bromide	74839
1-Methylbutadiene	504609
Methyl chloride	74873
Methyl chlorocarbonate	79221
3-Methylcholanthrene	56495
4,4′-Methylene(bis)chloroaniline	101144
Methylene bromide	74953
Methylene chloride	75092
Methyl ethyl ketone (MEK)	78933
Methyl ethyl ketone peroxide	1338234
Methyl hydrazine	60344
Methyl iodide	74884
Methyl isobutyl ketone	108101
Methyl isocyanate	624839
Methylmercaptan	74931
Methyl methacrylate	80626
Methyl parathion	298000
Methylthiouracil	56042
Mevinphos	7786347
Mexacarbate	315184
Mitomycin C	50077
Monoethylamine	75047
Monomethylamine	74895
Naled	300765
1-Naphthalenamine	134327
2-Naphthalenamine	91598
Naphthalene	91203
1,4-Naphthalenedione	130154
Naphthenic acid	1338245
alpha-Naphthylthiourea	86884
Nickel	7440020
Nickel ammonium sulfate	15699180
Nickel carbonyl	13463393
Nickel chloride	7718549
Nickel cyanide $Ni(CN)_2$	557197
Nickel hydroxide	12054487
Nickel nitrate	14216752
Nickel sulfate	7786814
Nicotine, & salts	54115
Nitric acid	7697372
p-Nitroaniline	100016
Nitrobenzene	98953
Nitrogen dioxide NO_2	10102440
Nitrogen oxide NO	10102439
Nitroglycerine	55630
Nitrophenol (mixed)	25154556
m-Nitrophenol	554847

Hazardous Substance	CAS Number
o-Nitrophenol	88755
p-Nitrophenol	100027
2-Nitropropane	79469
N-Nitrosodiethanolamine	1116547
N-Nitrosodiethylamine	55185
N-Nitrosodimethylamine	62759
N-Nitrosodiphenylamine	86306
N-Nitrosopyrrolidine	930552
Nitrotoluene	1321126
m-Nitrotoluene	99081
o-Nitrotoluene	88722
p-Nitrotoluene	99990
5-Nitro-o-toluidine	99558
Osmium tetroxide OsO_4	20816120
Paraformaldehyde	30525894
Paraldehyde	123637
Parathion	56382
Pentachlorobenzene	608935
Pentachloroethane	76017
Pentachloronitrobenzene	82688
Pentachlorophenol	87865
Perchloroethylene	127184
Phenacetin	62442
Phenanthrene	85018
Phenol	108952
Phenol, 3-(1-methylethyl)-, methyl carbamate (m-Cumenyl methylcarbamate)	64006
Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate (Promecarb)	2631370
Phenylmercury acetate	62384
Phenylthiourea	103855
Phorate	298022
Phosgene	75445
Phosphine	7803512
Phosphoric acid	7664382
Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester	60515
Phosphorus	7723140
Phosphorus oxychloride	10025873
Phosphorus pentasulfide	1314803
Phosphorus trichloride	7719122
Phthalic anhydride	85449
Piperidine, 1-nitroso-	100754
Piperidine, 1,1'-(tetrathiodicarbonothioyl)bis-(Bis(pentamenthylene)thiuram tetrasulfide)	120547
Polychlorinated biphenyls (PCBs)	1336363
Aroclor 1016	12674112
Aroclor 1221	11104282
Aroclor 1232	11141165
Aroclor 1242	53469219
Aroclor 1248	12672296
Aroclor 1254	11097691
Aroclor 1260	11096825
Potassium arsenate	7784410
Potassium arsenite	10124502
Potassium bichromate	7778509
Potassium chromate	7789006
Potassium cyanide KCN	151508
Potassium hydroxide	1310583
Potassium permanganate	7722647
Potassium silver cyanide	506616
Pronamide	23950585
1,3-Propane sultone	1120714
Propanedinitrile	109773
Propargite	2312358
Propargyl alcohol	107197
Propionic acid	79094
Propionic anhydride	123626
n-Propylamine	107108
Propylene oxide	75569
Pyrene	129000
Pyrethrins	121299
Pyridine	110861
Pyridine, 2-methyl-	109068
Pyrrolo[2,3-b] indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)-Physostigmine	57476
Quinoline	91225
Reserpine	50555
Resorcinol	108463
Saccharin and salts	81072
Safrole	94597
Selenious acid	7783008
Selenium	7782492
Selenium dioxide	7446084
Selenium sulfide SeS_2	7488564
Selenourea	630104
Silver	7440224
Silver cyanide AgCN	506649
Silver nitrate	7761888
Silvex (2,4,5-TP)	93721
Sodium	7440235
Sodium arsenate	7631892
Sodium arsenite	7784465
Sodium azide	26628228
Sodium bichromate	10588019
Sodium bifluoride	1333831
Sodium bisulfite	7631905
Sodium chromate	7775113
Sodium cyanide NaCN	143339
Sodium dodecyl-benzenesulfonate	25155300
Sodium fluoride	7681494
Sodium hydrosulfide	16721805
Sodium hydroxide	1310732
Sodium hypochlorite	7681529
Sodium methylate	124414
Sodium nitrite	7632000
Sodium phosphate, dibasic	7558794
Sodium phosphate, tribasic	7601549
Sodium selenite	10102188
Streptozotocin	18883664
Strontium chromate	7789062
Strychnine, & salts	57249
Styrene	100425
Sulfur monochloride	12771083

Hazardous Substance	CAS Number
Sulfuric acid	7664939
2,4,5-T acid	93765
2,4,5-T amines	2008460
	1319728
	3813147
	6369966
	6369977
2,4,5-T (n-butyl) esters	93798
	1928478
	2545597
Isooctyl	25168154
Methylpropyl	61792072
2,4,5-T salts	13560991
1,2,4,5-Tetrachlorobenzene	95943
2,3,7,8-Tetrachloro-dibenzo-p-dioxin (TCDD)	1746016
1,1,1,2-Tetrachloroethane	630206
1,1,2,2-Tetrachloroethane	79345
2,3,4,6-Tetrachlorophenol	58902
Tetraethyllead	78002
Tetraethyldithiopyrophosphate	3689245
Tetrahydrofuran	109999
Tetranitromethane	509148
Thallium	7440280
Thallium(I) acetate	563688
Thallium(I) carbonate	6533739
Thallium chloride TlCl	7791120
Thallium(I) nitrate	10102451
Thallium oxide Tl_2O_3	1314325
Thallium selenite	12039520
Thallium(I) sulfate	7446186
2H-1,3,5-Thiadiazine-2-thione, tetrahydro-3,5-dimethyl- (Dazomet)	533744
Thioacetamide	62555
Thiofanox	39196184
Thioperoxydicarbonic diamide, tetrabutyl (Tetrabutylthiuram disulfide)	1634022
Thioperoxydicarbonic diamide, tetraethyl (Disulfiram)	97778
Thiophenol	108985
Thiosemicarbazide	79196
Thiourea	62566
Thiourea, (2-chlorophenyl)-	5344821
Thiram	137268
Toluene	108883
Toluenediamine	95807
Toluene diisocyanate	584849
o-Toluidine	95534
p-Toluidine	106490
o-Toluidine hydrochloride	636215
Toxaphene	8001352
2,4,5-TP esters	32534955
Trichlorfon	52686
1,2,4-Trichlorobenzene	120821
1,1,1-Trichloroethane	71556
1,1,2-Trichloroethane	79005
Trichloroethene (Trichloroethylene)	79016
Trichloromethanesulfenyl chloride	594423
Trichloromonofluoromethane	75694
Trichlorophenol	25167822
2,3,4-Trichlorophenol	15950660
2,3,5-Trichlorophenol	933788
2,3,6-Trichlorophenol	933755
3,4,5-Trichlorophenol	609198
2,4,5-Trichlorophenol	95954
2,4,6-Trichlorophenol	88062
Triethanolamine dodecylbenzenesulfonate	27323417
Triethylamine	121448
Trimethylamine	75503
1,3,5-Trinitrobenzene	99354
Tris(2,3-dibromopropyl)phosphate	126727
Trypan blue	72571
Uracil mustard	66751
Uranyl acetate	541093
Uranyl nitrate	10102064
Urea, N-ethyl-N-nitroso-	759739
Urea, N-methyl-N-nitroso-	684935
Vanadium pentoxide	1314621
Vanadyl sulfate	27774136
Vinyl chloride	75014
Vinyl acetate	108054
Vinylamine, N-methyl-N-nitroso-	4549400
Warfarin, and salts, when present at concentrations greater than 0.3%	81812
Xylene (mixed)	1330207
Xylenol	1300716
Zinc	7440666
Zinc acetate	557346
Zinc ammonium chloride	52628258
Zinc, bis(dimethyl carbomodithioato-S,S')- (Ziram)	137304
Zinc, bis(diethylcarbamo dithioato-S,S')- (Ethyl Ziram)	14324551
Zinc borate	1332076
Zinc bromide	7699458
Zinc carbonate	3486359
Zinc chloride	7646857
Zinc cyanide $Zn(CN)_2$	557211
Zinc fluoride	7783495
Zinc formate	557415
Zinc hydrosulfite	7779864
Zinc nitrate	7779886
Zinc phenolsulfonate	127822
Zinc phosphide Zn_3P_2, when present at concentrations greater than 10%	1314847
Zinc silicofluoride	16871719
Zinc sulfate	7733020
Zirconium nitrate	13746899
Zirconium potassium fluoride	16923958
Zirconium sulfate	14644612
Zirconium tetrachloride	10026116

Appendix B

Ignitable Solids

(30 TAC Chapter 335 Subchapter R Appendix 1 Table 2)

Constituents listed from Department of Transportation Regulations, 49 CFR Part 173 Subpart E, October 1, 1993. Note: The presence of a constituent on this table in a nonhazardous waste does not automatically identify that waste as a Class 1 ignitable waste. The constituents on this table are examples of materials which could be considered Class 1 ignitable waste. The physical characteristics of the waste will be the determining factor as to whether or not a waste is ignitable. Refer to 30 TAC §335.505(2) (relating to Class 1 Waste Determination) for the Class 1 ignitable criteria.

Compound or Material	Compound or Material
Aluminum, metallic, powder	Celluloid
Alkali metal amalgams	Cerium
Alkali metal amides	Cesium metal
Aluminum alkyl halides	Chromic acid or chromic acid mixture, dry
Aluminum alkyl hydrides	Cobalt naphthenates, powder
Aluminum alkyls	Cobalt resinate
Aluminum borohydrides	Decaborane
Aluminum carbide	2-Diazo-1-naphthol-4-sulphochloride
Aluminum ferrosilicon powder	2-Diazo-1-naphthol-5-sulphochloride
Aluminum hydride	2,5-Diethoxy-4-morpholinobenzene-diazonium zinc choride
Aluminum phosphide	Diethylzinc
Aluminum resinate	4-Dimethylamino-6-(2-dimethyaminoethoxy)-toluene-2-diazonium zinc chloride
Aluminum silicon powder	Dimethylzinc
Ammonium picrate	Dinitrophenolates
2,2′-Azodi(2,4-dimethyl-4-methoxyvaleronitrile)	Dinitroresorcinol
2,2′-Azodi(2,4-dimethylvaleronitrile)	N,N′-Dinitroso-N,N′-dimethylterephthalamide
1,1′ Azodi(hexahydrobenzonitrile)	N,N′-Dinitrosopentamethylenetetramine
2,2′-Azodi(2-methyl-butyronitrile)	Diphenyloxide-4,4′-disulfohydrazide
Azodiisobutryonitrile	Dipicryl sulfide
Barium, metallic	4-Dipropylaminobenzenediazonium zinc chloride
Barium alloys, pyrophoric	Ferrocerium
Barium azide	Ferrosilicon
Benzene-1,3-disulfohydrazide	Ferrous metal
Benzene sulfohydrazide	Hafnium powder
4-(Benzyl(ethly)amino)-3-ethoxy-benzenediazonium zinc chloride	Hexamine
4-(Benzyl(methyl)amino)-3-ethoxy-benzenediazonium zinc chloride	Hydrides, metal
Borneol	3-(2-Hydroxyethoxy)-4-pyrrolidin-1-ylbenzenediazo-nium zinc chloride
Boron trifluoride dimethyl etherate	Iron oxide, spent
5-tert-Butyl-2,4,6-trinitro-m-xylene	Isosorbide dinitrate mixture
Calcium, metallic	Lead phosphite, dibasic
Calcium carbide	Lithium acetylide-ethylene diamine complex
Calcium chlorite	Lithium alkyls
Calcium cyanamide	Lithium aluminum hydride
Calcium dithionite	Lithium amide, powdered
Calcium hypochlorite	Lithium borohydride
Calcium manganese silicon	Lithium ferrosilicon
Calcium silicon powder	Lithium hydride
Calcium phosphide	Lithium metal
Calcium pyrophoric	Lithium nitride
Calcium resinate	Lithium silicon
Calcium silicide	Magnesium granules
Camphor, synthetic	Magnesium aluminum phosphide
Carbon, activated	

Compound or Material	Compound or Material
Magnesium diamide	Sodium aluminum hydride
Magnesium phosphide	Sodium amide
Magnesium silicide	Sodium borohydride
Maneb	Sodium chlorite
Manganese resinate	Sodium2-diazo-1-naphthol-4-sulphonate
Methyl magnesium bromide	Sodium2-diazo-1-naphthol-5-sulphonate
Methyldichlorosilane	Sodium dichloro-s-triazinetrione
Mono-(trichloro)tetra(monopotassium dichloro)-penta-s-triazinetrione	Sodium dinitro-ortho-cresolate
N-Methyl-N′-nitronitrosoguanidine	Sodium hydride
Naphthalene	Sodium hydrosulfite
Nitrocellulose mixtures	Sodium methylate
Nitroguanidine	Sodium nitrite and mixtures
p-Nitrosodimethylaniline	Sodium picramate, wet
Paraformaldehyde	Sodium potassium alloys
Pentaborane	Sodium sulfide, anhydrous
Peratic acid	Stannic phosphide
Phosphorous, amorphous, red	Strontium phosphide
Phosphorous, white or yellow	Sulfur
Phosphoric anhydride	Titanium metal powder
Phosphorous pentachloride	Titanium hydride
Phosphorus pentasulfide	Trichloroisocyanuric acid
Phosphorus sesquisulfide	Trichlorosilane
Phosphorus trisulfide	Trichloro-s-triazinetrione
Picric acid	Trinitrobenzoic acid
Potassium, metallic	Trinitrophenol
Potassium dichloro-s-triazinetrione	Trinitrotoluene
Potassium borohydride	Urea nitrate
Potassium dithionite	Zinc ammonium nitrite
Potassium phosphide	Zinc phosphide
Potassium sulfide, anhydrous	Zinc powder
Rubidium metal	Zinc resinate
Silicon powder, amorphous	Zirconium hydride, powdered
Silver picrate	Zirconium picramate
Sodium, metallic	Zirconium powder
	Zirconium scrap

Appendix C

Class 1 Toxic Constituents' Maximum Leachable Concentrations

(30 TAC Chapter 335 Subchapter R Appendix 1 Table 1)

Applicability: **Class 1, 2, and 3 Waste Evaluations**

Values are based on information contained in Federal Registers Vol. 55 / Friday, July 27, 1990; Vol. 56 / June 7, 1991; and Integrated Risk Information Systems, Environmental Protection Agency, and 40 CFR 264 Appendix 9.

Compound	CAS No.	Concentration (mg/l)
Acenaphthene	83-32-9	210
Acetone	67-64-1	400
Acetonitrile	75-05-8	20
Acetophenone	98-86-2	400
Acrylamide	79-06-1	0.08
Acrylonitrile	107-13-1	0.6
Aniline	62-53-3	60
Anthracene	120-12-7	1050
Antimony	7440-36-0	1
Arsenic	7440-38-2	1.8
Barium	7440-39-3	100.0
Benzene	71-43-2	0.50
Benzidine	92-87-5	0.002
Beryllium	7440-41-7	0.08
Bis(2-chloroethyl) ether	111-44-4	0.3
Bis(2-ethylhexyl) phthalate	117-81-7	30
Bromodichloromethane	75-27-4	0.3
Bromomethane	74-83-9	5
Butylbenzyl phthalate	85-68-7	700
Cadmium	7440-43-9	0.5
Carbon disulfide	75-15-0	400
Carbon tetrachloride	56-23-5	0.50
Chlordane	57-74-9	0.03
Chlorobenzene	108-90-7	70
Chloroform	67-66-3	6.0
Chloro-m-cresol, p	59-50-7	7000
2-Chlorophenol	95-57-8	20
Chromium	7440-47-3	5.0
m-Cresol	108-39-4	200.0*
o-Cresol	95-48-7	200.0*
p-Cresol	106-44-5	200.0*
DDD	72-54-8	1
DDE	72-55-9	1
DDT	50-29-3	1
Dibutyl phthalate	84-74-2	400
1,4-Dichlorobenzene	106-46-7	7.5
3,3-Dichlorobenzidine	91-94-1	0.8
1,2-Dichloroethane	107-06-2	0.50
Dichlorodifluoromethane	75-71-8	700
1,1-Dichloroethylene	75-35-4	0.6
1,3-Dichloropropene	542-75-6	1
2,4-Dichlorophenol	120-83-2	10
2,4-Dichlorophenoxy-acetic acid (2,4-D)	94-75-7	10.0
Dieldrin	60-57-1	0.02
Diethyl phthalate	84-66-2	3000
Dimethoate	60-51-5	70
2,4-Dimethyphenol	105-67-9	70
2,6-Dimethyphenol	576-26-1	21
m-Dinitrobenzene	99-65-0	0.4
2,4-Dinitrophenol	51-28-5	7
2,4-Dinitrotoluene (and 2,6-, mixture)	602-01-7	0.13
Dinoseb	88-85-7	3.5
1,4-Dioxane	123-91-1	30
Dioxins (Polychlorinated dibenzo-p-dioxins)		
2,3,7,8-TCDD	1746-01-6	0.005
1,2,3,7,8-PeCDD	40321-76-4	0.010
1,2,3,4,7,8-HxCDD	57653-85-7	0.050
1,2,3,6,7,8-HxCDD	34465-46-8	0.050
1,2,3,7,8,9-HxCDD		0.050
Diphenylamine	122-39-4	90
1,2-Diphenylhydrazine	122-66-7	0.4
Disulfoton	298-04-4	0.1
Endosulfan	959-98-8	0.2
Endrin	72-20-8	.02
2-Ethoxyethanol	10-80-5	1400
Ethylbenzene	100-41-4	400
Ethylene dibromide	106-93-4	0.004
Ethylene glycol	107-21-1	7000
Fluoranthene	206-44-0	140
Fluorene	86-73-7	140
Furans (Polychlorinated dibenzofurans)		
2,3,7,8-TCDF	51207-31-9	0.050
1,2,3,7,8-PeCDF		0.100
2,3,4,7,8-PeCDF		0.010
1,2,3,4,7,8-HxCDF		0.050
1,2,3,6,7,8-HxCDF		0.050
1,2,3,7,8,9-HxCDF		0.050
Heptachlor	76-44-8	0.008
Heptachlor epoxide	1024-57-3	0.04
Hexachlorobenzene	118-74-1	0.13
Hexachloro-1,3-butadiene	87-68-3	0.4
Hexachlorocyclopentadiene	77-47-4	20
Hexachloroethane	67-72-1	3.0
Hexachlorophene	70-30-4	1
Isobutyl alcohol	78-83-1	1000
Isophorone	78-59-1	90

Appendix C — Class 1 Toxic Constituents' Maximum Leachable Concentrations (MCLs)

Compound	CAS No.	Concentration (mg/l)	Compound	CAS No.	Concentration (mg/l)
Lead	7439-92-1	1.5	Pyridine	110-86-1	4
Lindane	58-89-9	0.3	Selenium	7782-49-2	1.0
Mercury	7439-97-6	0.2	Silver	7440-22-4	5.0
Methacrylonitrile	126-98-7	0.4	Styrene	100-42-5	700
Methomyl	16752-77-5	90	1,1,1,2-Tetrachloroethane	630-20-6	10
Methoxychlor	72-43-5	10.0	1,1,2,2-Tetrachloroethane	79-34-5	2
2-Methoxyethanol	109-86-4	14.0	Tetrachloroethylene	127-18-4	0.7
Methyl ethyl ketone	78-93-3	200.0	2,3,4,6-Tetrachlorophenol	58-90-2	100
Methyl isobutyl ketone	108-10-1	200	Toluene	108-88-3	1000
Methylene chloride	75-09-2	50	Toxaphene	8001-35-2	0.3
Methyl parathion	298-00-0	0.9	trans-1,3-Dichloropropene	542-75-6	1
Mirex	2385-85-5	0.7	Tribromomethane (Bromoform)	75-25-2	70
Nickel	7440-02-0	70	1,2,4-Trichlorobenzene	120-82-1	70
Nitrobenzene	98-95-3	2.0	1,1,1-Trichloroethane	71-55-6	300
N-Nitroso-di-n-butylamine	924-16-3	0.06	Trichloroethylene	79-01-6	0.5
N-Nitrosodiphenylamine	86-30-6	70	1,1,2-Trichloroethane	79-00-5	6
N-Nitrosomethylethylamine	10595-95-6	0.02	Trichlorofluoromethane	75-69-4	1000
N-Nitroso-n-propylamine	621-64-7	0.05	2,4,5-Trichlorophenoxy-propionic acid (2,4,5-TP or Silvex)	93-72-1	1.0
N-Nitrosopyrrolidine	930-55-2	0.2			
p-Phenylenediamine	106-50-3	20			
Parathion	56-38-2	20			
Pentachlorobenzene	608-93-5	3	1,2,3-Trichloropropane	96-18-4	20
Pentachloronitrobenzene	82-68-8	10	2,4,5-Trichlorophenol	95-95-4	400.0
Pentachlorophenol	87-86-5	100.0	2,4,6-Trichlorophenol	88-06-2	2
Phenol	108-95-2	2000	Vanadium pentoxide	1314-62-1	30
Pronamide	23950-58-5	300	Vinyl chloride	75-01-4	0.2
Pyrene	129-00-0	5.9	Xylenes (all isomers)	1330-82-1	7000

* If o-, m-, and p-cresol concentrations cannot be differentiated, the total cresol concentration is used. The Maximum Concentration for total cresol is 200.0 mg/l.

Appendix D

7-Day Distilled Water Leachate Test's Maximum Contaminant Levels

(30 TAC Chapter 335 Subchapter R APPENDIX 1 Table 3)

Applicability: **Class 3 Waste Evaluations**

Values obtained from 40 Code of Federal Regulations Part 141, Subparts B and G, Maximum Contaminant Levels and 40 Code of Federal Regulations Part 143, Total Dissolved Solids.

Constituent	MCL (mg/l)
Arsenic	0.05
Barium	1
*Benzene	0.005
Cadmium	0.005
*Carbon tetrachloride	0.005
Chlordane	0.002
*Chlorobenzene	0.1
Chromium	0.1
2,4-D	0.07
*Dibromochloropropane	0.0002
*ortho-Dichlorobenzene	0.6
*para-Dichlorobenzene	0.075
*1,2-Dichloroethane	0.005
*1,1-Dichloroethylene	0.007
*trans-1,2-Dichloroethylene	0.1
*1,2-Dichloropropane	0.005
*Ethylbenzene	0.7
Heptachlor	0.0004
Heptachlor epoxide	0.0002
Lead	0.05
Mercury	0.002
Methoxychlor	0.04
Pentachlorophenol	0.001
Selenium	0.05
Silver	0.05
*Styrene	0.1
*Tetrachloroethylene	0.005
*1,1,1-Trichloroethane	0.20
*Trichloroethylene	0.005
*Toluene	1
Toxaphene	0.003
2,4,5-TP (Silvex)	0.05
*Vinyl chloride	0.002
*Xylenes (total)	10
Total dissolved solids	500

* For a Class 3 waste classification, these constituents must also be evaluated using the test methods described in 40 Code of Federal Regulations, Part 261, Appendix II. See §335.507 (4) (A) (ii) for additional information.

Appendix E

Class 1 Toxic Constituents

(other than those identified in Appendix C, *and their Estimated Quantitation Limits [EQLs])*

Applicability: **Class 3 Waste Evaluations**

This table is to be utilized by the generator in evaluating detection limits for the identified constituents. The EQLs in this table are defined as the lowest detectable levels that can be reliably achieved using the Toxicity Characteristic Leaching Procedure (TCLP) at the time of the printing of this guideline. Applicable EPA method numbers are provided and can be found in EPA Report SW-846 "Test Methods for Evaluating Solid Waste" except where noted. Please note that more than one test method may be available for a particular constituent. Synonyms are provided in brackets "[]".

Constituent	EQL (mg/l)	Method(s)	Constituent	EQL (mg/l)	Method(s)
Acenaphthene	0.2	8100	Chloroform	0.0005	8010
	0.01	8270		0.005	8240
	0.02	8250	p-Chloro-m-cresol	0.005	8040
Acetone	0.1	8240		0.02	8270
Acetonitrile	0.1	8015	2-Chlorophenol	0.003	8040
[Methyl cyanide]	0.1	8030	[o-Chlorophenol]	0.01	8270
Acetophenone	0.001	8250	m-Cresol	0.01	8270
	0.01	8270	o-Cresol	0.01	8270
Acrylamide	0.005	8015	p-Cresol	0.01	8270
Acrylonitrile	0.005	8030	DDD [Dichlorodiphenyl-	0.0001	8080
[Vinyl cyanide]	0.005	8240	dichloroethane]	0.028	8250
Anthracene	0.2	8100		0.01	8270
	0.02	8250	DDE [Dichlorodiphenyl-	0.00004	8080
	0.01	8270	ethylene]	0.056	8250
Aniline	0.01	8250		0.01	8270
[Benzyl amine]	0.01	8270	DDT [Dichlorodiphenyl-	0.0001	8080
Antimony	0.2	204	trichloroethane]	0.047	8250
	0.3	6010		0.01	8270
	2.0	7040	Dibutyl phthalate	0.005	8060
	0.03	7041		0.01	8270
	2.0	7000A	1,4-Dichlorobenzene	0.004	8010
Benzidine [Dianiline]	0.44	8250		0.003	8020
Beryllium	**	210		0.013	8120
	0.003	6010		0.01	8270
	0.05	7090	3,3-Dichlorobenzidine	0.02	8270
	0.002	7091	Dichlorodifluoromethane	0.01	8010
	0.05	7000A		0.005	8240
Bis(2-chloroethyl) ether	0.057	8250	1,3-Dichloropropene	0.003	8010
[Dichloroethyl ether]	0.01	8270		0.005	8240
Bis(2-ethylhexyl)	0.02	8060	2,4-Dichlorophenol	0.05	8040
phthalate	0.25	8250		0.01	8270
	0.01	8270	Dieldrin	0.00002	8080
Bromodichloromethane	0.001	8010		0.01	8270
	0.005	8240	Diethyl phthalate	0.005	8060
Bromomethane	0.003	8010		0.01	8270
[Methylbromide]	0.01	8240	Dimethoate	0.02	8270
Butylbenzyl phthalate	0.005	8060	2,4-Dimethylphenol	0.003	8040
[Benzylbutyl phthalate]	0.025	8250		0.01	8270
	0.01	8270	2,6-Dimethylphenol	**	**
Carbon disulfide [CS_2]	0.005	8240	m-Dinitrobenzene	0.01	8270

Constituent	EQL (mg/l)	Method(s)
2,4-Dinitrophenol	0.13	8040
	0.05	8270
2,4-Dinitrotoluene	0.0002	8090
(and 2,6-, mixture)	0.01	8270
Dinoseb	0.007	8150
	0.02	8270
1,4-Dioxane	0.15	8015
Dioxins (Polychlorinated dibenzo-p-dioxins)		
2,3,7,8-TCDD	0.000005	8280
1,2,3,7,8-PeCdd	0.00001	8280
1,2,3,4,7,8-HxCDD	0.00001	8280
1,2,3,6,7,8-HxCDD	0.00001	8280
1,2,3,7,8,9-HxCDD	0.00001	8280
Diphenylamine	0.01	8270
1,2-Diphenylhydrazine	0.2	1625
Disulfoton	0.002	8140
	0.01	8270
Endosulfan	0.0001	8080
	0.056	8250
Endrin	0.00006	8080
	0.01	8250
2-Ethoxyethanol	**	**
Ethylene dibromide [EDB]	0.5	6231
(Standard Methods for Examination of Water and Wastewater)		
Ethylene glycol	**	**
Fluoranthene	0.2	8100
	0.01	8270
Fluorene	0.2	8100
	0.01	8270
Furans (Polychlorinated dibenzofurans)		
2,3,7,8-TCDF	0.00001	8280
1,2,3,7,8-PeCDF	0.00001	8280
2,3,4,7,8-PeCDF	0.00001	8280
1,2,3,4,7,8-HxCDF	0.00001	8280
1,2,3,6,7,8-HxCDF	0.00001	8280
1,2,3,7,8,9-HxCDF	0.00001	8280
Hexachlorobenzene	0.0005	8120
	0.0	8270
Hexachloro-1,3-butadiene	0.0034	8120
	0.01	8270
Hexachlorocyclopentadiene	0.004	8120
	0.01	8270
Hexachloroethane	0.0003	8120
	0.01	8270
Hexachlorophene	0.05	8270
Isobutyl alcohol	0.05	8015
Isophorone	0.06	8090
	0.01	8270
Lindane	0.00004	8080
	0.01	8250
	0.00004	608
	0.01	625
Methacrylonitrile	0.005	8015
Methomyl	0.09	632
2-Methoxyethanol	**	**

Constituent	EQL (mg/l)	Method(s)
Methyl ethyl ketone [MEK]	0.01	8015
	0.1	8240
Methyl isobutyl ketone [MIBK]	**	8015
	0.005	8240
Methylene chloride	0.005	8010
[Dichloromethane]	0.005	8240
Methyl parathion	0.0003	8140
	0.01	8270
Mirex	**	**
Nickel	0.04	249
	0.05	6010
	0.4	7520
	0.04	7000A
Nitrobenzene	0.04	8090
	0.01	8250
	0.01	8270
N-Nitroso-di-n-butylamine	0.01	8270
N-Nitrosodiphenylamine	0.01	8270
N-Nitrosomethylethylamine	0.02	8270
N-Nitroso-n-propylamine	0.01	8270
N-Nitrosopyrrolidine	0.01	8270
p-Phenylenediamine	0.01	8270
Parathion	0.01	8270
	0.0003	8140
Pentachlorobenzene	0.02	8270
Pentachloronitrobenzene	0.01	8270
Phenol	0.001	8040
	0.01	8270
Pronamide	0.01	8270
Pyrene	0.2	8100
	0.01	8270
Pyridine	0.005	8240
	0.01	8270
1,1,1,2-Tetrachloroethane	0.005	8010
	0.005	8240
1,1,2,2-Tetrachloroethane	0.0003	8010
	0.005	8240
2,3,4,6-Tetrachlorophenol	0.01	8270
trans-1,3-Dichloropropene	0.0034	8010
	0.005	8240
Tribromomethane [Bromoform]	0.002	8010
	0.005	8240
1,2,4-Trichlorobenzene	0.01	8270
1,1,2-Trichloroethane	0.0002	8010
[1,1,2-TCE]	0.005	8240
Trichlorofluoromethane	0.01	8010
[Freon 11]	0.005	8240
1,2,3-Trichloropropane	0.01	8010
	0.005	8240
2,4,5-Trichlorophenol	0.01	8270
2,4,6-Trichlorophenol	0.006	8040
	0.01	8270
Vanadium pentoxide	0.2	286
	0.08	6010
	2.0	7910
	0.04	7911

* If o-, m-, and p-cresol concentrations cannot be differentiated, the total cresol concentration is used.
** This information not available at time of publication.

Appendix F

7-Day Distilled Water Leachate Test Procedure

(30 TAC Chapter 335 Subchapter R Appendix 4)

Applicability: **Class 3 Waste Evaluations**

This test is intended only for dry, solid wastes, i.e., waste materials without any free liquids.

1. Place a 250 gram (dry weight) representative sample of the waste material in a 1500 milliliter Erlenmeyer flask.
2. Add 1 liter of deionized or distilled water into the flask and mechanically stir the material at a low speed for five (5) minutes.
3. Stopper the flask and allow to stand for seven (7) days.
4. At the end of seven (7) days, filter the supernatant solution through a 0.45 micron filter, collecting the supernatant into a separate flask.
5. Subject the filtered leachate to the appropriate analysis.

Appendix G

Form Codes

(30 TAC Chapter 335 Subchapter R Appendix 3)

Applicability: **All Waste**

In determining a waste stream's form code, it is recommended that the generator first determine into which major category the waste stream fits (e.g. inorganic liquids). The generator should then review all the form code descriptors in that category to determine which code or codes best describe the generator's waste stream. The generator should then choose, from the narrowed-down list, a form code for the waste stream.

Form codes are fairly generic in their descriptions. It is possible that more than one form code may be applicable to a particular waste stream. Generators should assign the form code which best describes the waste stream. If more than one form code can "best describe" the waste stream, then the generator should choose one of those several codes.

Code	Waste Description
	— Lab Packs —
	Lab Packs *— Lab packs of mixed wastes, chemicals, lab wastes*
001	Lab packs of old chemicals only
002	Lab packs of debris only
003	Mixed lab packs
004	Lab packs containing acute hazardous wastes
009	Other lab packs (Specify in Comments)
	— Liquids —
	Inorganic Liquids *— Waste that is primarily inorganic and highly fluid (e.g., aqueous), with low suspended inorganic solids and low organic content*
101	Aqueous waste with low solvents
102	Aqueous waste with low other toxic organics
103	Spent acid with metals
104	Spent acid without metals
105	Acidic aqueous waste
106	Caustic solution with metals but no cyanides
107	Caustic solution with metals and cyanides
108	Caustic solution with cyanides but no metals
109	Spent caustic
110	Caustic aqueous waste
111	Aqueous waste with reactive sulfides
112	Aqueous waste with other reactives (e.g., explosives)
113	Other aqueous waste with high dissolved solids
114	Other aqueous waste with low dissolved solids
115	Scrubber water
116	Leachate
117	Waste liquid mercury
119	Other inorganic liquids (Specify in Comments)
198	Nonhazardous photographic chemical wastes (inorganic)
199	Brine solution that could also bear the form code 113
	Organic Liquids *— Waste that is primarily organic and is highly fluid, with low inorganic solids content and low-to-moderate water content*
201	Concentrated solvent-water solution
202	Halogenated (e.g., chlorinated) solvent
203	Non-halogenated solvent
204	Halogenated/non-halogenated solvent mixture
205	Oil-water emulsion or mixture
206	Waste oil
207	Concentrated aqueous solution of other organics
208	Concentrated phenolics
209	Organic paint, ink, lacquer, or vanish
210	Adhesives or epoxies
211	Paint thinner or petroleum distillates
212	Reactive or polymerizable organic liquids
219	Other organic liquids (Specify in Comments)
296	Ethylene glycol based antifreeze

Code	Waste Description
297	Nonhazardous liquids containing greater than or equal to (>) 50 and less than (<) 500 ppm PCBs
298	Nonhazardous liquids containing greater than or equal to (>) 500 ppm PCBs
299	Nonhazardous photographic chemical waste (organic)

— Solids —

*(These codes **do not** apply to pumpable waste.)*

Inorganic Solids** — Waste that is primarily inorganic and solid, with low organic content and low-to-moderate water content; **not pumpable

301	Soil contaminated with organics
302	Soil contaminated with inorganics only
303	Ash, slag, or other residue from incineration of wastes
304	Other "dry" ash, slag, or thermal residue
305	"Dry" lime or metal hydroxide solids chemically "fixed"
306	"Dry" lime or metal hydroxide solids not "fixed"
307	Metal scale, filings, or scrap
308	Empty or crushed metal drums or containers
309	Batteries or battery parts, casings, cores
310	Spent solid filters or adsorbents
311	Asbestos solids and debris
312	Metal-cyanide salts/chemicals
313	Reactive cyanide salts/chemicals
314	Reactive sulfide salts/chemicals
315	Other reactive salts/chemicals
316	Other metal salts/chemicals
319	Other waste inorganic solids (Specify in Comments)
388	Empty or crushed glass containers
389	Nonhazardous sandblasting waste
390	Nonhazardous concrete/cement/ construction debris
391	Nonhazardous dewatered wastewater treatment sludge
392	Nonhazardous dewatered air pollution control device sludge
393	Catalyst waste
394	Nonhazardous solids containing greater than or equal to (>) 50 ppm and less than (<) 500 ppm PCBs
395	Nonhazardous solids containing greater than or equal to (>) 500 ppm PCBs
396	Nonhazardous electrical equipment/devices containing greater than or equal to (>) 50ppm and less than (<) 500 ppm PCBs
397	Nonhazardous electrical equipment/devices containing greater than or equal to (>) 500 ppm PCBs
398	Nonhazardous soils containing greater than or equal to (>) 50 ppm and less than (<) 500 ppm PCBs
399	Nonhazardous soils containing greater than or equal to (>) 500 ppm PCBs

Organic Solids** — Waste that is primarily organic and solid, with low-to-moderate inorganic content and water content; **not pumpable

401	Halogenated pesticide solid
402	Non-halogenated pesticide solid
403	Solids resins or polymerized organics
404	Spent carbon
405	Reactive organic solid
406	Empty fiber or plastic containers
407	Other halogenated organic solids (Specify in Comments)
409	Other non-halogenated organic solids (Specify in Comments)
488	Wood debris
489	Petroleum contaminated solids
490	Sand blasting waste
491	Dewatered biological treatment sludge
492	Dewatered sewage or other untreated biological sludge
493	Catalyst waste
494	Solids containing greater than or equal to (>) 50 ppm and less than (<) 500 ppm PCBs
495	Solids containing greater than or equal to (>) 500 ppm PCBs
496	Electrical equipment/devices containing greater than or equal to (>) 50 ppm and less than (<) 500 ppm PCBs
497	Electrical equipment/devices containing greater than or equal to (>) 500 ppm PCBs
498	Soil containing greater than or equal to (>) 50 ppm and less than (<) 500 ppm PCBs
499	Soils containing greater than or equal to (>) 500 ppm PCBs

— Sludges —

(These codes only apply to pumpable waste.)

Inorganic Sludges** — Waste that is primarily inorganic, with moderate-to-high water content and low organic content, and **pumpable

501	Lime sludge without metals
502	Lime sludge with metals/metal hydroxide sludge

Code	Waste Description
503	Wastewater treatment sludge with toxic organics
504	Other wastewater treatment sludge
505	Untreated plating sludge without cyanides
506	Untreated plating sludge with cyanides
507	Other sludge with cyanides
508	Sludge with reactive sulfides
509	Sludge with other reactives
510	Degreasing sludge with metal scale or filings
511	Air pollution control device sludge (e.g., fly ash, wet scrubber sludge)
512	Sediment or lagoon dragout contaminated with organics
513	Sediment or lagoon dragout contaminated with inorganics only
514	Drilling mud
515	Asbestos slurry or sludge
516	Chloride or other brine sludge
519	Other inorganic sludges (Specify in Comments)
597	Catalyst waste
598	Nonhazardous sludges containing greater than or equal to (>) 50 ppm and less than (<) 500 ppm PCBs
599	Nonhazardous sludges containing greater than or equal to (>) 500 ppm PCBs

Organic Sludges *— Waste that is primarily organic with low-to-moderate inorganic solids content and water content, and* ***pumpable***

601	Still bottoms of halogenated (e.g., chlorinated) solvents or other organic liquids
602	Still bottoms on non-halogenated solvents or other organic liquids
603	Oily sludge
604	Organic paint or ink sludge
605	Reactive or polymerizable organics
606	Resins, tars, or tarry sludge
607	Biological treatment sludge
608	Sewage or other untreated biological sludge
609	Other organic sludges (Specify in Comments)
695	Petroleum contaminated sludges other than still bottoms and oily sludges
696	Grease
697	Catalyst waste
698	Nonhazardous sludges containing greater than or equal to (>) 50 ppm and less than (<) 500 ppm PCBs
699	Nonhazardous sludges containing greater than or equal to (>) 500 ppm PCBs

— Gases —

Inorganic Gases *— Waste that is primarily inorganic with a low organic content and is a gas at atmospheric pressure*

701	Inorganic gases

Organic Gases *— Waste that is primarily organic with low-to-moderate inorganic content and is a gas at atmospheric pressure*

801	Organic gases

— Plant Trash —

(In order to be considered for one of the two plant refuse designations, a waste must first meet the following two criteria.

First*, the waste* ***must*** *be a Class 2 waste. This means that a proper classification determination must be performed for each item which a facility is considering as one of the plant refuse designations. A waste is not a Class 2 solely because it has been designated as a plant refuse waste.* ***Hazardous*** *and* ***Class 1 wastes*** *are* ***not eligible*** *for designation as one of the plant refuses.*

Second*, the waste must meet the particular definition of the plant refuse term. For more information on these terms, please refer to the terms listed in this table as well as the "Definitions" section which follows this table.)*

902	**Supplemental plant production refuse** – any Class 2 waste from production, manufacturing, or laboratory operations as long as the total amount of the supplemental plant production refuse does not exceed twenty percent of the total plant trash (form code 999) volume or weight, whichever is less – this could include, but is not limited to, such things as metal parts, floor sweepings, and off-specification materials
999	**Plant Trash** – any Class 2 waste originating in the facility offices, laboratory, plant production area or food services/cafeteria operations that is composed of paper, cardboard, linings, wrappings, paper and/or wooden packaging materials, uncontaminated food wastes and/or packaging, cafeteria wastes, glass, aluminum foil, aluminum cans, aluminum scrap, stainless steel, steel, iron scrap, plastics, styrofoam, rope, twine, uncontaminated rubber, uncontaminated wooden materials, equipment belts, wirings, uncontaminated cloth, metal bindings, empty containers with a holding capacity of less than five gallons, uncontaminated floor sweepings, and personal cosmetics generated by facility personnel (does not include cosmetics generated as a result of manufacturing or plant production operations).

Form Code Definitions

The following are definitions of terms utilized in form codes:

Acidic – A material having a pH less than 7.0.

Alkaline – A material having a pH greater than 7.0.

Aqueous – A water solution containing organic and/or inorganic constituents dissolved in solution.

Caustic – A material which is corrosive or irritating to living tissue and has a pH greater than 7.

Inorganic – Chemicals that are not organic (i.e., water, carbon dioxide, carbon disulfide, iron, zinc, steel). Generally, if a waste is composed of more than 50% inorganic materials, it is considered an inorganic waste.

Organic – Chemicals composed primarily of carbon and hydrogen and their derivatives. (i.e. methylene chloride, benzene, petroleum products). In general, if a waste is composed of 50% or more organic materials, it is considered an organic waste.

Plant Trash – Includes the following Class 2 wastes which are produced as a result of plant production, manufacturing, laboratory, general office, cafeteria or food service operations; paper, cardboard, linings, wrappings, paper or wood packaging materials, food wastes, cafeteria wastes, glass, aluminum foil, aluminum cans, aluminum scrap, stainless steel, steel, iron scrap, plastics, styrofoam, rope, twine, uncontaminated rubber, uncontaminated wooden materials, equipment belts, wirings, uncontaminated cloth, metal bindings, empty containers with a holding capacity of less than five gallons, uncontaminated floor sweepings, and personal cosmetics generated by facility personnel (does not include cosmetics generated as a result of manufacturing or plant production operations). **Please note that hazardous waste and Class 1 waste can not be designated as "plant office refuse".** Plant trash shall not include oils, lubricants of any type, oil filters, contaminated soils, sludges, or wastewaters.

Examples of "plant trash" include Class 2 soda cans, lunch sacks, food scraps, envelopes, plastic binders, empty boxes, pallets, styrofoam shipping boxes, chemical container liners, shrink wrap, and broken glassware.

As another example, used typing paper from the secretarial area could be considered "plant trash" because it resulted from general office operations. (Please note that typing paper would normally be considered a Class 2 waste unless it were contaminated with something to cause it to be considered a hazardous or Class 1 waste. For example, if typing paper were used to clean up a spill of a F003 waste, it would be considered a hazardous waste.)

As another example, a Class 2 off-specification production chemical could not be considered "plant trash" because it does not meet the definition of a "plant trash". However, the Class 2 off-specification production chemical might be considered a "supplemental plant production refuse" as long as the weight/volume limits established for "supplemental plant production refuse" were not exceeded. (For more information on "supplemental plant production refuse" and weight/volume limits, please see "Supplemental Plant Production Refuse" in these definitions.

Reactive – A material is reactive if it is capable of detonation or explosive decomposition:
1. at standard temperature and pressure, or
2. if subjected to a strong ignition source, or
3. heated under confinement.

A material is also considered reactive if, when mixed with water it is:
1. potentially explosive, or
2. reacts violently, or
3. generates toxic gases or vapors (i.e. hydrogencyanide or hydrogensulfide).

A material is also considered reactive if it is:
1. normally unstable and readily undergoes violent changes, or
2. a forbidden explosive (see 49 CFR §173.53), or
3. a Class B explosive (see 49 CFR §173.88).

Solvent – A liquid used to dissolve another material.

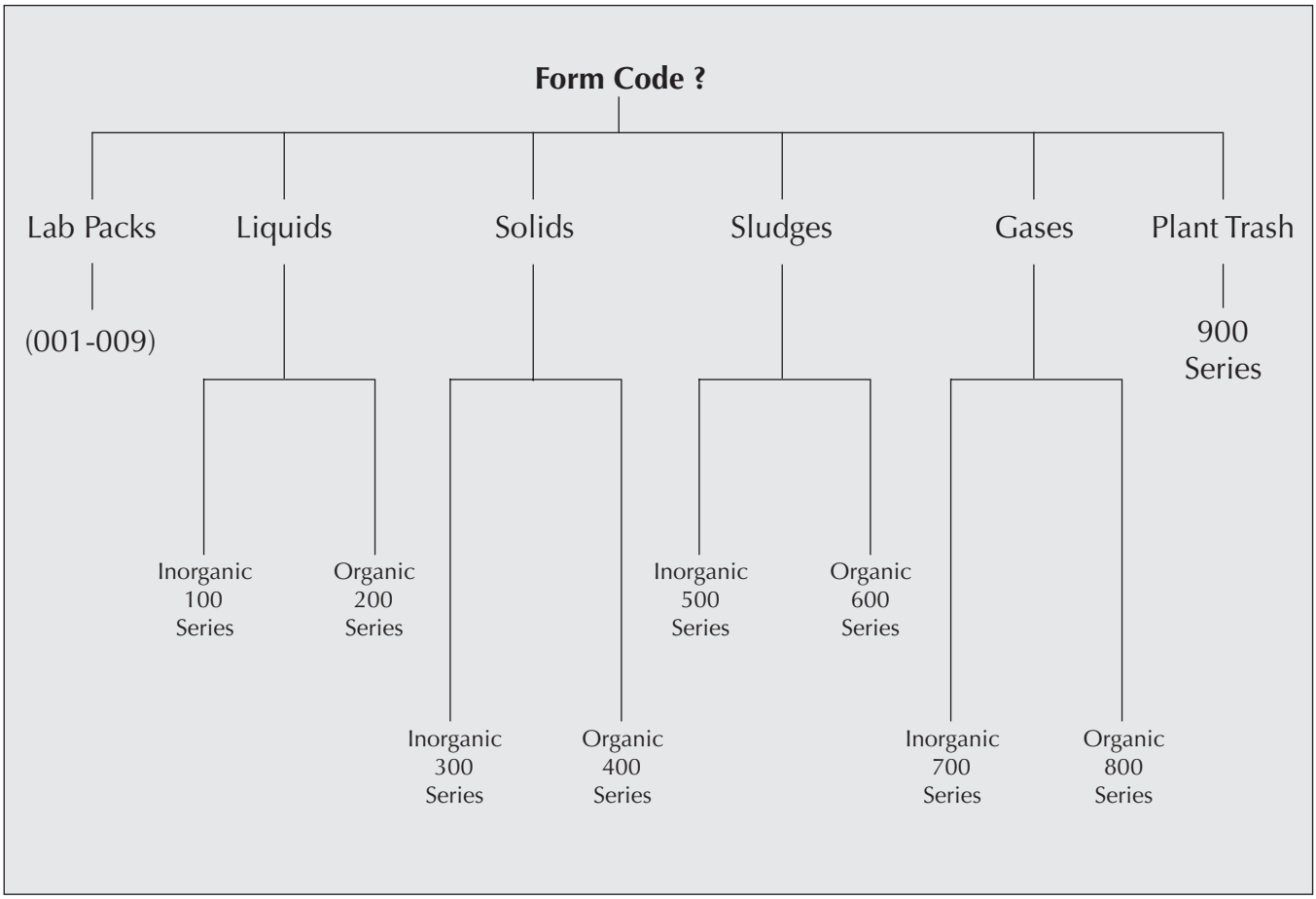
Supplemental Plant Production Refuse – Any **Class 2 Waste from production, manufacturing, or laboratory operations** can be designated as **"supplemental plant production refuse"** (form code 999) as long as the total amount of the supplemental plant production refuse **does not exceed twenty percent of the total plant production refuse volume or weight, whichever is less.**

Individual wastes which have been designated "supplemental plant production refuse" may be designated by the generator at a later time as a separate waste in order to maintain the "supplemental plant production refuse" at a level below 20% of the "plant trash" amount. For any waste stream so redesignated, the generator must provide the initial notification information required pursuant to 30 TAC Chapter 335.

Please note that hazardous waste and Class 1 waste can not be designated as "supplemental plant production refuse".

Examples of "supplemental plant production refuse" include Class 2 steel shavings, empty metal containers, aerosol cans, old chemicals, safety equipment, and machine parts.

Please note that when a site notifies the Commission that it generates "supplemental plant production refuse", it must include a list of those wastes which are expected to be included in the "supplemental plant production refuse" designation. If that list increases, the generator must notify the Commission of the additions to that list; otherwise, the Commission will not view the additions as "supplemental plant production refuse".



Lab Packs – 001-009 series

Examples:

1. Lab pack containing debris — **002**
2. Lab pack containing old unused or partially used chemicals — **001**

Plant Trash – 900 series

Examples:

1. Office debris (i.e., paper, plastic, aluminum cans and fax paper) — **999**
2. Scrap plastic from molds of toys and souvenirs — **902**
3. Packing debris from unpacking of raw materials — **999**

Liquids

Inorganic – 100 series

(Waste that is primarily inorganic and highly fluid, (e.g., aqueous), with low suspended solids and low organic content.)

Examples:

1. 99% water with 1% methanol — **101**
2. 98% water with 2% methyl ethyl ketone MEK — **102**
3. Waste sulfuric acid from plastics cleaning — **104**
4. Water with 0.73% potassium permanganate — **114**
5. Leachate from landfills — **116**
6. Waste photographic fixer — **198**

Organic – 200 series

(Waste that is primarily organic and is highly fluid, with low inorganic solids and low-to-moderate water content.)

Examples:

1. Solvent mixture 65% methylene chloride, 30% phenol, 5% cresol — **204**
2. 95% motor oil, 5% water emulsion — **205**
3. Used hydraulic oil — **206**
4. Unused varnish and organic paint — **209**
5. Waste ethylene glycol antifreeze — **296**

Solids

Inorganic – 300 series

*(Waste that is primarily inorganic and solid, with low organic content and low-to-moderate water content; **not pumpable**.)*

Examples:

1. Soil contaminated with naptha — **301**
2. Incinerator ash — **303**
3. Crushed RCRA empty metal drums — **308**
4. Lead acid batteries, chips and cores — **309**
5. Concrete, plaster and other construction debris — **390**
6. Metalic catalyst waste — **393**

Organic – 400 series

*(Waste that is primarily organic and solid, with low-to-moderate inorganic and water content; **not pumpable**.)*

Examples:

1. Unused malathion pellets — **402**
2. Spent carbon from filters — **404**
3. Wooden house exterior debris — **488**
4. Paper contaminated with oil — **489**
5. Sand blasting waste from petroleum tanks — **490**
6. Dewatered sewage sludge — **492**

Sludges

Inorganic – 500 series

*(Waste that is primarily inorganic, with moderate-to-high water content, and low organic content, and **pumpable**.)*

Examples:

1. Wastewater treatment sludge containing phenolics — **503**
2. Zinc plating wastewater sludge containing cyanide — **506**
3. Sludge from pollution removal scrubber — **511**
4. Sediment pond dragout contaminated with lead — **513**
5. Water based drilling mud with brine — **514**
6. Waste metal catalyst with 0.89% organics — **597**

Organic – 600 series

*(Waste that is primarily organic, with moderate-to-high water content, and low inorganic content, and **pumpable**.)*

Examples:

1. Still bottoms from naptha recovery — **602**
2. Ink and paint sludge from printing billboards — **604**
3. Bioremediation sludge from oil spill cleanup — **607**
4. Motor repair facility sludge with grease — **603**
5. Refinery wastewater sludge with petroleum compounds — **695**
6. Waste lubricating grease — **696**

Gases

Inorganic – 701

(Waste that is primarily inorganic with a low organic content and is a gas at atmospheric pressure.)

Organic – 801

(Waste that is primarily organic with low-to-moderate inorganic content and is a gas at atmospheric pressure.)

Appendix H

Codes for Out-of-State Waste Generators and Receivers

Codes for States of the United States			
State or Country	Abbreviation	Generator No.	Receiver No.
Alabama	AL	D0001	D0001
Alaska	AK	D0002	D0002
Arizona	AZ	D0004	D0004
Arkansas	AR	D0005	D0005
California	CA	D0006	D0006
Colorado	CO	D0008	D0008
Connecticut	CT	D0009	D0009
Delaware	DE	D0010	D0010
Dist. of Columbia		D0011	D0011
Florida	FL	D0012	D0012
Georgia	GA	D0013	D0013
Hawaii	HI	D0015	D0015
Idaho	ID	D0016	D0016
Illinois	IL	D0017	D0017
Indiana	IN	D0018	D0018
Iowa	IA	D0019	D0019
Kansas	KS	D0020	D0020
Kentucky	KY	D0021	D0021
Louisiana	LA	D0022	D0022
Maine	ME	D0023	D0023
Maryland	MD	D0024	D0024
Massachusetts	MA	D0025	D0025
Michigan	MI	D0026	D0026
Minnesota	MN	D0027	D0027
Mississippi	MS	D0028	D0028
Missouri	MO	D0029	D0029
Montana	MT	D0030	D0030
Nebraska	NE	D0031	D0031
Nevada	NV	D0032	D0032
New Hampshire	NH	D0033	D0033
New Jersey	NJ	D0034	D0034
New Mexico	NM	D0035	D0035
New York	NY	D0036	D0036
North Carolina	NC	D0037	D0037
North Dakota	ND	D0038	D0038
Ohio	OH	D0039	D0039
Oklahoma	OK	D0040	D0040
Oregon	OR	D0041	D0041
Pennsylvania	PA	D0042	D0042
Rhode Island	RI	D0044	D0044
South Carolina	SC	D0045	D0045
South Dakota	SD	D0046	D0046
Tennessee	TN	D0047	D0047
Utah	UT	D0049	D0049
Vermont	VT	D0050	D0050
Virginia	VA	D0051	D0051
Washington	WA	D0053	D0053
West Virginia	WV	D0054	D0054
Wisconsin	WI	D0055	D0055
Wyoming	WY	D0056	D0056

Country Codes		
State or Country	Generator No.	Receiver No.
American Samoa	D0083	D0083
Australia	F0095	F0095
Austria	F0078	F0078
Bahamas Islands	F0002	F0002
Belgium	F0069	F0069
Belize	F0091	F0091
Brazil	F0086	F0086
Cambodia	F0001	F0001
Canada	F0063	F0063
Chile	F0007	F0007
China	F0005	F0005
Columbia	F0003	F0003
Denmark	F0067	F0067
El Salvador	F0097	F0097
England	F0064	F0064
Finland	F0070	F0070
France	F0076	F0076
Germany	F0068	F0068
Greece	F0084	F0084
Guam	D0075	D0075
Haiti	F0093	F0093
Holland	F0079	F0079
Honduras	F0011	F0011
Hong Kong	F0080	F0080
India	F0006	F0006
Italy	F0090	F0090
Jamaica	F0089	F0089
Japan	F0062	F0062
Luxemburg	F0092	F0092
Malaysia	F0077	F0077
Marshall Islands	F0074	F0074
Mexico	F0061	F0061
Navajo Nation	D0057	D0057
Netherlands	F0071	F0071
Netherlands Antilles (A,B,C)	F0010	F0010
Nicaragua	F0094	F0094
Norway	F0081	F0081
Offshore beyond 12 mi.	F0087	F0087
Pacific Islands	F0072	F0072
Panama	F0082	F0082
Peru	F0085	F0085
Puerto Rico	D0060	D0060
Saudi Arabia	F0088	F0088
Slovenia	F0009	F0009
South Africa	F0004	F0004
Spain	F0065	F0065
Sweden	F0096	F0096
Taiwan	F0099	F0099
Thailand	F0008	F0008
Trinidad de Tobago	F0098	F0098
Venezuela	F0073	F0073
Virgin Islands	D0066	D0066

RG-029

SPECIAL WASTE REGULATIONS IN TEXAS

TCEQ REGULATORY GUIDANCE

Waste Permits Division
RG-029 • September 2006

Special Waste Regulations in Texas

Special waste is any solid waste that requires special handling and disposal because of its quantity, concentration, physical or chemical characteristics, or biological properties. Special waste is defined in Title 30 Texas Administrative Code (30 TAC), Chapter 330, 330.3. Special waste that is not specifically identified in 30 TAC 330.171(c) or (d), or 330.173 requires prior written authorization by the TCEQ for disposal. Written authorization for the disposal of a special waste can be obtained in two ways:

1. The generator, with written concurrence from a landfill willing to accept the special waste, may submit a Request for Authorization for Disposal of a Special Waste, agency form TCEQ-0152, along with any supporting documentation, to the Municipal Solid Waste (MSW) Permits Section for review; or
2. the generator may request approval to dispose of a special waste directly from an MSW landfill operator that has an approved Waste Acceptance Plan identified in 330.61(b) that authorizes the acceptance of the specific special waste as set out in 330.171(b)(2).

Special wastes identified in, and meeting the requirements of, 30 TAC 330.171(c) and (d) do not require prior written authorization before disposal, provided the MSW landfill is permitted to accept these wastes. These include:

- Municipal hazardous waste from conditionally exempt small-quantity generators may be accepted at a Type I or Type IAE landfill provided the amount of waste does not exceed 220 lb (100 kg) per month per generator.
- Municipal wastewater treatment plant sludges, other types of domestic sewage treatment plant sludges, and water-supply treatment plant sludges.
- Liquid wastes from municipal sources that are treated or processed to eliminate free liquids and tested in accordance with 30 TAC 330.171(c)(7).
- Grease-trap and grit-trap wastes.
- Slaughterhouse wastes.
- Dead animals.
- Empty pesticide (insecticide, herbicide, fungicide, or rodenticide) containers that have been triple rinsed and rendered unusable.

- Certain discarded materials containing asbestos as detailed in 30 TAC 330.171(c)(3) and (4). Regulated asbestos-containing material may be accepted for disposal at a Type I or Type IAE landfill. Nonregulated asbestos-containing materials (non-RACM) may be accepted for disposal at a Type I, Type IAE, Type IV, or Type IVAE landfill. For further information regarding asbestos abatement, contact the Asbestos Programs Branch of the Texas Department of State Health Services Toxic Substance Control Division at 512-834-6600 or 800-572-5548.

Special wastes that do require prior written authorization include:

- Untreated medical waste may be approved for disposal by the executive director when necessary to protect human health and the environment from the effects of a natural or man-made disaster.
- Class 1 nonhazardous industrial solid waste not routinely collected with municipal solid waste. (Also see the requirements of 30 TAC 330.173.)
- Wastes from commercial or industrial wastewater treatment plants; air pollution control facilities; and tanks, drums, or containers used for shipping or storing any material that has been listed as a hazardous constituent in 40 CFR, Part 261, Appendix VIII but has not been listed as a commercial chemical product in 40 CFR, 261.33(e) or (f).
- Drugs, contaminated foods, or contaminated beverages, other than those contained in normal household waste.
- Incinerator ash.
- Soil contaminated by petroleum products, crude oil, or chemicals in concentrations of greater than 1,500 milligrams per kilogram total petroleum hydrocarbons; or contaminated by constituents of concern that exceed the concentrations listed in Table 1 of 335.521(a)(1) of this title (relating to Appendices). Such contaminated soil must be disposed of in accordance with 330.171(b)(4).
- Waste from oil, gas, and geothermal activities subject to regulation by the Railroad Commission of Texas when those wastes are to be processed, treated, or disposed of at a municipal solid waste management facility permitted under Chapter 330.
- Waste generated outside the boundaries of Texas that contains:
  - Any industrial waste;
  - Any waste associated with oil, gas, or geothermal exploration, production, or development activities; or
  - Any item listed as a special waste in 30 TAC 330.3.

The following special wastes are prohibited from disposal in an MSW landfill:

- Used oil filters from internal combustion engines. Used oil filters are prohibited from disposal at MSW landfills by non-household generators by 30 TAC 330.171(d).
- Lead-acid storage batteries. Lead-acid storage battery disposal is prohibited at MSW landfills by 30 TAC 330.15(e).

Management and disposal options for special waste:

1. **Asbestos:** There are two types of asbestos waste—regulated (friable) and non-regulated (not friable) asbestos-containing material (RACM and non-RACM) as defined in 40 CFR Part 61 Section 141. Also, the amount of asbestos in the material contributes to the type of asbestos waste. Non-RACM may become RACM if subject to sanding, grinding, cutting, or abrading, or it has a high probability of being reduced to powder during demolition or renovation.
   a. RACM is friable asbestos-containing material that contains greater than 1 percent asbestos. Friable is defined as asbestos-containing material that, when dry, can be crushed to a powder by hand pressure. RACM may be disposed of at a Type I or Type I arid exempt (AE) MSW landfill in accordance with 30 TAC 330.171(c)(3).
   b. Non-RACM is material containing less than one percent asbestos or non-friable asbestos-containing material not identified as regulated. Non-RACM may be disposed of at any MSW landfill provided the facility is authorized to accept the waste in accordance with 30 TAC 330.171(c)(4).
2. **Grease-trap waste:** Material collected in and from a grease interceptor in the sanitary sewer service line of a commercial, institutional, or industrial food service or processing establishment, including the solids resulting from dewatering processes. Grease-trap waste may be from municipal sources and regulated under 30 TAC Chapter 330 or from industrial sources and regulated under 30 TAC Chapter 335. Industrial-waste generators must classify their waste in accordance with Subchapter R of 30 TAC Chapter 335. Grease-trap waste must be transported to an authorized facility which can be a processing or treatment facility, a liquid waste transfer station, or an MSW landfill. Grease-trap waste may also be processed on-site by mobile treatment or processing units. In order for grease-trap waste to be disposed of in an MSW landfill, the waste must pass the paint filter test, Method 9095. Some MSW landfills have liquid-waste solidification units and will process such waste prior to disposal.
3. **Grit-trap waste:** Includes waste from interceptors placed in the drains prior to entering the sewer system at maintenance and repair shops, automobile service stations, car washes, laundries,

and other similar establishments and is regulated under Chapters 330 and 335 in the same manner as grease-trap waste. Grit-trap waste must be transported to an authorized facility which can be a processing or treatment facility, a liquid waste transfer station, or an MSW landfill. Grit-trap waste may also be processed on-site by mobile treatment or processing units. In order for grit-trap waste to be disposed of in an MSW landfill, the waste must pass the paint filter test, Method 9095. Grit-trap waste from car washes may be dried on-site or at a location within 50 miles of generation that is owned by the generator and then disposed of at an authorized facility.

4. **Domestic septage:** Includes liquid and solid material pumped from a septic tank, cesspool, or similar sewage-treatment system and is regulated under 330 in the same manner as grease- and grit-trap waste, but is also subject to Chapter 312 of 30 TAC if used beneficially by land applying. Septage waste must be transported to an authorized facility which can be a wastewater treatment plant, a beneficial land-use site, an MSW processing facility or transfer station, a compost facility, a monofill (sludge only) landfill, or an MSW Type I landfill, or septage may be processed on-site by a mobile unit. Septage waste that is transported to a beneficial land-use site or a monofill must be treated by raising the pH of the waste to 12 for a period of 30 minutes. This treatment is usually performed in the transport unit by adding lime and is the only treatment process allowed for transporters. In addition, septage waste must meet the metal concentration requirements of 30 TAC 312.43 prior to beneficial land application. Like grease- and grit-trap waste, septage waste must pass the paint filter test prior to disposal in an MSW landfill or monofill.

5. **Liquid waste transporter requirements:** All transporters of liquid waste—including grease-trap, grit-trap, and septage waste—must be registered with the TCEQ. Transporters are required to manifest shipments of liquid waste in the form of a trip ticket that identifies the generator, the transporter, and the disposal facility. The transporter is required to provide the generator with the first copy of the trip ticket; after delivery, the transporter must provide the generator the completed fourth copy, which verifies that the disposal facility received the shipment of liquid waste. Transporter companies are required to maintain records of all shipments of liquid waste for five years.

6. **Liquid waste generator requirements:** Generators are responsible for the proper treatment and disposal of their waste. Generators must contract with a TCEQ-registered liquid-waste transporter and must receive a copy of the signed trip ticket from the transporter. The generator must also receive a second signed copy of the trip ticket with the treatment or disposal facility signature and information and must maintain trip-ticket records for three years. Industrial liquid-waste generators are responsible for properly

classifying their waste under Subchapter R of 30 TAC Chapter 335.

7. The following wastes pose a greater potential for objectionable odor. These wastes should be managed and transported to contain odor and then covered immediately at an MSW landfill:
   a. liquid waste
   b. grease-trap and grit-trap waste
   c. slaughterhouse waste
   d. dead animals
   e. sludges resulting from wastewater (and possibly water) treatment
8. Wastes which may cause a windblown particulate nuisance condition should be covered immediately at an MSW landfill.

For additional information or questions regarding the disposal of special waste, please contact the Municipal Solid Waste Permits Section of the TCEQ at 512-239-2334 or e-mail inquiries to <mswpermits@tceq.state.tx.us>.

RG-486

DISPOSAL OF EXEMPT WASTE THAT CONTAINS RADIOACTIVE MATERIAL

RG-486
November 2010

Disposal of Exempt Waste That Contains Radioactive Material

Radioactive Materials Division

printed on
recycled paper

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

DISPOSAL OF EXEMPT WASTE THAT CONTAINS RADIOACTIVE MATERIAL

Prepared by
Radioactive Materials Division

RG-486
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Contents

Tables

ABBREVIATIONS AND SYMBOLS

Abbreviations

CFR	Code of Federal Regulations
DL	detection limit
dpm	disintegrations per minute
DSHS	(Texas) Department of State Health Services
DOT	(U.S.) Department of Transportation
LLD	lower limit of detection
MDA	minimum detectable activity
MSW	municipal solid waste
NELAC	National Environmental Laboratory Accreditation Conference
NORM	naturally occurring radioactive material
NRC	(U.S.) Nuclear Regulatory Commission
RRC	Railroad Commission of Texas
SI	International System of units, from the French *Le Système Internationale d'Unites*
SS&D	sealed source and device
TAC	Texas Administrative Code
	30 TAC *xx* = 'Title 30, Texas Administrative Code, Chapter (Section, etc.) *xx*
TCEQ	Texas Commission on Environmental Quality
THSC	Texas Health and Safety Code

Symbols

%	percent
4E-2	4×10^{-2} (actual number shown as an example)

Bq	becquerel (1 disintegration per second)
Ci	curie (3.7×10^{10} disintegrations per second)
cm	centimeter
GBq	gigabecquerel (1 million disintegrations per second)
J	joule (unit of energy)
kBq	kilobecquerel (1,000 disintegrations per second)
m^2	square meter
mg/cm^2	milligram per square centimeter
pCi/g	picocurie per gram (0.037 disintegrations per second per gram)
rad	The special unit of absorbed dose equal to an absorbed dose of 0.01 J/kg.
rem	Unit of dose equivalent equal to the absorbed dose in rad multiplied by the quality factor (1 rem = 0.01 sievert).
s	second
Si	sievert: SI unit of dose equivalent equal to the absorbed dose in J/kg (grays) multiplied by the quality factor
T	tritium (Hydrogen-3)
yd^3	cubic yard

1 INTRODUCTION

This guide explains and clarifies the instances where radioactive materials can be exempted from the standard disposal requirements for radioactive wastes. If radioactive materials meet the criteria detailed in this guide, the TCEQ may issue an exemption for the materials. If a radioactive material is exempted, it can be disposed of as if it was not a radioactive material—e.g., if the material would be municipal solid waste if it were not radioactive, then it can be disposed of in an authorized municipal solid waste disposal facility when it receives an exemption. Radioactive waste is exempt from regulations when it poses a reasonably low risk to public health and safety and the environment. *Systematic Radiological Assessment of Exemptions for Source and Byproduct Materials* (NRC, 2001) contains the calculations and methodology used to assess the potential radiation doses associated with the exemption regulations for the normal life cycle, which includes final disposal.

Despite its radioactive content, exempt materials do not need to be sent to a facility that is licensed for radioactive waste disposal [25 TAC 289.101(o)].[1] The disposal of exempt material **as a radioactive substance** is not subject to further regulation by the TCEQ, though the material will still be regulated for other non-radioactive constituents. If it does not meet the exemption criteria, then it must be disposed of in the manner stipulated in 30 TAC 336.211, as appropriate to the type of licensed material.

Before accepting exempt materials, a disposal facility may require a letter from the TCEQ stating that the waste meets the exemption criteria found in the regulations and is thereby exempt from other regulations concerning radioactive-waste disposal. This statement from the TCEQ is called an e*xemption concurrence*. Some hazardous-waste disposal facilities regulated by the TCEQ have a condition in their permit requiring them to obtain an exemption concurrence before disposing of exempt materials.

This guide focuses on the disposal of exempt material in TCEQ-regulated disposal facilities: the agencies in Texas that have authority over exempt materials, what materials are exempt, the TCEQ regulations over exempt materials, and what documentation and analysis are required to determine whether the material meets the TCEQ's exemption requirements. Several terms are defined in Appendix A, tables containing exemption-activity values from the regulations are reproduced in Appendix B, and a primer on radiation appears in Appendix C.

[1] Short for 'Title 25, Texas Administrative Code, Subsection 289.101(o).'

This guide summarizes the TCEQ rules and regulations concerning exempt materials to assist waste generators and disposal facilities. The rules in the Texas Administrative Code should always be reviewed. The rules will form the ultimate basis for granting an exemption concurrence. If any wording of this guide conflicts with the code, then the code takes precedence.

2 REGULATORY BASIS

2.1 State Agencies that Regulate Radioactive Material

Three state agencies regulate the handling, processing, transporting, transferring, receiving, storage, and disposal of radioactive material in Texas: the TCEQ, the Texas Department of State Health Services (DSHS), and the Railroad Commission of Texas (RRC).

The **Department of State Health Services** (<www.dshs.state.tx.us/radiation/> regulates and licenses the possession, receipt, use, handling, transfer, transport, and storage of all radioactive material except for the radioactive material specifically regulated under the authority of the RRC and the TCEQ. Additionally, the DSHS registers radiation-producing equipment and operates the radiological emergency–response program for Texas. The radiation rules of the DSHS appear at 25 TAC 289. All exemption concurrences for waste that was generated under a DSHS radioactive-material license must be obtained from the DSHS.

The **Railroad Commission of Texas** <www.rrc.state.tx.us/environmental/publications/norm.php> has authority over uranium exploration, surface mining, and handling and disposal of naturally occurring radioactive-material (NORM) wastes produced during the exploration and production of oil and gas. The radiation rules of the RRC can be found at 16 TAC 4 for NORM and 16 TAC 11 for uranium mining. Any exemption concurrences for NORM waste at oil- and gas-production sites must be obtained from the RRC.

The **Texas Commission on Environmental Quality** <www.tceq.state.tx.us/nav/permits/rw.html> regulates and licenses the following:

- Receipt, processing, storage and disposal of by-product and low-level radioactive waste from other "persons," which is defined as to include organizations such as companies or institutions.
- Uranium- and thorium-recovery facilities and the disposal of uranium and thorium by-product wastes.
- Decommissioning of inactive uranium-recovery facilities and sites for the disposal of radioactive material.

The TCEQ radiation rules can be found at 30 TAC 336. Exemption concurrences for waste generated in Texas that was not generated under the authority of the DSHS or the RRC must be obtained from the TCEQ. Exemption

concurrences for waste generated outside of Texas, but to be disposed of in Texas, also must be obtained from the TCEQ.

2.2 TCEQ Regulations Concerning Exemptions

The use and disposal of radioactive materials in Texas is governed by Texas Health and Safety Code Chapter 401. The authorization and rules concerning exempt materials appear at THSC 401.106(a). Specific regulations concerning the criteria that materials containing radioactivity must meet to qualify for an exemption are described below, and are mostly found at 25 TAC 289.251 and 289.259. These exemption regulations are based on federal regulations promulgated by the NRC which require that agreement states have essentially identical language in their state rules.

Exemptions are promulgated by the TCEQ under 30 TAC 336.5. Most exemption concurrences are granted under 30 TAC 336.5(c), which exempts waste from licensing requirements under THSC 401.106(a), thus authorizing the TCEQ to use the exemption rules from the DSHS, such as 25 TAC 289.251(d), 251(e), and 259(d). *See* 25 TAC 289.101(c)(2) and (o).

Senate Bill 1604 of the 80th regular legislative session transferred the authority over processing and storage of uranium, by-product, and radioactive waste from the DSHS to the TCEQ, effective June 15, 2007. That bill also transferred the responsibility to grant exemption concurrences from the DSHS to the TCEQ. SB 1604 is reflected in 30 TAC 336.5(d), which exempts any material exempted from licensing requirements for disposal by the DSHS before June 18, 2007.

2.3 Additional Regulatory Considerations

2.3.1 NRC Alternate Disposal Authorizations

The NRC has an additional option for exempting radioactive material under Title 10, Code of Federal Regulations (10 CFR) 20.2002, which states are not required to adopt into their own regulations. This federal rule is not in the Texas code and cannot exempt a waste for disposal in Texas.

2.3.2 Dilution Not Allowed to Change Waste Class

Texas does not allow dilution for reduction of the radioactive concentration so that the waste classification is lowered or disposal requirements lessened [30 TAC 336.229]. The TCEQ will not grant an exemption concurrence to any

waste that was diluted so that it would meet the criteria. Waste that has been diluted due to stabilization, mixing, or treatment will be subject to the disposal regulations according to its pre-dilution concentration.

2.3.3 Department of Transportation Exempt Material

The U.S. Department of Transportation also has a category called *exempt radioactive material*. However, the DOT exemption rules regulate only how such material is to be transported, not how it is to be used or disposed of. DOT policy differs from the NRC exempt-material rules, and consequently the Texas rules. Therefore, this category only applies to issues related to transportation.

2.3.4 Use of Standard International Units

Additionally, whenever exemption limits are stated using both the units *curie* and *becquerel* in the regulations, the becquerel values are to be used. In such cases, the becquerel value is the legal limit, while the curie value is also stated in the rule since the curie is most widely used in the United States. The curie value is only an approximation of the becquerel unit due to rounding.

3 EXEMPTION RULES FOR RADIOACTIVE-MATERIAL LICENSEES ONLY

A radioactive-material licensee may dispose of the following licensed material exhibiting radioactivity as though it were exempt material. These exemptions apply only to licensees for the waste generated under authority of their radioactive-material license. Disposal of these materials is typically performed as one of several licensed activities (approved by the appropriate regulating agency in the license application and amendment reviews) and verified by inspections from the appropriate regulatory agency—not through an exemption concurrence. Occasionally, though, disposing of this material as exempt does require an exemption concurrence.

A licensee cannot exceed specific contamination limits for soil, facilities, or equipment in 25 TAC 289.202(eee) and 30 TAC 336.356. Contamination that exceeds those limits must be remediated and will not be considered exempt if left in place for unrestricted use. However, if removed for disposal, the contaminated soil, building rubble, or equipment may be considered exempt for disposal only. This rule applies to both specific licensees and general licensees. (General licenses are under the authority of the DSHS; the rules concerning them appear at 25 TAC 289.251.) However, the exemption rules discussed in this section may not apply to a general licensee and additional clarification should be obtained in such situations by contacting the appropriate regulatory agency.

3.1 Release into Sanitary Sewerage: 30 TAC 336.215

A licensee may discharge licensed material below specified activity levels into a sewer system ("sanitary sewerage") if the material is either readily soluble in water or is readily dispersible biological material. The quantity released into the sewer in one month divided by the average monthly volume of water released into the sewer cannot exceed the concentration values listed in Table III of 30 TAC 336.359 (values in this table can be found in Table B.1 in Appendix B). The sum-of-fractions rule (see Appendix A for definition) applies if more than one radionuclide is released.

The total activity released in one year may not exceed:

- 5 Ci (185 GBq) of hydrogen-3 (tritium),
- 1 Ci (37 GBq) of carbon-14, and
- 1 Ci (37 GBq) of all other radioactive materials combined.

3.2 Disposal of Hydrogen-3, Carbon-14, and Iodine-125 in Specific Media: 30 TAC 336.225(a) and (b), with qualifying rules at (e) and (f)

A licensee may dispose of the following licensed material as if it were not radioactive but not in a manner that would permit its use either as food for humans or as animal feed:

- 0.05 µCi (1.85 kBq), or less, of hydrogen-3, carbon-14, or iodine-125 per gram of medium used for liquid scintillation counting or in vitro clinical or in vitro laboratory testing.
- animal tissue containing 0.05 µCi (1.85 kBq), or less, of hydrogen-3, carbon-14, or iodine-125 per gram, averaged over the weight of the entire animal.

To qualify for this disposal exemption, the licensee must:

- perform surveys adequate to assure that the specified limits are not exceeded [336.225(e)(1)];
- remove or otherwise obliterate or obscure all labels, tags, or other markings which would indicate that the material or contents are radioactive [336.225(e)(2)]; and
- maintain records in accordance with 30 TAC 336.338 [336.225(f)].

3.3 The 300-Day Rule: 30 TAC 336.225(c)

A licensee may, if approved by the appropriate licensing authority (either the DSHS or the TCEQ), dispose of licensed material listed in 30 TAC 336.365 (and also in Table B.2 in Appendix B) in a Type I municipal solid-waste facility (as defined in TCEQ rules, 30 TAC 330) under the following provisions. The sum-of-fractions rule applies if more than one radionuclide is present. The rule is referred to as the "300-day" rule since the isotopes identified in 30 TAC 336.365 have a half-life under 300 days. The licensed material:

- cannot be hazardous waste, nor combined with hazardous waste, as defined at 30 TAC 330
- must not exceed the specified concentration and annual activity limits in 30 TAC 336.365, Appendix H (see Table B.2)
- must comply with all other requirements for disposals at a Type I municipal solid waste facility and any other requirements for those facilities as set forth in 30 TAC 330

If the material is hazardous waste or is combined with hazardous waste, then it must be disposed of at a hazardous waste disposal facility in accordance with TCEQ rules at 30 TAC 335. The licensee must:

- perform surveys adequate to assure that the specified limits are not exceeded [336.225(e)(1)]
- remove or otherwise obliterate or obscure all labels, tags, or other markings which would indicate that the material or contents are radioactive [336.225(e)(2)]
- maintain records in accordance with 30 TAC 336.338 [336.225(f)]
- submit a copy of the following procedures to TCEQ (or DSHS if it is a DSHS licensee) [336.225(d)]:
  - physical delivery of the material to the disposal facility
  - compliance surveys to be performed
  - maintaining secure packaging during transportation to the site
  - maintaining records of any disposals made under 30 TAC 336.225(d)

3.4 Decay in Storage: 30 TAC 336.211(a)(3)

Decay in storage is authorized in the regulations "according to law." This authorization is mainly used by medical institutions, licensed by DSHS, for short-lived radionuclides—with half-lives below 120 days—used in nuclear medicine, such as metastable technetium-99, xenon-133, and fluorine-18.

3.5 Release of Sites for Unrestricted Use: 30 TAC 336.603 and 336.356

If a site has been released for unrestricted use (also known as *clean release*), then it has been released from regulatory authority for radioactive material. The soil that remains in place at this site released for unrestricted use does not need an exemption concurrence to be considered exempt. However, if contaminated soil has been removed from the site before the declaration of release for unrestricted use, the soil may not be exempt, and an exemption-concurrence request would need to demonstrate that the soil meets the exemption criteria stipulated in the regulations.

A site meets the unrestricted-use requirement if the residual radioactivity distinguishable from background radiation results in a total effective-dose equivalent of 25 mrem (0.25 mSv) per year or less to an average member of the critical group [30 TAC 336.603]. Additional activity requirements are stated in 30 TAC 336.356(a) for radium. The activity of radium-226 or radium-228 in soil, based on dry weight and averaged over any 100 square meters of area, is not to exceed 5 pCi/g averaged over the first 15 centimeters of soil below the surface and 15 pCi/g averaged over each 15 cm–thick layer of soil below the first 15 centimeters beneath the surface. Also, radium-226 or

radium-228 activities in vegetation are not to exceed 5 pCi/g, based on dry weight.

All remediation and cleanup activities need the approval of the appropriate regulatory agency, which has the authority to determine if a site meets the requirements of unrestricted use.

3.6 Release for Unrestricted Use of Surface Contaminated Objects: 30 TAC 336.605

The release for unrestricted use of facilities, equipment, or materials with surface contamination is allowed if the radioactive surface contamination levels are below the limits specified in 30 TAC 336.364, Appendix G, which are replicated in Table 1 below. If it has been released for unrestricted use (through procedures approved by the regulatory license reviewers and inspectors), then it has been released from regulatory authority for radioactive material and does not need an exemption concurrence to be exempt.

Table 1. Acceptable Surface Contamination Levels from 30 TAC 336.364

Radionuclide	Average	Maximum	Removable
U-natural, U-235, U-238, and associated decay products except Ra-226, Th-230, Ac-227, and Pa-231	5,000 dpm alpha/ 100 cm^2	15,000 dpm alpha/100 cm^2	1,000 dpm alpha/100 cm^2
Transuranics, Ra-223, Ra-224, Ra-226, Ra-228, Th-natural, Th-228, Th-230, Th-232, U-232, Pa-231, Ac-227, Sr-90, I-125, I-126, I-129, I-131, and I-133	1,000 dpm/100 cm^2	3,000 dpm/100 cm^2	200 dpm/100 cm^2
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000 dpm beta-gamma/100 cm^2	15,000 dpm beta-gamma/100 cm^2	1,000 dpm beta-gamma/100 cm^2

Porous materials (e.g., concrete), before being released for unrestricted use, must be evaluated to determine whether radioactive contamination has penetrated to the interior of the material. If so, an average concentration, in picocuries per gram, must be determined by the facility, subject to TCEQ review. This interior contaminated porous material may be exempt if the radionuclide concentrations do not exceed the exemption limits specified in the regulations.

4 NATURALLY OCCURRING RADIOACTIVE MATERIAL

4.1 Definitions

NORM is any substance that naturally contains one or more radionuclides. Under 25 TAC 289.259(c)(4), NORM is naturally occurring material not regulated under the Atomic Energy Act which has had its radionuclide concentrations increased by, or as a result of, human practices. NORM does not include the natural radioactivity of rocks or soils, or background radiation, but instead refers to material which has had its radioactivity concentrated by controllable practices (or by past human practices).

The DSHS and the TCEQ have slightly different definitions of NORM in their rules. The DSHS definition is used for exemption concurrences, since the exemption rules are mostly contained in the DSHS regulations. The TCEQ definition can be found at 30 TAC 336.2(83): a solid, liquid, or gaseous material or combination of materials, excluding source material, special nuclear material, and by-product material, that

- in its natural physical state spontaneously emits radiation,
- is discarded or unwanted, and
- is not exempt under rules of the DSHS adopted pursuant to THSC 401.106.

Natural radioactivity is defined in 25 TAC 289.201(b)(63) as radioactivity of naturally occurring nuclides whose location and chemical and physical form have not been altered by humans.

4.2 Sources of Naturally Occurring Radioactivity

Naturally occurring radioactivity can be divided into two categories: *cosmogenic* and *primordial*. Cosmogenic radioactivity consists of radionuclides formed by interaction of cosmic rays with atoms in the atmosphere, which include carbon-14 (with a half-life of 5,715 years), tritium or hydrogen-3 (12.32 years), sodium-22 (2.6 years), and beryllium-7 (53 days).

Primordial radioactivity consists of radionuclides with half-lives over hundreds of millions of years that were present at the formation of the Earth, which include potassium-40, rubidium-87, uranium, and thorium. Uranium and thorium (the *parent* nuclides) decay into shorter-lived radionuclides

(*daughter* nuclides) such as radium and radon. Since the half-life of the parent is much larger than the half-lives of the daughters, the activity of each daughter approaches the activity of the parent after a time period approximately equal to five times the daughter's half-life. This is called secular equilibrium and results in an increase of the total activity of the material beyond the activity of the uranium or thorium alone. The three main decay chains of uranium and thorium, along with the daughters formed, are listed in the order in which they are formed in Table 2.

Since parent and daughter nuclides are different elements and thus have different chemical properties, they are often separated when the material containing them is processed. For example, NORM waste from the oil-and-gas industry either has radium as its main radionuclide of concern (from process water, scale, and sludge at exploration sites) or contains mainly lead-210 and its decay daughters, bismuth-210 and polonium-210 (typically found inside gas-processing equipment). Radium and lead were combined under the ground before being pumped up and processed.

Table 2. Uranium-238, Uranium-235, and Thorium-232 natural radioactivity decay chains

Radioisotope	Half-life[a]	Radioisotope	Half-life[a]	Radioisotope	Half-life[a]
uranium-238	4.5 By	uranium-235	0.7 By	thorium-232	14 By
thorium-234	21.4 d	thorium-231	25.6 y	radium-228	6.7 y
protactinum-234 (metastable)	1.2 m	proctacium-231	34,300 y	actinium-228	6.1 h
uranium-234	245,500 y	actinium-227	21.8 y	thorium-228	1.9 y
thorium-230	77,000 y	thorium-227	18.4 d	radium-224	3.6 d
radium-226	1,600 y	francium-223	21 m	radon-220	55 s
radon-222	93.8 d	radium-223	11.7 d	polonium-216	0.15 s
polonium-218	3.1 m	radon-219	3.9 s	lead-212	10.6 h
lead-214	26.8 m	polonium-215	0.002 s	bismuth-212	60.6 m
bismuth-214	19.7 m	lead-211	36.1 m	thallium-208	3.0 m
polonium-214	0.0002 s	bismuth-211	2.16 m	lead-208	stable
lead-210	22.3 y	polonium-211	0.5 s		
bismuth-210	5 d	thallium-207	4.78 m		
polonium-210	138.4 d	lead-207	stable		
lead-206	stable				

[a] By = billion years, y = years, d = days, h = hours, m = minutes, s = seconds

4.3 Small Quantities of Radium or NORM in Soil or Other Media: 25 TAC 289.259(d)

NORM waste is exempt for purposes of disposal under 25 TAC 289.259(d) if it contains, or is contaminated at, the following concentrations in soil or other media:

- 30 picocuries per gram (pCi/g) or less of radium-226 or radium-228 provided the radon emanation rate is less than 20 picocuries per square meter per second (pCi/m^2/sec),
- 5 pCi/g or less of radium-226 or radium-228 in which the radon emanation rate is equal to or greater than 20 pCi/m^2/sec; or
- 150 pCi/g or less of any other NORM radionuclide.

Radium-226 and radium-228 are considered separately, so both isotopes can be up to the limit (30 or 5 pCi/g) and still be exempt. Typically, Ra-226 is present in larger quantities than Ra-228. *Other media* is defined in 25 TAC 289.259(c)(5) as "any volumetric material other than soils or liquids (for example: sludge, scale, slag, etcetera [sic])."

Note that the radon-220 emanation rate, formed by the decay of radium-228–contaminated material, would likely be undetectable due to the extremely short half-life of radon-220. The radon-emanation rate specified in the rule above does not apply to:

- known NORM types for which the radon-emanation fraction has been documented to be low, e.g. oil-production scales and sludges;
- soil in which the known volume of NORM would be too low to produce a radon-emanation rate of 20 pCi/m^2/s (as demonstrated by calculation); or
- soil that has been displaced from its natural location and is to be disposed of in a (permitted) disposal site for hazardous material.

This 30 pCi/g rule [289.259(d)] is not applicable to pipe or other equipment as a means of determining exemption. It is more appropriate for volumetric media, such as sludge, slag, soil, scale, or rubble mixed with other media.

This rule is not to be confused with the "release for unrestricted use" rules at 30 TAC 336.356 (see section 3.5); 25 TAC 289.259(d) applies to soil that has been removed from the site before the site was declared to be released for unrestricted use. These rules are not to be used for determining if soil or other media can be released for unrestricted use.

4.4 Source Material: 25 TAC 289.251(d)(1) and (2)

4.4.1 Weight Percent of 0.05

For the purpose of exemption concurrences, source material is defined as uranium or thorium, or any combination thereof, in any physical or chemical form [30 TAC 336.2(125)]. Source material does not include special nuclear material (defined in Appendix A). Any chemical mixture, compound, solution, or alloy of source material is exempt if the source material is by weight less 0.05% of the mixture, compound, solution, or alloy [25 TAC 251(d)(1)].

The levels of activity per unit mass that corresponds to 0.05% by weight for different source material radionuclides are shown in Table 3. In the calculations of weight percent, the isotopes Th-228, Th-230, and U-234 can be ignored, since their activity values at 0.05 weight percent exceed the limit of U-238 or Th-232 by over three orders of magnitude and these isotopes, being in equilibrium with Th-232 and U-238, will have activities equal to or less than their parents'. Additionally, U-235 can usually be ignored for uranium that has not been enriched, since it is present in natural ore at only 0.72% by mass, and 2.2% by activity, compared to total uranium.

If radium and other daughters are at or reaching secular equilibrium with the uranium or thorium (each daughter activity should then be equal to or less than the parent activity), then the activity of the daughter is not considered for determining the exemption status of the material. The daughter radionuclides are considered to be covered under the exemption of the uranium or thorium parent. For example, if the material contains 100 pCi/g uranium-238 (under 0.05% by weight) and 90 pCi/g radium-226, it is still exempt even though the radium exceeds 30 pCi/g (see Section 4.1).

Table 3. Specific-Activity Values for 0.05 Weight Percent of Source Material

Isotope	Specific Activity	Material	Specific activity
thorium-232	54.9 pCi/g	natural thorium	110 pCi/g of total Thorium[a]
uranium-238	167.5 pCi/g	natural uranium	340 pCi/g of total Uranium[b]
uranium-235	1,078 pCi/g	depleted uranium	199 pCi/g of total Uranium[c]

[a] Th-232 is in secular equilibrium with its daughter Th-228 (both isotopes are at equal activity level).

[b] By activity, 48.8% U-234 (daughter of U-238), 2.4% U-235, and 48.8% U-238 (IAEA, 2010).

[c] Typically, by activity, 15.2% U-234, 1.1% U-235, and 83.7% U-238 (IAEA, 2010).

4.4.2 Unrefined or Unprocessed Ore

Unrefined and unprocessed ore containing source material are exempt provided that the ore has not been refined or processed [25 TAC

289.251(d)(2)]. This exemption does not apply to the mining of ore containing source material for the extraction of source material (known as *source recovery*), which requires a specific license from the TCEQ or the RRC.

4.4.3 Rare-Earth Elements with Source Material

Rare-earth metals and compounds, mixtures, and products containing no more than 0.25% by weight of thorium, uranium, or any combination of these are exempt [25 TAC 289.251(d)(A)(vi)]. Rare-earth metals include the elements scandium, yttrium, and the 15 lanthanides (also referred to as lanthanoids) with atomic numbers 57–71: lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium.

4.5 Specific Items Containing Source Material: 25 TAC 289.251(d)(3)

4.5.1 Thorium

The following specific items containing thorium are exempt, provided that they meet the weight percentage and other requirements found in the rule.

- incandescent gas mantles: any quantity of Th [25 TAC 251(d)(3)(A)(i)]
- vacuum tubes: any quantity of Th [25 TAC 251(d)(3)(A)(ii)]
- welding rods: any quantity of Th [25 TAC 251(d)(3)(A)(iii)]
- electric lamps used for illuminating: no more than 50 mg Th per lamp [25 TAC 251(d)(3)(A)(iv)]
- germicidal lamps, sunlamps, and lamps for outdoor or industrial lighting: no more than 2 g Th per lamp [25 TAC 251(d)(3)(A)(v)]
- personnel neutron dosimeters: no more than 50 mg Th per dosimeter [25 TAC 251(d)(3)(A)(vi)]
- finished optical lenses (except for contact lenses, spectacles, or in eyepieces in binoculars or in other optical instruments): no more than 30% by weight of Th (does not include the shaping, grinding, or polishing of such lenses or manufacturing processes other than the assembly of such lenses into optical systems and devices without any alteration of the lens) [25 TAC 251(d)(3)(G)]
- finished aircraft-engine parts containing nickel-thoria alloy [25 TAC 251(d)(3)(I)], provided that:

  - the thorium is dispersed in the nickel-thoria alloy in the form of finely divided thoria (thorium dioxide) and
  - the thorium content in the nickel-thoria alloy does not exceed 4.0% by weight
- any finished product or part containing metal-thorium alloys [25 TAC 289.259(d)(3)(D)], provided that:
  - the thorium content of the alloy does not exceed 4% by weight

  The chemical, physical, or metallurgical treatment or processing of these products or parts is not authorized under this rule. However, if parts are machined to ensure they still meet tolerance levels after a period of use, the shavings will be considered exempt for waste-disposal purposes

4.5.2 Uranium

Uranium contained in detector heads for use in fire-detection units are exempt, provided that each detector head contains not more than 0.005 microcuries of uranium [25 TAC 251(d)(3)(H)].

4.5.3 Source Material

The following items containing source material are exempt provided that they meet the weight percentages and other requirements in the rule.

- glazed ceramics (for example tableware): the glaze may not contain more than 20% source material by weight [25 TAC 251(d)(3)(B)(i)]
- glassware (except commercially manufactured glass brick, pane glass, ceramic tile, or other glass or ceramic used in construction): no more than 10% source material by weight [25 TAC 251(d)(3)(B)(ii)]
- glass enamel or glass-enamel frit imported or ordered for importation into the U.S., or initially distributed by manufacturers in the U.S., before July 25, 1983: no more than 10% source material by weight [25 TAC 251(d)(3)(B)(iii)]
- piezoelectric ceramic: no more than 2.0% source material by weight [25 TAC 251(d)(3)(B)(iv)]
- photographic film, negatives, and prints [25 TAC 251(d)(3)(C)]: no weight-percent limit

4.6 Depleted Uranium

Additionally, depleted uranium is exempt if it is used as shielding constituting part of any shipping container, provided that the shipping container is

conspicuously and legibly impressed with the legend "CAUTION—RADIOACTIVE SHIELDING—URANIUM;" and the uranium metal is encased in mild steel or an equally fire-resistant material, with a wall thickness of at least 1/8 inch [25 TAC 289.251(d)(3)(F)].

Depleted uranium is exempt if it is contained in counterweights installed (also if stored or handled in connection with the installation or removal of such counterweights) in aircraft, rockets, projectiles, and missiles [25 TAC 289.251(d)(3)(E)]. The rule does not authorize the chemical, physical, or metallurgical treatment or processing of any of these counterweights except for the purpose of repairing or restoring any plating, covering, or labeling. This exemption applies provided that:

- the counterweights are manufactured in accordance with a specific license issued by the NRC authorizing distribution by the licensee in accordance with 10 CFR 40;
- each counterweight has been impressed with the following legend clearly legible through any plating or other covering: “DEPLETED URANIUM” (“CAUTION—RADIOACTIVE MATERIAL—URANIUM” if manufactured prior to December 31, 1969); and
- each counterweight is durably and legibly labeled or marked with the identification of the manufacturer and the statement: “UNAUTHORIZED ALTERATIONS PROHIBITED” (“CAUTION—RADIOACTIVE MATERIAL—URANIUM” if manufactured prior to December 31, 1969).

4.7 Other Exempt NORM Items

4.7.1 Recycled Contaminated Objects

Materials and equipment in the recycling process contaminated with NORM scale or residue are exempt if the maximum radiation exposure level, including the background radiation level, does not exceed 50 microroentgens per hour (μR/hr) at any accessible point [25 TAC 289.259(d)(2)]. Recycling is defined in this context as “a process by which materials that have served their useful purpose are collected, separated, or processed and returned to use in the form of raw materials in the production of new products” [25 TAC 289.259(c)(8)]. Recycling does not include the reuse of an oil pipe after cleaning.

4.7.2 Oil and Gas Products and Processing

Pipe (tubulars) and other downhole or surface equipment used in oil production contaminated with NORM scale or residue are exempt if the

maximum radiation exposure level, including the background radiation level, does not exceed 50 μR/hr at any accessible point [25 TAC 289.259(d)(3)]. Unlike other exemption rules that apply to both gas and oil, this rule applies only to oil production.

Natural gas, natural-gas products, crude oil, and crude-oil products containing NORM are exempt [25 TAC 289.259(d)(7)]. However, the processing and manufacturing of natural-gas and crude-oil products containing NORM are subject to general license requirements. Possession of produced waters from crude oil and natural gas production is exempt if the produced waters are reinjected into a well approved by the agency having jurisdiction or if the produced waters are discharged under the authority of the appropriate agency [25 TAC 289.259(d)(8)].

If the waste is under the authority of the Railroad Commission, contact the RRC for the application of this rule to exempt material. Oil-production waste generated outside of Texas falls under the authority of TCEQ if disposed of in Texas.

4.7.3 Phosphate Industry

The wholesale and retail commercial distribution (including custom blending), possession, and use of the following products and materials, or the recycling of equipment or containers used to produce, contain, or transport them, are exempt [25 TAC 289.259(d)(6)]:

- Phosphate and potash fertilizer. (Note that the manufacture of phosphate and potash fertilizer is subject to general license requirements.)
- Phosphogypsum for agricultural uses, if such commercial distribution and uses meet the requirements of 40 CFR 61.204.

4.7.4 Building, Construction, Industrial Processing, and Other NORM

Materials used for building construction are exempt if the materials contain NORM that has not been concentrated to higher levels than those found in their natural state. This exemption includes the wholesale and retail commercial distribution, possession, use, and recycling of equipment or containers used to produce, contain, or transport these materials [25 TAC 289.259(d)(6)].

Material used for building construction, industrial processing, sand blasting, metal casings, or other NORM in which the radionuclide content has not been concentrated to higher levels than found in its natural state is exempt. This exemption includes any products or materials and the recycling of equipment

or containers used to produce, contain, or transport those products or materials [25 TAC 289.259(d)(5)].

The following materials commonly contain NORM at relatively high concentrations (but have not been concentrated to higher levels than those found in their natural state and are therefore exempt) and are frequently seen in exemption requests:

- Refractory bricks: NORM is not concentrated during use in a furnace and is therefore exempt under 25 TAC 289.259(d)(5)(C).
- Zirconium oxide (zircon, zirconium): commonly used as a blasting agent. It has a typical total activity of 130 to 145 pCi/g but contains a higher activity of radium (greater than 30 pCi/g) than uranium and thorium. It is exempt under 25 TAC 259(d)(5)(C) as a NORM material used in industrial processing in which radionuclide content has not been concentrated to higher levels than found in its natural state.
- Monazite sand containing thorium-232 and its daughters.
- Alumina, used for ceramic insulators in electrical equipment.

4.7.5 Potassium and By-Products from Fossil-Fuel Combustion

The following products and materials and the recycling of equipment or containers used to produce, contain, or transport them, are exempt [25 TAC 289.259(d)(5)]:

- potassium and potassium compounds that have not been isotopically enriched in the radionuclide K-40
- byproducts from fossil-fuel combustion (bottom ash, fly ash, and by-products of flue-gas emission control)

5 NON-NORM EXEMPTIONS

5.1 Exempt Concentrations of Radionuclides

Rule 25 TAC 289.251(e)(1) exempts materials (solid, liquid, or gaseous) containing radioactive material other than source material which have radionuclide concentrations that do not exceed those listed in 25 TAC §289.251(l)(1), which can be found in Tables B.3 and B.4 in Appendix B.

If a radionuclide decays to a radioactive daughter, the value in those tables for the parent radionuclide includes the daughter activity. The activity of the daughter, as long as it is not greater than the activity of the parent, is not considered in the determination of whether the material is exempt. The sum-of-fractions rule applies if more than one radionuclide is present.

Please note that in most disposal situations, waste form restrictions (such as moisture being below a certain percentage) at landfills and disposal facilities would rule out the disposal of liquid and gaseous wastes, even though values are given for liquid and gaseous concentrations in 25 TAC 289.251(l)(1). These exemption rules were written for use, as well as disposal, of those materials.

This exemption only applies to waste in which radioactive or by-product[2] material was introduced into the waste in accordance to a specific or general license (a specific license **only** for by-product material) of the NRC, an agreement state, or a licensing state.

5.2 Exempt Quantities of Radionuclides

Rule 25 TAC 289.251(e)(2) grants exemptions for materials (solid, liquid, or gaseous) containing radioactive material, other than source material, which have individual quantities of radionuclides that do not exceed those listed in 25 TAC 289.251(l)(2), reproduced in Table B.5 in Appendix B. The sum-of-fractions rule applies if more than one radionuclide is present.

Examples of individual quantities for which this rule applies include, but are not limited to, sealed sources and, for liquid waste, the container—such as a tank, truck, or train car—in which the waste is transported into the facility. If the radionuclide is listed in both 25 TAC 289.251(l)(1) and (2), then the concentration limit in 25 TAC 289.251(l)(1) is to be used.

[2] See Appendix A for definition.

This exemption only applies to waste into which radioactive material has been introduced in accordance with a specific or general license of the NRC, an agreement state, or a licensing state. Additionally, waste in which the radionuclide activity has decayed from quantities not originally exempt does not qualify for this exemption.

Note that in most disposal situations, restrictions on the form of waste (such as moisture being below a certain percentage) of landfills and disposal facilities would rule out the disposal of liquid and gaseous waste even though values are given for liquid and gaseous concentrations in 25 TAC 289.251(l)(1). Those exemption rules were written for use, as well as disposal, of such materials.

5.3 Specific Items: 25 TAC 289.251(e)(3)

The following items, which incorporate radioactivity for functional purposes, are exempt if they meet the activity and radiation exposure levels in the rule:

- Timepieces, hands, or dials [25 TAC 289.251(e)(3)(A)(i)(I)] containing not more than—
  - tritium (Hydrogen-3): 25 mCi per timepiece, 5 mCi per hand, 15 mCi per dial (bezels when used shall be considered as part of the dial);
  - radium-226: 1 μCi per timepiece in intact timepieces manufactured prior to January 1, 1986; or
  - promethium-147:
    - 100 μCi per watch or 200 μCi per any other timepiece, 20 μCi per watch hand or 40 μCi per other timepiece hand, 60 μCi per watch dial or 120 μCi per other timepiece dial (bezels when used shall be considered as part of the dial), and
    - The radiation exposure at 10 centimeters when measured through 50 milligrams per square centimeter (mg/cm^2) of absorber from any surface shall not exceed
      - 0.1 mrad/hr for wristwatches,
      - 0.1 mrad/hr for pocket watches, and
      - 0.2 mrad/hr for any other timepiece.
- Lock illuminators installed in automobile locks containing not more than [25 TAC 289.251(e)(3)(A)(i)(II)]—
  - tritium: 15 mCi or
  - promethium-147:
    - 2 mCi and

        - an exposure rate not exceeding 1 mrad/hr at 1 cm from any surface when measured through 50 mg/cm^2 of absorber.
- Precision balances containing not more than 1 mCi of tritium per balance or not more than 0.5 mCi of tritium per balance part [25 TAC 289.251(e)(3)(A)(i)(III)].
- Automobile shift quadrants containing not more than 25 mCi of tritium [25 TAC 289.251(e)(3)(A)(i)(IV)].
- Marine compasses containing not more than 750 mCi of tritium gas and other marine navigational instruments containing not more than 250 mCi of tritium gas [25 TAC 289.251(e)(3)(A)(i)(V)].
- Thermostat dials and pointers containing not more than 25 mCi of tritium per thermostat [25 TAC 289.251(e)(3)(A)(i)(VI)].
- Electron tubes (including spark-gap tubes, power tubes, gas tubes, glow lamps, receiving tubes, microwave tubes, indicator tubes, pick-up tubes, radiation detection tubes, and any other completely sealed tube designed to control electrical currents) [25 TAC 289.251(e)(3)(A)(i)(VII)] provided that—
    - each tube does not contain more than one of the following specified quantities of radioactive material:
        - Tritium: 150 mCi per microwave receiver protector tube or 10 mCi per any other electron tube,
        - Cobalt-60: 1 μCi,
        - Nickel-63: 5 μCi,
        - Krypton-85: 30 μCi,
        - Cesium-137: 5 μCi, or
        - Promethium-147: 30 μCi, and
    - for each tube, the exposure level does not exceed 1 mrad/hr at 1 cm from any surface when measured through 7 mg/cm^2 of absorber.
- Instruments for measuring ionizing radiation containing, for purposes of internal calibration or standardization, a source of radioactive material not exceeding either the applicable quantity set forth in 25 TAC 289.251(l)(2) [see Table B.5] or 0.05 μCi of americium-241 [25 TAC 289.251(e)(3)(A)(i)(VIII)].
- Spark-gap irradiators, each containing no more than 1 μCi of cobalt-60, for use in electrically ignited fuel-oil burners having a firing rate of at least 3 gallons per hour [25 TAC 289.251(e)(3)(A)(i)(IX)].
- Capsules containing 1 μCi or less of carbon-14 urea for *in vivo* diagnostic use in humans [25 TAC 289.251(e)(4)]. (A specific license is required to manufacture, prepare, process, produce, package, repackage, or transfer for commercial distribution such capsules.)

- Self-luminous products containing tritium, krypton-85, or promethium-147 if manufactured, processed, produced, imported, or transferred in accordance with a specific license issued by the NRC authorizing the transfer of the product to persons exempt from regulatory requirements except for [25 TAC 289.251(e)(3)(B)(i)]:
  - those who manufacture, process, or produce these products,
  - products in which self-luminosity serves frivolous purposes, or
  - toys or adornments.
- Ionization-chamber smoke detectors containing no more than 1 μCi of Am-241 per detector in the form of a foil and designed to protect life and property from fire [25 TAC 289.251(e)(3)(A)(i)(X)].
- Items that contain less than 0.1 μCi of radium-226 if received, possessed, used, transferred, or owned prior to January 1, 1986 [25 TAC 289.251(e)(3)(B)(ii)].
- Gas and aerosol detectors containing radioactive material designed to protect life or property from fires and airborne hazards are exempt (except for persons who manufacture, process, produce, or initially transfer these detectors) provided that the detectors were manufactured, imported, or transferred in accordance with a specific license issued by the NRC, an agreement state or a licensing state which authorizes the initial transfer of the detectors to persons who are exempt from regulatory requirements [25 TAC 289.251(e)(3)(C)].
  - Detectors must be intact to qualify for this exemption. That is, the cover must not have been removed, nor the source removed from the unit.
  - Required documentation to qualify for this exemption is typically either a sealed-source-and-device (SS&D) sheet or a copy of the radioactive-material license that identifies the make and model of the smoke detector as exempt. The SS&D sheet can be obtained from the manufacturer. If it is unobtainable, the state regulator (Chapter 7 has contact information) has access to additional resources not available to the public that may be able to identify the detector's make and model as exempt. If documentation cannot be found, then that item cannot be exempted under this rule.

5.4 Emission-control dust from electric arc furnaces: 25 TAC 289.202(ff)(2)

This exemption requires approval from either the TCEQ or the DSHS. The DSHS is the appropriate agency if the generator of the material was a DSHS licensee. The TCEQ is the appropriate agency in all other instances.

Emission-control dust and other material from electric-arc furnaces or foundries contaminated as a result of inadvertent melting of cesium-137 or americium-241 sources may be transferred for disposal to a hazardous-waste disposal facility authorized by the TCEQ without regard to its radioactivity if all of the following conditions are met [25 TAC 289.202(ff)(2)]. ("Licensee" includes the owner-operator of an electric arc furnace or foundry or the service contractor hired to handle the waste.)

- The emission-control dust and other incident-related materials ("contaminated materials"), whether packaged or unpackaged (i.e., bulk), must be treated through stabilization to comply with all waste-treatment requirements by the licensee, who must be licensed to possess, treat, or transfer incident-related material contaminated with Cs-137 or Am-241, .
- Transfer and storage (if applicable) and storage of the contaminated materials were in accordance with operating and emergency procedures approved by the appropriate regulatory agency.
- The total Cs-137 or Am-241 activity contained in the contaminated materials to be transferred for disposal was specifically approved by the NRC or all appropriate agreement states and does not exceed the total activity associated with the inadvertent melting incident.
- The operator of the hazardous-waste disposal facility has been notified in writing of the impending transfer and has agreed in writing to receive and dispose of the materials. (Copies of the notification and agreement must be submitted to the appropriate regulatory agency.)
- The licensee has notified the NRC or all agreement states in which the transferor and transferee are located, in writing, of the impending transfer, at least 30 days before the transfer.
- The stabilized contaminated materials had been packaged for transportation and disposal in non-bulk steel packaging as defined in DOT regulations at 49 CFR 173.213.
- The pretreatment average concentrations of Cs-137 in the stabilized contaminated materials do not exceed 130 pCi/g for packaged contaminated materials and 100 pCi/g for unpackaged contaminated materials.
- The pretreatment average concentrations of Am-241 in the stabilized materials do not exceed 3 pCi/g for packaged and unpackaged contaminated materials.
- The dose rate at 3.28 feet (1 meter) from the surface of any package containing the stabilized waste does not exceed 20 µrem/hr above background.
- The licensee transferring the contaminated materials must consult with the NRC, the appropriate state and federal agencies, and local governments and obtain all necessary approvals.

- The total incident-related activity received by a disposal facility over its operating life shall not exceed 1 Ci of Cs-137 and 30 mCi of Am-241.

6 ALTERNATIVE METHOD FOR OBTAINING AN EXEMPTION CONCURRENCE

Another option for obtaining an exemption concurrence is stipulated at 30 TAC 336.5(a): the TCEQ may exempt a radioactive material if it determines that the exemption is not prohibited by law and will not result in a significant risk to public health and safety or the environment. Persons requesting an exemption under this rule need to submit an application to TCEQ using the process in 30 TAC 90 (relating to regulatory flexibility).

The application must be accompanied by certain fees and must include:

- the nature of the request,
- a legal analysis to demonstrate that the exemption is not prohibited by law,
- a technical analysis to demonstrate that the exemption will not result in a significant risk to public health and safety or the environment, and
- a detailed explanation, including a demonstration as appropriate, that the proposed exemption is:
  - not prohibited by law, including any requirement for a federally approved or authorized program, and
  - at least as protective of the environment and the public health as the method or standard prescribed by the TCEQ rule that would otherwise apply.

7 OBTAINING AN EXEMPTION CONCURRENCE

To request an exemption concurrence, send a signed letter with the appropriate documentation to the Radioactive Materials Division, MC 233, TCEQ, P.O. Box 13087, Austin TX 78711-3087. Please mark on the envelope that an exemption is being requested. The request can also be scanned and electronically submitted to the Radioactive Materials Division. However, if the request is over 50 pages, a hard copy must be mailed as well. To determine the point of contact for exemptions, call the Radioactive Materials Division at 512-239-6466.

Often, a hazardous-waste disposal facility will request an exemption concurrence for the waste generator as part of its process of receiving and disposing of waste that contains radioactive material.

Please include the following information in the exemption-concurrence request:

- the waste-generator identification
- the volume of waste
- the physical form of the waste
- a sampling protocol and sampling data
- characterization
- the device manufacturer's name and device model number (if appropriate)
- any other information that may help in making the exemption determination

The TCEQ typically needs up to two weeks to review an exemption request. If the agency requires additional information, its staff will contact the requester by letter, e-mail, or phone. There is no fee for an exemption-concurrence request (or for the actual concurrence) unless the exemption is processed according to 30 TAC 336.5(a) (see Chapter 6).

An exemption concurrence can only be granted to a material or item if documentation shows that it meets the exemption criteria. Documentation can be one or more of the following: process knowledge, radiochemical analysis of the sample, radiation surveys of the item or material, or NRC analysis documenting that it meets the exemption criteria, provided that the criteria are also in the Texas Administrative Code.

7.1 Process Knowledge

Many items identified in the exemption rules have been manufactured with specific radioactive content so that those items would satisfy the exemption limits. Such items can be exempted without radiochemical analysis if it can be documented that they were manufactured to contain a radioactive content at or below the exemption limits. Some examples of such items or documentation include:

- a smoke detector which has a sticker attached verifying that it contains 1 μCi or less of americium-241
- a sealed-source-or-device sheet from the NRC exempting this specific sealed source, identified by manufacturer and model number
- NRC license showing the make and model of a device or sealed source as being authorized to be commercially distributed as an exempt item
- company literature
- a Material Data Safety Sheet
- items used by the U.S. armed forces that are built according to military specifications and listed by a national part number in the Technical Bulletin (Army, 1998) as exempt.

The list above is not an exhaustive discussion of the different possibilities for using process knowledge but only gives examples from prior exemption-concurrence requests.

Clearly defined manufacturing processes that use NORM material can be exempted using process knowledge [under 25 TAC 289.259(d)(5)(A), (5)(C), and (6)(C)] if it can be documented that the process does not concentrate the naturally occurring radionuclides according to the appropriate regulation.

7.2 Radiochemical Analysis

If process knowledge cannot demonstrate whether an item or material is exempt, then the TCEQ may require sampling to ascertain whether the waste meets the exemption criteria.

7.2.1 NELAC Accreditation

Analytical data from samples measured by a laboratory can only be accepted if the laboratory is National Environmental Laboratory Accreditation Conference (NELAC) accredited by the Texas Laboratory Accreditation Program operated

by the TCEQ[3] or the data are exempt from the NELAC-accreditation requirement under one of the following criteria [30 TAC 25.6]:

- The laboratory is an on-site or in-house environmental testing laboratory that
  - is inspected at least every three years by the executive director,
  - is located in another state and accredited or periodically inspected by that state, or
  - gets inspected at least every three years by the executive director and is performing work:
    - for another company with a unit located on the same site, or
    - without compensation for a governmental agency or a charitable organization.
- The lab is accredited under federal law, including certification by the United States Environmental Protection Agency to provide analytical data for decisions relating to compliance with the Safe Drinking Water Act.
- The lab supplies analytical data necessary for emergency response and the required analytical data are not otherwise available from an environmental testing laboratory that is accredited by the TCEQ or federal law.
- The lab supplies analytical data for which the commission does not offer accreditation.

7.2.2 Minimum Detectable Activity and Detection Limit

The *minimum detectable activity* (MDA) is the smallest activity above the background level of a radionuclide that will be detected with a 95% probability (a 5% probability of a *false negative*) and a 5% probability of falsely concluding that a sample at background is above the background activity value (*false positive*). The MDA is the minimum radionuclide activity that an instrument can reliably detect.

The *detection limit* (DL) is the smallest activity that will be detected with a 5% false positive probability but with a false negative probability higher than 5%. The DL is also known as the *lower level of detection*. If the analytical result is above the DL, even if the value is below the MDA, it can be concluded that the radionuclide is present above background in that sample. The DL is the minimum activity that an instrument can detect.

It is a common error to assume that measurements below the MDA indicate that the sample does not contain that radionuclide or that the radionuclide is at background levels. Reported values below the MDA should be reported as

[3] A list of which laboratories are accredited by the TCEQ appears at <www.tceq.state.tx.us/assets/public/compliance/compliance_support/qa/txnelap_lab_list.pdf>.

measured, even if negative, and not be listed only as being below the MDA. Since values above the DL indicate the presence of the radionuclide, the MDA should not be used as the detection cutoff point.

The MDA and DL depends upon the type of instrument, the counting geometry (position and size of the radiation source in relation to the detector), the measurement methodology, and the radionuclide to be detected. The DL must be below the exemption limits or the values cannot be used to confirm that the exemption requirements have been met.

Equations 1 and 2 determine the MDA and LLD, respectively. The square root of the background activity is also the standard deviation of the background count.

Eqn. 1 $$LLD = 2.33\sqrt{B}$$

Eqn. 2 $$MDA = 3 + 4.66\sqrt{B}$$

B is the measured background activity.

7.2.3 Averaging and Homogeneity

It is important that the sample accurately represent the average activity level of the waste volume. If homogeneity cannot be guaranteed, then four to five samples are required for every 20 cubic yards (yd^3). The maximum volume of material over which averaging may be performed is 20 yd^3. No single measurement made to calculate an average volumetric or surface-activity contamination can exceed 10 times the exemption criteria.

A total of fewer than four to five samples per 20 yd^3 will be accepted if additional data are included such as the studies of contaminated soil from an environmental remediation project which had been sampled extensively during the characterization or remediation stage. Examples of acceptable data successfully used in prior exemption-concurrence requests, combined with analytical laboratory analysis of samples, include the results of an *in situ* object-counting system (ISOCS) and screening surveys of soil or debris with the intent of on-site segregation into waste types.

Each waste container is considered as a separate waste volume. Two waste volumes cannot be averaged together to determine if the activity is below the exemption limit. For example, two containers, one at 34 pCi/g Ra-226 and the other at 20 pCi/g Ra-226 cannot be averaged to yield a result of 27 pCi/g Ra-226 and thereby exempt both containers. Only the container at 20 pCi/g Ra-226 would be exempt.

7.2.4 Measurement of Daughters to Determine Parent Radionuclide Activity

Some radiochemical analyses are difficult to perform, given the isotope and the material. These analyses may require alternative testing methodologies. For example, analysis of thorium in metal is a difficult measurement to perform since iron in the sample interferes with measuring the thorium. However, the daughters of the parent nuclide (uranium or thorium) may be measured to determine the parent radionuclide concentration. In addition, whether equilibrium has been reached (daughter activity equals parent activity) or the ratio of daughter activity to parent activity (if equilibrium has not yet been reached) can be calculated from the elapsed time since the item was processed or manufactured and the half-life values of the applicable isotopes.

7.2.5 Surface Contaminated Waste

Volumetric measurements of surface-contaminated waste (averaging the activity on the surface over the mass of the piece of debris)—such as fixed contamination on concrete rubble—for disposal exemption concurrences are allowed, case by case, if the procedures in ANSI/HPS N13.12-1999 are closely followed. Contaminated distinct items or equipment, if they are to be disposed of, do not need to meet the surface-contamination release limits in 30 TAC 336.364 (see Table 1). The TCEQ will not accept a calculation that averages the activity on the surface of a piece of debris and the entire mass of material in a container containing non-contaminated rubble or other waste. *Radiological Assessments for Clearance of Materials from Nuclear Facilities* (NRC, 2003: section 3.8) contains a methodology relating specific activities (Bq/cm^2) to specific areal activity (Bq/g), including the mass-to-surface-ratio conversion factors for various steel components of nuclear power plants.

7.3 Radiation Survey

Radiation surveys (wipes or exposure rates) are sometimes required to determine if exemption requirements are met. Rules regarding the radiation-survey instruments are at 25 TAC 289.259(e), which is summarized below.

- The radiation-survey instrument must be:
  - able to measure from 1 μR/hr to at least 500 μR/hr,
  - calibrated,
  - appropriate (for example, a detector able to measure alpha radiation shall be used for alpha-emitting radionuclides), and
  - operable.
- Calibration of the radiation-survey instrument must:

  - be performed by a person licensed or registered by the DSHS, another agreement state or licensing state, or the NRC to perform such service;
  - be for the same energy values as the radiation to be measured;
  - be performed annually and also after each time that the instrument is serviced (changing the battery does not require that the instrument be calibrated); and
  - demonstrate an accuracy within $\pm 20\%$ using a reference source supplied by a person properly authorized.
- Records of instrument calibrations are to be maintained for inspection by the NRC, DSHS, or an appropriate agreement-state agency for five years after the calibration date.

7.4 NRC Analysis

A letter from the NRC documenting its analysis and conclusion that a specific waste volume or stream meets the exemption requirements may be accepted by TCEQ to grant an exemption concurrence in Texas, provided that the rule in the Code of Federal Regulations used by the NRC to exempt the material is also in the Texas Administrative Code (see Subsection 2.3.1).

8 REFERENCES

American National Standards Institute–Health Physics Society. 1999. *Surface and Volume Radioactivity Standards for Clearance*. ANSI/HPS N13.12-1999. McLean, VA: Health Physics Society.

Army. Department of, Headquarters. 1998. *Identification of Radioactive Items in the Army.* Technical Bulletin 43-0116. Washington.

International Atomic Energy Association. 2010. *Feature: Depleted Uranium, Questions and Answers*. Vienna. Available online at: www.iaea.org/NewsCenter/Features /DU/du_qaa.shtml.

NRC. 1974. *Termination of Operating Licenses for Nuclear Reactors*. Regulatory Guide 1.86. Washington.

———. 2001. *Systematic Radiological Assessment of Exemptions for Source and Byproduct Materials.* NUREG-1717. Washington.

———. 2003. *Radiological Assessments for Clearance of Materials from Nuclear Facilities.* NUREG-1640. Washington.

APPENDIX A: DEFINITIONS

agreement state. Any state with which the NRC has entered into an effective agreement under 274b of the Atomic Energy Act of 1954, as amended. An agreement state regulates radioactive material within its boundaries except for federal sites and nuclear power plants.

by-product material. Defined in 30 TAC 336.2(16) in regards to source material as "the tailings or wastes produced by or resulting from the extraction or concentration of uranium or thorium from ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes, and other tailings having similar radiological characteristics." It excludes underground ore bodies depleted by these solution-extraction processes.

executive director. The executive director of the commission, or any authorized individual designated to act for the executive director [30 TAC 3.2(16)].

exempt material. Radioactive material that is exempt from the radioactive-material regulations and can therefore be used or disposed of without consideration of its radioactive content.

exemption concurrence. A letter from the appropriate regulatory agency stating that a specific radioactive material or object meets the exemption criteria stipulated in the Texas Administrative Code and is therefore exempt from the radioactive material regulations.

false negative. Failure of an analysis of a sample for a radionuclide contaminant to detect that radionuclide when the sample actually is contaminated with it.

false positive. Seeming detection of a radionuclide contaminant in a sample when the sample actually is not contaminated with that radionuclide.

licensed material. Radioactive material received, possessed, used, or transferred under a general or specific license issued by the agency [25 TAC 289.201(b)(53)].

naturally occurring radioactive material. Defined in 25 TAC 289.259(c)(4) as:

> Naturally occurring materials not regulated under the A[tomic] E[nergy] A[ct] whose radionuclide concentrations have been increased by or as a result of human practices. NORM does not include the natural radioactivity of rocks or soils, or background radiation, but instead refers to materials whose radioactivity is

concentrated by controllable practices (or by past human practices). NORM does not include source, byproduct, or special nuclear material.

special nuclear material. Either (A) plutonium, uranium-233, uranium enriched in the isotope 233 or in the isotope 235, and any other material that NRC, in accordance with the provisions of the Atomic Energy Act of 1954, 51 as amended, determines to be special nuclear material, but does not include source material; or (B) any material artificially enriched by any of the foregoing, but not source material [25 TAC 289.201(b)(101)].

sum-of-fractions rule. Equation used to determine if a mixture of radionuclides exceeds a regulatory limit when each radionuclide has a different activity limit. The rule is shown in Equation A-1, but can be described as the requirement that the sum of the ratios of the radionuclide concentrations over its regulatory limit is less than or equal to one.

Eqn. A-1 $$Ratio = \sum_{i=1}^{N} \frac{C_i}{R_i} \leq 1.0$$

C is the measured concentration or activity of radioisotope i.

R is the regulatory limit for the concentration or activity of radioisotope i.

N is the total number of radioisotopes in the waste.

transuranics (TRUs). Elements with an atomic number higher than that of uranium, which is 92. Common transuranic elements are neptunium, plutonium, americium, and curium.

tritium. A hydrogen isotope with one proton and two neutrons. It is commonly referred as tritium (T) instead of hydrogen-3 (H-3).

APPENDIX B: REGULATORY TABLES USED TO DETERMINE IF A MATERIAL IS EXEMPT

Table B.1. Monthly Average Radionuclide Concentrations Allowed for Release to Sewers as Authorized at 25 TAC 336.215

Element	N	Radionuclides with monthly average concentration (µCi/ml)					
Hydrogen (H)	1	H-3	1E-2				
Beryllium (Be)	4	Be-7	6E-3	Be-10	2E-4		
Carbon (C)	6	C-11	6E-2	C14	3E-4		
Fluorine (F)	9	F-18	7E-3				
Sodium (Na)	11	Na-22	6E-5	Na-24	5E-4		
Magnesium (Mg)	12	Mg-28	9E-5				
Aluminum (Al)	13	Al-26	6E-5				
Silicon (Si)	14	Si-31	1E-3	Si-32	4E-4		
Phosphorus (P)	15	P-32	9E-5	P-33	8E-4		
Sulfur (S)	16	S-35	1E-3				
Chlorine (Cl)	17	Cl-36	2E-4	Cl-38	3E-3	Cl-39	5E-3
Potassium (K)	19	K-40	4E-5	K-42	6E-4	K-43	9E-4
		K-44	5E-3	K-45	7E-3		
Calcium (Ca)	20	Ca-41	6E-4	Ca-45	2E-4	Ca-47	1E-4
Scandium (Sc)	21	Sc-43	1E-3	Sc-44m	7E-5	Sc-44	5E-4
		Sc-46	1E-4	Sc-47	4E-4	Sc-48	1E-4
		Sc-49	3E-3				
Titanium (Ti)	22	Ti-44	4E-5	Ti-45	1E-3		
Vanadium (V)	23	V-47	4E-3	V-48	9E-5	V-49	1E-2
Chromium (Cr)	24	Cr-48	8E-4	Cr-49	4E-3	Cr-51	5E-3
Manganese (Mn)	25	Mn-51	3E-3	Mn-52m	5E-3	Mn-52	1E-4
		Mn-53	7E-3	Mn-54	3E-4	Mn-56	7E-4
Iron (Fe)	26	Fe-52	1E-4	Fe-55	1E-3	Fe-59	1E-4
		Fe-60	4E-6				
Cobalt (Co)	27	Co-55	2E-4	Co-56	6E-5	Co-57	6E-4
		Co-58m	8E-3	Co-58	2E-4	Co-60m	2E-1
		Co-60	3E-5	Co-61	3E-3	Co-62m	7E-3
Nickel (Ni)	28	Ni-56	2E-4	Ni-57	2E-4	Ni-59	3E-3
		Ni-63	1E-3	Ni-65	1E-3	Ni-66	6E-5
Copper (Cu)	29	Cu-60	4E-3	Cu-61	2E-3	Cu-64	2E-3
		Cu-67	6E-4				
Zinc (Zn)	30	Zn-62	2E-4	Zn-63	3E-3	Zn-65	5E-5
		Zn-69m	6E-4	Zn-69	8E-3	Zn-71m	8E-4
		Zn-72	1E-4				
Gallium (Ga)	31	Ga-65	9E-3	Ga-66	1E-4	Ga-67	1E-3
		Ga-68	2E-3	Ga-70	1E-2	Ga-72	2E-4
		Ga-73	7E-4				
Germanium (Ge)	32	Ge-66	3E-3	Ge-67	6E-3	Ge-68	6E-4
		Ge-69	2E-3	Ge-71	7E-2	Ge-75	9E-3
		Ge-77	1E-3	Ge-78	3E-3		
Arsenic (As)	33	As-69	6E-3	As-70	2E-3	As-71	5E-4
		As-72	1E-4	As-73	1E-3	As-74	2E-4
		As-76	1E-4	As-77	6E-4	As-78	1E-3
Selenium (Se)	34	Se-70	1E-3	Se-73m	4E-3	Se-73	4E-4
		Se-75	7E-5	Se-79	8E-5	Se-81m	3E-3

Element	N	Radionuclides with monthly average concentration (µCi/ml)					
		Se-81	1E-2	Se-83	4E-3		
Bromine (Br)	35	Br-74m	3E-3	Br-74	5E-3	Br-75	5E-3
		Br-76	5E-4	Br-77	2E-3	Br-80m	3E-3
		Br-80	1E-2	Br-82	4E-4	Br-83	9E-3
		Br-84	4E-3				
Rubidium (Rb)	37	Rb-79	8E-3	Rb-81m	4E-2	Rb-81	5E-3
		Rb-82m	2E-3	Rb-83	9E-5	Rb-84	7E-5
		Rb-86	7E-5	Rb-87	1E-4	Rb-88	4E-3
		Rb-89	9E-3				
Strontium (Sr)	38	Sr-80	6E-4	Sr-81	3E-3	Sr-82	3E-5
		Sr-83	3E-4	Sr-85m	3E-2	Sr-85	4E-4
		Sr-87m	6E-3	Sr-89	8E-5	Sr-90	5E-6
		Sr-91	2E-4	Sr-92	4E-4		
Yttrium (Y)	39	Y-86m	3E-3	Y-86	2E-4	Y-87	3E-4
		Y-88	1E-4	Y-90m	1E-3	Y-90	7E-5
		Y-91m	2E-2	Y-91	8E-5	Y-92	4E-4
		Y-93	2E-4	Y-94	4E-3	Y-95	7E-3
Zirconium (Zr)	40	Zr-86	2E-4	Zr-88	5E-4	Zr-89	2E-4
		Zr-93	4E-4	Zr-95	2E-4	Zr-97	9E-5
Niobium (Nb)	41	Nb-88	1E-2	Nb-89 (22 min)	1E-3	Nb-89 (122 min)	7E-4
		Nb-90	1E-4	Nb-93m	2E-3	Nb-94	1E-4
		Nb-95m	3E-4	Nb-95	3E-4	Nb-96	2E-4
		Nb-97	3E-3	Nb-98	2E-3		
Molybdenum (Mo)	42	Mo-90	3E-4	Mo-93m	6E-4	Mo-93	5E-4
		Mo-99	2E-4	Mo-101	7E-3		
Technetium (Tc)	43	Tc-93m	1E-2	Tc-93	4E-3	Tc-94m	3E-3
		Tc-94	1E-3	Tc-95m	5E-4	Tc-95	1E-3
		Tc-96m	2E-2	Tc-96	3E-4	Tc-97m	6E-4
		Tc-97	5E-3	Tc-98	1E-4	Tc-99m	1E-2
		Tc-99	6E-4	Tc-101	2E-2	Tc-104	4E-3
Ruthenium (Ru)	44	Ru-94	2E-3	Ru-97	1E-3	Ru-103	3E-4
		Ru-105	7E-4	Ru-106	3E-5		
Rhodium (Rh)	45	Rh-99m	2E-3	Rh-99	3E-4	Rh-100	2E-4
		Rh-101m	8E-4	Rh-101	3E-4	Rh-102m	2E-4
		Rh-102	8E-5	Rh-103m	6E-2	Rh-105	5E-4
		Rh-106m	1E-3	Rh-107	1E-2		
Palladium (Pd)	46	Pd-100	2E-4	Pd-101	2E-3	Pd-103	1E-3
		Pd-107	5E-3	Pd-109	3E-4		
Silver (Ag)	47	Ag-102	9E-3	Ag-103	5E-3	Ag-104m	4E-3
		Ag-104	3E-3	Ag-105	4E-4	Ag-106m	1E-4
		Ag-106	9E-3	Ag-108m	9E-5	Ag-110m	6E-5
		Ag-111	2E-4	Ag-112	4E-4	Ag-115	4E-3
Cadmium (Cd)	48	Cd-104	3E-3	Cd-107	3E-3	Cd-109	6E-5
		Cd-113m	5E-6	Cd-113	4E-6	Cd-115m	4E-5
		Cd-115	1E-4	Cd-117m	6E-4	Cd-117	6E-4
Indium (In)	49	In-109	3E-3	In-110 (69.1 min)	2E-3	In-110 (4.9 hr)	7E-4
		In-111	6E-4	In-112	2E-2	In-113m	7E-3
		In-114m	5E-5	In-115m	2E-3	In-115	5E-6
		In-116m	3E-3	In-117m	2E-3	In-117	8E-3
		In-119m	7E-3				
Tin (Sn)	50	Sn-110	5E-4	Sn-111	1E-2	Sn-113	3E-4
		Sn-117m	3E-4	Sn-119m	6E-4	Sn-121m	5E-4
		Sn-121	8E-4	Sn-123m	7E-3	Sn-123	9E-5

Element	N	Radionuclides with monthly average concentration (µCi/ml)					
		Sn-125	6E-5	Sn-126	4E-5	Sn-127	9E-4
		Sn-128	1E-3				
Antimony (Sb)	51	Sb-115	1E-2	Sb-116m	3E-3	Sb-116	1E-2
		Sb-117	9E-3	Sb-118m	7E-4	Sb-119	2E-3
		Sb-120	2E-2	Sb-120 (5.8d)	1E-4	Sb-122	1E-4
		Sb-124m	3E-2	Sb-124	7E-5	Sb-125	3E-4
		Sb-126m	9E-3	Sb-126	7E-5	Sb-127	1E-4
		Sb-128 (10 min)	1E-2	Sb-128 (9.01 hr)	2E-4	Sb-129	4E-4
		Sb-130	3E-3	Sb-131	2E-3		
Tellurium (Te)	52	Te-116	1E-3	Te-121m	1E-4	Te-121	4E-4
		Te-123m	1E-4	Te-123	2E-4	Te-125m	2E-4
		Te-127m	9E-5	Te-127	1E-3	Te-129m	7E-5
		Te-129	4E-3	Te-131m	8E-5	Te-131	8E-4
		Te-132	9E-5	Te-133m	9E-4	Te-133	4E-3
		Te-134	3E-3				
Iodine (I)	53	I-120m	2E-3	I-120	1E-3	I-121	4E-3
		I-123	1E-3	I-124	2E-5	I-125	2E-5
		I-126	1E-5	I-128	8E-3	I-129	2E-6
		I-130	2E-4	I-131	1E-5	I-132m	1E-3
		I-132	1E-3	I-133	7E-5	I-134	4E-3
		I-135	3E-4				
Cesium (Cs)	55	Cs-125	1E-2	Cs-127	9E-3	Cs-129	3E-3
		Cs-130	1E-2	Cs-131	3E-3	Cs-132	4E-4
		Cs-134m	2E-2	Cs-134	9E-6	Cs-135m	1E-2
		Cs-135	1E-4	Cs-136	6E-5	Cs-137	1E-5
		Cs-138	4E-3				
Barium (Ba)	56	Ba-126	8E-4	Ba-128	7E-5	Ba-131m	7E-2
		Ba-131	4E-4	Ba-133m	4E-4	Ba-133	2E-4
		Ba-135m	4E-4	Ba-139	2E-3	Ba-140	8E-5
		Ba-141	3E-3	Ba-142	7E-3		
Lanthanum (La)	57	La-131	6E-3	La-132	4E-4	La-135	5E-3
		La-137	2E-3	La-138	1E-4	La-140	9E-5
		La-141	5E-4	La-142	1E-3	La-143	5E-3
Cerium (Ce)	58	Ce-134	8E-5	Ce-135	2E-4	Ce-137m	3E-4
		Ce-137	7E-3	Ce-139	7E-4	Ce-141	3E-4
		Ce-143	2E-4	Ce-144	3E-5		
Praseodymium (Pr)	59	Pr-136	1E-2	Pr-137	5E-3	Pr-138m	1E-3
		Pr-139	6E-3	Pr-142m	1E-2	Pr-142	1E-4
		Pr-143	2E-4	Pr-144	6E-3	Pr-145	4E-4
		Pr-147	1E-2				
Neodymium (Nd)	60	Nd-136	2E-3	Nd-138	3E-4	Nd-139m	7E-4
		Nd-139	1E-2	Nd-141	2E-2	Nd-147	2E-4
		Nd-149	1E-3	Nd-151	9E-3		
Promethium (Pm)	61	Pm-141	8E-3	Pm-143	7E-4	Pm-144	2E-4
		Pm-145	1E-3	Pm-146	2E-4	Pm-147	7E-4
		Pm-148m	1E-4	Pm-148	7E-5	Pm-149	2E-4
		Pm-150	7E-4	Pm-151	2E-4		
Samarium (Sm)	62	Sm-141m	4E-3	Sm-141	8E-3	Sm-142	1E-3
		Sm-145	8E-4	Sm-146	3E-6	Sm-147	4E-6
		Sm-151	2E-3	Sm-153	3E-4	Sm-1552	1E-2
		Sm-156	7E-4				
Europium (Eu)	63	Eu-145	2E-4	Eu-146	1E-4	Eu-147	4E-4
		Eu-148	1E-4	Eu-149	2E-3	Eu-150	4E-4

Element	N	Radionuclides with monthly average concentration (µCi/ml)					
						(12.6 h)	
		Eu-150 (34.2 y)	1E-4	Eu-152m	4E-4	Eu-152	1E-4
		Eu-154	7E-5	Eu-155	5E-4	Eu-156	8E-5
		Eu-157	3E-4	Eu-158	3E-3		
Gadolinium (Gd)	64	Gd-145	6E-3	Gd-146	2E-4	Gd-147	3E-4
		Gd-148	3E-6	Gd-149	4E-4	Gd-151	9E-4
		Gd-152	4E-6	Gd-153	6E-4	Gd-159	4E-4
Terbium (Tb)	65	Tb-147	1E-3	Tb-149	7E-4	Tb-150	7E-4
		Tb-151	5E-4	Tb-153	7E-4	Tb-154	2E-4
		Tb-155	8E-4	Tb-156m (5.0 hr)	2E-3	Tb-156m (24.4 hr)	1E-3
		Tb-156	1E-4	Tb-157	7E-3	Tb-158	2E-4
		Tb-160	1E-4	Tb-161	3E-4		
Dysprosium (Dy)	66	Dy-155	1E-3	Dy-157	3E-3	Dy-159	2E-3
		Dy-165	2E-3	Dy-166	1E-4		
Holmium (Ho)	67	Ho-155	6E-3	Ho-157	4E-2	Ho-159	3E-2
		Ho-161	1E-2	Ho-162m	7E-3	Ho-162	1E-1
		Ho-164m	1E-2	Ho-164	3E-2	Ho-166m	9E-5
		Ho-166	1E-4	Ho-167	2E-3		
Erbium (Er)	68	Er-161	2E-3	Er-165	9E-3	Er-169	5E-4
		Er-171	5E-4	Er-172	2E-4		
Thulium (Tm)	69	Tm-162	1E-2	Tm-166	6E-4	Tm-167	3E-4
		Tm-170	1E-4	Tm-171	2E-3	Tm-172	1E-4
		Tm-173	6E-4	Tm-175	1E-2		
Ytterbium (Yb)	70	Yb-162	1E-2	Yb-166	2E-4	Yb-167	4E-2
		Yb-169	2E-4	Yb-175	4E-4	Yb-177	2E-3
		Yb-178	2E-3				
Lutetium (Lu)	71	Lu-169	3E-4	Lu-170	2E-4	Lu-171	3E-4
		Lu-172	1E-4	Lu-173	7E-4	Lu-174m	4E-4
		Lu-174	7E-4	Lu-176m	1E-3	Lu-176	1E-4
		Lu-177m	1E-4	Lu-177	4E-4	Lu-178m	8E-3
		Lu-178	6E-3	Lu-179	9E-4		
Hafnium (Hf)	72	Hf-170	4E-4	Hf-172	2E-4	Hf-173	7E-4
		Hf-175	4E-4	Hf-177m	3E-3	Hf-178m	3E-5
		Hf-179m	1E-4	Hf-180m	1E-3	Hf-181	2E-4
		Hf-182m	5E-3	Hf-182	5E-5	Hf-183	3E-3
		Hf-184	3E-4				
Tantalum (Ta)	73	Ta-172	5E-3	Ta-173	9E-4	Ta-174	4E-3
		Ta-175	8E-4	Ta-176	5E-4	Ta-177	2E-3
		Ta-178	2E-3	Ta-179	3E-3	Ta-180m	3E-3
		Ta-180	2E-4	Ta-182m	3E-2	Ta-182	1E-4
		Ta-183	2E-4	Ta-184	3E-4	Ta-185	4E-3
		Ta-186	1E-2				
Tungsten (W)	74	W-176	1E-3	W-177	3E-3	W-178	7E-4
		W-179	7E-2	W-181	2E-3	W-185	4E-4
		W-187	3E-4	W-188	7E-5		
Rhenium (Re)	75	Re-177	2E-2	Re-178	1E-2	Re-181	7E-4
		Re-182 (12.7 hr)	9E-4	Re-182 (64.0 hr)	2E-4	Re-184m	3E-4
		Re-184	3E-4	Re-186m	2E-4	Re-186	3E-4
		Re-187	8E-2	Re-188m	1E-2	Re-188	2E-4
		Re-189	4E-4				
Osmium (Os)	76	Os-180	1E-2	Os-181	2E-3	Os-182	3E-4
		Os-185	3E-4	Os-189m	1E-2	Os-191m	2E-3

Element	N	Radionuclides with monthly average concentration (µCi/ml)					
		Os-191	3E-4	Os-193	2E-4	Os-194	8E-5
Iridium (Ir)	77	Ir-182	6E-3	Ir-184	1E-3	Ir-185	7E-4
		Ir-186	3E-4	Ir-187	1E-3	Ir-188	3E-4
		Ir-189	7E-4	Ir-190m	2E-2	Ir-190	1E-4
		Ir-192m	4E-4	Ir-192	1E-4	Ir-194m	9E-5
		Ir-194	1E-4	Ir-195m	1E-3	Ir-195	2E-3
Platinum (Pt)	78	Pt-186	2E-3	Pt-188	2E-4	Pt-189	1E-3
		Pt-191	5E-4	Pt-193m	4E-4	Pt-193	6E-3
		Pt-195m	3E-4	Pt-197m	2E-3	Pt-197	4E-4
		Pt-199	7E-3	Pt-200	2E-4		
Gold (Au)	79	Au-193	1E-3	Au-194	4E-4	Au-195	7E-4
		Au-198m	1E-4	Au-198	2E-4	Au-199	4E-4
		Au-200m	2E-4	Au-200	4E-3	Au-201	1E-2
Mercury (Hg) organic	80	Hg-193m	6E-4	Hg-193	3E-3	Hg-194	2E-6
		Hg-195m	4E-4	Hg-195	2E-3	Hg-197m	5E-4
		Hg-197	9E-4	Hg-199m	1E-2	Hg-203	7E-5
Mercury (Hg) sulfate	80	Hg-193m	4E-4	Hg-193	2E-3	Hg-195	1E-4
		Hg-195m	3E-4	Hg-195	2E-3	Hg-197m	4E-4
		Hg-197	8E-4	Hg-199m	8E-3	Hg-203	3E-4
Thallium (Tl)	81	Tl-194m	1E-2	Tl-194	4E-2	Tl-195	9E-3
		Tl-197	1E-2	Tl-198m	4E-3	Tl-198	3E-3
		Tl-199	9E-3	Tl-200	1E-3	Tl-201	2E-3
		Tl-202	5E-4	Tl-204	2E-4		
Lead (Pb)	82	Pb-195m	8E-3	Pb-198	4E-3	Pb-199	3E-3
		Pb-200	4E-4	Pb-201	1E-3	Pb-202m	1E-3
		Pb-202	2E-5	Pb-203	7E-4	Pb-205	5E-4
		Pb-209	3E-3	Pb-210	1E-7	Pb-211	2E-3
		Pb-212	2E-5	Pb-214	1E-3		
Bismuth (Bi)	83	Bi-200	4E-3	Bi-201	2E-3	Bi-202	2E-3
		Bi-203	3E-4	Bi-205	2E-4	Bi-206	9E-5
		Bi-207	1E-4	Bi-210m	8E-6	Bi-210	1E-4
		Bi-212	7E-4	Bi-213	1E-3	Bi-214	3E-3
Polonium (Po)	84	Po-203	3E-3	Po-205	3E-3	Po-207	1E-3
		Po-210	4E-7				
Astatine (At)	85	At-207	8E-4	At-211	2E-5		
Francium (Fr)	87	Fr-222	3E-4	Fr-223	8E-5		
Radium (Ra)	88	Ra-223	1E-6	Ra-224	2E-6	Ra-225	2E-6
		Ra-226	6E-7	Ra-227	3E-3	Ra-228	6E-7
Actinium (Ac)	89	Ac-224	3E-4	Ac-225	7E-6	Ac-226	2E-5
		Ac-227	5E-8	Ac-228	3E-4		
Thorium (Th)	90	Th-226	7E-4	Th-227	2E-5	Th-228	2E-6
		Th-229	2E-7	Th-230	1E-6	Th-231	5E-4
		Th-232	3E-7	Th-234	5E-5		
Protactinium (Pa)	91	Pa-227	5E-4	Pa-228	2E-4	Pa-230	1E-4
		Pa-231	6E-8	Pa-232	2E-4	Pa-233	2E-4
		Pa-234	3E-4				
Uranium (U)	92	U-230	8E-7	U-231	6E-4	U-232	6E-7
		U-233	3E-6	U-234	3E-6	U-235	3E-6
		U-236	3E-6	U-237	3E-4	U-238	3E-6
		U-239	9E-3	U-240	2E-4	U-natural	3E-6
Neptunium (Np)	93	Np-232	2E-2	Np-233	1E-1	Np-234	3E-4
		Np-235	3E-3	Np-236 (1.2E5 yr)	9E-7	Np-236 (22.5 hr)	5E-4
		Np-237	2E-7	Np-238	2E-4	Np-239	2E-4
		Np-240	3E-3				

Element	N	Radionuclides with monthly average concentration (µCi/ml)					
Plutonium (Pu)	94	Pu-234	1E-3	Pu-235	1E-1	Pu-236	6E-7
		Pu-237	2E-3	Pu-238	2E-7	Pu-239	2E-7
		Pu-240	2E-7	Pu-241	1E-5	Pu-242	2E-7
		Pu-243	2E-3	Pu-244	2E-7	Pu-245	3E-4
		Pu-246	6E-5				
Americium (Am)	95	Am-237	1E-2	Am-238	5E-3	Am-239	7E-4
		Am-240	3E-4	Am-241	2E-7	Am-242m	2E-7
		Am-242	5E-4	Am-243	2E-7	Am-244m	1E-2
		Am-244	4E-4	Am-245	4E-3	Am-246m	8E-3
		Am-246	4E-3				
Curium (Cm)	96	Cm-238	2E-3	Cm-240	1E-5	Cm-241	2E-4
		Cm-242	7E-6	Cm-243	3E-7	Cm-244	3E-7
		Cm-245	2E-7	Cm-246	2E-7	Cm-247	2E-7
		Cm-248	5E-8	Cm-249	7E-3	Cm-250	9E-9
Berkelium (Bk)	97	Bk-245	3E-4	Bk-246	4E-4	Bk-247	2E-7
		Bk-249	6E-5	Bk-250	1E-3		
Californium (Cf)	98	Cf-244	4E-3	Cf-246	5E-5	Cf-248	2E-6
		Cf-249	2E-7	Cf-250	3E-7	Cf-251	2E-7
		Cf-252	7E-7	Cf-253	5E-5	Cf-254	3E-7
Einsteinium (Es)	99	Es-250	6E-3	Es-251	1E-3	Es-253	2E-5
		Es-254m	4E-5	Es-254	2E-6		
Fermium (Fm)	100	Fm-252	6E-5	Fm-253	1E-4	Fm-254	4E-4
		Fm-255	7E-5	Fm-257	5E-6		
Mendelevium (Md)	101	Md-257	1E-3	Md-258	6E-6		
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life greater than 2 hours							1E-7
Any single radionuclide not listed above that decays by alpha emission or spontaneous fission, or any mixture for which either the identity or the concentration of any radionuclide in the mixture is not known							2E-8

Table B.2. Radionuclide Concentration and Annual Activity Limits for Disposal in a Type I Municipal Solid Waste Facility or a Hazardous Waste Facility According to 30 TAC 336.225(c) and 336.365 (Section 3.3)

Radioisotope	Concentration Limit (Ci/m^3)	Annual Generator Limit (Ci/yr)	Radioisotope	Concentration LImit (Ci/m^3)	Annual Generator Limit (Ci/yr)
Fluorine-18	3E-1	8	Rhodium-106	1	30
Sodium-24	9E-4	2E-2	Ag-110m	2E-3	5E-2
Silicon-31	1E+2	3E+3	Cadmium-115m	2E-1	5
Phosphorus-32	2	50	Indium-111	9E-2	2
Phosphorus-33	10	3E+2	Indium-113m	9	2E+2
Sulfur-35	9	2E+2	Tin-113	6E-2	2
Argon-41	3E-1	8	Tin-119	20	5E+2
Potassium-42	2E-2	5E-1	Antimony-124	2E-3	5E-2
Calcium-45	4	1E+2	Iodine-123	4E-1	10
Calcium-47	2E-2	5E-1	Iodine-125	7E-1	20
Scandium-46	2E-3	5E-2	Iodine-131	4E-2	1
Chromium-51	6E-1	20	Iodine-133	2E-2	5E-1
Iron-59	5E-3	1E-1	Tellurium-129	2E-1	5
Cobalt-57	6E-2	2	Xenon-127	8E-2	2
Cobalt-58	1E-2	3E-1	Xenon-133	1	30
Zinc-65	7E-3	2E-1	Barium-140	2E-3	5E-2
Gallium-67	3E-1	8	Lanthanum-140	2E-3	5E-2
Selenium-75	5E-2	1	Cerium-141	4E-1	10
Bromine-82	2E-3	5E-2	Cerium-144	1E-3	3E-2
Rubidium-86	4E-2	1	Praseodymium-143	6	2E+2
Strontium-85	2E-2	5E-1	Neodymium-147	7E-2	2
Strontium-89	8	2E+2	Ytterbium-169	6E-2	2
Yttrium-90	4	1E+2	Iridium-192	1E-2	3E-1
Yttrium-91	4E-1	10	Gold-198	3E-2	8E-1
Zirconium-95	8E-3	2E-1	Mercury-197	8E-1	20
Niobium-95	8E-3	2E-1	Thallium-201	4E-1	10
Molybdenum-99	5E-2	1	Mercury-203	1E-1	3
Technetium-99m	1	30			

Table B.3. Concentration Limits for Exemptions for Liquid (µCi/ml) and for Solids (µCi/g) According to 25 TAC 289.251(e)(1) and 289.251(l)(1) (see Section 5.1)

Element (Atomic Number)	Isotope[a]	Concentration	Isotope[a]	Concentration
Antimony (51)	Sb-122	3E-4	Sb-124	2E-4
	Sb-125	1E-3		
Arsenic (33)	As-73	5E-3	As-74	5E-4
	As-76	2E-4	As-77	8E-4
Barium (56)	Ba-131	2E-3	Ba-140	3E-4
Beryllium (4)	Be-7	2E-2		
Bismuth (83)	Bi-206	4E-4		
Bromine (35)	Br-82	3E-3		
Cadmium (48)	Cd-109	2E-3	Cd-115m	3E-4
	Cd-115	3E-4		
Calcium (20)	Ca-45	9E-5	Ca-47	5E-4
Carbon (6)	C-14	8E-3		
Cerium (58)	Ce-141	9E-4	Ce-143	4E-4
	Ce-144	1E-4		
Cesium (55)	Cs-131	2E-2	Cs-134m	6E-2
	Cs-134	9E-5		
Chlorine (17)	Cl-138	4E-3		
Chromium (24)	Cr-51	2E-2		
Cobalt (27)	Co-57	5E–3	Co-58	1E-3
	Co-60	5E-4		
Copper (29)	Cu-64	3E-3		
Dysprosium (66)	Dy-165	4E-3	Dy-166	4E-4
Erbium (68)	Er-169	9E-4	Er-171	1E-3
Europium (63)	Eu-152[b]	6E-4	Eu-155	2E-3
Fluorine (9)	F-18	8E-3		
Gadolinium (64)	Gd-153	2E-3	Gd-159	8E-4
Gallium (31)	Ga-72	4E-4		
Germanium (32)	Ge-71	2E-2		
Gold (79)	Au-196	2E-3	Au-198	5E-4
	Au-199	2E-3		
Hafnium (72)	Hf-181	7E-4		
Hydrogen (1)	H-3	3E-2		
Indium (49)	In-113m	1E-2	In-114m	2E-4
Iodine (53)	I-126	2E-5	I-131	2E-5
	I-132	6E-4	I-133	7E-5
	I-134	1E-3		
Iridium (77)	Ir-190	2E-3	Ir-192	4E-4
	Ir-194	3E-4		
Iron (26)	Fe-55	8E-3	Fe-59	6E-4
Lanthanum (57)	La-140	2E-4		
Lead (82)	Pb-203	4E-3		
Lutetium (71)	Lu-177	1E-3		
Manganese (25)	Mn-52	3E-4	Mn-54	1E-3
	Mn-56	1E-3		
Mercury (80)	Hg-197m	2E-3	Hg-197	3E-3
	Hg-203	2E-4		
Molybdenum (42)	Mo-99	2E-3		
Neodymium (60)	Nd-147	6E-4	Nd-149	3E-3
Nickel (28)	Ni-65	1E-3		
Niobium (Columbium) (41)	Nb-95	1E-3	Nb-97	9E-3
Osmium (76)	Os-185	7E-4	Os-191m	3E-2
	Os-191	2E-3	Os-193	6E-4

Element (Atomic Number)	Isotope[a]	Concentration	Isotope[a]	Concentration
Palladium (46)	Pd-103	3E-3	Pd-109	9E-4
Phosphorus (15)	P-32	2E-4		
Platinum (78)	Pt-191	1E-3	Pt-193m	1E-2
	Pt-197m	1E-2	Pt-197	1E-3
Polonium (84)	Po-210	7E-6		
Potassium (19)	K-42	3E-3		
Praseodymium	Pr-142	3E-4	Pr-143	5E-4
Promethium (61)	Pm-147	2E-3	Pm-149	4E-4
Radium (88)	Ra-226	1E-7	Ra-228	3E-7
Rhenium (75)	Re-183	6E-3	Re-186	9E-4
	Re-188	6E-4		
Rhodium (45)	Rh-103m	1E-1	Rh-105	1E-3
Rubidium (37)	Rb-86	7E-4		
Ruthenium (44)	Ru-97	4E-3	Ru-103	8E-4
	Ru-105	1E-3	Ru-106	1E-4
Samarium (62)	Sm-153	8E-4		
Scandium (21)	Sc-46	4E-4	Sc-47	9E-4
	Sc-48	3E-4		
Selenium (34)	Se-75	3E-3		
Silicon (14)	Si-131	9E-3		
Ag (47)	Ag-105	1E-3	Ag-110m	3E-4
	Ag-111	4E-4		
Sodium (11)	Na-24	2E-3		
Strontium (38)	Sr-85	1E-3	Sr-89	1E-4
	Sr-91	7E-4	Sr-92	7E-4
Sulfur (16)	S-35	6E-4		
Tantalum (73)	Ta-82	4E-4		
Technetium (43)	Tc-96m	1E-1	Tc-96	1E-3
Tellurium (52)	Te-125m	2E-3	Te-127m	6E-4
	Te-127	3E-3	Te-129m	3E-4
	Te-131m	6E-4	Te-132	3E-4
Terbium (65)	Tb-160	4E-4		
Thallium (81)	Tl-200	4E-3	Tl-201	3E-3
	Tl-202	1E-3	Tl-204	1E-3
Thulium (69)	Tm-170	5E-4	Tm-171	5E-3
Tin (50)	Sn-113	9E-4	Sn-125	2E-4
Tungsten(Wolfram) (74)	W-181	4E-3	W-187	7E-4
Vanadium (23)	V-48	3E-4		
Ytterbium (70)	Yb-175	1E-3		
Yttrium (39)	Y-90	2E-4	Y-91m	3E-2
	Y-91	3E-4	Y-92	6E-4
	Y-93	3E-4		
Zinc (30)	Zn-65	1E-3	Zn-69m	7E-4
	Zn-69	2E-2		
Zirconium (40)	Zr-95	6E-4	Zr-97	2E-4
Beta and/or gamma emitting radioactive material not listed above with half-life less than 3 years			1E-6	

[a] m referes to the metastable state of that radioisotope.
[b] Value for the isotope Eu-152, with a half-life of 9.2 hours.

Table B.4.Concentration Limits for Exemptions for Gases (µCi/ml) According to 25 TAC 289.251(e)(1) and 289.251(l)(1) (see Section 5.1)

Element (Atomic Number)	Isotope	Concentration	Isotope	Concentration
Argon (18)	Ar-37	1E-3	Ar-41	1E-7
Bromine (35)	Br-82	4E-7		
Carbon (6)	C-14	1E-6		
Chlorine (17)	Cl-138	9E-7		
Fluorine (9)	F-18	2E-6		
Hydrogen (1)	H-3	5E-6		
Iodine (53)	I-126	3E-9	I-131	3E-9
	I-132	8E-8	I-133	1E-8
	I-134	2E-7		
Krypton (36)	Kr-85m	1E-6	Kr-85	3E-6
Sulfur (16)	S-35	9E-8		
Xenon (54)	Xe-131m	4E-6	Xe-133	3E-6
	Xe-135	1E-6		
Beta and/or gamma emitting radioactive material not listed above with half-life less than 3 years			1E-10	

Table B.5.Total Activity Limits for Exemptions of Individual Quantities per Container According to 25 TAC 289.251(e)(2) and 289.251(l)(2) (see Section 5.2)

Isotope	µCi	Isotope	µCi	Isotope	µCi	Isotope	µCi
Antimony-122 (Sb-122)	100	Sb-124	10	Sb-125	10		
Arsenic-73 (As-73)	100	As-74	10	As-76	10	As-77	100
Barium-131 (Ba-131)	10	Ba-133	10	Ba-140	10		
Beryllium-7 (Be-7)	100						
Bismuth-210 (Bi-210)	1						
Bromine-82 (Br-82)	10						
Cadmium-109 (Cd-109)	10	Cd-115m	10	Cd-115	100		
Calcium-45 (Ca-45)	10	Ca-47	10				
Carbon-14 (C-14)	100						
Cerium-141 (Ce-141)	100	Ce-143	100	Ce-144	1		
Cesium-129 (Cs-129)	100	Cs-131	1,000	Cs-134m	100	Cs-134	1
		Cs-135	10	Cs-136	10	Cs-137	10
Chlorine-36 (Cl-36)	10	Cl-38	10				
Chromium-51 (Cr-51)	1,000						
Cobalt-57 (Co-57)	100	Co-58m	10	Co-58	10	Co-60	1
Copper-64 (Cu-64)	100						
Dysprosium-165 (Dy-165)	10	Dy-166	100				
Erbium-169 (Er-169)	100	Er-171	100				
Europium-152 (Eu-152), 9.2 hour half-life	100	Eu-152 13 year	1	Eu-154	1	Eu-155	10
Fluorine-18 (F-18)	1,000						
Gadolinium-153 (Gd-153)	10	Gd-159	100				
Gallium-67 (Ga-67)	100	Ga-72	10				
Germanium-68 (Ge-68)	10	Ge-71	100				
Gold-195 (Au-195)	10	Au-198	100	Au-199	100		
Hafnium-181 (Hf-181)	10						
Holmium-166 (Ho-166)	100						
Hydrogen-3 (H-3)	1,000						
Indium-111 (In-111)	100	In-113m	100	In-114m	10	In-115m	100
		In-115	10				
Iodine-123 (I-123)	100	I-125	1	I-126	1	I-129	0.1
		I-131	1	I-132	10	I-133	1
		I-134	10	I-135	10		
Iridium-192 (Ir-192)	10	Ir-194	100				
Iron-52 (Fe-52)	10	Fe-55	100	Fe-59	10		
Krypton-85 (Kr-85)	100	Kr-87	10				
Lanthanum-140 (La-140)	10						
Lutetium-177 (Lu-177)	100						
Manganese-52 (Mn-52)	10	Mn-54	10	Mn-56	10		
Mercury-197m (Hg-197m)	100	Hg-197	100	Hg-203	10		
Molybdenum-99 (Mo-99)	100						
Neodymium-147 (Nd-147)	100	Nd-149	100				
Nickel-59 (Ni-59)	100	Ni-63	10	Ni-65	100		
Niobium-93m (Nb-93m)	10	Nb-95	10	Nb-97	10		
Osmium-185 (Os-185)	10	Os-191m	100	Os-191	100	Os-193	100
Palladium-103 (Pd-103)	100	Pd-109	100				
Phosphorus-32 (P-32)	10						
Platinum-191 (Pt-191)	100	Pt-193m	100	Pt-193	100	Pt-197m	100
		Pt-197	100				
Polonium-210 (Po-210)	0.1						
Potassium-42 (K-42)	10	K-43	10				
Praseodymium-142 (Pr-142)	100	Pr-143	100				

Isotope	µCi	Isotope	µCi	Isotope	µCi	Isotope	µCi
Promethium-147 (Pm-147)	10	Pm-149	10				
Radon-222 (Rn-222)	100						
Rhenium-186 (Re-186)	100	Re-188	100				
Rhodium-103m (Rh-103m)	100	Rh-105	100				
Rubidium-81 (Rb-81)	10	Rb-86	10	Rb-87	10		
Ruthenium-97 (Ru-97)	100	Ru-103	10	Ru-105	10	Ru-106	1
Samarium-151 (Sm-151)	10	Sm-153	100				
Scandium-46 (Sc-46)	10	Sc-47	100	Sc-48	10		
Selenium-75 (Se-75)	10						
Silicon-31 (Si-31)	100						
Silver-105 (Ag-105)	10	Ag-110m	1	Ag-111	100		
Sodium-22 (Na-22)	10	Na-24	10				
Strontium-85 (Sr-85)	10	Sr-87m	10	Sr-89	1	Sr-90	0.1
		Sr-91	10	Sr-92	10		
Sulphur-35 (S-35)	100						
Tantalum-182 (Ta-182)	10						
Technetium-96 (Tc-96)	10	Tc-97m	100	Tc-97	100	Tc-99m	100
		Tc-99	10				
Tellurium-125m (Te-125m)	10	Te-127m	10	Te-127	100	Te-129m	10
		Te-129	100	Te-131m	10	Te-132	10
Terbium-160 (Tb-160)	10						
Thallium-200 (Tl-200)	100	Tl-201	100	Tl-202	100	Tl-204	10
Thulium-170 (Tm-170)	10	Tm-171	10				
Tin-113 (Sn-113)	10	Sn-125	10				
Tungsten-181 (W-181)	10	W-185	10	W-187	100		
Vanadium-48 (V-48)	10						
Xenon-131m (Xe-131m)	1,000	Xe-133	100	Xe-135	100		
Ytterbium-175 (Yb-175)	100						
Yttrium-87 (Y-87)	10	Y-88	10	Y-90	10	Y-91	10
		Y-92	100	Y-93	100		
Zinc-65 (Zn-65)	10	Zn-69m	100	Zn-69	1,000		
Zirconium-93 (Zr-93)	10	Zr-95	10	Zr-97	10		
Any radioactive material not listed above other than alpha emitting radioactive material							0.1

APPENDIX C: RADIATION PRIMER

Radiation is the release of energy by the nucleus of an atom to obtain a more stable (but still radioactive) or a stable (non-radioactive) state, which is called a *decay*. Radioactive materials are detected and analyzed by measuring the radiation released by the material.

An atom consists of a nucleus in its center, containing most of the atomic mass, and electrons surrounding the nucleus, comprising most of the atomic volume. The nucleus is composed of a combination of two particles: protons and neutrons. Atoms with the same number of protons are of the same element. For example, all atoms with six protons are carbon atoms and all atoms with eight protons are oxygen atoms. The atomic number of an atom is the sum of the protons and neutrons in the nucleus.

Atoms of the same element (same number of protons) but with different number of neutrons are called *isotopes*. Isotopes of the same element have the same chemical properties but the nuclei may have different radioactive statuses. For example, beryllium (Be), which has four protons in its nucleus, has several isotopes: Be-7 (3 neutrons) has a half-life of 53.28 days and emits a gamma ray, Be-9 (5 neutrons) is stable, and Be-10 (6 neutrons) has a half-life of 1.5 million years and emits a beta particle. Both *radioisotope* and *radionuclide* are terms for an atom with a radioactive nucleus.

A metastable isotope is an atom whose nucleus has excess energy that will undergo radioactive decay by emitting the excess energy to become the isotope with a non-energized nucleus, which may still be radioactive. For example, Tc-99m will undergo radioactive decay and become the radioisotope Tc-99.

The excess energy released by the nucleus is either in the form of a light particle, also known as a photon (this is *non-ionizing* radiation), or an energized charged particle (this is *ionizing* radiation). Each type of radiation interacts with matter differently, and thus different types of detectors are required to detect and measure each type. The different kinds of detectors used to measure radiation are not discussed in this primer. The three main types of radiation are:

1. A *gamma ray*, which is a photon emitted by the nucleus (in contrast to an x-ray which is a photon emitted by changes in the position of the electrons inside an atom to a lower energy state).
2. A *beta particle*, which is an electron.
3. An *alpha particle*, which is a helium nucleus (two protons and two neutrons).

The lifespan of a specific radioisotope is measured by its half-life, which is the amount of time required for half of these radioisotopes to decay. For example: Cesium-137 (atomic number, 137; its nucleus has 55 protons and 82 neutrons) has a half-life of 30 years and, in 30 years, 2 grams of Cs-137 will have decayed to 1 gram.

A related concept is the *decay constant*, which is the probability that the radionuclide will decay within a specified time. The decay constant can be calculated using the half-life as shown in equation C.1. The decay constant of Cs-137 is 0.023 per year. A Cs-137 atom has a 2.3% probability of decaying in any year. The equation to determine how many radioactive isotopes remain after a period of time is shown in equation C.2

Eqn. C.1 $$\lambda = \frac{\ln(2)}{T_{1/2}}$$

λ is the radioactive decay constant.

ln(2) is the natural log of 2, which is equal to 0.69315

$T_{1/2}$ = half-life.

Eqn. C.2 $$N(t) = N_0 e^{-\lambda t}$$

$N(t)$ is the number of radioactive isotopes at time t.

N_0 is the initial number of radioactive isotopes (at $t = 0$).

t is time.

The activity of a radioactive material is the number of decays that happen per unit time and is measured in units of counts per minute, disintegrations per minute, becquerel (Bq, one disintegration per second), or curie (Ci, 3.7×10^{10} disintegrations per second). The becquerel is the International System (SI) unit. Activity is measured by radiation detectors and can be calculated using equation C.3:

Eqn. C.3 $A = \lambda N$

A is the activity.

N is the number of atoms.

Radiation detectors only detect some of the radiation that enters the detector. Careful calibration of the instrument allows one to determine what percentage of radiation is detected, which is called the efficiency of the detector. The efficiency depends on the radiation type and its energy. Counts per minute (cpm) are the number of radiation particles that are detected (counted) in a minute. Disintegrations per minute (dpm) are the actual number of radiation particles emitted; dpm is calculated in equation D.4.

Eqn. C.4 $$dpm = \frac{cpm}{efficiency}$$

Additionally, radiation is present in the background due to naturally occurring radioactive materials and cosmic rays. This background radiation is not included in the radiation measurements to determine if a waste is at or below the exemption limits, unless the rule for that specific exemption stipulates that background be included. Therefore, a background count is typically measured (in an area close to the waste but at a sufficient distance so that the radioactivity in the waste does not affect the measurement) using the same radiation detector before measuring the waste sample. The background activity value is then subtracted from the measured activity value of the waste to obtain the activity value for the waste.

APPENDIX IVI
LIQUID WASTE SOLIDIFICATION PLAN