New Jersey
Department of Environmental Protection

Site Remediation and
Waste Management Program

Fill Material Guidance for SRP Sites

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Version 4.0

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1. INTENDED USE OF GUIDANCE

This guidance is designed to help the person responsible for conducting the remediation to comply with the New Jersey Department of Environmental Protection (Department) requirements established by the Technical Requirements for Site Remediation (Technical Rules), N.J.A.C. 7:26E. This guidance will be used by many different partners or persons involved in the remediation of a contaminated site, such as Licensed Site Remediation Professionals (LSRP), 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. Variances from a technical requirement or departure from 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. Departure from this guidance must be justified with a detailed explanation. The Technical Rules revised in August 2018 identify criteria where written pre-approval is required regarding the use of alternative fill from an off-site source. Deviation from N.J.A.C. 7:26E-5.2(b) requires pre-approval, as per N.J.A.C. 7:26E-5.2(c) and is further described in Section 4.9 of this document.

This guidance supersedes previous Department guidance issued on this topic inclusive of the *Fill Material Guidance for SRP Sites* (April 2015). Technical guidance may be used immediately upon issuance. However, the Department recognizes the challenge of using newly issued technical guidance when a remediation affected by the guidance may have already been conducted or is currently in progress. To provide for the reasonable implementation of new technical guidance, the Department will allow a 6-month "phase-in" period between the date the technical guidance is issued final (or the revision date) and the time it should be used. Submission to the Department of (or the completion of) an approvable Remedial Action Work Plan (RAW or RAWP) and/or Remedial Action Report (RAR) within this 6-month time frame will allow the use of the previous version of this technical guidance.

This guidance was prepared with stakeholder input. The following individuals contributed to this document:

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2. PURPOSE

The purpose of this document is to provide guidance on the use of fill materials strictly at Site Remediation Program sites (SRP sites) within the overall Site Remediation and Waste Management Program (SRWMP), and specifically at an area of concern (AOC) as defined at N.J.A.C. 7:26E-1.8. Note that an AOC may encompass the entire site, as is typical for historic fill. All other applications or use of this technical guidance at non-SRP sites or properties is beyond the scope and authority of the SRP regulations. This includes construction activities at properties that are not SRP sites.

In particular, this document:

- Provides background on the need for establishing the alternative/clean fill requirements;
- Emphasizes the Department's policy of minimizing the volume of alternative fill used for the purpose of remediation;
- Provides different approaches to achieve compliance with the alternative/clean fill requirements in the Technical Rules;
- Facilitates the use of alternative fill in a protective manner;
- Provides the default sampling frequencies for fill characterization and options for reduced sampling frequencies;
- Provides a pre-approval process for alternative fill pursuant to N.J.A.C. 7:26E-5.2(c); and
- Aids in the evaluation, approval, and use of fill material at SRP sites.

The intent of this technical guidance is to address the majority of SRP sites where fill material will be used as part of the remedial action. The Department recognizes that due to the complexity and diversity of SRP sites, variances from the Technical Rules and departures from this technical guidance may be appropriate to address site-specific conditions. It is anticipated that many of these issues would be addressed through the pre-approval process. The Department's contacts for this guidance are available to discuss departures and interpretations of this guidance prior to implementation. Contact information can be found via https://www.nj.gov/dep/srp/srra/srra_contacts.htm.

This technical guidance does not supersede any federal, state, or local laws, regulations, and/or guidance.

3. OVERVIEW

3.1. Organization

This technical guidance applies to alternative fill, clean fill, and authorized quarry/mine material. Sections 4 and 5, respectively, address the off-site and on-site use of alternative fill. Section 6 addresses the use of clean fill, and Section 7 addresses the use of authorized quarry/mine material. Because the remediation of a given SRP site does not necessarily involve the use of all the fill material types, the document handles each fill material type in separate sections. To ensure clarity, each section is complete and independent for each fill material type. Therefore, it is recognized that there is some repetition of requirements that apply to the different fill material types. Appendices provide supporting information as needed for the guidance text.

3.2. Limitations of Technical Guidance Application

This technical guidance applies to the use of alternative fill, clean fill, and authorized quarry/mine material only at SRP sites. The SRP does not regulate or approve products at their point of origin when they are not destined to be part of the remediation at a SRP site. The use of alternative fill, clean fill, and authorized quarry/mine material at non-SRP sites is beyond the scope and authority of the SRP regulations. Because the SRP regulates sites where a discharge has occurred, this technical guidance is not designed to address or be applied to other situations, such as typical construction activities that occur at properties that are not SRP sites. This technical guidance does not apply to landfills. This includes any landfill disruption or closure, for which the Division of Solid and Hazardous Waste (DSHW) should be consulted.

3.3. Protectiveness Requirement

Guidance is provided for the use of alternative fill (that might otherwise be disposed as solid waste) at SRP sites in a way that is protective of public health, safety, and the environment and is consistent and supportive of the selected remedial action. The overall objective is that the alternative fill be thoroughly characterized as to the types and concentrations of contaminants, extent, and its homogeneity. Alternative fill may include contaminated material that has been treated, but some contaminants still exceed the applicable remediation standards or criteria. As discussed below in Section 3.5, the use of alternative fill must not increase the contaminant concentrations present at a receiving AOC or introduce additional contaminants not already present at a receiving AOC. The overall intent of N.J.A.C.-7:26E-5.2(b) is that alternative fill should not make contamination at the site worse than existing conditions. After completion of a remedial action, if additional construction activities occur, any fill material brought onto the site cannot create a new discharge concern and is subject to this guidance and SRP regulations.

Alternative fill projects must consider other permits and/or approvals that are applicable to the work, including, but not limited, to soil erosion and sediment control requirements to ensure that the alternative fill project is protective of public health, safety, and the environment. To be protective, the use of alternative fill should include erosion control measures and engineering controls, as appropriate, to ensure that the alternative fill will be contained following completion of the remedial action. The use of alternative fill on a site may range from simply backfilling an excavation to grade, to complex settings where it will be used along slopes/banks that meet water bodies. Any requirements associated with Land Resource Protection Program permits must be addressed. Complex site features such as steep slopes, geotechnically unstable soils, banks

adjacent to water bodies subject to wind, wave activity, erosion, 100 Year storm events, etc. will need to be considered in the design of the engineering controls to ensure the final cap remains integral. To this end, when the complexity of the site dictates, it is strongly recommended that the Fill Use Plan (FUP) include Professional Engineer (PE) certifications and design drawings as specified in Appendix B. The LSRP should determine when such complexities exist and seek the input of a PE, as appropriate. The Department's Technical Guidance on the Capping of Sites Undergoing Remediation, as well as other geotechnical/engineering guidance documents, should be consulted when designing the engineering control.

The use of this document may involve large volumes of alternative fill being brought on site ahead of construction of the final engineering control (e.g., cap). The use of alternative fill, as part of a remedial action, should follow the projected schedule as part of a key document submission. Alternative fill stockpiled for use that exceeds the projected schedule may then be viewed as a solid waste. Stockpiling material on site for longer than the projected remediation schedule could be a violation of N.J.A.C. 7:26-1.4 (https://www.nj.gov/dep/dshw/resource/CURRENT/WEB%20PDFS/26%20CHAPTER%201.pdf) which defines the existence of an unauthorized solid waste facility, and would require a permit. The need for perimeter air monitoring should be considered.

3.4. Fill Volume that Exceeds Original Grade

Fill is routinely employed in the remediation of AOCs, which may encompass the entire site, including backfilling excavations to the original grade. **The use of alternative fill that increases site elevation above its original grade requires Department review and written pre-approval pursuant to N.J.A.C. 7:26E-5.2(b)3.** The use of any alternative fill volume above original grade is only allowed at the Department's discretion. Technical justification for the use of alternative fill, where reasonable changes in design will not eliminate the need for the material, is the basis for the Department's evaluation of the pre-approval request. From a technical perspective, financial benefits are not acceptable as the sole justification for the use of increased volumes of alternative fill. See Section 4.9 of this technical guidance for information and instructions on the preapproval process for the use of alternative fill.

Under certain conditions, the Department will allow the use of alternative fill at elevations above the pre-remediation topography as it recognizes the use of alternative fill to:

- encourage the redevelopment of sites undergoing remediation in a manner that minimizes the current and future impacts of our changing climate;
- maximize the beneficial use of contaminated soil in concert with appropriate engineering and institutional controls that are protective of public health, safety and the environment;
- preserve valuable landfill capacity by redirecting contaminated soil destined for landfills to suitable redevelopment projects;
- promote the use of dredged material or processed dredge material (PDM), where appropriate, to ensure its use in various beneficial uses as structural fill material, construction fill, grading material, and in habitat restoration projects; and
- preserve the use of uncontaminated soil for use as final cover where human or ecological exposure may occur.

3.5. Like-on-Like and 75th Percentile Requirements

In evaluating the use of alternative fill, the intent is to achieve the following primary objectives pursuant to the Technical Rule at N.J.A.C. 7:26E-5.2(b):

- **No new contaminants may be placed in an AOC other than those already determined to be present.** This concept is referred to as the **like-on-like** requirement. Chemicals or elements, including extractable petroleum hydrocarbons (EPH), detected in the donor material below the most stringent of the soil remediation standards for the ingestion-dermal and inhalation exposure pathways and/or the soil and soil leachate remediation standards for the migration to groundwater exposure pathway or site-specific alternative remediation standards need not be considered in the like-on-like requirement.
- **Contaminant concentrations in the alternative fill shall be lower than those on the receiving site AOC.** This objective is referred to as the **75th percentile** requirement.

These concepts are protective of clean or uncontaminated areas of the site. Any divergences from these criteria (like-on-like, 75th percentile, and use of alternative fill above pre-remediation topography) requires written pre-approval pursuant to N.J.A.C. 7:26E-5.2(c). It is important to note, N.J.A.C. 7:26E-1.7(b)7 prohibits requesting a variance that eliminates the requirement to obtain DEP's written pre-approval as stated in N.J.A.C. 7:26E-5.2(c).

3.6. Investigator Responsibilities

As discussed throughout this technical guidance, the investigator may be proposing the importation of alternative fill to meet the requirements of the Technical Rules and this technical guidance. Typically, an LSRP will be acting as the investigator for the site or AOC to place fill material. In cases under Department oversight, or where Department pre-approval of a RAWP is required, the Department will consider the use of fill material in compliance with Section 4.9 and the FUP (Appendix B of this guidance).

3.7. Protection of Environmentally Sensitive Natural Resources and Sensitive Receptors

The use of fill material in areas where there are environmentally sensitive natural resources (ESNRs), such as protected areas, wetlands, or open water, and/or sensitive receptors (as defined by the Technical Rules) may occur only where such use is in compliance with the Technical Rules, this technical guidance, the Department's Ecological Evaluation Technical Guidance, and all other federal, state, and local laws, regulations, and guidance. For example, the requirements of a Waterfront Development Permit may include stipulations on the type of fill and the area where the fill may be placed. To protect ESNRs, the fill material needs to be properly contained to prevent a discharge of contaminants to ESNRs.

3.8. Free Product/Free Liquids Restrictions

"Free product" is defined in N.J.A.C 7:26E-1.8 as a concentration greater than a contaminant's residual saturation point. Fill material containing free product may not be used unless these liquids are appropriately removed and properly treated and/or disposed prior to placement.

"Free liquids" means a liquid as determined by the paint filter liquids test (SW-846 Method 9095B) or an equivalent method. Fill material containing a certain amount of free liquids (i.e., water) may be acceptable for placement as fill where the remedial action is designed to accommodate such material and such placement is in compliance with the Technical Rules, the rest of this technical guidance, and all other federal, state, and local laws, regulations, and/or guidance. Use of fill material containing free liquids is a departure from this technical guidance that must be documented and adequately justified in the applicable work plan or report. However, this departure does not require preapproval by the Department, except for sediment, dredged material (DM), and processed dredged material (PDM) as discussed in later sections of this technical guidance.

3.9. Beneficial Use and CAO/BUD

The following is provided as general information concerning the potential need for a Certificate of Authority to Operate (CAO)/Beneficial Use Determination (BUD) from the DSHW for alternative or clean fill. However, it is recommended that the investigator contact DSHW for definitive site-specific determinations as the CAO/BUD is unrelated to the laws, regulations, and guidance for remediation of contaminated sites and is subject to change by the DSHW.

- The SRWMP has determined that alternative or clean fill defined to be soil and fill recyclable material as defined by the Dirty Dirt Law at P.L.2019, c.397 (C.13:1E-127.1 et al.) may be used as fill pursuant to N.J.A.C. 7:26-1.7(g)4v and be in compliance with the solid waste regulations and guidance without needing to obtain a CAO/BUD, as long as its use is approved by the receiving site's LSRP. It should be noted that the Department/LSRP approved alternative fill material is considered a beneficial use material, and therefore, is not a solid waste. An exception is for fill to be placed on a landfill. Fill to be placed on a landfill requires a separate approval granted by a landfill closure and post-closure plan approval or a landfill disruption approval issued pursuant to the Solid Waste Rules at N.J.A.C. 7:26-2A.
- An LSRP or case manager responsible for the remediation of the receiving site is authorized to approve the use of alternative fill as soil and fill recyclable material, which may include both soil and non-soil material, upon determination that the alternative fill material meets applicable regulations at N.J.A.C. 7:26E including, but not limited to, the like-on-like and 75th percentile policies as applicable. A written approval should be given to the supplier of the soil and fill recyclable material for use by the transporter, indicating, at a minimum, the source, classification (non-RCRA hazardous), and total quantity of such material approved to be imported as alternative fill.
- For soil and fill material that is intended for use as alternative fill material, the transporter of the material needs to maintain documentation pursuant to N.J.A.C. 7:26-1.13(b) that the alternative fill material is being beneficially used as alternative fill. Absent a licensed professional's (e.g., LSRP, PE, or A-901 licensed broker) approval, or a BUD issued by the DSHW, the transporter would be deemed to be carrying solid waste without an A-901 license under the Dirty Dirt law and would be in violation of the law. Written approval from the licensed professional would demonstrate that the material is approved for beneficial use as alternative fill, is not a solid waste, and that it is exempt from the Dirty Dirt law and the associated A-901 licensing requirements for the transporter.

- For those alternative fill materials that are non-soil (such as recycled concrete, brick and block) and meet the following criteria found in N.J.A.C. 7:26-1.6(a)6 for materials defined as not being solid waste: "Non-water soluble, non-decomposable, inert solid, such as rock, soil, gravel, concrete, glass, and/or clay or ceramic products that do not contain concentrations of one or more contaminants that exceed the residential soil remediation standards for the soil ingestion-dermal and soil inhalation exposure pathways or non-residential soil remediation standards for the soil ingestion-dermal and soil inhalation exposure pathways, whichever is more stringent, as set forth at N.J.A.C. 7:26D, Remediation Standards", these materials may be used as fill without the need to obtain a CAO/BUD from the Division of Solid and Hazardous Waste. If the material to be used as fill does not meet the definition of "soil and fill recyclable material", exceeds any direct contact soil remediation standard(s) for the soil ingestion-dermal and soil inhalation exposure pathways, and/or is not classified as RCRA-regulated hazardous waste, then the use as fill may only be allowed following issuance of a CAO/BUD for the material. Additionally, if the fill material is proposed for use at an SRP site, then at the discretion of the LSRP, the material may need to meet the migration to groundwater standards or be evaluated as described in Section 4.6 of this guidance. Alternative fill classified as RCRA-regulated hazardous waste is not allowed.
- Dredged material and PDM, from New Jersey's waters, do not require a CAO/BUD pursuant to N.J.A.C. 7:26-1.6(a)5, but they do require a separate approval with an Acceptable Use Determination (AUD) from the Department's Office of Dredging and Sediment Technology (ODST) for the donor source (i.e., dredger or processor). Additionally, written pre-approval by the SRP will be required if the use of alternative fill does not meet the requirements of N.J.A.C. 7:26E-5.2(b)1,2,3.
- Guidance on the CAO/BUD process is available on the DSHW web site at http://www.nj.gov/dep/dshw/rrtp/bud.htm.

3.10. Underground Storage Tanks

This technical guidance does not apply to material excavated to access a regulated or unregulated underground storage tank (UST) or UST system AOC when that material is used to backfill the original excavation as described in Section 6 of the Department's *Technical Guidance for the Investigation of Underground Storage Tank Systems* (July 2012). However, where there is a desire to reuse the excavated material from a regulated and unregulated UST or UST system AOC at another AOC on-site or off-site, then this technical guidance is to be used to determine its acceptability for use as alternative or clean fill.

3.11. Local Community and Municipal Acceptance

It is the Department's experience that local communities and municipalities will express concerns about the planned use of alternative fill that does not meet the requirements specified at N.J.A.C. 7:26E-5.2(b). To avoid potential delays in remediation and to promote transparency, the investigator is encouraged to communicate with local officials early in the process to identify potential local concerns about the use of alternative fill that does not comply with N.J.A.C. 7:26E-5.2(b).

In these cases, the Person Responsible for Conducting Remediation (PRCR) is reminded of the regulatory requirements to conduct public notification in accordance with the Administrative Requirements for the Remediation of Contaminated Sites (ARRCS) at N.J.A.C. 7:26C-1.7(k). ARRCS requires the PRCR to provide notification to:

i. Each owner of real property and the tenants of those properties, located within 200 feet of the site boundary;
ii. The mayor of each municipality in which the site located;
iii. The county designated solid waste coordinator;
iv. The municipal clerk of each municipality in which the site is located; and
v. The county health department and local health agency.

Pursuant to ARRCS, this notification must include the type and concentrations of contaminants in the alternative fill, the proposed use and volume of the alternative fill, and the controls designed to reduce or eliminate exposure. The FUP included in a RAWP will include this. Alternatively, the investigator may provide a summary of the required information in a simpler format (e.g., summary letter, cover letter to RAWP) that is more easily understood by the layperson. The investigator should obtain verification that this information was delivered, such as through a return receipt. Nothing in this section obviates the ARRCS requirement at N.J.A.C. 7:26C-1.7(i) to provide a copy of the RAWP to local government agencies, when requested. Documentation (e.g., return receipts or similar evidence of acceptance) that either the FUP or the summary letter were provided to fulfill the public notification requirements should be included with the FUP application to NJDEP.

The investigator shall advise the Department of any changes to the FUP in response to public notification.

Additional details are discussed in Section 4.9.2 of this guidance and the Fill Use Plan checklist (Appendix B).

4. ALTERNATIVE FILL FROM OFF-SITE SOURCES

Contaminated material excavated from off-site sources is the subject of this section. "Off-site" is defined as material from outside the lots and blocks of the original site.

4.1. Sampling the Receiving Site Area of Concern

Soil or sediment must be fully delineated at the receiving AOC according to the Technical Rules and applicable technical guidance in order to apply the like-on-like and 75th percentile requirements described more fully below. The Remedial Investigation (RI) data for each AOC shall be evaluated to determine the contaminants of concern (COC) and their concentrations. To meet the like-on-like and 75th percentile requirements, single phase, and discrete discharge remediations may require additional sampling and analyses for all potential contaminants.

4.2. Like-on-Like Requirement

Pursuant to N.J.A.C. 7:26E-5.2(b)1, no new contaminants in excess of the applicable standard, criteria, or action level may be placed in an AOC other than those already determined to be present. This concept is referred to as the like-on-like requirement. Allowing the use of alternative fill with contaminants not already present in an AOC would constitute an additional discharge as defined at N.J.A.C. 7:26E-1.8. Furthermore, the use of alternative fill in this situation would be de facto landfilling (i.e., the "placement" of new wastes) without complying with the Department's solid and hazardous waste regulations. Therefore, the acceptance of alternative fill is limited to the contaminants already present at the receiving AOC. In addition, the areal extent of the receiving AOC cannot be increased.

4.3. Application of 75th Percentile Evaluation in Receiving Site Area of Concern

The Department has determined there should be confidence that the contaminant concentrations in the donor material used as alternative fill do not exceed the contaminant concentrations already known to exist in a given receiving AOC. Using alternative fill with higher contaminant concentrations would result in making contamination worse at the receiving AOC. Of particular concern are the higher concentrations of a contaminant distribution. There are two issues with the higher concentration data. One, delineation of contamination for an AOC at a receiving or donor SRP site is focused on sampling to meet the applicable remediation standards, so only a limited number of samples characterize the upper end of a contaminant distribution, and these samples may represent a large volume of material and mass of contaminants. As a result, there will be more uncertainty concerning the characterization of receiving site and donor site material at the higher contaminant concentrations. Two, when the donor material being evaluated is from a non-SRP site; is from disturbed, possibly stockpiled material; or is from a manufactured, blended, or decontaminated soil, it will be difficult to determine with confidence that samples were biased and collected from the area of highest contaminant concentration. The net effect is limited data for the volume of material with higher contaminant concentrations and/or lower confidence that the data appropriately represent the highest contaminant concentrations.

Pursuant to N.J.A.C. 7:26E-5.2(b)2, to minimize the potential use of alternative fill with higher contaminant concentrations than in the receiving AOC, alternative fill is acceptable provided the maximum contaminant concentrations in the alternative fill are less than the 75th percentile of the contaminant concentrations already present at the receiving AOC. This concept is called the 75th

percentile requirement (see Appendix A). The selection of the 75th percentile of the receiving AOC data as the acceptance criterion for alternative fill is further discussed in Appendix A. For most sites, particularly with smaller-sized AOCs or limited data for the higher contaminant concentrations, this compliance requirement is likely to be the most cost-effective method of screening potential donor material. The intent of this requirement is to minimize the need for additional samples beyond those already collected in the RI of the receiving AOC. The 75th percentile also has the advantage of not being as constrained by data distribution issues to which the other statistical tests are subject.

The procedure for determining the 75th percentile at the receiving AOC consists of the following steps:

(1) Collect discrete samples and/or assemble existing data for the receiving AOC (or site when the whole site is the AOC) where the fill is proposed to be placed (placement location at the receiving site). The sampling of the placement location will typically result from a completed RI process.
(2) Organize the data from the receiving AOC placement location so that each COC is listed from least contaminated to most contaminated.
(3) Determine the 75th percentile for each contaminant. The investigator is referred to Appendix A for the calculation of the 75th percentile.
(4) Collect discrete samples and/or assemble existing data from the donor material for the alternative fill being proposed for placement. If data from a completed RI are not available for the donor material, use the sampling approach in this Technical Guidance (Section 4.5). It is highly recommended that data be obtained prior to excavation and shipment to the receiving AOC to avoid the possibility of having to remove alternative fill that does not meet the Technical Rules or this technical guidance.
(5) Determine the maximum concentration for each contaminant in the donor material proposed for placement. Then determine whether the maximum concentration is less than the respective 75th percentile for each contaminant in the receiving AOC placement location. If the maximum concentration of each contaminant is less than the respective 75th percentile for those same contaminants in the receiving AOC placement location, then the alternative fill is acceptable, and placement is permissible. See Section 4.5 below for additional details on the sampling and use of donor material.
(6) A discrete sample with the maximum concentration per contaminant from the donor material is the value needed for comparison to the receiving site percentiles.

4.4. Compliance Options Other than the 75th Percentile Requirement

Statistically based compliance options other than the 75th percentile requirement in Section 4.3 may be considered where appropriate to characterize the receiving AOC. This is a variance from N.J.A.C. 7:26E-5.2(b)2 and requires Department pre-approval pursuant to N.J.A.C. 7:26E-5.2(c).

More complicated or robust statistical evaluations are generally acceptable as long as the data are from discrete samples and all other statistical requirements for this evaluation are met. It is important that a data summary plot and an outlier analysis are performed on the dataset to ensure the alternative compliance option is not inappropriately biased high (see Appendix A). Additional

samples may have to be collected and analyzed to better characterize the volume of material at an AOC when there are just a few samples with higher contaminant concentrations and many samples with non-detects or low contaminant concentration (common pattern when delineating an AOC) to provide sufficient data for a data distribution suitable for the statistical calculations. This generally requires a large sample set (i.e., greater than 20 samples per AOC) to perform the calculations and would likely only be applicable to larger AOCs. The investigator should have a thorough understanding of the statistical concepts and methodologies to correctly apply them.

As an example of a potential option, the 95th percent upper confidence limit (95th UCL) of the sample distribution for each contaminant in the receiving AOC can be calculated for use as the receiving AOC compliance criterion instead of the 75th percentile. See Appendix A for more details on statistical calculations.

Department pre-approval pursuant to the Technical Rules (N.J.A.C. 7:26E-5.2(c)) is required for the use of compliance options other than the 75th percentile requirement, which will result in Department review of this component of the document as per Section 4.9 and Appendix C. Any departures from guidance should also be included in any pre-approval submission.

4.5. Sampling at the Donor Site Area of Concern

To determine if proposed alternative fill placement is appropriate, contaminant data for the proposed fill at the donor site must be evaluated. The overall objective is that the potential alternative fill be thoroughly understood as to uniformity as well as the types and concentrations of contaminants. The sampling protocol is to be applied by collecting discrete samples from each source of donor material. Donor source locations may include in-state and out-of-state sources of potential alternative fill.

The sampling frequencies are determined by volume and are independent for each source of donor material. For example, if 1,000 cubic yards of contaminated soil is obtained from each of two different sources (e.g., two different AOCs), then the 1,000 cubic yard sampling frequency would be applied to each 1,000 cubic yard source. The sampling frequency for 2,000 cubic yards would not be applicable, even though the total volume is 2,000 cubic yards. The sampling frequencies need to account for the depths of the donor material to be removed. If one area of donor fill will be excavated to more than one depth (e.g., 3 feet in one part and 6 feet in the other part), then the samples must be distributed accordingly at multiple depths to be representative of the full depth of each cut.

Sampling is not required where sufficient data are available to adequately characterize the donor material being proposed for use. Typically, the source of such data would be a completed RI. If the investigator has determined that the available data are not representative or not of acceptable quality, or there are an insufficient number of samples, then additional sampling is warranted and should be biased towards the worst-case material where possible. In certain cases, the location of the most contaminated area may not be known, or alternatively, the contamination could be of uniform distribution. In these cases, a grid pattern of sampling should be utilized. If the contamination distribution is known, then the worst-case material should be sampled first as defined by the available data and/or information from the preliminary assessment (PA)/site review as described below in Section 4.5.2. The consequence of this is that the highest rate of sampling is

applied to the area of expected greatest contamination. Additional samples (dictated by the volume proposed for use) are distributed pro rata in the remaining area in order of expected decreasing contamination.

The sampling of the proposed donor material should be based on a systematic approach whereby the investigator will have assurance that the results accurately represent the fill. When RI data are not available, a series of field screened, discrete grab samples should be collected, biased to areas that may indicate the highest contaminant concentration. For undisturbed material, collect samples at the surface and at depth to ensure that the samples are representative of the total volume of material that may be used as alternative fill. Where biased sampling is not necessary or only a few biased samples are needed, the investigator should use grid-based, random sampling procedures using accepted United States Environmental Protection Agency (USEPA) guidance or other statistically appropriate references (e.g., Gilbert 1987). Where a large stockpile of proposed alternative fill has already been staged and can be maintained for use on a specific project, then the sampling should be statistically designed to collect representative samples from both the surface and interior of the stockpile.

4.5.1. Composite Sampling

With the two exceptions noted below, composite samples may not be used for compliance with Table 1 sampling frequencies. In general, the fewer the number of samples in a composite, the more representative the composite data will be. Composite samples effectively "dilute" material that may have elevated concentrations and make it impossible to determine whether the standards, criteria, or screening levels have been met. Additionally, composite sampling is typically conducted over large volumes, and when a composite sample result exceeds a standard/criterion, one cannot determine the location of the specific soils responsible for the exceedance.

The Department will consider the use of composite data as follows:

1. For dredged material data obtained to support the Department's ODST. For additional information, see Section 4.7.4; or
2. Composite data, deemed appropriate by the investigator in terms of its representativeness and reliability to adequately characterize the alternative fill, may be used to **supplement** the discrete sampling required in Table 1. Composite data may not be used as the only line of evidence to characterize fill. If the investigator determines the composite data to be reliable, it may be used to reduce the discrete sampling required.

If composite data will be utilized, the following procedures should be used:

1. A minimum of 70% of the donor material volume should be characterized using discrete sampling, as per the frequency contained in Table 1*;
2. The volume of donor material that a composite sample represents should not exceed a volume greater than 5 times a discrete sample volume as contained in Table 1;
3. The composite sample should not be comprised of more than 5 discrete sub-samples of equal sample weight;

4. Composite sampling should be implemented in a manner such that samples are collected throughout the donor material (i.e., at various depths) to ensure the entire volume is adequately characterized;
5. Because composite sample data represents an average, the donor site composite sample data should be compared to the *receiving AOC arithmetic mean* (and not the 75th percentile); and
6. If the composite sample data for a specific volume of donor material exceeds the applicable acceptance criteria, then the entire volume of donor material associated with the composite sample should be rejected for use at the receiving area.

*Any proposed deviation from the use of composite sampling as described above to characterize donor material needs to be technically justified. It is strongly recommended that the investigator contact the Department for a technical consultation, prior to fill importation, to discuss the deviation.

Details for the procedures above and an example can be found in Appendix D.

When using composite data, the investigator should take the following considerations into account:

- The site from which the donor fill material is associated with should be well characterized. This is typically accomplished through the PA/SI and RI process.
- The use of composite sample data constitutes a departure from the use of discrete grab samples to characterize alternative fill and is a departure from sampling frequency that requires justification by the investigator.
- The investigator should clearly document the volume of material and the composite sample frequency.
- The composite sampling locations (grids and sub-grids) should be shown on a scaled site plan. If this data is not available for inclusion in the Fill Use Plan, then it should be included in the next key document submission;
- Sampling methodologies should be consistent with the FSPM and constituted of laboratory data of known quality;
- Composite samples are not acceptable for VOC characterization as specified by the latest version of the FSPM (NJDEP, 2005). Discrete samples for VOC analysis can be collected from one of the sub-samples used for compositing, which should be biased to the highest field screening results, odors, and/or other indicators of VOC contamination.

The investigator should be mindful of the Data Quality Objectives for the sample collection and analysis process, including the sensitivity of the analysis. This evaluation should aid in the determination of the use of this material to supplement discrete sampling.

4.5.2. Sampling Frequency Modifications

The sampling frequencies to be used to establish the characteristics of potential donor material are summarized in Table 1. There are two sampling frequencies listed in Table 1 – (1) Default Sampling and (2) Reduced Sampling. In general, the default sampling is used for donor material with little or no prior data, and the reduced sampling frequency is utilized where there has been some prior assessment of the fill source (e.g., site review, existing data). **Further reductions beyond the reduced sampling frequency in Table 1 are permitted.** These further reductions would be based upon an evaluation of the source material consistent with the concepts in this guidance. Departure from the default or reduced sampling frequencies requires appropriate justification. It is recommended that the Department be consulted before implementation of any further reductions of the reduced sampling frequency. Conversely, depending upon the site conditions and heterogeneity of the donor material, the investigator may elect to conduct additional sampling *beyond* that outlined in Table 1.

Table 1: Sampling Frequency Guide for Alternative Fill

Proposed Volume	**Default Sampling Frequency Without Justification**	**Reduced Frequency with Justification**
(Cubic Yards)	(Samples)	(Samples)
0 to 20	1	1
20.1 to 40	2	2
40.1 to 60	3	2
60.1 to 80	4	2
80.1 to 100	5	2
100.1 to 200	6	3
200.1 to 300	7	3
300.1 to 400	8	4
400.1 to 500	9	4
500.1 to 600	10	5
600.1 to 700	11	5
700.1 to 800	12	6
800.1 to 900	13	6
900.1 to 1,000	14	7
1,000.1 to 2,000	15	8
2,000.1 to 3,000	16	9
3,000.1 to 4,000	17	10
4,000.1 to 5,000	18	11
5,000.1 to 6,000	19	12
6,000.1 to 7,000	20	13
7,000.1 to 8,000	21	14
8,000.1 to 9,000	22	15

9,000.1 to 10,000	23	16
10,000.1 to 11,000 *	24	17
*For volumes greater than 11,000 cubic yards, the sampling rate is 1 additional sample per each additional 1,000 cubic yards. The sampling frequency may be reduced with appropriate justification, for either the default or reduced sampling frequencies.		

In most cases, modifications in sampling frequencies and analytical requirements will be expected to be based upon: (1) an understanding of the donor site's current and historical use and/or (2) reliable SI/RI data as discussed below:

- An evaluation of the historical operations and hazardous substances used at a donor site by review of a PA or other "Site Review" where a PA is not required at a donor site. The PA or Site Review can be used to assess the likely types and concentrations of hazardous substances that may be present in site soils, whether from natural or anthropogenic sources. For a Site Review, the investigator should evaluate historical site use, perform a historical aerial photograph review, and review other site historical information as typically performed for a PA. Potential sources of useful information may include (1) listings of known contaminated sites, (2) NJ-GeoWeb interactive mapping on the Department's GIS, (3) SI/RI data from nearby sites available through Open Public Records Act (OPRA) reviews, and/or (4) a visual inspection of the donor site for evidence of contamination or AOCs.
- Where reliable analytical data from an SI or RI are available for the donor material, these data may be used in lieu of, or to supplement, sampling and analyses using this technical guidance. The investigator is reminded to assess whether the SI/RI data accurately reflects the donor material (e.g., was it taken from a similar location/soil type) and current site conditions (e.g., likelihood of additional releases or chemical degradation). If the fill is uniform in terms of similar contaminant concentrations and physical characteristics, some further reduction in sampling and analyses may be warranted. This reduction may include testing for a broad suite of analytes on some samples and a reduced suite of analytes on others. Conversely, linear projects such as highway and utility work are less likely to be uniform sites – particularly if they pass through heterogeneous soil types and areas with a variety of commercial/industrial uses – and may be less suitable for a reduction in sampling.
- It is expected that donor material will be analyzed for the Target Analyte List (TAL) / Target Compound List (TCL) plus 30 and Extractable Petroleum Hydrocarbons (EPH) unless a targeted suite of contaminants can be justified. The sampling and analyses may be modified for all, or just a subset of, the fill characterization samples based upon the PA/Site Review and/or existing sampling data. For some soils and non-soil like donor materials, pH of donor material may be of concern relative to the pH present at the receiving site. Therefore, the need for the analysis of pH in donor material should be evaluated by the LSRP to demonstrate that it is protective of public health, safety, and the environment.

- The Department does not require analysis of all samples for asbestos, dioxins, hexavalent chromium, or radionuclides, but the potential presence of these contaminants is discussed in more detail later in this section of the guidance and professional judgment with justification should be used to determine whether samples should be collected and analyzed for these potential contaminants.

If the investigator determines that existing data (this includes data from ODST) and/or other information accurately and reliably reflects the source material (e.g., it was taken from a similar location/soil) and current site conditions, the investigator may rely on this data, provided:

- The analyses were performed by a laboratory certified for those methods by the Department.
- The data meet the data quality requirements in the Technical Rules and any associated Department technical guidance for quality assurance (QA)/quality control (QC) reviews.
- A detailed description of the sample collection methodologies for the data is obtained for the donor material.
- The donor material was not moved to another property for storage.

4.6. Migration to Ground Water and Surface Water Evaluation for Off-Site Sources

Pursuant to the Technical Rules, the proposed remedial action for a given AOC must address all ground water and surface water issues whether from the existing contamination at the receiving AOC or from the proposed alternative fill. The proposed alternative fill's potential to increase or result in ground water or surface water contamination should be evaluated prior to placement consistent with the following Departmental guidance:

- Ecological Evaluation Technical Guidance;
- Characterization of Contaminated Ground Water Discharge to Surface Water Technical Guidance; and/or
- Alternative Remediation Standards Technical Guidance for Soil and Soil Leachate for the Migration to Ground Water Exposure Pathway

The finding of no ground water contamination at the donor AOC cannot be used as the sole basis for assuming no migration to ground water at the receiving AOC because excavated donor material may behave differently, in terms of potentially impacting groundwater, than in-situ donor material. Note that migration to ground water (MGW) evaluation applies to alternative fill material obtained from both the saturated and unsaturated zones because saturated fill may be placed above the water table at the receiving AOC.

4.6.1. Donor Material Below Soil Remediation Standards for the MGW Exposure Pathway

If the soil contaminant levels in the donor material are **below** the applicable soil remediation standards for the migration to ground water exposure pathway, then no further MGW evaluation is needed for the donor material. The material may be used as alternative fill provided there is compliance with other standards, criteria, or screening levels.

4.6.2. Donor Material Above Soil Remediation Standards for the MGW Exposure Pathway

If the soil contaminant concentrations in the donor material are **above** the applicable soil remediation standards for the migration to ground water exposure pathway, then an evaluation of the potential for MGW for the donor fill material should be performed according to the relevant guidance for developing site-specific values.

This will typically require an evaluation using the Department's Synthetic Precipitation Leaching Procedure (SPLP) procedure for MGW. Samples of donor material used in the SPLP methodology should be collected (selected from RI and/or Table 1 samples) from areas of the highest contaminant concentration range and representative of the different characteristics of the donor material that would affect the mobility of any given contaminant into ground water (e.g., pH, soil texture, composition of fill). The development of site-specific MGW criteria would require the submission of the Alternative or Interim Remediation Standard and/or Screening Level Application Form. It should be noted that the SPLP procedure is developed on the assumption that soil is used as the media and, therefore, uses soil properties such as soil texture, and soil bulk density to derive the Alternative Remediation Standards Technical Guidance for Soil and Soil Leachate for the Migration to Ground Water Exposure Pathway (ARS-MGW). When the fill material is not soil, such as crushed concrete or brick, professional judgment or consultation with the Department is necessary to determine the suitability of the procedure.

Evaluate SPLP results as follows:

- When leachate results indicate no potential to impact ground water using the Department's SPLP procedure for MGW, then the MGW evaluation is complete and the donor material can be used as alternative fill.
- When SPLP leachate results indicate the potential to impact ground water (using the Department's SPLP procedure for MGW, then the material should not be used as alternative fill. However, a site-specific Leachate Criteria may be calculated by developing a site-specific Dilution Attenuation Factor as described in Section 5.0 of the ARS-MGW document. If the donor material results, are less than the site-specific standards developed, then the MGW evaluation is acceptable, and the donor material can be used as alternative fill.
- Donor material with SPLP results, using the Department's SPLP procedure for MGW, in excess of either the default SRS MGW contained in Section 6.0 or the site-specific ARS-MGW, shall not be used as alternative fill unless this material will not impact the type, effectiveness, or feasibility of the ground water remedy at the receiving site, will not increase the concentration of ground water contamination, and will not adversely impact adjacent surface water.

In addition to the SPLP assessment, the investigator may consult the various methods to develop site-specific MGW soil remediation standards available in Department guidance (i.e., Dilution Attenuation and Soil Water Partition). It should be noted that the SESOIL and the Immobile Chemical methodologies rely on the physical structure of the soil remaining intact; as donor

material will be moved and mixed during transport, their use to evaluate MGW soil remediation standard exceedances in donor material is not appropriate. Consideration should also be given to the nature of the donor material. For example, low permeability donor materials such as Processed Dredge Material (PDM) should be expected to mitigate the transfer of contaminants to ground water. Moreover, the pozzolanic materials used to create PDM will increase the pH of the dredge material, which can reduce the solubility of many metals.

4.6.3. VOC Contamination

Unless the MGW guidance indicates otherwise, it is not appropriate to use the SPLP guidance for volatile organic compounds (VOCs). Donor material with contaminant concentrations that are above the default MGW soil remediation standards may not be used as alternative fill unless:

- The VOC concentrations in the donor material meet the like-on-like requirement,
- The 75th percentile requirement is met,
- There would be no vapor intrusion impact pursuant to the Department's Vapor Intrusion Technical Guidance, and
- The importation of this alternative fill will not impact the type, effectiveness, or feasibility of the ground water remedy at the receiving site and will not impact on-site or adjacent surface water.

4.6.4. Other Conditions

All other conditions, exclusions, and restrictions applicable to the use of alternative fill in Section 4 still apply. In all cases, the final remedial action must be protective of public health, safety, and environment.

4.7. Material Considerations

4.7.1. Resource Conservation and Recovery Act Waste Exclusion

Only nonhazardous material may be used at a receiving AOC; the proposed alternative fill cannot be a listed or characteristic hazardous waste as determined pursuant to N.J.A.C. 7:26G and 40 C.F.R. Part 261. Pursuant to N.J.A.C. 7:26E-5.2(f), the use of hazardous waste fill material is prohibited. Based on N.J.A.C. 7:26E-1.7(b)8, variance from this requirement is not allowed. When contaminant concentrations are substantially elevated, it may be necessary to evaluate the nature of the material using the Toxicity Characteristic Leaching Procedure.

4.7.2. Dioxin Exclusion

Unless donor material is suspected to be contaminated with dioxins (i.e., is from a Site or AOC contaminated with dioxins or the donor material is within a migration pathway from such a Site or AOC), analysis for dioxins should not be necessary. If donor material is sampled and analyzed for dioxins, donor material that contains dioxins (expressed as Toxicity Equivalent Quotients (TEQs) for 2, 3, 7, 8-TCDD) at concentrations above the Department's remediation standards should not be used as alternative fill (for soil or sediment) at a receiving AOC, unless the like-on-like requirement is met and a site-specific human health and ecological evaluation for the use at the receiving AOC has been completed and approved by the Department. Contact the Fill Material

Guidance representative(s) in the Bureau of Environmental Evaluation and Risk Assessment as listed on the contacts list on the SRP web site for the current remediation standards and further information on the site-specific evaluation process (also contact the SRP case manager, if assigned). Because of the site-specific evaluation for dioxins at the receiving AOC, the 75th Percentile requirement does not apply, which will require pre-approval pursuant to N.J.A.C. 7:26E-5.2(c), but all other parts of this technical guidance still apply. As noted, if the requirements of N.J.A.C. 7:26E-5.2(b) will not be met, the investigator is required to obtain pre-approval from the Department pursuant to N.J.A.C. 7:26E-5.2(c). The Pre-Approval request should be adequately supported with data or other information, further described in the Pre-Approval Section 4.9 of this document, and including the technical information outlined in N.J.A.C. 7:26E-1.7(a). Any departures from guidance should also be included in any pre-approval submission. When the receiving AOC is part of, or adjacent to, an ecologically sensitive natural resource, then a site-specific ecological evaluation should be completed and approved by the Department.

4.7.3. Polychlorinated Biphenyls Restriction

Use of polychlorinated biphenyl (PCB) containing materials must comply with the Toxic Substance Control Act (TSCA) and associated regulations, 40 CFR 761 et seq., and guidance found at https://www.epa.gov/pcbs/managing-remediation-waste-polychlorinated-biphenyls-pcbs-cleanups and https://www.nj.gov/dep/srp/guidance/pcbremediation/pcbremediation.pdf. It should be noted that fill brought to a site must contain less than 1 ppm PCBs as stated in the NJDEP Coordination of NJDEP and USEPA PCB Remediation Policies (Updated July 2, 2020). In addition to TSCA compliance, use of PCB-contaminated material must also comply with this technical guidance, the Technical Rules (N.J.A.C. 7:26E), and the Remediation Standards (N.J.A.C. 7:26D).

4.7.4. Dredged Material

Dredged material (DM), to include processed dredged material (PDM), is evaluated the same as other potential alternative fill sources. If DM are not impacted by known specific contaminant discharges, are relatively homogeneous and are hydraulically dredged, then such materials are candidates for reduced sampling frequency. Data for evaluation pursuant to this technical guidance may be obtained from the completion of a SI/RI and/or from the Department's ODST. Collection and analysis of additional samples may be needed to supplement data obtained from ODST that may not meet the sampling frequencies, analyses, or discrete sampling of this technical guidance.

A concern about PDM is that the additives used may also be a source of contamination that needs to be assessed, in addition to whatever contaminants are present in the material. If bench-scale data for PDM is obtained from ODST, then the investigator should evaluate the data to determine if it is sufficient to meet this technical guidance. If the investigator determines the bench-scale data is either not representative or the sample frequency is inadequate, or to ensure compliance with the applicable remediation standards, then discrete samples of the actual PDM to be placed at the receiving AOC may need to be collected and analyzed.

The investigator needs to be aware that the supplier (whether an on-site or off-site person or entity) of DM as alternative fill, must have an AUD from ODST. The receiving AOC does not require

an AUD, but a final RAWP for the receiving site is required by ODST for placement of alternative fill.

4.7.5. Historic Fill

Historic fill as defined by N.J.A.C. 7:26E-1.8 may be used as alternative fill at a receiving AOC under this technical guidance. Historic fill that is non-soil as defined in this technical guidance requires a CAO/BUD. Evaluate the sampling data for all donor historic fill in accordance with Section 4.5 of this technical guidance to determine if the material should be allowed to be placed at the receiving AOC. Because of the limited amount of data usually associated with historic fill, additional sampling may be needed in accordance with Section 4.5.2 of this technical guidance. The donor historic fill data are then used for the like-on-like evaluation (Section 4.2) and the 75th percentile evaluation (Section 4.3).

Evaluation of MGW should follow Section 4.6 of this technical guidance. If ground water in the receiving AOC is uncontaminated and ground water in the donor AOC is contaminated from the historic fill, then SPLP testing is not necessary as it is likely that the donor historic fill may impact ground water at the receiving AOC, so the donor historic fill should not be used as alternative fill at the receiving AOC. However, if the donor historic fill will still be considered for use, then conduct SPLP analyses of the material in accordance with Section 4.6. If the SPLP results indicate a potential impact to ground water, then the donor material should not be used as alternative fill unless the importation of this donor material will not impact the type, effectiveness, or feasibility of the ground water remedy at the receiving site; will not increase the concentration of ground water contamination; and will not impact adjacent surface water.

A special case of historic fill relocation is applicable to redevelopment sites that include multiple contiguous properties containing historic fill. Where the donor historic fill is from a non-contiguous property, follow Section 5.4 of this technical guidance. It is anticipated that the historic fill will be similar across the redevelopment site in consisting of low level polycyclic aromatic hydrocarbons (PAHs) and metals. However, if contaminant suites and their concentrations vary from that expected between the development site properties, movement of the fill may need to be reconsidered.

4.7.6. Recycled Concrete and Class B Recyclables

Use of recycled concrete as alternative fill at SRP sites, for either construction or remediation purposes, is subject to this technical guidance and not the recycled concrete guidance from the Department's DSHW. The SRP definition of alternative and clean fill and this technical guidance governs what material can used at SRP sites as well as how.

Buildings and other structures at SRP sites should be sampled prior to demolition so samples can be biased appropriately. Existing concrete, brick, and block located on site from previously demolished structures should be sampled pursuant to Table 1. Concrete and other recyclables obtained from a Class B recycling facility will require sample collection and analysis using this technical guidance, because the source of the material and contaminant concentrations in the material are not usually known. While intact concrete should not be a concern for impact to ground water, concrete to be used as alternative fill is usually processed to achieve smaller sizes suitable for use as fill, which presents more of a concern for impact to ground water. Therefore, the

recycled concrete should be evaluated for MGW using Section 4.6 of this technical guidance, if necessary.

For non-SRP sites, the Department's DSHW regulations and guidance apply to the use of recycled materials and Class B recyclables.

4.7.7. Radiation Exclusion

Donor material with radiation or radionuclide contamination above natural background should not be used as alternative fill. Should a potential for radionuclide contamination be indicated in the PA or site review, then field screening with a handheld radiation/gamma meter should occur of the donor material. A person qualified and experienced in the use of radiation survey techniques shall conduct the survey and delineation. If radiation is found to be present above receiving site background levels, donor material should not be used as alternative fill without analytical results and consultation with the Bureau of Environmental Radiation.

The following should be considered when assessing potential fill sources:

- Is the donor site in a different geological region than the receiving site? If alternative fill material originates from areas of potentially elevated naturally occurring radionuclides, such as areas associated with higher radon-in-air potential (https://www.njradon.org/radonin.htm), the investigator should consider appropriate field screening.
- The following industries have the potential to produce TENORM1 or other anthropogenic radioactive material contamination: historical use of radioactive materials (current or former radioactive materials licensee); paper and pulp facilities; ceramics manufacturing; paint and pigment manufacturing; metal foundry facilities; optical glass facilities; fertilizer plants; aircraft manufactures; munitions and armament manufactures; scrap metal recycling; zirconium manufacturing; oil and gas production, refining, and storage; electricity generation; cement and concrete product manufacture; radiopharmaceutical manufacturing; and geothermal energy production.
- If the PA or site review indicates that the donor material may be from one of the industries listed above or field screening results are above receiving site background, and the material will still be considered as a potential source of alternative fill, contact the Department's Bureau of Environmental Radiation for sample collection and analytical requirements.

Guidance on radiological assessment is contained in Field Sampling Procedures Manual Chapter 12. Pursuant to N.J.A.C. 7:28-12 (Remediation Standards for Radioactive Materials http://www.state.nj.us/dep/rpp/njacdown.html) and as stated on the Department's web site for radiation (http://www.state.nj.us/dep/rpp/rms/rad_cleanups.htm), staff of the Bureau of Environmental Radiation provide technical support to the SRP on the investigation and remediation of radiologically contaminated sites in New Jersey, specifically, those contaminated

1 Technologically enhanced naturally occurring radioactive materials (TENORM) is defined at N.J.A.C. 7:28-1.4 as any naturally occurring radioactive materials whose radionuclide concentrations or potential for human exposure have been increased by any human activities.

with anthropogenic radionuclide contamination. The LSRP program (http://www.nj.gov/dep/srp/) applies to these sites with one notable exception; the LSRP cannot approve and implement any work regarding the anthropogenic radionuclide contamination without first obtaining Department approval. Regulations, guidance, and a spreadsheet is available for download to assist LSRPs, consultants and responsible parties in complying with cleanup and backfill requirements.

Contact the Department's Bureau of Environmental Radiation for further guidance:

New Jersey Department of Environmental Protection
Bureau of Environmental Radiation
25 Arctic Parkway
Mailcode 25-01
PO Box 420
Trenton, New Jersey 08625-0420
(609) 984-5400 (voice)
(609) 633-2210 (FAX)
rpp@dep.nj.gov

4.7.8. Asbestos-Containing Material Exclusion

Because the Department does not have standards or criteria for asbestos (i.e., naturally occurring or asbestos-containing material (ACM, i.e., material containing >1% asbestos)) in soil or non-soil material, the Department recommends that donor material containing or potentially containing asbestos not be used as alternative fill. The presence or potential presence of asbestos in proposed alternative fill may be determined through a PA, other site review, on-site visual observations, and/or sample collection and analysis. Properties where buildings have been demolished are of particular concern, unless acceptable documentation exists and is reviewed to determine that ACM has been removed and properly disposed in accordance with all federal, state, and local laws, rules, regulations, and guidance. If an assessment of asbestos in soil for material being considered for placement is done and the results exceed 1%, the Department recommends that the material not be used as alternative fill.

It is important to note that asbestos measured as <1% in samples of potential donor material (while historically used by the Department on a site-specific basis to indicate that asbestos did not require remediation) may not be a reliable determination of the absence of asbestos or that no hazard or risk from asbestos is present from the use of such material as alternative fill. For more background on this issue, the investigator can consult the USEPA's Framework for Investigating Asbestos-Contaminated Superfund Sites (USEPA 2008) and 40 CFR Part 61 Subpart M, National Emission Standard for Asbestos.

4.7.9. Use of Asphalt Millings (Recycled Asphalt Pavement) at SRP Sites

This section describes the appropriate use of asphalt millings at SRP sites in conjunction with the implementation of a remedial action at an AOC. Any proposed use of asphalt millings in an area not defined as an AOC (i.e., clean area of the site) is outside the purview of Site Remediation, and therefore, such use must comply with the standards specified at the asphalt millings legislation (P.L. 2017, c. 325, https://www.njleg.state.nj.us/2016/Bills/PL17/325_.PDF). Uses of asphalt millings that are outside of the purview of the SRP, but do not meet the standards specified in the

above legislation, would be subject to review and approval by the Division of Solid and Hazardous Waste (DSHW).

4.7.9.1. Asphalt Millings as part of an Engineering Control

Asphalt millings may be used as a component of an engineering control at an SRP site when used:

1. As a sub-base aggregate under roads, parking lots, or building/slabs foundations and sidewalks at an AOC where the asphalt millings are being utilized as a component of an engineering control.
2. As an unbound surfacing material if an appropriate additive is utilized to stabilize and contain the asphalt millings at an AOC. Some examples of additives include foaming bitumen, emulsions, cementitious materials, or other appropriate technologies/products.

For uses 1 and 2 described above, the asphalt millings are not considered alternative fill as they are acting as a structural component of an engineering control, and as such, the like-on-like, 75th percentile, and MGW provisions of this guidance document do not apply. The thickness of the asphalt millings needs to be consistent with that required by standard engineering design specifications to support the final engineered surface. For example, if a 4-inch-thick asphalt pavement cap requires a 6-inch sub-base of three-quarter inch dense grade aggregate, and asphalt millings are proposed as a substitute material for the dense grade aggregate, then six inches of asphalt millings should be proposed. In all instances, the use of asphalt millings as a component of an engineering control must be appropriate for its intended future use, remain integral, and be protective of public health, safety, and the environment.

4.7.9.2. Asphalt Millings used as Alternative Fill

Asphalt millings may be used as an alternative fill at an SRP site when used as general fill used to backfill an excavation or raise site topography provided that the like-on-like, 75th percentile, and MGW evaluation and other provisions of this document are met.

Pursuant to N.J.A.C. 7:26E-5 and N.J.A.C. 7:26C-7, asphalt millings must be included in the deed notice and addressed with a Soil Remedial Action Permit when used as alternative fill. Pursuant to N.J.A.C. 7:26E-5.2(b) and (c), submittal of a FUP and Department pre-approval are required prior to use. Proposed uses of asphalt millings outside of those described above require the same evaluation described in this technical guidance for other types of alternative fill.

4.8. Other Requirements

4.8.1. Engineering and Institutional Controls

Sites that import alternative fill usually include engineering and institutional controls as potential components of the remedy where these components are necessary to achieve protection of public health, safety, and the environment through mitigation of exposure. Examples of engineering controls include:

- Caps;
- Barrier walls;

- Building slabs;
- Gas control and leachate control systems; and
- Vapor intrusion barriers or mitigation systems.

Where barrier walls are employed, they should be installed prior to placement of alternative fill, where practicable, and consistent with good engineering practice. If the placement of alternative fill is likely to damage the barrier wall, the installation of the barrier wall may need to be conducted after the alternative fill has been emplaced.

Specific requirements for (1) establishing and maintaining engineering and institutional controls, including requirements for deed notices; (2) long-term operation, maintenance, and monitoring program; and (3) Remedial Action Permits are detailed in the Technical Rules at N.J.A.C. 7:26E-5 and ARRCS at N.J.A.C. 7:26C-7.

In the event that placement of alternative fill as part of a site remedy leads to unforeseen off-site migration of contamination, an increase in extent of contaminated area, and/or adverse impacts to human receptors or sensitive ecological receptors (i.e., environmentally sensitive natural resources), construction of appropriate remedial actions is to be initiated as soon as is practicable to address these problems. The FUP shall include a narrative description of the erosion control measures and engineering controls that demonstrate how all alternative fill placed at the site will be contained during completion of the remedial action, which should include, as applicable, PE certifications and design drawings.

4.8.2. Tracking and Record Keeping

All incoming shipments of alternative fill must be accompanied by fully executed bills of lading or manifests that clearly document that the incoming alternative fill is from the approved donor site, and copies of these forms provided to the Department with the RAR. It is important that the RAR (including the deed notice) and Soil Remedial Action Permit and/or Remedial Action Protectiveness Certifications contain all documentation demonstrating compliance with N.J.A.C. 7:26E-5.2(b, c, e, g & h) and this technical guidance, including the analytical data, volume and thickness (with surveyed elevations of existing grade and top of alternative fill), and area(s) where alternative fill has been placed (post-grading and consolidation) on the site or AOC.

4.9. Pre-Approval Process for Alternative Fill

Preapproval is required, pursuant to N.J.A.C. 7:26E-5.2(c), when the alternative fill:

1. Contains a contaminant that is not already present at the receiving AOC above the applicable remediation standard(s) or criteria.
2. Contains a contaminant concentration above the 75th percentile of the existing contaminants' concentration in the receiving AOC; or
3. Causes an exceedance of the pre-remediation topography and elevation of the receiving AOC.

If the use of alternative fill will not meet the requirements of N.J.A.C. 7:26E-5.2(b) (like-on-like, 75th percentile, or the use of alternative fill above pre-remediation topography), it is required that the investigator obtain pre-approval pursuant to N.J.A.C. 7:26E-5.2(c).

It is important to note, N.J.A.C. 7:26E-1.7(b)7 prohibits requesting a variance that eliminates the requirement to obtain DEP's written pre-approval as stated in N.J.A.C. 7:26E-5.2(c).

This pre-approval process is effective as of August 6, 2018, the date that amendments to the Technical Rules, N.J.A.C. 7:26E, were adopted.

Fill use projects are frequently very complex. Identifying and resolving major issues as soon as possible is beneficial to all parties. As such, the recommended process for requesting this pre-approval is as follows (Figure 1):

Step 1 - Conference Call: The investigator is encouraged to request a conference call with the Department's Fill Material Guidance contacts at the earliest date possible to discuss the conceptual approach.

Step 2 - Technical Meeting: The investigator is encouraged to request a technical meeting once the design has been formalized. Providing a preliminary RAW which includes the FUP would be beneficial to the Department in advance of the technical meeting for review. The Department considers the FUP and checklist as critical elements of the pre-approval process and the FUP should include the information listed in Section 4.9. In addition, the investigator should include any public outreach plans, as mentioned in Section 3.11. The provided information will be used to evaluate the compliance of the proposal with this technical guidance.

Step 3 - Administratively Complete Pre-approval Proposal: The investigator should ensure the pre-approval proposal is administratively complete to allow the Department to commence formal review. An administratively complete proposal includes:

- A narrative explaining why alternative fill must be used for this remedial action, and documentation of how the like-on-like and 75th percentiles were determined. Include a detailed description of why and how this option minimizes the amount of alternative fill needed to complete the remedial action.
- All applicable supporting documents listed in the FUP (Appendix B).
- Public notification pursuant to N.J.A.C. 7:26C-1.7(i & k) will need to be addressed as part of the Fill Use Plan submission (Step 4) and prior to any importation of material.

The local community or municipality may be impacted if the use of alternative fill will not meet the requirements of N.J.A.C. 7:26E-5.2(b) (like-on-like, 75th percentile, or the use of alternative fill above pre-remediation topography), and it is necessary to develop a plan and obtain pre-approval pursuant to N.J.A.C. 7:26E-5.2(c). As such, the PRCR must conduct public notification in accordance with ARRCS at N.J.A.C. 7:26C-1.7(i) & (k). Additional details are discussed in Sections 3.11 and 4.9.2 of this guidance and the Fill Use Plan checklist (Appendix B).

Step 4 - Submission of Pre-approval Proposal: The investigator should submit the administratively complete pre-approval proposal with the RAW, focusing on the FUP, by completing the RAW service using the report upload page (standard submission to the Department via the e-portal). The Department understands that the RAW is not a key document. However, the Department requires the information contained in the RAW to process the pre-approval proposal. Assuming steps 1 through 3 have been completed, the Department anticipates providing a formal letter response with the determination within 45 days of submission of the completed pre-approval proposal.

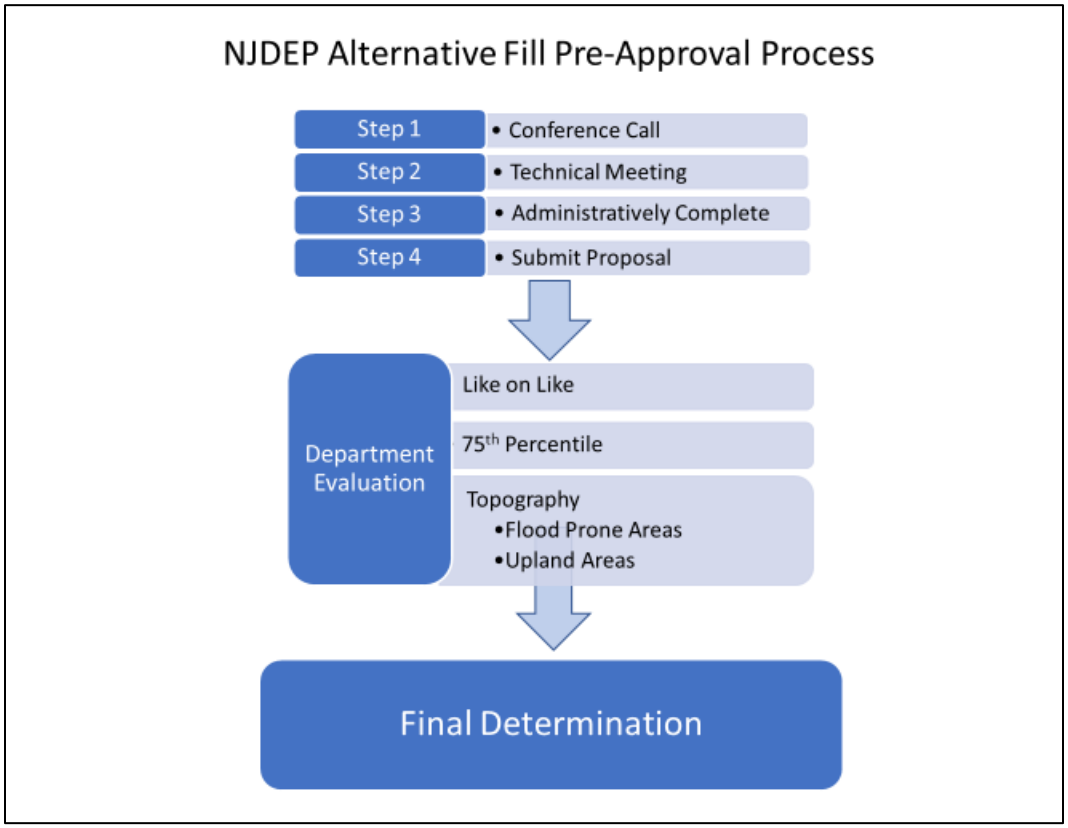


Figure 1. Alternative Fill Pre-Approval Process

4.9.1. Pre-approval Evaluation Criteria for Alternative Fill that does not Comply with Like-On-Like Requirement

The like-on-like requirements are stated in Section 4.2; the basic tenet is that the contaminants in the donor material used as alternative fill must be present in the receiving AOC. Allowing the use of alternative fill with contaminants not already present in an AOC would constitute an additional discharge as defined at N.J.A.C. 7:26E-1.8. Furthermore, the use of alternative fill in this situation would be de facto landfilling (i.e., the "placement" of new wastes) without complying with the Department's solid and hazardous waste regulations. If the investigator chooses to request placement of alternative fill that varies from the like-on-like requirement, then preapproval is required pursuant to N.J.A.C 7:26E 5.2(c). The Department will evaluate these proposals as per Appendix C.

4.9.2. Pre-approval Evaluation Criteria for Alternative Fill that Exceeds 75th Percentile Requirement

The 75th percentile requirements are stated in Section 4.3; the basic tenet is that the contaminant concentrations in the donor material used as alternative fill may not exceed the contaminant concentrations already known to exist in a receiving AOC. If the investigator chooses to request placement of alternative fill that varies from the 75th percentile requirement, then preapproval is required pursuant to N.J.A.C 7:26E 5.2(c). The Department will evaluate these proposals as per Appendix C.

4.9.3. Pre-approval Evaluation Criteria for Alternative Fill that Exceeds Original Grade

Preapproval is required, pursuant to N.J.A.C. 7:26E-5.2(c), when the alternative fill causes an exceedance of the pre-remediation topography and elevation of the receiving AOC. If the investigator chooses to request placement of alternative fill that exceeds original site grade, justification for such a request is required.

Remediation needs are the primary goal of the alternative fill evaluation. Redevelopment design objectives should not be the primary goal to use alternative fill. Although the Department will entertain the use of alternative fill above the pre-remediation topography elevations for bona fide redevelopment projects, when and where it is needed, there is an expectation that remediating parties and developers will incorporate design features or implement other appropriate strategies to **minimize** the volume of alternative fill above the pre-remediation topography elevation and limit the volume only to that which is absolutely required to complete the remedial action. Therefore, the Department encourages those anticipating the use of alternative fill above pre-remediation topography elevations for remediation and/or redevelopment to request a pre-application meeting to discuss the design of the vertical development.

Considerations that the Department would include in the evaluation are as follows:

- Is the proposed fill volume the minimum required to accomplish the needed remediation?
- Have all steps been taken to minimize the fill volume needed, including design modification of the remedial action proposed?
- Will the requested fill volume result in significant alteration of the remedial action needed or are additional remedial measures needed solely to accommodate the alternative fill volume being proposed?
- Is alternative fill still needed to level the grade following all reasonable efforts to do so with the existing material present at the AOC?
- Is the alternative fill volume primarily for redevelopment purposes or to generate revenue to support the redevelopment?
- Is the alternative fill needed to increase grade elevation as required by the Stormwater Management Plan?
- Is the fill needed to accommodate essential redevelopment features?
- Is the alternative fill being utilized to comply with a municipal ordinance?

- Is the alternative fill being used to address existing construction obstacles or other physical hazards; and/or to achieve greater sustainability, improve resiliency, use of green infrastructure, or accomplish other specific DEP-supported environmental, social, or economic goals (e.g., renewable energy, open space, etc.)?
- Is alternative fill needed to increase grade elevation to improve resiliency/sustainability to flooding?

While the remediation and redevelopment of contaminated sites typically results in a positive environmental, economic, and social benefit to the affected community, the importation and placement of additional contaminated material may raise concerns with the host municipality and neighboring communities. Those concerns, real or perceived, may include:

- a greater risk to public health and safety or the environment resulting from a greater volume of contaminated material;
- design concerns for the proper management of imported material, such as slope stabilization or erosion;
- increased truck traffic and associated impacts resulting from the transportation of contaminated fill, such as diesel emissions, noise, risks to pedestrians and damage to roads;
- exposure concerns associated with the transportation of contaminated fill; and
- extending the duration of the remediation and redevelopment to accommodate the importation and management of an increased volume of fill material.

To ensure full transparency and ensure that the host community and others affected are fully informed of both the positive and negative attributes of a remediation/redevelopment project involving the use of alternative fill above the pre-remediation topography elevations, the PRCR will be required to engage the host and affected communities by meeting the notification and reporting requirements set forth at N.J.A.C. 7:26C-1.7(i & k) and by providing the details of the project; the chemical composition, characteristics, estimated total quantity of the alternative fill, and the volume of alternative fill that exceeds pre-remediation topography elevations; and detailing the reasonably anticipated direct and indirect positive and negative impacts of the project. A FUP, developed in accordance with this guidance document, must also be provided to the affected communities. It should be noted that the preparation of a FUP is required as part of a RAW pursuant to N.J.A.C. 7:26E-5.2(h), and that ARRCS at N.J.A.C. 7:26C-1.7(i) requires submission of the RAW to various local governmental agencies. Refer to Section 3.11 for additional detail.

PRCRs and investigators are reminded that local communities and municipalities may require formal municipal Planning Board or Zoning Board approval and, in some cases, approval by the regional planning entity (i.e., Highlands Council, Pinelands Commission, Meadowlands District) following a formal public meeting. The requirement for these meetings is outside of the purview of the Department.

When the complexity of the site dictates, it is strongly recommended that the FUP include PE certifications and design drawings as specified in Appendix B. The LSRP should determine when such complexities exist and seek the input of a PE, as appropriate. Design plans should indicate

the total quantity of fill material required, engineering controls to be employed to contain the alternative fill above the pre-remediation topography elevations and protect the public from exposure should be documented in the FUP. At the completion of the project, an as-built survey of engineering controls shall be incorporated into the deed notice to document that engineering controls were constructed pursuant to the certified design. Any modification to the remedial design will need to be documented in the RAR, including documentation of protectiveness of public health, safety, and environment.

The FUP containing the request to use alternative fill at elevations above pre-remediation topography elevations shall be certified by the LSRP and the PRCR. As stated previously, written pre-approval from the Department shall be obtained prior to the use of alternative fill at elevations above pre-remediation topography elevations.

For projects subject to Remediation Funding Source (RFS) requirements, as a condition of FUP approval, the Department will require that the RFS be amended to include the cost to complete the construction of all engineering controls necessary to cap the alternative fill material imported to the site. For projects that are not subject to RFS requirements, be advised that the Department, pursuant to N.J.A.C. 7:26E-1.5(f) and N.J.A.C. 7:26C-1.7(h)1, will require the PRCR to provide semi-annual reports describing the status and projected completion date of the capping project as a condition of FUP approval.

The General Requirements for the use of Alternative Fill and the Fill Use Plan Checklist, both located in Appendix B, should be consulted to ensure all relevant information needed for the Department's evaluation is submitted, as per Step 3 in Section 4.9 above.

4.9.4. Evaluation of Alternative Fill that Exceeds Original Grade for Areas Subject to Flooding

Flood zone evaluations must consider a dynamic environment subject to erosion and soil movement by the elements of nature; placement will depend on site-specific conditions.

In reviewing these potential alternative fill proposals for which the volume of alternative fill is above pre-remediation topography elevations, the Department will examine several factors. The pre-approval request should include all relevant information and technical justification for the fill volume being proposed to support the use of alternative fill that exceeds original grade. Information to include with the description of the proposed remedial action should include the following, as applicable:

- Documentation of compliance with like-on-like
- Documentation of compliance with 75th percentile
- Existing ground elevation
- Proposed final ground elevation
- Cut and fill calculations, site maps, and cross-sections
- Documentation to support the FEMA 100-year flood elevation or equivalent metric
- Known historic flood elevation measurements

- Mean high water elevation
- Spring high water elevation
- Identification and location of wetlands and associated transition areas including Letters of Interpretation (LOI)
- Identification of all applicable permits, including flood hazard, storm water control, and wetland permits

Remediation needs are the primary goal of the alternative fill evaluation. Redevelopment design objectives are not an acceptable technical reason to use alternative fill. Considerations that the Department would include in the evaluation are as follows:

- Is the proposed fill volume the minimum required to accomplish the needed remediation?
- Have all steps been taken to minimize the fill volume needed, including design modification of the remedial action proposed?
- Will the requested fill volume result in significant alteration of the remedial action needed or are additional remedial measures needed solely to accommodate the alternative fill volume being proposed?
- Is alternative fill still needed to level the grade following all reasonable efforts to do so with the existing material present at the AOC?
- Is the alternative fill volume primarily for redevelopment purposes or to generate revenue to support the redevelopment?

4.9.5. Evaluation of Alternative Fill that Exceeds Original Grade for Upland Areas

In reviewing the potential alternative fill proposals above pre-remediation topography elevations in upland areas (areas that are not wetlands/floodplains), the Department will evaluate the same factors listed for areas subject to flooding but will exclude those that are related to water elevations. As in the previous section, the pre-approval request should include all relevant information to support the use of alternative fill as part of the proposed remedial action.

Information to include with the description of the proposed remedial action should include the following:

- Documentation of compliance with like-on-like
- Documentation of compliance with 75th percentile
- Existing ground elevation
- Proposed final ground elevation
- Cut and fill calculations, site maps, and cross-sections
- Documentation that site is not within a FEMA 100 -year flood elevation area
- Storm water control requirements
- Permit approvals required or obtained

5. ALTERNATIVE FILL FROM ON-SITE SOURCES

Contaminated material excavated from on-site sources are the subject of this section. On-site is defined as material from inside the contiguous lots and blocks of the original site.

5.1. AOC Data Evaluation

All AOCs, donor and receiving, must be delineated, and the physical and chemical properties of the soil must be compatible. Ideally, contaminant concentrations should be similar, but as long as the remediation requirements of the Technical Rules (Subchapter 5) for a remedial action are met, it is acceptable to move higher contaminant concentrations to an AOC with lower contaminant concentrations (see Section 5.2). The Department may allow an exemption of 75th and like-on-like requirement with the movement of alternative fill from a donor AOC to a receiving AOC (see Section 5.3).

Movement of hazardous waste is prohibited. Hazardous waste once excavated may not be reused on site and must be disposed of accordingly.

5.1.1. Composite Sampling

With the two exceptions noted below, composite samples may not be used for compliance with Table 2 sampling frequencies. In general, the fewer the number of samples in a composite, the more representative the composite data will be. Composite samples effectively "dilute" material that may have elevated concentrations and make it impossible to determine whether the standards, criteria, or screening levels have been met. Additionally, composite sampling is typically conducted over large volumes, and when a composite sample result exceeds a standard/criterion, one cannot determine the location of the specific soils responsible for the exceedance.

The Department will consider the use of composite data as follows:

1. For dredged material data obtained to support the Department's ODST. For additional information, see Section 4.7.4; or
2. Composite data, deemed appropriate by the investigator in terms of its representativeness and reliability to adequately characterize the alternative fill, may be used to **supplement** the discrete sampling required in Table 1. Composite data may not be used as the only line of evidence to characterize fill. If the investigator determines the composite data to be reliable, it may be used to reduce the discrete sampling required.

If composite data will be utilized, the following procedures should be used:

1. A minimum of 70% of the donor material volume should be characterized using discrete sampling, as per the frequency contained in Table 1*;
2. The volume of donor material that a composite sample represents should not exceed a volume greater than 5 times a discrete sample volume as contained in Table 1;
3. The composite sample should not be comprised of more than 5 discrete subsamples of equal sample weight;

4. Composite sampling should be implemented in a manner such that samples are collected throughout the donor material (i.e., at various depths) to ensure the entire pile is adequately characterized;
5. Because composite sample data represents an average, the donor site composite sample data should be compared to the *receiving AOC arithmetic mean* (and not the 75th percentile); and
6. If the composite sample data for a specific volume of donor material exceeds the applicable acceptance criteria, then the entire volume of donor material associated with the composite sample should be rejected for use at the receiving area.

*Any proposed deviation from the use of composite sampling as described above to characterize donor material needs to be technically justified. It is strongly recommended that the investigator contact the Department for a technical consultation, prior to fill importation, to discuss the deviation.

Details for the procedures above and an example can be found in Appendix D.

When using composite data, the investigator should take the following considerations into account:

- The site from which the donor fill material is associated with should be well characterized. This is typically accomplished through the PA/SI and RI process.
- The use of composite sample data constitutes a departure from the use of discrete grab samples to characterize alternative fill and is a departure from sampling frequency that requires justification by the investigator.
- The investigator should clearly document the volume of material and the composite sample frequency.
- The composite sampling locations (grids and sub-grids) should be shown on a scaled site plan. If this data is not available for inclusion in the Fill Use Plan, then it should be included in the next key document submission;
- Sampling methodologies should be consistent with the FSPM and constituted of laboratory data of known quality;
- Composite samples are not acceptable for VOC characterization as specified by the latest version of the FSPM (NJDEP, 2005). Discrete samples for VOC analysis can be collected from one of the sub-samples used for compositing, which should be biased to the highest field screening results, odors, and/or other indicators of VOC contamination.

The investigator should be mindful of the Data Quality Objectives for the sample collection and analysis process, including the sensitivity of the analysis. This evaluation should aid in the determination of the use of this material to supplement discrete sampling.

5.1.2. Sampling Frequency Modifications

The sampling frequencies to be used to establish the characteristics of potential donor material are summarized in Table 1. There are two sampling frequencies listed in Table 1 – (1) Default

Sampling and (2) Reduced Sampling. In general, the default sampling is used for donor material with little or no prior data, and the reduced sampling frequency is utilized where there has been some prior assessment of the fill source (e.g., site review, existing data). **Further reductions beyond the reduced sampling frequency in Table 1 are permitted.** These further reductions would be based upon an evaluation of the source material consistent with the concepts in this guidance. Departure from the default or reduced sampling frequencies requires appropriate justification. It is recommended that the Department be consulted before implementation of any further reductions of the reduced sampling frequency. Conversely, depending upon the site conditions and heterogeneity of the donor material, the investigator may elect to conduct additional sampling *beyond* that outlined in Table 1.

5.2. Movement of On-Site Alternative Fill without Department Pre-Approval

Pursuant to N.J.A.C. 7:26E -5.2(d)1, the investigator may move alternative fill from a donor AOC to a receiving AOC provided that the individual contaminants present in the donor AOC are also present in the receiving AOC at concentrations above applicable remediation standards. The movement of alternative fill as per the above does not require Department pre-approval.

For on-site movement of contaminated soil, consolidation is encouraged as long as it enhances the final remedial action. The Department will allow exceptions to the 75th percentile requirement in this technical guidance and the sampling frequencies in Table 1 in this technical guidance if all four of the following requirements are met:

1. The consolidation will not result in or increase contamination of ground water at the receiving AOC, as per N.J.A.C. 7:26E-5.1(d)3 (see Section 4.6.2 of this guidance);
2. The consolidation will not result in the mixing of incompatible contaminants or creation of a vapor intrusion pathway at the receiving AOC, as per N.J.A.C. 7:26E-5.1(d)3;
3. The alternative fill being moved shall not contain any hazardous waste, as per N.J.A.C. 7:26E-5.2(f); and
4. The alternative fill being moved shall not contain any free liquid waste, as per N.J.A.C. 7:26E-5.2(g).

5.3. Movement of Alternative Fill that Requires Prior Written Approval from the Department

The movement of alternative fill to a clean area of the site is prohibited. The Department will allow exceptions to the like-on-like and 75th percentile requirements if the individual contaminants present in the alternative fill (donor AOC) and receiving area are not the same. This movement of on-site alternative fill should be technically justified as part of a written request. It is **strongly recommended** that an investigator proposing to implement the above procedure request a technical consultation to present technical justification to the Department prior to the movement of alternative fill.

The on-site movement of alternative fill that does not meet the like-on-like and 75th percentile requirements must comply with requirements 1 through 4 above, and the following additional conditions:

1. **A clean area is created**. A clean area that meets both the residential ingestion-dermal and inhalation standards, and migration to ground water standards, must be created at the donor AOC by the movement of alternative fill to the receiving AOC.

   AND

2. **Total area of contamination is reduced.** The movement of alternative fill results in a 25% reduction of the areal extent of contamination at the donor AOC.

5.4. Exceptions for 75th Percentile and Movement of Historic Fill at SRP Redevelopment Sites

A special case of historic fill relocation across property lines is applicable to SRP redevelopment sites that include multiple contiguous properties containing historic fill (e.g., a Department-designated Brownfield Development Area). In order to conduct the like-on-like comparison, sampling of both the donor and receiving sites needs to occur. The historic fill should be investigated at a sampling frequency of four samples per acre as recommended in the Department's Historic Fill Technical Guidance. Chemical analyses should include base neutrals and metals (other parameters may need to be analyzed based on site specific information). On-site relocation of historic fill can be performed provided the following:

- Donor and receiving areas meet the like-on-like requirement. If the like-on-like requirement is not met, as per N.J.A.C. 7:26E-5.2(b)1, then the Department pre-approval is required pursuant to N.J.A.C. 7:26E-5.2(c);
- It will not result in, or increase, ground water contamination;
- Placement of historic fill is protective of public health, safety, and environment; and
- All historic fill at the site is remediated in accordance with the Technical Rules.

5.5. Material Considerations

The material considerations identified in Section 4.7 also apply to on-site alternative fill sources.

5.6. Tracking and Record Keeping

It is important that the RAR (including the deed notice) and the remedial action permit for soil and/or biennial certifications contain all documentation demonstrating compliance with N.J.A.C. 7:26E-5.2(b), (c), (e), and (f) and this technical guidance, including the relevant analytical data, the volume and thickness (with surveyed elevations for existing grade and top of alternative fill), and area(s) where alternative fill has been moved from and placed (post grading and consolidation) on the site or AOC.

6. CLEAN FILL

6.1. Purpose

This section applies to both off-site and on-site sources of clean fill as defined in the Technical Rules (N.J.A.C. 7:26E-1.8). The overall objective is that the proposed clean fill be thoroughly evaluated as to the types and concentrations of contaminants, and to homogeneity, so contaminated fill is not unintentionally placed as clean fill that could result in the need for additional remediation. Clean fill is generally required for the implementation of presumptive remedies to be protective of sensitive receptors. Unlike the certification for quarry material in Section 7, there is no certification for clean fill; all clean fill requires sampling in accordance with Section 6 of this guidance.

The guidance in this section applies strictly to the use of clean fill for remediation at SRP sites. The SRWMP does not regulate or approve products at their point of manufacture when they are not destined to be part of the remediation at an SRP site. The use of clean fill at non-SRP sites is beyond the scope and authority of the SRWMP regulations. Because the SRP regulates sites where a discharge has occurred, this technical guidance is not designed to address or be applied to other situations.

6.2. Sampling the Material Proposed for Clean Fill

Donor material proposed for use as clean fill on a SRP site should be thoroughly evaluated through a review of the source history and operations to develop a sampling and analysis strategy in accordance with the Technical Rules, this technical guidance, the EPH Protocol or Guidance, and the Department's Field Sampling Procedures Manual (NJDEP, 2005). Many potential sources generate clean fill, topsoil, or manufactured soil for sale based on a blending process, often including mulched, composted organic materials (e.g., grass clipping or leaves) or peat moss. These sources should be sampled and analyzed after the blending process, but before placement at the receiving AOC. Professional judgment should be used to sample each component separately before blending if there is a cause for concern with contaminant concentrations in the separate materials. Blending contaminated material with clean material at the receiving AOC or at the donor source location to meet the definition of clean fill via dilution is not acceptable. Other sources of clean fill can include construction projects where topsoil is stripped and sold prior to construction or contaminated material that has been treated so it meets the definition of clean fill. Therefore, there are different concerns that should be addressed in the evaluation, sampling, and analysis of each source type. Source locations may be in-state or out-of-state.

Subsequent to clean cap installation, many clean fill caps include installation of grass sod and/or landscaping. Unless grass sod placed on top of clean fill is considered part of a cap, sod would not need sampling and analysis. In addition, soil in root balls of shrubs and trees planted in a clean fill cap would not need sampling and analysis.

Sampling of the proposed clean fill should be based on a systematic approach whereby the investigator will have assurance that the results accurately represent the clean fill characteristics. A series of field screened, discrete grab samples should be collected, biased to areas that may indicate the proposed clean fill is actually contaminated (based on the site review). Where biased sampling is not necessary or only a few biased samples are needed, the investigator should use

grid-based, random sampling procedures using accepted USEPA guidance or other statistically appropriate references (e.g., Gilbert 1987). For undisturbed in-situ material, collect samples at the surface and at depth to ensure that the samples are representative of the total volume of material that may be used as clean fill. Where a large stockpile of proposed clean fill has already been staged and can be maintained for use on a specific project, then the sampling should be statistically designed to collect representative samples from the surface and interior of the stockpile. Very large stockpiles may need regrading to smaller sizes to allow for practical physical access for sampling. Note that carcinogenic PAHs may not be grouped as allowed for alternative fill in Appendix C of this guidance, because this would not meet the definition of clean fill at N.J.A.C. 7:26E-1.8.

6.2.1. Composite Sampling

With the two exceptions noted below, composite samples may not be used for compliance with Table 2 sampling frequencies. In general, the fewer the number of samples in a composite, the more representative the composite data will be. Composite samples effectively "dilute" material that may have elevated concentrations and make it impossible to determine whether the standards, criteria, or screening levels have been met. Additionally, composite sampling is typically conducted over large volumes, and when a composite sample result exceeds a standard/criterion, one cannot determine the location of the specific soils responsible for the exceedance.

The Department will consider the use of composite data as follows:

1. For dredged material data obtained to support the Department's ODST. For additional information, see Section 4.7.4; or
2. Composite data, deemed appropriate by the investigator in terms of its representativeness and reliability to adequately characterize the alternative fill, may be used to **supplement** the discrete sampling required in Table 1. Composite data may not be used as the only line of evidence to characterize fill. If the investigator determines the composite data to be reliable, it may be used to reduce the discrete sampling required.

If composite data will be utilized, the following procedures should be used:

1. A minimum of 70% of the donor material volume should be characterized using discrete sampling, as per the frequency contained in Table 1*;
2. The volume of donor material that a composite sample represents should not exceed a volume greater than 5 times a discrete sample volume as contained in Table 1;
3. Composite sampling should be implemented in a manner such that samples are collected throughout the donor material (i.e., at various depths) to ensure the entire pile is adequately characterized;
4. If the composite sample data for a specific volume of donor material exceeds the applicable standard, then the entire volume of donor material associated with the composite sample should be rejected for use at the receiving area; and
5. Discrete and composite sample results must be compared to the most stringent of the soil ingestion/dermal, soil inhalation, and migration to groundwater standards or site-specific

alternative standards (not the 75th percentile or arithmetic mean) to meet the definition of clean at N.J.A.C. 7:26E-1.8.

*Any proposed deviation from the use of composite sampling as described above to characterize donor material needs to be technically justified. It is strongly recommended that the investigator contact the Department for a technical consultation, prior to fill importation, to discuss the deviation.

Details for the procedures above and an example can be found in Appendix D.

When using composite data, the investigator should take the following considerations into account:

- The site from which the donor fill material is associated with should be well characterized. This is typically accomplished through the PA/SI and RI process.
- The use of composite sample data constitutes a departure from the use of discrete grab samples to characterize fill and is a departure from sampling frequency that requires justification by the investigator.
- The investigator should clearly document the volume of material and the composite sample frequency.
- The composite sampling locations (grids and sub-grids) should be shown on a scaled site plan. If this data is not available for inclusion in the Fill Use Plan, then it should be included in the next key document submission;
- Sampling methodologies should be consistent with the FSPM and constituted of laboratory data of known quality;
- Composite samples are not acceptable for VOC characterization as specified by the latest version of the FSPM (NJDEP, 2005). Discrete samples for VOC analysis can be collected from one of the sub-samples used for compositing, which should be biased to the highest field screening results, odors, and/or other indicators of VOC contamination.

The investigator should be mindful of the Data Quality Objectives for the sample collection and analysis process, including the sensitivity of the analysis. This evaluation should aid in the determination of the use of this material to supplement discrete sampling.

6.2.2. Sampling Frequency Modifications

The sampling frequencies that should be used to establish the characteristics of a potential clean fill source are summarized in Table 2. The sampling frequencies in Table 2 are based on the collection of discrete grab samples. Note that there are two sampling frequencies listed in Table 2 – Default Sampling and Reduced Sampling. In general, the default sampling is used for a source with little or no prior data, and the reduced sampling frequency is used where there has been some prior assessment of the clean fill source (e.g., site review, prior sampling). Further reductions in sampling frequency are permitted, with justification. These further reductions would be based upon an evaluation of the source material consistent with the concepts in this guidance. Departure from the default or reduced sampling frequencies requires appropriate justification in the next key document submission. It is recommended that the Department be consulted before implementation

of any further reductions of the reduced sampling frequency. Conversely, depending upon the site conditions and heterogeneity of the donor material, the investigator may elect to conduct additional sampling *beyond* that outlined in Table 2.

Table 2: Sampling Frequency Guide for Clean Fill

Proposed Volume	Default Sampling Frequency Without Justification	Reduced Frequency With Justification
(Cubic Yards)	(Samples)	(Samples)
0 to 20	1	1
20.1 to 40	2	2
40.1 to 60	3	2
60.1 to 80	4	2
80.1 to 100	5	2
100.1 to 200	6	3
200.1 to 300	7	3
300.1 to 400	8	4
400.1 to 500	9	4
500.1 to 600	10	5
600.1 to 700	11	5
700.1 to 800	12	6
800.1 to 900	13	6
900.1 to 1,000	14	7
1,000.1 to 2,000	15	8
2,000.1 to 3,000	16	9
3,000.1 to 4,000	17	10
4,000.1 to 5,000	18	11
5,000.1 to 6,000	19	12
6,000.1 to 7,000	20	13
7,000.1 to 8,000	21	14
8,000.1 to 9,000	22	15
9,000.1 to 10,000	23	16
10,000.1 to 11,000 *	24	17
*For volumes greater than 11,000 cubic yards, the sampling rate is 1 additional sample per each additional 1,000 cubic yards. The sampling frequency may be reduced with appropriate justification for either the default or reduced sampling frequencies.		

In most cases, modifications in sampling frequencies and analytical requirements will be based upon: (1) an understanding of the donor site's current and historical use and/or (2) reliable sampling data as discussed below.

- Because a donor site is presumed to be "clean", information from a PA will not usually be available. Therefore, a Site Review is conducted to evaluate the donor site's current and historical use, such as historical operations and hazardous substance use. The Site Review can be used to assess the likely types and concentrations of hazardous substances that may be present in site soils, whether from natural or anthropogenic sources. For a Site Review, the investigator should evaluate historical site use from an analysis of a historical aerial photograph review and other site historical information as typically performed for a PA. Other potential sources of useful information may include listings of known contaminated sites and Classification Exception Areas (CEA) on the Department's NJ-GeoWeb GIS, characterization data from nearby sites available through OPRA reviews, and a visual inspection of the donor site for evidence of chemical releases or AOCs.
- Where reliable analytical data are available for the donor site, these data may be used in lieu of, or to supplement, the sampling discussed in this section of the guidance. Unlike alternative fill, data for clean fill will typically not have been generated as part of a SI or RI. The investigator is reminded to assess whether the data accurately reflects the source material (e.g., was it taken from a similar location/soil) and current site conditions (e.g., likelihood of new releases, change in site activities or proximity to impacted properties). As with alternative fill, it is appropriate to consider the likely uniformity of the source material. If the source material is uniform in terms of similar contaminant concentrations (based on existing data) and physical characteristics, some further reduction in frequency may be warranted. This reduction may include testing for a broad suite of analytes on some samples and a reduced suite of analytes on others. Conversely, linear projects such as highway and utility work are less likely to be uniform sites – particularly if they pass through heterogeneous geologic formations and areas with a variety of commercial/industrial uses – and may be less suitable for a reduction in sampling.
- It is expected that clean fill will be analyzed for the Target Analyte List/Target Compound List and EPH.
- This analytical protocol may be modified for all, or just a subset of, the clean fill samples based upon the site review and/or prior reliable sampling data as discussed below.
- The Department does not require analysis of all samples for asbestos, dioxins, hexavalent chromium, or radionuclides, but the potential presence of these contaminants is discussed further later in this section of the guidance and professional judgment with justification should be used to determine whether samples should be collected and analyzed for these potential contaminants.

If the investigator determines that pre-existing data (this includes data from ODST) and/or other information accurately and reliably reflects the source material (e.g., it was taken from a similar location/soil material) and current site conditions, the investigator may rely on this data, provided:

- The analyses were performed by a laboratory certified for those methods by the Department.

- The data meet the data quality requirements in the Technical Rules and all associated Department technical guidance for QA/QC reviews.
- A detailed description of the sample collection methodologies is provided for the source site.
- The material was not moved to another property for storage.

6.3. Elevated Natural Background Consideration

Certain soils or geologic formations are known to contain naturally occurring elements or compounds that can exceed the Department's remediation standards or other criteria. Examples include the glauconitic "greensand" that contains arsenic (Tedrow, 2002) and certain igneous rock formations that contain radionuclides, such as the gneisses in the New Jersey Highlands that release radon gas. For a map of radon potential see https://www.nj.gov/dep/rpp/radon/radonin.htm. Material from such natural sources may not be used as clean fill at SRP sites, unless the receiving AOC and the donor material are from the same natural geologic formation (e.g., both the receiving AOC and the donor material are greensand) or have the same contaminant concentrations.

Should a potential for TENORM (see section 4.7.7) or radionuclides exist or be indicated in the site review, then field screening with a handheld radiation/gamma meter should occur at the donor site. A person qualified and experienced in the use of radiation survey techniques shall conduct the survey. If radiation is found to be present in donor material above natural background levels, do not use the material as clean fill without analytical results and consultation with the Bureau of Environmental Radiation.

6.4. Asbestos-Containing Material Exclusion

Because the Department does not have standards or criteria for asbestos (i.e., naturally occurring or asbestos-containing material (ACM) in soil or other soil-like material), off-site donor source material containing or potentially containing asbestos may not be used as clean fill. The presence or potential presence of asbestos in donor source material may be determined through a PA, other site review, on-site visual observations, or sample collection and analysis. Naturally occurring asbestos can be found in serpentine rock found in Hudson County (Speiser, 1978) or in the Highlands of Sussex County (Germine, 1986).

Properties where buildings have been demolished are of particular concern, unless acceptable documentation exists and is reviewed to determine that ACM has been removed and properly disposed in accordance with all federal, state, and local laws, rules, regulations, and guidance. If an assessment of asbestos for material being considered for placement is performed and the results exceed 1% in soil, the Department recommends that the material not be used as clean fill.

It is important to note that asbestos measured as <1% in donor source may not be a reliable indicator of the absence of asbestos or that no hazard or risk from asbestos is present from the use of such material as clean fill, despite the fact that historically this was used by the Department on a site-specific basis to indicate that asbestos did not require remediation. For more background on this issue, the investigator can consult the USEPA's *Framework for Investigating Asbestos-Contaminated Superfund Sites* (USEPA 2008) and 40 CFR Part 61 Subpart M, *National Emission Standard for Asbestos*.

6.5. Migration to Ground Water Evaluation

An MGW evaluation should not be needed, as clean fill is expected to meet the soil and soil leachate remediation standards for the MGW exposure pathway.

If the soil contaminant concentrations in the donor material are **above** the applicable soil remediation standards for the migration to ground water exposure pathway, then an evaluation of the potential for MGW for the donor fill material should be performed according to the relevant guidance for developing site-specific values, as described in Section 4.6.

6.6. Resource Conservation and Recovery Act Waste Exclusion

Clean fill can be assumed to be nonhazardous because of its definition, so waste classification testing should not be needed. If there is any question whether a clean fill source may be hazardous, then this shall be determined pursuant to N.J.A.C. 7:26G and 40 C.F.R. 261.

6.7. Recycled Concrete and Class B Recyclables

Use of recycled concrete as clean fill is subject to this technical guidance and not the recycled concrete guidance from the Department's DSHW. The SRWMP definition of alternative and clean fill and this technical guidance determines what material can be used at SRP sites as well as how. Previously, DSHW considered Class B recyclables to be clean fill. This is no longer the position of DSHW based on the Legacy Landfill Law (N.J.A.C. 7:26-1.1). Buildings and other structures should be sampled prior to demolition so samples can be biased appropriately. Existing concrete, brick, and block located on site from previously demolished structures should be sampled pursuant to Table 1. Concrete and other recyclables obtained from a Class B recycling facility will require sample collection and analysis using this technical guidance, because the source of the material and contaminant concentrations in the material are not usually known. While intact concrete should not be a concern for migration to ground water, concrete to be used as clean fill is usually processed to achieve smaller sizes suitable for use as fill, which presents more of a concern for migration to ground water. Therefore, the recycled concrete should be evaluated for MGW using Section 6.5 of this technical guidance, if necessary.

6.8. Dioxin Exclusion

Unless donor material may be contaminated with dioxins (e.g., is from a Site or AOC contaminated with dioxins or the donor material is within a migration pathway from such a Site or AOC), analysis for dioxins should not be necessary. If donor material is sampled and analyzed for dioxins, donor material that contains dioxin expressed as TEQs for 2, 3, 7, 8-TCDD at concentrations above the Department's screening/action level or remediation standard in effect at the time the donor material is evaluated should not be used as clean fill at a receiving AOC. Contact the alternative and clean fill representative(s) in the Bureau of Environmental Evaluation and Risk Assessment as listed on the contacts list on the SRWMP web site for the current screening/action level. For most situations, donor material with dioxins less than the Department's screening/action level may be used as clean fill (for soil or sediment) at a receiving AOC without further evaluation under this technical guidance. The exception is when the donor material is used for clean soil and the receiving AOC is part of, or adjacent to, an ecologically sensitive natural resource. In these

situations, a site-specific ecological evaluation should be completed and approved by the Department.

6.9. Sediment

Sediment, inclusive of dredge material (DM) and processed dredge material (PDM), being considered for placement at a SRP site as clean fill is subject to the same requirements as other clean fill sources. Based on the PA or Site Review, if sediments are from a source not known or suspected to be contaminated, and are relatively homogeneous, then such materials are candidates for reduced sampling frequency as described in Section 6.2.2 of this technical guidance. Data for evaluation pursuant to this technical guidance may be obtained from the completion of a Site Investigation/RI or from the Department's Office of Dredging and Sediment Technology (ODST). Collection and analysis of additional samples may be needed to supplement any data obtained from ODST that may not meet the sampling frequencies, analyses, or discrete sampling recommended in this technical guidance.

A concern about processed dredge materials is that the additives used may also be a source of contamination that needs to be assessed. If bench-scale data for PDM is obtained from ODST, then the investigator should evaluate that data to determine if it is sufficient to meet the concepts of this technical guidance. If the investigator determines the bench scale data is either non-representative or the sample frequency is inadequate to ensure compliance with the applicable remediation standards, then discrete samples of the actual PDM may need to be collected and analyzed.

The investigator needs to be aware that the supplier (whether an on-site or off-site person or entity) of sediment as clean fill, must have an Approved Used Determination (AUD) from ODST. The receiving SRP site does not require an AUD, but an approved RAW for the receiving site is required by ODST.

Clean fill proposed for use at a SRP site cannot impact sediment quality at the receiving AOC in a way that is inconsistent with the proposed remedial action. In other words, the proposed remedial action for the receiving AOC must address all sediment issues whether from the existing contamination or the placement of the clean fill.

6.10. Engineering Concerns

Sites that import clean soils or soil-like material (e.g., sediment) that are being placed on top of contamination, may require the use of engineering and institutional controls, such as containment systems, as potential components of the remedy where these components are necessary to achieve protection of public health, safety, and the environment through mitigation of exposure. Examples of containment systems/engineering controls include:

- Caps;
- Barrier walls;
- Building slabs;
- Gas control and leachate control systems; and
- Vapor intrusion barriers or mitigation systems.

Where barrier walls are employed, they should be installed prior to placement of clean fill where practicable, and consistent with good engineering practice. If the placement of clean fill is likely to damage the vertical barrier, the installation of the barrier wall may be conducted after the clean fill has been emplaced.

Specific requirements for establishing and maintaining engineering and institutional controls, including requirements for deed notices; long-term operation, maintenance, and monitoring program; and Remedial Action Permits for soil are detailed at N.J.A.C. 7:26E-5 and N.J.A.C. 7:26C-7. The Department has also established guidance for the preparation of Remedial Action Permits, which can be accessed at: https://www.nj.gov/dep/srp/guidance/#rap_soils.

In the event that placement of clean fill as part of a site remedy leads to unforeseen off-site migration of fill and/or adverse impacts to human receptors or sensitive ecological receptors (i.e., environmentally sensitive natural resources), construction of appropriate engineering controls is to be initiated as soon as is practicable to correct these problems.

6.11. Tracking and Record Keeping

With all incoming shipments of clean fill for use at a SRP site, include fully executed bills of lading to document clearly that the incoming clean fill is from the approved donor site, with copies of these forms provided to the Department with the RAR. It is important that the RAR (including the deed notice) and the remedial action permit for soil and/or biennial certifications contain all documentation demonstrating compliance with N.J.A.C. 7:26E-5.2(d), (e), and (f) and this guidance, including the volume and thickness (with surveyed elevations of final subgrade and top of clean fill), analytical data demonstrating compliance with definition of clean fill at N.J.A.C. 7:26E-1.8, and area(s) where clean fill has been placed (post-grading and consolidation) on the site or AOC.

7. AUTHORIZED QUARRY/MINE MATERIAL

7.1. Purpose

The purpose of this section is to describe the steps to be followed when authorized quarry/mine material is proposed for use as part of a remedial action (e.g., capping) at SRP sites. Unlike the certification for an authorized quarry/mine material in this section, there is no certification for clean fill; all clean fill requires sampling in accordance with Section 6 of this guidance. The guidance in this section applies strictly to the use of authorized quarry/mine material for remediation purposes only at SRP sites. The use of authorized quarry/mine material at non-SRP sites is beyond the scope and authority of the SRWMP regulations, as this technical guidance is not designed to address or be applied to other situations.

Note: The Department does not maintain a list of sources for licensed quarry/mine material.

7.2. Authorized quarry/mine facilities

An authorized quarry/mine is a facility which operates pursuant to the following:

- New Jersey Department of Labor and Workforce Development pursuant to the New Jersey Mine Safety Act, N.J.S.A. 34:6-98.1 et seq., and the regulations adopted thereunder at N.J.A.C. 12:185.1 et seq. (questions may be directed to 609-292-2096 or osc@dol.nj.gov); or
- New York State Department of Environmental Conservation pursuant to the New York State Mined Land Reclamation Law, New York ECL § 23-2701, and the regulations adopted thereunder at 6 NYCRR 420.1 et seq.; or
- Pennsylvania Department of Environmental Protection pursuant to the Pennsylvania Noncoal Surface Mining Conservation and Reclamation Act, 52 P.S. § 3311(a), and the regulations adopted thereunder at 25 Pa. Code §77.1 et seq.; or
- Similar statutes and regulations from other states

7.3. Licensed quarry/mine material

Licensed quarry/mine material is sand, gravel, or rock:

- Excavated from undisturbed geologic formations;
- Obtained from a licensed quarry/mine;
- Not located on or impacted by other contaminant sources;
- Not comingled with any other material;
- Not known or suspected of being contaminated;
- Not adversely impacted by discharges of hazardous materials or chemical application;
- Not affected by conditions or processes that would result in the introduction of contaminants into the licensed quarry/mine material in concentrations above regulatory concern; and

- Not affected by conditions or processes that would increase the concentrations of contaminants already present in the licensed quarry/mine material to concentrations above regulatory concern.

7.4. Quarry/mine material certification

Whenever quarry/mine material, certified as such by the quarry/mine operator, is delivered to a property undergoing remediation, the investigator may rely on the certification for the purpose of issuing a Response Action Outcome (RAO) without sampling the delivered licensed quarry/mine material. The investigator should review the certification, which should indicate the source of the delivered licensed quarry/mine material and state that the licensed quarry/mine material has not been subject to a discharged hazardous substance at any time. It is incumbent upon the investigator to determine that the certification is acceptable.

A description of any steps taken to document or confirm the certification may be included with the certification or RAR. Examples of these potential steps include a description of the site history and geology of the formations from which the licensed quarry/mine materials originated, information regarding the absence of contaminated sites or AOCs neighboring or at the licensed quarry/mine, and procedures at the licensed quarry/mine to address minor discharges that may occur during normal operations (hydraulic fluid leaks, diesel fuel spills, etc.).

7.5. Evaluation of Quarry/mine materials without certification or authorization

Sand, gravel, or rock from unauthorized quarries/mines or from authorized quarries/mines without a certification need to be evaluated according to Section 6 of the current version of this technical guidance to demonstrate successful compliance with the definition of clean fill set forth in the Technical Rules at N.J.A.C. 7:26E-1.8.

7.6. Analytical data considerations for certified quarry material

Certification of quarry/mine material does not preclude testing by an investigator or other interested party. If analytical data are provided by the quarry/mine for the material, the analytical data are acceptable for use as long as the investigator of record at the site where the quarry/mine material is or was placed determines that these data are reliable and are representative of the quarry/mine material.

7.7. Tracking and Record Keeping

The investigator shall document the description, quantity, and location (address and contact information) of the quarry/mine material in the RAR (or other applicable key document) by providing a copy of the quarry/mine material certification and all supporting documentation, verifiable and legible load or weight tickets, figures showing the quarry/mine location and the emplacement location(s) of the quarry/mine material at the SRP site undergoing remediation.

7.8. Responsibility

The Department is not defining quarry/mine material as clean fill, but rather as a class of material distinct from alternative or clean fill. Under no circumstances will the Department assume any responsibility for the placement of such material. It is the Department's intent to neither regulate

the use of quarry/mine material at non-SRP sites nor validate any certification of quarry/mine material at non-SRP sites. Note that the Department does not maintain a list of sources for quarry/mine material.

8. REFERENCES

Germine, Mark, 1986. *Asbestiform and Non-Asbestiform Amphiboles, Cadmium, and Zinc in Quarry Samples of Marble from Franklin and Sparta, Sussex County, New Jersey*. New Jersey Geological Survey, Geologic Report 15.

Gilbert, Richard O., 1987. *Statistical Methods for Environmental Pollution Monitoring*. New York, NY: Van Nostrand Reinhold Company.

NJDEP, 2005. *Field Sampling Procedures Manual*, August 2005

Speiser, Robert, 1978. *A Quest for New Jersey Minerals*, 13 Beam Place, Haledon, NJ 07508, 27 p., illus., out of print.

Tedrow, J.C.F., 2002. *Greensand and Greensand Soils of New Jersey: A Review*, Rutgers Cooperative Extension, New Jersey Agricultural Experiment Station, Rutgers, The State University of New Jersey.

USEPA, 2008. *Framework for Investigating Asbestos-Contaminated Superfund Sites*, OSWER Directive #9200.0-68, September 2008.

USEPA. 40 CFR Part 61 Subpart M, *National Emission Standard for Asbestos*.

USEPA, 2002. *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites*, OSWER 9285.6-10.

APPENDICES

APPENDIX A

STATISTICAL CALCULATIONS

STATISTICAL CALCULATIONS

Determining the 75th percentile

The determination of the 75th percentile of a population can be done in various ways; however, the SRP would prefer to avoid confusion and make the process as easy and efficient as possible. Consequently, the SRP has elected to use the methodology found in the Excel software program because Excel is widely available and is already in use by the regulated community.

The steps to use Excel to calculate the 75th percentile of a data set follow:

1. Input or import the data points into a column within a blank Excel spreadsheet.
2. Type "=PERCENTILE(" into an empty cell.
3. Continuing in this same cell, enter the address of the data using the array format (e.g., A1:A26 for data in column A occupying rows 1 through 26).
4. Still continuing in the same cell, type in a "," followed by "0.75)" and then hit "Enter."
5. The 75th percentile of the data will appear in the formerly empty cell.

The following example is provided for illustrative purposes.

75th percentile example calculation for a given contaminant

Sample No.	**Concentration in mg/kg**
1	2.2
2	5.3
3	10
4	19
5	21
6	25
7	52
8	612
The 75th percentile is	32

If you do not have access to Excel, the following is the calculation that Excel employs.

1. $(V_{.75})$ is the 75th percentile of an ascending ordered dataset containing N values which are (V_1 through V_N)
2. If $(n) = (((0.75) (N-1)) + 1)$ and assuming $(n) = (k + d)$ where k is the integer component and d is the decimal component, then $(V_{.75}) = (V_k) + ((d) (V_{k+1} - V_k))$ for $1 < n < N$

Discussion of the Selection of the 75th Percentile at Receiving Areas of Concern

The selection of the 75th percentile is based on two considerations. First, the 75th percentile is a robust boundary beyond which extreme values or outliers in a population occur irrespective of population distribution type. As such, the 75th percentile is a conservative upper bound of the central distribution of a sample population. Second, the Department does not want to institute new or additional sampling requirements, but rather opted to rely mainly on the existing data provided by the RI of an AOC, where possible. There is recognition that the RI sampling would typically be limited relative to statistical requirements for sample size and sampling design. Therefore, the Department chose to be conservative in selecting the upper limit of the concentration of contaminants that are allowed to be brought in as alternative fill, rather than expand the sampling requirements for an AOC where placement is proposed.

SRP has found that the maximum concentrations observed (100th percentile) in the RI of AOCs can be atypical, much higher than those measured in the remaining AOC. Allowing these atypical concentrations to be imported would exaggerate the already increased mass of contaminants that will occur with the placement of these materials. Thus, a comparison of maximum concentrations in the imported alternative fill and the placement location was deemed to be inappropriate, and the 75th percentile was chosen instead.

Furthermore, the Department advocates for the evaluation of the dataset to determine if there are high concentration sample values present that would inappropriately bias the results. As noted in the example above, high concentrations may not significantly impact the 75th percentile. Regardless, the Department recommends conducting this evaluation as part of any statistical compliance option. If the investigator performs a hotspot removal, the data should not be included in the statistical evaluation.

SRP also considered using a comparison of mean values (which, depending on the distribution, can be equivalent to the 50th percentile) as a basis for establishing a critical value. However, the potential issues of unlike distributions, unequal sample sizes, sampling bias, etc. caused SRP to regard this option as less credible. If the 75th percentile is chosen as the decision statistic, the 75th percentile of the concentrations in the placement locations shall be the maximum concentration allowable for a given contaminant in any alternative fill allowed to be placed under this guidance.

The use of the 75th percentile offers certain advantages:

- For many uni-modal distribution types, observations in the distribution do exhibit a central tendency. It has been further observed that outliers and potential outliers for a given population of observations are generally above the 75th percentile or below the 25th percentile. The selection of the 75th percentile as a critical value would allow the importation of the largest volume of alternative fill, while minimizing the inclusion of extreme concentrations.

- Use of the 75th percentile as a decision statistic would provide a margin of safety to prevent bringing on-site concentrations above those already present. SRP recognizes the

limitations of small sample sizes and, rather than increase the characterization effort, opted to employ a more conservative limit.

SRP recognizes that the selection of any decision statistic has drawbacks or weaknesses. Consequently, the use of the 75th percentile will be subject to periodic scrutiny and SRP is committed to revising this guidance document as needed.

95% UPPER CONFIDENCE LEVEL OF THE MEAN AT THE RECEIVING AOC

As an example of a potential compliance option other than the 75th percentile, the 95% upper confidence level of the mean (95% UCL) of the sample distribution for each contaminant in the receiving AOC can be calculated for use as the receiving AOC compliance criterion instead of the 75th percentile. This can be calculated using USEPA's ProUCL software or other equivalent commercially available statistical software to generate the 95% UCL of the sample distribution for each contaminant in the receiving AOC. The maximum concentration for each contaminant in the donor material is compared to the 95% UCL for each contaminant in the receiving AOC to determine whether the alternative fill is acceptable for placement.

The Department has observed that the calculation of the 95% UCL of the mean is significantly influenced by high value outliers. The inclusion of outliers in the computation of the various decision statistics tends to yield inflated values of those decision statistics, which can lead to poor decision-making. Often statistics that are computed for a data set which includes outliers tend to be inflated and represent those outliers rather than representing the main dominant population of interest. This results in an inappropriate 95% UCL whose use would contradict the goal of this guidance. Consequently, the Department recommends that an outlier analysis be conducted on all data sets being subjected to 95% UCL analysis. See ProUCL Technical Guide for further details (https://www.epa.gov/sites/production/files/2016-05/documents/proucl_5.1_tech-guide.pdf).

SRP recognizes that the selection of any basis for a critical value has drawbacks or weaknesses. Consequently, the use of the 95% UCL will be subject to periodic scrutiny and SRP is committed to revising this guidance document as needed.

The Department recommends that the most current version of ProUCL be used to calculate the 95% UCL. Currently that is ProUCL Version 5.1 and is available as a free download from: https://www.epa.gov/land-research/proucl-software. Technical and user guides are also available and provide instructions on how to use the software package. Be advised that this is a sophisticated program and consultation with a statistician may be necessary to correctly employ the program or to properly interpret the resulting outputs.

Because the 95% UCL is significantly impacted by the distribution of the data and in particular the high concentration outliers, the Department is recommending:

1. As indicated in Section 4.4, a sample size of 20 or more be used as the size of the data set being evaluated, and

2. An outlier evaluation with successive testing and removal of outliers at the 5% significance level.

An example of an outlier evaluation is illustrated by the following example. In the example dataset, 56 actual field results are provided. The values in the data set are:

18.4	22	359	134	41	25.1	10.8	20.4	13.8	18.1	23.7	115
11.5	13	11.9	13.5	44	75.9	21.1	22.5	27.7	18.9	19.5	19.5
21.2	8.84	6.72	17.8	26.9	25.5	9.49	25	14.9	17.1	23.4	22.8
23.7	41	110	262	12.9	19.1	31.6	13.6	22.2	14.6	10.8	7.39
11.7	15.2	134	21.7	25.3	30.3	17.7	28.2				

Prior to using ProUCL, copy the dataset into an excel file where all values are under a single column, then load the excel file into the ProUCL program. To conduct an initial evaluation of the raw data set in the ProUCL program, three separate analyses will need to be run to obtain the general statistics, identify outliers, and determine which statistical UCL method to use. To obtain the general statistics of the raw dataset, ensure the dataset is highlighted on the Navigation Panel, select "Stats/Sample Sizes", and then "General Statistics". This analysis will provide data below for items 1-5. To conduct an initial outlier evaluation, ensure the dataset is highlighted on the Navigation Panel, select "Statistical Tests", then "Outlier Tests, and then "Compute". The outlier test will identify any potential outliers and will yield information for item 6 below. To determine the UCL method, select the dataset on the Navigation Panel, select "UCLs/EPCs", and then "All". This analysis will provide you with a Suggested UCL to Use, listed below as item 7. The complete initial evaluation of the raw data set yields the following:

1. Number of observations = 56;

2. Minimum value = 6.72;

3. Maximum value = 359;

4. Mean = 38.8;

5. 75^{th} Percentile = 27.1;

6. Potential Outlier for 5% Significance Level = 359; and

7. Suggested UCL to Use = 95% Chebyshev (Mean, Sd) UCL of 74.21 as a Nonparametric Distribution.

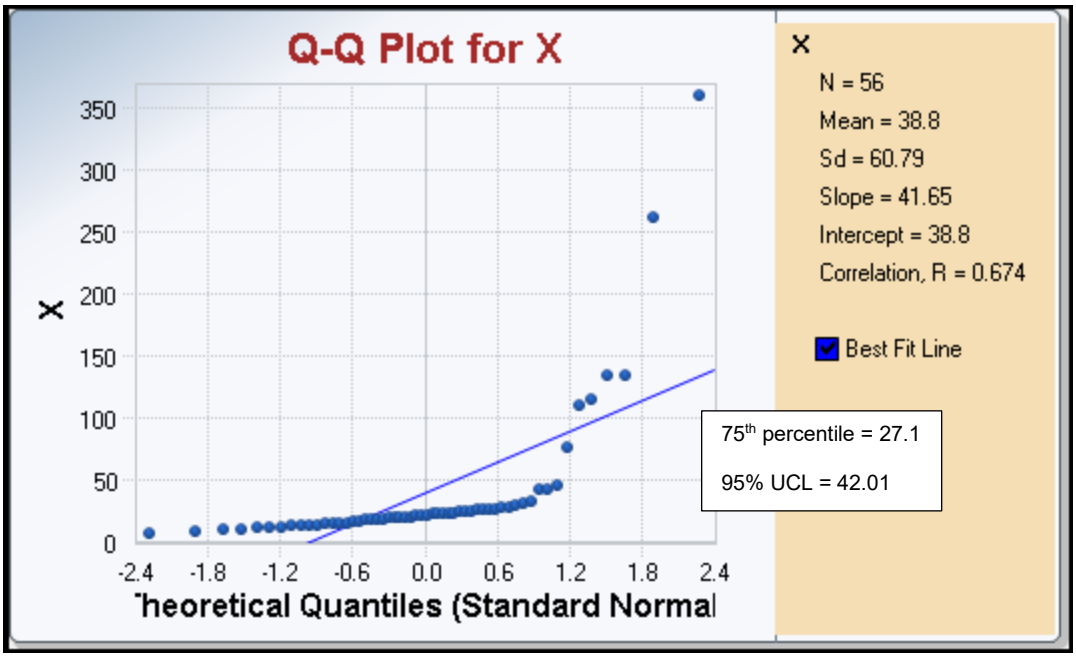
Since a potential outlier at 5% significance level was identified (item 6 at 359), remove the outlier from the dataset and re-run the outlier analysis. This step should be conducted repetitively until no outliers are identified. The successive removal of outliers at a 5% significance level eliminated 7 values which were: 359; 262; 134; 134; 115; 110; and 75.9.

A subsequent evaluation of the dataset without outliers yields the following:

1. Number of samples = 49;
2. Minimum value = 6.72;
3. Maximum value = 44;
4. Mean = 20.06;
5. 75^{th} Percentile = 23.7;
6. Potential Outlier for 5% Significance Level = None; and
7. Suggested UCL to Use = 95% Student's-t UCL of 22.06 as a Normal Distribution.

DATA SUMMARY PLOT

A data summary plot (Figure A1) is to be generated by the investigator and provided to the Department if the 95% UCL compliance option is used. The data summary plot consists of various outputs from the ProUCL software package. The main component is the Quantile – Quantile Plot (Q-Q Plot) which is a "Graphs" pull down menu option. The Q-Q plot which plots all the sample data in increasing order of value as well as portrays the best regression line for that data. The Q-Q plot allows for a graphical evaluation of the subject data set. Of particular interest are any sharp changes or large separations between values at the high end of the concentration gradient. This is because they are indicative of potential outliers that may significantly impact the decision statistics. Use of Q-Q Plots is recommended by ProUCL because it allows a better interpretation of the data even in the presence of outliers. Provided below are the Q-Q Plots for the example data set used in the 95% UCL section. The first is with the data set with outliers included. The second is with the outliers removed.



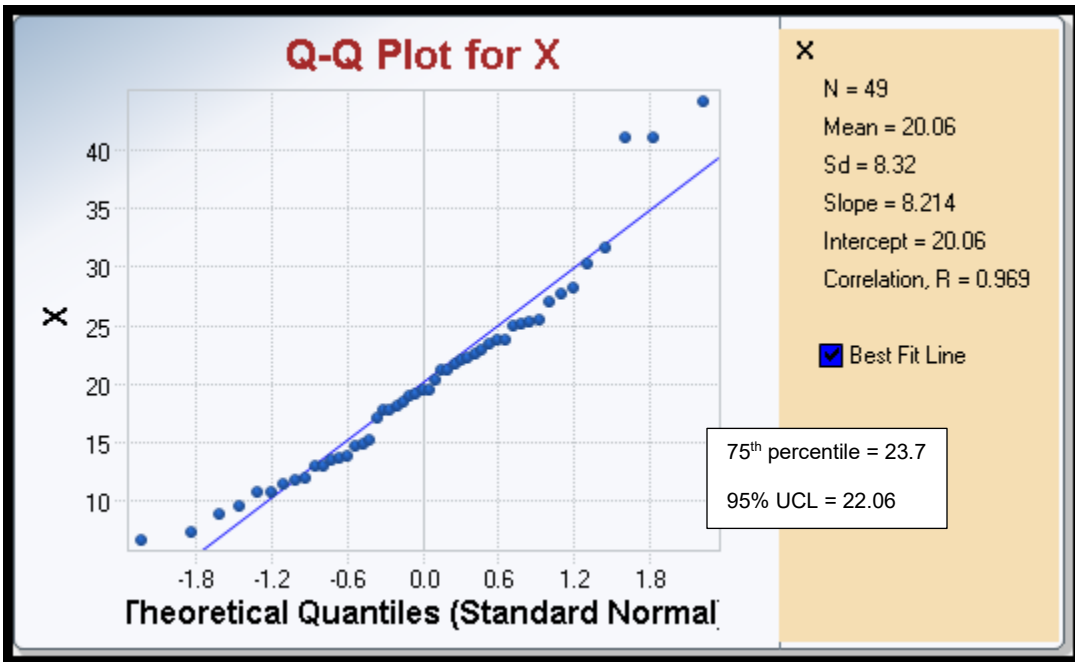


Figure A1. Data Summary Plot

Also, to be included on the data summary plot are the mean, 75th percentile, and the 95% UCL. The mean and the 75th percentile can be found on the output from the Stats/Sample Size menu, General Statistics option. The 95% UCL is the output from the UCLs/EPCs pull down menu options. This information is useful in evaluating the impact of outliers on the decision statistics as well as serving as a basis for justifying a proposal to not meet the 75th percentile requirement pursuant to N.J.A.C. 7:26E-5.2(b)2.

APPENDIX B

FILL USE PLAN

FILL USE PLAN

The Fill Use Plan (FUP), not a Material Acceptance Plan, required in the RAWP pursuant to N.J.A.C. 7:26E- 5.2(h) and N.J.A.C. 7:25E-5.5(b)9 should include all of the information indicated below. For the items marked with an asterisk, if the information regarding the proposed donor site material is not known at the time of FUP preparation, in accordance with 7:26E-5.7(b) that information should be included in the RAR.

1 General Requirements for the Use of Alternative Fill and Clean Fill:

1.1 The location of the donor and receiving sites including state, county, municipality, address, block, and lot numbers.*

1.2 The names, contact information, and relationship of all entities involved with the source, preparation, and transport of the fill from the donor site to the receiving site.*

1.3 A description of the donor site or AOC including use history from a PA or site review (if available).*

1.4 The volume of alternative fill or clean fill proposed for use.

1.5 Identification of the specific location(s) on the receiving site where the use will occur on a properly scaled map.

1.6 The depth to ground water on the receiving site, including the method of determination.

1.7 The description of the geotechnical properties of the fill appropriate for the intended use.

1.8 The intended future use of the area(s) of the receiving site (e.g., residential or nonresidential) being as specific as possible (e.g., light industrial, commercial strip mall, soccer field, condominium complex, etc.).

1.9 A discussion of why the proposed fill would not impact public health, safety, or the environment pursuant to the requirements at N.J.A.C. 7:26E-5.1(d).

1.10 A description of the documentation to be provided that will ensure all fill shipments received are from the approved donor site(s).

1.11 All other documentation demonstrating compliance with this guidance.

2 Additional Requirements for Alternative Fill:

2.1 Data used to demonstrate like-on-like compliance (same contaminants are present at the receiving and donor AOCs). *

2.2 Documentation, including the spreadsheet with the sorted data, to demonstrate compliance with the 75th percentile or 95% UCL of mean criterion.*

2.3 Documentation to demonstrate compliance with composite sampling requirements.

2.4 Documentation of the waste classification of the alternative fill, including all supporting data.*

2.5 Cut and fill calculations to support the volume of alternative fill is not above what is required for the remedial action.

2.6 Documentation that the intended use of the alternative fill will not contaminate or increase contamination of ground water, surface water, or sediment, or result in or increase ecological risks.

2.7 Documentation to support the FEMA 100-year flood elevation or equivalent metric.

3 Additional Requirements for Clean Fill:

3.1 The documentation that the clean fill meets all applicable remediation standards and criteria and is free of extraneous debris or solid waste. *

3.2 Documentation to demonstrate compliance with composite sampling requirements.

4 Additional Requirements for Quarry/Mine Material:

4.1 The certification from the NJ Department of Labor for licensed quarry/mine material.*

Fill Use Plan (FUP) – check list for submittal components

For the Department to effectively review fill use plans for the use of alternative fill, it is essential that key elements of the plan be present. To this end, the Department has developed a check list of the essential elements that must accompany alternative fill use plans. For items that are not applicable (e.g., wetlands not present on site), the applicant should clearly indicate so in the FUP. Proposals that do not include the items listed below will be considered administratively incomplete and will not be reviewed until the missing items are provided.

- ☐ Identify any proposed variances from N.J.A.C. 7:26E and provide a technical justification for the variance pursuant to N.J.A.C. 7:26E-1.7.
- ☐ Identify any proposed departures from this guidance and provide a technical justification as to its protectiveness of public health, safety, and the environment.
- ☐ A narrative description containing the essential elements of the FUP.
- ☐ Appropriately scaled figure depicting the *current* ground elevation[1]
- ☐ Appropriately scaled figure depicting elevations of the area where alternative fill use is proposed, and *final* ground elevations[1]
- ☐ Appropriately scaled figure depicting the FEMA 100 Year flood elevation[1]
- ☐ Appropriately scaled figure depicting post-remediation engineering controls (which may include building slabs, roads, parking areas, vegetative caps, etc.) in areas containing alternative fill, plus post-remediation elevations[1]
- ☐ Appropriately scaled figure depicting mean high water and spring high water elevation data[1]
- ☐ Cut and fill volume calculations, related site maps, and cross-sections
- ☐ Appropriately scaled figure depicting wetlands and associated transition areas
- ☐ Document any known historic flood elevation measurements
- ☐ Identify any flood hazard and storm water control requirements related to use of alternative fill
- ☐ Identification of any site-specific features that influenced the use of fill
- ☐ Documentation of public notification pursuant to N.J.A.C. 7:26C-1.7(k)2, as discussed in Section 3.11
- ☐ A description of the plan for modification of the Remediation Funding Source, if applicable, as outlined in Section 4.9.3

- Engineering plans signed and sealed by a professional engineer licensed by the State of New Jersey, as outlined in Section 4.8.1and 4.9.3

[1] Elevations should be referenced to NAVD'88 to be consistent with N.J.A.C. 7:26E-1.6(a)5ii and maps used to support the NJDEP Land Use Regulation program.

APPENDIX C

DEPARTMENT EVALUATION OF PRE-APPROVAL PROPOSALS

DEPARTMENT EVALUATION OF PRE-APPROVAL PROPOSALS

NJDEP Evaluation Process and Concerns:

The following is to inform the investigator on how the Department intends to conduct the evaluation of the pre-approval proposals for fill material use. The goal is to provide insight to the investigator on the Department's reasoning and basis for information needed to complete the review. It is the Department's aim that this will facilitate the investigator's ability to provide the needed information. Site-specific conditions may alter the Department's evaluation process. The evaluation process may be subject to change based on the Department's future experience and/or unanticipated situations.

There are scenarios where limited Department review may be needed in the context of a FUP. This includes:

1. Use of clean fill placement as part of a remedial action.

2. Excavations that return the site to existing grade.

3. Clean fill soil caps and/or structural engineering controls (asphalt paving, concrete slabs, etc.) that exceed existing grade by the thickness of the soil cap and/or structural engineering controls.

These are the questions the Department will consider in the evaluation, as well as the rationale for addressing them as part of the review:

1. Is the proposed placement of fill material part of the remediation of a site?

This technical guidance can only be applied to sites undergoing remediation.

2. Is pre-approval of the proposed placement of material required?

Fill placement at a site undergoing remediation that causes an exceedance of existing grade; does not follow the like-on-like requirement; or does not use the 75th percentile to determine acceptability results in the need for pre-approval pursuant to N.J.A.C. 7:26E-5.2(c).

3. Is the placement of alternative fill placement proposed in an uncontaminated area?

Placement of alternative fill in an uncontaminated area is prohibited.

4. Which stage is the proposed project/remediation currently in?

Projects/remedial actions that have completed the design phase and are nearing construction are problematic for resolving any potential fill material concerns that arise at this late stage. It is

difficult to alter the design at this stage since so much time, money, and resources have already been expended.

Ideally, the process for pre-approval should be initiated when the RI is near completion. Complications can also arise if the RI has not been completed and if the contaminant profiles (type/concentration) were to change with further investigation.

5. Was the receiving site previously remediated or an NFA/RAO issued?

Re-opening sites that have been remediated and are currently protective is problematic. The practice of re-opening remediated sites is concerning because it creates an opportunity to bring in excessive amounts of alternative fill for the purposes of revenue generation for every closed site. Any site that received an NFA/RAO, that involves a proposal to use alternative fill must comply with N.J.A.C.-7:26E and this guidance document. Interim capped sites will be allowed to be re-opened because, by definition, they have not been fully completed. In this scenario, a pre-approval meeting is highly encouraged.

6. Will the alternative fill come from off-site source(s), on-site source(s), or both?

Identifying the source of the fill material is critical in determining which portion of the technical guidance applies.

7. Have there been communications with the Department regarding the alternative fill material process, to include LURP permitting, and what were they?

Identifying any communications with the Department will allow a quicker evaluation of the proposal.

8. Where is the material proposed to be placed?

A general understanding of the design or conceptual basis for the project should be provided. The Department wishes to fully understand the position of the investigator as part of the evaluation process. The investigator should give as many details as possible here to support their proposed placement of alternative fill.

9. What is the volume proposed for placement?

Relatively small volumes (barring other issues) may not receive the same level of scrutiny as larger volumes. Volumes less than 500 cubic yards would likely fit in this "small volumes" category. Conversely, large volumes in proximity to environmental receptors like wetlands, waterways, and water bodies present more potential concerns and would receive increased scrutiny.

10. What are the contaminants and the concentrations in the material proposed for placement?

Material containing lower concentrations of contaminants (relative to the applicable standards) and fewer contaminants that do not raise heightened concerns (barring no other issues) may not receive the same level of scrutiny as others. Higher concentrations may present greater potential exposure issues. If higher contaminant concentrations are being considered for placement, determining if the material proposed for placement is a hazardous waste is a critical concern. A limited number of high concentrations can also skew a distribution and thereby affect statistical analysis. These factors are examples that could complicate the evaluation process.

11. Is the proposed placement in the flood hazard area, an upland area, or both?

Flood hazard area placement is primarily about getting the cap above the 100-year flood elevation.

Upland placement (already above the 100-year flood elevation) is primarily about minimization of the volume used. This volume is evaluated initially from the perspective of remedial need. Leveling of grade due to structural obstacles, where grading of existing material or design changes cannot be done, is one of the other reasons to allow placement. Slope stability is another.

A further additional reason is to capture information about the proximity of the proposed placement to sensitive environmental areas such as wetlands, water ways, water bodies, receptors, etc., as these factors may influence the design of the remedy.

12. What are the proposed final elevations relative to existing grade? What justifications have been provided?

Identification of final height of fill placement is needed. Assessing the level of concern about the placement of large volumes of fill in proximity to receptors of all types is an aspect of this inquiry.

This is the opportunity for the investigator to present the reasoning and logic used to support the proposed actions. The Department wishes to fully understand the use of alternative fill as it relates to the proposed final elevation of the remedial action. The investigator should give as many details as possible here to support their proposed placement of alternative fill.

13. What measures have been taken to reduce alternative fill material use?

The investigator should detail any steps taken to minimize the alternative fill volume and impacts to potential receptors. The Department will take this into account as part of the evaluation.

14. Is a variance from the like-on-like requirement involved?

The Department views the like-on-like requirement as a means of ensuring a site is not made worse than its original state. Furthermore, the Department views this requirement as a safeguard to preclude alternative fill placement in uncontaminated areas.

For the purposes of this guidance only, certain PAHs will be considered the same contaminant if their relevant ingestion-dermal human health-based criteria are the same (see Appendix 1 of the Remediation Standards, N.J.A.C. 7:26D). For example, for a residential exposure scenario,

benzo(a)pyrene and dibenzo(a,h)anthracene can be considered as the same contaminant for movement of alternative fill onto a receiving site since their ingestion-dermal human health-based criteria are both 0.5 mg/kg and they have the same health endpoint. Within each sample at a receiving or donor site these contaminants may be added together, but they cannot be added between separate samples. Therefore, if the observed concentrations of benzo(a)pyrene and dibenzo(a,h)anthracene in a sample are 2 mg/kg and 5 mg/kg, respectively, then the combined PAH concentration for this set of contaminants would be 7 mg/kg in that sample. This 7 mg/kg concentration would then be the concentration used for the 75th percentile evaluation of the receiving AOC. This exercise would also be performed for the donor site data to determine the maximum concentration to be used in the compliance process. The other grouping that may occur would be benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene as they all have ingestion-dermal human health-based criteria of 5 mg/kg for a residential exposure scenario, and 17 mg/kg for a non-residential exposure scenario. Note that non-carcinogenic PAHs, metals, and other contaminant classes may not be grouped because each has a different health endpoint.

15. Is a variance from the 75th percentile requirement involved? Is the 95% upper confidence limit of the mean (95% UCL) being applied? If not, what is the proposed compliance mechanism?

If the use of the 95% UCL is proposed, it should be applied for each contaminant in the receiving AOC. This metric can be calculated using USEPA's ProUCL software (https://www.epa.gov/land-research/proucl-software), or other equivalent, commercially available statistical software. It is recommended that at least 20 data points be used to perform the analysis. The maximum concentration for each contaminant in the donor material is compared to the 95% UCL for each contaminant in the receiving AOC to determine whether the alternative fill is acceptable for placement. When the 95% UCL is greater than the maximum contaminant concentration for the receiving AOC, then the investigator should evaluate the need for additional sample analyses to augment the existing data to provide a more representative data set of the population present. The statistical analyses can then be rerun with the new, larger dataset. The concern is that when the 95% UCL exceeds the maximum concentration for a given contaminant, the data may be insufficient to generate a truly valid 95% UCL and is likely due to the limited sampling. Alternatively, the investigator may need to run an outlier analysis to modify the data set used (see item 16 below for additional options). The investigator is cautioned that the appropriate use of the 95% UCL requires an understanding of the limitations of this particular statistical test.

16. What did the Data Summary Plot (See Appendix A) indicate?

The Data Summary Plot consists of a single page graphic of all the data under consideration which have been sorted and graphed in order of increasing concentration (low to high). In addition, the concentrations representing the mean, the median, the 75th percentile, and if appropriate, the 95% UCL are also indicated.

If inspection of the higher concentrations comprising the data point curve shows an inflection and if this inflection is a result of a limited number of data points, the Department will examine more closely the usability of the data set. Less inflection means greater population consistency which

would reduce concerns about the use of statistical metrics that are sensitive to data distribution effects or the effects of high values. The end result might result in the trimming of some or all of the data past the inflection point. Confirmation of this manual trimming would be through outlier analysis that is available on statistical software such as ProUCL.

The more proximate the various statistical metrics are to the 75th percentile, the less concerned the Department is about the use of a non-75th percentile metric such as the 95% UCL or the mean.

17. What are the proposed placement criteria specifics for each contaminant of concern?

The investigator is encouraged to present, in detail, the reasoning and logic used to support their selection of the proposed criteria. The placement of alternative fill should be driven by the individual contaminants present at each receiving area of concern. The investigator should clearly indicate on the site map the acceptance criteria for each area of concern that can receive alternative fill. This will facilitate the Department's review of the proposed placement criteria.

On a non-residential site, the non-residential use SRS cannot be used as a justification for material placement. The acceptance of alternative fill is limited to the contaminants already present at the receiving AOC.

18. What are the other concerns relative to federal, state, or local agencies, permit requirements, or laws and regulations?

This technical guidance or any approval resulting from it does not supersede other requirements or the need to address them. The investigator should be aware that Flood Hazard Regulations, in particular, may influence the placement of alternative fill and related remedial design.

19. Has public notification been accomplished and what is the public's response tothe proposed work?

The Department will not approve any proposed placement unless proper notification has been accomplished in accordance with N.J.A.C. 7:26E-1.7 and the community is in favor of the project to include fill material placement.

20. Will the remediation result in a capped or developed site?

The Department prefers that sites do not remain at interim stages for periods exceeding a year. The site should move to a completed remediation or a developed site status as soon as possible.

APPENDIX D

COMPOSITE SAMPLING APPROACH

COMPOSITE SAMPLING APPROACH

The intent of this example is to showcase how composite sampling can be used to supplement the discrete sampling frequencies found in Table 1. In this case, composite samples have been collected from a stockpile that underwent waste classification sampling. To further characterize the pile for use as alternative fill, discrete samples should also be collected.

The following composite sampling approach assumes that the off-site stockpile is 10,000 cubic yards (yd^3). Per Table 1, the default sampling scheme indicates the collection of 24 discrete samples is needed to characterize 10,000 yd^3 of potential donor material. Per Section 4.5.1, discrete samples should represent at least 70% of the samples listed in Table 1. Additionally, the volume of donor material that a composite sample represents should be no more than five times the volume of a discrete sample point.

In the default sampling scheme, 24 discrete samples would be used to characterize 10,000 yd^3, so each discrete sample would represent 416 yd^3 (10,000 yd^3/24 samples). Thus, per Section 4.5.1, no composite sample may represent more than five times the quantity of one discrete sample, or 2,080 yd^3.

To supplement the default discrete sampling quantity with composite samples, 24 discrete samples would be reduced to 16 discrete samples:

$$70\% \text{ of } 24 = (0.7 \times 24) = 16 \text{ discrete}$$

The 16 discrete samples would be collected from the yellow area, representing 70% of the soil stockpile (7,000 yd^3), as depicted below. Composite samples may be used to characterize the remaining volume of soil (3,000 yd^3) in the blue area. As stated above, the maximum volume of soil to be characterized using a composite sample under this sampling scheme would be 2,080 yd^3 therefore, two composite samples would be needed to adequately characterize the blue area.

The analytical results of the composite sampling would be compared to the receiving area of concern's (AOC) *mean* for each contaminant. The analytical results from discrete sampling would be compared to the receiving AOC's *75^{th} percentile* for each contaminant.

The advantage to using the grid style approach described above and shown below in Figure D1 is if a composite sample concentration exceeds the mean concentration of a contaminant in the receiving area, the grid and associated volume of soil from which the composite sample was collected can be eliminated as donor material, and the remaining volume (discrete samples below the 75^{th} percentile and other composite samples below the mean of the receiving area) may be used on-site.

The use of composite sampling will be subject to periodic scrutiny and the Department is committed to revising this guidance document as needed.

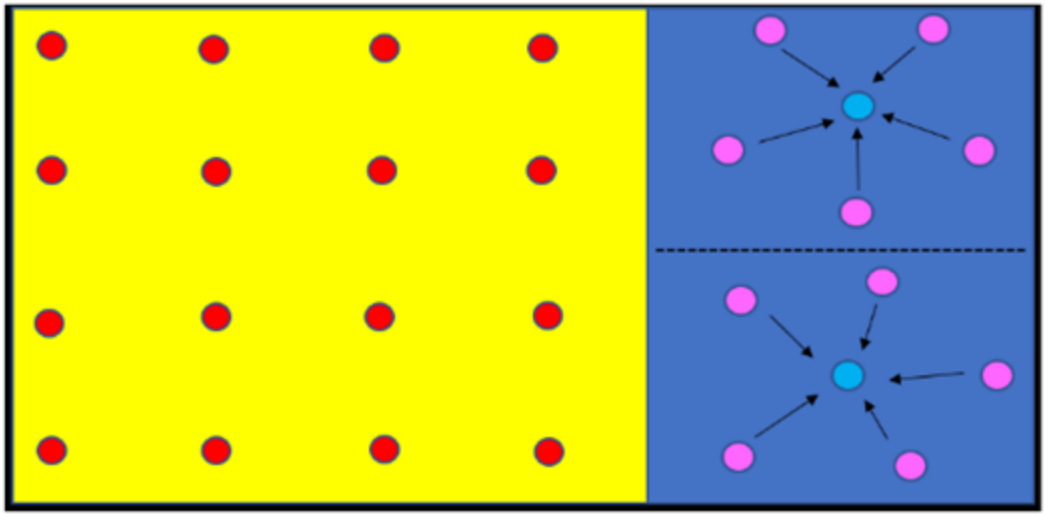


FIGURE D1 –

Composite Sampling Approach

Total Stockpile Area = 10,000 yd^3

Yellow area (70%) = 7,000 yd^3

Blue area (30%) = 3,000 yd^3

APPENDIX E

GLOSSARY

GLOSSARY

Alternative Fill: Material to be used in a remedial action that contains contaminants in excess of the most stringent soil remediation standards, site-specific alternative standards, or site-specific interim standards and does not contain free liquids. This also includes any material that contains contaminants in excess of criteria or action levels for contaminants without standards available on the Department's website at www.nj.gov/dep/SRWMP. This material can be “soil” or “non-soil.”

Clean Fill: Material to be used in a remedial action that meets all soil remediation standards, site-specific alternative standards, or site-specific interim standards, does not contain extraneous debris or solid waste, and does not contain free liquids. This also includes any material that meets all criteria or action levels for contaminants without standards, available on the Department's website at www.nj.gov/dep/SRWMP. This material can be “soil” or “non-soil.”

Concrete: Concrete includes concrete, concrete block, and brick from all sources including buildings or other structures (such as roadways, sidewalks, and curbing). Concrete from buildings or other structures must have all caulk, glass, doors, windows, and other construction debris removed from the concrete prior to use as alternative or clean fill.

Donor Site: Property (in-state or out-of-state) from which fill is obtained for use at a Site Remediation and Waste Management Program (SRWMP) site for remediation.

Fill Material: Alternative Fill, Clean Fill, or Licensed Quarry/Mine Material

Licensed Quarry/Mine Material: Licensed quarry/mine material is sand, gravel, or rock:

- Excavated from undisturbed geologic formations;
- Obtained from a licensed quarry/mine;
- Not located on or impacted by other contaminant sources;
- Not comingled with any other material;
- Not known or suspected of being contaminated;
- Not adversely impacted by discharges of hazardous materials or chemical application;
- Not affected by conditions or processes that would result in the introduction of contaminants into the licensed quarry/mine material in concentrations above regulatory concern; and
- Not affected by conditions or processes that would increase the concentrations of contaminants already present in the licensed quarry/mine material to concentrations above regulatory concern.

Non-Soil: Material that does not meet the definition of a "soil." Examples of non-soil material include, but are not limited to, Class B recyclables, asphalt millings, and construction and demolition screenings.

Receiving Area of Concern: An area of concern (AOC) at a Site Remediation Program (SRP) site that is being remediated and for which fill will be imported for use in t remediation.

Soil: Unconsolidated mineral or organic matter on the surface of the earth that has been subjected to and influenced by geologic and other environmental factors. Materials or mixtures that are predominantly soil-like in nature will be considered as soil, which include sediment, dredged material (DM), and processed dredged material (PDM).

Technical Rules: Technical Requirements for Site Remediation (N.J.A.C. 7:26E)

APPENDIX F

ACRONYMS

ACRONYMS

ACM	Asbestos Containing Material
AOC	Area of Concern
ARS	Alternative Remediation Standard
AUD	Acceptable Use Determination
BUD	Beneficial Use Determination
CAO	Certificate of Authority to Operate
CEA	Classification Exception Area
COC	Contaminants of Concern
DSHW	Division of Solid and Hazardous Waste
DM	Dredged Material
EPH	Extractable Petroleum Hydrocarbons
ESNR	Environmentally Sensitive Natural Resource
FUP	Fill Use Plan
MGW	Migration to Ground Water
LOI	Letters of Interpretation
LSRP	Licensed Site Remediation Professional
N.J.A.C.	New Jersey Administrative Code
ODST	Office of Dredging and Sediment Technology
OPRA	Open Public Records Act
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PDM	Processed Dredged Material
QA/QC	Quality Assurance/Quality Control
RAR	Remedial Action Report
RAW or RAWP	Remedial Action Work Plan
RFS	Remediation Funding Source
RI	Remedial Investigation
SI	Site Investigation
SPLP	Synthetic Precipitation Leaching Procedure
SRP	Site Remediation Program
SRWMP	Site Remediation and Waste Management Program
SRS	Soil Remediation Standards
TEQ	Toxicity Equivalent Quotients
TSCA	Toxic Substance Control Act
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compound
95% UCL	The 95 Percent Upper Confidence Level of the Mean