New Jersey Department of Environmental Protection

Site Remediation Program

Historic Fill Material and Diffuse Anthropogenic Pollutants Technical Guidance

October 20, 2011
Version 1.0

TABLE OF CONTENTS

APPENDIX

1. INTENDED USE OF GUIDANCE DOCUMENT

This technical guidance is designed to help the person responsible for conducting remediation to comply with the New Jersey Department of Environmental Protection (the Department) requirements established by the Technical Requirements for Site Remediation (Technical Rules), N.J.A.C. 7:26E-3.12(b) and 4.6(b). This document also provides the Department's guidance on diffuse anthropogenic pollution (DAP) even though the Department does not currently have rule requirements related to DAP.

This technical guidance will be used by many different people involved in the remediation of a contaminated site; such as Licensed Site Remediation Professionals (LSRPs), non-LSRP environmental consultants and other environmental professionals. Therefore, the generic term "investigator" will be used to refer to any person that uses this guidance to remediate a contaminated site on behalf of a remediating party, including the remediating party itself.

The procedures for a person to vary from the technical requirements in regulation are outlined in the Technical Rules at N.J.A.C. 7:26E-1.7. Deviation from technical guidance must be documented and adequately supported with data or other information. In applying technical guidance, the Department recognizes that professional judgment may result in a range of interpretations on the application of the guidance to site conditions. Some of the recommendations provided herein differ from the Technical Rule requirements. The investigator may follow the recommendations herein by noting in the remedial phase report and on the accompanying form that they have differed from the rule requirements, but have followed the Department's technical guidance recommendations.

The Department prepared this guidance document with stakeholder input. The following people were on the committee who prepared this document:

Carrie McGowan	ISP Management Co. Inc.
Michael J. Morris	LSRP, Partner Eng. and Science Inc.
Kathleen F. Stetser	LSRP, Roux Associates Inc.

Representatives from the Department's Site Remediation Program include the following:
Kevin Schick
Steve Byrnes
Tessie Fields
Maryanne Kuserk

2. PURPOSE

This technical guidance document details methods that investigators may use to confirm the presence of historic fill material and provides procedures to delineate and remediate the associated soil and ground water contamination. The investigator may either remediate historic fill material under the assumption that it is contaminated or they may establish, via sampling, that the historic fill material is not contaminated above the Department's residential soil remediation standards, N.J.A.C. 7:26D-4. The investigator must investigate all areas of

concern (AOCs) located within historic fill material independently pursuant to N.J.A.C. 7:26E-3.4, 3.6 and 3.9.

This document also provides technical guidance regarding the investigation, evaluation and remediation of DAP.

3. DOCUMENT OVERVIEW

3.1. Historic Fill Material

Historic fill material is material, deposited to raise the topographic elevation of the site, which was contaminated prior to emplacement and was used extensively throughout the State, particularly along industrialized water front areas in North-Eastern and South-Western New Jersey. The Department considers historic fill material an AOC pursuant to the Technical Rules.

The Legislature, through passage of the Brownfield Act N.J.S.A. 58:10B-35h(1), directed the Department to identify procedures to demonstrate the presence of historic fill material and to establish remediation requirements designed to prevent exposure to these contaminants that allow for the continued use of the property, are less costly than removal or treatment, and are protective of human health and the environment.

In 2003, in response to this legislative mandate, the Department adopted procedures for historic fill material in the Technical Rules. These procedures are still in effect at the time that this technical guidance was prepared and provide the remediating party with straightforward investigation and remediation requirements. Investigation requirements allow the remediating party to either sample the fill for typical historic fill material contaminants (metals and polynuclear aromatic hydrocarbons (PAHs)) or to assume that the fill is contaminated. Remediation requirements allow for the use of engineering and institutional controls to mitigate exposure to historic fill material contaminants. Remediating parties that choose to assume that the historic fill material is contaminated are allowed to use a list of contaminants with maximum and average concentrations provided in the Technical Rules (Table 4-2) on the Deed Notice for the site. Requirements are also established in the Technical Rules for ground water contamination associated with historic fill material at N.J.A.C. 7:26E-3.12(b)4-6.

Since that time, the Department and the regulated community have gained more experience with contamination associated with historic fill material and the recommendations provided here represent advances based on that knowledge.

By May 2012, the Department anticipates amendments to the Technical Rules that correspond to the recommendations provided here. If a remediating party wants to use these recommendations prior to May 2012, they may use this technical guidance to deviate from the Technical Rule requirements, and provide documentation of the variance in the applicable remedial phase report that is submitted to the Department.

3.2. Diffuse Anthropogenic Pollution (DAP)

The term DAP describes broadly distributed contaminants present in surface soil, often arising from multiple sources which have been historically generated by human activities. DAP generally arises via atmospheric deposition, but may also contain contributions from random, non-attributable, non-point sources. DAP is usually identified when a remediating party has conducted sampling of AOCs at a site undergoing remediation and is in the process of interpreting the analytical results. DAP generally contains contaminants similar to those found in historic fill material (metals and PAHs) and like historic fill material, this type of contamination cannot be attributed to any discharge at a site. Unlike historic fill material, DAP is usually limited to the upper six inches of soil or less.

While the Department does not consider DAP to be an AOC pursuant to the Technical Rules at N.J.A.C. 7:26E-1.8, the contaminants present in DAP still may represent a health risk if left uncontrolled.

This technical guidance represents the Department's position on DAP based upon decades of empirical evidence overseeing the remediation of contaminated sites and the Department's report entitled *A Summary of Selected Constituents and Contaminants at Background Locations in New Jersey, September,* 1993 (http://www.state.nj.us/dep/dsr/soilrep.pdf). Straightforward recommendations are provided to allow remediating parties to identify and mitigate exceedances of the Department's remediation standards in as simple a way as is feasible.

4. DEFINITIONS

Historic fill material means non-indigenous material, deposited to raise the topographic elevation of the site, which was contaminated prior to emplacement, and is in no way connected with the operations at the location of emplacement and which includes, without limitation, construction debris, dredge spoils, incinerator residue, demolition debris, fly ash, or non-hazardous solid waste. Historic fill material does not include any material which is substantially chromate chemical production waste or any other chemical production waste or waste from processing of metal or mineral ores, residues, slag or tailings. In addition, historic fill material does not include a municipal solid waste landfill site. (N.J.A.C. 7:26E-1.8)

Diffuse anthropogenic pollution (DAP) means broadly distributed contaminants, often arising from multiple sources, which have been historically generated by human activities. DAP generally arises from atmospheric deposition, but may also contain contributions from random, non-point sources that are not attributed to any discharge at the site. DAP contaminants typically include polynuclear aromatic hydrocarbons (PAHs) and in some cases metals, which may be present above health-based soil remediation standards.

5. PROCEDURES FOR HISTORIC FILL MATERIAL

5.1. Preliminary Assessment

The investigator must evaluate the presence of historic fill material during the preliminary assessment (PA) conducted for the site if a PA is required. If a PA is not required at the site basic historical site information is still needed, but would be conducted during the Site Investigation phase. This evaluation can be conducted by review of available historical site records, maps and aerial photographs. The evaluation should include review of the New Jersey Geological Survey (NJGS) historical fill maps which are available for much of New Jersey, available at: http://www.nj.gov/dep/njgs/geodata/dgs04-7.htm.

It should be noted the Site Remediation Reform Act (SRRA) at N.J.S.A. 58:10C-16k exempts an LSRP from the requirement to contact the Department Hotline when historic fill material is encountered. While SRRA exempts the finding of historic fill material as a reportable discharge, the person responsible for conducting the remediation must still investigate and remediate the historic fill material in accordance with the Technical Rules, which is initiated by the submission of an LSRP Retention or Dismissal Form to the Department.

5.2. Site Investigation

It is important that other potential AOCs are identified and investigated independently of the historic fill material. Information obtained during the preliminary assessment, such as a diligent inquiry of the origin of the fill material and site history, or the information from the site investigation such as elevated PID/FID readings (five times background as per N.J.A.C. 7:26E-4.6(b)3iii(1)) or the detection of any free and/or residual product are good indications that additional, non-historic fill material AOCs are present. Where field instrumentation (PID/FID) detects volatile organics above background, the investigator should also analyze samples for the EPA Target Compound List Volatile Organic compounds pursuant to N.J.A.C. 7:26E-2.1 (Table 2-1 and footnote 1).

If historic fill material is not part of a regional historic fill material area and is limited to an area within the site, it should be investigated as an AOC following the remedial investigation requirements in section 5.3.1 of this technical guidance. The reason for this is that in the Department's experience fill that is not regional, but is contained within the property boundaries of the site often has contamination that is not consistent with regional historic fill material. Site contained fill often contains process wastes that were emplaced by the property owners for the purposes of disposal, not for the purpose of raising the topographic level. The Department believes that additional investigation is warranted in these situations.

5.2.1. Soil/Fill Material

The investigator must conduct a subsurface investigation to evaluate the nature and extent of historic fill material as follows:

- Install test pits, trenches or borings within the suspected extent of the historic fill material to a depth of two feet below the fill material to determine the vertical and general horizontal extent of the fill.

- Screen all boring/test pits/trenches utilizing field instruments (PID/FID) and log the results to document subsurface conditions including soil types, field instrument readings and a detailed description of fill materials including the vertical extent in the profile and characteristics (i.e., ash, brick, debris). When extending the test pit below the fill, care must be exercised to avoid breaching any low permeability soils underlying the fill.

- Document the depth to ground water, if encountered, and the presence of odor, soil discoloration, and free and/or residual product if found.

- Photo-documentation for sampling locations and subsurface stratigraphy is encouraged.

Once the presence of historic fill material is confirmed the investigator may either:

- Assume that the fill material is contaminated above the residential soil remediation standards and conduct a remedial investigation pursuant to N.J.A.C. 7:26E-4.6(b); **or**

- Collect samples to document that contaminant concentrations in the historic fill material do not exceed the Department's residential soil remediation standards. The sampling recommended here reflects a reduction from the current Technical Rule sampling requirements. Conduct sampling as follows:

    - Select a minimum of two sample locations per acre of historic fill material (regardless of site size);

    - If the material is homogeneous, collect one discrete sample, per sample location, from a six inch interval in the historic fill material; or

    - If the fill has defined strata (or layers of different fill material), collect a minimum of one discrete sample from a six inch interval from each stratum within the historic fill material present at the site (not recommending sampling each strata from each subsurface sample);

    - Conduct sampling in accordance with N.J.A.C. 7:26E-2.1;

    - Analyze soil samples for the EPA Target Compound List (TCL) Polynuclear Aromatic Hydrocarbons (PAHs) and EPA Target Analyte List (TAL metals). Twenty-five percent of all samples collected should be analyzed for complete TCL/TAL analysis and Extractable Petroleum Hydrocarbons (EPH) with a minimum of one sample, per stratum/fill type, per site; and

- Analyze EPH following the Department's "Protocol for Addressing Extractable Petroleum Hydrocarbons," available at: http://www.nj.gov/dep/srp/guidance/srra/eph_protocol.pdf and evaluate the results using EPH Category 2.

Evaluate the analytical results as follows:

- If analytical results confirm that the historic fill material does not exceed the Department's residential soil remediation standards, no further investigation of the fill is required (note that an evaluation of impact to ground water soil remediation standards would not be required and the ground water requirements in section 5.2.2 must be followed); or

- If analytical results confirm the presence of contaminants exceeding residential soil remediation standards, then the investigator must conduct a remedial investigation as outlined in section 5.3 of this guidance.

Investigate other potential AOCs independently of the historic fill material based on information obtained during the preliminary assessment or the site investigation.

5.2.2. Ground Water

If contaminated historic fill material is not within 2-feet of the seasonal high water table then no further ground water investigation is required. If historic fill material is confirmed and the fill material is located within 2-feet of the seasonal high water table, the investigator may either:

- Assume that the ground water associated with historic fill material is contaminated above the applicable ground water remediation standards pursuant to N.J.A.C. 7:26D-2 and conduct a remedial investigation pursuant to N.J.A.C. 7:26E-4.4); **or**

- Collect ground water samples to evaluate that the ground water associated with historic fill material is **not** contaminated above the ground water remediation standards as follows:

    - Select a minimum of one ground water sample location within the fill area;

    - If it is not possible to take a ground water sample in the fill, collect the ground water sample in the expected downgradient flow direction and within 10 feet of the historic fill material area. Predict ground water flow direction based on data from existing ground water monitoring wells, topographic relief, the location of surface water bodies, structural controls in the bedrock or soils, location of pumping wells and subsurface conduits at or below the water table.

    - Collect one sample pursuant to N.J.A.C. 7:26E-3.7 using any generally acceptable sampling method specified in the NJDEP Field Sampling Procedures Manual. The Department recommends the use of the low-flow

sampling method to minimize sediment in the sample in order to prevent a false positive result.

- Conduct sampling in accordance with N.J.A.C. 7:26E-2.1;

- Analyze ground water sample(s) for the USEPA Target Compound List and the EPA Target Analyte List (TCL/TAL);

Evaluate the analytical results as follows:

- If analytical results confirm that the ground water associated with the historic fill material does not exceed the Department's ground water remediation standards, no further investigation of the ground water is required; or

- If analytical results confirm the presence of contaminants exceeding the Department's ground water remediation standards then the investigator must establish a classification exception area (CEA) as follows:

    - When historic fill material extends beyond the property boundaries, the person responsible for conducting the remediation is required to request that the Department establish a ground water CEA pursuant to N.J.A.C. 7:26E-8. The boundaries of the CEA will be based on the footprint of the property with an indeterminate duration.

    - When historic fill material is contained within the property boundaries, the person responsible for conducting the remediation shall conduct a remedial investigation of the ground water pursuant to the Tech Rules N.J.A.C. 7:26E-4.4.

5.3. Remedial Investigation

The remedial investigation procedures provided here are largely the same as the current Technical Rule requirements, but additional direction and recommendations are provided.

5.3.1. Soil/Historic Fill Material

The investigator must confirm the vertical and horizontal extent of historic fill material as follows:

- Install at least four borings, test pits or trenches per acre of historic fill material with a minimum of four locations per site, regardless of size. A reduced number of borings, test pits or trenches based upon professional discretion may be used at large sites based on the investigator's professional judgment and documented in the remedial investigation report.

- Locate the borings or test pits to establish the vertical extent of the historic fill material. Advance the borings or test pits through the historic fill material to native soil, meadow mat, or bedrock whether or not ground water is encountered.

- It is not necessary to delineate historic fill material beyond the property boundary.

- If the investigator knows or suspects that the historic fill material extends to or beyond the site boundaries he or she may submit aerial photos or other applicable documentation, such as information obtained from the Department Geographic Information Systems (NJ-GeoWeb/i-Map NJ DEP) or New Jersey Geological Survey historic fill maps. Such mapping, if paired with other lines of evidence, may be used in lieu of perimeter borings/test pits/trenches to verify that historic fill material is site-wide

- If historic fill material is not part of a regional historic fill material area and is limited to an area within the site, it should be investigated as an area of concern (AOC) and the extent of the historic fill material must be documented. Install a minimum of four borings/test pits/trenches installed in non-fill areas evenly spaced around the historic fill material area. The Department recommends more extensive additional subsurface investigations to more accurately delineate large areas of historic fill material.

- The Technical Rules (N.J.A.C.7:26E-4.6(b)3) allows the investigator to characterize contamination in historic fill material by using the contaminants and values provided in Table 4-2 or by collecting and analyzing samples for each type of historic fill material present, to determine the site-specific contaminant levels.

  The Department recommends suspending the use of Table 4-2 for the contaminant characterization in the Deed Notice. Instead the Department recommends that the investigator provide a general description of the fill material including information such as the depth below ground surface, thickness and characteristics of the fill material (i.e., ash, brick, debris) as identified during the subsurface investigations.

5.3.2. Ground Water

If information needed for a ground water classification was not obtained during the site investigation it should be gathered during the remedial investigation. If contaminated historic fill material is not within 2-feet of the seasonal high water table the no further ground water investigation is required. If the contaminated historic fill material is within 2-feet of the seasonal high water table collect 1 sample as outlined in section 5.2.2. above, and establish a CEA Pursuant to N.J.A.C. 7:26E-8.3 and the Department's CEA Guidance.

5.4. Remedial Action

If historic fill material is contaminated above applicable soil remediation standards, either by assumption or sampling, engineering and institutional controls are required as part of the remedial action. Contaminant levels identified as being between residential and non-

residential for a non-residential use site would only require a limited restricted use remedy such as a Deed Notice. The person responsible for conducting the remediation must establish a Deed Notice pursuant to N.J.A.C. 7:26E- 8.2 and Appendix E to ensure the continued protectiveness of the cap and must obtain a soil remediation permit. The Deed Notice should include maps and summary information presenting the historic fill material related data and contaminant distribution found at the site.

Based on the current or intended use of the site, a cap may be required to prevent exposure to the contaminants in the historic fill material. A cap must consist of an engineered surface such as, asphalt, concrete or clean soil fill material and be maintained pursuant to N.J.A.C. 7:26E-8.7.

The investigator may demonstrate that historic fill material is already capped, making additional engineering controls unnecessary. Soil sampling conducted consistent with section 5.2.1 of this guidance must be conducted to confirm that a soil cap, if present, does not exceed the Department's residential soil remediation standards, unless the investigator can demonstrate that the cap consists of certified clean fill material pursuant to N.J.A.C. 7:26E-6.4(b)2iv.

DAP is often identified during the investigation of historic fill material. See recommendations for DAP below in section 6.

The Department recommends suspending the use of Table 4-2 at N.J.A.C. 7:26E-4 for the contaminant characterization in the Deed Notice. Instead the Department recommends that the investigator provide a general description of the historic fill material including information such as the depth below ground surface, thickness and characteristics of the historic fill material (i.e., ash, brick, debris) and the following statement:

> "Historic fill material is likely to contain contaminants including PAHs and metals at levels in excess of the Department's applicable soil remediation standards."

6. DIFFUSE ANTHROPOGENIC POLLUTION (DAP)

6.1. Determining the Presence of DAP

DAP is usually identified when a remediating party has conducted sampling at AOCs at a site undergoing remediation and is in the process of interpreting the analytical results. DAP generally contains contaminants similar to those found in historic fill material (metals and PAHs) and like historic fill material, this type of contamination cannot be attributed to any discharge at a site. Unlike historic fill material, DAP is usually limited to the upper six inches of soil or less.

- Use multiple lines of evidence. Consider data and information from:
    - The AOCs under investigation at the site,

- surrounding sites, or
- regional sources.

- Evaluate data from the site as follows:

  - Contaminants in surface soil that are above the applicable soil remediation standards; and
  - Results show no concentration gradients that would be expected if the contamination were associated with a discharge.

- The Department does not require the off-site delineation of DAP related contaminants.

- The potential impacts of DAP on ground water quality, if any, should be based on a site-specific ground water investigation and the use of professional judgment.

6.2. Remedial Action for DAP

Based on the current or intended use of the site, a cap may be required to prevent exposure to contaminants in the DAP. A cap must consist of an engineered surface such as, asphalt, concrete, or clean soil fill material.

The person responsible for conducting the remediation must establish a Deed Notice to ensure the continued protectiveness of the cap and must obtain a soil remediation permit. The Deed Notice should include maps and summary information presenting DAP-related data and contaminant distribution found at the site.

Appendix A

Acronyms

ACRONYMS

AOC	area of concern
CEA	classified exception area
DAP	diffuse anthropogenic pollution
EPA	Environmental Protection Agency
EPH	extractable petroleum hydrocarbons
LSRP	Licensed Site Remediation Professional
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NJGS	New Jersey Geological Survey
N.J.S.A.	New Jersey Statutes Annotated
PAH	polynuclear aromatic hydrocarbons
PID/FID	Photoionization Detector/Flame ionization Detector
SRRA	Site Remediation Reform Act
TAL	Target Analyte List
TCL	Target Compound List
U.S. EPA	United States Environmental Protection Agency