Overview

Effective Date: July 1999 – July 2004

This specification outlines current procedural and regulatory guidance for evaluating Nonhazardous Recyclable Materials (NRMs) for potential inclusion in TxDOT Specification Items. It has been prepared in collaboration with the Texas Commission on Environmental Quality (TCEQ). In this document, Nonhazardous Recyclable Material (NRM) refers to a material that has been recovered or diverted from the nonhazardous waste stream for purposes of reuse or recycling in the manufacture of products that may otherwise be produced using raw or virgin materials.

TxDOT Recycling Initiative

The Texas Department of Transportation (TxDOT) is interested in using Nonhazardous Recyclable Materials (NRMs) in all phases of construction and maintenance. In so doing, TxDOT demonstrates environmental stewardship and supports the recycling initiatives of industries, municipalities, and the Texas Commission on Environmental Quality (TCEQ).

Goal

TxDOT’s goal is to increase the use of Nonhazardous Recyclable Materials (NRMs) in road construction where they yield economic or engineering advantages and environmental benefits. TxDOT is attempting to ensure that only responsible recycling activities are considered by limiting such material to NRMs that can be used in an environmentally acceptable and occupationally safe manner.

Incorporating Nonhazardous Recyclable Materials into TxDOT Projects

The current procedural and regulatory guidance for evaluating Nonhazardous Recyclable Materials (NRMs) are as follows:

Approval Criteria

TxDOT’s decision regarding the use of NRMs is dependent on two evaluations:

1. Engineering Properties
   - The properties of NRMs must meet the engineering specifications required of the materials that NRMs are proposed for replacing. The same testing requirements and test methods that are used for conventional materials are employed for NRMs, therefore, the engineering evaluation requirements are not included in this guidance.

2. Environmental Quality
The environmental characteristics of NRMs must be such that TxDOT considers any risk posed by using NRMs as acceptable. The evaluation of a material to assess its environmental quality is highlighted in this guidance. The environmental quality of NRMs will attest to the materials environmental suitability for use in TxDOT projects and will in no way warranty a material’s engineering suitability for meeting TxDOT specifications.

TxDOT requires that contractors who want to use NRMs in TxDOT projects submit to the Department a certification, signed and sealed by a Texas Licensed Professional Engineer, certifying that the material has undergone an evaluation consistent with the requirements of this guidance and that the requisite documentation is true and complete. For details regarding the certification requirements, reference Step 7-Y.

Note: Generators shall not submit samples directly to TxDOT, but rather work with local contractors, material suppliers, Texas Engineering universities or commercial laboratories, to determine material suitability for recycling in TxDOT projects.

Flowchart #1 illustrates the process of incorporating NRMs into TxDOT construction and maintenance projects if they are similar to materials normally used in TxDOT specifications.

Flowchart #2 illustrates the steps required if the NRMs are different than materials normally used in TxDOT specifications.

Steps for Furnishing NRMs

The steps that are required for furnishing NRMs are as follows:

STEP 1: Identifying Large Volume Source of Nonhazardous Recyclable Materials

As a rule of thumb, a minimum quantity of 250 tons of any one material is necessary to be considered for inclusion. Individual determinations about what constitutes an acceptable volume can be negotiated between the generator and the contractor or material supplier. (See: Step 3-Y.) The costs associated with conducting tests and documenting a material’s
suitability in accordance with these guidelines will be a factor in determining a feasible minimum volume.

Recycled materials that TxDOT will use shall not endanger human health, the environment, or the waters of the state. (Refer to 30 TAC [Texas Administrative Code] Subchapter A, Section 335.4 and Section 26.121 of the Texas Water Code. For reference, the primary, relevant Texas environmental statutes can be found on the Internet at: http://lamb.sos.state.tx.us/tac.

Hazardous wastes are prohibited from inclusion in TxDOT projects and will be rejected as outlined in "Item 8, Prosecution and Progress," Section 8.10. Hazardous Materials. (The hazardous waste definition can be found in 30 TAC 335 Subchapter A, Section 335.1 and how to make a hazardous waste determination can be found in 30 TAC 335, Subchapter R, Section 335.504.)

**STEP 2: Determining Whether Material is Normally Found in TxDOT Specifications**

The types of materials most commonly used in construction and maintenance projects include: coarse and fine aggregates, cementitious materials (i.e., cement and fly ash), and asphaltic compounds.

TxDOT specifications that offer the most potential for incorporating NRMs include:

- "Item 132, Embankment"
- "Item 247, Flexible Base"
- "Item 276, Cement Stabilized Base"
- "Item 300, Asphalts, Oils, and Emulsions"
- "Item 302, Aggregates for Surface Treatments"
- "Item 340, Hot Mix Asphaltic Concrete"
- "Item 345, Asphalt Stabilized Base-Plant Mix"
- "Item 400, Excavation and Backfill for Structures"
- "Item 421, Portland Cement Concrete"
- "Item 423, Retaining Wall"
- "Item 432, RipRap."

Nonhazardous Recyclable Materials (NRMs) may not necessarily be called out by name in the TxDOT specifications. Therefore, the engineering properties and function of the particular NRMs must be comparable to the materials they are replacing. For example, coal-fired boiler slag can be ground to the consistency of sand and used as a sandblasting material or depending on the chemical characteristics of this material; it may also be substituted for traditional sand in roadway construction applications.
NOTE: NRMs routinely used in TxDOT construction and maintenance projects including crushed concrete, reclaimed asphalt pavement (RAP), fly and bottom ashes from electrical utility plants, ground granulated blast furnace slag, tire rubber, plastics, ceramics, and glass, are exempt from TxDOT’s certification requirements (reference Step 7-Y), as long as the NRMs have not come in contact with hazardous materials. Materials that are TxDOT property are also exempt from certification requirements.

If the NRMs are of the type found within TxDOT specification items, follow Steps 3-Y through 7-Y.

If the NRMs are not of the type found within TxDOT specification items, follow Steps 3-N through 9-N.

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For NRMs of the type found within TxDOT specification items:

**STEP 3-Y: Generator Contacts a Local Material Supplier or Contractor**

To aide in locating contractors and material suppliers who have expressed an ability or willingness to process NRMs in the geographic area, contact TxDOT’s Recycling and Recycled Products Program staff (512) 416-2086.

Since the generator and contractor/material supplier will be entering into a contractual agreement, it is important that they verify the regulatory compliance, product history, quality control, and financial stability of each other.

**STEP 4-Y: Meeting TCEQ’s Eight Non-Waste Criteria**

TxDOT’s goal is to use those NRMs with an environmental quality which do not necessitate long term management (i.e., deed certification, tracking, monitoring) or special handling after the project life. TCEQ has developed eight criteria to help distinguish between regulated industrial wastes and materials that are legitimately being reused or recycled. In order to document that responsible recycling practices are followed, TxDOT requires that the NRMs used in our projects satisfy all the criteria specified in the TCEQ’s Eight Non-Waste Criteria.

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<th>TCEQ’s Eight Non-Waste Criteria</th>
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<td>1. Each constituent found in the NRM must also be a constituent normally found in the raw material it is replacing. If not, it does not present an increased risk to human health and/or the environment and/or waters of the state. <em>(For TxDOT purposes, recycled materials need to be compared to the Texas Risk Reduction Standard Number 2 (RRS2), found in 30 TAC 335, Subchapter S. Persons conducting the evaluation/certification should also refer to the TCEQ’s July 23, 1998 interoffice memo – Implementation of the Existing Risk Reduction Rule (available on TCEQ’s Office of Waste Management Web Page). This memo updated and expanded the Texas Risk Reduction Standards Number 2 tables. In addition, the TCEQ is proposing a new Texas Risk Reduction Program which may further refine/revise these standards. If the NRMs exceed RRS2, then the)</em></td>
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results are compared to materials they are replacing as used in the district where the subject project is located. Details regarding certification requirements are provided in STEP 7-Y. These RRS2 tests must be conducted by an independent commercial lab. TxDOT reserves the right to verify test results and reject data from labs that do not follow industry standards).

2. A legitimate market exists for the NRMs and its products.

3. The NRM is managed and protected from loss as would be raw materials and/or ingredients and/or products.

4. The quality of the final product is not degraded by substitution of raw material/product with the NRM.

5. The use of the NRM is an ordinary use and met and/or exceed the specifications of the product it is replacing without treatment or reclamation, or, the NRM is a reasonable ingredient in a production process and meet and/or exceed raw material specifications without treatment or reclamation.

6. The NRM is not burned for energy recovery, used to produce a fuel or contained in a fuel.

7. The NRM can be used as a product itself or to produce products as it is generated without treatment or reclamation.

8. During the calendar year (beginning January 1), 75% or more of the NRM (by weight or volume) accumulated at the start of the year is recycled.

The above “Eight Non-waste Criteria” are reprinted from TCEQ Publication RG-240 Helpful Recycling Facts for Materials That Could Be Considered Industrial and/or Hazardous Wastes. For questions regarding these criteria, contact TCEQ’s Waste Evaluation Section at (512) 239-6832.

**STEP 5-Y: Compliance with Recycling Regulations**

Compliance with waste management and recycling regulations is determined by the status of the material generator. The options for materials currently suitable for recycling into TxDOT projects are either: Municipal, Compost, Petroleum-Substance Contaminated, or Industrial. Examples of industrial generators are power generation facilities, manufacturing facilities such as metal casters, laboratories serving an industry, and parts manufacturers. Non-industrial or municipal generators include schools, hospitals, churches, dry-cleaners, most service stations, and laboratories serving the general public. (Ref: TCEQ Publication Fact 0417.96 for more information regarding generator status.)

TxDOT does not make environmental regulatory determinations for contractors or material suppliers. It is the sole responsibility of generators, contractors, and material suppliers to ensure they are in compliance with applicable TxDOT specifications, and relevant local, state, and federal regulations, regulatory guidance, laws, and statutes. TxDOT reserves the right to verify compliance with engineering and environmental specifications and may perform additional verification testing.
Municipal Generators: Regulations for municipal generators are located in 30 TAC 330. The recycling definition for municipal generators is expressed in 30 TAC 330.2, "Recycling—A process by which materials that have served their intended use or are scrapped, discarded, used, surplus, or obsolete are collected, separated, or processed and returned to use in the form of raw materials in the production of new products. Except for mixed municipal solid waste composting, that is, composting of the typical mixed solid waste stream generated by residential, commercial, and/or institutional sources, recycling includes the composting process if the compost material is put to beneficial use."

Compost Generators: Regulations relevant to compost are located in 30 TAC 312 and 332. Class A Biosolid compost is allowed on TxDOT projects.

Petroleum-Substance Contaminated Generators: Regulations relevant to petroleum-substance contaminated waste generators regulated by the TCEQ are located in 30 TAC 334. Environmental guidelines for reuse of certain petroleum-substance wastes in cold and hot mix paving applications are provided in this chapter. (Petroleum-substance contaminated wastes regulated by the Railroad Commission are not currently allowed on TxDOT projects.)

Industrial Generators: Regulations relevant to industrial generators are located in 30 TAC 335. All industrial generators who want to provide NRMs for TxDOT projects shall notify TCEQ of their intent to recycle, using TCEQ Form 0525 "Generator Notification Form For Recycling Hazardous or Industrial Waste" available on the TCEQ web site, http://www.tceq.state.tx.us/. New recycling activities require such notification a minimum of 90 days prior to engaging in such activities. Recycling operations may commence 90 days after the initial notification of the intent to recycle, or upon receipt of confirmation that the TCEQ executive director has reviewed the information found in this section. (For facilities receiving and recycling wastes, TCEQ Form 0524 "Notification Form for Receiving and Recycling Hazardous or Industrial Waste" is required.)

**STEP 6 -Y: Transferring Material to Supplier or Contractor**

Once the eight non-waste criteria and other applicable regulatory requirements have been satisfied, final arrangements for transferring materials can be made. Specific economic and logistic details are negotiated directly between the generator and material supplier or contractor. Potential cost savings include landfill tipping fees, processing and transportation costs, and other expenses normally associated with material disposal.

**STEP 7-Y: Certifying Compliance with Guidelines and Required Laws Before Start of Construction**

Contractors desiring to use NRMs on TxDOT projects shall furnish a written certification signed and sealed by a Texas Licensed Professional Engineer, certifying that the material has undergone an evaluation consistent with and met the TxDOT requirements, and that the requisite documentation is true and complete.
The type and amount of documentation required to accompany the certification form depends upon whether the NRMs are below or above Risk Reduction Standard 2 (RRS2).

### NRMs Below RRS2

Option 1: Project certification

Form CST/M&P-NRM-1, “Nonhazardous Recycled Materials (NRMs) Certification For An Individual Project,” (NRM-1) shall be submitted to the Area Engineer. This form shall include information about the specific NRMs used, the volume used, the product it’s used in, and the location of the project where it will be used. The project certification form must be signed and sealed by a Texas Licensed Professional Engineer and turned in prior to the start of construction.

Adequate and detailed documentation for the NRMs used in TxDOT projects shall be kept in the contractor’s files and be available for TxDOT review. This documentation shall include:

- Written answers to TCEQ’s 8 Non-Waste Criteria, and
- A lab report documenting that the NRMs’ values are below RRS2.

Option 2: Annual certification

Form CST/M&P-NRM-2, "Nonhazardous Recycled Materials (NRMs) Certification For NRMs Below Risk Reduction Standard 2 (RRS2)-ANNUAL," (NRM-2) is intended for contractors that routinely supply TxDOT products incorporating NRMs. In submitting this form, the contractor certifies—through the signature and seal of a Texas Licensed Professional Engineer—that all NRMs used in their operations are evaluated according to the requirements stipulated by TxDOT.

Adequate and detailed documentation for each NRM used during the year shall be kept in the contractor’s files and be available for TxDOT review. This documentation shall include:

- Written answers to TCEQ’s 8 Non-Waste Criteria, and
- A lab report documenting that the NRMs’ values are below RRS2.

### NRMs Above RRS2

"Above RRS2" includes any constituents (chemicals of concern) that exceeded the tabulated values for Risk Reduction Standard No. 2. Process knowledge and analytical sampling should be used. Material Safety Data Sheets (MSDS), when available, can provide information on chemicals used in a process. This information may also be of value in determining reaction and daughter products, which might be contained in the waste. In cases where there are one or more unknowns with regard to the generating process and/or raw or reaction products, then these unknowns pass to the waste product. Other relevant issues associated with NRMs that the generator should address include whether the NRMs are generated from different processes and whether or not other wastes have been mixed with the NRMs. Information about such other wastes should be addressed as well.
Form CST/M&P-NRM-1, "Nonhazardous Recycled Materials (NRMs) Certification For An Individual Project," \(\text{NRM-1}\) shall be submitted to the Area Engineer. The type and amount of documentation required increases for NRMs above RRS2. This certification form must be signed and sealed by a Texas Licensed Professional Engineer. (When NRMs exceed RRS2 they should be compared to the environmental parameters of the materials they are replacing as used in the district where the subject project is located.)

The required documentation includes:

- Written answers to TCEQ’s 8 Non-waste Criteria
- Lab report highlighting values above RRS2
- Stockpile sampling plan (including total stockpile volume, number of samples taken, and sampling method)
- Required precautions to protect worker health/safety
- Explanation of why NRMs are safe in the proposed application.

The "stockpile sampling plan" should be prepared to account for potential variability and inconsistency in the material. The number of samples and frequencies of testing are dependent on the variability of the generating processes and consistency of the NRMs. The sampling and analysis plan must be defensible and in accordance with Chapter 9 of EPA’s SW-846 or other approved methodologies.

The "explanation of why NRMs are safe in the proposed application" shall consider the proposed application of the material, as well as, site-specific factors (i.e. specifying a maximum usage rate within a mix design).

The TxDOT Area Engineer receiving Form CST/M&P-NRM-1 \(\text{NRM-1}\) or Form CST/M&P-NRM-2 \(\text{NRM-2}\) should forward a copy to the Construction Division, Materials & Pavements Section (CST/M&P). CST/M&P will forward copies to the Environmental Division and the Recycling and Recycled Products Program.

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For NRMs not of the type found within TxDOT specification items:

If the NRM is of the type not normally found within TxDOT specification items, or that determination cannot be made with certainty, a commercial lab or Texas engineering university can help determine the NRMs’ potential for use in TxDOT projects. This evaluation process, including a pilot project stage, will generally take three years or more to complete.
STEP 3-N: Generators Contact a Commercial Laboratory or Texas Engineering University Laboratory

Generators of NRMs of the type not normally found within TxDOT specification items, or that determination cannot be made with certainty shall contact Commercial laboratories or Texas Engineering Universities with a Civil Engineering Program and laboratory facility, who are familiar with TxDOT specifications. These laboratories can run preliminary tests to begin accessing the potential of the NRMs for use in TxDOT projects. TxDOT reserves the right to reject data from laboratories that do not follow industry standards.

STEP 4-N: Determining if the NRMs have Engineering Potential

The commercial or university laboratory will conduct tests to determine if the NRMs have the necessary engineering properties for use in TxDOT projects. A time and cost estimate should be obtained prior to initiating any service. The laboratory shall determine which TxDOT specification item offers the most potential for the NRMs and which tests will be required.

STEP 5-N: Meeting the TCEQ 8 Non-Waste Criteria, Complying with Regulations, and Certifying

If the laboratory determines that the NRMs have engineering potential, the next step is for the generator to verify that the NRMs meet the necessary environmental standards. It is important to note that TxDOT does not make environmental regulatory determinations for contractors or material suppliers. It is the sole responsibility of generators, contractors, and material suppliers to ensure they are in compliance with applicable TxDOT specifications, and relevant local, state, and federal regulations, regulatory guidance, laws, and statutes (Ref.: Steps 4-Y, 5-Y, and 7-Y above).
STEP 6-N: Notifying the TxDOT Recycling and Recycled Products Program

After demonstrating that the NRMs can meet basic engineering and environmental criteria, notify TxDOT’s Recycling and Recycled Products Program at (512) 416-2086 for help in identifying department contacts regarding a potential pilot project location.

STEP 7-N: Developing a Draft Specification

After a potential pilot project location has been identified, the commercial or university laboratory that conducted the initial material evaluations shall draft a specification (in the TxDOT format) for using the NRMs.

STEP 8-N: TxDOT Installing a Pilot Project

If approved by TxDOT, this specification shall be used on a “one-time” pilot project and a test section may be installed. TxDOT will be responsible for overseeing the installation of the test section and collecting performance data for one year, or a time as determined by TxDOT. The Materials & Pavements Section of the Construction Division (CST/M&P) will assume primary responsibility for determining the type and frequency of data collection and the Research Section (CSTR) will assume primary responsibility for data collection and performance monitoring.

STEP 9-N: Finalizing a Statewide Specification

If the material performance warrants, TxDOT will finalize a statewide specification that will allow for the use of the NRMs on any TxDOT project. Determinations regarding actual NRMs usage will be made in each district.