NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

ENVIRONMENTAL PROTECTION
SITE REMEDIATION PROGRAM
Remediation Standards; Technical Requirements for Site Remediation

Adopted New Rules:	**N.J.A.C. 7:26D**
Adopted Amendments:	**N.J.A.C. 7:26E-1.3**
Adopted Repeal:	**N.J.A.C. 7:26E-1.13**
Proposed:	May 7, 2007 at 39 N.J.R. 1574(a).
Adopted:	May ___, 2008 by Lisa P. Jackson, Commissioner Department of Environmental Protection
Filed:	May ___, 2008 as R. 2008 d.___, **with technical changes** not requiring additional public notice and comment (see N.J.A.C. 1:30-6.3).
Authority:	N.J.S.A. 13:1D-1 et seq., 58:10-23.11a et seq., 58:10A-1 et seq., and 58:10B-1 et seq.
DEP Docket Number:	07-07-04/46
Effective Date:	____, 2008.
Expiration Date:	____, 2013.

The Department of Environmental Protection (the Department) hereby adopts amendments and repeals to the Technical Requirements for Site Remediation (Technical Rules), N.J.A.C. 7:26E, and adopts the Remediation Standards at N.J.A.C. 7:26D. The remediation standards for ground water and surface water are recodified from the Technical Rules at N.J.A.C. 7:26E-1.13 to the new Remediation Standards and new residential and non-residential soil remediation standards are also codified in this new chapter. The Remediation Standards also codify mechanisms for: (1) establishing interim remediation standards for ground water and soil; (2) updating the remediation standards using the notice of administrative change process; and (3) developing numeric alternative soil remediation standards, including a mechanism by which a person responsible for conducting the remediation may propose such a standard.

Amendments to the Technical Rules provide that the person responsible for conducting the remediation may conduct remediation pursuant to the criteria in effect prior to the adoption of the Remediation Standards if the person submitted a remedial action workplan to the Department prior to the effective date of the new rules plus six months, and the workplan meets all of the requirements of the Technical Rules concerning remedial actions. The numeric cleanup criteria that were applicable prior to the effective date of the new rules would be applicable, unless the new remediation standard is lower than the then-effective remediation standard by an order of magnitude or less.

Note that, in consideration of comments received, the Department has determined to not adopt the proposed impact to groundwater soil remediation standards while it continues to review the issues raised by commenters. See the response to comments 316 through 420.

The proposal was published in the New Jersey Register on May 7, 2007 at 39 N.J.R. 1574(a). The comment period closed on July 27, 2007.

This adoption document may be viewed on the Department's website at http://www.nj.gov/dep/rules.

Summary of Hearing Officer's Recommendation and Agency Response:

The Department held a public hearing concerning the proposal on June 7, 2007 at the Department's headquarters at 401 East State Street, Trenton, New Jersey. Dr. Barry Frasco, Assistant Director for the Hazardous Site Science Element, served as the hearing officer. Forty seven people attended the meeting and four people testified. Dr. Frasco recommended that the proposal be adopted as proposed with the changes described below in the Summary of Public Comments and Agency Responses and the Summary of Agency-Initiated Changes. The Department accepts the recommendations of Dr. Frasco.

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Summary of Public Comments and Agency Responses

The following people submitted written or oral comments on the proposal:

1. M. Ferdows Ali, New Jersey Department of Agriculture
2. Brent B. Archibald, ExxonMobile Corporation
3. William A. Baker, Scarini and Hollenbeck, LLC
4. Robert Baldisserotto, Hoffman-La Roche Inc.
5. Joseph Barbanel, Solar Compounds Corporation
6. Milind Bhatte, Conoco Phillips Company
7. Mark W. Biedron, The Willow School
8. Dianne Brake, PlanSmart NJ
9. David H. Brogan, New Jersey Business and Industry Association
10. Valorie Caffee, New Jersey Work Environment Council
11. Daniel R. Callahan, Stepan Company
12. Enrique Castro, Tierra Solutions, Inc.
13. Jennifer Celeste, Sunoco, Inc.
14. Michael Connolly, Tube City IMS
15. Eric DeGesero, Fuel Merchants Association
16. Nick DeRose, Technical Requirements Advisory Coalition (TRAC)
17. Eric Dickerson, Weeks Marine Inc.
18. Michael Draickiwicz, New Jersey Pharmaceutical Environment Committee
19. William G. Dressel, Jr., League of Municipalities
20. Michael A. Egenton, New Jersey State Chamber of Commerce
21. Bobby Ficquette, United States Department of Defense
22. David B. Fisher, Matzel & Mumford Organization
23. Gary Garetano, Hudson Regional Health Commission
24. Jim Garrison, URS Corporation
25. Amy Goldsmith, New Jersey Environmental Federation
26. Avery Grant, Concerned Citizens Coalition
27. Jarrod C. Grasso, New Jersey Association of Realtors
28. Carolyn L. Green, Sunoco, Inc.
29. Bruce J. Hough, Hercules Inc.
30. Peter Jaran, P.E., Equity Environmental Engineering LLC
31. Roy Jones, South Jersey Environmental Justice Alliance
32. Richard Labov, Standard Coating Corporation and Union Ink Company
33. Justin Lauterbach, RT Environmental
34. Robert Lavorerio, Chevron Environmental Management Company
35. Richard Kapuscinski, Site Remediation Industry Network of New Jersey
36. Karen Kiggins, National Slag Association
37. Justin Lauterbach, RT Environmental
38. Paula A. Martin, Arkema Inc.
39. John Maxwell, New Jersey Petroleum Council

40. Donald McCloskey, PSEG Services Corporation
41. Michael G. McGuinness, National Association of Industrial Office Properties
42. Tom McKee, Interfaith Community Organization
43. Richard Nieuwenhuis, New Jersey Farm Bureau
44. Jane Nogaki, New Jersey Environmental Federation
45. Patrick J. O'Keefe, New Jersey Builders Association
46. George Pavlou, United States Environmental Protection Agency
47. Stefan Pryor, City of Newark Department of Economic and Housing Development
48. Sal Risalvato, New Jersey Gasoline, C-Store, and Automotive Association
49. Richard T. Roat, Valero Refining Company
50. Dennis Rochford, Maritime Exchange for the Delaware River and Bay
51. Richard Rosera, Reckitt Benckiser, Inc.
52. Tony Russo, Chemistry Council of New Jersey and Site Remediation Industry Network
53. Sonny Rutkowski, Weston Solutions, Inc.
54. Marwan M. Sadat, Gerdau Ameristeel Sayreville, Inc.
55. Phillip Sandine
56. Steven T. Senior, Technical Requirements Advisory Coalition
57. Kathleen Jackson Shrekgast, Rutgers Environmental Law Clinic
58. Michael Sivak, United States Environmental Protection Agency
59. Harry Slagle, Jersey Central Power & Light
60. Jack Snyder, Styrene Information and Research Center, Inc.
61. Joseph M. Sorge, J.M. Sorge Inc.
62. Bob Spiegel, Edison Wetlands Association
63. David N. Speis, Accutest Laboratories
64. Lawrence Szuhay, Brush Wellman Inc.
65. Jeff Tittel, Sierra Club
66. Jeff Wagenbach, Riker Danzig, Scherer, Hyland, Perretti
67. Judith B. Weinstock, Edison Wetlands Association
68. Bill Wolfe, Public Employees for Environmental Responsibility

The timely submitted comments and the Department's responses follow. The number(s) in parentheses after each comment identifies the respective commenters listed above.

General Comments in Support of the Rules

1. COMMENT: The Department should be commended for using approaches in these rules that are more consistent with USEPA models, providing greater recognition and flexibility in the use of alternative soil remediation standards based on site-specific conditions, and for including more realistic assumptions. (11)

2. COMMENT: The Department has taken on a difficult and controversial task to establish soil remediation standards. The methodologies for soil remediation standards that the Department has used to derive the soil remediation standards provide an improved scientific basis over the current soil cleanup criteria. The commenters acknowledge the Department's significant efforts and work in developing these rules. (16, 20, 38, 41, 52, 56, 66)

3. COMMENT: Commenters support the 1-in-a-million standard for carcinogens and the hazard quotient of 1 for non-carcinogens and expressed support of many aspects of the proposed rules. The fact that more than a third of the standards have been strengthened, that many other standards are strong as well when it comes to toxic chemicals in our soils and the impact they would have on public health, and that standards for the impact to groundwater pathway have been included for a whole range of chemicals is supported. (10, 25, 31, 65)

4. COMMENT: The proposed rules contain elements that the commenters embrace because they represent practical approaches to protecting human health and the environment and are consistent with widely accepted principles and practices for risk-based assessment and remediation, such as allowing for site-specific alternative remediation standards and identifying certain technical bases for alternative remediation standards petitions that can be routinely granted. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 52, 54, 59)

5. COMMENT: The Department should be commended for the valuable opportunity for stakeholders to identify issues that are fundamental to the creation of a comprehensive and practical program for the remediation of sites in New Jersey and urge the Department to continue its dialogue with stakeholders. (34)

6. COMMENT: The commenter supports the Department's efforts to update remediation standards for direct contact pathway for residential and non-residential land use that will be protective of human health. (1)

RESPONSE to COMMENTS 1 through 6: The Department acknowledges and appreciates the commenters' support of this rulemaking effort.

7. COMMENT: The Department should be commended for providing this valuable opportunity for stakeholders to identify issues that are fundamental to the creation of a comprehensive and practical program for the remediation of sites in New Jersey and the Department should continue dialogue with stakeholders to resolve outstanding issues before adopting a final soil remediation rule. (5, 22, 29, 32, 40, 43)

RESPONSE: The Department appreciates the commenters' endorsement of the Department's efforts to continue the valuable dialogue concerning its implementation of the Brownfield and Site Remediation Act (Brownfield Act), N.J.S.A. 58:10B-1, et seq. through the Site Remediation Program, and it looks forward to continued and meaningful discussions with all stakeholders. As mentioned above, the Department intends to continue to review the issues raised by commenters concerning the impact to groundwater soil remediation standards and has therefore determined to not adopt the proposed impact to ground water soil remediation standards at this time. Nevertheless, the adoption of the remaining numeric soil remediation standards is an important step forward that should not be further delayed. The effort to adopt uniform soil standards has been ongoing since at least 1992. Moreover, the Brownfield Act specifically declares that "strict remediation standards are necessary to protect public health and safety and the environment" and that these standards "should be adopted based upon the risk posed by discharged hazardous substances." See N.J.S.A. 58:10B-1.2. The Department is obligated and is thus fully prepared to amend these rules in the future, should ongoing discussions with stakeholders and efforts by the Legislature concerning statutory reforms so require.

8. COMMENT: While the pace of cleanups has been too slow, the need to speed up the number of cleanups should not result in any sacrifice to the effectiveness of the remedy in protecting human health and the environment. This is especially important in environmental justice communities that are already overburdened and disadvantaged. Strict environmental standards must be applied in an even-handed way and more resources should be provided to the

site remediation program. The Department should employ stricter enforcement of the State's laws and rules. If the Department were to more aggressively use treble damages, responsible parties would remediate more sites faster and additional resources would be provided to the Department.

Legislative reform to the site remediation program is in progress. Standards of cleanup are integral to the site remediation reform discussion and should not be moving ahead of these reforms.

The Department should adopt those provisions that strengthen protections and expedite cleanups without weakening protections now and move forward with a supplemental proposal for provisions that are likely to be impacted by the upcoming legislative changes. Upcoming changes could change the standards significantly. (10, 25, 26, 31, 68)

RESPONSE: The Department and the Legislature are actively engaged in discourse concerning Legislative reforms to the statutes that underlie the Site Remediation Program, and the Department acknowledges that as a result of these anticipated statutory amendments, the Department may need to amend some of its implementing rules. However, the Department believes that it would not be prudent to further delay the adoption of soil remediation standards. Department utilizes all appropriate legal remedies at the Department's disposal to ensure that sites are cleaned up consistent with the Department's statutory authority at NJSA 58:10-23.11f(a)(1).

The Department agrees with the commenter that it is important not to sacrifice the effectiveness of the remedy in protecting human health and the environment. Accordingly, the Department is adopting the residential direct contact and the non-residential direct contact soil remediation standards at this time, and will provide guidance on determining the appropriate impact to ground water soil remediation standard on a case-by-case basis.

Developing Interim Standards and Updating Soil Standards by Notice of Administrative Change

9. COMMENT: The commenters agree that not all environmental contaminants can be included in the rule. However, the process by which an interim standard will be developed and uniformly used when addressing environmental contaminants for which remediation standards have not been developed and promulgated should be clarified. This would ensure that uniform criteria are used when no promulgated remediation standards are available. (46, 58)

RESPONSE: N.J.A.C. 7:26D-5, Interim Soil Remediation Standards, describes the process by which an interim standard will be developed. When, after the promulgation of these rules, the Department determines that a standard is needed for a contaminant that is not listed in the standards tables codified in Chapter Appendix 1, an interim standard will be developed. The Department will use the criteria development procedures set forth in Appendices 2 and 3 of these rules for the development of ingestion-dermal and inhalation standards respectively. Appendices 2 and 4 codify the procedures that were used to develop the promulgated standards. The application of these same procedures will ensure that interim standards will be developed uniformly. When the interim standard is posted on the Department's web site, it may be used at any site as needed.

10. COMMENT: The Department proposes to develop and post interim standards and not to do rulemaking until it is reasonably possible. By doing this, the Department has reserved for itself the discretion to develop open-ended interim standards. Merely making the standards and technical information "publicly available" is insufficient notice and contrary to the requirements of the Administrative Procedure Act. See U.S. Sportsmen's Alliance Foundation v. N.J. Dept. Environmental Protection, 182 N.J. 461 (2005); Metromedia, Inc. v. Director, Div. of Taxation, 97 N.J. 313 (1984).

As noted in Sportsmen's Alliance, formal rulemaking is required when a rule is intended to have wide coverage encompassing a large segment of the regulated or general public rather than an individual or a narrow select group, or is intended to be applied generally and uniformly to all similarly situated persons. Clearly, that is the intent with regard to "interim" soil standards. The statutes and decisions are clear: the Department cannot by regulation grant itself an exemption from a requirement imposed on it by the Legislature.

The Department's reservation of the discretion to apply interim soil standards violates statutory obligations governing new standards and will further erode the predictability that is essential to informed due diligence inquiries. The Department should propose and adopt standards in strict adherence to the rulemaking norms of the Administrative Procedure Act. (19, 22, 27, 45)

11. COMMENT: The Department is proposing to include rule provisions at N.J.A.C. 7:26D-5 that will allow it to develop interim specific criteria for additional chemicals, using the same procedures as for the proposed soil remediation standards for any contaminant that does not already have a soil remediation standard.

The proposed rule also contains provisions at N.J.A.C. 7:26D-6.2 under which the Department would update soil remediation standards as a result of a change in the carcinogenic slope factor or reference dose data contained in the USEPA's Integrated Risk Information System (IRIS).

These provisions require the Department to only give public (administrative) notice of the interim or new standards, but would not include public review and comment and would set no deadline for promulgation as a final rule. These provisions must be revised to allow for public review of the interim and updated standards that apply to more than a single site and their basis. Any procedure for adopting standards, interim or not, must be developed in a manner consistent with the Administrative Procedure Act.

The procedure to adopt an amendment to a rule should be the same as that applicable to the original proposal of that rule (see N.J.S.A. 52:14B-4), whether to augment the rule or to revise the rule. No case or statute provides to the contrary, except for limited emergent circumstances that are discussed below. Thus, it is inappropriate for the Department to reserve to itself a right to change validly adopted remediation standards, to adopt new interim standards, and to adopt policies and practices regarding application of the numeric standards for soil remediation as and when the Department chooses. The Department cannot, after adoption of a standard, determine unilaterally and without advance public notice and comment, that the original adoption was erroneous, at the time of the adoption or the new determination, whether by reason of its own deliberations or by reason of some arguably better scientific information than the Department had at the time of the original adoption. The Department cannot deviate from the proper procedure by proposing and adopting a rule that provides a different process for amending rules, including soil remediation standards.

Furthermore, the proposed regulation is not consistent with the ordinary process for adopting rules, whether the interim revision is to add a standard for a new material not previously regulated or to revise an existing standard.

A change in soil remediation standards adopted by rule is itself rulemaking. Such a proposed regulation is not minor, even if a standard is only changed by 1 microgram per kilogram (ug/kg), because even minor changes could have significant effects on the investigation and remediation of a number of sites, and the liabilities for such sites. And without doubt, unilateral development of interim specific criteria for additional chemicals denies the regulated community the opportunity to engage in meaningful discussion about the proposed new standard and the basis for the change. This process is simply not authorized by the Legislature. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE to COMMENTS 10 and 11: The development of interim standards and the updating of existing standards by notice of administrative change involve two separate procedures, neither of which conflict with the Administrative Procedure Act. N.J.A.C. 7:26D-5, Interim Soil Remediation Standards, describes the process by which an interim standard will be developed and through which the public will be notified of its development. In accordance with the Administrative Procedure Act, the Department has established the data sources, equations and procedures for the development of remediation standards, including interim standards, in the Remediation Standards rules. These rules were afforded public comment, and the Department has provided responses to those comments as part of this adoption document. The public is therefore on notice, by codification of these rules, that it is these, and only these codified data sources, equations and procedures, that the Department will use to establish interim standards. Subchapter 5 simply allows the Department to use these adopted procedures to develop a standard for a contaminant for which there is no standard currently listed in the applicable tables that are a part of these adopted rules. The notice of the resulting standard will be published in the New Jersey Register. The Department will then incorporate the interim standard into the tables at N.J.A.C. 7:26D-6.2 through formal rulemaking as soon as is reasonably practicable. At that time, the interim standard and its derivation will be open to public scrutiny and comment. A similar process has been adopted in the Department's Ground Water Quality Standards, N.J.A.C. 7:9C. The Department agrees with the commenter, however, to the extent that, if the Department wishes to establish a standard using any data sources, equations or procedures not codified herein, formal rulemaking would be required.

The procedures for updating standards by notice of administrative change as established at N.J.A.C. 7:26D-6.2 allow the Department to update soil remediation standards only under certain specified circumstances. A change in the carcinogenic slope factor or reference dose data contained in the USEPA's Integrated Risk Information System (IRIS) or a change in a drinking water MCL adopted by the Department would necessitate a change in an adopted remediation standard. If toxicity data from either of these sources are updated and result in a change, the Department will use the criteria development procedures set forth in Appendices 2 through 4 of these rules to update its soil remediation standards.

The Department does not believe that updating any of the soil remediation standards that appear in N.J.A.C. 7:26D-6.2 by notice of administrative change is a violation of the Administrative Procedure Act. New health-based levels that are used to establish or update the MCLs and that form the basis of some of the soil remediation standards under these rules are adopted only after rulemaking. During the rulemaking process, the public is provided an opportunity to comment on the new and revised health-based levels.

Furthermore, as explained in the summary of the proposal at 39 N.J.R. 1581, for those criteria that are based on information provided in the USEPA's IRIS database, USEPA's revisions to IRIS are subject to a comprehensive internal and external peer review process prior to their inclusion in the database. As explained by the USEPA, IRIS is in the first tier of the recommended hierarchy as the generally preferred source of human health toxicity values. IRIS generally contains reference doses (RfDs), reference concentrations (RfCs), cancer slope factors, drinking water unit risk values, and inhalation unit risk values that have gone through a peer review and USEPA consensus review. IRIS normally represents the official Agency scientific position regarding the toxicity of the chemicals based on the data available at the time of the review. See USEPA Office of Solid Waste and Emergency Response, "Human Health Toxicity Values in Superfund Risk Assessments, OSWER Directive 9285.7-53" (December 5, 2003).

The public can access information regarding IRIS by telephone (202)566-1676, or fax (202)566-1749, email to the EPA IRIS hotline at hotline.iris@epa.gov, or by regular mail or visit to the IRIS reading room at IRIS Reading Room, EPA-West Building 1301 Constitution Avenue NW, Washington, DC 20005.

It is important for the Department to have the ability to update standards in a timely manner so that they remain protective of human health and the environment. The provisions of N.J.A.C. 7:25D-5 and 6 will allow the Department to use the best available science to update these standards in a timely manner.

If the Department determines that it needs to use toxicity data from an alternate source or use equations or assumptions that are different than those that are set forth in these rules to develop a new standard or to update a standard, the Department will conduct formal rulemaking.

12. COMMENT: If there is new chemical toxicity data or new risk assessment methodology or models that would support a less stringent soil remediation standard, the Department, as the regulatory authority, has the obligation to expeditiously develop the alternative or updated soil

remediation standards. This action is required to ensure that overprotective remedial actions do not occur since remedial actions pose a real incremental risk to the environment and human health and waste unfairly, financial and energy resources. (55)

RESPONSE: Subchapter 6, Updating Soil Remediation Standards, establishes the procedures by which the Department can rapidly update existing standards. Using this system, the Department will update remediation standards when the USEPA revises the carcinogenic slope factor or reference dose data contained in the Integrated Risk Information System (IRIS) database on which a soil remediation standard in Table 1A or 1B is based by recalculating the standard using the appropriate formulas codified in the Remediation Standards rules and then posting notice of this new standard in the New Jersey Register and on the Department's website. The notice will identify the contaminant, the basis for the administrative change, and the revised criterion to be listed in Appendix 1, Table 1A, 1B. The Department will revise a standard using this methodology, when it is necessary to revise a particular standard upward or downward.

The Department also proposed to update impact to ground water remediation standards when a new criterion in the Ground Water Quality Standards at N.J.A.C. 7:9C is promulgated. This provision is being deleted because the impact to ground water soil remediation standards are not being adopted. Impact to ground water impacts will continue to be addressed on a site-by-site basis and approved only where the Department is confident the proposed remediation level is protective of human health and the environment.

Note, however, that if the Department determines that an existing standard should be changed based on toxicity information other than IRIS, the Department will conduct formal rulemaking with the required proposal and a public comment period.

13. COMMENT: The Soil Remediation Standards rules offer no provision for public notice of interim specific standards for those communities most directly affected by contaminated sites. The Department should seize this opportunity to involve citizens who live and work near areas requiring remediation in the discussion of applicable standards. The rule summary states that

"[t]he Legislature specifically declared that 'strict remediation standards are necessary to protect public health and safety and the environment' and that these standards" should be adopted based upon the risk posed by discharged hazardous substances. Clearly, the purpose of the Soil Remediation Standards is, first and foremost, to protect the people who come into regular contact with contamination. Indeed, the Department has taken pains to repeatedly note risk levels and health precautions with respect to soil remediation. However, it has declined to include processes for allowing free information dissemination to the neighbors of contaminated sites.

Specifically, the Department should post a notice of the interim specific standards on its web site and should also publish notice in local and regional newspapers. Following the notice of interim specific standards and/or approved applications for alternative soil remedial standards, the Department should allow for a 45-day public comment period. The Department should allow local elected representatives or community residents to request a public hearing, and use its discretion to determine whether such a hearing is warranted, given the public health ramifications surrounding a specific site remediation. The Department should then respond to and address comments and concerns within 45 days and make modifications to its decision as necessary. (57)

14. COMMENT: The Department should allow public comment on the scientific methodologies to ensure proper application of the alternative soil remediation standard process by withdrawing the current soil remediation standards proposal and re-proposing soil remediation standards and Technical Rules and appropriate guidance for both the numeric criteria and appropriate methodologies. This approach should not be too burdensome for the Department due to the availability of USEPA's Soil Screening Level guidance that was cited by the Department. (16, 20, 38, 41, 52, 56)

RESPONSE to COMMENTS 13 and 14: The Department agrees that communication with affected communities is important. The Department also believes that this need should be balanced with the need to develop interim standards (which will only be developed where no standard appears in the tables at N.J.A.C. 7:26D-6.2) quickly, so that site remediation may proceed quickly and to a level that is protective of human health and the environment. Note that the Department will only utilize the formulas and variables that are codified in the appendices at N.J.A.C. 7:26D-6.2 to derive the interim standards, and through this rulemaking, the public was afforded an opportunity to scrutinize and comment on these formulas and variables. With the adoption of these formulas and variables, the public is on notice of the methodology that the Department intends to use to derive an interim standard. Moreover, as discussed above, the Department is required under N.J.A.C. 7:26D-5.3(b) to timely propose and adopt interim standards as a part of these rules through formal rulemaking, and that process will afford members of communities where sites are being remediated to an interim standard the opportunity to publicly comment on that standard.

15. COMMENT: Information on the statistical application of the numeric standards apparently will be conveyed via administrative notice only, without an opportunity for public review and comment. Information regarding statistical application of the standards, specifically the use of averaging to assess compliance with the numeric standards, represents a critical part of the proposed rule. The procedures for averaging should be subject to public review and comment before a final soil remediation rule is promulgated. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Department will only use the notice of administrative change mechanism to amend existing remediation standards, and then, only as provided in Remediation Standards Subchapter 6.

The concept of statistical application of numeric standards comes into play when determining whether remediation is in compliance with a particular standard. This determination is made within the purview of the Technical Rules. Currently, limited statistical application of sampling data is allowed under the Technical Rules (see N.J.A.C. 7:26E-4.8(c)3), which provides for averaging of sampling results within an area of concern. The Department anticipates incorporating additional statistical applications of numeric soil standards, such as compliance averaging for the inhalation exposure pathway, into the Technical Rules. Until the Technical

Rules can be amended, the Department will provide detailed technical guidance on its web site to provide the regulated community with the information that will be needed to use data averaging. The Department will take comments on the technical guidance and will, as part of the formal rulemaking process, take comments during the public comment period when the Technical Rules are amended.

Technical Rules Issues

16. COMMENT: To foster a more streamlined and flexible remedial process, the Technical Rules should be modified and updated to incorporate a comprehensive range of approaches for developing site specific alternative remediation standards, which is authorized by statute. To better fulfill the Legislative intent, the Technical Rules should also be modified and updated to incorporate practical procedures and guidelines for alternative soil remediation standards petitions, and an expedited schedule for timely approvals of those petitions. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59, 16, 20, 38, 41, 52, 56)

RESPONSE: The Department intends to amend the Technical Rules to incorporate compliance procedures and other technical requirements associated with the remediation standards. The expiration date of the Technical Rules was recently extended from December 17, 2007 to December 17, 2009. The Department is working with a large stakeholder group and members of the Legislature concerning amendments to the statutes administered by the Department's Site Remediation Program. The Department anticipates that these amendments will have a substantial and significant impact on the Site Remediation Program and will likely require significant amendments to the Technical Rules. Until the Technical Rules can be amended, the Department will provide technical guidance specific to the development of alternative soil remediation standards and will make the guidance available on its web site.

The Department does not anticipate setting a schedule for the review of alternative soil remediation standard petitions. While the Department acknowledges that there will be a learning curve for case managers and the regulated community to become familiar with the different alternative soil remediation standard options, it is probable that many of the alternative soil remediation standard requests will contain common issues that can be resolved in a timely manner.

17. COMMENT: There is a disconnect between the proposed alternative soil remediation standards and the Technical Rules. The proposed rules require conducting a background study per the Technical Rules. There is nothing in the alternative soil remediation standards procedures specifying how a background study will be used to establish alternative soil remediation standards. The proposed alternative soil remediation standards procedures do not allow the "natural background" level of a contaminant to be proposed as an alternative soil remediation standard. This disconnect must be corrected. In addition, the Technical Rules also lack any definition of the term "region of the site," which may be used to determine "background." This oversight should be corrected in both the Remediation Standards and the Technical Rules as part of this adoption. (62, 65)

RESPONSE: The Remediation Standards do not require the person responsible for conducting the remediation to conduct a background study per the Technical Rules. The Remediation Standards at N.J.A.C. 7:26D-1.2(e) codify the statutory provision at N.J.S.A. 58:10B-12g4 that the person responsible for conducting the remediation shall not be required to remediate to a level or concentration that is lower than the regional natural background level. Accordingly, the requirements for proposing an alternative soil remediation standard if contaminant concentrations were truly at background would not apply because the person responsible for conducting the remediation is not required to remediate to levels below background.

The mechanism for making a showing that a particular contaminant is present on a particular site at or below background concentration is codified in the Technical Rules at N.J.A.C. 7:26E-3.10. These procedures prescribe sampling and other requirements that the person responsible for conducting the remediation would undertake to satisfactorily demonstrate to the Department that identified contaminant concentrations in soil in the region of the site are the same concentration as the soil found on the site under investigation.

The term “region of the site” is defined in the Technical Rules at N.J.A.C. 7:26E-1.8 to mean the area on and adjacent to the site.

18. COMMENT: The Department should amend the Technical Rules to allow for approval of remedial action work plans that provide an acceptable level of protection of human health and the environment, but which do not necessarily attain the numeric remediation standards by removal or treatment.

The rules should outline acceptable remedial measures to ensure that current human exposures are under control and migration of contaminated groundwater is under control; and to allow for institutional controls, including Classification Exception Areas and Declarations of Environmental Restriction, and/or engineering controls to mitigate human exposure to residual concentrations that exceed applicable, generic remediation standards for groundwater and soil. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: While this comment pertains to the Technical Rules, and not to the proposed Remediation Standards Rules, it is worth noting that the Technical Rules currently provide at N.J.A.C. 7:26E-8 that the person responsible for remediation may include institutional or engineering controls as a part of the remedial action plan. These remedial options include unrestricted remedial action, limited restricted remedial action, and restricted remedial action. These remedial options represent a combination of remediation standards that are achieved and may employ engineering and institutional controls to mitigate or eliminate potential exposure to contaminants remaining at the site. While the Department is currently considering clarifications to these rule provisions, it does not intend that the rules will outline specific remedial measures. A vast range of removal, treatment and control options are available to remediating parties, and whether one option is more appropriate for a site than another option is a site-specific determination. The selection of remedies can depend on the nature and extent of contamination at the site, the intended use of the site, and other site-specific environmental and economical considerations. Each remediating party must determine which remedial action is appropriate for a particular site. The Department will continue to review each remedial action to ensure that it is appropriate for the site and will be protective of human health and the environment.

19. COMMENT: The Department should consider incorporating alternative remedial approaches into the Technical Rules. Conceptually, an alternative remedial approach would encompass alternative soil remediation standards and would demonstrate the protectiveness of the remedy in lieu of a formal alternative soil remediation standards petition. The Department should approve the alternative soil remediation standards and the associated remedial action work plan based upon site-specific use and conditions.

The Department should not require soil treatment or removal to the impact to ground water standards when migration of contaminated ground water and human exposures are under control, consistent with USEPA practices and the practices of many other states. In addition, soil treatment or removal based upon an impact to groundwater should not be required in any circumstance where groundwater quality is already acceptable for current and reasonably expected future uses of the water-bearing unit or where ground water contaminant concentrations are declining. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: A person responsible for conducting the remediation may submit a petition for an alternative soil remediation standard (ARS) with a remedial action workplan (RAWP), both as a part of the same document, and the Department does not object to reviewing the ARS request as part of the RAWP submittal. The Department understands that a proposed ARS may be integral to the overall evaluation of the RAWP, and therefore encourages persons responsible for conducting remediation to submit the ARS request with the RAWP and to bring this fact to the Department's attention at the time of submittal. However, the Department, without more detail, is unable to respond to the comment that a less "formal" approach should be taken.

Because the impact to ground water soil remediation standards are not being adopted, as discussed in response to comments 316 through 420, the impacts to ground water from contaminated soil will continue to be evaluated on a site-by-site basis using guidance developed by the Department. It may be necessary to remove contaminated soil at a site where that soil will act as a source of contamination to the ground water. All remedies must eliminate or mitigate human exposure to contaminated ground water. The Department will only consider control of contaminated ground water plumes when removal or treatment of sources to ground water contamination is impracticable. Classification exception areas are the institutional controls that are used to identify contaminated ground water. However, contaminated ground water must be remediated to the applicable ground water quality standard established pursuant to N.J.A.C. 7:9C.

20. COMMENT: The Department has proposed several methods for developing site specific alternative soil remediation standards, ranging from relatively simple and inexpensive to complex modeling at significant expense. The Department should clarify that use of alternative remediation standards does not require a variance such as is allowed under the Technical Rules at N.J.A.C. 7:26E-1.6(d) or other procedure that would create a burden on a remediating party. (16, 20, 38, 41, 52, 56)

RESPONSE: The development and approval of alternative soil remediation standards does not require a variance as the term is used in the Technical Rules at N.J.A.C. 7:26E-1.6(d). The process of developing and approving alternative soil remediation standards is established by N.J.A.C. 7:26D-7. This subchapter and Appendix 6, Alternative Soil Remediation Standard Application, require basic site information and whatever documentation that is necessary to support the development and use of the alternative standard. The Department acknowledges that it will take the remediating parties time and resources to prepare alternative soil remediation standards petitions. However, it is anticipated that the implementation of an approved alternative soil remediation standard will result in more expeditious and less costly remediation.

21. COMMENT: The Department should modify the proposed standards to allow the development of alternative soil remediation standards at any phase of the remediation process. Throughout the Technical Rules, various references are made to the need for investigation, delineation, and remediation if contaminants are present over the "applicable unrestricted use

remediation standards." The Technical Rules should clarify references to the proposed soil remediation standards. In cases of soil contamination, it is unclear if these standards are the proposed remediation standards at Table 1 or if alternative soil remediation standards may be developed at any stage of the investigation and remediation process. (16, 20, 38, 41, 52, 56)

RESPONSE: The timing of when an alternative soil remediation standard can be developed relates directly to the alternative soil remediation standard option chosen and the data and information that are needed to develop the alternative standard. Some alternative soil remediation standards can be developed as soon as basic soil chemistry and characteristics are known. Other alternative soil remediation standards require a full delineation of contaminants and the collection and use of an extensive amount of site-specific data. The Department will provide technical guidance specific to the development of alternative soil remediation standards and will make the guidance available on its web site.

22. COMMENT: Several sections of the Basis and Background Documents for the remediation standards rules make reference to the Technical Rules, N.J.A.C. 7:26E, to determine appropriate numbers of samples based on the size of the site or area of concern in order to develop alternative soil remediation standards. The Basis and Background documents also state that more sampling will need to be collected for larger areas of concern. However, N.J.A.C. 7:26E does not currently address these issues. Specific proposed sampling frequencies for each procedure should be provided before the soil remediation standards are adopted and implemented.

There are several important clarifications that are needed relative to application of the soil remediation standards that can only be effectively evaluated by the regulated community through preparation of a rule proposal that includes not only numeric criteria but also the appropriate revisions to the Technical Rules needed to implement the numeric criteria. (16, 20, 38, 41, 52, 56)

RESPONSE: The Technical Rules at N.J.A.C. 7:26E-3.9 include minimum sampling requirements for more than 20 specific types of areas of concern for the site investigation phase of remediation. The Department anticipates that the majority of alternative soil remediation standards will be able to be developed using site investigation data. The Department is developing technical guidance for the development of alternative soil remediation standards that will be posted on its web site. These guidance documents will include information regarding the number of samples and other site information that will be needed to develop alternative remediation standards. The Department anticipates incorporating much of this information into the Technical Rules when those rules are next readopted.

23. COMMENT: The current trigger for ground water investigation in N.J.A.C. 7:26E-4.4 indicates that if contamination is present within two feet of bedrock or in the saturated zone, a ground water investigation is warranted. This appears to be a non-specific, arbitrary distance, and will be outdated based upon the proposal of the new soil remediation standards for the impact to ground water pathway. Will the location of bedrock and/or the saturated zone remain a trigger for ground water investigations despite establishment of alternative soil remediation standards protective of ground water? (16, 20, 38, 41, 52, 56)

24. COMMENT: The Department should offer clarification on what will trigger the requirement to install monitoring wells after the Remediation Standards are adopted, considering the fact that the models and calculations used in estimating the soil remediation standards and alternative remediation standards incorporate a more substantial number of geologic and hydrogeologic properties (e.g. fractional organic carbon content, K_d values for soil pH, parameters in developing SESOIL models, etc.). In addition, how will seasonal and tidal fluctuations of ground water table be addressed? (16, 20, 38, 41, 52, 56)

25. COMMENT: In order to ensure consistency and predictability in the application and use of the impact to ground water soil remediation standards, it will be necessary for the Department to clearly state when these standards cannot be used to determine the need to install a ground water monitoring well. The commenters also request that in presenting this information, the

Department should provide the basis and background for its determination. The developed standards should apply to all releases of hazardous substances. (16, 20, 38, 41, 52, 56)

26. COMMENT: In the narrative that accompanied the draft Soil Remediation Standards rule proposal in 2004, the Department stated that "it is not appropriate to use the impact to groundwater soil remediation standards to determine when a groundwater sample should be collected." The rationale explained during the Department's August 10, 2004 Soil Remediation Standards Workshop was that the existing impact to groundwater soil remediation standards based on the Jury Model is not conservative enough in accounting for potential future impacts from older releases and therefore should not be used to evaluate the need for a groundwater investigation. Essentially the current criteria are implied to only be protective 'looking forward' and do not consider an old release. (16, 20, 38, 41, 52, 56)

RESPONSE to COMMENTS 23 through 26: The minimum requirements concerning when the person responsible for conducting the remediation must collect a ground water sample are codified in the Technical Rules at N.J.A.C. 7:26E-3.7 and 4.4. No amendments to these sections were proposed as a part of the Remediation Standards proposal and accordingly, the requirements of these sections remain unchanged as a result of the adoption of the Remediation Standards.

The requirement to sample ground water when soil contamination is detected within two feet of bedrock of the water table is a promulgated requirement and has been used by the Department for many years. The proximity of soil contamination to bedrock and/or the saturated zone has been, based on the Department's experience, an effective predictor of ground water contamination. Fluctuation of the water table and the fact that soil contamination can migrate at different rates in different areas often result in ground water impacts even when one particular soil boring indicates a two-foot buffer. Accordingly, this sampling requirement will continue to be required.

The need to collect a ground water sample at a site is dependent on a number of site specific factors. Based on the Department's extensive experience with the investigation of ground water contamination, the impetus to collect a ground water sample does not relate solely to the concentration or location of contaminants detected in the vadose zone. In many cases, discharges to the environment go unrecorded or are unseen. Without knowing when a discharge occurred or how much contaminant was released, it is impossible to predict with any accuracy the location of the contaminant in the environment. Depending on the age and number of discharges that have taken place at a particular area of concern, the mobility and volatility of the contaminant, and the soil properties, contamination may have moved through the vadose zone long before any soil samples are collected. In addition, for heterogeneous soils, it is difficult to determine if the vertical extent of contamination has been delineated due to the presence of preferential pathways for contaminant migration that may exist in the vadose zone. The Department intends to amend the Technical Rules in the near future to amend the trigger for ground water sampling. The Department is considering basing a new trigger on the mobility of the contaminant that was discharged or stored at a site and will likely rely less on whether a contaminant is detected in the vadose zone.

The Department did not state that "the existing impact to groundwater soil remediation standards based on the Jury Model is not conservative in accounting for potential future impacts from older releases and therefore should not be used to evaluate the need for a groundwater investigation". The very nature of the impact to ground water pathway, no matter what the model used, dictates that it address future ground water contamination and not predict whether ground water contamination currently exists.

27. COMMENT: The idea of proposing soil cleanup standards that cannot be applied to old releases suggests again that the Department is being overly conservative in its approach to establishing generic standards that are available to promote the remediation of sites following reasonable assumptions. (16, 20, 38, 41, 52, 56)

RESPONSE: The impact to ground water soil remediation standards apply to both old and new releases. The impact to ground water soil remediation standards apply only to vadose zone soils. Current concentrations of contaminants in the vadose zone may not be related to the presence or absence of contamination in ground water. A discharge of a mobile and volatile contaminant that has an affinity for water that took place 15 years ago may only be detectable in ground water. This contaminant may have long since migrated and volatilized out of the vadose zone. The impact to ground water soil remediation standards can only be applied “looking forward” as any contaminant currently in the vadose zone represents contamination that will migrate to the water table in the future.

Dilution Attenuation Factor

28. COMMENT: The use of a generic soil type for the entire State to develop impact to ground water standards is inconsistent with the Department’s proposed Water Quality Management Planning rules. There, water quality standards are applied by very small geographic areas—often hydrologic unit codes (HUC) 14s, although sometimes HUC 11s, on the principle that different conditions require different application of the rules. Certainly, the Department should use a similar method to recognize that soil types vary widely across the State. (19, 22, 27, 45)

RESPONSE: The Department’s proposed Water Quality Management Planning (WQMP) rules do not establish water quality standards nor do they apply different water quality standards to different HUC11s or HUC14s. The proposed WQMP rules establish the procedures to be used to demonstrate compliance with the Ground Water Quality Standards antidegradation policy through the use of the wastewater management planning process and nitrate-dilution modeling. The nitrate-dilution model simply recognizes that different soils absorb and infiltrate precipitation at differing rates, which understandably affects the total volume available for dilution, but the underlying water quality standards remain consistent.

The Site Remediation Program used one particular dilution attenuation factor (DAF) value, a DAF of 13, to develop the generic standards that would be protective of ground water in most cases. The DAF of 13 was calculated using the Kirkwood Formation, which is a sandy loam soil type. The Department, however, is not adopting the impact to ground water soil standards at this time. The Department understands that there are many different soil types throughout the State. Many soils and geologic formations in the State, particularly in the northern portion, have more silt and clay which would have a higher DAF. The Department will provide technical guidance specific to the development of alternative soil remediation standards for the impact to groundwater pathway and will make the guidance available on its web site. This guidance will allow for the use of site specific soil types and for the development of a site specific DAF in the development of impact to ground water soil standards.

Order of Magnitude

29. COMMENT: The proposed soil standards would create uncertainty for prospective purchasers, developers, and lenders who are contemplating brownfield redevelopment. The Brownfield Act at N.J.S.A. 58:10B-12j and 13e grant the Department the discretion to reconsider approved remedial action work plans and No Further Action (NFA) decisions, respectively, if any applicable remediation standard decreases by an “order of magnitude” or more from current criteria. Because many of the proposed standards are lower than current criteria by a factor of ten or more and are lower than the levels of contamination that the Department previously allowed to remain at sites, many sites with NFA decisions would be potentially subject to being re-opened for further investigation and/or remedial action under N.J.S.A. 58:10B-13e. Faced with this prospect, prospective purchasers, developers, and lenders may reconsider their decision to redevelop brownfield sites. To reduce this uncertainty, the Department should adopt a policy that presumes that completed remedial actions are protective unless there is compelling evidence to the contrary and that recognizes that institutional and engineering controls that have been established and are being maintained and enforced represent an effective means of ensuring health and environmental protection. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59, 16, 20, 38, 41, 47, 52)

30. COMMENT: The Department must develop a reopener process that does not create a major administrative impediment to environmental cleanup and does not cast unnecessary doubt on the validity of existing NFAs and the decades of work previously completed under the Department's Site Remediation Program. The potential for significant numbers of reopeners will unnecessarily create uncertainty, complicate transactions, and cast a pall on previously remediated sites.

The environmental benefits of reopening closed cases would be minimal. The existing site remediation program is rigorous, including, but not limited to the across-the-board application of the 10^{-6} risk factor that is applied to all sites. In particular, the reopening of sites based on an order of magnitude decrease in the impact to ground water soil remediation standards will provide significant administrative and economic burdens, without resulting in increased protection of human health and the environment.

The Department should develop a process and information that will allow all interested parties to determine whether remediation at a particular site will be reopened. The Department could safely limit the cases that they will reopen to cases with remedies based on unrestricted use direct contact standards or where there is a demonstrated threat to public health or the environment.
(16, 20, 38, 41, 52, 56)

RESPONSE to COMMENTS 29 and 30: The Brownfield Act allows but does not require the Department to compel additional remediation if it is determined that a site that has been previously remediated poses a risk to human health and the environment when new standards are reduced by an order of magnitude or more. See N.J.S.A. 58:10B-13e. However, only a person who is a responsible party under the Spill Compensation and Control Act (Spill Act) at N.J.S.A. 58:10-23.11g is liable for any additional remediation costs necessary to bring the site into compliance with a remediation standard that is more stringent by an order of magnitude or more than the standard by which the site was previously remediated and for which an NFA was issued. Part of this determination will include an evaluation of existing engineering and institutional controls to ensure that they have been adequately maintained and will continue to be protective. After the issuance of an NFA letter, the burden to prove that the remediation and any engineering and institutional controls used at a site, will continue to be protective of human health and the environment rests with the responsible party pursuant to the Brownfield Act.

The Department is in the process of developing a policy to effectively and consistently identify the situations that would warrant the reevaluation of implemented remedies. The Department believes that the majority of sites for which the Department has issued an NFA letter will not pose an unacceptable risk to human health and the environment and thus will not result in the revocation of NFA letters.

Because the Department has decided not to adopt the proposed impact to ground water soil remediation standards, fewer remediation standards will be impacted by the order of magnitude provision. As adopted, 13 residential and 16 non-residential direct contact standards are at least order of magnitude lower than the soil cleanup criteria. Of these, only three contaminants, chloroform, 4-methylphenol and naphthalene, are detected frequently at sites in New Jersey.

31. COMMENT: When a standard changes by an order of magnitude, either through Federal or State adoption or due to new information, the Department should require additional cleanup for any active cases or sites with conditional no further action approvals. It would be particularly important to revisit cases where there is a likelihood of offsite contamination, and sites that are being redeveloped for residential use, schools, and child care. (10, 25, 31, 65)

32. COMMENT: Will the Department require the person responsible to reassess sites that have been remediated without the use of institutional or engineering controls to determine whether any contaminants remain above any new, more stringent standards? When and under what circumstances will the Department require such reviews to be conducted and who would have responsibility for conducting such reviews? (19, 22, 27, 45)

33. COMMENT: The Department should address how it would handle previously remediated sites as a consequence of a change in standards. The Department has only indicated how it proposes to handle current remedial action workplans by proposing amendments to the Technical Rules.

How does the Department intend to handle sites that completed remediation with the use of engineering controls and/or institutional controls and have been issued no further action letter? When a standard is lowered, will the Department require additional remediation for any contaminant that is present at a site but not identified in an institutional control because it did not exceed the standard at the time of the no further action letter? (19, 22, 27, 45)

RESPONSE to COMMENTS 31 through 33: The Legislature, at N.J.S.A.58:10B-12j and 13e, limits the instances under which the Department may require additional remediation when a new remediation standard is adopted. The requirements of N.J.S.A. 58:10B-12j apply to sites that are in the process of remediation, active cases with approved remedial action work plans, and when new standards are developed by the Department. N.J.S.A. 58:10B-13e applies to any site on which remediation has been completed and for which a no further action letter has been issued.

N.J.S.A.58:10B-12j allows the person conducting a remediation, who has an approved remedial action workplan or similar report to use the standards or criteria developed for that site pursuant to N.J.S.A. 58:10B-12a, unless those standards are greater by an order of magnitude or more than the standards adopted at N.J.A.C. 7:26D.

N.J.S.A. 58:10B-13e states that the Department may compel a person who is liable for the discharge pursuant to the Spill Act (as distinguished from the person responsible for conducting the remediation, who may not be one and the same) to conduct additional remediation when a subsequent standard is adopted that is lower by an order of magnitude or more than the level of contamination of a contaminant found at the property.

The Department issues a conditional no further action letter when the person conducting the remediation uses an institutional or engineering control as part of the remedy. There are requirements to monitor and maintain the protectiveness of these controls, as well as a requirement to certify to their safety to the Department every two years. Biennial certification requirements are set forth in the Technical Rules at N.J.A.C. 7:26E-8.3 to 8.7. As part of the biennial certification, the person responsible for maintaining the engineering or institutional control is required to compare New Jersey laws, remediation standards and other regulations applicable at the time of review and identify any relevant subsequently promulgated or modified laws, regulations or remediation standards to determine whether each engineering and/or institutional control complies with the requirements of the new laws and regulations. The results of the comparison must be included in the biennial certification along with a conclusion as to whether each remedial action that includes an engineering and/or institutional control remains protective of the public health and safety and the environment. This would include the evaluation of any established off-site engineering and institutional controls.

Under the Remediation Standards, when biennial reviews occur, it is likely that some sites will require additional remediation and some will not. For example, if a standard becomes more stringent by an order of magnitude (such as from 100 mg/kg to 10 mg/kg) and a cap has been used as an engineering control, the person responsible for monitoring and maintaining the control would need to determine if the existing cap extends to cover soil contaminated at levels greater than 10 mg/kg. If the cap is not sufficient to cover soil contaminated above the new 10 mg/kg standard, the cap would need to be extended. However, if the current cap does extend to cover soil contaminated at levels greater than 10 mg/kg, then the existing control would likely remain sufficiently protective.

Sites that have been remediated to residential standards have no monitoring or biennial reporting requirements. However, when a site comes under the Department's oversight again (for example, when a site changes hands and there is a triggering of the requirements of the Industrial Site Remediation Act (ISRA) rules, N.J.A.C. 7:26B, or if a lending institution requires an update of environmental conditions at a site), a review of the previous remediation is required pursuant to

N.J.A.C. 7:26E-3.2. These remediation reevaluations tend to occur relatively frequently. The person conducting the reevaluation must identify when a standard has been lowered by an order of magnitude or more and must determine whether additional remediation is required. The person will not be required to evaluate contamination for which the remediation standard has not been lowered by an order of magnitude or more. As stated above, the Department may require any person who is liable for contamination pursuant to the Spill Act, N.J.S.A. 58:10-23.11g to conduct additional remediation at the site when a standard is lowered by an order of magnitude or more.

Pursuant to N.J.S.A. 58:10B-13e the Department may compel a person who is a responsible party under the Spill Act to conduct additional remediation if it is determined that a site has been remediated to unrestricted standards and currently poses a risk to human health and the environment. The Department does not anticipate that there will be many circumstances that will warrant revoking a no further action letter based on the reduction of a remediation standard. However, the possibility cannot be ruled out particularly if sensitive populations are exposed to contaminants above an applicable standard.

The Department is currently developing a policy on how it intends to evaluate cases that are triggered by the order of magnitude reopener. While this policy has not been finalized, it will address those situations where a site had been remediated to the most stringent remediation standards but needs to be reevaluated due to the order of magnitude trigger. Under such a scenario, the Department may compel a person who is a responsible party under the Spill Act to conduct additional remediation if it is determined that conditions at the site pose a risk to human health and the environment, particularly if sensitive populations are present. If a Spill Act responsible party cannot be identified or is no longer viable, the Department could use public money to conduct additional remediation if it was warranted.

Note that when a remediation standard is lowered, the person who conducted the remediation or the person who owns the site may want to ensure that the remedy implemented at the site continues to be protective of the people who use or reside at the site. In that case that person could conduct an additional environmental review under the Department's oversight with a memorandum of agreement pursuant to N.J.A.C. 7:26C.

34. COMMENT: The lowering of standards essentially means that prior remedial actions and Department approvals based on the prior standards are no longer protective. For those parameters that have been lowered by an order of magnitude or more, the law requires the Department to reopen any prior remedial action workplan approval, no further action letter or covenant not to sue. If not, the Department would knowingly allow human exposure to risks in excess of the statutory risk standards. (68)

RESPONSE: A lowering of standards does not automatically mean that a prior remedial action is no longer protective. For example, a remedy could still be adequately protective if all contamination above the new standard is contained by the previously installed engineering control.

The Brownfield Act does not require the Department to open any prior remedial action workplan approval, no further action letter or covenant not to sue. As discussed in more detail above, the Brownfield Act, at N.J.S.A.58:10B-12j and 13e, limits the situations where the Department may require additional remediation when a new, lower standard is adopted. Sites that are being remediated with an approved remedial action workplan will need to comply with new standards that have been lowered by an order of magnitude or more. Every site that has an engineering or institutional control will be required to evaluate the protectiveness of the remedy in light of new, lower standards. The Department is currently developing a plan to determine when and how to evaluate sites that have completed remedies to the unrestricted use standards that will be workable considering the Department's current workload issues.

35. COMMENT: The proposal establishes the "order of magnitude" concept where the Department may reopen old cases or require further remediation at any site where the cleanup standard is reduced by an order of magnitude or more. Landowners, who have already made significant investments to remediate contamination, and have received a no further action letter

from the Department, should have that determination honored by the Department indefinitely. It is unfair to change the rules in the middle of the process and make these landowners go through the significant time and expense a second time. (43)

RESPONSE: The order of magnitude provisions are not new. Since 1993, the Brownfield Act has enabled the Department to reopen some remediation projects when the standards to which they were remediated become stricter by an order of magnitude or more.

A lowering of standards, however, does not automatically mean that a prior remedial action is no longer protective. For example, a remedy could still be adequately protective if all contamination above the new standard is contained by a previously installed engineering control.

However, pursuant to N.J.S.A. 58:10B-13e, the Department may compel a person who is a responsible party under the Spill Act to conduct additional remediation if it is determined that a site has been remediated to unrestricted standards and currently poses a risk to human health and the environment. The Department does not anticipate that there will be many circumstances that will warrant revoking a no further action letter based on the reduction of a remediation standard. However, the possibility cannot be ruled out particularly if sensitive populations are exposed to contaminants above an applicable standard.

36. COMMENT: As proposed, the order of magnitude provision established at N.J.A.C. 7:26E-1.3(d) is unclear. It appears that approved and even completed remediations will be reopened where there are order of magnitude changes in the remediation standards. The proposal also seems to provide that, whenever the new standards involve an order of magnitude change (i.e., made more stringent), all cleanup projects must comply with the new standards for the contaminants involved without regard to whether the person performing cleanup has an innocent purchaser defense to cleanup liability under N.J.S.A. 58:10-23.11g.d of the Spill Act.

This requirement is contrary to the Spill Act and the legislative policies of the Brownfield Act. While the Department cites N.J.S.A. 58:10B-12j as statutory authority for the order of magnitude protection, that statutory provision must be construed together with other applicable provisions of the Brownfield Act and the Spill Act, which the Brownfield Act amended. N.J.S.A. 58:10B-13e provides that only a person who is liable to cleanup pursuant to the Spill Act, and who does not have a defense to liability unless the difference between the new remediation standard and the level of concentration of contaminant at the property differs by an order of magnitude.

The legislature specifically exempted persons who have a defense to cleanup liability under N.J.S.A. 58:10-23.11g.d from compliance with new remediation standards must also be read together with applicable provisions of the Spill Act governing liability for the cleanup and removal of hazardous substances. Innocent purchasers of real property who qualify for the defenses to cleanup liability cannot be subject to an order of magnitude "reopener" when new remediation standards are adopted by the Department.

The Department should amend its proposed regulations to make it clear that does not apply to purchasers of previously contaminated property who satisfy the innocent purchaser criteria of N.J.S.A. 58:10-23.11g.d(2). (19, 22, 27, 45, 4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 47, 51, 52, 52, 54, 59)

RESPONSE: N.J.A.C. 7:26E-1.3(d) establishes the standards to which contamination must be remediated for any site that is being remediated under the Department's oversight pursuant to N.J.S.A. 58:10B-12j. The requirements of N.J.S.A. 58:10B-12j apply to sites that are in the process of remediation when new standards are developed by the Department.

For active sites, any person conducting a remediation who has not submitted a remedial action workplan or a remedial action report within 6 months after the rule is adopted, must use the standards adopted at N.J.A.C. 7:26D. However, for active cases where the person conducting a remediation has submitted a remedial action workplan or a remedial action report within 6 months after rule is adopted, N.J.A.C. 7:26E-1.3(d)2 allows the use of the standards or criteria developed for that site pursuant to N.J.S.A. 58:10B-12a unless those standards are greater than an order of magnitude or more, rather than the standards adopted at N.J.A.C. 7:26D. N.J.A.C.

7:26E-1.3(d)2 applies to any site for which either a remedial action workplan or a remedial action report has been submitted, but for which a no further action letter has not yet been issued.

The Department included the submittal of a remedial action report at N.J.A.C. 7:26E-1.3(d)2 because not all persons responsible for conducting the remediation are required to, or elect to, submit remedial action workplans. The Brownfields Act at N.J.S.A. 58:10B-12j concerns sites on which the remediation is ongoing, and refers to the submission of a remedial action workplan or similar plan. The Department, for the purposes of N.J.A.C. 7:26E-1.3(d)2, considers a remedial action report to be a "similar plan." The provisions of N.J.S.A. 58:10B-12j are the same for any person conducting a remediation without regard to Spill Act liability. The Department believes that the if the Legislature wanted to limit the requirements of this section to Spill Act liable parties, it would have specifically included language in this section much in the same way it did at N.J.S.A. 58:10B-13e (which requires only a person who is liable under the Spill Act and has no defenses thereto to bear the cost of any additional remediation). The requirements of N.J.A.C. 7:26E-1.3(d) clearly apply to any party that is conducting remediation under the Department's oversight and therefore requires no change.

The Department believes that the commenters are confusing the provisions of N.J.S.A. 58:10B-13e, which limits the liability for the cost of any additional remediation when a standard changes by an order of magnitude or more after a remediation is completed, with N.J.S.A. 58:10B-12j, concerning when the Department may require a change in a remedial action workplan when standards change by an order of magnitude.

N.J.S.A. 58:10B-13e applies to any site on which remediation has been completed and for which a no further action letter has been issued. The Department has included the order of magnitude evaluation provided by N.J.S.A. 58:10B-13e, in the Technical Rules as part of the preliminary assessment report. N.J.A.C. 7:26E-3.2(a)5 requires that an order of magnitude evaluation be conducted to determine if additional remediation of the site is needed at all sites for which the Department has issued a no further action letter and that have come back under the Department's oversight . The order of magnitude evaluation is required for any area of concern that was previously remediated. The order of magnitude provision would not apply to any new discharges or new areas of concern.

The Remediation Standards Rules are Overly Conservative

37. COMMENT: The Legislature is clear in the Brownfield Act on how the Department's rules are to facilitate voluntary remediations (i.e., remediation by parties not responsible for the contamination): "in order to encourage the cleanup of contaminated sites, there must be finality in the process, the provision of financial incentives, liability protection for innocent parties who clean up, cleanup procedures that are cost effective and regulatory action that is timely and efficient." N.J.S.A. 58:10B-1.2.

Because of its uniqueness, the Legislature did not weave the Brownfield Act into the fabric of statutes aimed at prospectively protecting and preserving natural resources, or directing investments in public facilities and infrastructure. This is apparent in the lack of reference to the State Planning Act (N.J.S.A. 52:18A-196, et seq.), the Water Quality Planning Act (N.J.S.A. 58:11A-1, et seq.), or other statutes relating to the prospective protection and/or preservation of environmental media, species and natural resources. The Legislature recognized the need to foster remediation by appealing to the marketplace to provide capital to restore contaminated sites to productive and safe use. In the Brownfield Act, the Legislature carefully provided the Department with focused instructions in order to balance protective standards with the economic realities necessary to foster private remediation through the redevelopment of brownfield sites.

Contrary to the Legislature's specific mandates, the Department has proposed standards that use overly conservative and redundant assumptions resulting in values that are far more stringent than are necessary to address the risk levels established by our Legislature. Further, the proposed rules do not include clear language confirming that the liability protections that the statutes extend to innocent parties will be honored by the Department. (2, 16, 19, 20, 22, 27, 45, 4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 38, 40, 41, 45, 49, 51, 52, 54, 59)

38. COMMENT: The New Jersey legislature, through the Industrial Site Recovery Act (ISRA), declared that it is the policy of New Jersey "to promote efficient and timely cleanups and to eliminate any unnecessary financial burden of remediating contaminated sites." (N.J.S.A. 13:1K-7). The Department's proposed rule does not meet these policy objectives, because it is based upon redundant conservative goals for soil and ground water remediation and is inflexible. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 47, 51, 52, 54, 59)

RESPONSE to COMMENTS 37 and 38: The Legislature, in the Brownfield Act, directed the Department to develop remediation standards with specified health-based goals, namely, the Department was directed to use an incremental lifetime cancer risk of 10^{-6} and a hazard quotient of one for noncarcinogenic effects. See N.J.S.A. 58:10B-12d(2). The choice of these public health goals is not a scientific issue, but an issue of public policy. The Legislature clearly stated when it adopted the health based goals for remediation, that strict standards are necessary to protect public health and safety and the environment. In fact, the Legislature has established that human health risk policy consistently in both the Safe Drinking Water Act at N.J.S.A. 58:12A-13(b) and the Brownfield and Contaminated Site Remediation Act at N.J.S.A. 58:10B-12d. Therefore, as directed by statute, the Department is striving to develop consistent, health based standards and criteria across the different media and Department programs, including the Site Remediation Program.

The Remediation Standards rules will apply State-wide, without regard to whether the remediation is being conducted by a responsible party pursuant to the Spill Act or is being conducted by a volunteer who is not responsible for the discharge. The Department Oversight of the Remediation of Contaminated Sites rules (Oversight rules), N.J.A.C. 7:26C address some issues of liability. These rules identify the administrative procedures for a person to participate in the remediation of a contaminated site under the Department's oversight, including ways to identify whether the person who is conducting the remediation is a responsible party or is an innocent purchaser who is volunteering to clean up the site. Appendix C to the Oversight rules contains the Covenant Not to Sue that accompanies the Department's no further action letters, and Appendix D contains a Developer Certification that allows the person conducting the remediation to identify themselves as a prospective purchaser and not a responsible party under the Spill Act. Nevertheless, the Department is working on amendments to the Oversight rules that will further clarify who qualifies as a prospective purchaser and what responsibilities are associated with that status.

Alternative Soil Remediation Standards

39. COMMENT: By allowing remediating parties to develop alternative soil remediation standards based on site specific factors the Department is allowing the minimum remediation standards to be waived and weaker standards applied at contaminated sites. Alternative standards will result in more contamination that will impact the environment and public health. Alternative soil remediation standards should only be allowed in limited situations. (31, 42, 44, 65, 67)

40. COMMENT: The commenters are concerned that numeric standards can be too readily waived and weaker standards applied under the alternative soil remediation standard (ARS) option based on site specific factors and this represents a loophole in the regulations. While ARSs may be appropriate in very limited cases, it would be in the public interest for the Department to determine these rare situations rather than letting applicants/developers/ responsible parties take on this responsibility. Applicants have a responsibility to clean up to the Department standard; it should not be at their discretion to play out risk scenarios and juggle numbers to justify a non-permanent remedy. The concern is that developers/responsible parties with resources will spend a lot of money to justify a lesser cleanup, and that developers/responsible parties with fewer resources will be held to the letter of the law. Adopting the Alternative Soil Remediation Standard subchapter will likely lead to more “pave and wave’ remedies rather than permanent remedies**.** (10, 25, 31, 44, 65)

RESPONSE to COMMENTS 39 and 40: Higher alternative soil remediation standards are not less protective than the minimum remediation standards provided in Appendix 1. The methods for the development of alternative soil remediation standards simply allow a person to use site specific information and data to develop a “customized” remediation standard that will achieve the same health-based goals on which the promulgated standards are based. The Department will only approve alternative soil remediation standards that, pursuant to N.J.S.A. 58:10B-12c(1) and d., do not exceed a health risk standard for human carcinogens, as categorized by the USEPA, that will result in an additional cancer risk of one in one million, and for noncarcinogens, that will limit the hazard quotient for any given effect to a value not to exceed one.

N.J.A.C. 7:26E-7, Alternative Soil Remediation Standards, establishes the process and procedures for the person responsible for conducting the remediation to establish an alternative remediation standard. Because the characteristics and conditions of contaminated sites around the State can vary widely, it can be appropriate to use site specific data and information to develop an alternative remediation standard. The Department provides detailed direction in Appendixes 4 through 6 that the person requesting an alternative standard must use to demonstrate to the Department that the proposed standard will meet the same human health goals set by the Legislature for all remediation standards and will be protective of the environment. The Department will not approve the use of an alternative soil remediation standard if the person responsible for conducting the remediation cannot make that demonstration. Because alternative soil remediation standards are developed using site-specific conditions, the Department will not allow their use at other sites.

41. COMMENT: The Department should provide notice of approved requests for alternative soil remediation standards by petition approvals on its web site and should also notify area residents through local and regional newspaper publication. The Department should offer direct notification by mailing notice to local elected representatives and to businesses and residents residing within 500 feet of contaminated sites.

The alternative remediation standards approval process should allow for a 45-day public comment period. This would allow local elected representatives or community residents to request a public hearing about specific requests. The Department could use its discretion to determine whether such a hearing is warranted given the public health ramifications surrounding a specific site remediation. The Department should then respond to and address comments and concerns within 45 days and make modifications to its decision as necessary. (57)

RESPONSE: The Department agrees with the commenter that communication with affected communities is important. The Department also believes that this need should be balanced with the need to develop alternative soil remediation standards quickly, so that site remediation may proceed quickly and to a level that is protective of human health and the environment.

It is important to note that alternative soil remediation standards will not be less protective than the promulgated standards. The methods for the development of alternative soil remediation standards simply allow a person to use site specific information and data to develop a "customized" remediation standard that will achieve the same health-based goals on which the promulgated standards are based. The Department will only approve alternative soil remediation standards that meet the human health goals established by the Legislature, pursuant to N.J.S.A. 58:10B-12c(1) and d. Therefore, the Department does not believe that it is necessary to provide notice or allow public comment on alternative soil remediation standards petitions and approvals.

The Department anticipates adopting amendments to the Technical Rules at N.J.A.C. 7:26E-1.4 that were proposed at 39 NJR 2687 (August 6, 2007) concerning notification and public outreach. Those proposed rules will require remediating parties to provide neighboring property owners, tenants and local officials information about sites being remediated in their neighborhoods. Under the rules as proposed, any person who has interest in the remediation of a particular site, including the development and use of site specific alternative soil remediation standards, will be able to get that information directly from the remediating party or the Department.

42. COMMENT: There are elements within the proposed rules that the commenters embrace because they represent practical approaches to protecting human health and the environment and

are consistent with widely accepted principles and practices for risk-based assessment and remediation. For example, the Department is applauded for allowing for site-specific alternative soil remediation standards and for identifying certain technical bases for alternative soil remediation standards that can be routinely granted. (4, 5, 11, 15, 16, 18, 19, 20, 22, 27, 28, 29, 30, 32, 34, 38, 40, 41, 45, 51, 52, 54, 56 59)

RESPONSE: The Department appreciates the commenters' support of its efforts to develop flexible and protective remediation standards.

43. COMMENT: The alternative soil remediation standards option provided in the proposal is highly limiting and other approaches, such as those that are acceptable to USEPA or have been peer reviewed, should also be considered. The Department should allow alternative soil remediation standards that are developed for a particular site to be used at other sites that have the same contaminants and conditions. Alternative soil remediation standards should be developed for specific types of materials or wastes. (14, 36, 38)

44. COMMENT: The Department should consider material-specific criteria, such as remediation standards for slag material, rather than relying on general assumptions related to remediating contaminated soils. (36)

45. COMMENT: The proposed rule inappropriately limits approaches for developing site-specific alternative soil remediation standards values. To foster a more flexible remedial process, the Department should expand the range of acceptable alternative soil remediation standards approaches to account for the full range of site-specific factors that can affect human and environmental exposures. The Department's Technical Rules should be modified and updated to incorporate a comprehensive range of approaches for developing site-specific alternative soil remediation standards, which is authorized by statute (N.J.S.A. 58:10B-1 et seq.). (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

46. COMMENT: The Department should do more in order to affect the goals of the Brownfields Act and incorporate additional risk assessment considerations into the development of cleanup standards, consistent with USEPA guidance. The Department should not limit the use of site-specific risk assessments, nor create obstacles to the use of alternative soil remediation standards or appropriate engineering controls. The commenters recommend that new procedures be developed to accompany the proposed soil remediation standards that would take into account reasonable assumptions about risk and ensure that all relevant site-specific factors can be considered. (4, 5, 11, 15, 16, 18, 20, 28, 29, 30, 32, 34, 38, 40, 41, 45, 51, 52, 54, 56, 59)

RESPONSE to COMMENTS 43 through 46: The Legislature mandated, at N.J.S.A. 58:10B-12f(1), that the Department allow the development of alternative soil remediation standards based on site specific factors. Subchapter 7, Alternative Soil Remediation Standards, establishes the procedures and bases for the proposal and development of alternative soil remediation standards. The Department does not agree that the subchapter limits the options for proposing alternative soil remediation standards to those outlined in the Appendices. N.J.A.C. 7:26D-7.3(a) discusses the procedure to be used in making the request while N.J.A.C. 7:26D-7.3(b) discusses the basis for making the request, including 1) new chemical toxicity data; 2) new risk assessment methodology or models; 3) alternative land use planned for the site; or 4) site-specific conditions that support the modification of input parameters for models used to develop alternative soil remediation standards pursuant to the Appendices. The Department believes that, when these two subsections are read together, they provide the flexibility contemplated by the Brownfields Act.

The Department does not believe that it is appropriate to develop remediation standards for specific types of materials (such as slag) or wastes because the chemical makeup of even similar materials and wastes can vary widely. Remediation standards for potentially complex matrices would be difficult to determine with any level of confidence.

It is possible that the use of an alternative soil remediation standard could be approved for other like sites if the basis for the alternative standard were the same. The fact that the Department has approved an alternative soil remediation standard for a particular site could conceivably be offered as evidence in favor of using that standard at a different site. However, the person applying for permission to use that standard at another site still bears the burden of proving its applicability at that person's site to ensure that, based on site-specific factors, the use of the alternative soil remediation standard would be protective of human health, safety and the environment at that person's site.

The Department anticipates that it will propose amendments to the Technical Rules as part of the readoption to add compliance and technical procedures. In the mean time, the Department intends to develop and post on its web site, guidance on the application of the remediation standards and practical procedures to develop alternative soil remediation standards. It is anticipated that this guidance will include simple to use spreadsheets and clear direction that will be helpful to the regulated community as well as Department case managers.

47. COMMENT: As proposed, the Department has provided a complex system of developing alternative soil remediation standards so that remediating parties may accurately project remediation costs. However, the proposed alternative soil remediation standards processes will take an indefinite period of time, even if the Department has enough staffing to review these petitions. The time that it will take to get these alternative soil remediation standards approvals will be too long for many developers that are considering the purchase and remediation of Brownfield sites and will harm Brownfield redevelopment overall. (19, 22, 27, 45)

48. COMMENT: Because the proposed soil remediation standards are overly conservative, an overwhelming number of alternative soil remediation standards will need to be developed by remediating parties. It will take a lot of time and money to develop alternative soil remediation standards and to gain the Department's approval for their use. The Department does not have the resources to review alternative soil remediation standards petitions in a timely manner. The cost and delays associated with alternative soil remediation standards will be an impediment to Brownfield remediation projects. (3, 4, 16, 19, 20, 22, 27, 45, 4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 38, 40, 41, 45, 51, 52, 54, 56, 59)

49. COMMENT: The proposed rules will over-complicate site investigations and cleanups and slow Department review times. The economic analysis presented along with the proposed rule focuses on the individual compound or individual standard view of the economic impacts of the proposed rule. However, under the proposed new soil remediation standards, there will be no simple site investigations. Property owners will need to conduct multiple investigations on their site in order to identify the contaminants present, provide data to develop site-specific alternative soil remediation standards and delineate the impacts once the remediation standards have been developed.

The development of an alternative soil remediation standard will be a costly and burdensome effort that will require significant resources that could otherwise be used to clean up a site. When consulting and other costs are accurately stated, the proposed regulations place the burden of developing site-specific alternative soil remediation standards (for non-mobile organics and metals) squarely on the backs of the regulated community. Although the Department provides a few examples of what it believes the costs for developing alternative soil remediation standards will be, it provides no basis for these cost estimates other than to include certain analytical costs. Under current funding and staffing mechanisms, the system will become overburdened and, as a result, alternative soil remediation standards applications will overwhelm the resources of the Department. (16, 19, 20, 22, 27, 38, 41, 52, 55, 66)

50. COMMENT: The Department's proposed soil remediation standards will increase the administrative and technical burden on Site Remediation staff by increasing the use of and reliance upon alternative soil remediation standards, which will delay review and approval and, therefore, implementation of remedial action work plans. Impeding site remediation is not in the public interest. The Department should develop a substantive framework for evaluating and administering alternative soil remediation standards; even though these alternative standards are allowed by statute, their use will almost certainly become the norm rather than the exception if the proposed standards are adopted as currently written. To support that framework, the

Department's Technical Requirements for Site Remediation should be modified and updated to incorporate a comprehensive range of practical procedures and an expedited schedule for timely approvals of petitions for site-specific alternative remediation standards. (3, 4, 16, 19, 20, 22, 27, 45, 4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 38, 40, 41, 45, 46, 51, 52, 54, 56, 58, 59)

RESPONSE to COMMENTS 47 through 50: The Department strongly believes that these rules satisfy the Legislature's mandates, N.J.S.A. 58:10B-12, for both the Appendix 1 soil remediation standards that are being adopted and the procedures for the development of alternative soil remediation standards. The Department anticipates a large the number of petitions for alternative soil remediation standards and acknowledges that these petitions will take additional time and money for the regulated community to prepare and the Department to review. The Department will be taking steps to streamline the review process to the greatest extent possible. The Department is aware, however, that new programs and procedures often have an implementation learning curve. The Department anticipates that the development and approval of alternative soil remediation standards will quickly become routine and timely. However, the Department believes that there will be cost and time savings associated with remediation using alternative soil remediation standards which will counterbalance the cost and time spent to develop them.

Subchapter 7 of the Remediation Standards details how the Department or the person responsible for conducting the remediation will develop alternative soil remediation standards, to the extent that they are appropriate for a particular site, and the Department believes that this framework is quite substantive and specific. The Department agrees that sites for which alternative soil remediation standards are appropriate may undergo more up-front review time in connection with determining the appropriate remedial action to be taken at that site. However, by providing flexibility in the development of soil remediation standards, the Department anticipates that the actual remediation phase will be expedited.

To further aid in this process, in addition to the procedures codified in Appendices 4-6, the Department anticipates that it will propose amendments to the Technical Rules as part of the readoption to add compliance and technical procedures. In the mean time, the Department intends to develop and post on its web site, guidance on the application of the remediation standards and practical procedures to develop alternative soil remediation standards. It is anticipated that this guidance will include simple to use spreadsheets and clear direction that will be helpful to the regulated community as well as Department case managers.

51. COMMENT: The proposed soil remediation standards would substantially reduce the number of sites that could potentially qualify for the Cleanup Star Program, thereby reducing its effectiveness. Under the Department's Cleanup Star Program, pre-qualified environmental professionals are permitted to investigate and remediate certain low-priority sites and areas of concern (AOCs) (i.e., ones of lesser complexity and limited contamination) with limited the Department oversight. By relying upon pre-qualified environmental professionals, the Cleanup Star program intends to relieve case managers so they can focus on the more contaminated and complex sites.

Subject to certain limitations, the Department's Cleanup Star Program applies to sites for which remediating parties are seeking either a no further action (NFA) letter for an AOC or an NFA for the entire site or property where proper application of the Technical Rules would result in no more than two (2) potentially contaminated AOCs pursuant to N.J.A.C. 7:26E-3.1. Because the proposed numeric standards for many chemical substances are more stringent than the existing soil cleanup criteria, many more sites will have more than two AOCs and will, therefore, be ineligible for this program.

Properties and AOCs that will be remediated to an alternative soil remediation standard would also be excluded from the Cleanup Star Program. The proposed impact-to-groundwater standards are so stringent that site owners/operators almost certainly will need to pursue ARSs for most sites, precluding most sites from the Cleanup Star Program.

By reducing the number of sites eligible for the Cleanup Star program, the Department's proposed soil remediation standards will increase the administrative and technical burden on Department staff, above and beyond the substantial burden projected for the alternative soil remediation standards petition reviews alone. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59

RESPONSE: The Department acknowledges the value of the Cleanup Star pilot program and is continuing to seek ways to expand its applicability. The Department is currently working with stakeholders and the Legislature to identify ways to make this pilot program more efficient and to identify program improvements, with the ultimate goal of helping to make the Site Remediation Program more effective. This will include an evaluation of the restriction that a site may qualify for Cleanup Star treatment only if it has a maximum of two areas of concern, as well as the possible inclusions of sites with ground water contamination.

In addition, as a part of its proposal to readopt subchapter 16 of the Underground Storage Tank rules, N.J.A.C. 7:14B-16, the Department has recently proposed new rules that will require homeowners who wish to receive No Further Action letters from the Department in connection with the remediation of discharges from unregulated heating oil tanks to use a certified individual rather than seeking Departmental oversight for these remediation cases. See __ NJR ___ (May 5, 2008).

As mentioned elsewhere, the Department has determined not to adopt the impact to groundwater soil remediation standards. Accordingly, the Department will continue to develop impact to groundwater standards on a case-by-case basis.

52. COMMENT: The development of alternative soil remediation standards for small underground storage tank sites is not a viable alternative. The cost and effort of developing an alternative soil remediation standard is going to be prohibitive at all but a handful of industrial sites. (15)

RESPONSE: The Department intends to develop guidance for the evaluation of the impact to ground water pathway and guidance designed specifically for the remediation of fuel oil discharges from unregulated underground storage tanks. The guidance will focus on commonly encountered conditions and simple methods to develop site-specific standards that will be protective of the environment. The Department anticipates that, since remediation of discharges from these types of USTs is fairly routine, it will be unlikely that the development of an alternative soil remediation standard will be required. In the unlikely event that an alternative standard is needed, the Department anticipates that its guidance will help make the standard development process straightforward.

53. COMMENT: The ability of the regulated community to complete site remediation projects that are protective of human health and the environment rests on having a set of reasonably conservative generic remediation standards that are available for the majority of situations where a release of hazardous substances has occurred. There are numerous technical issues in the application of alternative remediation standards that can only be resolved or clarified with the simultaneous publication of revisions to the Technical Requirements for Site Remediation, N.J.A.C. 7:26E or issuance of appropriate technical guidance subject to public review and comment. (16, 20, 38, 41, 52**,** 56)

54. COMMENT: The Department should allow public comment on the scientific methodologies to ensure proper application of the alternative remediation standard process by withdrawing the current Remediation Standards proposal and re-proposing soil remediation standards and Technical Rules and appropriate guidance for both the numeric criteria and appropriate methodologies. This approach should not be too burdensome for the Department due to the availability of USEPA's Soil Screening Level guidance that was cited by the Department. (16, 20, 38, 41, 52, 56)

RESPONSE to COMMENTS 53 and 54: The public was given the opportunity to comment on the development of the soil remediation standards in 2004. A notice of this opportunity was published in the New Jersey Register 36 N.J.R. 3395(a) and the Department provided Basis and Background documents on the Department's web site in order to solicit public review and comment. The Basis and Background documents provided detail on the scientific methodologies used to develop the remediation standards and discussed compliance and other technical issues including the development of alternative remediation standards. The Department received over 300 comments from 73 commenters as a result of the 2004 opportunity for public comment, which were carefully considered during the development of these rules.

In addition, as a part of the current rulemaking effort, several Basis and Background documents, which described the derivation of soil remediation standards and process for the development of alternative remediation standards, were made available on the Department's web site for public review.

The Department intends to amend the Technical Rules in the near future to incorporate technical requirements that are associated with these standards. An opportunity for public comment will be provided as part of that rulemaking. Until then, the Department will prepare and make available technical guidance for the regulated community to follow.

55. COMMENT: The Department proposes to require that alternative soil remediation standards petitions be submitted as part of an oversight document to ensure that the Department receives payment for review of the submission, and proposes to require that the applicant enter into a Memorandum of Agreement (MOA) if the site is not presently subject to a regulatory oversight document. The Department should establish a process whereby an alternative soil remediation standards petition can be submitted and the Department can be compensated for its review time, without being under an oversight document. If a person conducting remediation enters into a MOA, will they still be considered to be a volunteer? (16, 20, 38, 41, 52, 56)

RESPONSE: N.J.A.C. 7:26D-7.4 requires the person responsible for conducting the remediation who elects to apply for an alternative soil remediation standard to pay the Department's oversight costs pursuant to the Industrial Site Recovery Act rules, the Underground Storage Tank rules or the Oversight rules, because each of these rules prescribes applicable fees that pertain to Departmental oversight conducted pursuant to these respective rules. The Department will allow a person who is not subject to the Industrial Site Recovery Act or the New Jersey Underground

Storage of Hazardous Substances Act to conduct remediation at a known or suspected contaminated site or area/areas of concern at a site, which the Department has not scheduled for publicly funded remediation, under a Memorandum of Agreement (MOA) pursuant to the Oversight Rules at N.J.A.C. 7:26C-3. A person who is conducting the remediation of a contaminated site on a voluntary basis generally does so under a MOA; in fact, the MOA is reserved for voluntary remediations. The person requesting an MOA can specify that they want the Department's oversight for the entire process of the remediation of a site or some select piece, such as the approval of an alternative soil remediation standard, and doing so does not change their status as a volunteer. Accordingly, whether or not the person is a volunteer, that person may apply for the use of an alternative soil remediation standard.

56. COMMENT: The Department's narrative description of the alternative remediation standards process stipulates that petitions must be submitted as part of an oversight document to ensure that the Department receives payment for review of the submission. The Department should establish a process whereby an alternative remediation standard application can be submitted and compensate the Department for its review time, without being under an oversight document. (16, 20, 38, 41, 52, 56)

RESPONSE: N.J.A.C. 7:26D is designed to work in concert with the Technical Rules, N.J.A.C. 7:26E, and the Oversight Rules, N.J.A.C. 7:26C. Pursuant to N.J.A.C. 7:26E-1.3(b), any person seeking Department review of work undertaken pursuant to the Oversight Rules is required to execute an oversight document with the Department to ensure the Department is compensated for review of the submission.

As the Department gains more data on review times and costs, the Department might consider establishing a fee-based system for ARS applications.

57. COMMENT: The proposed regulations fail to propose a timetable under which the Department must provide a response to an alternative soil remediation standards application.

Schedules are absolutely critical to the business community. Without a schedule for the review and approval of alternative soil remediation standards, commercial or real estate transactions will be overly complicated, burdened and delayed. In lieu of a set schedule for Department review, at a minimum, a petition process should be implemented where aggrieved applicants can go to have the application process accelerated based on equitable grounds. The Department should provide accurate estimates of how much obtaining an alternative soil remediation standard will cost as this would add to the predictability of the alternative soil remediation standard process. (3, 16, 20, 38, 41, 52, 56, 66)

RESPONSE: The Department will provide guidance on its web site that will provide simplified methods for the regulated community to develop alternative soil remediation standards applications and will aid case managers' review and approval. Because both the standards and the application process are new, the Department anticipates that there will be a learning curve for a period of time after these rules are adopted. But because appropriate training and technical support will be made available, the Department also believes that the process of developing and approving alternative standard will become routine and will not slow down the remediation process. It is anticipated that the development and review times will vary based on the type and complexity of the alternative remediation standards being developed. The development of a simple alternative soil remediation standard may involve the input of some site specific measurement into a spreadsheet which will automatically generate an alternative standard. Others may require the collection of more site data and the use of computer transport models. The person responsible for conducting remediation must determine which approach is right for their site. For these reasons, specified review times are not included in the rules.

58. COMMENT: The proposed rules do not provide a definitive framework for the Site Remediation Program staff to efficiently and effectively assess alternative remediation standard requests. Accordingly, as proposed, the soil remediation standards have the potential to essentially eliminate objective numeric cleanup standards and will return approval of site

cleanups to site-by-site, case-by-case administrative analysis and, to a large degree, discretionary internal decision-making process by the Department for determining contaminants of concern. The remediating parties will not be able to anticipate, with any degree of certainty, that a proposed remedial action for soils with engineering and institutional controls will be approved by the Department. (3)

RESPONSE: The soil remediation standards at N.J.A.C. 7:26D-7 and the Appendices referenced therein describe in detail the framework for the development and approval of alternative remediation standards (ARSs). This information provides the Department and the regulated community with clear directions for establishing an ARS with little discretionary decision-making. As stated above, the Department has developed the process by which Department staff will process ARS applications. In order to ensure that ARS requests are responded to quickly and efficiently, the Department will be providing training to the regulated community and in-house staff, publishing guidance documents on its web site and providing tools, such as spreadsheets, to in-house staff. The Department is confident that these tools will result in a minimum negative impact on the Department's resources.

The minimum requirements for the use of engineering and institutional controls are codified in the Technical Rules at N.J.A.C. 7:26E-8. No amendments to this subchapter were proposed as a part of the Remediation Standards proposal and accordingly, the requirements of these sections remain unchanged as a result of the adoption of the Remediation Standards.

59. COMMENT: Overall, the application of the proposed soil remediation standards at Superfund sites will require a much higher level of effort from technical staff, specifically geologists and hydrogeologists, in the review of Remedial Investigation Work Plans and Reports, due to the inherent limitations in the calculated standards when applying them to sites with differing geologic and hydraulic characteristics and the various alternative approaches allowed, in particular when vadose zone and groundwater modeling is involved. Staff must be fully

trained on the limitations of the standards, how they were developed and the various alternatives and their specific data requirements. (46, 58)

RESPONSE: The Department acknowledges that increased resources will be required to implement the remediation standards, both, at Superfund and non-Superfund sites. The Technical Rules and the remediation standards adopted herein will become Applicable Relevant and Appropriate Requirements (ARARs) which must be considered for the remediation of all Superfund sites in the State. The Department is confidant that technical review staff and case managers at both the Department and USEPA will be able to work together to ensure that remediations conducted at Superfund sites will be as thorough and as protective as remediations being conducted by remediating parties.

In addition, the Department will be developing guidance documents, training tools and will utilize spreadsheet programs to help increase efficiency and reduce the time required for implementation of the remediation standards and alternative remediation standards process.

60. COMMENT: The Department's acceptance of site-specific alternative remediation standards will be paramount to ensuring that reasonable scientific standards are developed and applied to remediation cases. This will be particularly important for the impact to groundwater exposure pathway. In order to ensure that the identified alternative options are accepted and applied without any reservation, commenters recommend that the Soil Remediation Standards regulations clearly and unambiguously identify that these alternatives are available and applicable to all sites and that streamlined procedures be developed for their development. (16, 20, 38, 41, 52, 56, 66)

RESPONSE: The rules at N.J.A.C. 7:26D-7 clearly describe the process for the development of alternative remediation standards for all sites, and the technical procedures for each exposure pathway are detailed in the two Basis and Background Documents that are available on the Department's web site at www.nj.gov/dep/srp/regs/srs. The applicability of alternative remediation standards to all sites cannot be pre-determined because input parameters will likely change from site to site. Input parameters can even change between different areas of concern within one site, which can result in the development of different alternative remediation standards. Therefore, it is important that site specific conditions be used to develop each alternative remediation standard to ensure that the standard is protective of human health and the environment. Because the impact to ground water pathway remediation standards are not being adopted from these rules on adoption, the impacts to ground water will be evaluated on a site-by-site basis using guidance developed by the Department.

61. COMMENT: As a result of the stringent numeric soil remediation standards proposed by the Department, the majority of remediation sites with multi-media impacts will require the development and submission of an alternative remediation standard (ARS). This will occur, even though the Department will not allow a site-specific ARS for the direct contact pathway. (16, 20, 38, 41, 52, 56, 66)

RESPONSE: The rules at N.J.A.C. 7:26D-7 allow for the development of an alternative remediation standard for the direct contact pathway. Details are available in Appendices 5 and 6. The Department will post additional guidance on its web site to aid in the development of alternative remediation standards.

62. COMMENT: Site-specific options should not require prior approval by the Department case manager through the variance procedure that is included in the Technical Regulations, but should be generally available and allow for incorporation of site-specific information using streamlined procedures when this approach is preferred over the use of the generic standards. Of course, final review and approval of alternative remediation standards options based on submitted technical information is expected by the Department. (16, 20, 38, 41, 52, 56, 66)

63. COMMENT: The Department has proposed several methods for developing site specific alternate remediation standards (ARSs), ranging from relatively simple and inexpensive to complex modeling at significant expense. The Department should clarify that use of an ARS

does not require a variance or other procedure that would create a burden on a remediating party. (16, 19, 20, 22, 27, 38, 41, 52, 56, 66)

RESPONSE to COMMENTS 62 and 63: The Remediation Standards do not require a party seeking an alternative remediation standard (ARS) to do so by going through the variance procedure in the Technical Rules at N.J.A.C. 7:26E-1.6. The procedure for obtaining an ARS is contained in Subchapter 7 of the Remediation Standards rules.

The process of developing ARSs is new and will require a level of review to ensure that the standards are being developed accurately and are protective. The Department anticipates that over time, as the Department gathers more information about ARS requests and approval, the Department might develop ARS options requiring less Department involvement.

64. COMMENT: The Department states that the alternative remediation standard may be developed when site-specific information is available. After an alternative remediation standard is developed for a given pathway, it must be compared to the standards for the remaining exposure pathways. The lower of the generic standards or calculated alternative remediation standard for all the potential pathways becomes the remediation standard for the site. However, it is not clear whether the Department intends to allow the use of multiple options within a specific area of concern and with different compounds. The Department should clarify when and if the use of multiple area of concern options within specific area of concern and different options for different contaminants will be allowed. For example, if you utilize one of the impact to ground water alternative remediation standards approaches for determining a criterion, is the responsible party obligated to use that same option for all contaminants in a specific area of concern or site? (16, 20, 38, 41, 52, 56, 66)

RESPONSE: The person responsible for conducting the remediation will submit an application to use an alternative remediation standard (ARS) for a specific area or areas based on site-specific factors. ARSs must be developed based on those factors.

Therefore, the ARS is only applicable to other areas or across the site to the extent that pertinent site characteristics also are applicable.

The Department will allow the use of different ARS options for different contaminants that are scientifically valid, supported and appropriate within a specific area of concern.

65. COMMENT: The Department should modify the proposed standards to allow the development of an alternative remediation standard at any phase of the remediation process. Throughout the Technical Rules, various references are made on the need for investigation, delineation, and remediation if contaminants are present over the "applicable unrestricted use remediation standards." Modifications will be required to the Technical Rules to clarify references to the proposed soil remediation standards, and add provisions consistent with all the aspects of the soil remediation standards document. In cases of soil contamination, it is unclear if these standards are the proposed generic soil remediation standards (Table 1) or if alternative remediation standards may be developed at any stage of the investigation and remediation process.

The Department should allow alternative remediation standards to be developed at any phase of the site remediation process to determine if additional investigation or remediation is necessary. Additionally, at various locations throughout the Technical Rules, reference is made to the "applicable soil remediation standards." This text needs to be clarified as to whether the generic standards may include an alternative remediation standard. (16, 20, 38, 41, 52, 56, 66)

RESPONSE: The Department anticipates amending the Technical Rules to reflect and coordinate with the Remediation Standards rules in the near future. Until those rules can be updated, the Department will clarify Technical Rule related issues in technical guidance that will be posted on the Department's web site. The Department intends to amend the definition of remediation standard to mean a remediation standard for soil as defined pursuant to the Remediation Standards, N.J.A.C. 7:26D. Practically, this means that a remediation standard for soil can be any standard that is listed in N.J.A.C. 7:26D and any standard that is developed pursuant to those rules including interim and alternative standards.

Alternative soil remediation standards may be developed at any time during the remediation process when there is sufficient data and/or site information on which to base a particular alternative standard.

66. COMMENT: The proposed standards should be amended to allow for the approval of an alternative soil remediation standard (ARS) after a work plan is approved by the Department. Pursuant to N.J.A.C. 7:26E-6.1(b)2, the Technical Rules state that all remedial actions must comply with applicable remediation standards at the time of work plan approval. If the remediation standards change prior to the issuance of the No Further Action letter, then an order-of-magnitude evaluation must be completed to determine if additional remediation is necessary to achieve the new remediation standards. However, there is no provision to evaluate the ARS during the remediation process when a work plan has already been approved by the Department (16, 20, 38, 41, 52, 56, 66)

RESPONSE: A person responsible for conducting the remediation can apply to the Department for an alternative remediation standard (ARS) at any time that it is technically appropriate. The Remediation Standards do not preclude a person from applying for an ARS after a work plan is approved by the Department. If a person is concerned that a standard may be changing by an order of magnitude or more after the approval of a remedial action work plan, but prior to the issuance of a No Further Action letter, the person may apply for an ARS.

67. COMMENT: The Department's approval of an alternative soil remediation standard should be viewed as precedent for sites that are similarly situated. The Department has proposed several methods for developing site specific alternative remediation standards, ranging from relatively simple and inexpensive to complex modeling at significant expense. After an alternative remediation standard is approved, it should be anonymously published on the

Department's web site with information that identifies the geographic area for which such standard applies. In this manner, an applicant can determine if there have been alternative remediation standard approved in a location that may be close enough that a similar standard may be applicable to its site. (16, 20, 38, 41, 52, 56, 66)

RESPONSE: The alternative soil remediation standard (ARS) options are site specific options and are generally not modifications that would apply to other sites in the region or the state. The vast majority of the ARS options require site specific data. Regional ARSs will not be approved. The person responsible for conducting the remediation must develop the technical data to support a site specific ARS. However, there may be some similarity from site to site within a given geological region.

68. COMMENT: The Department should incorporate an appeal process into these rules in the event that an alternative soil remediation standard is partially or totally denied, to allow a party to dispute the Department's decision or submit additional and/or supporting information to its request for an alternative soil remediation standard. It would be important that the process be expedited, e.g., the expedited review process provided at N.J.S.A. 58:10B-17 (this establishes the dispute resolution process) that can be completed within 21 days. The Department should acknowledge, either by regulations or as part of the dispute resolution process, that such decision constitutes final agency action for the purpose of appeal. (16, 20, 38, 41, 52, 56, 66)

RESPONSE: The Department already provides an internal review process and this process can be utilized in the event an alternative remediation standard is denied by the case manager assigned to the case through the Department's Technical Review Panel. The Brownfields Act at N.J.S.A. 58:10B-17 permits any person conducting a remediation to dispute a decision by the Department in accordance with guidelines developed by the Department. The Act requires that the Department's guidelines include provisions for an expedited review procedure under which the Commissioner or her designee shall issue a decision on the dispute within 21 calendar days of the date on which the request for that review was received. Information on the Department's Technical Review Panel process is available on the Department's website at:

http://www.nj.gov/dep/srp/guidance/techreview/rev_tech_disputes.htm. Nothing in this procedure prohibits parties dissatisfied with the outcome of the Technical Review Panel from availing themselves of whatever additional review or challenge is permitted by law.

Agriculture Related Comments

69. COMMENT: Endosulfan is a USEPA registered pesticide, which is currently recommended for commercial orchard and vegetable crop production use in New Jersey as published in the Commercial Vegetable Production Recommendations and Commercial Fruit Production Recommendations published by the New Jersey Agricultural Experiment Station, Rutgers, Cooperative Research & Extension. Use in accordance with labeling and State recommendations should not be considered a “discharge.” The Department must review all proposed standards to ensure that registered chemicals can be legally applied.

Establishing a soil remediation standard for a currently recommended spray material is inconsistent to say the least. The proposed impact to groundwater standard is l ppm (endosulfan sulfate) and the currently recommended spray rate is 3 lbs per acre with 50% active ingredients (endosulfan). Converting the units, it is apparent that spraying 2 applications of endosulfan will result in a level exceeding the impact to groundwater standard for this pesticide in the upper six inches of soil in an orchard or field.

Based on the proposed impact to ground water remediation standards, the application of USEPA registered pesticides in accordance with labeling and State recommendations could be considered a “discharge” and could require farmers to report a discharge under the Spill Compensation Control Act when applying pesticides at the recommended rate. The Department must review all proposed standards to ensure that registered chemicals can be legally applied. (61)

RESPONSE: The Spill Compensation and Control Act, N.J.S.A. 58:10-23.11b, defines a discharge as “. . . any intentional or unintentional action or omission resulting in the releasing, spilling, leaking, pumping, pouring, emitting, emptying or dumping of hazardous substances into the waters or onto the lands of the State, or into waters outside the jurisdiction of the State when damage may result to the lands, waters or natural resources within the jurisdiction of the State." It is the act or omission that results in a hazardous substance entering the environment that is relevant to the question of assigning liability for conducting the remediation, and not, as the commenter suggests, the resulting impact of the hazardous substance after being discharged into the environment, including whether the discharge might impact ground water. Therefore, even if the Department were to adopt the proposed impact to ground water soil remediation standards, which, as previously discussed, it is not, the standards would not factor into a determination as to whether or not a discharge has occurred. Instead, all of New Jersey's remediation standards are applicable, once it is believed that a discharge has occurred, to decisions on the extent of the remediation that is necessary to clean up the discharge.

Based on the Department's review of remedial investigations and remedial actions conducted on agricultural properties to date, the levels of pesticides in soil are generally not a problem with regard to potential impacts to ground water. Because agricultural pesticides are applied in limited quantities at the ground surface and there are usually several feet of clean soil between the plow zone and the ground water table, the Department generally does not see impact to ground water. Therefore, it is likely that any impact to ground water soil remediation standard developed for a given contaminant on a site-by-site basis will have a higher concentration than the generic impact to ground water standard contained in the rule proposal in Table 2B, negating the necessity to remediate the site as a result of the application of an agricultural pesticide.

70. COMMENT: The net effect of the proposal is to shift the most restrictive cleanup criteria for historic pesticides from human exposure to the potential impact on groundwater. This raises a major concern for agricultural lands. In the past, soil blending was used to satisfactorily remediate nearly all historic pesticide sites. This method was only approved to prevent direct human contact with the substances. The proposed rule revision does not confirm in any way that the Department will allow blending to address an exceedance of the groundwater impact standard in either the synthetic precipitation leachate procedure (SPLP) or standard analysis. The Department should expressly allow blending to address exceedance of the ground water impact standard. (43)

RESPONSE: Soil blending is a policy recommendation from the Historic Pesticide Task Force in its 1999 report. The report does not limit the use of blending to any particular exposure pathway. Therefore, blending could be used to comply with the impact to ground water remediation standards. Currently, there are no plans to change the soil blending policy for farms. Because the impact to ground water pathway is not being adopted, the impacts to ground water from contaminated soil will continue to be evaluated on a site-by-site basis using guidance that will be developed by the Department to ensure that human health and the environment are protected.

71. COMMENT: The lack of mobility of historic pesticides is well documented and accounts for their persistence over 35 years after their use was curtailed. The synthetic precipitation leachate procedure (SPLP) test is a relatively new test which has not been applied to historic pesticides to any significant extent. Historic pesticides have not been used for over 35 years, were deliberately applied in a uniform manner over large areas of soil as then recommended, and do not result from any recent discharge. Therefore, a simple ground water grab sample would provide a reliable means of verifying any potential groundwater impact, eliminating any need for an SPLP test.

The SPLP test is more appropriate for use in determining the mobility of a recently discharged material. Has the Department evaluated the reliability of the SPLP test when applied to chemicals which have been contained in soils for several decades? (61)

RESPONSE: Because the impact to ground water pathway is not being adopted, the impacts to ground water will continue to be evaluated on a site-by-site basis using guidance developed by the Department. The Department agrees with the commenters' general statements about impact to ground water on agricultural sites. The Department will include in its guidance how ground water sampling should be used to verify any potential groundwater impact under certain circumstances including the site conditions discussed by the commenter.

Risk Assessment and Risk Management Study Commission

72. COMMENT: In November 1995, the Risk Assessment and Risk Management Study Commission, established by the Industrial Site Recovery Act (ISRA), recommended that a Risk Assessment and Risk Management Science Advisory Board be formed to guide the Department and Governor in human health-related matters regarding site remediation, site re-utilization, and evaluation of future risk assessment policy. Recommendations of the Risk Commission have never been implemented. The commenter believes that the Commission's report and recommendations should be adopted promptly. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

73. COMMENT: When the State Legislature passed ISRA, it created the Environmental Risk Assessment and Risk Management Study Commission (Risk Commission). The Risk Commission was charged with assessing the scientific basis for the Department's selection of a risk management standard of one in a million for the use in soil cleanup criteria, and to consider and assess alternative scientific standards prior to the Department setting soil standards (Section 47 of the 1993 Act) (emphasis added).

The Risk Commission published a draft report in which it stated, "The Commission strongly supports a risk management standard of 1 in 100,000 for Class A & B carcinogens for calculation of soil remediation standards" (report titled, "Environmental Risk Assessment and Risk Management Study Commission," November 1995. Chair of the Commission was Michael Gallo, Professor, UMDNJ-Robert Wood Johnson Medical School). The commission reported that "a review of the history of the 1 in a 1,000,000 risk criterion did not reveal an intent for use other than for food safety. Specifically the commission stated that "the basis for the *de minimis* risk for excess cancer of 1 in 1,000,000 is not supported by biological or medical science. The USFDA history …does not reveal an intent for use in any application other than safety of indirect and direct food additives. The target population estimated (by the USFDA) to be exposed to indirect or direct food additives was in the tens of millions. This level of population exposure potential does not exist at the vast majority of the remedial sites (where only tens to a hundred or so individuals is the realistic worst case potential exposure population). Other exposure patterns such as frequency and duration differ significantly for food additives and (soil contaminated) sites. Therefore, the … 1 in a 1,000,000 risk standard should not (Commission's emphasis) be globally applied to all risk management situations."

Although a final report was not prepared, it is logical to conclude that the Risk Commission's final recommendation would have been to use a 1 in 100,000 risk to set soil standards for carcinogenic compounds. It is also relevant to note that the Department's Division of Science, Research & Technology and the USEPA use a 1 in 100,000 risk in setting fish advisories (see USEPA, "Guidance for Assessing Chemical Contaminant Data for Use In Fish Advisories Volume 2: Risk Assessment and Fish Consumption Limits - Third Edition").

Unless the Department can provide a science-based position that refutes the Risk Commission's findings and supports regulating soil quality more stringently than fish (a food), it appears that the use of the 1 in 100,000 risk is appropriate when setting soil standards. The commenter believes that referring to the one in a million risk in the Brownfield Act would not represent a science-based justification. (55)

RESPONSE to COMMENTS 72 and 73: The Department received the draft Risk Commission report when it was published in 1995. As noted by the commenters, the Risk Commission was disbanded prior to preparation of a final document. The Risk Commission's draft recommendations are simply that, draft recommendations to the Legislature. The Legislature chose not to have the Commission finalize its recommendations. Therefore, it is considered inappropriate for the Department to consider the draft recommendations as part of the development of the Remediation Standards.

The Legislature, in the Brownfield Act, directed the Department to develop soil remediation standards with specified health-based goals. Specifically , the Department was directed to use an incremental lifetime cancer risk of 10^{-6} and a hazard quotient of one for noncarcinogenic effects. The choice of these public health goals is not a scientific issue, but an issue of public policy.

The Legislature has clearly stated, when it adopted the health based goals for remediation, that strict standards are necessary to protect public health and safety and the environment. In fact, the Legislature has established that human health risk policy consistently in both the Safe Drinking Water Act, at N.J.S.A. 58:12A-13(b), and the Brownfield and Contaminated Site Remediation Act, at N.J.S.A. 58:10B-12(d). Therefore, as directed by statute, the Department is striving to develop consistent, health-based standards and criteria across the different media and programs including the Site Remediation Program.

The Department acknowledges that fish consumption advisories have been issued based on a 1 in 100,000 excess cancer risk. These advisories are based on USEPA guidance which suggests that states set fish advisories based on excess cancer risk between 1 in 10,000 and 1 in 1,000,000. The Department has chosen, in most cases to set its fish advisories at 1 in 100,000 excess cancer risk to balance the health risks with the benefits associated with the consumption of fish. However, as noted above, the Brownfield Act directs the Department to develop soil remediation standards with specified health-based goals.

Solid Waste

74. COMMENT: Most of the proposed numeric soil remediation standards are substantially and unnecessarily more stringent (lower) than the soil cleanup criteria that the Department has applied since February 1992 and that were last updated in May 1999. For those chemical substances for which the proposed numeric soil remediation standard is set at the practical quantitation level (PQL), soil will need to be remediated to ensure that there is no measurable presence of these substances in any sample of soil. Because more soil samples will have concentrations that exceed the proposed standards than exceed the current soil cleanup criteria, volumes of “contaminated” soil at sites will become larger. A substantial portion of this additional quantity of soil will require excavation and management as contaminated soil, if the proposed standards are adopted as currently written. Under the proposed standards, a substantial volume of soil and dredged sediment from public works projects will also require disposal because those materials cannot be re-used as “clean fill,” which has to meet residential soil

remediation standards, and will require management as “contaminated” materials. As a result, substantial additional volumes of soil and sediment will be excavated and will require off-site disposal, if the proposed soil remediation standards are adopted as currently written. New Jersey landfills do not have adequate capacity to dispose of the increased quantities of soil from public works and remediation projects that will require management as contaminated soil under the proposed standards.

According to the draft State-wide Solid Waste Management Plan 2006, solid waste generation rates increased annually to approximately 20 million tons per year in 2003, while additional landfill capacity is decreasing. New Jersey cannot afford to use its limited landfill capacity for soil disposal. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Department does not anticipate a significant increase in the amount of contaminated soil that will be generated by the remediation of sites that will need to be managed off-site or in landfills based on the adoption of these rules. Not many of the standards developed for the direct contact exposure pathway are lower than their corresponding practical quantitation levels (PQLs) such that remediation is driven by the PQL. For residential use, only five of the 135 standards are based on PQLs and for non-residential use, two of the 134 standards are based on PQLs.

The Department is adopting soil remediation standards for the direct contact pathway, which consists of ingestion-dermal pathway standards and inhalation standards for residential and non-residential use. As compared with the soil cleanup criteria, , approximately half of the standards are being increased and half are being decreased for a wide variety of reasons, including changes in toxicity data and other factors. For the 102 residential direct contact standards, the Department proposes to increase the standards for 45 contaminants, decrease the standards for 48 contaminants, and leave the standards the same for 9 contaminants. For the 100 non-residential direct contact standards, the Department proposes to increase the standards for 44 contaminants, decrease the standards for 55 contaminants (16 by an order of magnitude or more), and leave the standard the same for 1 contaminant.

The Department has decided not to adopt the impact to ground water pathway standards, but will continue to determine the impact of soil contamination on ground water on a site-by-site basis. However, based on the Department's experience, impact to ground water remediation standards that are developed using site-specific information will generally be higher than the generic impact to ground water standards proposed in Table 2B. As a result, the Department does not believe that there will be a substantial increase in the amount of contaminated soil generated by the remediation of contaminated sites.

Soil removal for off site disposal or management, discussed by the commenter, is only one option that is available to a person conducting remediation. On-site treatment and the use of engineering and institutional controls are frequently used as part of remediation.

Regardless of soil volume that may require remediation, the proposed soil standards are based on current science and reflect what is deemed an acceptable risk of exposure. What the commenter is suggesting is that the proposed standards are unacceptable because they would generate too much contaminated soil and not because they pose an unacceptable health risk.

75. COMMENT: The current soil cleanup criteria have been used historically by the Solid and Hazardous Waste Program to determine acceptability of certain materials (e.g., crushed concrete) for recycling and beneficial re-use purposes, such as landfill cover and common fill. Under the proposed standards, a substantial volume of such materials would require disposal and be precluded from recycling or re-use, because they will require management as "contaminated" material. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Department will continue to use its remediation standards, or other criteria as applicable, to evaluate the appropriate use of contaminated or potentially contaminated materials. Because the remediation standards are developed to be protective of human health it is appropriate to use these standards to ensure that people who may come into contact with beneficial re-use or common fill material are not exposed to unacceptable contaminant levels. It is important to manage these properly to avoid contaminating previously unaffected sites.

76. COMMENT: Whenever the Department has developed a soil remediation standard that is based on a inhalation health risk and that standard is used to evaluate a beneficial reuse proposal, as required by the New Jersey Solid Waste Management Act, N.J.S.A: 13:1E-1 et seq., the actual health risk should be evaluated based on the actual exposure and the benefits of the beneficial reuse. For example, if the reused material would not result in an inhalation risk, then the soil cleanup standards would not be an absolute barrier to beneficial reuse. (54)

RESPONSE: The Department is very interested in supporting and encouraging the beneficial use of materials that would otherwise be waste, in environmentally sound applications. This preserves valuable landfill space for essential disposal uses and helps conserve natural resources by reusing valuable existing materials. To date, the Department has issued hundreds Certificates of Authority to Operate (CAO) for beneficial use projects for more than 3.9 million cubic yards of these materials. However, the Department must make sure that the reuse of materials does not, and will not pose a risk to human health and the environment.

The Department evaluates beneficial reuse proposals based on the chemical composition of the reuse material relative to the soil remediation standards and the proposed future use of these materials. As provided in the Solid Waste rules at N.J.A.C. 7:26-1.7(g)5iv, an application for beneficial reuse must include both an evaluation of the general quality of the material including a contaminant profile of the material in relation to current soil cleanup criteria and other standards as specified by the Department, and the concentration limits for contaminants in the material during the proposed use or reuse, including a rational for those limits. This is because the physical characteristics of the reuse material at the time of the proposal may change over time. For example, solid material that does not represent an inhalation hazard can break down in the environment to a form fine particles that can pose a risk to human health. This is a particular concern when the beneficial reuse proposal does not include the use of engineering and institutional controls. Accordingly, the Department cannot guarantee that if, as the commenter posits, the reused material would not result in an inhalation risk, then the soil cleanup standards would not be an absolute barrier to beneficial reuse, because each material must be evaluated individually, and that evaluation must include both the current and future contaminant profiles.

Technical Impracticability

77. COMMENT: The Department should consider "technical impracticality" on a site-specific basis in its review of alternative soil remediation standard proposals. Waivers from specific numeric and narrative remediation requirements in the Technical Rules should be allowed due to "technical impracticality." Technical impracticability may result from: 1) impossibility of implementation from a construction, logistical, or other engineering perspective; 2) increased risk to human health or the environment; 3) cost effectiveness relative to alternative remedial approaches that would attain an acceptable level of health and environmental protection; and 4) inability to attain remediation standards in a reasonable time-frame. The Department should develop guidance on "technical impracticality" of soil or groundwater remediation that incorporates these recommendations. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Department does, in limited circumstances, consider technical impracticability for purposes of determining an appropriate remedial action and is generally because of physical or engineering impediments. For example, an impracticability determination may be made when it has been determined that ground water contamination is "trapped" deep in bedrock and cannot be removed, or that the removal of deep soil contamination is not feasible due to engineering limitations. However, impracticability is not related to the use of a particular adopted standard or the development of an alternative standard because whether a particular remedial action is technically impracticable is a question of remedial action selection, not whether a particular standard applies.

Acute Toxicity and Cumulative Effects

78. COMMENT: The Department's proposed health based standards by law are risk based to 1 in a million for carcinogens, and a hazard quotient of 1 for non-carcinogens. The commenters support the 1 in a million standard and the hazard quotient of 1 and suggest that the Department develop criteria to address acute exposure from a subset of chemicals that have extreme acute toxicity. (10, 25, 31, 44)

RESPONSE: The Department is considering the development of soil remediation standards based on an acute exposure risk, particularly where acute toxicity information is currently available. The development of acute exposure risk standards is significantly different than the development of chronic health-based remediation standards. The development of acute health-based standards will require, at a minimum, a technical and rulemaking effort separate from these rules.

Volatile Organic Compounds Cap Removal and Other Factors Affecting the Calculation of the Soil Remediation Standards

79. COMMENT: The commenters note that approximately half of the soil remediation standards are more stringent than the corresponding soil cleanup criteria, and approximately half are less stringent. The commenters attribute the less stringent soil standards to the removal of the 1,000 ppm volatile organic compound (VOC) cap, the removal of the 10,000 ppm organic cap, the use of human health exposure endpoints instead of ecological endpoints and the use of outdoor worker instead of indoor worker exposure scenarios. The commenters do not support the weakening of standards, and are concerned that the lifting of the caps and change of exposure scenarios puts residents, workers, and ecological receptors at risk.

The cap on VOCs should not be removed, as it would allow for extremely high levels of these substances and would significantly weaken the rules. (10, 25, 31, 44, 65)

RESPONSE: Prior to this rule making, the Department used, as guidance, soil cleanup criteria that had "not to exceed" or "cap" values for certain contaminants whose cleanup criteria were not directly based on human health data. A cap value of 1000 ppm for VOCs was used to address vapor intrusion concerns and 10,000 ppm total organic contamination was used because soil that is contaminated at that level ceases to function as a typical or normal soil ecosystem. The Department did not include "cap" values in these rules because the Legislature mandated that the Department develop human health standards based solely on contaminant-specific cancer and non-cancer effects. The standards, as adopted, appropriately reflect this mandate, and the best available science that will result in the protection of the health of residents and workers from site-related contamination was used in their development. The Department is not weakening standards, but rather updating them to incorporate the most current science and to meet its statutory mandate. The Department will continue to require the evaluation of both ecological and vapor intrusion impacts as part of the site investigation and remedial investigation pursuant to the Technical Rules.

Cumulative and Synergistic Effects

80. COMMENT: The commenters are concerned that the Department does not consider aggregate, cumulative, or synergistic effects of combinations of substances when setting numerical standards. The approach of doing risk assessment on one chemical at a time grossly underestimates risk because, in reality, we are exposed to multiple chemicals over time, some of which interact with each other to form even more toxic chemicals, some of which degrade into more toxic by-products, and some of which, if simply added together, would overload an exposed individual. Furthermore, the impact of exposure over time, i.e. cumulative impact, is not considered, nor are mode of action or windows of vulnerability for sensitive populations taken into account. Until legislation becomes available that regulates chemicals in a more rational manner that considers common modes of action, aggregate risk, and cumulative risk, the Department should factor in greater margins of safety in its standard setting. (10, 25, 31, 44, 65, 68)

RESPONSE: The Department employs risk assessment methodology coupled with legislatively mandated risk goals (10^{-6} for cancer and HI=1 for non-cancer effects) that are purposefully conservative to account for the uncertainty surrounding potential synergistic and cumulative effects. The toxicity information used to develop standards takes life time exposure and sensitive populations into account. The use of mode of action in the assessment of potential carcinogens is a main focus of EPA's 2005 Cancer Guidelines. As toxicity profiles on the USEPA Integrated Risk Information System (IRIS) are updated, the mode of action will be examined. In the absence of sufficient and justifiable mode of action information, the Department and USEPA take conservative default positions regarding the toxicologic and epidemiologic data to ensure public health protection.

Persistent Compounds

81. COMMENT: It is not clear how persistent and/or biological chemical characteristics were considered in deriving the proposed standards. The Department should clarify this set of issues and assure the public that these characteristics were incorporated in deriving standards. (68)

RESPONSE: Chemical persistence and bioaccumulation are considered to the extent that these mechanisms affect the toxicity testing of animals, which forms the basis of the chemical toxicity profiles on the USEPA Integrated Risk Information System (IRIS) and other sources of toxicity information. This toxicity information, in conjunction with exposure assessment, is used to derive the human health soil remediation standards. However, the terms "persistence" and "bioaccumulation" are primarily used in reference to the evaluation of ecological impacts. The Department will consider persistence and bioaccumulation in the development of standards for a particular site that are protective of ecological receptors pursuant to the Brownfields Act at N.J.S.A. 58:10B-12a.

Ingestion/Dermal Pathway- Land Use Scenarios

82. COMMENT: The ingestion-dermal pathway soil remediation standards have been developed for two specific land use categories, residential (including schools and daycare

facilities) and commercial/industrial. The rule should provide additional guidance on how other common land use scenarios, such as community centers, hospitals, and recreational parks near communities and recreational areas not near communities will be considered. (46)

RESPONSE: The Department developed the ingestion-dermal pathway soil remediation standards for two broad categories of land uses, namely, residential and non-residential (including commercial/industrial uses to which the commenter refers). The Department currently considers, and will continue to consider, community centers and hospitals as non-residential land uses. As described in the Basis and Background document for this exposure pathway, the ingestion-dermal pathway soil remediation standards for non-residential land uses are based on routine worker exposures for outdoor workers. The Department acknowledges that most workers in hospitals and community centers are not outdoor workers. Accordingly, the Department will consider granting alternative soil remediation standards that are appropriate for these types of institutions, particularly in the case where the occupants of the institutions would not need to be protected by a routine worker exposure scenario.

83. COMMENT: The commercial/industrial land use scenario is based on an outdoor worker being exposed to 100 mg of soil per day for 225 outdoor days. This ingestion rate is twice as high as the ingestion rate of 50 mg per day for indoor workers. Many sites under investigation in New Jersey are in urban areas with little to no bare soil or outdoor habitat. In addition, many sites focus on commercial or industrial businesses that center around indoor activities rather than outdoor activities, and the weather conditions that vary across the State are also likely to influence the time spent outdoors. The Department should consider this in the commercial/industrial scenarios. There are several ways to accommodate different commercial/industrial scenarios, including providing generic soil remediation standards for both indoor workers and outdoor workers using appropriate soil ingestion rates and exposure frequencies. (46)

RESPONSE: As discussed at length in the Basis and Background document for the ingestion-dermal pathway soil remediation standards, the Department chose the outdoor worker for consideration in calculating the non-residential soil remediation standards for this pathway because the outdoor worker represents the most sensitive individual in a non-residential (including industrial) land use scenario. This is because outdoor workers are at greatest risk for direct exposure to soil by virtue of the fact that they work outdoors. While the Department acknowledges that there may be conditions in urban areas where there is little bare soil, this is not true of the majority of cases.

84. COMMENT: The residential land use scenario does not account for exposure via uptake by homegrown garden produce. This scenario also does not apply to agricultural land use. The Department should provide guidance on how these specific scenarios should be addressed. (46)

RESPONSE: The generic residential and non-residential standards may not be protective of all known human exposure pathways at a particular site. For this reason, the Department set its standards at an admittedly conservative 10^{-6} cancer risk and a hazard quotient of 1 for individual contaminants. These risk goals will typically protect for additional unevaluated pathways within the USEPA's risk range and hazard level. However, if significant exposure pathways have not been taken into account and the residential or non residential scenarios are not sufficient to evaluate the impact of contamination at the site, the person responsible for conducting the remediation may apply to the Department for permission to use an alternate soil remediation standard that the responsible person believes will take into account additional site specific pathways for the Department's evaluation on a site-specific basis.

Default Exposure Parameters

85. COMMENT: Although the USEPA uses the same default exposure frequency for children to set soil screening criteria as is used by the Department the USEPA also recognizes that it is appropriate to modify the default exposure frequency based on how activities will change with the seasons in some regions of the country. For example, children play outdoors less frequently or not at all during the winter months (or if they do, there is no exposure due to soil cover and/or frozen ground) and on rainy days. It is also reasonable to expect that toddlers (1

to 2 year olds) will play outdoors much less frequently than 3 to 6 year olds. Also, outdoor play is less common than it was a generation ago (R. Clements. 2004. An Investigation of the Status of Outdoor Play. Contemporary Issues in Early Childhood, 5(1): 68-78). Ignoring the common sense fact that children do not play outdoors anywhere near 350 days a year, especially toddlers, the Department's soil standards are also not consistent with the Legislature's requirement that the Department ". . . base (soil) standards upon reasonable assumptions of exposure scenarios" (N.J.S.A. 58:10B-12b(2)). Consequently, prior to developing soil standards, it is reasonable that the Department revisit its current default exposure for children of 350 days. (55)

RESPONSE: As mandated by the Brownfields Act, N.J.S.A. 58:10B-12, the Department has used the same default exposure frequencies as used by the USEPA. Exposure frequency is related to contact with both outside soil and indoor dust. While children may be outdoors less frequently in winter time, they continue to be exposed to indoor dust containing contamination that is tracked in from outside. The Department does not take rainy days into consideration due to the intermittent nature of these events; that is, rain may occur only part of the day. Wet soil caused by a rain event actually results in an elevation of the amount of soil that adheres to clothing and shoes, resulting in more dirt brought into the house and greater exposure to contaminated indoor dust that results as the mud dries.

Toddlers are particularly sensitive to soil and dust ingestion due to their mouthing behavior and the fact that they spend the majority of their time close to the ground (outdoors) and the floor (indoors) where the concentration of contamination is much greater. The exposure duration of 350 days is a reasonable assumption that is used by the regulated community, and is particularly appropriate for the Department because it does not calculate cumulative risk across exposure pathways and exposure to multiple contaminants.

86. COMMENT: Logically, the current default exposure frequency of an outdoor soil exposure of 250 days for adults at an industrial site should be based on how activities vary seasonally . The Department should revise its non-residential standards based on climatic conditions in New Jersey. (55)

RESPONSE: The Department uses an exposure frequency value of 225 days per year for adult outdoor worker, not 250 days as noted by the commenter. This frequency was established by the USEPA and is based on data from the US Census Bureau's 1990 Earnings by Occupation and Education Survey. It represents the average number of days worked per year by male and female workers engaged in activities similar to those of the outdoor worker, including gardeners, groundskeepers, mechanics, painters, maintenance workers, and construction laborers. The Department believes that the use of 225 days per year as the exposure frequency for adult outdoor worker is appropriately protective of human health and is consistent with the legislative mandate.

Remediation Standards and Redundant Conservative Assumptions

87. COMMENT: The Department has based the proposed soil remediation standards for carcinogens on a risk target of 10^{-6}, which is at the lower end of the Federal National Contingency Plan's cancer risk range of 10^{-6} to 10^{-4} for the target cancer risk level. The commenters believe that consideration should be given to using a more realistic target cancer risk level, such as 10^{-5}, which has been used successfully in setting soil standards in Pennsylvania and Michigan, to give two specific examples, and/or using 10^{-4} as an appropriate risk level. The commenters understand that a legislative change may be needed to address these proposals, which could be proposed as part of the legislative stakeholder reform process that is on-going. (4, 5, 11, 15, 16, 18, 20, 28, 29, 30, 32, 34, 38, 40, 41, 45, 51, 52, 54, 56, 59)

RESPONSE: The Brownfields Act directs the Department to derive standards for carcinogenic contaminants at a target cancer risk of 10^{-6}. This risk level forms the basis of other Department media standards as well as the risk level for remediation goals under the Federal Government's Superfund Program and soil standards for the majority of states across the country. The Department will make appropriate changes to this rule as a result of any legislative changes made as part of the Site Remediation Program legislative reform.

88. COMMENT: The Brownfield Act at N.J.S.A. 58:10B-12(c) requires that the soil remediation standard (SRS) values developed pursuant to N.J.A.C. 7:26D-4 must "avoid the use of redundant conservative assumptions" and avoid the use of unrealistic, conservative parameters in the development of remediation standards. To provide a quantitative evaluation of whether the Department has met that legal requirement, the commenter has conducted a probabilistic (Monte Carlo) analysis to determine the percentile of the population protected by the proposed SRS values for certain example chemicals. The results of this analysis demonstrate that the SRS approach does not meet the legislative requirement of avoiding the use of redundant conservative assumptions, and that the proposed SRS values for the example standards were protective of greater than the 99.9th percentile of the population at a hazard index of 1 and a cancer risk of 10^{-6}. Thus, the SRS methodology should be revised to avoid the use of redundant conservative assumptions and for consistency with USEPA Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) guidance. (11)

RESPONSE: The Brownfield Act at N.J.S.A. 58:10B-12b(3) mandates that the Department use equations and assumptions in the development of standards that represent reasonably conservative default values using guidance and regulations for exposure assessment developed by the USEPA pursuant to CERCLA, 42 U.S.C. § 9601, et seq. The Department's equations and assumptions are designed to be consistent with the USEPA's concept of Reasonable Maximum Exposure (RME) and are protective of the majority of the population. As discussed in the Basis and Background documents that were prepared in support of this rulemaking, the values for the combined ingestion and dermal absorption pathway and the inhalation exposure pathways are based on equations and default assumptions commonly used by state and Federal regulatory agencies. These equations and assumptions are found in the USEPA's Risk Assessment Guidance for Superfund Human Health Evaluation Manual, Part B (USEPA 1991), Soil Screening Guidance (USEPA 1996), Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA 2002), and Risk Assessment Guidance for Superfund Part E, Supplemental Guidance for Dermal Risk Assessment (USEPA 2004). Until the USEPA routinely uses statistical distributions to determine a Reasonable Maximum Exposure (RME) in the development of its screening levels and remediation goals, the Department will continue to use point estimates as the basis for its standards.

Methodologies Used to Assess Potential Exposures

89. COMMENT: The soil remediation standards (SRS) values are fundamentally inconsistent with their use as described in the Technical Rules at N.J.A.C. 7:26E-5.1(c) concerning Remedial Action Selection. The Technical Rules state that the selected remedy must reduce or eliminate exposure to contaminants above applicable remedial standards. Hence, the Technical Rules requires remediation to SRSs as though they are "not to be exceeded values" in any soil samples. This is consistent with standards protective of short-term exposures and acute health effects. However, the proposed SRS values are derived using methods to be protective of long-term average exposures and chronic health effects (e.g., increased risk of cancer). This inconsistency must be addressed in either the proposed guidance or the Technical Rules, because the use of SRS values as maximum acceptable standards is unnecessarily conservative and results in remediation to levels that exceed the desired target risk level. SRS values, as described in the current proposed guidance, should be compared to soil concentration data using the 95% upper confidence limit (UCL) of the arithmetic mean soil concentration at a site or exposure area. (11)

90. COMMENT: The commenter believes the proposed approach by the Department is entirely inconsistent with USEPA's methodology for determining compliance with cleanup standards and the exposure-point concentration for risk assessment. The USEPA's methodology has been reiterated clearly over the past 18 years since the first detailed risk assessment guidance was released with Risk Assessment Guidance for Superfund (RAGS) Part A in 1989, and the 1996 and 2002 Soil Screening Level (SSL) guidance. These are the same USEPA guidance documents that the Department relies on for the draft soil remediation standards guidance. Specifically, USEPA guidance states that exposure is considered to occur as a random event over the entire exposure area, and thus, the mean concentration should be used to describe the concentration of each chemical in each exposure area of a site. To ensure that the mean is truly

representative of the site contaminant levels, the 95% upper confidence limit (UCL) of the mean is used, which also affords some degree of conservatism. (11)

91. COMMENT: The commenters believe that methodologies to assess potential exposures are not realistic or scientifically based. For example, by not incorporating procedures to determine the proper 'Exposure Area' and related methods (as detailed in USEPA guidance), the Department has not ensured the proper evaluation of reasonable assumptions of exposure scenarios, as mandated by the Brownfields Act. N.J.S.A. 58:10B-12b(2). This is unexplainable, given the substantial amount of guidance and detailed methodology provided by the USEPA in the same guidance cited by the Department, and given the numerous comments by the USEPA stressing the need for proper scientific methodologies to apply the identified numeric soil screening levels (SSLs) as remediation standards. (16, 20, 38, 41, 52, 56)

92. COMMENT: The commenter strongly concurs with the USEPA guidance that exposure to hot spots should be evaluated separately for the potential for acute, and in some instances, subchronic exposures. However, it is technically incorrect to evaluate chronic exposure at a site by comparing the levels of the chemicals in single samples to their corresponding soil remediation standard. The USEPA has recognized this concept for more than 18 years. It may be appropriate to specifically address hot spots during remediation; however, in determining the need for remediation based on health risk considerations, it should not be assumed that exposure occurs only in a hot spot, unless that assumption is consistent with the toxicity criteria used to assess risk for the particular chemical of interest and specific exposure conditions (e.g., acute standards protective of short-term exposures). (11)

93. COMMENT: The commenter believes that USEPA guidance is consistent and scientifically justified. The exposure assessment process in a chronic situation is structured toward addressing long-term, average exposures. To accomplish this, it is incumbent upon the assessor to use estimates of the average concentration to which the populations may be exposed. The Department's proposed approach for comparing individual chemical concentrations in soil to the soil remediation standards is contrary to the approach recommended by the USEPA.

Because during the site screening process, which is generally more conservative than the remediation process, the USEPA recommends comparison of the 95% upper confidence limit (UCL) of the mean to the USEPA soil screening level (SSL), it is especially relevant and important that the same, or even a less conservative, approach be used for comparison of site contaminant concentrations with the soil remediation standards. Consistency with USEPA guidance on this issue will allow the Department and the regulated community to characterize human health risks and determine the need for and scope of remedial action accurately, thoughtfully, and in a scientifically defensible manner. (11)

94. COMMENT: The proposed soil remediation standards are very conservative estimates of safe levels of chemicals in soil and are designed to be protective of chronic exposures using toxicity criteria (RfCs, RfDs, and cancer slope factors) that are protective of chronic exposures. The soil remediation standards are designed to be protective of long-term, even lifetime, exposures to mean concentrations of chemicals in soil, and it is not necessary or appropriate to compare soil remediation standards values to individual data points. (11)

95. COMMENT: The use of the soil remediation standards (SRS) as not-to-be-exceeded values is inconsistent with the requirements of the Brownfield Act, in that the Act requires that reasonable assumptions be applied in exposure scenarios, and that the Department avoid redundant conservative assumptions and develop SRS values that are consistent with the USEPA Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) guidance. Using the SRS as not-to-be-exceeded values is consistent with an exposure assumption that an individual will spend all day, every day, for 30 years (for a resident) or 25 years (for a worker) in the same location. That is not only unreasonable, it is preposterous. The Department must address this issue in the current proposed guidance to change the application of SRS values such that they are used in comparison with the 95% upper confidence limit (UCL) of mean concentrations at a site or in an exposure area, rather than as maximum acceptable concentrations. This is consistent with USEPA guidance, the basis of the toxicity criteria used to calculate SRS values, and New Jersey law. (11)

96. COMMENT: The Department has based its derivation of soil remediation standards for the direct contact pathway on the methodologies used in the USEPA Soil Screening Guidance (1996). However, the Department has not fully adopted the methodologies, procedures and assumptions outlined in the USEPA Soil Screening Guidance and has failed to incorporate essential aspects needed to ensure the proper use and evaluation of reasonable assumptions and exposure scenarios as mandated by the Brownfields Act. N.J.S.A. 58:10B-12b. For example, the USEPA guidance states that soil screening levels (SSLs) can be used as Preliminary Remediation Goals, the use of average contaminant concentrations over a specified exposure area, comparison of the contaminant concentrations in composite samples from an exposure area to two times the SSL and the use of the 95% upper confidence limit (UCL) on the arithmetic mean of contaminant concentrations in surface soils. (16, 20, 38, 41, 52, 56, 4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

97. COMMENT: The Department should allow remediators to have the option to apply the numeric criteria on a point-by-point basis or to apply USEPA's scientific methodologies and procedures for proper application of screening levels, using appropriate site characterization and exposure assessment methodologies. These scientific methodologies must be available in order for the numerical standards to be properly used by the regulated community. It is imperative that the Department recognize that these scientific methods and procedures developed by the USEPA are necessary to ensure the proper application of strict numeric criteria as screening levels and remediation standards.

The Basis and Background document indicates that compliance with the ingestion/dermal pathway will be determined on a point-by-point basis, with limited identified exceptions. This is in contrast to the USEPA Soil Screening Level (SSL) guidance, which promotes the use of contaminant averaging to determine appropriate exposure concentrations for the development of alternative remediation standards.

The commenters are not advocating use of site-wide averaging, but rather averaging over an identified potential exposure area as per USEPA SSL guidance and accepted scientific methodologies to ensure the use of reasonable assumptions and exposure scenarios as required by the Brownfields Act. Additionally, the determination of the appropriate exposure area must be made in order to determine the appropriate sampling strategy.

The USEPA method actually specifies averaging within a determined exposure area, and is a nationally accepted and utilized method. Therefore, this is a manageable assumption for qualified risk assessors and regulatory agencies nationwide. The USEPA guidance specifies that a reasonable exposure area must be considered, which could be different at each site and would address the Department’s concern. (16, 20, 38, 41, 52, 56)

98. COMMENT: A point-by-point comparison is an overly conservative method for determining compliance with generic risk-based cleanup standards. Some form of site wide, area of concern (AOC) wide, or exposure area averaging should be allowed by the Department to comply with the scientific basis established by the USEPA. This is now even more important and necessary given the stringent new proposed soil remediation standards. Unless and until compliance averaging effectively can be used at sites in New Jersey, as averaging is recommended by the USEPA, the soil remediation standards should not be adopted and implemented.

The commenters suggest use of averaging over an identified potential exposure area as per USEPA SSL guidance and accepted scientific methodologies to ensure the use of reasonable assumptions and exposure scenarios as required by the Brownfields Act. In addition, the Department should allow averaging based on identification of a reasonable exposure area using accepted scientific methodologies and that the Department address the issue of acute exposures separately. (16, 20, 38, 41, 52, 56)

99. COMMENT: The commenter recommends that the Department should not allow averaging of contaminants in soil where hot spots can remain on site as long as the overall

average of the soils meets the standards. Using averaging in an area of concern will allow hot spots to remain on site and could result in the ingestion of higher levels of contamination. (65)

RESPONSE to COMMENTS 89 through 99: The Department is aware of the USEPA recommendation to use an area average approach to determine the exposure point concentration and compliance with cleanup standards. The not-to-exceed option entails treating or removing all soil with contaminant concentrations greater than a specified remediation level. An area average approach involves treating or removing soils to a level that represents the average concentration in an exposure area, thereby leaving on site some soils with concentration levels that exceed the applicable standard. The Department believes that the uncertainty surrounding the type and adequacy of site sampling, the exposure assumptions, and the limited examination of only chronic toxicity does not support the use of an average exposure concentration or an area average approach for the ingestion-dermal exposure pathway. Several commenters recognized the need to evaluate potential acute and subchronic exposure conditions. In addition, the Department does not believe that exposure should be considered to occur as a random event over the entire site or exposure area. The Department is concerned with exposure to contamination that is non-random. In residential land use, people can be repeatedly exposed to residual contamination at specific locations during routine use of play areas and gardens. Similarly, in non-residential land use, workers frequent areas that are likely to be contaminated such as loading docks and product transfer areas, which are common areas of concern. Instead, the Department believes that remediation of a site should start with a not-to-exceed approach. However, the Department, based on a request by the person conducting the remediation for an alternative soil remediation standard, may approve an area average compliance approach if the uncertainty of exposure can be reduced significantly through a site-specific determination that non-random exposure will not occur, sampling is adequate to determine site wide representative conditions, the levels of contaminants left on site are not acutely toxic, and an appropriate exposure area is defined.

100. COMMENT: The commenter believes that the “bright line” policy of the Department’s Technical Rules is inconsistent with the sworn testimony of the Department’s scientists in the Interfaith Community Organization case against the Department. The commenter reviewed the deposition testimony of Department staff members offered in the Interfaith Community Organization action against the Department (see: Interfaith Community Organization v. Robert C. Shinn, Jr. et al., Civil Action Nos. 93-4772, 94-3434, 94-3793 (D.N.J.). Specifically, the commenter reviewed the testimony of Dr. Alan Stern, Ms. Linda Cullen, Dr. Barry Frasco, and Mr. Greg John that was relevant to this discussion on the use of the "bright-line" approach versus site-wide averaging for chronic exposures. The testimony of these staff members addresses the health risk assessment prepared by Dr. Martin for the Liberty State Park site. Dr. Martin used the maximum measured concentrations of chromium and other chemicals in soil to estimate risks from long-term exposures. Dr. Martin's approach is consistent with the use of the soil remediation standards values as a "bright line," or a maximum acceptable concentration. The commenter can provide the specific excerpts from the Department testimony if requested. (11)

RESPONSE: The Department believes that when the commenter refers to the “bright line” policy, the commenter is referring to those requirements in the Technical Rules that require comparison of contaminant concentrations in single samples to the applicable remediation standard. Those provisions of the Technical Rules are not a part of this rulemaking initiative. When the Department readopts the Technical Rules, it will reevaluate these requirements and will propose amendments to its compliance policies at that time.

101. COMMENT: The “Site Remediation News,” Spring 1995 Issue, provides further guidance on compliance averaging that expands upon the allowable techniques in the regulations, including provisions for *de minimis* exemptions. However, given the two cycles of amendments to the Technical Rules since the publication of the newsletter, it is unclear whether the guidance therein is applicable. (16, 20, 38, 41, 52, 56)

RESPONSE: The “Site Remediation News,” Spring 1995, described compliance averaging approaches. However, that guidance was superseded in 1997 by amendments to the Technical Rules. Since 1997 compliance averaging must be conducted pursuant to the Technical Rules at N.J.A.C.7:26E-4.8(c)3i(5).

Comparison of USEPA Soil Screening Levels with the Soil Remediation Standards

102. COMMENT: The use of screening-level methods is inappropriate in setting remediation standards (N.J.A.C. 7:26D-4). Multiple citations from relevant USEPA documents are available in support of the assertion that “soil screening levels (SSLs) are not national cleanup levels.” The purpose of the new soil remediation standards set forth by the Department is that they are to be used as remediation or cleanup goals. In order to calculate these soil remediation standards, the Department has, for the most part, used the same methods and assumptions that the USEPA used to calculate SSLs. The Department has compared the new soil remediation standards to USEPA SSLs and demonstrated that most of the new standards are not overly conservative. However, to calculate the SSLs, the USEPA used generic assumptions that are generally more conservative than what would be used for calculating cleanup levels. (11)

103. COMMENT: The USEPA makes it clear that its soil screening levels (SSLs) are screening levels only, and should not be construed as cleanup or remediation standards. Hence, although the comparison of the Department’s soil remediation standards with USEPA SSLs has the benefit of providing a perspective on which of the soil remediation standards are more conservative than the SSLs, it does not suggest that the ones that are the same or less conservative than the SSLs are not based on overly conservative assumptions. (11)

104. COMMENT: The commenters believe that the Department has not used many of USEPA’s assumptions and that the standards are overly conservative. The commenters recognize that the USEPA soil screening levels (SSLs) provide numeric criteria and scientific methodologies that allow for the establishment of a “bright line” between contaminated and uncontaminated media. The commenters also recognize the desire of stakeholders interested in the remediation process to have available a set of generic “look-up numbers” that establish this “bright line.” The commenters also understand that the use of generic look-up criteria will be more conservative than standards that are based on site-specific conditions. While the Department has attempted to establish standards based on sound scientific principles, it has not adopted many of the assumptions made by the USEPA that are essential to its use of the SSLs.

As a result, the numeric criteria developed by the Department are significantly more conservative than USEPA's SSLs. In addition, by proposing to use these more conservative numeric criteria as remediation standards, without consideration of proper characterization of exposure scenarios and appropriate methodologies for assessing the spatial distribution and associated average concentrations present (in the case of the direct contact/inhalation soil remediation standards), the Department's approach is in direct conflict with the USEPA's methodology. The USEPA cautions against using the SSLs as generic remediation standards, as the Department has proposed, based on their conservative nature, and the USEPA stresses the need for appropriate site characterization methods in order to determine how to apply the identified generic SSLs as remediation standards. The Department has failed to incorporate in its rule proposal the USEPA's additional assumptions and guidance needed to properly apply strict screening criteria. Several citations in support of not using SSLs for standards are given. (16, 20, 38, 41, 52, 56)

RESPONSE to COMMENTS 102 through 104: The USEPA's soil screening levels (SSLs) are "risk based" levels below which no further action or study is warranted under specific exposures and site conditions. They were developed by the USEPA as a tool to focus the performance of a baseline risk assessment at a site by identifying the contaminants and areas of concern. As acknowledged in USEPA's "Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites" (August, 2001), SSLs can also be used as remediation goals provided the conditions found at the site are the same as the assumptions used in the generic exposure equations used to develop the SSL.

As required by the Brownfield Act at N.J.S.A. 58:10B-12b and d, the Department has used USEPA's SSL generic equations and models, but not the SSL screening methodology, to develop its generic soil standards. While it is true that generic assumptions are necessarily more conservative than site-specific determinations, the Department, pursuant to the Remediation Standards rule, allows for the use of alternative soil remediation standards where site specific input is appropriate. The primary reason that some of the Department's generic ingestion-dermal contact standards are lower than the SSLs is due to the Department's use of different or new toxicity information, not the exposure assumptions. Unlike the Federal Government, the

Department is prohibited by the Brownfield Act to assess site conditions using baseline risk assessment (cumulative risk) and, therefore, the Department did not account for the additive risks of multiple contaminants across multiple pathways when it calculated the soil remediation standards.

Conformance of the Soil Remediation Standards with the Technical Rules

105. COMMENT: The Technical Rules do not mention the acceptability of site-wide averaging, outlined in the Ingestion-Dermal Basis and Background document or for determination of an Exposure Area. The language in the Technical Rules at N.J.A.C. 7:26E-4.8(c)3i refers specifically to compliance averaging for a particular area of concern. (16, 20, 38, 41, 52, 56)

RESPONSE: The concerns expressed in the comment are not part of this rulemaking. However, it should be noted that the Department anticipates amending the Technical Rules in the future to include requirements concerning when the person responsible for conducting the remediation may use site-wide compliance averaging for the ingestion-dermal exposure pathway and under what conditions. In the meantime, the Department will evaluate proposals for site-wide compliance averaging and determinations of exposure areas for the ingestion-dermal exposure pathway on a case-by-case basis.

106. COMMENT: The Technical Rules do not provide for averaging sporadic low levels of contaminants with no discernible source areas or where minimal exceedances of the standard are detected during post excavation sampling. (16, 20, 38, 41, 52, 56)

RESPONSE: The concerns expressed in the comment are not part of this rulemaking However, it should be noted that the Department anticipates amending the Technical Rules in the future to include procedures for averaging sporadic low levels of contaminants when there is no discernible source area and for minor residual contamination determined with post excavation sampling. In the meantime, the Department will evaluate proposals to implement such procedures on a case-by-case basis.

Alternative Remediation Standards for the Ingestion-Dermal Contact Pathway

107. COMMENT: In the proposed rules, the Department limits alternative remediation standards options to methods that do not employ site-specific factors. Default factors in the equations used to calculate remediation standards are based on values used by USEPA and other states. The Department believes it is not practicable to modify default parameters. The Department should reconsider this position, because end-use property conditions could justify modification of several variables in the formulas, including averaging time, exposure frequency, exposure duration, soil ingestion rate, the skin-soil adherence factor, and event frequency. (16, 20, 38, 41, 52, 56)

RESPONSE: The Department believes that the non-site specific parameters for averaging time, exposure frequency, exposure duration, soil ingestion rate, skin-soil adherence factor, and event frequency used in the derivation of soil remediation standards is justified and correct. The default values selected for these variables, which are used by the USEPA in their soil screening levels, represent reasonably conservative values (but not a worst case), which are designed to be consistent with the USEPA's concept of Reasonable Maximum Exposure (RME) and are protective of the majority of the population. Accordingly, the Department believes that the use of the selected non-site specific parameters is reasonably protective of the resident or worker who has the greatest exposure potential on a given site. A modification of one or more of these default parameters will not be accepted by the Department unless any such default value is modified by the USEPA.

108. COMMENT: The Department should allow alternative soil remediation standards requests for modification of cancer slope factors, oral reference dose, and dermal absorption factor, when supported by publication under the risk factor hierarchy. The commenters believe

that the regulated community will be able to incorporate changes in toxicity information more quickly than the Department will be able to update standards using the processes that have been included in the rule. (16, 20, 38, 41, 52, 56)

RESPONSE: The Department encourages the submission of new toxicity information, including new or updated slope factors, oral reference doses, etc.; however, this information and the accompanying alternative soil remediation standards requests, will be carefully reviewed by the Department to ensure their acceptability. After its review, the Department will make a determination as to whether the new toxicity information warrants a change to an existing remediation standard.

109. COMMENT: The Department states that an appropriate alternative soil remediation standard request may be based on different land use determinations such as a recreational scenario. The commenters request that the Department clarify the different types of land use scenarios that would be considered for ingestion-dermal absorption alternative soil remediation standards development. The Department only cites two examples of different land uses (i.e., recreational and trespasser) in the basis and background document for the combined ingestion and dermal absorption pathway. (16, 20, 38, 41, 52, 56)

RESPONSE: Recreational land uses, which include various trespasser scenarios and active/passive park scenarios, are the only alternate land use scenarios that the Department has received at this time for the ingestion/dermal absorption pathway. As sites are being remediated, the Department anticipates the submittal of requests for alternative remediation standards based on other land use scenarios. Due to the site specificity of these determinations, generalizations cannot be made, and each submittal will be reviewed on its own merit.

110. COMMENT: The Department should allow a site-specific evaluation of the dermal/inhalation pathways at each site to support selection of the applicable soil standard.

Defaulting to the lowest value is appropriate only when there is risk of exposure through both the ingestion and inhalation pathways. (16, 20, 38, 41, 52, 56)

RESPONSE: The Department assumes that no site-specific situation exists where residents and workers are not exposed to contaminants through both the ingestion-dermal pathway and the inhalation pathway because it is assumed that these exposures occur simultaneously during activities including children's outdoor play and in adult activities such as gardening, landscaping and excavation. Adults and children that engage in these activities contact soil on the skin and incidentally ingest and inhale soil contaminants. As such, for a given contaminant, the Department defaults to the exposure pathway that derives the lower concentration soil remediation standard in order to be protective of human health for both exposure pathways.

Ecological Based Standards

111. COMMENT: The rule should contain ecological-based standards that consider adverse ecological and wildlife effects. The Department says the technical regulations require a baseline ecological evaluation (BEE) and if needed, ecological risk assessment. Can the Department demonstrate that, in fact, persons responsible for conducting remediations are doing these assessments, and that this process is as protective as would be specific standards, since ecological receptors are much more sensitive to environmental contaminants than humans? (10, 25, 31, 65, 68)

RESPONSE: The Department is prohibited by the Brownfield Act from promulgating soil remediation standards that are protective of the environment (ecological based soil remediation standards) until recommendations are made by the Environment Advisory Task Force. See N.J.S.A. 58:10B-12a. The Environment Advisory Task Force, however, has never been convened. However, until such time that the Environment Advisory Task Force does issue its recommendations, the Brownfield Act allows the Department to determine the need for and the application of soil remediation standards that are protective of the environment on a case-by-case basis. See N.J.S.A. 58:10B-12a.

While the Remediation Standards rule does not include ecological-based remediation standards, the Department does separately evaluate ecological impact/risk in accordance with USEPA guidance at all contaminated sites. The Department requires, in the Technical Rules, that a baseline ecological evaluation be conducted at every site. See N.J.A.C. 7:26E-3.11. The site investigation report that is prepared pursuant to N.J.A.C. 7:26E-3.13 must present and discuss all of the information identified or collected during the site investigation, including the baseline ecological evaluation. The Department, it its review of each site investigation report, ensures that this evaluation is conducted and that it meets the requirements of this section. If the baseline ecological evaluation indicates ecological impacts, a more detailed ecological assessment must be conducted pursuant to the Technical Rules. See N.J.A.C. 7:26E-4.7. A baseline ecological evaluation and, if required, any additional ecological assessment and remediation must be performed before the Department will issue an No Further Action letter for the site.

The Department agrees that ecological criteria can be lower than the health-based standards for some contaminants. The Department applies the lowest, most conservative ecological criteria in the baseline ecological assessment process, which determines the need for further ecological evaluation. The Department believes that this site-by-site approach is effective for the identification and mitigation of ecological impacts caused by discharges at contaminated sites.

112. COMMENT: The Legislature has imposed a requirement to first establish an Environmental Task Force, which would make initial recommendations regarding soil remediation standards. Until such a body has been formed, the Legislature directed the Department to determine the need for the application of remediation standards upon a case-by-case basis in accordance with the United States Environmental Protection Agency's ("USEPA") Comprehensive Environmental Response, Compensation and Liability Act of 1980 guidance and regulations ("CERCLA"), 42 U.S.C. § 9601 et seq. The Department has failed to first establish an Environment Advisory Task Force prior to proposing soil remediation standards. Until such a Task Force is established and that body issues recommendations regarding soil "remediation standards that are protective of the environment," the Department is forbidden from adopting <u>or</u>

proposing soil remediation standards. (N.J.S.A. 58:10B-12a). Therefore, the Department's proposed soil remediation regulations constitute *ultra vires* action by the Department. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Department believes the commenters have misinterpreted the Brownfield Act regarding the Environment Advisory Task Force. N.J.S.A. 58:10B-12a states that, "The department shall not propose or adopt remediation standards protective of the environment pursuant to this section, except standards for groundwater or surface water, until recommendations are made by the Environment Advisory Task Force created pursuant to section 37 of P.L. 1993." The soil remediation standards that were proposed are protective of human health and not of the environment. As such, the proposed soil remediation standards are in conformance with the Brownfield Act and do not constitute *ultra vires* action by the Department.

Please refer to the response to comment 111 above for a discussion on how the Department assesses environmental/ecological impacts at contaminated sites.

113. COMMENT: The lack of ecological protections contradicts recent efforts by the Department to establish wildlife criteria in the surface water quality standards. The soil criteria need to address wildlife and ecological impacts. (68)

RESPONSE: Since 1993, in accordance with USEPA Region II policy, nationally-recognized screening criteria for soil and sediment have been used for comparison with site specific data. These criteria were formally adopted by reference in N.J.A.C. 7:26E in 1997. Surface water data are compared with aquatic chronic New Jersey Surface Water Quality Standards. Additionally, since 2003, the Department's Site Remediation Program has recommended the use of the New Jersey-Specific Wildlife Values as Surface Water Quality Criteria for PCBs, DDT, and Mercury at contaminated sites where these persistent biomagnifying contaminants are of concern. The Department establishes the Surface Water Quality Standards as its remediation standards for surface water in N.J.A.C. 7:26D-3 of these rules.

Please refer to the response to comment 111 above for additional discussion on how the Department assesses environmental/ecological impacts at contaminated sites.

Schools

114. COMMENT: The commenter applauds the Department's efforts to update the listed soil contaminants which should be addressed during the remediation of brownfields and contaminated sites within New Jersey. However, the commenter is concerned that these remediation standards only address soil, ground water and surface water on the site pre-development and do not take into consideration soil contamination that could potentially imported as a part of fill that may be used during the building process. In the past year, New Jersey has experienced several instances in which soils imported to building sites, particularly school sites, were found to be contaminated with one or more of the contaminants the Department proposes to regulate, in particular, chlordane. The Department's proposed amendments are an important step toward securing the health of our school children, but we need to also take action to ensure that contractors and suppliers are testing borrowed fill for sites before importation. There is no reason why the non-residential and residential ingestion-dermal exposure pathways should be different for soil imported to a site versus soil historic to a site. In fact, lack of a legal requirement that borrowed fill meet the soil remediation standards seems to undermine efforts to ensure that New Jersey's building sites are clean and safe for our children.

The Department should not leave the enforcement of minimum requirements for borrowed fill and likewise imported materials to the good will of contractors and concurrent flush budgetary allowances. Unlike a corporation moving its office onto a former brownfield, New Jersey's students are not in a position to advocate for the safest contamination remediation requirements, nor are they knowledgeable enough to foresee that even a "clean" site might be subsequently contaminated by seemingly benign backfill. (7)

RESPONSE: The Technical Rules at N.J.A.C. 7:26E-6.2(b) contain minimum requirements for the physical and chemical properties for fill material. These requirements are generally applicable to the material used to cap contaminated soil at a site. Fill material used must be uncontaminated pursuant to any applicable remediation standard and free of extraneous debris or solid waste. The quality of the fill must be certified by the person responsible for conducting the remediation, and often sampling is conducted to confirm this fact. In some circumstances, contaminated soil may be reused at a site. In these cases, the remediating party must provide the Department with an evaluation pursuant to N.J.A.C. 7:26E-6.4(d) to ensure that the proposed activity will be protective of human health and the environment.

The use of contaminated soil as fill would constitute a violation of the Spill Act at N.J.S.A. 58:10-23.11c, which prohibits the discharge of hazardous substances. The Act defines a discharge as "any intentional or unintentional action or omission resulting in the releasing, spilling, leaking, pumping, pouring, emitting, emptying or dumping of hazardous substances into the waters or onto the lands of the State. . . ." See N.J.S.A. 58:10-23.11b. Moreover, contaminated soil meets the definition of solid waste codified at N.J.A.C. 7:26-1.6 and must be disposed of properly according to the Solid Waste Management Act and its implementing regulations. Accordingly, to use contaminated soil as "clean fill" would constitute a violation of the Solid Waste rules. The Department highly recommends that property owners, particularly schools, have all imported fill sampled to ensure that it meets the soil remediation standards and the Solid Waste rules' definition of "clean fill" at N.J.A.C. 7:26-1.4, and does not result in the emplacement of contamination of soils.

The Department is aware that chlordane has been used extensively around many kinds of structures throughout the State for protection against termites, including most homes and schools. If left in place, however, these soils do not represent a risk to public health. If soil containing chlordane at concentration greater than an applicable standard is removed, that soil must be handled and properly disposed of in accordance with the Department's Solid Waste rules.

115. COMMENT: The commenters strongly support the inclusion of residential use sites, schools (K-12), and childcare centers to be cleaned up to residential standards. The commenters

recommend that pre-kindergartens be included to the list of those land uses to which residential standards apply. (25, 31, 44)

RESPONSE: The Department has modified the definition of "Residential direct contact soil remediation standard" at N.J.A.C. 7:26D-1.5 on adoption to include pre-kindergartens. Pre-kindergartens are analogous to childcare centers and are also school-based programs that bridge between childcare and kindergarten. Accordingly, the Department is clarifying this definition to be inclusive of all childcare centers and schools.

Fill Material/Clean Fill Material

116. COMMENT: The soil remediation standards based upon impact to groundwater, as currently proposed, will govern soil remediation decisions at the vast majority of sites. The proposed soil standards state that engineering and institutional controls are generally not acceptable for soil areas that exceed an impact-to-groundwater standard. Hence, the Department's proposed soil remediation standards will require excavation and off-site disposal at the vast majority of sites. The lack of clean back-fill will be an impediment to brownfield re-development and site remediation at these locations and will substantially increase the costs of procuring sufficient quantities of clean fill. The proposed soil remediation standards will impose additional costs in locating and importing clean fill and in managing "contaminated" soil that must be excavated. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Department recognizes the potential adverse impact of the proposed standards on the available volume of fill material that would be considered in compliance with the Remediation Standards rules. However, the more critical charge of the Department is to protect human health and the environment. The proposed standards are based on the best available science, to protect human health and the environment. The Legislative mandate to generate these standards does not include a requirement to ensure the availability of clean fill material for construction or similar purposes. Note, however, that reuse of this material is not precluded; therefore, excavation and offsite disposal are not the only remedial options available.

Additionally, soil is not the only type of material that can be used as "clean fill." The Solid Waste rules contain provisions for the use of certain materials that would otherwise qualify as solid waste as clean fill, as long as these materials qualify under those rules.

Impact of the Remediation Standards on the use of Capping as an Engineering Control

117. COMMENT: Capping of sites may affect the ability for remediating parties to meet the proposed remediation standards. Materials that are brought onto sites to cap contamination may themselves be contaminated, and the cumulative impact of those materials, on top of what may be left in the ground, may exceed the standards. (65)

RESPONSE: The Technical Rules at N.J.A.C. 7:26E-6.2(b) contain minimum requirements for the physical and chemical properties for fill material. These requirements are generally applicable to the material used to cap contaminated soil at a site. Fill material used must be uncontaminated pursuant to any applicable remediation standard and free of extraneous debris or solid waste. The quality of the fill must be certified by the person responsible for conducting the remediation, and often sampling is conducted to confirm that the fill meets the applicable standards. In some circumstances, contaminated soil may be reused at a site. In these cases, the remediating party must provide the Department with an evaluation pursuant to N.J.A.C. 7:26E-6.4(d) to ensure that the proposed activity will be protective of human health and the environment.

Note also that certain materials are appropriate for use as a part of a cap when they have been approved for that use by the Department pursuant to a beneficial use permit granted pursuant to the Solid Waste rules at 7:26-1.7(g). Included in the list of materials that are categorically approved for beneficial use and require no further approval or authorization for use or reuse, provided they are used in a manner consistent with the Solid Waste rules are, by way of example, soil for on-site reuse that contain contaminants at levels below the most stringent site clean-up levels established by the Department for a specific site (except for sites in the Pinelands Areas), contaminated soil that has been decontaminated to the satisfaction of the Department and is used or reused in a manner acceptable to the Department, and nonhazardous solid waste, paper mill fiber or paper fiber combustion ash approved in advance by the Department for use or reuse as cover material, landfill liner, cap material or other landfill design and management components. See N.J.A.C. 7:26-1.7(g)4.

Analytical and Practical Quantitation Levels

118. COMMENT: The commenter believes that it is a prudent decision to set the remediation standard at the practical quantitation level (PQL) when the computed standard is below the ability of the available technology to measure it at an acceptable level of accuracy. (1)

RESPONSE: The Department appreciates the commenter's support for setting remediation standards at the practical quantitation level (PQL) when available technology is not able to accurately detect contaminants to the level of the corresponding remediation standard.

119. COMMENT: The Department has chosen to compare the chemical-specific, health-based concentrations to standard practical quantitation limits (PQLs) and select the higher of these two values for the soil remediation standard for that particular exposure pathway. Promulgation of standards based on PQLs is challenging, as PQLs are often not consistently reported at the same level. Factors such as changes to laboratory methods, interferences associated with soil matrices, and moisture content may influence the sensitivity of reported results. It is especially critical for chemicals such as polyaromatic hydrocarbons (PAHs), specifically benzo(a)pyrene, which is commonly found at all sites. The commenters recommend that the Department consider amending this approach. Rather than promulgate the PQL, one option would be to note that the health-based concentration is below the PQL and therefore the PQL, without identifying a specific level, would be the soil remediation goal. This would allow for the intent of the current approach to remain setting the remediation goal at the PQL, but would allow for other influences on the analytical result to be accommodated when evaluating site data. (46, 58)

RESPONSE: The Department recognizes that promulgating standards based on practical quantitation levels (PQLs), when detection to the promulgated remediation standard is not analytically attainable, is challenging. However, even though laboratories may have different PQLs for any given compound, the PQL that the Department assigned to each contaminant listed in the Tables in Chapter Appendix 1was chosen with sample matrix variability taken into consideration and such that the PQL would be routinely attainable by conventional and readily available analytical methodologies.

The Department does not believe that the approach recommended by the commenter, to note that the health-based concentration is below the PQL and therefore the PQL would be the soil remediation goal, without identifying a specific level, would be appropriate. The intent of the current approach is to not only set a remediation goal at a PQL but to also ensure that a particular PQL applied is consistently from site to site. Without Department-specified values, the PQLs reported to the Department would be inconsistent, resulting in similarly inconsistent remediation goals/endpoints.

120. COMMENT: There are a number of practical concerns with how the technical capabilities and capacities of the testing laboratories will impact the implementation of the proposed rules. Under current protocols, laboratory testing is often delayed and very expensive. It currently takes several weeks from the time that the data is submitted and the time that the verified results are received from the laboratory. Under the proposed rules, it is estimated that technical reviews of information submitted to the Department will typically take one year or more. Lags of this duration will preemptively abort most redevelopment due diligence reviews.

More critically, there are not many laboratories in New Jersey certified to test and analyze data to the proposed levels, particularly those that are below the current industry lab Practical Quantitation Level (PQL) capabilities. For example, the Department proposes that testing of volatile organic contaminants be run using the median level method. Some laboratories are evaluating at the lower methodologies and would be required to gear up to test at the median level.

Most, if not all, laboratories have not developed the necessary techniques and sought the necessary approvals to meet the more stringent proposed standards. To do so, laboratories will be required to revise their testing procedures and revamp their equipment, adding yet more costs and delays to voluntary remediations and redevelopment.

The proposed technical regulations also do not adequately specify or discuss the required methodology for laboratories based on the proposed standards. This must be done well in advance of the effective date of the rules, should they be adopted.

Thus, it is unclear when New Jersey laboratories realistically may be able to achieve the proposed levels. If the testing community cannot timely and reliably meet the Department's expectations, implementation will be forestalled. It is, as noted, even less clear whether demand will be sufficient to induce laboratories outside of New Jersey to develop the capability to test to the proposal's levels. The Department is also likely to incur costs associated with data gathering and review of the submission by its own technical staff which is a concern given the Department's current staffing.

The Department should reconsider its assumptions in light of how laboratories currently operate and the impacts arising from the proposed standards. Since these criteria will be somewhat unique to New Jersey, and therefore, laboratories outside the State may not see sufficient demand to justify investment in equipment and staff, the Department should also consult with New Jersey laboratories as to their ability to timely implement the proposed remediation standards. (4, 5, 11, 15, 18, 19, 20, 22, 27, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Department conferred with the laboratory community prior to proposing the soil remediation standards and their corresponding practical quantitation levels (PQLs) to determine whether laboratories will be able to meet or to adjust to the analytical requirements of the proposal. The Department's Site Remediation Program participates in monthly meetings with the environmental laboratory community via the Environmental Laboratory Advisory

Committee (ELAC). The issues of capacity, detection levels and costs have been discussed in several committee meetings. With respect to capacity and costs, the laboratories represented in ELAC have expressed little concern that their routine operations will be significantly impacted. With respect to detection levels, concerns over being able to have adequate analytical sensitivity to reach soil PQL criteria for several compounds was expressed. However, the actual remediation standards for those compounds were significantly higher than the corresponding PQLs, thereby making the concern moot. In those instances, laboratories may not be able to "reach" the cited PQLs, but will have adequate instrument sensitivity to meet the remediation standards.

Laboratory capacity should not be affected by the implementation of the soil remediation standards. The basic mechanics of remediating sites will not change nor should the volume of samples delivered to laboratories for analysis significantly change as a result of the adoption of the rule. The analytical protocol required to meet the standards is readily available to laboratories. They may be found in the most recent revisions of the USEPA Contract Laboratory Program Statement of Work for Organic Analysis, the USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, the USEPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846), and other sources noted in N.J.A.C. 7:26E-2.1(a)3. Many laboratories already have implemented more sensitive techniques and/or purchased new equipment to maintain competitiveness in the market place. In addition, many laboratories have previously modified their capabilities in order to fulfill similar requirements of the Ground Water Quality Standards, N.J.A.C. 7:9C.

The Department disagrees with the commenters' claim that under the proposed rules, technical reviews of information submitted to the Department will typically take one year or more. The Department anticipates that the majority sampling conducted at contaminated sites will remain unchanged by the adoption of the soil remediation standards. It may be instructive to remember that site remediation is often conducted in multiple phases, and samples collected during the early phases would not necessarily need to be analyzed with the analytical sensitivity required to detect contaminants at the remediation standard or its PQL. For example, when the remediation is at the remedial investigation phase, where the objective is to conduct "rough" delineation, or when the remediation is in the site investigation phase, where the objective it to determine, based on existing site information or previous sampling, whether a contaminant is expected to be present at levels greater than the applicable remediation standard, less sensitive analytical methods may be used to verify the existence of contamination. A third example of the appropriate use of less sensitive analysis would be when the remediation is at the phase where long term monitoring of ground water, having high levels of contamination, is being conducted. It is only at such time when a site is a candidate for approval for no further action that the person responsible for conducting the remediation must demonstrate compliance with the Remediation Standards or the applicable PQLs.

121. COMMENT: Laboratory capacity and costs will impede redevelopment. Even in the event that there is sufficient laboratory capability and capacity, testing to the proposal's remediation standards will impose significant costs and delays. Significant costs are also anticipated with the development of an alternative impact to groundwater soil remediation standard using the site-specific modification of soil-water partition equation parameters. The cost for this effort is estimated in the range of $15,000 to $25,000 per sample, with an indeterminate number of samples needed.

The Department should allow adaptation of the impact to ground water values based on the distance between the sample and the water table, providing a series of generic values associated with groups of soil types and other methods that require less field investigation but more labor-intensive modeling and parameter input analysis. Implementation of the proposed rules may be substantially impaired due to numerous constraints on the capacity of the testing laboratories. Before the Department proceeds to adoption of any rule requiring increased timeliness or sophistication by those laboratories, these impediments must be resolved.

The Department should identify specific means and methods that would be accepted for the derivation of the necessary numerical values to be input into the formulae. Only then can costs associated with the alternative remediation standards process be estimated and informed comments be provided. (4, 5, 11, 15, 18, 19, 20, 22, 27, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: With regard to the commenters concerns related to the development of alternative remediation standards for the impact to ground water pathway, the Department has determined not to adopt the standards for this pathway. See the response to comments 316 through 420.

The commenters estimate that the cost of deriving an alternative soil remediation standard for the impact to ground water pathway would range between $15,000 and $25,000 per sample. It is not clear how the commenters arrived at this estimation. The Department is aware of additional costs associated with the synthetic precipitation leachate procedure (SPLP) and analysis of the leachate sample, but estimates these to be less than $1,000 per sample. The number of samples needed to develop an alternative soil remediation standard would depend on the type of alternative soil remediation standard for which the person responsible for conducting the remediation was applying. The Department acknowledges that costs are associated with developing an alternative remediation standard. However, the Department believes that these costs will be a minor component of the overall cost of remediation. Moreover, the overall cost of remediation may be reduced because remediation is conducted to the alternative, site-specific standard.

Regarding general analytical concerns, the Department participates in monthly meetings with the environmental laboratory community via the Environmental Laboratory Advisory Committee (ELAC). The issues of capacity, detection levels and costs have been discussed. With respect to capacity and costs, the laboratories have expressed little concern that their routine operations will be significantly impacted. With respect to detection levels, concerns over being able to have adequate analytical sensitivity to reach soil PQL criteria for several compounds was expressed. However, the actual remediation standards for those compounds were significantly higher than the corresponding PQLs, thereby making the concern moot. In those instances, laboratories may not be able to “reach” the cited PQLs but will have adequate instrument sensitivity to meet the remediation standards.

122. COMMENT: The proposal is based upon practical quantitation levels (PQLs) in establishing the enforceable basis for standards. Many of the remediation standards are based on the PQL. Forty-eight parameters have calculated health based standards that are lower than the PQL; how have analytical methods and PQLs changed over time for these parameters and what, if anything is the Department doing to drive PQLs closer to the health-based criteria?

Specific additional sampling and remedial measures should be required to provide additional assurances of adequate protection for these 48 PQL based parameters. (68)

RESPONSE: As proposed, 48 contaminants had remediation standards that were lower than the corresponding practical quantitation level (PQL). However, because the impact to ground water standards are not being adopted, only eight direct contact soil remediation standards that are based on the PQL are being adopted. The Department anticipates amending the Regulations Governing Certification of Laboratories and Environmental Measures rules, N.J.A.C. 7:18, to require certified laboratories to submit current laboratory data, including minimum detection limits, practical quantitation limits and other quality control information. With this information, the Department plans to develop New Jersey quantitation limits (NJQLs), to be used by the Department’s different regulatory programs and to provide more accurate quantitation levels that more closely approximate applicable health-based remediation standards.

The Department’s Site Remediation Program does not limit analytical methods to those solely generated by the USEPA. However, regardless of the originating authority, analytical methods must have the necessary components such that the data produced will be of reliable and defensible quality and be amenable to environmental matrices (air, water, soil). Additionally, those methods must be readily available to the analytical laboratory community, be of sufficient detail to withstand a certification protocol, and allow for samples to be analyzed and the subsequent data generated, both in an efficient and economically feasible manner. Research-based methods have been considered for incorporation into more of the main stream procedures of the analytical laboratory community and there may be other methods that provided lower detection limits. However, many research-grade methods are ill suited for the present environmental laboratory climate. In most instances, these research methods are not written with the intent of being able to process and accommodate the large volume of samples analyzed annually pursuant to remediation activities. In addition, these research methods are typically not adaptable to environmental matrices without producing deleterious effects on the instrumentation that is subject to repeated and significant wear as a result of sample volume. And finally, the organizations utilizing these research methods are not in the commercial laboratory business and are usually not interested in going through the certification process required to be competitive in the industry.

As analytical methods are updated, the Department will evaluate and incorporate updated methods and associated PQLs into the development remediation standards.

123. COMMENT: The Department's omission in promulgating a total petroleum hydrocarbons (TPH) standard along with the Department's failure to provide policy and guidance on the required analytical methods for investigation of the release of # 2 heating oil equates to a failure to provide the regulated community a uniform standard to which sites affected by these contaminants are to be remediated. (15)

RESPONSE: The Department was unable at the time of rule proposal to include a health-based soil remediation standard for total petroleum hydrocarbons (TPH). As #2 fuel oil is a complex mixture, developing a health-based standard is more difficult than for individual compounds. Additionally, the analytical method that would be used to generate the necessary data to determine compliance with a standard is complex and requires development. However, the Department is currently in the process of determining the feasibility of developing a soil remediation standard for #2 fuel oil and determining an appropriate analytical method. The Department intends to develop a standard for TPH in the near future.

In the interim, the Department has developed guidance on the analytical methods to be used for the investigation of #2 fuel oil. That guidance is available on the Department's web site at: http://www.nj.gov/dep/srp/guidance/tph/.

124. COMMENT: All soil remediation standards should be health-based, rather than being based on a practical quantitation limit (PQL). The quantitation limit is completely unrelated to what is a safe and acceptable level of toxic substances to have in the environment. The PQL is based on average laboratory performance and reflects levels that laboratories can detect with the equipment they have available. The people of New Jersey should not have to tolerate higher levels of chemicals in their environment as a result of a technical average of equipment, rather than on health impacts. (65)

RESPONSE: The Brownfield Act requires that the Department develop health-based standards, and indeed, each of the standards being adopted as a part of the Remediation Standards rules are health based. This should not be confused with the PQL. A site may only be remediated to the PQL where the corresponding standard falls below its PQL, because laboratories cannot detect that chemical at a level below the PQL. Feasibility must be taken into account, to ensure that the data produced will be of reliable and defensible quality and be amenable to environmental matrices. Additionally, those methods must be available to the analytical laboratory community, be of sufficient detail to withstand a certification protocol and allow for samples to be analyzed reliably.

The Department set direct contact soil remediation standards at the PQL for eight contaminants. As part of the standards development process, the Department evaluated existing analytical methods that could detect or come close to detecting contaminant levels at the health-based standards in environmental samples. The reliability of analytical methods was evaluated as well as the availability of New Jersey certified laboratories that could conduct these analyses. As technology improves over time, analytical methods and achievable detection limits will be driven lower. As new analytical methods are developed or revised in the future, the Department will strive to set analytical detection limits closer to the health-based criteria in order to be as protective of human health and the environment as is possible and feasible.

125. COMMENT: The proposed rule borrows the practical quantitation limit definition from the Technical Rules, N.J.A.C. 7:26E-1.8. The definition is as follows: "Practical quantitation level" or "PQL" means "the lowest quantitation level of a given analyte that can be reliably achieved among laboratories within the specified limits of precision and accuracy of a given analytical method during routine laboratory operating conditions."

Specified limits of precision and accuracy are defined by the calibration range of individual methods. Accordingly, a calibration standard at the PQL concentration must be included in the calibration range for the method used in the determination of each target analyte. The calibration data must satisfy the calibration criteria of the method for the PQL to be within specified limits of precision and accuracy.

PQLs for specific compounds in Chapter Appendix 1, Tables 1A & 1B have been established at concentrations that cannot be included in the calibration range of the methods employed for the analysis of soil. The PQLs for 2,4 Dinitrophenol, 4,6 Dinitro-o-cresol, Hexachlorocyclopentadiene, and Pentachlorophenol should be changed from 0.3 mg/kg to 0.7 mg/kg. The Department should either elevate the PQLs or modify the existing accreditation for semi-volatile organics analysis methods by selective ion monitoring (SIM). (63)

RESPONSE: The Department believes that laboratories will be able to analyze samples within the specified limits of precision and accuracy and still meet the requirements of the proposal. The proposed PQLs for the contaminants cited by the commenter are at the lower end of analytical performance using methods that are readily available to the analytical laboratory community. However, for the contaminants cited by the commenter, the PQLs do not necessarily need to be used to define the lowest calibration standard in a range for the analytical method used. This is because the actual remediation standards for those compounds are, at a minimum, a factor of 10 greater than the proposed PQLs and are also above the commenter recommended PQLs for 2,4 Dinitrophenol, 4,6 Dinitro-o-cresol, Hexachlorocyclopentadiene, and Pentachlorophenol. Therefore, no changes need to be made to the PQLs.

126. COMMENT: Practical quantitation levels (PQLs) for several specific compounds in Table 2B of the Rule have been established at concentrations that cannot be included in the calibration range of the methods employed for the analysis of leachate. The commenter recommends modifying the existing accreditation for semi-volatile organics analysis methods by selective ion monitoring (SIM).

Additionally, the PQLs listed for the metallic elements and cyanide in Table 2C, which are used as the criteria for alternative demonstrations of compliance by applying synthetic precipitation leaching procedures to soil, have been established at unrealistically low concentrations for aqueous samples. Normal environmental applications of inductively coupled plasma (ICP), ICP-mass spectrometry (MS), or other spectrophotometric techniques cannot satisfy the Department's PQL levels. Alternative methods would require development to meet the lower limits for these compounds to report elemental data without qualification. The commenter recommends elevating the PQL concentrations for these elements. (63)

RESPONSE: At this point, changing the PQLs established for the impact to ground water soil remediation standards is not necessary. Because the impact to ground water soil remediation standards are not going to be adopted, the impacts to ground water will be evaluated on a site-by-site basis using guidance developed by the Department. When the site-specific criteria are developed, the issue of PQLs will be addressed at that time, if necessary. However, most of the compounds cited have health based criteria above the PQLs and a laboratory would not be required to demonstrate analytical performance at the PQL concentration level.

127. COMMENT: The Department's proposed numeric standards that are based upon practical quantitation levels (PQLs) represent "maximum" remediation standards, because they would essentially require any measurable concentration of most chemicals to be excavated, yielding a volume to be remediated and a remediation performance standard that substantially

exceeds what would be necessary to protect human health and the environment. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: Basing a cleanup on a practical quantitation level (PQL) instead of a lower health-based number is still a minimum remediation standard. The fact that a PQL is above the health-based criterion actually implies that a greater chance exists for trace amounts of contamination to be left on site and the scenario would be the reverse of that which is described by the commenters.

128. COMMENT: The commenters request more information about how the Department derived the practical quantitation levels (PQLs) and specifically, address the following questions. Where did the Department obtain the PQLs listed in the soil remediation standards tables? Is the definition of PQL consistent from study to study? Are the studies available for review? Was matrix effect taken into account with regards to the PQLs? For example, if a base/neutral sample is highly viscous, it may not be possible to fully concentrate the sample extract and achieve the polyaromatic hydrocarbons (PAH) PQLs. The Department should provide basis and background data describing the PQL development process to the public. (16, 20, 38, 41, 52, 56)

RESPONSE: The practical quantitation levels (PQLs) for the impact to ground water soil remediation standards were those used in the Ground Water Quality Standards, N.J.A.C. 7:9C. Their derivation may be found in the basis and background document associated with N.J.A.C. 7:9C, which can be found on the Department's web site at http://www.state.nj.us/dep/wms/bwqsa/docs/gwqsbb.pdf. The PQLs for the Residential and Non-Residential Direct Contact Soil Remediation Standards were derived from a number of sources: the Contract Required Quantitation Limits in the USEPA Contract Laboratory Program Statement of Work for Organics; the Estimated Quantitation Limits from USEPA SW-846 methods; and actual laboratory PQLs where the PQL = MDL X 5. All PQLs represent values that are attainable by the laboratory community and are from analytical methods that have the necessary components such that the data produced will be of reliable and defensible quality and be amenable to environmental matrices. No specific PQL studies were conducted by the

Department. The Department is uncertain as to the identities of the studies referenced by the commenters. Matrix effects were not specifically taken into account when the PQLs in the proposal were developed, although the PQLs cited in the methods do take into account the non-homogenous nature of samples (methods used to derive the PQLs do take into account the possible effects of matrices). However, as not every scenario can be predicted, there is the possibility that the matrix may affect the PQL. For example, a sample that contains high levels of contamination may need to be diluted in order to analyze it by a certain method, which would which then affect the PQLs that could be attained. The Department will review these instances on a case-by-case basis.

129. COMMENT: The commenters support the use of the Practical Quantitation Limit (PQL) for a substance as the regulatory standard, if the PQL is greater than the calculated health-based value, but are concerned about possible future changes in the PQL resulting in changes to remediation standards.

Proposed Subchapter 6 allows the Department to update soil remediation standards, to post the updated standards on its web site and publish in the New Jersey Register a Notice of Administrative Change. The rules state that updates are limited to changes to the USEPA carcinogenic slope factor or reference dose data in the Integrated Risk Information System and promulgation of a revised Groundwater Quality Standard on which the soil standard is based. Changes to the PQL that would result in a change to the cleanup standard are not discussed.

It appears that revisions to constituent PQLs could result in changes to the operable soil remediation standards without the chance for public comment. As laboratory instrumentation and methods change over time, it is possible that PQLs could be reduced over time, affecting the standards for constituents whose soil remediation standards are linked to PQLs. Because the basis for the PQLs stated in the proposed N.J.A.C. 7:26D are not defined, future changes to the PQL could apparently occur at any time without explanation. Because the public does not have a chance to comment on the establishment of a PQL itself in accordance with the Administrative Procedure Act, and the impact on the regulated community of lowering PQLs and associated soil remediation standards is significant, any changes to the remediation standard created by the change of a PQL should only be made following the normal proposal, public comment, and promulgation process. (16, 20, 38, 41, 52, 56)

RESPONSE: The Department will address any change to a promulgated practical quantitation level (PQL) through formal rulemaking which includes a public comment period.

Polycyclic Aromatic Hydrocarbons (PAHs) Background

130. COMMENT: Background studies have documented elevated levels of polycyclic aromatic hydrocarbons (PAHs) in nonindustrial urban locations (e.g., Bradley, L.J.N.; Magee, B.H; and Allen, S.L. 1994. "Background Levels of Polycyclic Aromatic Hydrocarbons (PAHs) and Selected Metals in New England Urban Soils." Journal of Soil Contamination, Vol. 3, no. 4, pp. 349-361). In addition, investigations of regulated urban industrial/commercial sites in New Jersey have routinely documented elevated levels of PAHs in surface soils that were not associated with a site specific discharge. Although the Department may accept these site-specific PAH background findings, remediation is still required because the Department does not consider elevated background levels of PAHs natural, but rather, anthropogenic.

The sources of background levels of PAHs include natural and anthropogenic ones. According to Agency for Toxic Substances and Disease Registry (ATSDR), PAHs enter the air mostly as releases from volcanoes, forest fires, burning of coal and fuel oil, and vehicle exhaust (see ATSDR's "ToxFAQs for Polycyclic Aromatic Hydrocarbons," September 1996). Another source is residential use of fireplaces and wood burning stoves.

It is important to note that the following issues result from the Department's position that background levels of PAHs must be remediated and the Department should address these issues:

- That conducting a cleanup of background PAH impacted soil is not permanent because the anthropogenic sources will remain active for centuries and the natural ones forever.

- PAHs can even impact soil as a result of heavy equipment exhaust used during the remediation.
- Asphalt is typically used as an engineering control remediation for surface soils that are impacted by background levels of PAHs. Asphalt itself contains elevated levels of PAHs. Consequently, as the asphalt wears, small particles containing PAHs are transported by storm water to adjacent soil areas or surface water bodies, or are entrained and transported by wind to more distance locations. Therefore, the engineering control becomes a long-term source of PAHs at the site.
- Also, with the proposed direct contact residential soil standard for benzo(a)pyrene of 0.2 mg/kg, which is over three times lower than the current cleanup criterion of 0.66 mg/kg, the scale of PAH-driven remediations at regulated sites will be larger, and many more urban and suburban sites will have a PAH issue due to background.

In summary, it is reasonable to conclude that to require remediation of background PAH levels will not result in a permanent remediation, will be a direct cause of additional PAH emissions and does not appear to be consistent with the intent of the Industrial Site Remediation Act, which was enacted to address industrial or site-specific discharges of hazardous chemicals. Consequently, a reevaluation of the Department's current position regarding the remediation of background levels of PAHs is warranted. (55)

131. COMMENT: The commenter expressed concern that the Department is reducing its direct contact standards for a key parameter of concern, benzo(a)pyrene, from 0.66 mg/kg to 0.2 mg/kg. For many years, New Jersey's very low remediation criteria for benzo(a)pyrene has been criticized as unrealistic, and this proposed change will make it even more so. Benzo(a)pyrene is associated with fuel and coal combustion, so wide areas of urbanized New Jersey have surface soils of concentrations above the residential and non-residential soil cleanup criteria.

One aspect of the standard for this parameter does not make sense. A peer reviewed statewide health standard in Pennsylvania is 2.5 milligrams per kilogram, more than an order of magnitude higher than the proposed reduced New Jersey value. Based on comparison with cleanup standards in other states, it would appear that the non-residential soil cleanup criteria in New Jersey is not proposed based on the requirements of the Legislature as specified in the Brownfield law. In addition to surface soil concentrations in urban areas commonly being above the residential cleanup criteria, historic fill prevalent along rivers and in former marshlands and floodplains in many urbanized areas of the state typically also have PAHs typically from partially burned or unburned coal. The artificially low proposed non-residential cleanup criteria could make it difficult and much more costly to remediate brownfield sites. Hazardous materials will likely have to be landfilled at a time when the State has no landfills left. More contaminated soil will have to be shipped out of the State for disposal. The Department should revisit the benzo(a)pyrene soil cleanup criteria because it doesn't make much sense to remediate islands in urbanized areas of brownfield sites and to not remediate adjacent areas where thousands of residents live. There is no question that benzo(a)pyrene is a carcinogen, but setting soil standards below typical urbanized background does not make sense. (33)

RESPONSE to COMMENTS 130 and 131: The Department is aware of numerous natural and anthropogenic sources of polycyclic aromatic hydrocarbons (PAHs) including benzo(a)pyrene, understands the wide distribution of these contaminants in soil and fill throughout the State and understands that some capping materials can contribute to PAH concentrations in adjacent soil. However, PAHs are also detected in hazardous materials that are discharged at contaminated sites. Discharges at the site must be identified, delineated and remediated pursuant to the Department’s remediation regulations.

The Department is aware that asphalt is often used as an engineering control for surface soil contamination and that asphalt contains elevated levels of PAHs. While it is possible for small amounts of contamination to result from wear and weathering, the Department believes that there is an overall benefit from the use of asphalt caps, namely the reduction or elimination of human exposure to underlying contamination. The Department emphasizes that proper maintenance of asphalt caps is important to ensure its continued protectiveness and to minimize impacts from wear and weathering on the environment.

With regard to background concentrations of PAHs, the Department is considering allowing the person responsible for conducting the remediation to conduct sampling at the site to determine levels of PAHs are consistent with regional anthropogenic concentrations. When the person determines that PAHs at the site are due to regional background conditions and not to a local discharge, then the Department may consider allowing the person to handle PAHs in the same way that natural background is handled. Stricter requirements may be imposed for sites that are being developed for schools or residential use. As soon as the Department determines in what instances it is appropriate to consider regional PAH contamination, guidance will be posted on the Department's web site.

The commenter noted that the peer reviewed statewide health standard in Pennsylvania for PAHs is 2.5 milligrams per kilogram, more than an order of magnitude higher than the proposed reduced New Jersey value. The primary reason for this difference is that the Legislature in Pennsylvania established 10^{-5} as the health-based goal for remediation standards as compared to the New Jersey Legislature which set 10^{-6} as its health-based goal for carcinogens.

Large Areas of Historic Industrial Contamination

132. COMMENT: The Department should develop recommendations for remedial actions in "large areas of historic industrial contamination" before or in conjunction with developing a final rule regarding soil remediation standards. (52)

133. COMMENT: The proposed standards contain neither recommendations for remedial actions in "large areas of historic industrial contamination" nor any affirmation that the Department will not require the removal or treatment of historic fill material. Hence, the proposed regulation ignores the Legislature's mandates within the Brownfield and Contaminated Site Remediation Act (N.J.S.A. 58:10B-12).

In a revised rule that is first subject to public review and comment, the Department should issue recommendations for remedial actions in “large areas of historic industrial contamination” and affirm that it will not require the removal or treatment of fill material. In addition, historic fill should not be subject to synthetic precipitation leachate procedure (SPLP) testing. The Department should also establish procedures for a person to demonstrate that a particular parcel of land contains large quantities of fill material.

Anthropogenic sources other than historic fill also contribute to chemical presence in soil at many sites, particularly in well-developed, urbanized areas. Widespread, persistent, or active combustion sources and atmospheric deposition to soil are relevant examples. Such anthropogenic contamination should not be subject to the proposed soil remediation standards because the source is not related to site operations. Polyaromatic hydrocarbons (PAHs) are but one example of the difficulties that will be imposed if the Department proceeds with its proposed rule without establishing remediation standards that recognizes anthropogenic sources that are not related to historic fill or site operations. PAHs are ubiquitous and persistently present in the environment. PAHs are formed during the incomplete burning of organic material including wood, coal, oil, and gasoline and are also found in asphalt. Levels of PAHs are also present in the environment from natural sources, such as forest fires. As products of incomplete combustion and commerce, PAHs will be present at some baseline concentration at many, if not most, sites. Based upon our experience, baseline concentrations can be expected to exceed the Department’s proposed numeric remediation standards for many individual PAHs. Soil excavation or treatment to concentrations below the baseline levels will not and can not provide any practical, long-term risk reduction since any individual residing in an urbanized setting will continue to be exposed to the prevalent contamination concentrations in the course of their daily lives. The continuing sources of PAHs would re-establish the baseline PAH contamination levels over time, as the site is re-contaminated via the continuing anthropogenic activity.

In a revised rule that is first subject to public review and comment, the Department should affirm that it will not require the removal or treatment of soil with such contamination. Finally, the Department should assess and establish anthropogenic background concentrations for a range of substances in developed or urbanized areas, including lead, mercury, nickel, PAHs, and dioxins. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE to COMMENTS 132 and 133: The Department has put considerable effort developing its policies and strategies regarding the remediation of large areas of historic industrial contamination. The Site Remediation Program's Office of Brownfield Remediation was formed to focus on large areas of historic industrial contamination and to facilitate the remediation of what are referred to nationally as “brownfields.” The Office of Brownfield Remediation works closely with Brownfield communities and providing loans and grants to qualifying applicants.

The Department has codified minimum technical requirements for the investigation and remediation of contaminated historic fill material. See Technical Rules at, N.J.A.C. 7:26E-3.12 and N.J.A.C. 7:26E-4.6. Remedial actions associated with historic fill material largely entail capping and deed notice as a presumptive remedy. Ground water contamination is often associated with historic contaminated fill and the Department generally will establish a classification exception area up to the property boundaries, which is based on ground water sampling. The Department generally will not require SPLP analysis because impacts to ground water are usually only evaluated when an area of concern is identified that is independent of the fill material. Because the impact to ground water pathway soil remediation standards are not being adopted, impacts to ground water from contaminated soil will be evaluated on a site-by-site basis using guidance developed by the Department.

The Department is aware of anthropogenic sources of polyaromatic hydrocarbons (PAHs) and other contaminants particularly in heavily developed areas of the State. See the Department’s response to comments on background PAH issues at comments 130 through 131.

<u>Arsenic Background</u>

134. COMMENT: The commenter agrees with the common sense approach of requiring soil remediation to natural background concentrations and commends the Department for establishing a State-wide natural background level for arsenic. The commenter believes that

further flexibility could be attained if alternative soil remediation standards were developed for areas of the State with higher natural arsenic concentrations. However, the benefit of this background standard will be compromised if the groundwater impact method generates a lower clean-up standard. (1)

RESPONSE: The Department appreciates the commenter's support for the Statewide arsenic standard. Even though the impact to ground water soil remediation standards are not being adopted, the impacts to ground water will still be required to be evaluated on a site-by-site basis using guidance developed by the Department. Impacts to ground water will be handled in the same way that direct contact standards are handled for naturally occurring chemicals. Impact to ground water standards will default to natural background concentrations for the site.

As to alternative soil remediation standards specific to areas of the State with higher natural arsenic concentrations, as discussed in detail in the response to comments 135 and 136, below, the Department conducted a Statewide survey of background soil concentrations, and determined that arsenic is usually present in New Jersey soil at concentrations that are higher than the health-based criterion of 0.5 mg/kg (ingestion/dermal exposure pathway). The Department evaluated two (2) options to address this issue: 1) conduct a site specific soil background determination for arsenic at every contaminated site in New Jersey, or 2) promulgate a soil remediation standard for arsenic based on natural background. Since the Department lacks the resources to evaluate site specific soil arsenic background studies at the more than 20,000 known contaminated sites in New Jersey, it therefore selected the second option, namely to promulgate a Statewide soil remediation standard for arsenic based on natural background.

135. COMMENT: The Brownfield Act, N.J.S.A. 58:10B-12(g)(4), states that remediation is not be required beyond the regional natural background levels for any particular contaminant and that the Department must develop regulations that set forth a process to identify background levels of contaminants for a particular region. The Legislature defined

regional natural background levels as the concentration of a contaminant consistently present in the environment of the region of the site and which has not been influenced by localized human activities.

The remediation standards should reflect regional differences in background levels. The statute does not provide for a Statewide generic background standard. Although the statute does not define “region” or delineate regions, it is clear that a Statewide standard such as the 19 mg/kg arsenic standard is counter to the purpose and intent of the statute. The Department’s own study found natural background levels of arsenic ranging from 8mg/kg in the Ridge and Valley geographic province to 29 mg/kg in the Piedmont geographic province. Applying the 19 mg/kg arsenic standard to the Piedmont area would mean a cleanup requirement that is less than the background level that is proscribed by the statute. Furthermore, other areas have a cleanup standard that would leave arsenic concentrations higher than the regional natural background level. According to the Department, the health-based criterion for arsenic is 0.5 mg/kg. Remediation requirements above the natural background level where levels are significantly above the health-based criterion defy the statutory mandate that remediation standards protect public health and safety. (10, 25, 31, 44, 47, 58, 62, 65, 67, 68)

136. COMMENT: The Department should require site-specific standards for arsenic and other chemicals, and should not be based on regional natural background. Cleaning up arsenic to regionally-applied natural background will mean that high levels of arsenic will remain in some areas that could impact public health to a magnitude of three or four times the health-based standard. For example, while the health-based criterion is 0.5 mg/kg, areas in the Piedmont would only be held to a 29 mg/kg standard based on regional natural background.

Further, without site-specific standards, it is difficult to determine whether a specific site was cleaner than the average background for the region before arsenic was brought onto the site and whether, by only holding remediation to the regional average, we are in fact raising that average. (65)

RESPONSE to COMMENTS 135 and 136: In developing the proposed soil remediation standards, the Department balanced several Legislative mandates. In addition to requiring that soil remediation standards be health-based, the Brownfield Act at N.J.S.A. 58:10B-12(g)(4) precludes the Department from requiring the remediation of a discharge to levels that are lower than regional natural background levels for any particular contaminant. The Department reviewed regional natural background levels of inorganic chemicals in soil in relation to the health-based standards being proposed to ensure that the proposed soil remediation standards are not lower than frequently detected background levels in New Jersey. After an evaluation of a Statewide survey of background soil concentrations, the Department determined that arsenic is usually present in New Jersey soil at concentrations that are higher than the health-based criterion of 0.5 mg/kg (ingestion/dermal exposure pathway).

The Department evaluated two (2) options to address this issue: 1) conduct a site specific soil background determination for arsenic at every contaminated site in New Jersey, or 2) promulgate a soil remediation standard for arsenic based on natural background.

The Department eliminated option 1 as it does not have the resources to evaluate site specific soil arsenic background studies at the more than 20,000 known contaminated sites in New Jersey.

The Department, therefore, selected option 2. The Department evaluated background levels of arsenic in soil using a three year study conducted by the Department which determined background values of selected metals in soil throughout the State. (Sanders, P., 2002. Characterization of Ambient Levels of Selected Metals and Other Analytes in New Jersey Soils.) This report is available on the Department's web site at: www.state.nj.us/dep/dsr/publications/pub.htm. A total of 248 soil samples were collected in areas of the State that were not directly affected by local discharges of contaminants. The geographic provinces included in the study were the Piedmont, Ridge and Valley, Highlands, and the Coastal Plain. Samples were collected in urban and rural areas within the sampled regions. The Department ranked the background sample data by concentration and by distribution of the samples throughout the State, including geographical provinces and population density (urban or rural). The Department used the arsenic measured in these samples to represent the background arsenic concentrations in soil from the different geographic provinces throughout the State, although some additional concentration of arsenic may be present from diffuse anthropogenic sources.

The Department initially considered the development of background standards for arsenic for the different geographical regions of the State; however, it was determined that this was not feasible. An examination of the background arsenic data from the Sanders study indicates that there are significant statistical constraints which would not support the development of regional background soil standards for arsenic. The Department has a higher level of confidence in the Statewide standard that results when all the data are pooled. The Department determined that it was appropriate to use the 95th percentile of the entire background arsenic data set. The 95th percentile is 19 milligrams of arsenic per kilogram of dry weight soil (mg/kg).

The Department selected 19 mg/kg as the background arsenic value that is representative of New Jersey soil that is not affected by local discharges. While there is a possibility that this approach may result in some “false negatives” (that is, discharged arsenic will be assumed instead to be natural background), the Department believes that this will be an infrequent occurrence. Based on its review of numerous cases, it is the Department’s experience that arsenic concentrations up to 19 mg/kg are likely to be due to background and are rarely if ever, caused by a discharge of arsenic.

In addition, if the Department believes levels of arsenic at a site less than 19 mg/kg are a result of a discharge (based on site-specific information), the Department may require a site-specific background determination for arsenic be conducted. Similarly, in those instances where the person responsible for conducting the remediation believes that naturally occurring levels of arsenic are greater than 19 mg/kg at a site (“false positives”), a site-specific background determination can be conducted as part of the remediation. The procedures to determine background on a site-specific basis are contained in the Technical Rules at N.J.A.C.7:26E-3.10.

137. COMMENT: While using the natural background as a limitation for cleanup of a specific contaminant may be a valid approach, as proposed by the Department, the minimum arsenic standard will increase the exposure of the citizens of New Jersey to a known carcinogen. The commenters do not believe the legislature intended to increase health risks when it incorporated the "background" concept into the Brownfields Act.

The Department is trying to set a "one size fits all" standard for arsenic and it simply won't work. This approach is also contrary to the Brownfield Act's requirements. As currently proposed, the arsenic standard allows for increased arsenic levels in 80% of New Jersey. Based on the Department's background studies, arsenic occupies the unique position of being the contaminant where background levels may exceed safe health based levels. Unique problems require innovative solutions. The Department needs to take a completely new look at the arsenic question and must consult with the Legislature on New Jersey's arsenic problem. An arsenic management program for the entire State that is protective of the citizens of New Jersey is required and the Department and the Legislature must develop this management program. The current proposal is not protective of human health and is completely unacceptable. (10, 25, 31, 44, 62, 67)

RESPONSE: As explained in prior responses to comments, the Department selected 19 mg/kg as the background arsenic value that is representative of New Jersey soil that is not affected by local discharges. While there is a possibility that this approach may result in some "false negatives," the Department believes that this will be an infrequent occurrence. Based on its review of numerous cases, it is the Department's experience that arsenic concentrations up to 19 mg/kg are likely to be due to background and are rarely, if ever, caused by a discharge of hazardous substances. However, it is not the Department's intent to allow discharges of arsenic to remain unremediated at sites simply because the levels are less than 19 mg/kg. If the Department believes levels of arsenic in soil at a site that are less than 19 mg/kg are a result of a discharge (based on site specific information), the Department may require a site specific background determination for arsenic be conducted. This will ensure that the resultant site specific remediation standard is protective of human health to the extent mandated by the Brownfield Act by balancing health based criteria and natural background conditions.

138. COMMENT: The Department should set the standard for arsenic, a carcinogen, at 5 ppb, which is the median of soils sampled by the State. Setting the standard at 19 exposes to higher contamination those areas of the State whose regional background level of arsenic is well below 19. The Department makes no exception in the surface water quality and drinking water standards for background levels of arsenic and if the Department is to make an exception here it should, at the very least, be more protective than proposed. (25)

RESPONSE: Soil remediation standards are expressed in mg/kg (parts per million -ppm) and not parts per billion (ppb). The Department is assuming the commenter meant 5 ppm and not 5 ppb. The Department acknowledges that 5 mg/kg (ppm) is the median soil arsenic value from the Sanders 2002 study (Sanders, P., 2002. Characterization of Ambient Levels of Selected Metals and Other Analytes in New Jersey Soils, available on the Department's web site at: www.state.nj.us/dep/dsr/publications/pub.htm). The Department is aware that background concentrations of arsenic at some sites will be lower than the adopted soil remediation standard of 19 mg/kg. However, it is not the Department's intent to allow discharges of arsenic to remain unremediated at sites simply because the levels are less than 19 mg/kg. If the Department believes levels of arsenic in soil at a site that are less than 19 mg/kg are a result of a discharge (based on site specific information), the Department may require a site specific background determination for arsenic be conducted. This will ensure that the resultant site specific remediation standard is protective of human health to the extent mandated by the Brownfield Act by balancing health based criteria and natural background conditions.

While the Department's drinking water quality standards do not consider background water quality, the Department's ground water quality standards do. Where natural quality for any constituent is higher than the ground water quality criteria established in N.J.A.C. 7:9C-1.7 so that the water is not viable for the primary designated use, the Department may establish a Classification Exception Area for the area that exceeds the criteria. For surface water, the

Department bases it surface water classifications on natural quality; however, the Department may consider background contaminant concentrations when developing discharge effluent limits under the New Jersey Pollutant Discharge Elimination System (NJPDES) program.

139. COMMENT: The Department is well aware that the level of contaminants on a given site can vary tremendously, even on a very small parcel. The Department should back off from the proposed bright-line approach for background based arsenic numbers and adopt more of a performance-based and/or narrative standard that recognizes the inherent heterogeneity and variability of soils. The United States Environmental Protection Agency and the State of Pennsylvania recognize the value of statistical analyses and its application to cleanup scenarios. If adopted, much of the State's naturally occurring soils would be in violation of the arsenic standard. The Department should establish regional background levels for arsenic (and other metals) as the proposed standard is going to be exceeded by natural occurrence in wide areas of the State. (19, 22, 27, 41)

RESPONSE: The procedures to determine background on a site-specific basis are contained in the Technical Rules at N.J.A.C.7:26E-3.10. These procedures recognize that background levels at a site can be variable. The resultant background value obtained using the procedure contained in the Technical Rules is an upper bound value of the collected data set.

With regard to establishing regional background levels for arsenic, please see the response to comments 135 and 136 above.

140. COMMENT: The proposal circumvents the Brownfield Act with respect to regional background levels by proposing to establish a State-wide standard for arsenic, while acknowledging that there is a wide variation in background concentrations of arsenic that exist across the State. Background investigations of arsenic have indicated that levels are much higher than those specified in this rule proposal.

It is unclear why the Department did not take a regional approach and consider soils and geology as required by the statute. The Department has information developed from numerous sites in New Jersey to identify regional characteristics of those areas in which arsenic is found naturally occurring in concentrations well in excess of the proposed standards. For example, areas of known concentrations of glauconitic soils are well documented. While the rule allows for a site-specific determination where the responsible party believes the naturally occurring level exceeds the proposed standard, this impermissibly shifts responsibility to prospective redevelopers adding yet another impediment to both remediation and redevelopment. Reliance on such a technique, as distinct from promulgating science-based regional standards, is an abrogation of the Legislature's specific instructions to the Department. The Department should reevaluate its approach for setting the standards based on background and abide by Brownfield Act. (19, 22, 27, 45, 55)

RESPONSE: The single standard for arsenic for the State represents an appropriate balance of protectiveness and limiting the need to conduct background determinations at every potentially contaminated site. Site specific background determinations can be conducted when arsenic concentrations at the site exceed the Statewide standard and are thought to be naturally occurring, or if site information collected as part of the preliminary assessment indicates use of arsenic at the site even though soil arsenic levels are below the adopted standard. See also the response to comments 135 and 136 above.

The Department is aware that areas of the State have high background concentrations of arsenic, including the referenced glauconitic soils. However, there is a large range of arsenic concentration in these soils. Therefore, where the person responsible for conducting the remediation believes that background arsenic levels exceed the remediation standard, that person is free to conduct site-specific background studies for sites with naturally elevated arsenic concentrations.

141. COMMENT: The commenter believes that the Department has an extensive background arsenic data base in which it has accumulated data obtained through site specific investigations

and data from its background arsenic studies. Some of the data have been summarized by Department staff. The Department should place all arsenic background data in one document, which would be continuously updated and posted on the Department's web site. (55)

RESPONSE: The Department does not currently maintain a database for background soil arsenic concentrations and thus is unable at this time to post such data on the Department's web site.

Dredged Material

142. COMMENT: The risk factor of one in one million excess lifetime cancer risk and the exposure criteria that are used to develop soil remediation standards are too restrictive for the evaluation of dredge disposal sites. This proposed target risk level is adequately conservative for intended child settings and also allows a factor of consideration for residential sites. However, it is unlikely that dredge disposal sites will ever be used for such purposes. These sites will require protective measures including capping and institutional controls without regard to future use of these sites. The commenters believe that, consequently, applying risk factors to dredged material is overly conservative. It is more appropriate to use the non-residential exposure scenario to evaluate the risks associated with these sites. (6, 13, 17, 50, 53)

RESPONSE: It may be appropriate to apply non-residential remediation standards to dredge disposal sites based on an evaluation of current and intended future use. These are determinations that must be made on a site-specific basis. When contamination is left behind at any site at levels greater than the residential remediation standards, the person responsible for conducting the remediation must use engineering and institutional controls as appropriate to ensure the protection of human health and the environment.

143. COMMENT: The proposed rules are cause for serious concern for the non-Federal berth owners on both the Delaware and Schuylkill Rivers. It is anticipated that the proposed soil remediation standards for benzo(a)pyrene (BaP) will effectively cause the issuance of Water Quality Certificates for disposal of dredge material at White's Basin to cease. In fact, the

majority of dredge material that has historically been disposed in New Jersey will not meet the new non-residential soil remediation standards for BaP. Currently, dredge material is analyzed for a wide range of compounds including volatile and semivolatile organic compounds, pesticides, polychlorinated biphenyls, and metals. A comparison of historical maintenance dredge material characterization results with the proposed soil remediation standards indicates that BaP would consistently exceed the proposed non-residential soil remediation standards of 0.2 milligrams per kilogram (mg/kg). In the data that was reviewed, concentrations of BaP in sediment ranged from 0.01 mg/kg to 2.3 mg/kg, with a mean of 0.33 mg/kg. In addition, several other polycyclic aromatic hydrocarbons are typically present in dredged material in levels near the proposed soil remediation standards.

Will dredge material that exceeds the non-residential soil remediation standards still be permitted for disposal at existing disposal facilities? (6, 13, 17, 28, 50, 53)

RESPONSE: The issues raised by the commenters primarily pertain to a specific dredge disposal facility. Permit specific comments should to be raised during the renewal of the Water Quality Certificate/Waterfront Development Permit for the referenced facility. The Department uses the Rules for Coastal Zone Management, N.J.A.C. 7:7E and the New Jersey Technical Manual on Managing Dredge Material to evaluate potential environmental impacts for specific dredge management sites. The Department has discretion when making an acceptable use determination for managing dredge material including the development of alternative standards for individual contaminants. In addition, the Department is aware that polycyclic aromatic hydrocarbons including benzo(a)pyrene can be linked to regional background conditions. See the response to comments 130 and 131 on regional background concentrations of benzo(a)pyrene.

144. COMMENT: If as a result of the proposed soil remediation standards, dredged material cannot be disposed at a specific facility, public and private berthing areas will experience severe economic hardship, will be forced to increase the use of risky lightering to transport their product, and could potentially close the rivers to vessel traffic creating significant adverse economic problems. Reducing or eliminating dredging is not an alternative. Lack of adequate

depths at docks forces facilities to reduce shipment loads or, in the case of the refineries lighter the crude oil in the open waters of the Delaware Bay before berthing. (6, 13, 17, 28, 50, 53)

RESPONSE: The Department does not expect that the soil remediation standards will reduce or eliminate dredging, cause severe economic hardship, force increased use of lightering to transport product, or potentially cause the closure of rivers to vessel traffic. For example, as part of the Project Cooperation Agreement (PCA) for the Delaware River Deepening Project, the Philadelphia Regional Port Authority and the Philadelphia District Corps of Engineers are developing a dredged material management plan for this project. One alternate site being evaluated for the Delaware Deepening Project is a mine reclamation project in Hazleton, PA. In addition, the Department is aware of numerous brownfield/development projects along the shores of the Delaware River that could potentially utilize unprocessed or processed dredged material as fill or remediation material on these properties. As these properties are permitted to accept dredged material from the Delaware River Deepening Project, these sites could also serve as an alternate disposal site for public and private berth dredging projects.

145. COMMENT: The disposal of dredged material in a controlled, managed, treatment environment should not be subject to the strict interpretation of the proposed soil remediation standards (SRS) as has been done historically with the soil cleanup criteria (SCC). If the Department intends to apply the proposed SRS to dredge material placement or other non-remediation activities, then the circumstances and criteria for their application should be clearly outlined and documented during the rulemaking process. For years, the Department has applied the SCC to dredged material. The Department did not, as part of this rule proposal, specifically authorize the application of these criteria to dredge material evaluation. The commenters believe that the risk-based assumptions made for the soil remediation standards may not apply to dredged material. The Department should develop criteria specific to dredged material and adopt them into rules. (6, 13, 17, 28, 50, 53)

RESPONSE: As stated above, the Department issues Water Quality Certificate/Waterfront Development Permits based on a review of site specific conditions. The Department uses the

Rules for Coastal Zone Management, N.J.A.C. 7:7E and the New Jersey Technical Manual on Managing Dredge Material to evaluate potential environmental impacts for specific dredge management sites. The Technical Manual will be amended to reference the Remediation Standards, N.J.A.C. 7:26D, including the provisions for the development of alternative soil remediation standards.

However, because remediation standards are based on the protection of human health for residential and non-residential site use, it is appropriate to for the Department to use these standards to evaluate the dredge management sites that are proposed for redevelopment.

Impact of Standards on Programs other than the Remediation Program

146. COMMENT: The Department's current Soil Cleanup Criteria, which have been used by the Site Remediation Program, are also used by a number of regulatory programs within the Department for a variety of purposes. Following the adoption of soil remediation standards, other Department programs may be tempted to continue this practice with the soil remediation standards. However, based upon past inconsistency of use of the soil cleanup criteria for activities other than remediation of contaminated sites, it is clear that the Department must clarify its intentions and allow the public to have an opportunity to provide input to any such proposal.

Many Department programs utilize the current soil cleanup criteria in some very important decision-making capacities. While the reasons for this use may vary from program to program, a common reason they often share is the lack of a more appropriate regulatory tool for the program or the specific media on which they can base their regulatory and permitting decisions. Examples of programs that utilize the existing soil cleanup criteria include: 1) the Land Use Regulation Program for a variety of uses such as determining impacted/contaminated wetlands and sediments; 2) the Solid and Hazardous Waste Program for determining the acceptability of certain materials for specific recycling and/or beneficial use purposes such as landfill cover, common fill and identification of materials regulated as waste; and, 3) the Office of Dredging and Sediment Technology for determining the acceptability of dredged material at approved, permitted dredged material management facilities. This is not a comprehensive list of programs that utilize the current soil cleanup criteria. In certain of these scenarios the use of the current soil cleanup criteria is logical and appropriate when the application is consistent with the site remediation scenarios. In other scenarios, the application is clearly inconsistent with the established and accepted basis for the soil cleanup criteria.

The Department has provided a rationale for the proposed soil remediation standards in the context of site remediation scenarios and regulations for this purpose. The proposal also presents a clear link to the various statutes that provide the basis for the development and use of the standards. However, there are circumstances where the use of the proposed standards would not be appropriate, are not technically justified and simply are not consistent with the legal basis and risk scenarios upon which they have been developed. The proposed rules do not identify or reference other Department regulatory programs/authorities that would utilize the soil remediation standards in their regulatory, compliance and permitting decisions. The Department should clarify that it does not intend to use the soil remediation standards in any other program for any purpose other than site remediation.

The use of the soil cleanup criteria and the soil remediation standards for any purpose other than the identification and remediation of contaminated sites must be closely studied and carefully proposed, with an opportunity for public input. Programs that ultimately may use the soil remediation standards for decision making should be required to provide a full and comprehensive rationale on the applicability of the soil remediation standards to their particular program and their permitting and/or compliance decisions. (4, 5, 6, 11, 15, 16, 18, 19, 20, 22, 27, 28, 29, 30, 32, 34, 38, 40, 41, 45, 51, 52, 54, 56, 59)

RESPONSE: The Department developed the soil remediation standards based on the protection of human health in the circumstances where people may be exposed to contaminated soil caused by a discharge. The Department may also need to evaluate human health risk in the context of other specific regulatory programs. If it is appropriate to apply the same risk assessment assumptions and level of human health protection to another regulatory program, it may be entirely appropriate for that program to use the soil remediation standards. For example, when dredged material that contains elevated concentrations of contaminants is to be placed on the upland portion of a property, it is appropriate to compare the analytical results to the soil cleanup standards, as human exposure to the material may be a concern. The soil cleanup criteria have been used for the last decade for this purpose as specified in the Department's dredging technical manual. This manual was incorporated into regulations on February 3, 2003 through adoption of revisions to Rules on Coastal Zone Management (N.J.A.C. 7:7E et seq.).

Similarly, the Department’s Solid and Hazardous Waste Program's beneficial use program uses remediation standards to aid in the evaluation of the quality of materials proposed for use or reuse at a site as compared to the quality of materials that would typically be used. This use of remediation standards, set forth in the Solid Waste rules at N.J.A.C. 7:26-1.7(g)5, helps to ensure that the use of the material does not constitute an inappropriate application of hazardous substances.

The Department’s Freshwater Wetlands Protection Act Rules, N.J.A.C. 7:7A, cross-reference the Site Remediation Program’s rules in the context of general wetlands permits and wetlands mitigation projects. These cross-references are appropriate and necessary to ensure that contamination that may be present at a site that is subject to the wetlands rules is properly characterized and mitigated. The wetlands rules, however, do not specify the standards to which a site must be remediated.

<u>Inhalation Exposure Pathway - General</u>

147. COMMENT: In the Inhalation Basis and Background Document, the Department acknowledges that the inhalation pathway was previously only addressed to a limited extent, and because the approach is being implemented at all sites and is "more complex" in nature than the other pathways evaluated, the agency is "reserving the eventual right to approve all proposals for

evaluating the inhalation pathway." This "reserved right" does not afford remediating parties the certainty needed for achieving remedial goals and finality in cleanup.

The Department then recommends that it be consulted by remediating parties early in the remedial process to avoid misinterpretation and other errors that could result in wasted resources and effort. As noted above, as this pathway is both relatively new and more complex than the impact to groundwater and the combined dermal ingestion pathways, there is a great potential for the Department case managers to misinterpret, err in the application, or apply the calculations inconsistently. (16, 20, 38, 41, 52, 56)

RESPONSE: In the Introduction to the Inhalation Basis and Background Document, the Department provided a discussion of its new approach to the inhalation exposure pathway. While the Department has used generally accepted methods, models, and assumptions to develop the inhalation soil remediation standards that were primarily taken from USEPA Soil Screening Guidance, many of the concepts may be new to persons conducting remediation in New Jersey. The Department wants to make itself available to remediating parties who need general direction or technical guidance to evaluate the inhalation exposure pathway. In the Department’s experience, up front dialogue between the case team and the remediating party can facilitate a more focused and timely remediation.

To aid the regulated community, the Department has posted technical guidance to assist with the proper application and interpretation of the inhalation remediation standards on its web site at http://www.nj.gov/dep/srp/guidance/rs. This guidance includes electronic spreadsheets which will allow the user to easily input site specific variables to develop alternative soil remediation standards. In addition, the Department intends to conduct training for staff and the public on the rules and the technical guidance.

#2 Fuel Oil

148. COMMENT: The potential exists for excessive increased remedial costs and excessive delays beyond those currently being incurred at residential sites where #2 heating oil is being remediated in the excavation and management of soil for which no commensurate health based benefit is derived. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Department acknowledges that, in some cases, additional soil remediation efforts may be required at certain residential sites with soil contaminated with #2 heating oil. Both the soil cleanup criteria and the Remediation Standards contain human health based soil remediation standards for various contaminants, some of which, like naphthalene, for example, are contained in #2 heating oil. Therefore, under both the Soil Cleanup Criteria and the Remediation Standards that replace the Criteria, if these compounds are discharged to the environment and are detected at levels in excess of the inhalation soil remediation standards, the site must be remediated to a level that ensures protection of human health. The Department believes that, based on the current scientific knowledge, it is appropriate to make the inhalation soil remediation standards for some of the components of #2 heating oil more stringent to ensure protection of public health and safety.

The Department intends to develop guidance specifically for the remediation of #2 heating oil discharges from unregulated underground storage tanks including a health based guidance number for total petroleum hydrocarbons (TPH). The guidance will focus on commonly encountered conditions and simple methods to determine compliance. The Department anticipates that remediation to the TPH guidance number will most likely address other individual components of #2 fuel oil.

Inhalation Exposure Pathway - Naphthalene

149. COMMENT: The Department's proposed inhalation remediation standards for naphthalene, which are based on California's OHHEA, are unreasonably low. The Department should not apply the Class C carcinogen safety factor to naphthalene, because California's OHHEA basis and background document for the airborne contaminant numeric standard clearly

states "Although a number of reports exist which describe non-cancer health effects in humans (OEHHA, 2000), no studies of carcinogenic effects in humans were identified" (emphasis added).

RESPONSE: The soil remediation standards for naphthalene are based on carcinogenic toxicity data. The Department selected a unit risk factor from California OEHHA, which was finalized in 2004, to which no safety factor was applied. The inhalation soil remediation standard is based on a cancer endpoint, using a unit risk factor for carcinogenicity finalized by California in 2004. It was not adjusted in any way. The proposed soil standard is not based on non-cancer effects (the IRIS reference concentration divided by 10), because this would result in a standard less stringent than the cancer risk-based number.

150. COMMENT: The numeric inhalation standard for naphthalene could become an additional driver in residential heating oil remediations. (15)

RESPONSE: The Department recognizes that naphthalene will likely be a driver in residential heating oil remediations. The inhalation soil remediation standard for naphthalene was calculated based on the same exposure scenarios and assumptions as all the other compounds. Inhalation is considered a direct contact pathway, and therefore the lower of either the ingestion/dermal pathway standard or the inhalation pathway standard will represent the direct contact standard for the residential exposure scenario. Regulation of naphthalene in this manner is appropriate and whether or not naphthalene is of concern at a particular site will be determined by the concentration present.

Inhalation Exposure Pathway - Alternative Remediation Standards Options

151. COMMENT: Regarding the development of Alternative Remediation Standards (ARSs) for inhalation of particulate contaminants at non-residential sites, the Department states that site-specific truck traffic can be used. On page 54 of the Inhalation Exposure Pathway Soil Remediation Standards, Basis and Background, it further states, "The Department will require

the use of an institutional control pursuant to N.J.A.C. 7:26E-8 for an alternative soil remediation standard based on actual vehicle activity to ensure that the basis for the alternative soil remediation standard is maintained." It is illogical for the Department to specify that an institutional control will be used to ensure that the site-specific truck traffic does not exceed the allowed limit for the ARS, but it does not specify an institutional control or way of monitoring truck traffic for sites that are subjected to default soil remediation standards. The Department has considered an average truck traffic of 33 trucks per non-residential site for its proposed soil remediation standards. However, there are bound to be sites that have much lower or no truck traffic, and sites that have much higher traffic, such as mining sites or construction companies. This means that, even though these sites with much higher truck traffic would have higher vehicular emissions, they would still be subject to compliance with the default soil remediation standards. Hence, the truck traffic scenario should not be considered by the Department for development of soil remediation standards. Instead site-specific traffic modeling should be included in the development of ARSs at sites that have truck traffic.

The Department mentions truck traffic as the only variable that can be modified when developing ARSs for the non-residential scenario, and provides a list of nine variables that cannot be modified (pages 53-56, Inhalation Exposure Pathway Soil Remediation Standards, Basis and Background). However, there are some variables that are not included in either list, e.g., it does not specify either way whether site size or soil particle size can vary.

On page 91 of the Inhalation Exposure Pathway Soil Remediation Standards, Basis and Background, the Department provides a sensitivity analysis of the particulate inhalation soil remediation standards to non-residential site size. As site size increases, the emissions decrease and soil remediation standards increase. When site size was doubled from two acres to four acres, the soil remediation standards was almost doubled too. Both site size and soil particle size can have a significant effect on the magnitude of non-residential inhalation exposures and should be included among the variables for which site-specific data can be considered for developing alternative remediation standards. (12)

RESPONSE: The Department believes that it is important to include vehicle traffic as a component when determining applicable inhalation soil remediation standards for non-residential land use because it represents a major source of particulate contamination. The Department has used a daily traffic count of 33 vehicles per day in order to calculate an inhalation pathway soil remediation standard as a reasonable average. Generally, if a site is remediated to the inhalation soil remediation standard, the Department believes that the remediation will be protective of human health and it would not be necessary to use an institutional control or require the monitoring of truck traffic.

If the person responsible for conducting the remediation believes that site-specific traffic count differs significantly from 33 vehicles per day, an alternative soil remediation standard (ARS) could be developed to reflect these site specific conditions. Daily traffic count is one of the factors for which the Department is specifically developing a means by which an ARS can easily be calculated. However, an institutional control such as a deed notice would be required because it defines the conditions under which the alternative soil remediation standard is appropriate and it ensures that traffic will be held to the level upon which the ARS is based. To develop an ARS based on a traffic count that differs from the Department's default value, the person responsible for conducting the remediation would need to provide documentation such as vehicle logs or a record of manifests.

In addition, after the remediation has been completed, documentation of compliance with the ARS conditions will be required and likely would be part of the operation and maintenance plan established for the site.

To develop the inhalation soil remediation standards, it was necessary in the calculation, to specify site size for residential (a quarter of an acre) and non-residential (2 acres) land use. In order to determine compliance with the inhalation soil remediation standards listed in Appendix 1 Tables 1A and 1B, it is necessary to evaluate the remediation standard against a average concentration for a contaminant across a quarter of an acre for residential land use or 2 acres for non-residential land use. The Department acknowledges that it did not amend those portions of the Technical Rules that are relevant to the commenter's concerns as a part of this rulemaking. The Department intends to include the methodology for determining compliance with the inhalation soil remediation standards in the next revision of the Technical Requirements for Site Remediation, N.J.A.C. 7:26E. In the interim, the Department has provided guidance on this topic. This includes various spreadsheets and training tools to help increase efficiency and reduce the time required for implementation of the remediation standards. The guidance documents are available on the Department web site at http://www.nj.gov/dep/srp/guidance/rs.

If factors other then those identified by the Department are to be considered in developing an ARS, the person responsible for conducting the remediation should submit a proposal to do so for Department review and potential approval.

152. COMMENT: The methods for estimating particles generated from both windborne dust and from truck traffic rely heavily on modeling. As with any model, the default parameters are selected based on a typical situation or an average scenario, and some site-specific information might suggest that a site would not be protected by the generic number. (46, 58)

RESPONSE: The default parameters for a 2-acre site size were selected because the Department believes that they are sufficiently conservative to be protective. In theory, the smaller the site is, the fewer the number of vehicles that can occupy or traverse it, and the less fetch (the area or distance where wind encounters little or no resistance over a surface) available for wind erosion emissions. Pursuant to the Remediation Standards, based on site-specific information, an alternative soil remediation standard can be applied for any contaminant detected at a site. The alternative soil remediation standard can be either more or less conservative than the promulgated standard and still be protective of the specific conditions present.

153. COMMENT: The Department should not include dust generated by vehicular (truck) traffic and the associated exposure assumptions in the non-residential inhalation standard by "default." Instead, it is recommended that truck traffic considerations be included as an option under the development of Alternative Soil Remediation Standards, when appropriate for site-

specific conditions. While particulates from truck traffic may be high during construction or at specific industrial sites, it is not reasonable to assume that the general public would be exposed to such concentrations 225 days per year for 25 years. As such, the commenter recommends that the Department consider changing this approach so that the default non-residential soil remediation standards are based on plausible exposure assumptions for most non-residential scenarios (rather than the non-paved, truck-traffic scenario). (21)

RESPONSE: The Department believes that the inclusion of particulates generated by vehicle traffic is essential to providing protection for people at non-residential sites even if construction is not an issue. The Department intent is to provide protection for exposure at the non-residential location. Particulates generated by vehicle traffic are potentially a significant source of contamination at these types of locations. The person responsible for conducting the remediation can apply for an alternative soil remediation standard at a non-residential site by altering the number of vehicle trips per day.

The Department has chosen to use USEPA's exposure frequency (225 days) and exposure duration (25 years) as its default parameters in the calculation of the non-residential inhalation soil remediation standards. These default values are used by the USEPA in their soil screening levels, and represent reasonably conservative values (but not a worst case), which are designed to be consistent with the USEPA's concept of Reasonable Maximum Exposure (RME) and are protective of the majority of the population. Accordingly, the Department believes that the use of the selected non-site specific parameters is reasonably protective of the worker who has the greatest exposure potential on a given site. A modification of one or more of these default parameters will not be accepted by the Department unless any such default value is modified by the USEPA.

154. COMMENT: The Department should allow alternative remediation standards (ARSs) based on intermediate sized sites with regard to the number of trucks per day, size of the trucks, distance traveled, and presence of paving of the driveway. (16, 20, 38, 41, 52, 56)

RESPONSE: An alternative soil remediation standard (ARS) based on vehicle traffic other than the assumed value may be proffered by the person responsible for conducting the remediation, based on a site-specific survey of vehicle traffic (i.e., average number of vehicles per day, vehicle weight). Similarly, as provided at N.J.A.C. 7:26D-7.2(b), the person responsible for conducting the remediation may propose to alter other variables, for proposal of different models, assumptions, and information on a case-by-case basis. If the Department approves of their use, these may then be used to develop an acceptable ARS. An ARS may be proffered for any sized site. To the extent that the person responsible for conducting the remediation believes that site size is important to their ARS calculation, it should be indicated in the ARS application.

The use of engineering controls such as paving is a remedial action decision, rather than the basis for an alternative soil remediation standard. The continued monitoring and maintenance of paving is essential to its continued protectiveness.

155. COMMENT: Using the models that the Department used for the non-residential inhalation scenario, the commenter back-calculated the value for PM_{10} associated with emissions from wind erosion and traffic on a non-residential site. The resulting value was 13.5 $\mu g/m^3$. By comparison, the PM_{10} levels measured in New Jersey ranged from 21.2 $\mu g/m^3$ (Atlantic City) to 36.5 $\mu g/m^3$ (Fort Lee) in 2003 (NJDEP 2003). Thus, it may be inferred that the Department's model is estimating that approximately 40 percent to 70 percent of PM_{10} in ambient air is derived from emissions of suspended soil from a non-residential site. This seems unrealistically high, but there are no data available to specifically validate these estimates. The Department should validate its model for the conditions it is simulating and determine the variability of results with different realistic traffic scenarios. (12)

RESPONSE: The calculations done by the commenter are technically flawed because it is not appropriate to compare the modeling done for the development of the inhalation soil remediation standards to the Statewide PM_{10} monitoring values.

The modeling done for the development of the inhalation remediation standards is designed to estimate the impacts from the resuspension of dust by vehicles and wind erosion measured at or near the property line of a contaminated site. The Department believes that the near ground releases from a contaminated site will have a relatively small impact area because impact concentrations are likely to tail off considerably at 50 to 100 meters from the site.

The Statewide PM_{10} monitoring is designed to measure impacts from nearby sources, such as traffic and small sources, and from long-range transport, such as large air pollution sources with tall stacks. The Department does not believe that 40 percent to 70 percent of Statewide PM_{10} is derived from contaminated sites. The Department does not believe that the emissions from contaminated sites have a significant impact on the Statewide PM_{10} levels as stated by the commenter. Regional modeling as part of State Implementation Plans and Attainment Designations are a better validation of source emissions than State-wide monitoring measurements.

156. COMMENT: The wind erosion model predicts emissions between disturbances. The Department assumes one wind disturbance per day (see 39 N.J.R. 1606, May 7, 2007). However, no reason is given for this assumption. (12)

RESPONSE: Appendix 3 contains the methods for the development of inhalation remediation standards, including residential and non-residential use. This appendix is divided into four parts. Equation 22 falls in Part IV of this appendix. As the heading to Part IV indicates, the equations for this part are from Section 13.2.5 of U.S. EPA’s AP-42, “Compilation of Air Pollutant Emission Factors, Column I: Stationary, Point, and Area Source.” USEPA AP-42 states that, "A disturbance is defined as an action that results in the exposure of fresh surface material." Since the calculations assume traffic each day of the USEPA-recommended worker exposure frequency of 225 work days per year, it is practical to assume a minimum of one disturbance per day.

157. COMMENT: While emissions from traffic are adjusted for precipitation, no adjustment in the emissions calculations is included for precipitation for wind erosion. The Department assumes that traffic emissions do not occur on days when precipitation is greater than 0.01 inches (page 55 of the Inhalation SRS Basis and Background document) but wind emissions do. Precipitation will limit emissions from wind, as well as traffic, and should be considered for both. (12)

RESPONSE: The Department concurs that the equation for unpaved roads includes a variable for precipitation days, whereas the equations for wind erosion do not. The Department is electing to follow EPA AP-42, and this model does not include a variable for precipitation days in the wind erosion equations.

158. COMMENT: The Department notes the availability of alternative remediation standards (ARSs) for "recreational purposes" which are "site-specific uses that do not reflect either a residential or nonresidential land use scenario." The Department notes that ARSs may be based on site-specific land use scenarios that affect the amount of time that people are likely to spend at a site that is designated for recreational use. Two basic types of recreational land uses, active and passive, may be considered. Examples of active recreational land use are sports playing fields and playgrounds. Examples of passive recreational land use are walking or bike trails. The approval of an ARS for recreational land use will be contingent on the use of proper institutional controls to ensure the continued use of the site for the proposed recreational purpose. It is unclear what input parameters will be allowed to be changed to determine this use.

Because the inhalation exposure pathway is relatively new and the methods provided for the development of alternative remediation standards is quite complex, there is a great potential for case managers to misinterpret, err, or apply the calculations inconsistently. The commenters recommend training for case managers on the development and use of ARSs for recreational scenarios.

In the proposal, the Department stated that it would require institutional controls with some alternative remediation standards for the inhalation pathway. The commenters do not think that this requirement is justifiable. (16, 20, 38, 41, 52, 56)

RESPONSE: The Department will consider applications for alternative soil remediation standards (ARSs) using the procedures for the application and evaluation of all ARSs, including recreational land use, that are set forth in Subchapter 7 of the Remediation Standards. Subchapter 7, Appendix 6, Option III sets forth the criteria on which an ARS may be based on the use of the site for recreational purposes. As stated under Option III, recreational purposes are site-specific uses that do not reflect either a residential or non-residential land use scenario. The actual type of recreational land use is an important factor in determining the appropriate site specific alternative soil remediation standard for a site.

The Department has created electronic spreadsheets that allow the user to easily input specific variables to determine ARSs for contaminants for the inhalation pathway. In addition, the Department has also produced guidance to assist in properly applying and interpreting the inhalation pathway at a site, to determine what additional remedial activities are required. Lastly, the Department intends to conduct training for staff to assist them in properly interpreting the inhalation pathway. Training will also be offered to the public.

The use of an institutional control is required for other ARS options, not just the recreational land use scenario. As stated in the Inhalation Pathway Basis and Background document, an institutional control is required if an ARS is approved for particulate contamination that involves modifying either the amount of vegetative cover (residential sites) or the number of vehicle trips per day (non-residential sites). The institutional control would also ensure that the appropriate land use was maintained.

Inhalation Exposure Pathway - Soil Type

159. COMMENT: Remediation sites in New Jersey vary greatly in terms of physical, geological, geochemical, and land use characteristics. It is inaccurate for the Department to use limited input parameters in a model intended to account for all the site-specific variations across the State in order to determine numeric inhalation standards. To accommodate the variations, there should be a greater flexibility to adjust the input parameters to determine alternate remediation standards. (16, 20, 38, 41, 52, 56)

RESPONSE: The Brownfield Act tasks the Department with developing soil remediation standards that are protective of public health and safety. See N.J.S.A. 58:10B-12a. To that end, the Department has developed the inhalation pathway soil remediation standards using average input parameters applicable to New Jersey. Pursuant to the Remediation Standards, the person responsible for conducting the remediation may use the models that the Department used in developing the generic inhalation pathway soil remediation standards and substitute site-specific information for several of these parameters in order to develop alternative remediation standards (ARSs) for a site. See N.J.A.C. 7:26D-7.3(a).

In addition, an ARS request may also be based on any or all of the factors listed at N.J.A.C. 7:26D-7.3(b), including new chemical toxicity data, new risk assessment methodology or models, alternative land use planned for the site, or site-specific conditions that support the modification of input parameters for models used to develop alternative soil remediation standards pursuant to Appendices 5 through 7.

That being said, there are certain parameters for which the Department does not believe it is practicable to develop alternatives because these parameters have been accepted and used consistently by the USEPA and other state agencies, and their values are generally accepted as defensible in the scientific community.

These parameters include non-site specific parameters such as averaging time, exposure frequency, exposure duration, inhalation rate, and body weight and several site specific parameters such as total soil porosity, water filled soil porosity, air filled porosity, dry soil bulk density, surface material moisture content, number of days with greater than 0.01 inches of precipitation and mean vehicle weight. The rationale for discouraging the development of alternative input values for these parameters is discussed in the "Inhalation Exposure Pathway Soil Remediation Standards Basis and Background" document. They include extreme difficulty in properly obtaining the information (e.g. total soil porosity, air filled soil porosity, water filled soil porosity), highly variable site specific conditions that would make it difficult to derive a valid ARS (e.g., mean vehicle weight, number of days with greater than 0.01 inches of precipitation), and modification of the parameter with site-specific data has minimal impact on the calculated standard (e.g. dry soil bulk density). For the input parameters that can be altered, the Inhalation Pathway Basis and Background document includes sensitivity analyses of model parameters. With this information, the person responsible for conducting the remediation can determine when it is appropriate to calculate site-specific remediation standards.

160. COMMENT: The Department appears to have accepted USEPA's default value of 0.002 for soil organic carbon content in lieu of the findings of a large local database containing information on this parameter in calculating the remediation standards for the inhalation exposure pathway. Over 250 organic carbon analyses from a diverse cross-section of surface soils (0-6 in.) throughout New Jersey is compiled in three DEP publications: (1) Characterization of Ambient Levels of Selected Metals and Other Analytes in New Jersey Soils: Year 1, Urban Piedmont Region, May 1997; (2) Characterization of Ambient Levels of Selected Metals and Other Analytes in New Jersey Urban Coastal Plain Region Soils, October 1998, and (3) Characterization of Ambient Levels of Selected Metals and PAHs in New Jersey Soils: Year III-Rural Areas of New Jersey Highlands, Valley and Ridge, and Coastal Plain Physiographic Provinces, March 2002. The mean, median, and geometric mean f_{oc} calculated for all of these data are 0.028, 0.016, and 0.017, respectively. Less than four percent of the samples analyzed in these studies exhibited f_{oc} less than the default value of 0.002.

It is generally acknowledged that the organic carbon content at depth is typically lower than that at the surface. A means of evaluating this assumption is available through review of summary statistics (again specific to New Jersey) provided in the New Jersey Geologic Survey report:

Baseline Concentrations of Arsenic, Beryllium and Associated Elements in Glauconite and Glauconitic Soils in the New Jersey Coastal Plain, 2001. As part of this investigation, organic carbon content was measured in a total of 113 soil samples, collected from depths of 0-6 in., 12-18 in., 24-30 in., and deeper than 30 in., from the Adelphia, Colemantown, Collington, Freehold, Holmdel, Kresson, Marlton, and Shrewsbury soil series. The mean f_{oc} in these samples (across soil series) ranged from 0.009 to 0.032 and the median ranged from 0.005 to 0.021. These data generally support a decrease in f_{oc} at depth, but not uniformly, nor are they consistent with a default f_{oc} equal to 0.002. In sum, these data suggest that a more appropriate generic f_{oc} may be on the order of 0.01. (16, 20, 38, 41, 52, 56)

RESPONSE: The Department did accept USEPA’s default value for soil organic carbon content. The New Jersey studies cited by the commenter have limitations. The three studies pertaining to ambient levels of metals in the urban Piedmont, urban Coastal Plain, and rural areas of the state were limited to the sampling of surface soils (0-6"). As the commenter acknowledges, organic carbon content in the subsurface is typically lower than that of surface soils. Therefore, these studies do not provide useful information for determining default organic carbon content for the entire soil column. The commenter also cites the New Jersey Geologic Survey study that sampled glauconitic soil types. Some of these samples were of subsurface soils. However, this study is also insufficient to determine default subsurface organic carbon contents for the following reasons: (1) only a few soil types were studied, and they were all of glauconitic soils, which are not representative of New Jersey as a whole; and (2) the maximum depth of sampling was in most cases 2.5 feet. Out of the 113 samples, only eight samples were taken at greater depths, and only three were taken at depths greater than 3 feet. The article by Carsel et al. cited in the impact-to-groundwater Basis and Background document indicates a continuing decrease in organic matter at depths greater than 3 feet.

The summary organic carbon contents described by the commenters combine surface soil and subsurface soil results. A default subsurface organic carbon content is needed, since this represents the bulk of the soil column. Considering subsurface results only (Table 27 of Dooley, John H. (2001) "Baseline Concentration of Arsenic, Beryllium and Associated Elements in

Glauconite and Glauconitic Soils in the New Jersey Coastal Plain" New Jersey Department of Environmental Protection, Division of Science, Research and Technology, Geological Survey, Trenton, New Jersey), the median organic carbon content reported in this study is 0.003, only slightly higher than the default value in these rules of 0.002. Thus, the New Jersey subsurface data, while limited, does not conflict with USEPA's default value.

The USEPA default subsurface organic carbon content is based on a database of 10,373 samples, described in the article by Carsel, R.F., Parrish, R.S., Jones, J.L., and Lamb, R.L. (1988). Characterizing the uncertainty of pesticide leaching in agricultural soils. J. Contam. Hydrol. 2:111-124. Samples were taken from four different depth intervals, and 2,300 samples were taken to a depth of approximately 4 feet. While the database in which these samples are compiled may still under represent organic carbon contents at greater depths, it is nonetheless one of the largest databases available of this type. The mean subsurface organic carbon content was 0.002, with the median value being slightly lower. Thus, the EPA default value of 0.002 is supported. However, as stated in the Inhalation Pathway Basis and Background document, an alternative soil remediation standard can be calculated using a fraction of organic carbon for site specific soils at a given site.

161. COMMENT: The generic cleanup standards use only one soil type - sandy loam. The Department should propose standards based on soil types representative of the various regions of New Jersey. The EPA uses loam as its default soil texture, based on nationwide data. However, because the southern half of New Jersey is primarily composed of sandy loam, loamy sand and sand soils (Tedrow, 1986), it was determined that a loam soil texture would not be protective of many areas of the State.

Regarding the fraction organic carbon content (f_{oc}), the DEP deviates from EPA's default value of 0.006. The reason for this is that the Jury model calculates contaminant transport for the entire soil column, using a single value for f_{oc}. Using a surface default value of 0.006 in the model may be appropriate for the surface layer of the soil column, but may underestimate volatile migration in the subsurface portion of the soil column. Therefore, to provide a conservative (maximum) estimate of contaminant volatilization, the EPA subsurface default value for foc (0.002) was used instead of the surface default value (0.006). This latter value does not represent typical soil organic carbon values in the subsurface, and would reduce the extent of contaminant volatilization. (19, 22, 27, 45, 16, 20, 38, 41, 52, 56)

RESPONSE: The EPA value of 0.006 is based on surface soils and is too high to represent the soil column as a whole. The default EPA subsurface value of 0.002 is more appropriate. The USEPA default subsurface organic carbon content is based on a database of 10,373 samples, described in the article by Carsel et al. cited in the Inhalation Pathway Basis and Background document. Samples were taken from four different depth intervals, and 2,300 of them were taken to a depth of approximately 4 feet. While these samples may still overestimate organic carbon contents at greater depths, it is nonetheless one of the largest databases available of this type. The mean subsurface organic carbon content was 0.002, with the median value being slightly lower. The value of 0.002 is therefore a typical subsurface value, not a conservative one.

The generic standards are designed to be used unless the person responsible for remediating the site has obtained Departmental approval to utilize site-specific including information regarding soil type, to derive an ARS. As stated in the Inhalation Pathway Basis and Background document, an alternative soil remediation standard can be calculated using fraction of organic carbon for site specific soils at a given site.

Inhalation Exposure Pathway - Mercury

162. COMMENT: The Department should consider elemental mercury when assessing inhalation of volatiles. (46, 58)

RESPONSE: The Department based the mercury inhalation standard on the elemental mercury toxicity factor (reference concentration). In addition, the mercury standard for both residential and non-residential exposure scenarios is determined by the volatile pathway.

Inhalation Exposure Pathway - Institutional/Engineering Controls

163. COMMENT: It is unreasonable that the Department does not allow for the use of engineering or institutional controls in determining an alternative soil remediation standard (ARS). However, the DEP does allow that "if an alternative soil remediation standard is developed using a given site-specific physical and/or operational condition(s), that (those) condition(s) must be applied consistently, and discusses institutional controls to ensure they are maintained." It is not clear why operational conditions (such as trucks per week) can be considered, yet engineering conditions (such as paving) can not. (16, 20, 38, 41, 52, 56)

164. COMMENT: It is unclear as to why the Department is limiting the use of engineering and institutional controls, such as paving surfaces. Caps and other surfaces have been implemented successfully in New Jersey and other states, and represent a generally accepted method of reducing and eliminating exposure; additionally, methods exist for ensuring the controls are maintained. While the Department dismisses the use of caps and engineering controls to protect for future use scenarios when evaluating the inhalation pathway, it requires use of an institutional control to "ensure that the basis of the alternative soil remediation standard is maintained" (for a non-residential alternative soil remediation standard based on actual vehicle activity or a residential alternative soil remediation standard based upon actual vegetative cover). The inconsistency in approach to use of engineering and institutional controls is not justified or appropriate. (16, 20, 38, 41, 52, 56)

165. COMMENT: The Department acknowledges that volatile organic compounds and particulate compounds were dealt with separately because the "inhalation risk from fugitive dusts results from particle entrainment from the soil surface; thus contaminant concentrations in the surface soil horizon (e.g., the top two centimeters) are of primary concern for this pathway under the current scenario. While the entire column of contaminated soil can contribute to volatile emissions at a site, the top two centimeters are likely to be depleted of volatile contaminants at most sites. Thus, contaminant concentrations in subsurface soil, which are measured using core

samples, are of primary concern for quantifying the risk from volatile emissions" (EPA 1996a, page 21). Engineering controls could be used to eliminate the potential for subsurface soil to be brought to the surface in a future use scenario. (16, 20, 38, 41, 52, 56)

RESPONSE to COMMENTS 163 through 165: The commenters are confusing the relationship between alternative soil remediation standards and institutional and engineering controls, discussed in the Inhalation Basis and Background Document. Institutional and engineering controls may be used as part of a remedial action, to reduce or eliminate exposure to contaminants that remain at a site. An engineering control, such as a cap, is a generally accepted remedial action used to contain soil contamination and to eliminate an exposure pathway to that soil contamination. An institutional control, such as a deed notice, is used to ensure that future purchasers of the property are aware of the existence of the engineering control and to thereby ensure that the engineering control is properly maintained over time.

An alternative soil remediation standard is a numerical standard that is developed for a specific site, using the models and equations set forth in Appendix 3, that, when used at a site, is protective of residential use or non-residential use without the use of institutional and engineering controls. The person responsible for conducting the remediation may elect to develop one or more alternative remediation standards for a site pursuant to N.J.A.C. 7:26D-7 and propose the use of institutional and engineering controls in its remedial action workplan developed pursuant N.J.A.C. 7:26E-6. If the Department determines that the proposed remediation for the site is adequately protective of human health and the environment it will approve the remedial action workplan.

Compliance with Inhalation Pathway Soil Remediation Standards

166. COMMENT: The point of compliance for the inhalation pathway soil remediation standards is somewhat different than the other soil remediation goals (impact to groundwater and ingestion/dermal), which utilize a discrete point of compliance for each sample result. This difference in the approach introduces a potential complication when evaluating the overall

compliance of a site to the soil remediation goals. The Department should recognize that these different approaches will result in an increase in resources to ensure compliance has been achieved. (46, 58)

RESPONSE: The Department acknowledges that the new inhalation pathway soil remediation standards may result in an increase in Department staff resources and resources of the regulated community necessary to ensure compliance has been achieved. The Department, however, will be taking steps to streamline the review process to the greatest extent possible. The Department is aware, however, that new programs and procedures often have an implementation learning curve. The Department anticipates proposing amendments to the Technical Rules that will address compliance issues. In the mean time, the Department has developed guidance documents concerning compliance with the soil remediation standards that are available to Department staff as well as the regulated community. It is believed that this guidance will provide clear simple direction to the regulated community as well as Department case managers which will result in routine and timely compliance evaluations.

167. COMMENT: The draft Department soil remediation standard proposal, released in July 2004 for interested party review, contained a proposal that sites be evaluated through the use of “functional areas” and at various depth intervals. This appears to be absent from the May 7, 2007 rule proposal. It is requested that the Department provide guidance regarding how and to what depth intervals the inhalation pathway standards will be applied. (16, 20, 38, 41, 52, 56)

168. COMMENT: The point of compliance for the inhalation pathway soil remediation goals appears to be based on a 95% upper confidence limit of the mean, estimated over the top two feet of the site. The commenters recommend that additional guidance be provided to ensure that areas with an extremely high potential for dust generation will not be subsumed by combining this with areas with little to no potential for dust generation. (46, 58)

169. COMMENT: The issue of averaging data to determine compliance for the inhalation pathway should also address how non-detect results will be evaluated. Current policy suggests

substitutions for non-detects at one-half of the detection limit is acceptable. However, recent research into the statistical methods associated with exposure point concentration calculations demonstrates that other approaches may be more scientifically defensible. The USEPA is currently evaluating this new research and the commenters recommend that the Department also consider allowing alternative methods to calculate the 95% upper confidence limit of the mean. (46, 58)

RESPONSE to COMMENTS 167 through 169: The Department acknowledges that it did not amend the Technical Rules, as a part of this rulemaking, to include the methodology to be used to determine compliance with the inhalation pathway soil remediation standards. The Department intends to address this issue in the next revision of the Technical Requirements for Site Remediation, N.J.A.C. 7:26E. In the interim, the Department has provided guidance on this topic. This includes various spreadsheets and training tools to help increase efficiency and reduce the time required for implementation of the soil remediation standards. The guidance documents are available on the Department web site at http://www.nj.gov/dep/srp/guidance/rs. This guidance addresses the concerns expressed by the commenters including how and to what depth intervals the inhalation pathway soil remediation standards will be applied, use and appropriate placement of compliance “functional areas”, and procedures to calculate the 95% upper confidence level (UCL) of the mean. With regard to the calculation of the 95% UCL, the Department recommends the use of the ProUCL4 software package, but will, as the commenters recommend, evaluate any new USEPA recommendations on this issue.

Inhalation Exposure Pathway - Definitions

170. COMMENT: The inhalation pathway was evaluated for both residential and commercial/industrial land use scenarios. Both land use scenarios considered inhalation of volatiles. The commenters understand that volatiles are not consistently defined, and that there are several criteria that can be used to categorize volatile chemicals, including Henry's Law constant, vapor pressure, and molecular weight. The commenters recommend the Department further evaluate other approaches to defining volatiles, including definitions used by other states

and other Federal agencies such as the Agency for Toxic Substances and Disease Registry (ATSDR), in addition to the USEPA, so that the definition used by the Department is not inconsistent with other approaches. (46, 58)

RESPONSE: The Department believes that rather than "defining" volatiles, it is more appropriate to utilize one of two sets of equations for the inhalation exposure pathway: volatile and particulate, based on the chemical nature of the chemical under consideration. Where a chemical has both a Henry's Law constant and a vapor pressure, it is possible to use both the volatile and the particulate equations. Note that, except for inorganics with zero vapor pressure, all chemicals were evaluated for both the particulate and volatile inhalation exposure pathways. In those cases, where the calculation based on the volatile exposure pathway yielded a lower number than the number derived using the particulate equations, the Department considered that chemical to be a "volatile" chemical for purposes of this regulation. The remaining contaminants were controlled by the particulate pathway and were considered particulate phase contaminants. One benefit of this approach is that some compounds not ordinarily considered volatile (e.g. 4,4'-DDE, dieldrin) are in fact controlled by the volatile inhalation pathway and should be treated as such.

<u>Inhalation Exposure Pathway - Inconsistent with USEPA Methodology</u>

171. COMMENT: The calculation of inhalation based soil remediation standards for non-residential sites incorrectly applies a USEPA model for wind erosion emissions. The approach uses a different equation from that used for wind erosion by the USEPA for non-residential site Soil Screening Levels and that used by the Department for residential sites. The Department's soil remediation standards approach is from USEPA AP-42; however, the model is misapplied.

USEPA AP-42 states that the emissions values calculated using the equations described in Section 13.2.5.3 of this model "represent intermittent events and should not be input directly into dispersion models that assume steady-state emission rates" (EPA AP-42 section 13.2.5.3). The

Department uses emissions from this model with output from the air dispersion model and assumes that the emissions are steady state. (12)

RESPONSE: The Department acknowledges the emission rates calculated using Section 13.2.5 of USEPA AP-42 "should not be input directly into dispersion models that assume steady-state emission rates." However, for a lack of a better reference to calculate wind erosion emissions, the Department has consistently used emissions calculated using Section 13.2.5 in air dispersion modeling applications. The Department has been using this method to calculate wind erosion emissions for air permits for the last 15 years. As with other aspects of the inhalation exposure pathway, in order to be consistent with the Department's Air Program, the inhalation pathway soil remediation standards also use this calculation.

172. COMMENT: The Department misapplies the equations in USEPA AP-42. The emission occurs only when the friction velocity exceeds the threshold friction velocity after a disturbance. The Department assumes that the threshold friction velocity is 1.33 m/s. The Department uses the maximum wind speed for the state of New Jersey (55 mph) to calculate the friction velocity of 1.39376 m/s (Equations 24-25). The resulting erosion potential is then calculated for this event as 1.83 g/m^2 (Equation 23). The Department then assumes that this amount of wind erosion occurs once a day (Equation 22). The wind-generated particulate emission rate (ER_{wind}) value of 0.0528 g/s is then used to calculate the particulate emission factor (PEF_s) value, which is then used to calculate the doses and Soil Remediation Standard inhalation values. This approach assumes that the maximum annual wind speed in New Jersey, 55 mph, is reached every day at the site, which is clearly overly conservative and unrealistic.

Correct use of the USEPA AP-42 model involves using the threshold friction velocity, u^*, of 1.33 m/s. The Department should use Equation 24 to calculate the wind speed at 10 meters, u^+_{10}. This value would be 25.1 m/s. The Department should also use Equation 25 to calculate the wind speed at the anemometer height of 6.1 meters, $u^{6.1}$. This value would be 23.47 m/s, or about 51 to 52 mph. The Department should check the National Oceanic and Atmospheric Administration (NOAA) local climatological data summaries for New Jersey cities to determine how many times each year this threshold value is exceeded. The Department should then use these wind speeds to calculate the dust generation for each event. Finally, the Department should sum these values to get the total amount of dust generated per year, and divide by 31,536,000 to get the annual average emission rate (g/s) for wind erosion. It is highly unlikely that this value would be close to the ER_{wind} value of 0.0528 g/sec presented on page 112. Even if correctly used, the use of this model for Soil Remediation Standard derivation is not consistent with the USEPA's directions for its use. (12)

RESPONSE: Section 13.2.5 of USEPA AP-42 specifically states, "The routinely measured meteorological variable that best reflects the magnitude of wind gusts is the fastest mile. This quantity represents the wind speed corresponding to the whole mile of wind movement that has passed by the 1 mile contact anemometer in the least amount of time. Daily measurements of the fastest mile are presented in monthly Local Climatological Data (LCD) summaries. The duration of the fastest mile, typically about 2 minutes (for a fastest mile of 30 mph), matches well with the half-life of the erosion process, which ranges between 1 and 4 minutes."

According to the National Oceanic and Atmospheric Administration (NOAA) Local Climatological Data Annual Summary for Newark (ISSN 0198-3431), the maximum 2-minute wind speed is 55 miles per hour (MPH). The USEPA AP-42 equation does not assume that this wind speed occurs every day at a site; and Section 13.5.2 does not state or infer this. The 2-minute wind speed is used as a variable to estimate worst-case erosion.

The commenter suggests that some other wind speed should be used. However, Section 13.5.2 further states, "Because the erosion potential is highly nonlinear function of the fastest mile, mean values of the fastest mile are inappropriate."

173. COMMENT: For wind erosion emissions, the commenter recommends that the Department use USEPA's approach from its Soil Screening Level document (not AP-42), which is the same as that used to obtain the Department’s residential particulate emission factor (PEF). The annual average particulate emission rate for wind erosion (ER_{wind}) would be:

$$ER_{wind} = 0.036 * (1 - V) * \left(\frac{U_m}{U_t}\right)^3 * F(x) * A_{site} * (1hr / 3600 sec)$$

where:

V = 0.0, fraction of vegetation (worst case)

U_m = 4.56m/s, mean annual wind speed (from Equation 11, page 101)

U_t = 11.32 m/s, equivalent threshold wind speed (from Equation 11, page 101)

F(x) = 0.159, function from Cowherd et al. (from Equation 11, page 101)

A_{site} = 8093.65 m^2, area of site (from Equation 22, Page 112).

The resulting value for ER_{wind} would be 0.00084 g/s, as compared to the Department's value of 0.0528 g/s, using AP-42 for the non-residential sites. (12)

RESPONSE: The use of a formula for calculating a residential input value in the calculation of a non-residential clean up standard is not appropriate. The equations used by the Department are specific to non-residential sites, and therefore are appropriate for calculating the inhalation pathway non-residential soil remediation standards.

174. COMMENT: Inconsistency with the USEPA is demonstrated by the number of contaminants for which the Department's proposed soil remediation standards are either (a) more stringent than the USEPA's, or (b) include compounds for which the USEPA currently has no standard.

For 50 contaminants considered by the Department under the inhalation exposure pathway, the Department is proposing residential inhalation soil remediation standards that are more stringent than the USEPA's Soil Screening Levels (SSLs). Of the 50, the Department is proposing inhalation pathway soil remediation standards for 44 contaminants for which the USEPA currently has no standards, and 6 of the Department's proposed inhalation pathway soil remediation standards are more stringent than the USEPA's SSLs.

For 71 contaminants, the Department is proposing non-residential inhalation pathway soil remediation standards that are more stringent than the USEPA's SSLs. Of the 71, the Department is proposing soil remediation standards for 61 contaminants for which the USEPA has no standards. Ten of the Department's proposed inhalation pathway soil remediation standards are more stringent than the USEPA's SSLs.

The commenter believes it is necessary for the Department to justify the rationale for this significant departure from USEPA guidance and requirements. (16, 20, 38, 41, 52, 56)

RESPONSE: As detailed in the Federal Standards Analysis, some of the proposed inhalation pathway soil remediation standards are either more stringent than the USEPA Soil Screening Levels (SSLs) or are for compounds for which the USEPA currently has no standard. Reasons that some of the inhalation standards are more stringent than the USEPA SSLs include use of New Jersey-specific assumptions for soil characteristics and meteorological conditions; the New Jersey specific meteorological conditions result in differences in air dispersion and air concentrations. Another reason is that the Department considered different toxicity data, such as the C carcinogen policy. The reason the Department is adopting inhalation pathway soil remediation standards for compounds for which no USEPA SSL exists is that these contaminants are of specific concern at contaminated sites in New Jersey.

175. COMMENT: The proposed rule states that it relies on the USEPA Soil Screening Levels (SSLs) guidance, but uses values for silt content from an outdated version of USEPA AP-42's section on unpaved roads. The USEPA SSL uses silt content of 8.5% for calculating dust emissions from unpaved roads (Equation E-18). The Department uses 11%, which it obtained from an outdated version of USEPA AP-42, and is about 30% higher than the value of 8.5% used by the USEPA. The reference cited by the Department does not appear to support selection of the higher silt content, and it is not New Jersey specific. The current version of USEPA AP-42 has an average silt content value of 8.5% for construction sites (USEPA AP-42, Table 13.2.2-1). The result of using a higher silt content value is a particulate emission rate that is over 25% greater than if the silt content used in the USEPA SSLs were used to calculate the Department’s

soil remediation standards. Because the silt content, and hence, the particulate emission rate, can vary from site to site, the Department should allow the use of site-specific silt content values for the development of alternative remediation standards. (12)

RESPONSE: The Department acknowledges that the silt content being used as the default value in the soil remediation standards calculations is from an older version of the USEPA AP-42 section on unpaved roads (version dated September 1998). The older mean silt content value of 11% represents a value for publicly accessible unpaved dirt roads. The reason for the inclusion of this value from the September 1998 version of USEPA AP-42 in the calculations is that, while the September 1998 version distinguished between non-publicly accessible unpaved roads (for example, utility/construction roads) and publicly accessible roads, the March 2003 version of the USEPA AP-42 section on unpaved roads (dated March 2003) does not include a silt content value for publicly accessible unpaved dirt roads. Silt content varies between these two road types due to maintenance requirements. The Department believes that the 11 percent silt content for publicly accessible roads from the September 1998 version of USEPA AP-42 is more representative of the remediation sites than the 8.5 percent average silt content for non-publicly accessible unpaved roads such as those found at construction sites in the March 2003 version of USEPA AP-42. As stated in the Inhalation Pathway Basis and Background document, the Department is currently evaluating substituting site-specific values for soil type, but that until such data are available in a statistically large enough data set, the value listed in the September 1998 version of USEPA AP-42 will continue to be used.

176. COMMENT: The Department is inconsistent with the USEPA on the selection of its toxicity hierarchy. The Department's hierarchy is similar to those used for the other exposure pathways, except that the Department exhibits a preference for inhalation-based toxicity data as opposed to oral-based data. For example, for two compounds (1,1-dichlropropane and styrene), the Department determined that these compounds should be considered carcinogens, whereas the USEPA considered them non-carcinogenic. (16, 20, 38, 41, 52, 56)

RESPONSE: The Department determined that use of inhalation-based toxicity data was more appropriate to use for evaluation of the inhalation pathway, as opposed to oral-based data.

The Department is aware that the Unit Risk Factor for styrene was deleted from HEAST in 1992. However, styrene is currently classified by the International Agency for Research on Cancer as 2B, possibly carcinogenic to humans. In light of this classification, the Department determined that it was prudent to evaluate styrene as a carcinogen, and has adopted the standard based on carcinogenic effects.

It should be noted that the commenters refer to a typographical error in the Federal Standards Analysis. The Department did not develop an inhalation pathway soil remediation standard for 1,1-dichloropropane (CAS 78-99-9; propylidene dichloride). The Federal Standard Analysis should have referenced 1,2-dichloropropane (CAS 78-87-5; propylene dichloride). This error has been corrected upon adoption. 1,2-dichloropropane was evaluated as a carcinogen because a value for inhalation unit risk is available in the California EPA Toxicity Criteria Database (http://www.oehha.ca.gov/risk/ChemicalDB/index.asp).

177. COMMENT: The Department's reliance on vehicular traffic is inconsistent with the USEPA's approach. The USEPA believes vehicular traffic is appropriate for a short-term construction scenario. Such a scenario represents an extreme worst case relative to the potential for the generation of dust. The Department states that its use of truck traffic scenarios is just an extension of the USEPA's logic to apply for future use scenarios; but it merely adds an additional, redundant layer of conservatism to the soil remediation standards. The Department takes this worst case scenario, and adds additional conservative assumptions, including applying it for 225 days per year for 25 years and accounting for "future use" by evaluating the site excluding all institutional and engineering controls. This is done even if such features or their equivalents are currently present. If a site subject to truck traffic is evaluated assuming an absence of paving, the concern about fugitive dust emissions would necessarily be greatly magnified. On the other hand, if paving is assumed to be present at the same facility, the concern is reduced to an insignificant level. This probably accounts for why the USEPA is concerned

with vehicular traffic under a short-term construction scenario, but not under a standard non-residential exposure scenario. (16, 20, 38, 41, 52, 56)

RESPONSE: The use of engineering controls is a remedial action decision, rather than evaluation of whether contamination exceeds a given standard. In terms of determining whether contamination is present in exceedance of the inhalation pathway soil remediation standard, the person responsible for conducting the remediation is required to evaluate the site pursuant to the models and equations set forth in the Inhalation Pathway Basis and Background document. If it is determined that contamination is present that exceeds the inhalation pathway soil remediation standard, then the person responsible for conducting the remediation can propose some type of engineering control as the remedial action.

178. COMMENT: The approach used to derive the inhalation pathway soil remediation standards for non-residential sites is significantly different from the corresponding USEPA Soil Screening Level (SSL) approach, in that it includes traffic on unpaved soils as a major generator of soil particulates. The USEPA assumes only wind erosion for non-residential sites. The Department states that it assumes that the USEPA does not consider truck traffic for non-residential sites, because the USEPA considers them to be paved (page 5, Inhalation Exposure Pathway Soil Remediation Standards, Basis and Background). However, this assumption is faulty, because the USEPA evaluated fugitive dust emissions from wind erosion for non-residential sites, and considers the percent vegetation cover - assessments that are inconsistent with the assumption of pavement covering non-residential sites.

The Department’s Soil Remediation Standards (SRS) scenario that describes truck traffic on unpaved sites is highly uncertain and should not be used. Rather, for those sites that support significant truck traffic on unpaved surfaces, modeling to determine a site-specific soil remediation standard should be conducted. The default SRS, similar to the SSL for non-residential sites, should be based on wind erosion alone. (12)

RESPONSE: The Department does not assume that the USEPA considers all non-residential sites to be entirely paved. The Department recognizes the USEPA evaluates scenarios which it considers appropriate, inclusive of vegetated and/or open areas subject to wind erosion.

The Department determined that vehicle traffic is a common aspect of non-residential sites and that vehicle traffic produces a significant component of the particulate emissions present. In order to be protective of human health and the environment, the Department determined it prudent to include vehicle traffic as part of the assumed non-residential exposure scenario. A primary reason for this approach is that the Department is required to evaluate future use scenarios, and paving, even if currently present, may not always be present at a site. Additionally, paving (i.e., capping) is a remedial alternative, and does not eliminate the potential exposure pathway.

Inhalation Exposure Pathway - Non-residential More Conservative than Residential

179. COMMENT: Many of the proposed inhalation standards are more stringent for non-residential sites than residential sites. Currently, any site that is remediated to a non-residential standard requires a deed notice for closure. Will this still be the case using the Soil remediation standards, or will the new unrestricted use standard be the more stringent of the two? (16, 20, 38, 41, 52, 56)

RESPONSE: Typically, the residential direct contact soil remediation standards are more restrictive than the non-residential direct contact soil remediation standards. If contamination remaining at a site is above the residential direct contact soil remediation standards, a Deed Notice is required. For non-residential sites, when contamination remaining at a site is above the residential direct contact soil remediation standards but below the non-residential direct contact soil remediation standards, the Deed Notice would also require the site be restricted to non-residential use, unless engineering controls are also present. For non-residential sites, when contamination remaining at a site is above the non-residential direct contact soil remediation standards, a Deed Notice and engineering controls are required.

Where the most restrictive standard is the non-residential direct contact soil remediation standard:

1. The Department will not require the establishment of a deed notice at residential sites when remaining contamination exceeds the non-residential direct contact soil remediation standard but not the residential direct contact soil remediation standard.

2. For residential sites, when remaining contamination exceeds both the non-residential direct contact soil remediation standard and the residential direct contact soil remediation standard, both a Deed Notice and engineering controls are required.

3. For non-residential sites, when contamination remaining at a site is above the non-residential direct contact soil remediation standards but below the residential direct contact soil remediation standards, a Deed Notice and engineering controls are required.

<u>Inhalation Exposure Pathway - Overly Conservative</u>

180. COMMENT: The central principle employed in developing the standards was to establish viable methodologies for calculating values and to apply these to the full range of exposure scenarios and contaminants that need to be assessed. Having established a potential universe of proposed standards, the products of these efforts were evaluated with the goal of selecting the process that was the most technically sound and defensible. This principle was flawed; the assumptions are too broad to address the full range of truck traffic, number of trips, soil type at the site, presence or absence of paving; exposure frequency; weight of trucks, and number of trucks per day. In order to address the "full universe of proposed standards" the selection criteria is too conservative for most non-residential sites in New Jersey. (16, 20, 38, 41, 52, 56)

181. COMMENT: The non-residential calculations are overly conservative, because they are based on the disturbance of roads/dirt piles that are continually replenished with fine particles between disturbances. (12)

RESPONSE to COMMENTS 180 and 181: The Department believes that the criteria used to calculate the inhalation pathway soil remediation standards are not too conservative. Many of the variables used are default parameters used by EPA. For the New Jersey specific parameters, the Department used average values that are representative of typical conditions in New Jersey. As noted in Appendix 6 of the Remediation Standards rule, as well as in the Inhalation Pathway Basis and Background document, the number of vehicle trips per day can be varied on a site-specific basis in order to calculate an alternative soil remediation standard that more accurately reflects local conditions.

The Department assumes that contamination below the top two centimeters can eventually reach the surface by way of a number of mechanisms which include, but are not limited to, wind erosion, the freeze-and-thaw cycle, vehicle traffic, and/or excavation.

182. COMMENT: An additional conservative assumption by the DEP involves the soil-to-air volatilization factor (VF), which defines the relationship between the concentration of the contaminant in soil and the flux of the volatilized contaminant to air, taking into consideration chemical-specific properties and soil characteristics. The equation for VF is improperly based on the volatilization model developed by Jury et al. (1984) for infinite sources. (16, 19, 20, 22, 27, 38, 41, 52, 56)

RESPONSE: With respect to the volatile exposure pathway, the Jury model was selected because it is the recommended model from the EPA Soil Screening Level (SSL) guidance. This model does assume infinite contaminant mass, but this statement needs further elaboration. The form of the Jury model used for the standards assumes there is infinite mass in the sense that it uses an infinite depth of contamination. However, it does not assume a constant source of contamination, because a contaminant is depleted as volatilization proceeds. The contaminant is first depleted from soil at or near the surface, and then is depleted from increasing depths as time proceeds. Volatilization flux decreases rapidly as the depth of the source of the contamination increases, and there is a corresponding decrease in the influence of contamination at increasing depths on the soil criteria. Thus, even though an "infinite" depth of contamination is assumed for the Remediation Standards, the surface and near-surface contamination, containing a finite amount of contamination, are dominant in determining the value of the criteria. Since generic soil standards are for use when there is no site-specific information, the use of an infinite depth of contamination is appropriate. However, if the actual depth range of contamination is known, the responsible party has the option of calculating an alternative soil remediation standard based on this information.

183. COMMENT: The New Jersey Legislature has mandated that, in developing minimum remediation standards, the Department shall (1) base the standards on generally accepted and peer reviewed scientific evidence or methodologies, (2) base the standards upon reasonable assumptions of exposure scenarios, and (3) avoid the use of redundant conservative assumptions. As detailed below, the Department's proposed numeric soil remediation standards incorporate several redundant, overly conservative assumptions for the inhalation pathway. When these redundant conservative assumptions are collectively used, the results are inaccurate and unreasonable assumptions for the exposure scenario:

Regarding contaminant mass, the Department assumes there is an infinite contaminant mass contributing to volatiles or particulates; this is clearly not representative of the finite contaminant mass load associated with any site.

Although the Department acknowledges that the first two centimeters of soil are generally depleted of volatile organic compounds, the Department conservatively uses the concentrations over the first two feet of soil column. The use of the first two feet of soil column is not an accurate representation of contaminant contribution to this scenario.

The Department's outdoor worker scenario for the non-residential pathway assumes a worker is outside 8 hours a day, for 225 days per year, which is equal to almost every working day regardless of the weather. This exposure duration for non-residential receptors may overestimate their potential exposures. Although consistent with EPA guidance, it may be appropriate to recognize in the supporting text that this likely overestimates the "typical" workers exposure since it implies that the individual works at the same facility for 25 years. In addition, a conservatively light average body weight of 70 kg also is assumed. Lastly, the outdoor worker scenario reflects an inhalation rate for "heavy activity" for the full 8 hours each day, 225 days per year, for 25 years.

184. COMMENT: The allowable air concentrations for many substances are set far below the levels that the Occupation Safety and Health Administration (OSHA) has determined to be acceptable under its worker protection standards.

The combined result of these unrealistic and/or atypical assumptions of exposure scenarios is that the Department's numeric soil remediation standards are based upon exposure estimates that are well outside a realistic range of exposure. Consequently, the Department has set its proposed soil remediation standards at levels far more stringent than would EPA and far more stringent than is necessary to protect public health. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59, 16, 20, 38, 41, 52, 56)

RESPONSE to COMMENTS 183 and 184: The Department used different models and assumptions to develop inhalation remediation standards for particulate contaminants and for volatile contaminants, and therefore the models and assumptions used will be addressed separately.

For the development of inhalation remediation standards for particulate contaminants, the Department assumed that contaminated soil would persist as an inhalation pollution source until the contaminant is removed or remediated. Contaminated soil located at depth can continue to be brought to the surface by, among other processes, erosion and wear of the surface by wind, the freeze-and-thaw cycle, vehicle traffic, and/or excavation.

With respect to the volatile exposure pathway, the Jury model was selected because it is the recommended model from the EPA Soil Screening Level (SSL) guidance. This model does assume infinite contaminant mass, but this statement needs further elaboration. The form of the Jury model used for generic standards assumes there is infinite mass in the sense that it uses an infinite depth of contamination. However, it does not assume a constant source of contamination, because contamination is depleted as volatilization proceeds. The contaminant is first depleted from soil at or near the surface, and then is depleted from increasing depths as time proceeds. Volatilization flux decreases rapidly as the depth of the source of the contamination increases, and there is a corresponding decrease in the influence of contamination at increasing depths on the soil criteria. Thus, even though an "infinite" depth of contamination is assumed for the standards, the surface and near-surface contamination - a finite amount of contamination - are dominant in determining the value of the criteria. Since generic soil standards are for use when there is no site-specific information, the use of an infinite depth of contamination is appropriate. However, if the actual depth range of contamination is known, the responsible party has the option of calculating an alternative soil remediation standard based on this information.

The "first two centimeters" statement is actually a quote from the EPA Soil Screening Guidance Document. Regarding the volatile exposure pathway, the presence or absence of contamination in the top two centimeters of soil (less than one inch) has a negligible effect on the calculated remediation standard. The Department also points out that the model used for standards is that recommended by the EPA, and it includes contamination in the top two centimeters of soil, even though the EPA acknowledges volatile contaminant depletion at the soil surface. Additionally, the Department is concerned that soil below the top two centimeters can be brought to the surface and will then pose a concern for both volatile organic compounds and particulates. The first two feet of contamination is considered when field sampling is conducted because that is the depth interval of the split spoon sampler commonly employed. Soil samples may also be taken in the 0-6 inch interval, but the top two centimeters is not separately evaluated.

The Department does not believe it appropriate to state that the values used in the outdoor worker scenario evaluation (8 hours a day, 225 days per year, 25 years, average body weight of 70 kg) overestimate the "typical" worker exposure, as all of the values used in the evaluation are consistent with EPA default values.

The OSHA-set allowable air concentrations are not relevant to the inhalation soil remediation standards. In setting Permissible Exposure Limits (PELs), OSHA used non-health related inputs such as economic factors. The Department is mandated to base the inhalation remediation standards on health-related inputs. In addition, the remediation standards are applied to discharges, whereas the OSHA PELs are relevant to workers under normal operational circumstances, where these workers have been informed, trained, and monitored for an exposure.

Although not directly analogous, comparison of the inhalation pathway remediation standards to USEPA soil screening levels (SSLs) indicates that for some contaminants, the Department remediation standard is lower, whereas for other contaminants, the SSL is lower. Consequently, the Department has not set the inhalation remediation standards at levels far more stringent than the USEPA.

Inhalation Exposure Pathway - Calculation of the Inverse Concentration at Center of Source (Q/C_{vol})

185. COMMENT: The commenters question whether the calculation of the inverse concentration at center of source (Q/C_{vol}) term is sufficiently representative for the entire State. The Q/C term discussed on page 16 of the Basis and Background document was derived from meteorological conditions associated with the flat terrain at Newark Airport. The commenter also questions whether this is sufficiently representative of the rougher and more elevated terrain found in other portions of the State. At a minimum, it may be worthwhile to include this discussion in the sensitivity assessment found in the Inhalation Basis and Background Document. (16, 20, 38, 41, 52, 56)

RESPONSE: The inverse concentration at the center of source variable, or Q/C term, is limited to locations where the Department has hourly meteorological observations. While the Department acknowledges that there are rougher and more elevated terrain in New Jersey currently, there is not sufficient monitoring data to support the inclusion of meteorological observations for these areas. Presently, the Department has meteorological observations for areas represented by Newark International Airport, Philadelphia International Airport, and Atlantic City International Airport**.** For example, the Q/C values calculated for a half-acre site using Newark, Philadelphia, and Atlantic City are 90.4, 85.2, and 81.4 g/m^2-sec per kg/m^3, respectively. Taking into account the small variability between the Q/C values calculated for these locations and the overall conservative nature of the model and inputs, the Department believes that the default Q/C term is sufficiently representative of the entire State.

The Department will include a discussion of this issue in the Inhalation Basis and Background Document.

<u>Inhalation Exposure Pathway - Route to Route Extrapolation</u>

186. COMMENT: The toxicity values used to develop the soil remediation standards appear, at least for some chemicals, to use a simple route-to-route extrapolation that involves an inhalation rate of 20 m^3/day and a body weight of 70 kg. It should be noted that this mathematical calculation is not a route-to-route extrapolation, as it does not consider portal-of-entry effects, first pass liver effects, or other considerations that are typically involved in route-to-route extrapolation. EPA's Superfund program is currently reviewing its guidance to adopt methodologies that move away from this approach, and towards using dosimetric models that do not rely on inhalation rate and body weight to calculate an intake, but rather incorporate population-specific exposure scenarios to develop an exposure concentration for a population. One outcome of this dosimetric application is that adults and children exposed under the same scenario would be evaluated as one population, rather that separately. The commenters strongly

recommend that the Department also consider moving away from this approach and using models based on inhalation toxicity values and appropriate route-to-route extrapolation. (46, 58)

RESPONSE: The Department is aware of the development of this field of risk assessment and is awaiting EPA guidance on applying dosimetric models. When EPA publishes guidance, the Department will consider using it in the development of inhalation remediation standards in the future. Until such time, the Department will continue to use the approach described in the Inhalation Pathway Basis and Background to convert oral to inhalation toxicity values.

187. COMMENT: Page 7 of the Inhalation pathway "Basis and Background" document states, “For a number of contaminants, there were no inhalation toxicity data to be found. If oral toxicity data were available, they were converted to inhalation units.” Given the significant uncertainty associated with route-to-route extrapolation of oral toxicity values to the inhalation exposure route, the commenter suggests that the Department discontinue this practice which incorporates redundant conservative assumptions into the derivation of inhalation values. (21)

RESPONSE: The Department acknowledges that there are uncertainties involved in route-to-route extrapolation of oral toxicity data to inhalation data. However, the alternative to not evaluate the inhalation pathway for certain chemicals is not protective of public hearth and safety. The Department decided that, despite the uncertainties, it was better to derive an inhalation-based soil remediation standard using the oral toxicity data, than to have no inhalation pathway standard at all for these compounds.

Total Petroleum Hydrocarbons Cap

188. COMMENT: Among the commenter's most significant concerns as to why the Remediation Standards Rule should not be adopted is that the Department has not included a standard for total petroleum hydrocarbon (TPH) concentration. The TPH standard has existed within the context of the Technical Rules with a maximum contaminant concentration of 10,000 ppm (established based on the 10,000 mg/kg maximum for total organic contaminants), subject

to contingency analysis as set forth in Table 2-1 and been the foundation of the framework for investigation and remediation of #2 heating oil for over 15 years.

The Department has not demonstrated that the current remediation activities conducted under this standard pose any increased risk to public health and the environment. There are over 4,000 homeowner cases in process currently, for which the Technical Rules specify an analytical requirement, but for which there is no remediation standard. The absence of a remediation standard has not been deficient in ensuring protection of public health and or the environment.

The Department, through this regulation, has failed to provide guidance on this issue. If the analytical requirements should defer to analysis of volatile organic compounds by default, then the benzene standard, set at .005 ppm, becomes the driving standard. The benzene standard of .005 ppm is set at the practical quantitation level (PQL) for the contaminant. In effect, the remediation standard becomes a standard of 'none detected' or a standard reflective of 'pristine condition' as it is set at the most sensitive level for which the contaminant can be discerned. This standard is based on the theoretical capability of analytical laboratories to detect contaminant concentrations, but is not necessarily reasonable or practical when applied to the field activities of site remediation. The Department has not published guidance on sample collection methodologies that will ensure sample integrity is not compromised in the soil sample collection and transport process. The potential of background airborne contaminant concentrations, present during remedial activities, infiltrating the compliance soil sample collected causes for the very real potential that the laboratory reported data is not representative of the actual post remedial contaminant concentration at the site.

The Department unrealistically sets the remediation standard at the PQL for many of the listed compounds. The impracticality of this policy is best illustrated by the example of benzene due to the potentially large number of homeowner remediation sites where #2 heating oil is of concern.

Benzene is a contaminant of limited concern in remediation of fuel oil releases at homeowner sites; however, low levels of xylenes and ethylbenzene have been identified in soils impacted by the release of #2 heating oil. The proposed standard for xylenes, for example is 12 ppm. Soil with a concentration on the order of 10 ppm xylenes, a concentration below the proposed standard, will likely elevate benzene above its PQL, which is 0.005 mg/kg.

Therefore, the unrealistic policy inherent in the Department's proposed rule which sets the remediation standard at the PQL, combined with the failure of the Department to promulgate a remediation standard for TPH establishes the potential for the analytical costs alone incurred in the investigation and the remediation of homeowner sites to increase six-fold due to the requirement of more expensive analytical methods and a practical necessity to collect and analyze duplicate samples at each event. At the same time, it is likely remediation of homeowner sites will be designed to achieve a pristine post remedial standard, greatly increasing the cost to the homeowner for removal management of soils for which there is no demonstrated need solely due to the failure of the Department adequately assess and promulgate a TPH standard. (15)

RESPONSE: The commenter's concern about the absence of a total petroleum hydrocarbon standard is shared by the Department. The Brownfields Act permits the Department to promulgate soil remediation standards that are protective of human safety and health. Because the TPH number derived for use with the Soil Cleanup Criteria is ecologically based, it does not qualify for codification, as it is not a human health based number. Efforts are currently underway to develop a replacement for the current 10,000 mg/kg cap value that is human health based, and the Department intends to provide an alternative value as soon as possible. The Department is anticipating that sampling and analytical requirements will be similar and therefore the commenter's concern about a six-fold increase in cost and the need to develop new sampling techniques is not supported.

The Department is mandated to derive standards that are protective of human health and the environment. This includes evaluating both direct contact impacts and impacts to ground water. In situations where the health based standard is below the practical quantitation level (PQL), the Department is obligated to set the standard at the PQL. In this manner, the potential threat to human health and the environment is reduced while acknowledging that current analytical methods do not allow for measurement of the actual health based standard.

As noted elsewhere, the Department is not adopting the impact to ground water soil remediation standards, and therefore the benzene standard for residential sites will be established at 2 ppm, not at the PQL of 0.005 mg/kg (ppm) posited by the commenter. The Department recognizes that site-specific impact to ground water soil remediation standards may be developed that could be below the direct contact standard of 2 ppm, and potentially as low as the PQL of 0.005 ppm. The Department will address these situations on a case-by-case basis.

The commenter is referred to the most recent edition of Department's Field Sampling Procedures Manual regarding sample collection methodologies and sample integrity. Collection of volatile organic compound samples requires a trip blank whose function is to assess the potential of background airborne contamination impacting the collected samples. If sampling protocols are adhered to, the commenter's concern regarding background airborne contaminants should not be an issue.

189. COMMENT: Releases of fuel oil at residential sites are typically small in nature and impact a limited area, and many do not impact ground water. The proposed rule requires the remediation to be to the more stringent of either the residential direct contact or the impact to groundwater criteria in order to receive a No Further Action letter. Interested parties such as banks, insurers, attorneys, realtors, and most importantly, perspective purchasers, do not want institutional and engineering controls used at residential remediations. The cost and effort of developing alternative remediation standards will be prohibitive at all but a handful of industrial sites so it is certainly not realistic to believe they will be employed at a residential site. (15)

RESPONSE: The Department is not adopting the impact to ground water soil remediation standards on adoption, and instead will be evaluated on a site-by-site basis using guidance developed by the Department. The Department does not believe that this process will be cost prohibitive. As part of the guidance, the Department is developing spreadsheets

that will assist in calculating the applicable alternative soil remediation standard for contaminants.

190. COMMENT: The Department has suggested that one significant step that might streamline the Site Remediation Program's management of contaminated sites is to allow Department certified contractors to "sign-off" on the remediation of residential sites. If that occurs and this rule is adopted as proposed the only thing the Department will have done is shifted the responsibility and delay to a contractor and the objective of expediting a small remediation that has little or no public health impact will still not be achieved. (15)

RESPONSE: As a part of its proposal to readopt subchapter 16 of the Underground Storage Tank rules, N.J.A.C. 7:14B-16, the Department has recently proposed new rules that will require homeowners who wish to receive No Further Action letters from the Department in connection with the remediation of discharges from unregulated heating oil tanks to use a certified individual rather than seeking Departmental oversight for these remediation cases. See __ NJR ___ (May 5, 2008). The Department disagrees that the objective of expediting homeowner cases will not be achieved, regardless of who actually performs and/or reviews remediation at homeowner sites. Using both the Technical Requirements for Site Remediation, N.J.A.C. 7:26E, and the Remediation Standards, N.J.A.C. 7:26D, the person responsible for conducting the remediation should be able to determine exactly how and where to collect samples, as well as what the remedial goals are for the site. These goals are protective of human health and the environment, including direct contact exposures to people and impacts to ground water.

191. COMMENT: The Department states in the proposed rule, "If contaminants in soil exceed the impact to ground water standards, then the person responsible for conducting the remediation must either remove or treat the contaminated soil, or may request an alternative soil remediation standard."

The Department has not presented a clear and compelling argument that remediations conducted to the existing standards are not protective of human health and the environment. Yet, adoption of this proposal will place excessive economic hardship on the underground storage tank (UST) regulated community, as removal or treatment of soil to a 'non-measurable' standard is imposed.

It is estimated the increased investigative and remedial costs could potentially double in order to comply with the numeric standards set for in this proposal. The policy of the Department dictates that soil with a contaminant concentration which exceeds a proposed impact-to-groundwater standard would have to be excavated or treated even when the underlying groundwater has not been contaminated or is not reasonably expected to become contaminated. Requiring soil remediation under such circumstances clearly imposes substantial costs on site owners, and provides no commensurate public health benefit. It is unreasonable to require soil remediation for the impact-to-groundwater pathway when groundwater is not contaminated to unacceptable levels based on current and reasonably expected groundwater use. The proposed rule should allow for remediation to the Residential Direct Contact standard, if groundwater is not present, groundwater is not impacted or is not reasonably anticipated to be impacted.

Remediation at most regulated UST sites is conducted by utilizing a simplified approach though excavating and managing impacted soil, completing investigation of groundwater impact and instituting groundwater remediation as required. A priority in the process is returning the site to its best use, that is, dispensing motor fuel to the public; in the shortest time period possible.

While the Department continually refers to the allowance of an alternative soil remediation standard, this is impractical and not a viable alternative for many UST sites as the facility is precluded from its best use in the process. Therefore, the business owner is faced with the decision to pursue an alternative soil remediation standard at the cost of not conducting business or complying with the proposed remediation standards at costs greatly higher than is currently required. Furthermore, there is the delay of having the remediating party's experts educate the Department's experts on alternative remediation standards and no guarantee that the Department will accept alternative remediation standards. The remediating party is paying both his consultant to prepare the alternative soil remediation standard and the Department to review it all the while delaying utilization of the site. (3, 15)

RESPONSE: The Department recognizes that some of the remediation standards being adopted are more stringent than the historical soil cleanup criteria. However, these remediation standards are based on up-to-date toxicity factors, as well as current scientific methods for determining carcinogenic and non-carcinogenic impacts from contaminants. The historical soil cleanup criteria were last revised by the Department in 1999.

As noted above, the impact to ground water soil remediation standards are not being adopted and instead will be utilized on a site-by-site basis using guidance developed by the Department. It is quite possible that the person responsible for conducting the remediation will be able to demonstrate that a site-specific impact to ground water standard is appropriate for the site. However, if the contamination detected represents a threat to human health or the environment, then it will be necessary to remediate the contamination to remove this threat.

Compliance with the remediation standards being adopted herewith could increase investigative and remedial costs. However, the commenter presented no substantive information to support the assertion that costs could double, and therefore, the Department is unable to respond to this assertion.

The statement that soil contamination which exceeds a proposed impact-to-groundwater standard would have to be excavated or treated even when the underlying groundwater has not been contaminated or is not reasonably expected to become contaminated if the proposed rule is adopted is inaccurate. Demonstrating that ground water is not and will not be impacted by residual soil contamination is one of the parameters that can be evaluated when determining a site-specific impact to ground water standard. In those situations, if the site-specific impact to ground water standard is greater than the residential direct contact standard, then the residential direct contact standard would be the applicable standard for the site.

The commenters state that the "best use" at most regulated UST sites is dispensing motor fuel to the public. The Department does not understand why it is neither practical nor viable for such sites to request/determine a site-specific impact to ground water standard for contamination, nor why doing so will preclude a regulated underground storage tank site from its "best use." The Department is assuming that the primary concern of the commenters is again the proposed impact to ground water soil remediation standard for benzene. As noted above, the impact to ground water soil remediation standards are not being adopted. The Department has developed guidance to assist the person responsible for conducting the remediation in more quickly determining the appropriate site-specific impact to ground water standard; it is the belief of the Department that this process will minimize the amount of time required to remediate a site, and to minimize the amount of time that a site may be out of operation.

Inhalation Exposure Pathway - Compliance Averaging

192. COMMENT: The Department states that while currently allowed under the Technical Regulations (N.J.A.C. 7:26E-4.8(c)3i(5)), compliance averaging over an area of concern is limited and used infrequently, if at all, throughout the Department's Site Remediation and Waste Management programs. There are various reasons for the current lack of use of compliance averaging, including the difficulties in establishing the below-standard average due to the lack of acceptable sample points (different depths, clean zone, etc.). With the proposed soil remediation standards, the commenters anticipate that there will be a significant increase in the interest of the regulated community to pursue techniques for compliance averaging, determination of realistic exposure concentrations and to use geostatistics to determine average subsurface soil concentrations. The Department should address these various scientific concepts to ensure proper use and application of the soil remediation standards. (16, 20, 38, 41, 52, 56)

RESPONSE: While the Department is adopting numerical standards for the inhalation pathway, it acknowledges that it has not yet proposed or adopted rules for obtaining compliance with these standards. The Department intends to address this issue in the next revision of the Technical Requirements for Site Remediation, N.J.A.C. 7:26E. In the interim, the Department has provided guidance on this topic. This includes various spreadsheets and training tools to help increase efficiency and reduce the time required for implementation of the remediation standards. The guidance documents are available on the Department web site at http://www.nj.gov/dep/srp/guidance/rs. Pursuant to the Technical Requirements for Site Remediation, the Department already allows compliance averaging for the ingestion/dermal pathway under limited circumstances. Additional discussion of compliance averaging for both the ingestion/dermal pathway and the inhalation pathway will be included when the Department proposes to readopt N.J.A.C. 7:26E.

193. COMMENT: Upon review of the soils map from “Soils of New Jersey” by Tedrow (1985), the selection of “sandy loam” as the default soil texture for the entire State seems representative of relatively few areas, given that the majority of the area represented by this soil type selection is in the Pinelands areas (16, 20, 38, 41, 52, 56).

RESPONSE: The majority of sandy loam soil is not in the Pinelands. The Pinelands are composed largely of sand and loamy sand. Approximately two thirds of New Jersey exhibits soil types as coarse or coarser than the default sandy loam texture; therefore, this soil texture may be considered to be in the middle of the range of New Jersey soil textures.

194. COMMENT: Evaluation of particulate contamination at the surface using both an unlimited contaminant mass, as well as using the two foot deep interval without a separate evaluation of the top two centimeters, is an inaccurate representation of many industrial facilities. (16, 20, 38, 41, 52, 56)

RESPONSE: The Department is aware that the mechanics of particulate dispersion effect surface soil (i.e., soil in the top two centimeters). However, because the Department is concerned about potential exposure to contamination, both currently and in the future, the inhalation soil remediation standards were designed to consider contamination in the top two feet of the soil column. It is important to include contaminants in the top two feet because over time, contamination can reach the surface by way of erosional forces (such as wind or rain) or by mechanical disturbance (such as vehicle traffic, grading, or excavation). Based on the

Department's experience, it is reasonable and appropriate to assume that these erosional forces can occur at industrial facilities.

195. COMMENT: Regarding concentrations near or greater than saturation, there were several residential and non-residential soil concentrations in Tables H1 and H2 of the Basis and Background document that were near or greater than 1E+9 mg/Kg (i.e., pure product; see acetone in Table H2). Although it is still helpful to include such values in these tables, it is recommended to present these in brackets with a footnote that the calculated value exceeded the theoretical maximum soil concentration. (16, 20, 38, 41, 52, 56)

RESPONSE: The Department appreciates the suggestion made by the commenters, and agrees that it is helpful to indicate which inhalation remediation standards are at or exceed one million parts per million. It should be noted that those inhalation remediation standards which exceed one million parts per million are indicated in Table 6 of the Inhalation Pathway Basis and Background document ("Lowest soil remediation standards for the inhalation pathway"). The intent of Appendices H1 and H2 was to show the raw results of the calculations. The Department has modified the Inhalation Pathway Basis and Background document to indicate in Appendices H1 and H2 which inhalation remediation standards are at or exceed one million parts per million.

196. COMMENT: Non-residential exposures do not account for work period; an implied assumption for residential exposures is that the exposure is continuous over a 24-hour period. Since the non-residential receptor is not exposed for the entire day, then an adjustment factor for the typical workday (8/24) should be added to exposure equations, such as equation 18 on page 26 of the Inhalation Exposure Pathway Soil Remediation Standards, Basis and Background (May 2007). (16, 20, 38, 41, 52, 56)

RESPONSE: An adjustment factor for a typical 8-hour workday was included in the equation for the non-residential exposure scenario. This adjustment factor is included in the air dispersion modeling used to calculate a particulate emission factor (PEF; Equation 19 in the Inhalation

Pathway Basis and Background document). The air dispersion modeling includes a variable emission rate factor to estimate the air concentration for the eight daytime hours when workers are exposed. The Inhalation Pathway Basis and Background document will be revised to include this detail.

Inhalation Exposure Pathway - Toxicity

197. COMMENT: The commenter is concerned that the Department appears to be making conclusions regarding the toxicity of certain chemicals without providing sufficient information to justify these conclusions. The commenter recommends that the Department include justification regarding the derivation and use of the inhalation cancer slope factors for these chemicals. Unless such documentation is provided and the public is able to comment on the appropriateness of these values, the commenter does not support the Department's position to use these values. (21)

RESPONSE: The Department did not derive cancer slope factors for any of the chemicals evaluated for the inhalation pathway. The values, unit risk factors, were taken directly from specific sources, primarily the USEPA and the California Environmental Protection Agency. Descriptions of how the values were derived are available in the references cited in the Inhalation Pathway Basis and Background document. In general, when there are conflicting values from different sources that are considered reliable, the Department’s Air Program generally uses the more stringent value, in order to be protective of human health. As with other aspects of the inhalation exposure pathway, in order to be consistent with the Department’s Air Program, the inhalation pathway soil remediation standards also use the more stringent value.

198. COMMENT: The Department states in the proposal that its toxicity hierarchy gave the first priority to information that forms the basis for drinking water standards adopted by the Department pursuant to the Safe Drinking Water Act, followed by EPA’s Integrated Risk Information System (IRIS), and finally, other relevant health-based data sources, such as California EPA. However, the Department does not strictly follow this toxicity hierarchy in its

rule proposal. For example, in choosing a unit risk factor for cadmium, the Department relied on a value of 4.2E-03 $(\mu g/m^3)^{-1}$ from California EPA, 2002, even though IRIS presents a value of 1.8E-03 $(\mu g/m^3)^{-1}$. The Department does not provide any justification for choosing a 2.3-fold higher value from California EPA even though a value is reported by IRIS, which is considered by the Department as higher in its hierarchy of toxicity criteria sources. The Department should strictly adhere to its toxicity hierarchy and should provide explanations of any deviations from this guideline. (12)

RESPONSE: The toxicity values used for the inhalation pathway are primarily the same ones used in the Department's Air Program. The Air Program deviates from using the Integrated Risk Information System (IRIS) and USEPA values when there is some concern about how they were derived, and if other reliable sources of data are available. In the case of cadmium, the Air Program in 1991 declined to use the USEPA value of 1.8E-3/ug/m3 because it represents the Maximum Likelihood Estimate, instead of the 95% Upper Bound Estimate used in deriving other unit risk factors. It was later decided to use the California value. Because USEPA has gotten behind in the IRIS review and update process, the Department's Air Program has frequently turned to California for inhalation toxicity information.

199. COMMENT: The Department posted the following document in conjunction with this proposed rule: Inhalation Exposure Pathway, Soil Remediation Standards Basis and Background, May 2007. Page 6 of this document states that for inhalation toxicity values, the following hierarchy was considered: (1) IRIS, (2) California Environmental Protection Agency, (3) USEPA's Health Effects Assessment Summary Tables, and (4) other resources, including Toxicology Excellence for Risk Assessment (TERA), the Agency for Toxic Substances and Disease Registry (ATSDR), and a paper by I.C.T. Nisbet and P.K. LaGoy on toxic equivalency factors for polycyclic aromatic hydrocarbons. The commenter recommends that this document also consider USEPA's Provisional Peer Reviewed Toxicity Values (PPRTV) as a resource for current peer-reviewed toxicity values the Department could use in developing their criteria/standards. (21)

RESPONSE: The Department's Air Program has not used the USEPA's Provisional Peer Reviewed Toxicity Values (PPRTV). Therefore, in order to be consistent with the Department's Air Program, PPRTVs were not used to develop the inhalation pathway soil remediation standards. However, the Department agrees with the commenter that the PPRTVs could be used as a potential resource for toxicity values, and will consider their use for developing inhalation based soil remediation standards in the future.

<u>Inhalation Exposure Pathway - Table 1B – Non-Residential Direct Contact Health Based Criteria and Soil Remediation Standards</u>

200. COMMENT: In the Rule proposal, in the Section "Federal Standards Analysis - Ingestion-Dermal Exposure Pathway - Inhalation Exposure Pathway," the last paragraph of this section reads, "Two of the Department's proposed standards, for 1,1-dichloropropane and styrene, are more stringent because the Department determined, based on a review of pertinent toxicological studies, that it is appropriate to consider these contaminants as carcinogens as compared with USEPA's decision to use non-carcinogenic end points." Neither the proposed standard nor the "Inhalation Exposure Pathway Soil Remediation Standards, Basis and Background" document contains the toxicity values used for 1,1-dichloropropane. The commenter recommends that the Department ensure that all information used to develop the proposed standards for 1,1 dichloropropane is included in the document. (21)

RESPONSE: In the Federal Standards Analysis, the Department stated that the standard developed for 1,1-dichloropropane was more stringent than the USEPA's soil screening levels (SSLs) because it is a Class C carcinogen. The Department did not develop a soil remediation standard for 1,1-dichloropropane. This was a typographical error. The Department intended to discuss the inhalation pathway soil remediation standard for 1,2-dichloropropane. The supporting toxicity information for 1,2-dichloropropane is accurately reflected in the "Inhalation Exposure Pathway Soil Remediation Standards, Basis and Background" document.

201. COMMENT: The Department incorrectly calculates the particulate emission factor (E_{10}) value in Equation 21. This error results in incorrect values for the particulate emission rate for site traffic ($ER_{traffic}$), particulate emission factor from site activity (PEF_s), and exposure dose (Dose) values. However, it appears that the correct E_{10} value may have been used in calculating the actual soil remediation standards (SRS) inhalation values. These errors in calculations are as follows:

There is an error in calculating E_{10} for vehicle emissions. The Department lists 579.3 g/VKT. The correct value, using the Department's input values, is 265 g/VKT. This error, in turn, results in the incorrect $ER_{traffic}$ value of 0.0453 in Equation 20. The correct value is 0.0273. This results in an incorrect PEF_s value of 0.0167 in Equation 19. The correct value is 0.0136. Due to the error above, incorrect Dose values of 0.00105 for carcinogens and 0.00294 for non-carcinogens are calculated using Equation 18. The correct values are 0.000855 and 0.00240, respectively. This error should result in incorrect SRS soil inhalation values. However, back calculating the carcinogenic PEF_s from the unit risk factor (URF) and SRS values, the PEF_s value is 0.0135. Thus, it appears that the Department has the wrong values in the text, but used the correct ones in their actual calculations of the inhalation pathway SRS values for non-residential sites. (12)

RESPONSE: The Department thanks the commenter for pointing out these errors. Although Equation 21 specifies that the mean vehicle weight for use in Equation 21 is 3.1 megagrams (metric tons), the Department inadvertently used the value of 16 megagrams (metric tons) when it calculated mean vehicle weight, yielding the proposed value of 579.3 g/VKT for E_{10}. However, if the correct mean vehicle weight of 3.1 megagrams (metric tons) is used in the calculation, the E_{10} value of 277.8g/VKT results. Consequently, on adoption, the Department is modifying the default values in Equations 14, 15, 18, 19, 20 and 21 that are calculated using the correct mean vehicle weight of 3.1 tons in Equation 21, as follows:

Appendix 3 - Section III
Correction of Default Values in
Equations 14, 15, 18, 19, 20 21 on Adoption

Parameter	Proposed Default Value	Default Value Being Amended on Adoption
E_{10}	579.3 g/VKT	277.8 g/VKT
$ER_{traffic}$	0.0453 g/s	0.0286 g/s
PEF_s	0.0167 mg/m^3	0.0139 mg/m^3
Dose (carcinogenic)	0.00105 mg/kg/day	0.000871 mg/kg/day
Dose (non-carcinogenic)	0.00294 mg/kg/day	0.00244 mg/kg/day

In reviewing the equations in Appendix 3 and the inhalation health-based criteria listed in Appendix 1 and Table 1B, the Department identified additional errors that require correction on adoption.

The standard for 2-methylnaphthalene was incorrectly entered as 250,000 in Appendix 1 Table 1B. When calculated using Equations 14 through 25, the standard can be correctly calculated at 300,000 mg/kg. Similarly, the standard for n-nitrosodiphenylamine was incorrectly entered as 1,500 mg/kg. This standard can also be correctly calculated at 130,000 mg/kg by using Equations 14 through 25.

In addition, the Department calculated the inhalation non-residential standards for volatile organic contaminants using an incorrect non-residential exposure frequency value in Equations 1 and 2 of Appendix 3 in the rule proposal. The Department inadvertently used an exposure frequency of 250 days to calculate these standards even though the exposure frequency in Equations 1 and 2 was published correctly as 225 days. The Department intended to be consistent with the USEPA and use its exposure frequency of 225 days. As a result, the Department recalculated the standards for the 39 affected contaminants using Equations 1 and 2 and the correct exposure frequency of 225 days. The resulting corrected criteria are listed below and are being corrected on adoption:

Table 1B – Non-Residential Inhalation Health Based Criteria
Comparison of Proposed Criteria and Changes Being Made on Adoption (mg/kg)

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Contaminant	Inhalation Health Based Criterion as Proposed (mg/kg)	Inhalation Health Based Criterion Being Changed on Adoption (mg/kg)
Acetophenone	4	5
Acrylonitrile	2	3
Aldrin	13	14
Benzene	4	5
Bis(2-chloroethyl)ether	1	2
Bis(2-chloroisopropyl)ether	60	67
Bromoform	250	280
Bromomethane (Methyl bromide)	53	59
Chloromethane (Methyl chloride)	11	12
2-Chlorophenol (o-Chlorophenol)	2,000	2,200
Dibromochloromethane (Chlorodibromomethane)	7	8
1,4-Dichlorobenzene (p-Dichlorobenzene)	12	13
1,1-Dichloroethane	21	24
1,2-Dichloroethane	2	3
1,1-Dichloroethene	130	150
1,2-Dichloroethene (cis) (c-1,2-Dichloroethylene)	500	560
1,2-Dichloroethene (trans) (t-1,2-Dichloroethylene)	650	720
1,3-Dichloropropene (cis and trans)	6	7
2,4-Dinitrotoluene	15	16
2,6-Dinitrotoluene	6	7
1,2-Diphenylhydrazine	12	13
Heptachlor	16	18
Heptachlor epoxide	12	13
Hexachloro-1,3-butadiene	31	35
Hexachlorocyclopentadiene	97	110
Lindane (gamma-HCH) (gamma-BHC)	9	10
Methylene chloride (Dichloromethane)	87	97
Methyl tert-butyl ether (MTBE)	290	320
Naphthalene	16	17
Nitrobenzene	350	390
N-Nitrosodimethylamine	0.04	0.05
Polychlorinated biphenyls (PCBs)	52	57
Styrene	230	260
Tertiary butyl alcohol (TBA)	10,000	11,000
Toxaphene	180	200
1,1,2-Trichloroethane	5	6

Contaminant	Inhalation Health Based Criterion as Proposed (mg/kg)	Inhalation Health Based Criterion Being Changed on Adoption (mg/kg)
Trichloroethene (TCE) (Trichloroethylene)	18	20
2,4,6-Trichlorophenol	870	960

The standards for two volatile organic contaminants, n-nitrosodi-n-propylamine, and, pentachlorophenol were incorrectly entered as 130,000 mg/kg, and 300,000 mg/kg in Appendix 1 Table 1B. Using Equations 1 and 2 and the correct exposure frequency of 225 days, as explained above, the standard for n-nitrosodi-n-propylamine is 0.5 mg/kg, and for pentachlorophenol is 1,700 mg/kg. Accordingly, the Department is making these changes on adoption.

The proposed inhalation non-residential standard for 2-Nitroaniline of 83 mg/kg was calculated using Equations 1 and 2 for volatile contaminants and used 250 days as the exposure frequency. Using the correct exposure frequency of 225 days (explained above), the standard would be calculated at 92 mg/kg. However, this value exceeds the saturation value in air (C_{sat}) for 2-Nitroaniline, which is 87 mg/kg. As explained in the Inhalation Pathway Basis and Background document, when a calculated standard for a volatile contaminant exceeds the C_{sat} value for that compound, the calculated values cannot be achieved and therefore the applicable standard is that calculated using Equations 9 through 13 (residential) or Equations 14 through 25 (non-residential), applicable for particulate contaminants. Therefore, the inhalation standard for 2-Nitroaniline, calculated using Equations 14 through 25, is 23,000 mg/kg. Accordingly, the Department is adopting 23,000 mg/kg as the non-residential inhalation soil remediation standard for 2-Nitroaniline.

It should be noted that none of these corrected health based standards affect whether the standard is governed by the practical quantitation limit (PQL) because all of the health based numbers exceed their respective PQLs.

The equations that are incorporated into these rules are designed to result in the calculation of soil remediation standards that do not exceed a human health risk standard of 1 x 10^{-6} for carcinogens and a hazard index of 1 for noncarcinogens as set forth in the Brownfield Act. The Department recalculated the standards for these 41 contaminants using the equations in the rules and is adopting these corrected standards. The values for two standards are lower than proposed and therefore becoming more strict on adoption, and the values for the remaining standards are higher than proposed and thus becoming less strict on adoption.

The Department also recalculated the non-residential inhalation health based criteria for 4-chloroanaline using the correct exposure frequency of 225 days. However, as discussed in number 6 of the Agency-initiated changes provided below, the Department has determined not to adopt a remediation standard for this contaminant because the National Center for Environmental Assessment (NCEA) withdrew its toxicity value on which this contaminant was based.

Inhalation Exposure Pathway - Vehicle Traffic - Economic Impact

202. COMMENT: The Department should consider the expected economic impact of applying the traffic scenario in deriving the non-residential inhalation soil remediation standards values. The USEPA does not consider traffic for non-residential soil screening levels, and the vast majority of non-residential sites that support significant traffic do so on paved or covered soils. The Department states that it thinks the USEPA considers non-residential sites to be paved; however, that conclusion is illogical given that the USEPA considers factors for vegetative cover and wind erosion of soils in the soil screening levels derivation. The Department should use the same approach that the USEPA uses for soil screening levels derivation at non-residential sites, and use site-specific approaches to address the impact of traffic on unpaved soils for the small fraction of sites for which that condition is potentially important. Application of a generic traffic model for inhalation soil remediation standards for all

non-residential sites is not necessary and likely results in an unnecessary economic burden to meet an overly stringent standard. (12)

RESPONSE: The Department's approach differs from the USEPA because the Department has determined that vehicle traffic is a common aspect of non-residential sites and that vehicle traffic produces a significant component of the particulate emissions present at a given site. In order to be protective of human health and the environment, the Department determined to include vehicle traffic as part of the assumed non-residential exposure scenario. A primary reason for this approach is that the Department is required to evaluate future use scenarios, and paving, even if currently present, may not always be present at a site. Additionally, paving (i.e., capping) is a remedial alternative, and does not eliminate the potential exposure pathway.

Furthermore, the Department does not assume that the USEPA considers all non-residential sites to be entirely paved. The Department recognizes the USEPA evaluates scenarios which it considers appropriate, inclusive of vegetated and/or open areas subject to wind erosion. It should be noted that like the USEPA, the Department does assume a certain level of vegetative cover as well as wind erosion factors in developing the inhalation pathway standards.

The commenter envisions cost savings by not addressing vehicle traffic as a component of a non-residential exposure scenario. As detailed, above, the Department has determined that it is inappropriate to do so.

<u>Inhalation Exposure Pathway - Vehicle Traffic – Rutgers Study</u>

203. COMMENT: The Boile (2006) study and the Quick Response Freight Manual (QRFM) provide information on the total number of truck visits per day and are not specific to an 8-hour period, but rather, a 24-hour period. Many of the businesses in the studies, such as the hotel, mining, and construction industries, operate 12-24 hours/day. Thus, truck traffic is overestimated at these sites per 8-hour day, because the model used by the Department for the inhalation pathway soil remediation standards is specific to an 8-hour period. For example,

mining operations usually occur around the clock, and truck traffic would be about the same from hour to hour. A value of 259 truck trips per employee per day was used by the Boile (2006) study to estimate the average number of truck trips per mining establishment. About a third of this value should have been used by the Boile (2006) study to calculate truck traffic at mining sites for an 8-hour day. Similarly, proportional values for other business and employment types, such as construction, hotel industry, truck transportation businesses, and wholesale and retail trade, which would be expected to have truck traffic beyond the 8-hour workday, should have been used. The QRFM presents data on median hourly distribution of truck travel as a percentage of total daily truck trips at some wholesale, truck transportation, and retail businesses in four urban areas (population 25,000 to 750,000) (Table F-1 of QRFM; FHWA 1996). These data show that 23.6% of all truck traffic at these businesses occurred in the 16 off-peak hours (peak hours being from 8 a.m. to 4 p.m.). The Department is making an overly conservative assumption that all of the traffic that may occur throughout a 24-hour day at a site occurs within an 8-hour exposure period, significantly overestimating potential exposures. (12)

RESPONSE: The commenter is correct that the cited study estimates the average daily traffic and not an 8- or 12-hour day at any establishment. No data are readily available on hours of operation for all of the different types of establishments. The only information available through the Quick Response Freight Manual (QRFM) is for urban areas and certain Standard Industrial Classification (SIC) codes. Fully recognizing the limitations of the data, the Department chose to assume the daily traffic count established by the study applied to an 8-hour day. This is the most conservative choice the Department could make. However, based on the professional evaluation of the Boile study, it was also decided to remove all traffic counts with maximum values greater than 2,000 trips per day, as it was determined that these counts were unreasonable and would more likely represent operations over a 24-hour period. Therefore, the Department has approached the selection of data inputs in a balanced manner, so as to ensure the calculated value will be as accurate as possible and remain protective of human health and the environment.

204. COMMENT: The truck trip generation rates per employee used in the Boile (2006) study were derived from the Quick Response Freight Manual (QRFM) (FHWA 1996). These data are based on studies performed in only four selected counties in Washington and one metropolitan region each in Arizona, New York, Tennessee, California, and Michigan. In this regard, the Boile study states, "Although the rates reported are quite extensive, the sources they are derived from (studies performed in selected counties and metropolitan regions in the states of Washington, Arizona, New York, Tennessee, California and Michigan) are limited in scope and geographic coverage" (pages 9-10). Whether the traffic counts per day at a site from these other geographic regions can be extrapolated to New Jersey on the basis of per-employee count is questionable, and it appears that the data from these sources are highly variable and may not be representative. (12)

RESPONSE: The Department recognizes the limitations of the data used. However, these data are the best available, and the Department has determined them to be appropriate for use. The Department is evaluating ways to improve the data set, including conducting additional survey work within New Jersey. Note that if the person responsible for conducting the remediation believes that the standard does not reflect the vehicle activity at the site, then the request for an alternative remediation standard is an option that the Department offers.

205. COMMENT: The Boile (2006) study presents values for daily truck trips for each of the Standard Industrial Classification (SIC) codes for different types of employment (pages 72-74, Boile study). For the mining establishments, the study presented average values in the range of 3,817-51,022 truck trips. It is unclear whether these are daily truck trips per establishment or the daily total for all establishments. Either way, these are very high, unrealistic values, but especially so if these are daily truck trips per establishment. (12)

RESPONSE: The tables included in the Boile (2006) report present all of the available data. However, as the data were aggregated, it was determined that vehicle trip rates per employee with a maximum value greater than 2,000 were considered to be unrealistic and were not included in the calculations of the final number of vehicle trips. Based on this, all 4-digit subcategories that were included in the 2-digit Standard Industrial Classification (SIC) categories 10-14 were excluded for all counties in the state; mining operations all fall within SIC categories 10-14.

206. COMMENT: Using the method of calculating daily truck trips per establishment presented by Boile (2006) (i.e., multiplying the average truck load equivalent rate (259 daily truck load equivalents per employee for Standard Industrial Classification (SIC) code 11) by the total number of employees (5,978 for SIC code 11) and a factor of 0.73 to convert from truck-load equivalent to truck trip, and then dividing this product by the number of establishments for that SIC code (113 for SIC code 11), results in a value of 10,041 daily truck trips per establishment for SIC code 11. It is unclear why this value is different from the value of 51,022 presented in the table on page 73 of Boile (2006). Moreover, both of the values for daily truck trips per mining establishment are unrealistically high. (12)

RESPONSE: The table on page 72 presents average values for 2-digit Standard Industrial Classification (SIC) codes, which are the result of aggregations mentioned in the report. The detailed calculations for average vehicle trips have been made at the 4-digit SIC level.

Note that the Department considered vehicle trip rates per employee with a maximum value greater than 2,000 to be unrealistic and did not include them in the calculations of the final number of vehicle trips. As a result all 4-digit subcategories that were included in the 2-digit SIC categories 10-14 were excluded. This is the reason for the difference between the value calculated by the commenter and that presented in the Boile (2006) report.

207. COMMENT: It is unclear how the Boile (2006) study arrived at an average of 95 daily truck trips per establishment for Standard Industrial Classification (SIC) codes 10-19 combined (on page 72), which is two orders of magnitude different from the values presented on page 73. This information should be clarified, because it is not possible to follow the analysis of traffic count through the Boile (2006) study to understand how the arithmetic mean of 33 trucks per day is calculated from the data presented. (12)

RESPONSE: The table on page 72 the Boile (2006) study presents average values for 2-digit Standard Industrial Classification (SIC) codes, which are the result of aggregations mentioned in the report. As mentioned above, vehicle trip rates per employee with a "maximum" value greater than 2,000 were considered to be unrealistic and were not included in the calculations of the final number of vehicle trips so as to not artificially inflate the results. The average value of 95 vehicle trips per day for SIC codes 10-19 was calculated subsequent to deleting these values.

208. COMMENT: If the truck trip values, presented on pages 73-74 of the Boile study report, represent the daily total for all establishments for that Standard Industrial Classification (SIC) code, this study is heavily weighted toward mining and construction operations (SIC codes 10-19), it appears that more than 95% of the total truck traffic occurs at mining and construction operations around the State. (12)

RESPONSE: The table on pages 73 and 74 the Boile (2006) study shows the results of the aggregate calculations. As mentioned above, Standard Industrial Classification (SIC) codes 10-14, which includes high vehicle activity mining and construction operations, have not been included in the final calculations of the average number of trips due to their unrealistic trip-rate-per-employee value. Therefore, the study does not use these data that artificially inflate the results, and the study is not weighted toward mining and construction operations.

209. COMMENT: The use of traffic-count data from the mining and construction operations, presented in the Quick Response Freight Manual (QRFM) raises several concerns. The truckload equivalents data (used for generating truck trip data in New Jersey) on mining (Standard Industrial Classification (SIC) codes 10-14) and construction (SIC codes 15-19) operations are derived from four counties of one state only - Washington. No data are presented from any other states. The relevance of applying Washington data to the state of New Jersey needs to be established.

Another concern with the use of traffic-count data from the mining and construction operations, presented in the QRFM is that the comparison of truck-trip data for other employment types (SIC codes 20-51, 52 and 52-59) between Washington and the other states clearly highlights the discrepancy between these data sets. For example, for the retail trades (SIC codes 52-59), the average number of truck trips per employee was 0.283 for all states combined, except Washington. The average truckload equivalent per employee from Washington was 16.76. Applying a truck-load-equivalent-to-truck-trip conversion factor of 0.73 (assuming that the same value was used as that for New Jersey), the resulting value of 12.23 is 43-fold higher than the average for the other five states. Although the data for these SIC codes were not used by the Boile study, it demonstrates that the Washington data are substantially and consistently different from the data for the other five states. If data on mining operations were available for the other states, the disparity between them and the Washington data would most likely be evident there, too.

Another concern with the use of traffic-count data from the mining and construction operations, presented in the QRFM is that the data from Phoenix, Arizona; Knoxville, Tennessee; Modesto, California; Rochester, New York; and Saginaw, Michigan differentiate between 4-tire trucks, single-unit 6(+)-tire trucks, and combination 6(+)-tire trucks (tractor trailers), the data from Washington do not. This further demonstrates the limited scope and coverage of the Washington data. (12)

RESPONSE: As noted above, vehicle trip rates per employee with a maximum value greater than 2,000 were considered to be unrealistic and were not included in the calculations of the final number of vehicle trips. This means that all 4-digit subcategories that were included in the 2-digit Standard Industrial Classification (SIC) categories 10-14 were excluded. Also as noted above, the Department acknowledges the conclusions reached in the Rutgers vehicle study, including the need to obtain better "New Jersey specific" data regarding vehicle traffic at sites within the state. However, in the interim, the Department has also determined that it is important to include vehicle traffic as a component when determining applicable inhalation soil remediation standards. To that extent, the Department is utilizing the conclusions of the Rutgers vehicle study as default values in its calculations.

210. COMMENT: The Department contracted Rutgers University to determine an average number of trucks that traverse an industrial site each day: The Rutgers Study includes a statement that correctly notes the flaws in determining this value. The Rutgers study states that, given the variation in size and employment within various industries, as well as the wide range in type and size of truck generating facilities, the procedure to develop a single value representing the average number of trucks visiting any and all non-residential sites in New Jersey has many inherent problems. The study suggests alternatives, including conducting a survey of various facilities in New Jersey for the purpose of establishing the average number of truck trips, per truck size and weight category. These survey data could be classified by type and size of facility. An expanded sample of the above data could be used further, to adjust the Quick Response Freight Manual (QRFM) truck trip rates to New Jersey conditions. This study would estimate accurate trip rates for various types of facilities for the state of New Jersey. (16, 20, 38, 41, 52, 56)

RESPONSE: The Department recognizes the limitations of the study and is considering potential options for addressing this concern. As stated in the Inhalation Pathway Basis and Background document, the option for establishing an alternative remediation standard (ARS) based on vehicle traffic other than the assumed value already exists. The person responsible for conducting the remediation can conduct a site-specific survey of vehicle traffic, and then request an alternative remediation standard using these values (i.e., average number of vehicles per day, vehicle weight). Similarly, the person responsible for conducting the remediation may propose to alter other variables, as the Inhalation Pathway Basis and Background document allows for proposal of different models, assumptions, and information on a case-by-case basis. If the Department approves of their use, these alternative variables may then be used to develop an acceptable ARS.

211. COMMENT: The Rutgers Study correctly notes that given the variation in size and employment within various industries as well as the wide range in type and size of truck generating facilities, a procedure for estimating a single value representing the average number of trucks visiting a non-residential site in New Jersey has many inherent problems. The authors suggest alternatives, including a survey of various facilities in New Jersey for the purpose of establishing the average number of truck trips, per truck size and weight category. The number and type of facilities to be surveyed would need to be determined, to ensure that the sample data would be adequate and the sample representative. These survey data could be classified by type and size of facility. An expanded sample of the above data could be used further, to adjust the Quick Response Freight Manual (QRFM) truck trip rates to New Jersey conditions. This study would estimate accurate trip rates for various types of facilities for the state of New Jersey. Upon review of the study, it should be noted that many categories of sites had fewer than 33 trips per day, and light vehicles were the predominate majority; 93% of the trucks were 5,120 lbs or less. The Department should modify its assumptions to reflect actual usage at sites in New Jersey.

The numeric soil remediation standards for non-residential land use, based upon inhalation, are also based upon a level of truck traffic that is not typical for most sites. (4, 5, 11, 15, 16, 20, 18, 20, 28, 29, 30, 32, 34, 38, 40, 41, 45, 51, 52, 54, 56, 59)

RESPONSE: The Department acknowledges the conclusions reached in the Rutgers vehicle study, including the need to obtain better "New Jersey specific" data regarding vehicle traffic at sites within the State. However, in the interim, the Department has also determined that it is important to include vehicle traffic as a component when determining applicable inhalation soil remediation standards. To that extent, the Department is utilizing the conclusions of the Rutgers vehicle study as default values in its calculations.

212. COMMENT: Several of the parameters, including number of truck trips on a non-residential site and the average weight of trucks, that were used in the inhalation soil remediation

standards for non-residential sites, are based on the Boile (2006) study. However, this study is not specific to the application of these data in the Department's model, for several reasons.

The vehicle study (2006) addresses all truck traffic, not traffic on unpaved surfaces at non-residential sites. Clearly, more traffic is expected on paved surfaces than unpaved surfaces; hence, the traffic counts from Boile (2006) overestimate traffic for unpaved sites. Neither the Boile (2006) study nor the Federal Highway Administration Quick Response Freight Manual (QRFM) (FHWA 1996), on which this study relied for the truck trip-generation rates, differentiates between paved and unpaved surfaces in the traffic count. Application of the Boile (2006) study data for the soil remediation standards is inappropriate and overly conservative. (12)

RESPONSE: The Department agrees that the study does not differentiate between paved and unpaved surfaces. However, the purpose for considering unpaved surfaces is to evaluate a worst-case scenario in order to determine whether the Department would have any regulatory concerns regarding future use at a site.

213. COMMENT: The Department attempted to improve upon the traffic-count data used in the soil remediation standards non-residential soil suspension model, relative to the previous proposal, using the Boile (2006) study. However, there are still many questions as to how these data were generated and whether they are appropriate for New Jersey. Also, it is apparent that the Boile (2006) data are not consistent with the Department model, because they provide traffic data for all sites regardless of pavement and are not specific to an 8-hour workday. In both cases, use of the Boile (2006) data overestimates exposures. Further, it is evident from the Boile (2006) study that there is tremendous variability in the level of truck traffic at any site. Hence, it is recommended that the Department use the same approach for inhalation non-residential Soil remediation standards as used by the USEPA for soil screening level values, i.e., consider particulate generation from wind erosion only, and conduct site-specific assessments for those sites that support truck traffic on unpaved surfaces. In fact, it is reasonable to assume that the soil remediation standards values generated with this approach may not be health protective at

sites with substantially more than 33 truck trips per day, such as a mining site or construction companies where the traffic count could exceed this estimate by more than 10-fold. (12)

RESPONSE: The New Jersey model is based on unpaved surfaces. The commenter is correct that the study estimates the average daily traffic and not an 8- or 12-hour day at any establishment. There are no data readily available on hours of operation for all of the different types of establishments. The only information available through the Quick Response Freight Manual (QRFM) is for urban areas and certain Standard Industrial Classification (SIC) codes. Fully recognizing the limitations of the data, the Department chose to assume the daily traffic count established by the study applied to an 8-hour day. This is the most conservative choice the Department could make. However, based on the professional judgment of the Boile study, it was also decided to remove all traffic counts with maximum values greater than 2,000 trips per day, as it was determined that these counts were unreasonable and would more likely represent operations over a 24-hour period. Therefore, the Department has approached the selection of data inputs in a balanced manner, so as to ensure the calculated value will be accurate and remain protective of human health and the environment. Again, the Department has also determined that it is important to include vehicle traffic as a component when determining applicable inhalation soil remediation standards. To that extent, the Department is utilizing the conclusions of the Rutgers vehicle study as default values in the calculations. If the person responsible for conducting the remediation chooses, they can include site-specific information, such as vehicle activity, to calculate an alternative remediation standard.

Inhalation Exposure Pathway - Vehicle Traffic – Miscellaneous Comments

214. COMMENT: Calculations for traffic on unpaved roads are based on USEPA parameters for unpaved roads and open areas of industrial sites, such as mines, steel mills, etc., which are probably not applicable to most New Jersey non-residential sites. (12)

RESPONSE: Vehicle trip rates that were considered to be unrealistic, including those for mining facilities, were not included in the calculations of the final number of vehicle trips. As noted above, the Department is concerned with future use of a site, and therefore assumes that paving is not present, and that it is possible that future exposure to the contamination could occur . The Department does not believe all sites to be currently unpaved. The current presence of a barrier like paving does not eliminate the potential exposure pathway. It simply prevents immediate exposure to the contamination.

215. COMMENT: The Department's approach is inconsistent with the USEPA's approach to determining inhalation soil screening levels (SSLs) with regard to the evaluation of vehicle traffic for the inhalation exposure scenario. The USEPA does not consider vehicle activity under its non-residential exposure scenarios, whereas the Department does. The Department's justification for this application is based on the requirement for the Department to evaluate future use situations without consideration of institutional or engineering controls. As the Department has noted, this approach differs from the USEPA's in that USEPA assumes only short construction scenario for truck traffic on bare soil. The Department's different approach may be appropriate for some sites, such as sand pits and rock quarries, where truck traffic is largely over unpaved surfaces.

The Department assumes that roadways on a given industrial or commercial property are unpaved. This does not reflect the reality that the vast majority of sites indeed have paved roads and that this is a typical requirement of enforceable local ordinances and/or the land development approval process. This scenario also is based on a conservative assumption about duration of exposure for non-residential use - 25 years. Therefore, using these assumptions for the calculation of default generic soil remediation standards is not credible and reflects a misplaced focus on establishing default standards based on eliminating an unlikely "worst case" scenario. The commenters conclude that the fundamental assumptions used by the Department for the inhalation pathway should be re-evaluated, given the apparent overly conservative assumption and the implications that result. The Department can address its concern regarding the unlikely potential for unpaved roadways by requiring proof that roadways are required as part of a land use approval and, or enforceable municipal ordinance. (16, 20, 38, 41, 52, 56)

RESPONSE: One of the criteria used by the Department when developing the inhalation soil remediation standards is future use scenarios. A potential future use for a contaminated area could include no form of cover over the contamination. Additionally, there is no guarantee that an area will remain covered, or that the cover will remain intact. Therefore, the non-residential inhalation pathway soil remediation standards are calculated using vehicle traffic. In terms of applying the non-residential inhalation pathway soil remediation standards, the Department is concerned with the contamination that is present. The fact that an engineering control (i.e., paving) may be present is irrelevant to determining whether the concentration of contamination presents risk to human health and the environment for a given exposure scenario (residential, non-residential). The engineering control is relevant in terms of a remedial alternative. Nothing in the Remediation Standards precludes the person responsible for conducting the remediation from using an engineering control as the remedial alternative. The Department followed USEPA models in calculating the inhalation pathway soil remediation standards, including the exposure duration for non-residential use of 25 years. The Department does not believe that the assumptions used in determining the inhalation pathway soil remediation standards are overly conservative, nor do they reflect an unlikely worst-case scenario.

216. COMMENT: It is overly conservative to establish the entire truck route as unpaved, and not allow for consideration of engineering controls (paving) to eliminate this potential exposure pathway. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59, 16, 20, 38, 41, 52, 56)

RESPONSE: Whether engineering controls are utilized at a site is a remedial action decision, rather than a factor to be used in evaluating whether contamination exceeds a given standard. In terms of determining whether contamination is present in exceedance of the inhalation pathway soil remediation standard, the person responsible for conducting the remediation is required to evaluate the site pursuant to the applicable models and equations. If it is determined that contamination is present in exceedance of the inhalation pathway soil remediation standard, then the person responsible for conducting the remediation can propose some type of engineering control as the remedial action. The use of an engineering control does not eliminate the potential exposure pathway; it simply prevents immediate exposure to the contamination. An engineering control, such as currently existing paving, may not always be present at the site unless there is a requirement for the paving to remain.

217. COMMENT: In two places in the inhalation basis and background document (pages 4 and 36), the text states that emissions from vehicle traffic are much higher than those from wind erosion alone. In reality, this is likely the case, but it is not the case in the Department model - in fact, the opposite occurs. Emissions from wind are almost two times higher than those from traffic. Equation 19 presents the ER_{wind} as 0.0528 g/s, and $ER_{traffic}$ as 0.0453, but the actual $ER_{traffic}$ is 0.0273 g/s. Thus, emissions of particulates for wind predominate in the non-residential soil remediation standards model for particulate inhalation. (12)

RESPONSE: Vehicle traffic at a site significantly affects the number of disturbances, and thus the wind erosion component of the Department model. Airborne particulate concentrations from the combination of vehicle traffic and wind erosion are greater than airborne particulate concentrations from wind erosion alone. In fact, airborne particulate concentrations from the combination of vehicle traffic and wind erosion are 1.5 times greater than those from wind only. Accordingly, if a site has no vehicle traffic, the airborne particulate concentrations from just wind erosion will be much less than those for a site with vehicle traffic because there will be less disturbances per year to initiate wind erosion. The number of disturbances (225 days per year) reflects the EPA-recommended worker exposure frequency of 225 days per year (USEPA 2001).

218. COMMENT: Regarding the default parameter value of 0.09 km for "average distance a vehicle travels through the unpaved area," it is inaccurate to characterize all sites greater than 2 acres as having the same truck traffic; a smaller site (for example, 2 to 10 acres) will not have the same truck traffic as a much larger facility. (16, 20, 38, 41, 52, 56)

RESPONSE: The Department understands that the amount of truck traffic varies for different sites and different sized sites. In order to develop a generic set of soil remediation standards the Department calculated the inhalation soil remediation standards based on a 2-acre parcel. For example, an eight acre site would be evaluated as four separate 2-acre parcels for comparison to the remediation standards. Thus, the remediation for each 2-acre parcel will depend on the level of contamination measured within each parcel.

219. COMMENT: Inhalation of particles (for semivolatiles and nonvolatiles) was also considered for both the residential and the commercial/industrial scenario. The residential scenario was assessed for inhalation of particles from windborne dust, while the commercial/industrial scenario considered inhalation of particles generated from both windborne dust and truck traffic. This has resulted in lower soil remediation goals for some contaminants under the commercial/industrial scenario than under the residential scenario, primarily associated with the amount of dust attributable to truck traffic. Due to the proximity of many sites to residential areas in a state as densely populated and as urbanized as New Jersey, the commenters recommend also considering inhalation of particles generated from truck traffic for residential scenarios as well. (46, 58)

RESPONSE: The Department agrees that it is appropriate to ensure that the remediation of a non-residential property that is adjacent to a residential property is protective of human health on-site and also prevents the transport of contamination to off-site locations, including residential properties. The non-residential inhalation pathway soil remediation standards are calculated based on specific exposure assumptions (exposure frequency, exposure duration, averaging time) that do not apply to the residential inhalation pathway soil remediation exposure scenario. However, if a residential land use is adjacent to non-residential site and vehicle traffic is causing an unacceptable risk to residents via the inhalation exposure pathway, the Department would require the person responsible for conducting the remediation to reduce or eliminate the transport of contaminated soil to the adjacent property to ensure that human health is protected.

Chromium

220. COMMENT: The Department's proposed standards do not address numeric soil remediation standards for trivalent or hexavalent chromium. The Department’s numeric and

narrative soil remediation standards should also apply to chromium. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

221. COMMENT: The proposed standards failed to include a “minimum remediation standard” for chromium contamination in soils. Despite the fact that large areas of highly populated section of New Jersey suffer from legacy of massive chromium contamination the Department failed to include "minimum remediation standard" for chromium in the proposed standards. The commenter has urged the Department to adopt a chromium standard for the last decade based on the mountain of evidence of the acute and chronic toxicity of chromium. Chromium has been a known Class A human carcinogen for decades. It has been a regulated ground water quality parameter and safe drinking water parameter for decades. In addition to the decades old records on the toxicology of chromium, the National Toxicology Program (NTP) has confirmed chromium as a carcinogen via the ingestion route. The NTP results have been peer reviewed and published should the Department take an interest in this important matter. It can only be construed that the Department’s failure to include chromium in the soil standards proposal is out of neglect, incompetence or the undue influence of chromium polluters. It is our sincerest hope that any future proposals will not suffer thusly. (42)

222. COMMENT: Hexavalent chromium is of particular interest due to its presence throughout the State as a result of chromium ore processing. Recent studies by the National Toxicology Program suggest the potential for carcinogenicity via oral exposure. The commenters recommend that the Department include a remediation standard for hexavalent chromium that addresses this potential health effect. At a minimum, the Department should provide guidance on how to address this chemical during soil remediation efforts. (46, 58)

223. COMMENT: Using the calculation methods and assumptions put forth by the Department for inhalation of particulates at non-residential sites, the commenter calculated an soil remediation standards for hexavalent chromium, Cr(VI), assuming that the same methods will be used. This calculation resulted in a value of 27 mg/kg for Cr(VI). Even though this will be a remediation standard, this value is about 19-fold less than the USEPA SSL for Cr(VI) for

the industrial outdoor worker scenario, i.e., 51,520 mg/kg, which is used by USEPA for screening contaminated sites. This further highlights the overly conservative assumptions used by the Department in the development of the new soil remediation standards for this scenario. More conservative than the calculated Cr(VI) soil remediation standard of 27 mg/kg is the chromium policy that was put into effect earlier this year that considered 20 mg/kg as the soil standard for unconditional No Further Action (NFA) approval for chromium-contaminated sites (NJDEP 2007c: Memorandum from Lisa P. Jackson, Commissioner, to Irene Kropp, Assistant Commissioner, Site Remediation and Waste Management. Re: Chromium Moratorium. New Jersey Department of Environmental Protection, Trenton, NJ. February 8). Even though the calculated soil remediation standard is much lower than the USEPA SSL is, it is still higher than the standard considered by the chromium policy. Both of these standards are overly conservative for setting remediation levels and should be adjusted to reflect more realistic values that are still sufficiently protective of human health.

In summary, the methods used for the non-residential soil remediation standards derivation for particulate emissions are uncertain and overestimate exposures for most sites. A more appropriate approach would be to use the USEPA SSL methodology for non-residential sites, i.e., consider emissions from wind erosion only, and address sites that support traffic on unpaved surfaces with site-specific alternative remediation standard values. (12)

RESPONSE to COMMENTS 220 through 223: The Department has not included soil remediation standards for trivalent or hexavalent chromium as part of these rules because the Department's evaluation of chromium is on-going. The Department is awaiting the official release of the complete results of the National Toxicology Program study evaluating hexavalent chromium as an oral carcinogen. When this report is released, the Department will review the report and will make a decision with regard to setting a remediation standard for chromium. Until such time, the Department will continue to develop site-specific soil remediation standards for chromium.

Particle size

224. COMMENT: The proposed standards fail to take into account the dynamics of the unsaturated soil environment where contaminants can undergo transformation, concentration and partition. The cleanup number for the bulk soil must be less than the health-based number, especially when dealing with inhalation and ingestion concerns. This result is predicated upon the knowledge that metals and organic compounds will often distribute themselves sorbed preferentially to the finest soil fractions, such as clay-sized as opposed to sand-sized soil particles and due to changes in soil moisture. These phenomena are described in the USEPA guidance for developing soil screening levels. Unfortunately, the currently proposed standards have not addressed this known and critically important phenomenon. It is not atypical for a contaminant concentration on the finest fraction of the soil to be at least 10 times greater, an order of magnitude greater, than would be found in the bulk soil analysis which includes the lower concentration sand-fraction components diluting down the high concentration clay-sized components.

Soils are a dynamic system. As rocks weather to form soil, certain metals become more soluble and under the proper climatic conditions will be transported in the soil solution to enrich in certain zones or parts of the soil. Iron enrichment has been often identified at preferential depths within the soil profile and as iron oxide coatings on the surfaces of the smallest mineral fractions (clay-sized soil fractions) of the soil (Brady, N.C., 1974). Contaminant distribution of metals or organic compounds will be defined by the same physical and chemical constraints within the soil column. Unsaturated flow of the soil solution; and, the distribution of sand-sized, silt-sized, and clay-sized soil particles influence the distribution of metals and organic compounds in the soil.

Soils are most often composed of some mixture of sands, silts, and clays. Therefore, the greatest enrichment of metals in soils is known to preferentially sorb to that fraction of soil particles exhibiting a high surface area per unit mass on the clay-sized soil fraction and the least on the sand-sized soil particles. This most often results in a disproportionate concentrating effect of surface-sorbed contaminants on the finest fractions of the soil, resulting in orders of magnitude higher contaminant concentrations in the clay-sized versus the sand-sized fractions. The important consequence of this effect is that the cleanup number for a given bulk soil must be less than the health-based number, especially when dealing with inhalation and ingestion issues where the finer soil particles are the likely vectors of exposure. Further, the bulk soil cleanup number can be calculated based upon the distribution of contaminant concentration with particle size, soil particle size distribution, and the known redistribution effect due to unsaturated transport where it is applicable. For the reasons explained above the commenter and NJPEER urge the Department to go back to the drawing board on this proposal. (42)

RESPONSE: The Department recognizes that soil particle size and contaminant distribution can effect the impacts of certain contaminants in the environment. However, the information available on these topics is quite variable. Because of this, USEPA has chosen not to address these issues in their current soil screening level guidance documents and the Department has determined to follow EPA's lead. In the future, when the USEPA incorporates these soil dynamics into their guidance, the Department will follow suit.

Failure to Meet Legislative Mandate

225. COMMENT: The proposed rule clearly states the requirement for the Department, in developing remediation standards, to consider "the location, the surroundings, the intended use of the property, the potential exposure to the discharge and the surrounding ambient conditions, whether naturally occurring or man-made." However, the Department's existing policy is to consider not "what is," but what "may be" at the site. This policy effectively dictates remediation in the State be conducted to the most stringent published standard, regardless of the current use of the site or the projected use of the site, and regardless of the presence of groundwater for sites which currently seek not to use institutional or engineering controls. Therefore, by policy, the Department fails to meet its Legislative mandate.

The entire intent of the cited Legislative mandate is blatantly ignored as the Department's policy is clearly foretold on page 8 where the Department states, "If contaminants in soil do not exceed or are remediated to a level that meets both the most stringent direct contact remediation standards and the impact to ground water standards, no further remediation is required. If contaminants in soil exceed the most stringent direct contact remediation standards, the person responsible for conducting the remediation may elect, with Department approval, to use institutional and/or engineering controls pursuant to the Technical Rules, N.J.A. C. 7:26E-8, instead of removing or treating the contaminated soil to achieve the remediation standard. If contaminants in soil exceed the impact to ground water standards, then the person responsible for conducting the remediation must either remove or treat the contaminated soil, or may request an alternative remediation standard." (15)

RESPONSE: The Department does not require a remedial action that removes or treats contamination to the most stringent standard. The Department does require delineation of contamination to the most stringent standard, so as to determine the proper remedial action to take at a site. The Department is adhering to the mandate that all remedial action be protective of human health and the environment, including addressing potential future use scenarios. Once contamination is delineated to the most stringent standard, the Department can assess the necessary remedial action for a site, including removal or treatment of the soils, or establishment of an institutional control (such as a deed notice), with or without an engineering control (such as capping).

Impact Statements

Social Impact

226. COMMENT: The social impact statement observes that "remediation of contaminated sites and the resulting protection of human health and the environment has wide ranging social benefits." The statement does not address the social impact if contaminated sites are not remediated, as will be the case when the costs of cleanups exceed the potential returns on private investment. In those instances, when human health and the environment receive no new protection, there will be wide ranging social costs. To the extent that the proposed rules deter

redevelopment, and they will, their impact will be declining public health and deteriorating environmental conditions.

Because the proposed standards go well beyond nationally established levels and beyond what is scientifically justified, the economics of redevelopment will not support them. Since there are few public subsidies to offset the costs of unduly ambitious standards, few voluntary remediations will be undertaken. (19, 22, 27, 45)

RESPONSE: The Department does not believe that the remediation standards rules will deter redevelopment of brownfield sites. The Department is confident that the Brownfield Program will continue to grow and foster the redevelopment of the State's urban and industrial areas. The Legislature has provided funding to aid designated Brownfield Redevelopment areas through the Hazardous Site Discharge Fund. The proposed standards, with the exception of the impact to ground water soil remediation standards, are not significantly different than the previously used soil cleanup criteria. Because the impact to ground water soil remediation standards are not being adopted, the impacts to ground water will continue to be evaluated on a site-by-site basis using guidance developed by the Department. For more discussion of the changes in the standards from the soil cleanup criteria see the Department's response to comment 258.

227. COMMENT: The Department should anticipate the prospective application of the proposed standards and establish exposure standards for existing public facilities, most especially schools and parks, where children spend many hours every week. Since such actions will have significant impacts (social and fiscal), the Department is encouraged to assemble, in conjunction with other state agencies (e.g., Education, Health, Community Affairs, etc.), a panel of experts to recommend appropriate responses. (19, 22, 27, 45)

RESPONSE: The Department intends to use the residential remediation standards for sites that will be used for child care facilities and schools. The Department believes that these standards are appropriately protective for this type of land use. Park settings are viewed differently by the Department. The application of site specific risk assessment parameters for the length and duration of exposure in this type of land use scenario will typically result in soil remediation standards with higher acceptable concentrations compared to those based upon residential land use. For more discussion on recreation land use standards see the Department's responses to comments 82, 109 and 158.

Economic Impact

228. COMMENT: The economic impact analysis of the proposed rule is superficial and does not address the significant potential economic impacts of applying the proposed standards to all sites in New Jersey. The Department states that the proposed standards will have an economic impact primarily on persons responsible for conducting remediation of contaminated sites. However, the indirect impact on industry in general, land reuse and development, and the New Jersey economy as a whole should be considered. The rule states that the use of a uniform set of standards will have a positive economic benefit, because it will allow those responsible for conducting remediation to accurately predict the costs associated with a remediation project. Even though the Department highlights this as a positive economic benefit, it is certainly not an improvement, because the current soil cleanup criteria can be applied in exactly the same way. Just as the EPA soil screening levels were found by the Department to not be specifically applicable to New Jersey, the uniform soil screening levels values are not specifically applicable to all sites in New Jersey. Site-specific conditions should be given greater consideration in the determination of cleanup levels and the need for and level of remedy. Because the soil remediation standards values are so conservative, it is probable that most large-scale remediation projects will be conducted with an alternative soil remediation standards approach. (11)

229. COMMENT: The Department's economic impact statement is glaringly myopic in its assertion that "the proposed remediation standards will have an economic impact on persons responsible for conducting remediation of contaminated sites." Such a modest view of the proposal's effects suggests a fundamental misunderstanding of the nature and scope of the proposal's economic implications.

State policies dictate that redevelopment will be the predominant, if not exclusive, vehicle for meeting New Jersey's future needs for places to live and work. Given that redevelopment will typically require some site remediation, the proposed rules will greatly affect the availability and affordability of workplaces and residences Statewide.

Consequently, the proposal's economic impacts will directly impact redevelopment; and will have indirect economic consequences, through impacts on employment levels, labor costs, household incomes, public sector revenues, etc. And those impacts, whether positive or negative, will be significant. The Department's failure to acknowledge the broad extent of the proposal's economic impacts suggests that it has fundamentally miscalculated the merits of its approach relative to alternatives that would produce greater amounts of redevelopment and, therefore, cleanups. (19, 22, 27, 45, 48)

230. COMMENT: The Department's economic impact statement provides little to support the Department's position that proposed soil remediation standards and the mechanisms for establishing alternative remediation standards will have a positive effect on the State as a whole. The proposed standards will have a deleterious impact on the economy of New Jersey. Commenters believe that the soil remediation standards will dramatically increase the cost and workload to all parties involved in site remediation, without providing any additional protection to public health or the environment than the current soil cleanup criteria. These rules will further burden and adversely affect business in New Jersey. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59, 16, 20, 38, 41, 52, 56)

RESPONSE to COMMENTS 228 through 230: In the Economic Impact Statement, Department maintains that the proposed standards would primarily impact the person responsible for conducting the remediation. The Department understands that its rules and policies, particularly those that relate to remediation and redevelopment of the State's brownfields, affect the State and its citizens as a whole. Brownfield redevelopment is important, not only to local communities but also Statewide . However, in order for the citizens to truly benefit from brownfield development, the remediation of contaminated sites must be protective of human health and the environment.

The Department was directed by the Legislature to use specified health-based goals to develop remediation standards for residential and non-residential site use. The Department believes that the proposed standards meet those goals. The Legislature also stated that flexibility is needed in the remediation process. To provide flexibility, the Department provided several options that remediating parties can use to develop alternative remediation standards, and allows the use of engineering and institutional controls as part of the remediation of contaminated sites.

231. COMMENT: The economic impact statement offered a wide range of costs that can be associated with site investigations and work that is required to conduct remediation. The rules will negatively impact parties that volunteer to remediate sites and thus brownfield remediations in general. To achieve the Brownfield Act's goals, voluntary remediation must be encouraged; however, the proposed rules will make it more difficult, if not impossible, to estimate remediation costs. In most cases the proposed standards and procedures will inhibit conduct of timely, reliable due diligence inquiries.

There is also uncertainty for voluntary remediators regarding liabilities that can arise from future changes in standards. The Department should withdraw these rules and replace them with a proposal that fulfills the Brownfield Act's objective of encouraging voluntary remediations through economically feasible private redevelopment. (2, 19, 22, 27, 45)

RESPONSE: The Department does not believe that the proposed rules will discourage brownfield redevelopment. It is important to communities and all the citizens of New Jersey that brownfield remediation and redevelopment be protective of human health and the environment. These rules incorporate the most current toxicity data which has resulted in the development of standards that meet the health-based goals set by the Legislature. The Department believes that the proposed standards, along with remediation alternatives established by the Technical Rules, meet the Legislature's goals for flexible yet protective remediation.

The health-based standards must be applied whether the person conducting the remediation is the responsible party under New Jersey's environmental statutes or is conducting remediation on a voluntary basis.

With regard to the responsibility of remediating parties to comply with future changes in remediation standards, the Department and the Legislature strongly believe that remediations be protective of human health and the environment. For ongoing remediations, the Legislature did not differentiate between responsible parties and volunteers. Prior to the submission of a remedial action workplan, all remediating parties must use new or updated remediation standards. After the Department approves a remedial action workplan, remediating parties do not need to use new or updated standards unless those standards have been lowered by an order of magnitude or more. After a no further action letter has been issued, the Department may compel only Spill Act responsible parties to conduct additional remediation when new remediation standards have been lowered by an order of magnitude or more. See the Department's responses to comments 29 through 36 for more discussion of this issue.

232. COMMENT: The Department has failed to fully evaluate the economic impact on regulated underground storage tank sites. These sites represent the second largest category of caseload for the Department. Most regulated underground storage tank cases involve the release of motor fuels with volatile organic contaminants into the environment. In its Economic Impact Analysis, the Department did a comparison of the number of standards that are proposed to be increased and the number that are proposed to be decreased. This comparison is an over simplification of impacts of the proposed decreases in numeric standards for the contaminants that are commonly found during the remediation of underground storage tank cases. The standards for benzene, ethylbenzene, and toluene are all proposed to be decreased by more than an order of magnitude. The standards proposed for xylenes, MTBE and TBA, which are also associated with underground storage tank remediations, are also proposed to be decreased. (15, 48)

RESPONSE: Although the Department did not specifically evaluate the economic impacts of the proposed rules on the owners and operators of underground storage tanks, the Department does not believe that the impacts on owners and operators of underground storage tanks will be significantly different from the remediation requirements that predated this rulemaking. The commenters referenced the impact to ground water standards for benzene, ethylbenzene, and toluene, which are becoming more stringent by an order of magnitude. Even though the impact to ground water pathway is not being adopted at this time, the impacts to ground water will still need to be evaluated on a site-by-site basis. The Department anticipates that the site-specific standards for the noted volatile organic contaminants will also be low. The reason for this is primarily due to the fact that these contaminants, which are associated with discharges of petroleum products, are very likely to move through the soil quickly and cause ground water contamination.

The costs of remediating contaminated soil and ground water caused by discharges of hazardous substances from underground storage tanks is significant, and are not likely to change with the adoption of the Remediation Standards rules. Remediation of leaking petroleum underground storage tanks that pollute ground water aquifers throughout the State is extremely costly and will remain so until adequate leak detection and control systems are uniformly installed and maintained.

233. COMMENT: The proposed rules will add to the cost of doing business in New Jersey. The Department's statements regarding the overall economic impacts of the proposed regulations on the regulated community are understated, and the examples provided are misleading. The fact of the matter is that the proposed soil remediation standards, if adopted, will require the regulated community to either abide, at great cost, by a set of overly conservative cleanup standards that are rigidly applied, or embark on a long and costly application process for an alternative remediation standard. These true economic impacts of the proposed soil remediation standards need to be fully studied before the standards are applied, and the results of that study need to be submitted for public consideration.

The Department provides example cost estimates for site and remedial investigations based on the number of areas of concern being investigated. However, no basis for these estimates is provided. Based on the experience of the commenters, it is generally agreed that actual investigative costs are greater than estimates provided by the Department. More stringent cleanup standards and the lack useful, streamlined procedures are certain to add costs for several reasons. Lowering cleanup standards will most assuredly increase laboratory costs, time frames for the completion of investigations, complexity of investigations, and prolong implementation of remedial action. Additionally, they may needlessly expand areas of contamination and increase the impacted media at a site. More cost-effective approaches to cleanup standard can and should be pursued by the Department.

The proposed standards will overwhelm the Department's resources for site remediation and cause numerous delays that will slow the cleanup and redevelopment of contaminated sites. In order for the proposed regulations to work, a more efficient system will be needed. The system should include strict review schedules, scheduled over sight costs and an appeal process by which the application review process is accelerated, even if the respondent must demonstrate cause. The Department must assign ombudsmen and/or facilitators to help speed up the process and provide applicants with status reports. In the alternative, some portion of the site remediation program, especially the alternative remediation standards process, should be privatized using licensed professionals in a manner similar to the Licensed Site Professional program in Massachusetts. After the protection of human health and the environment, the goal of the site remediation process should be to reduce delays, increase efficiency and create economic opportunity, not curtail it. (16, 20, 38, 41, 52, 56)

234. COMMENT: The best approach for reducing the administrative burden posed by alternative soil remediation standard petitions is for the Department to establish achievable and practical soil remediation standards that are not based upon redundant conservative assumptions

and would obviate the need to rely on alternative remediation standards at most sites. Achievable and practical soil remediation standards are also essential to successfully implementing and sustaining a privatized site remediation program, such as Massachusetts' Licensed Site Professional program. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE to COMMENTS 233 and 234: The Department based its economic impact analysis on a review of costs associated with remediation cases that have successfully gone through the Site Remediation Program. The Department has overseen thousands of remediation cases, from small soils-only contamination cases to large multimedia cases that take years to investigate and delineate. The Department considered the potential impacts based on whether contaminants are commonly or rarely found at contaminated sites. Even though the Department has a lot of experience overseeing the remediation of contaminated sites and has conducted remediation itself on many publicly funded sites, it is difficult to determine the potential increases or decreases in remediation costs because such an evaluation is contingent on numerous site-specific characteristics and factors.

Even though a remediation standard is amended, there may be or may not be significant changes in the cost of remediation at any given site. It is likely that additional delineation samples will be needed when the remediation standards are lowered and that an engineering control may need to be somewhat larger based on the extent of contamination at any particular site. Therefore, the Department provided ranges of expected costs, with the understanding that actual costs at individual sites will vary widely.

The Department cannot develop soil remediation standards based on the evaluation of costs and economic impacts. The Department is mandated by the Legislature to develop remediation standards based on specific health-based goals established by the Brownfield Act. The standards adopted herein are the result of the application of accepted risk assessment methods and current toxicity information. The Legislature and the Department provided flexibility to the person responsible for conducting remediation through the use of engineering and institutional controls. In addition the Department has been working with stakeholder groups and the Legislature to reassess the program and to identify opportunities for efficiency and improvement. The Department anticipates that the results of this effort will be reflected in new legislation and policies in the near future.

In addition, to facilitate the development of alternative soil remediation standards, the Department will provide technical guidance. The guidance will include additional standards tables and spreadsheets can be used by the regulated community and Site Remediation Program case managers to develop alternative standards more quickly and easily.

235. COMMENT: The proposed rules will over-complicate site investigations and cleanups and slow Department review times. The economic analysis presented along with the proposed rule focuses on the individual compound or individual standard view of the economic impacts of the proposed rule. However, under the proposed new soil remediation standards, there will be no simple site investigations. Property owners will need to conduct multiple investigations on their site in order to identify the contaminants present, provide data to develop site-specific alternative remediation standards and delineate the impacts once the remediation standards have been developed.

The development of an alternative remediation standard will be a costly and burdensome effort that will require significant resources that could otherwise be used to cleanup a site. When consulting and other costs are accurately stated, the proposed regulations place the burden of developing site-specific alternative remediation standards (for non-mobile organics and metals) squarely on the backs of the regulated community. Although the Department provides a few examples of what it believes the costs for developing an alternative remediation standards will be, it provides no basis for these cost estimates other than to include certain analytical costs. Under current funding and staffing mechanisms, the system will become overburdened and, as a result, alternative remediation standards applications will overwhelm the resources of the Department.

RESPONSE: As previously stated, the Department cannot develop soil remediation standards based on the evaluation of costs and economic impacts. The Department is mandated by the Legislature to develop remediation standards based on specific health-based goals established by the Brownfield Act. The Legislature and the Department provided flexibility to the person responsible for conducting remediation through the use of engineering and institutional controls. To facilitate the development of alternative remediation standards, the Department will provide technical guidance. The guidance will include additional standards tables and spreadsheets can be used by the regulated community and Site Remediation case managers to develop alternative standards more quickly and easily.

Environmental Impact

236. COMMENT: The environmental impact statement asserts that “the remediation standards being proposed will have a positive environmental benefit.” The commenters would agree with that statement, if sites are actually cleaned up. However, since the economics of redevelopment will not support compliance with the proposed rules, there will be few voluntary cleanups. Consequently, historic contamination that could have otherwise been remedied will continue to pose the health hazards and environmental degradation that the Brownfield Act was intended to address. The Act requires acceptable and affordable standards, but the proposal substitutes its own pristine but unaffordable requirements. In the end, this will serve to perpetuate pollution, which is an outcome New Jersey cannot afford. Deterring voluntary remediation through for-profit redevelopment, the rules will, negatively affect the state’s environmental condition. The Department should withdraw these rules and replace them with a proposal that will reduce historic contamination through private initiative and investment. (19, 22, 27, 45)

RESPONSE: The Department does not believe that the Remediation Standards rules will have an adverse impact on the environment by deterring redevelopment. The proposed standards, with the exception of the impact to ground water soil remediation standards, are not significantly different than the previously used soil cleanup criteria. Because the Department is not adopting the impact to ground water soil remediation standards, the impacts to ground water will be evaluated on a site-by-site basis using guidance developed by the Department. For more discussion of the changes in the standards from the soil cleanup criteria see the Department's response to comment 258.

The Brownfield Act requires acceptable and affordable standards but also states that strict remediation standards are necessary to protect public health and safety and the environment. The Department believes that the remediation standards were developed based on Legislative direction and when they are implemented through the Technical Rules, will result in remediations that are protective of both human health and the environment.

237. COMMENT: Conducting a remedial action has direct and indirect negative environmental impacts (these impacts can be determined by conducting a life-cycle analysis, which evaluates the environmental burdens associated with a product, process, or activity by identifying energy and materials used and wastes released to the environment). Remedial actions also pose a quantifiable actual risk to residents of the state.

Indirect impacts from site remedial actions are extensive and include the consumption of natural resources and energy that are required for the manufacture and transport of materials used or consumed during remedial actions. The vehicles and heavy machinery used to conduct a remedial action generate air pollution. And remediations that include excavation and offsite disposal of contaminated soil increase the risk of a truck accident. The removal of soil that is contaminated at low levels can result in the discharge of a greater mass of chemicals than the mass of chemicals contained in the soil removed. If the contaminated soil is treated, then the mass of the chemicals in the combined emissions of the excavation/transport and treatment may be substantially greater than the mass removed. When this occurs, the remedial action is not environmental protection.

A simple indirect example is the consumption of items to conduct just the post excavation sampling. Items consumed during this activity include: latex gloves and glass bottles, and the cardboard boxes that they come in; the labels that are affixed to the bottles; ice; decontamination materials; fuel used by the sampler’s vehicle and the lab’s truck that picks up the samples; and the paper used by the laboratory to report the sampling results and for the consultant’s report to the Department.

In a recent article (Costanza R. 2006. Thinking Broadly About Costs and Benefits in Ecological Management. Integrated Environmental Assessment and Management: 2(2): 166–173), Dr. Costanza stated the following: “Decisions regarding both human and natural systems often involve either explicit or implicit consideration of relative costs and benefits. (However) failure to think broadly enough about costs and benefits leads to decisions that serve only narrow special interest, not the sustainable well-being of society as a whole.”

In summary, based on the fact that remedial activities do have negative environmental impacts, which can be substantial, and pose a real risk to residents of the state, it is reasonable that the Department develop a cost benefit process to be used to ensure that only those remedial actions, or parts of a remedial action, that have more benefit than cost (harm) to society and the environment are conducted. (55)

RESPONSE: While the Department acknowledges that site remediation activities may have associated environmental impacts, in and of themselves, it is difficult if not impossible to determine the impacts of each remedial action as compared to leaving the site contaminated. That said, the Department must honor its Legislative mandate to codify remediation standards that are protective of human safety and health. Individuals, communities and regions of the State are impacted by the discharge of hazardous materials and the resulting contaminated sites. Contaminated soil can directly impact people at the site via the ingestion-dermal and inhalation pathways. Contamination can also run off site and negatively impact the State's lakes and rivers and can also be transported to the ground water of the State, which is widely used as a source for drinking water.

Federal Standards Analysis

238. COMMENT: The Department compares and bases its numeric soil remediation standards against EPA's guidance and Soil Screening Levels. However, the Department has altered and modified EPA's assumptions, substituting overly conservative assumptions. The Department proposes to adopt numeric cleanup criteria without the adoption of the related scientific methodologies that EPA employs to ensure the proper application of the soil screening levels. The intent of Executive Order 27 is to ensure that such a rule or regulation would be promulgated only in cases where actual benefits will result. The Order further requires that those benefits exceed the additional costs and burdens that the new regulation imposes. The cleanup standards set by the proposed rule exceed those standards imposed by Federal law. The Department has not demonstrated that the proposed rule will produce commensurate benefits. (4, 5, 11, 15, 18, 19, 20, 22, 27, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

239. COMMENT: The Department's description of its proposed numeric soil remediation standards suggests that they are conceptually and numerically similar to EPA's soil screening levels. The commenters suggest that they are not similar in concept. The Department's proposed numeric soil remediation standards are "cleanup standards," not soil screening levels. Because of these fundamental differences in application, the Department's proposed numeric soil remediation standards do not warrant adoption on the basis of alleged similarity or equivalency to EPA's SSLs. (16, 20, 38, 41, 52, 56, 4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

240. COMMENT: The Department notes that most of the proposed numeric standards based upon impact to groundwater are more stringent than the corresponding EPA soil screening levels

and many of the proposed numeric standards based upon direct contact or inhalation are also more stringent than the corresponding EPA soil screening levels.

The Department's overall concept regarding the proposed soil remediation standards is radically different from EPA's approach regarding soil screening levels. The proposed numeric soil remediation standards represent substance concentrations that require remediation if exceeded in soil. Any and all soil areas with one or more soil samples that exceed a chemical-specific remediation standard based upon impact to groundwater, direct contact, or inhalation would require remediation, based upon past Department practice. Hence, they are "cleanup standards" in EPA's terminology, not soil screening levels.

"EPA emphasizes that soil screening levels are not cleanup [remediation] standards" and should not be used as soil remediation standards. Under EPA's soil screening levels concept, a soil area can have multiple samples with concentrations that exceed a chemical-specific soil screening levels and not require remediation. Soil areas of potential concern are those with mean (average) substance concentrations higher than the chemical-specific soil screening levels. Soil areas of potential concern warrant further study, but do not necessarily warrant remedial action. Soil areas with mean substance concentrations less than the chemical-specific soil screening levels do not warrant further study under CERCLA, regardless of the number of samples that have an exceedance(s) of the chemical-specific soil screening levels.

In addition, site-specific soil remediation standards are typically set at substantially higher numeric levels than the soil screening levels, due to consideration of site-specific factors (e.g., source geometry, contaminant mobility and attenuation, and reasonable likelihood of exposure pathways under current and reasonably expected future land use conditions). Even so, soil areas do not require remediation unless the mean concentration exceeds those standards. Clearly, there are fundamental differences in the meaning of remediation standard versus soil screening levels and in how the Department and EPA assess compliance with their respective numeric values.

Because of these fundamental differences, any numeric soil remediation standard in New Jersey that is lower (more stringent than) a corresponding EPA soil screening levels must be evaluated pursuant to the Federal Standards Analysis. As such, the proposed rule would impose standards and requirements that exceed federal requirements. The Department's "Federal Standards Analysis" does not acknowledge this fact.

Furthermore, the proposed rule does not include a credible evaluation of the adverse consequences and limited benefits of the proposed rule. With regard to additional costs and various logistical, administrative, and economic burdens, the Department merely states that its "[m]ore stringent remediation standards may increase the cost of regulation to the regulated community." Regarding the cost-benefit comparison, the Department only states categorically that "[t]he Department believes that additional costs associated with the more stringent standards is necessary to satisfy the statutory requirements that the Department develop remediation standards that are protective of human health." The proposed rule would not produce commensurate health benefits and would impede site remediation and redevelopment and have other adverse consequences that are not in the public interest. Consequently, the proposed rule should not be adopted. To promulgate the proposed rule would be contrary to executive mandate and intent. (4, 5, 11, 15, 18, 19, 20, 22, 27, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

241. COMMENT: The Department's Federal Standards Analysis posits that there is a comparison with EPA is inaccurate because EPA uses a sliding scale depending on site criteria, groundwater recharge, vegetation, and many other factors. It was inappropriate for the Department to use the weakest part of EPA guidance, not the most stringent. (65)

RESPONSE TO COMMENTS 238 through 241: As indicated in the Federal Standards Analysis and as the commenters have pointed out, USEPA and the Department use different approaches to evaluate and remediate contaminated sites. USEPA uses its soil screening levels to conduct a site-specific baseline risk assessment to determine if the cumulative risk posed by all the contaminants at the site exceeds the 10^{-4} to 10^{-6} risk range thereby triggering remediation. This approach differs from the Department's approach. The Brownfield Act requires the Department to develop remediation standards for individual contaminants based on human health risk at 1 x 10^{-6} for carcinogens and a hazard index of 1 for noncarcinogens, and the Legislature prohibits the evaluation of the cumulative effects of multiple contaminants.

In addition, the Legislature prohibits the Department from evaluating the cumulative effects of contaminants; therefore each standard must be individually protective of the human health goals set by the Legislature. USEPA has no such legislative restrictions.

That said, the Department primarily uses the same risk assessment techniques as are used by the USEPA to develop the soil screening levels. The Department has departed in some instances where it was deemed appropriate to include factors specific to New Jersey. These departures are discussed in detail in the ingestion-dermal and the inhalation pathway Basis and Background documents, throughout these responses to comments and in the Federal Standards Analysis. While there are differences between the Department's remediation standards and USEPA's soil screening levels, the Department chose to conduct its Federal Standards Analysis using these two lists because they are developed using many of the same assumptions and are the most closely comparable.

The commenters also point out differences between the Department's and USEPA's methods to determine compliance. Issues of compliance and data averaging are not part of this rulemaking, but will be addressed in future guidance and amendments to the Technical Rules. The Department anticipates, however that sampling and compliance requirements will also differ from the Federal model due to the basic differences between the State and Federal approaches to the investigation and remediation of contaminated sites.

The Department believes that its Federal Standards Analysis meets the intent of the statutory and regulatory requirements. The Administrative Procedure Act, N.J.S.A. 52:14B and N.J.A.C. 1:30 require a State agency, on proposal of an amendment to an existing rule or a new rule, to compare State rules with applicable, analogous Federal rules. Even though the Federal government does not have remediation rules, it is appropriate to compare its remediation guidance with the Department's remediation standards. One of the purposes of the Federal Standards Analysis is to inform the public and remediating parties about the relationship between the proposed remediation standards and the existing Federal regulatory scheme.

The Department acknowledges that is very difficult to provide a detailed evaluation of the costs associated with its standards, which is why the cost analysis has been relatively general. However, because there are such large differences in the way that the State and Federal governments administer their remediation programs, it is not possible to evaluate the specific costs or benefits when the Department's standards exceed Federal standards. The Department believes that the adoption of remediation standards benefit the citizens of the State because they are based on sound science and accurately reflect the health-based goals that are set by the Legislature as public policy for the State.

Jobs Impact Analysis

242. COMMENT: The proposed standards have the potential to drive new and existing employers from the State. Although it is likely true that the more stringent standards will create additional work for environmental consultants, attorneys, remediation contractors, and laboratory personnel, the rules will result in cost increases which will significantly impact New Jersey business. Property owners/operators and businesses may decide the financial burden is too costly to increase or maintain operations in New Jersey. This may result in downsizing staff, reducing operations, or even leaving a site and the cleanup to the State. This not only increases costs to a State with a deficit, but removes jobs from the State as well.

Driving employers from the State is a real and persistent problem at all levels of New Jersey's economy. The technological platform exists for jobs to be performed in places other than New Jersey. Business owners may choose a neighboring state to set up manufacturing operations, with good jobs, while still taking advantage of New Jersey's infrastructure and wealth. More reasonable generic standards can be developed that are equally protective of public health and the environment, cost less to implement and, therefore, are better for the economy of New Jersey. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59, 16, 20, 38, 41, 52, 56)

RESPONSE: The Legislature mandates, and the Department fully supports, the remediation of contaminated sites that is protective of human health and the environment. The proposed standards were developed using the most current data and risk assessment procedures available. The resulting standards meet the human health based goals set by the Legislature. The Department disagrees that more "reasonable" generic standards can be developed, that are equally protective of public health and the environment and also meet the Legislative criteria for remediation standards. The proposed standards along with remediation alternatives established by the Technical Rules meet the Legislature's goals for flexible yet protective remediation.

The commenters have not provided information to support the assertion that the remediation standards will significantly increase the cost of doing business in New Jersey resulting in businesses leaving the State and jobs being lost. The Department has done an analysis of the difference between the standards being promulgated herein and the Soil Cleanup Criteria, which the Department has been using on a site-by-site basis to determine remediation standards for the past 15 years. As discussed in greater detail in the response to comment 258, approximately the same number of contaminants are becoming more stringent through the adoption of the remediation standards as are the number of contaminants that are becoming less stringent through the adoption of the remediation standards. It is unlikely that the change in these few standards will cause businesses to relocate from New Jersey.

243. COMMENT: The proposed standards are likely to harm the State's Brownfield program and redevelopment of urban and industrialized areas. More stringent, costly cleanup standards for contaminated sites will increase the demand for "clean" sites (a.k.a. "green fields"). Potential property owners will opt for developing green field sites, available in suburbs and undeveloped areas, because the cost and delay associated with developing a contaminated site make the business plan for such a site economically non-viable. This will leave contaminated sites in the urban core vacant. It will also add to sprawl, tax our existing infrastructure, and decrease the

overall economic quality of life in New Jersey. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59, 16, 20, 38, 41, 52, 56)

RESPONSE: The Department is statutorily bound to remediate or cause to be remediated sites to a level that is protective of public health and the environment, regardless of where the site is located or whether it's a "Brownfield" or a "Greenfield." The Department has considered that a Brownfield site may involve more issues regarding remediating contamination than greenfields through its Brownfield Redevelopment Program. Although Brownfield sites have to be remediated applying the same standards as other sites in New Jersey, the Department provides other incentives to remediate these sites. For example, under the Brownfield Act, a developer that enters into a redevelopment agreement may potentially recoup up to 75% of his or her cleanup costs. The Department's Brownfield program has yielded significant achievements in remediating Brownfield sites, such as the Trenton Tunnel Project. This Brownfield site was contaminated with various heavy metals, base neutrals and historic fill, and was successfully transformed through the Department's Brownfield programs into a 6.3-acre community park sitting atop the Trenton Tunnel. The promulgation of the remediation standards will not have an adverse impact on the Brownfield program since they are, in large part, the same standards that have been applied throughout the history of the Brownfield program.

244. COMMENT: The jobs impact statement indicates that the "promulgation of these rules will increase the number of jobs for people who are skilled in engineering, laboratory analysis and environmental technology." The commenters agree that there will be employment gains however; these gains will arise from compliance with the rule's overly complex, excessively expensive procedures.

As in the economic impact statement, the Department is unduly modest in its assessment of the proposal's jobs impact. It does not, for example, address the significant number of jobs that will be eliminated in the construction trades as redevelopment projects are abandoned. Nor does it recognize the loss of ancillary employment among those who supply, consult or provide services to the redevelopment sector. And to the extent there would have been "more jobs associated with the staffing of the businesses" had redevelopment gone forward, the rules must be credited with the consequent net reduction in employment when redevelopment is stymied.

The jobs impact statement suffers the same analytical flaws that pervade the economic statement. Consequently, it fails to evaluate the impact of these rules on employment and earnings in the State. For the same reasons, the Department should withdraw these rules and propose rules that will create jobs through the remediation of the legacies of "New Jersey's industrial past." (19, 22, 27, 45)

RESPONSE: The Department does not believe that the remediation standards rules will cause jobs to be lost or deter development. The proposed standards, with the exception of the impact to ground water soil remediation standards, are not significantly different than the previously used soil cleanup criteria. Because the impact to ground water soil remediation standards are not being adopted, the impacts to ground water will be evaluated on a site-by-site basis using guidance developed by the Department. For more discussion of the changes in the standards from the soil cleanup criteria see the Department's response to comment 258.

The Department is confident that its Brownfield Program will continue to grow and foster the redevelopment many of its urban and industrial areas. The Legislature has provided funding to aid designated Brownfield Development areas through the Hazardous Site Discharge Fund.

Agricultural Impact Statement

245. COMMENT: The Agricultural Impact Statement, required by law, is completely insufficient. According to the statement, the Department has determined that the proposed remediation standards will impact State agriculture only when a discharge occurs and impacts a farm. This completely disregards the massive potential financial impact these new standards could have on owners of agricultural land. No estimate of the amount of farmland acres that might be affected is given. The Department's assumption that there is no impact on agriculture so long as the land remains in farming fails to take into account the devaluation of

property values these new standards are likely to cause, and the impact that loss in value has on an agricultural operation. Farm businesses rely heavily on their ability to borrow money for operating expenses from year to year. The devaluation of their property seriously limits their ability to get the loans they need to continue farming, and can have other detrimental effects as well.

The devaluation of farm properties also diminishes a farmland owner's likelihood to participate in an open space or farmland preservation program. Because these programs pay farmers for the development value of their property, when that value is decreased, so is the likelihood that the landowner would choose preservation. In this time of limited preservation funding resources, it is also questionable whether or not a preservation program would even be interested in purchasing the development rights on a property that is unlikely to be developed because the immense costs of remediation. (43)

246. COMMENT: The proposed cleanup standards for historic pesticides will further reduce the value of agricultural property by imposing more restrictive remediation criteria. Agricultural land values have been dramatically impacted by the Department's current policy regarding historic pesticides, far more than by any leaking tank or other "discharge." The Department's analysis of the impact on the agricultural community does not incorporate the net economic effect of burdening the primary underlying farm asset, the land, with additional environmental remediation liability. Remediation liability and stigma effects the ability of agricultural operations to access institutional funding required to sustain operations. The economic impact of the Department's previous historic pesticide remediation policy effectively resulted in the significant devaluation of the value and liquidity of farmland. Determination of the realistic impact of the cleanup standard changes and any associated Department policy changes needs further analysis. (61)

RESPONSE to COMMENTS 245 and 246: The Department assumes that a significant amount of concern expressed by the commenters is related to the proposed impact to ground water soil remediation standards, many of which were lower than the Soil Cleanup Criteria previously used by the Department. Because the Department has determined not to adopt the impact to ground water soil remediation standards, the impacts to ground water will be evaluated on a site-by-site basis using guidance developed by the Department.

The agricultural impact analysis provided in the rule summary focused on discharges at farms that would require remediation. It did not evaluate the potential affect on the ability of farmers to obtain loans that are needed to continue farming or the estimation of remediation costs when a farm is being developed for other uses. It is difficult for the Department to estimate the potential loss in property values, if any, that the adopted remediation standards will have on farms.

The Department has overseen the sampling and remediation of farm properties over the last 10 years. Costs associated with these activities range from the tens of thousands of dollars to a few hundred thousand dollars, when and if remediation is deemed to be necessary. The costs at any given site are related to the concentration and extent of soil contamination that remains after years of pesticide application. In the 1999 Historic Pesticide Task Force report recommendations, the Department estimated that at least a quarter million acres of the land in New Jersey may be impacted by the historical use of pesticides. The Department understands that these impacts can be significant for individual farmers and for the industry Statewide.

However, the standards developed by the Department that are being adopted herein are necessary to protect human health and the environment. Agricultural land is primarily affected by remediation standards only when the owner of the land chooses to discontinue farm activities and to use the site for other uses such as residential development or the building of new schools. When the Department reviews such evaluations, it is entirely appropriate and necessary to use standards that are protective of residential use and to ensure that ground water quality has not been impacted by many years of farming, which usually includes the extended use of pesticides and fertilizers.

Regulatory Flexibility Analysis

247. COMMENT: Development of alternative remediation standards will require the use of specialized, professional services. It is unlikely that a small business will have the financial capability to pursue alternative remediation standards. The impacts of the proposed regulations on the small business community have not been adequately addressed and must be. A mechanism for technically and financially assisting small businesses in developing alternative standards should be incorporated into the proposed regulations. (62)

248. COMMENT: The Department must address the serious economic impact adopting these new rules would have on the small business community of New Jersey, and the Department should substantiate the failure of existing standards to adequately protect human health and the environment. (48)

RESPONSE to COMMENTS 247 and 248: The Department acknowledges that increased resources will be required to implement the remediation standards, and these resources may include costs associated with the development of alternative remediation standards. The Department is developing various guidance and tools that can be easily used to develop alternative remediation standards in many circumstances. The Department will post on its web site spreadsheets, training tools and guidance documents to help increase efficiency and reduce the time required for implementation of the remediation standards and alternative remediation standards development and approval process.

The Department understands that its rules and standards have economic impacts on small business. The Spill Act does not differentiate the responsibilities and requirements relative to the discharge of hazardous materials into the environment based on the size of the business. In order to adequately protect the residents and the environment of New Jersey, the requirements to remediate discharged materials and to achieve the health-based goals must be the same for large businesses and small.

The Department disagrees that the previously used cleanup criteria guidance failed to protect the environment. Remediation standards are developed using the most current toxicity data and risk assessment methods available to meet health-based goals that are set by public policy. As environmental science improves over time, the Department updates the standards to more closely reflect the health-based goals set by the Legislature.

249. COMMENT: The proposed remediation standards will have a disparate impact on the small business owners who operate gasoline service stations in New Jersey. The nature of these standards may serve as a serious deterrent to those considering projects to upgrade and modernize existing locations. The small business owners that operate gasoline service stations have already endured devastation and economic pain inflicted upon them in recent years. Many times these small businesses have been innocent in the actual contamination of their properties but have borne the burden of remediation. (48)

RESPONSE: The Department is aware that changes in standards can have an economic impact on underground storage tank owners and operators. The adoption of these standards is required by law and is necessary to protect human health and the environment. However, some resources are available to eligible owners and operators to help finance project costs for the closure, and/or improvement of State regulated underground storage tanks, as well as the remediation of discharges from these tanks. Similar funding is available for the owners and operators of non-regulated tanks as well.

The Petroleum Underground Storage Tank Remediation, Upgrade & Closure Fund (UST Fund) was established in 1997 within the New Jersey Economic Development Authority (NJEDA) which is administered jointly with the Department. This fund makes available Conditional Hardship Grants (up to $1 million) and loans (up to $3 million) for use by regulated tank owners or operators to fund tank closures and remediations. Funding for upgrades of regulated tanks is no longer available, although loans in order to finance the costs of the improvement or replacement of tanks to meet State and Federal standards are available to those eligible owners or operators who have previously met the upgrade requirements. Certain eligibility requirements apply. To access the UST Fund application online, go to www.nj.gov/dep/srp/finance/ustfund and download, complete and mail in the application. Questions regarding the UST Fund should be directed to the Bureau of Contract & Fund Management at (609) 777-0101.

250. COMMENT: The proposed standards may place small business owners in a double jeopardy situation if they have already remediated their locations to previous standards and now may be subject to new standards before selling their property or making further upgrades. This effectively nullifies a previously earned No Further Action (NFA) letter. It is imperative that a “grandfather rule” be implemented in any proposed change to remediation standards to avoid the double jeopardy experience of those small business owners who have already complied and remediated. Without insurance against double jeopardy, many small businesses will become subject to difficulties making business decisions like borrowing money for capital improvements as lenders will no longer be able to rely on previous NFAs. This is a serious impact on many economic fronts, including on those hired to contract capital improvements and on potential purchasers. (48)

RESPONSE: The Department acknowledges that certain sites may have to undergo further remediation where a prior remediation standard is lowered by an order of magnitude by virtue of the adoption of the Remediation Standards rules. Please see the detailed response to comments on this issue in its responses to comments 29 through 36. However, the Department does not believe that the adoption of the Remediation Standards rules will disproportionately affect small businesses. Standards are amended when, based on new toxicity information, a change is necessary to meet the human health based goals established by the Legislature. Discharges of hazardous substances pose unacceptable risk to the citizens of the State and the environment regardless of the size of the business from which the discharge originated.

Smart Growth Impact

251. COMMENT: The smart growth statement reports that, “the proposed remediation standards do not involve land use policies or infrastructure development and, therefore, will not have an impact on the achievement of smart growth.” This is an entirely erroneous statement.

The New Jersey State Development and Redevelopment Plan (State Plan) and the Economic Growth Strategy for the State of New Jersey 2007 both call for the reuse of abandoned urban areas, in part to compensate for development restrictions in much of the rest of the State.

It is the official policy of the State of New Jersey to redevelop abandoned sites and utilize existing infrastructure systems to revitalize the State's Cities and Towns (March 1, 2001 State Plan, Goal #1). Just this past year the "Economic Growth Strategy for the State of New Jersey 2007" addressed the importance of redevelopment to the State's economic growth. Priority # 3 is to support smart, sustainable growth and infrastructure investments. One of the implementation techniques identified is to encourage brownfield redevelopment.

The importance of redevelopment to the future of New Jersey was also recognized by the New Jersey Legislature in 1992 when it reorganized and amended the State's redevelopment laws and adopted the Local Redevelopment and Housing Law, N.J.S.A. 40A:12A. The Legislature recognized the importance of revitalizing the State's housing, commercial and industrial installations, public services and facilities.

The proposed site remediation standards will deter voluntary remediation through the private, for-profit redevelopment of contaminated sites. The proposed standards will make it economically infeasible for redevelopers to do business in areas identified for growth in the State Plan and, because of the rules, sites will remain contaminated. The desired reuse of these sites for the needed economic development and housing will not take place. As a consequence, the proposed standards will thwart the smart growth policies of New Jersey. (19, 22, 27, 45)

252. COMMENT: The commenter supports the Legislature's direction in the Brownfield and Contaminated Site Remediation Act that "strict remediation standards are necessary to protect public health and safety and the environment" but expressed concern that these rules will reduce the ability for redevelopment of New Jersey's cities to occur. The rules will, thus, undermine one of the cornerstones of Smart Growth. The rules, when proposed, began to have a chilling effect on the clean up of brownfields in New Jersey. If the rules are adopted, brownfield

cleanups would become very difficult and will cause developers to walk away, leaving unclean conditions for residents of distressed urban areas to live in.

New Jersey's cities are largely made up of brownfields as a consequence of their industrial past. According to the Brownfields Environmental Solutions for Trenton Committee, all seven square miles of Trenton are composed of brownfields. Redevelopment of cities faces numerous obstacles. The Legislature's desired outcome of the voluntary clean up of formerly vacant, contaminated sites to allow for new jobs or homes to be built in the State's designated smart growth areas appears to be in jeopardy if the standards as proposed are adopted.

The Department's smart growth analysis stated that "The proposed remediation standards do not involve land use policies or infrastructure development and, therefore, will not have an impact on the achievement of smart growth." This analysis appears to take an overly narrow view of either land use policies or factors affecting smart growth. The Department should not exclude soil remediation standards from policies that affect land when soil is the basic component of land.

A meaningful analysis of the impact of the proposed rule on smart growth in New Jersey would include a review of soil remediation standards in a subset of other states to determine what effect the various standards had on redevelopment of brownfields. For example, California has had success with capping brownfield sites and redeveloping them. Was a review conducted on the effect of remediation standards on brownfields redevelopment in other states?

The commenters accept the fact that the Department must develop standards that balance protecting the health of the public and the environment through stringent standards, yet not stifle the clean up of contaminated sites through overly conservative standards. The proposed rule has not given sufficient consideration to the latter as indicated in the extremely cursory smart growth impact statement provided with the rule. (8)

RESPONSE to COMMENTS 251 and 252: The Department does not believe that the remediation standards rules will deter development. The proposed standards, with the exception of the impact to ground water, are not significantly different from the previously used soil cleanup criteria. Because the impact to ground water pathway is not being adopted, the impacts to ground water will be evaluated on a site-by-site basis using guidance developed by the Department. For more discussion of the changes in the standards from the soil cleanup criteria see the Department's response to comment 258.

The Department is confident that the Brownfield Program will continue to grow and foster the smart growth in New Jersey. The Legislature has provided funding to aid designated Brownfield Development areas through the Hazardous Site Discharge Fund. Persons conducting remediation of brownfields have, pursuant to the Technical Rules, the ability to use cost effective institutional and engineering controls that can effectively reduce or eliminate exposure to contamination in order to make sites in these areas available for redevelopment. Funding is also available as discussed in further detail in the Department's response to comment 249.

The Remediation Standards establish various standards that can be applied in a variety of contexts. As discussed in the Smart Growth impact statement, the standards are intended to ensure the protection of the State's natural resources, and the protection of natural resources is one of the overall goals of the State Plan. Accordingly the protection and preservation of the State's soil, surface water and ground water resources is supportive of the goals of the State Plan. To the extent that the commenters' concerns and suggestions relate to the application of these standards by one of the Department's programs, including the Site Remediation Program, these concerns can be addressed only in the context of the promulgation and implementation of a rule through which the standards are applied.

Pesticides

253. COMMENT: The Department should allowing soil blending for farmland when soil contamination is present above the impact to ground water remediation standards. If blending is not an allowable remedial action, farmland impacted by residual historic pesticides could not be

cleaned up from a practical perspective because the cost to remove the contaminated soil would exceed the value of the farm. (43)

254. COMMENT: The current policy of allowing soil blending to achieve the soil remediation standard should be continued. The Historic Pesticide Task Force report allowed blending of soil with residual historic pesticides which had been applied in accordance with State recommendations. Blending has been allowed to reduce the risk of direct dermal exposure to acceptable levels. The Department should evaluate the available data to determine if there is any evidence of significant groundwater impact associated with historic pesticides prior to imposing the impact to ground water remediation standards. Does the Department intend to allow the use of soil blending to achieve the following: the direct contact soil remediation standards, the impact to groundwater criteria for low mobility contaminants, or the impact to groundwater criteria for mobile organic contaminants? (61)

RESPONSE to COMMENTS 253 and 254**:** The Historic Pesticide Contamination Task Force Final Report (March 1999) recognized that blending of contaminated soil is a substantial departure from State policy, and recommended that soil blending only be allowed to reduce risk at sites with historical pesticide contamination resulting from agricultural use. The soil blending policy will continue to be used for the remediation of farmland to the adopted direct contact soil remediation standards and to site specific impact to ground water remediation standards.

255. COMMENT: Before adopting and implementing the proposed soil remediation standards, the Department should address the application of the ingestion/dermal compliance methodology to the current soil blending provisions for historic pesticide sites. (16, 20, 38, 41, 52, 56)

RESPONSE: The Historic Pesticide Contamination Task Force final report released in March 1999 provided recommendations for the investigation and remediation of farmlands undergoing development. The soil blending provision in the recommendation is only applicable to pesticide residues in soil in former agricultural areas. The

Department’s current approach to determining whether an agricultural site has been adequately remediated, which is based on point-by-point sampling after the blending has been conducted, is not changing upon adoption of these rules are adopted.

Harm Caused by Remediation Activities

256. COMMENT: The proposed rules may even jeopardize the health and safety of surrounding communities due to exposure and traffic accidents that would result from extensive excavation and off-site disposal of soil. Transportation of significant volumes of soil from one location to another would result in more diesel truck and greenhouse gas emissions, more energy consumption, and even less already-limited landfill space. By way of example, the excavation of 10,000 cubic yards of soil and its transportation to an off-site disposal facility 100 miles away will consume approximately 400 gallons of gasoline and 35,000 gallons of diesel fuel, will generate approximately 454 tons of carbon dioxide (a greenhouse gas), and entail approximately 186,000 miles of total truck traffic. Overall, excavation remedies can create more harm, rather than provide greater protection of public health and the environment relative to remedies that use engineering and institutional controls, because they can cause workers and the surrounding communities to become exposed to fugitive dusts and vapors. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Department shares the commenters' concern for the environment and the problem of global warming. Remedial actions are required, pursuant to the Technical Requirements for Site Remediation, N.J.A.C. 7:26E, to be undertaken in a manner that protects not only the surrounding communities, but also the workers conducting the remediation. These requirements include health and safety plans, construction quality assurance/quality control plans, soil and sediment erosion control and monitoring, and dust and odor control and monitoring, and are specified in N.J.A.C. 7:26E-6.2(a).

Additionally, there are in situ remedies available that might enable a more "green" solution to the problem. The Department is not prepared to conduct a holistic, carbon footprint evaluation of every contaminated site. It is difficult if not impossible to determine the impacts of each remedial action as compared to leaving the site contaminated. Individuals, communities and regions of the State are impacted by the discharge of hazardous materials and the resulting contaminated sites. Contaminated soil can directly impact people at the site via the ingestion-dermal and inhalation pathways. Contamination also can runoff to negatively impact the State's lakes and rivers and can also be transported to the ground water of the State, which is widely used as a source for drinking water. The Remediation Standards rules and the Technical Requirements for Site Remediation are designed to require site investigation and remediation to protect the citizens of the State and its precious resources.

Historic Fill and Brownfields

257. COMMENT: Redevelopment in the City of Newark is severely hindered by the residues of historic industrial activities. The extensive historic industrial operations, including filling operations, have caused widespread contamination. The requirements currently proposed do not allow for addressing the ubiquitous contamination in a feasible manner. Redevelopment will become stagnant in older industrial cities like Newark, despite numerous attractive features of potential redevelopment parcels. The Technical Rules, coupled with New Jersey's low soil cleanup criteria and groundwater standards, have made the potential for redeveloping historically industrialized parcels in New Jersey's cities increasingly difficult. The proposed changes will only make redevelopment of these parcels even more difficult, causing them to remain dormant and underutilized.

The new standards would, in essence, deny Newark residents much needed employment opportunities, deny the municipality much needed tax ratables, and leave innumerable parcels both fallow and unremediated. Regional contamination is present throughout Newark; implementation of unnecessarily stringent numeric and onerous narrative standards will serve to impede rather than assist in the remediation and redevelopment of environmentally impaired properties. The Department's focus should be on implementation of adequately protective, sustainable redevelopment in conjunction with remediation.

The Remediation Standards proposed at N.J.A.C. 7:26D will not provide meaningful relief from these onerous requirements; rather, they will make the potential to negotiate site-specific cleanup criteria more costly (in time and money), and difficult to achieve. Furthermore, these standards will actually prevent redevelopment and cleanup on several sites since they will unnecessarily inflate remediation costs. (47)

RESPONSE: The standards are intended to work in concert with the Technical Requirements for Site Remediation (Technical Requirements), N.J.A.C. 7:26E. Historic fill will continue to be evaluated and remediated pursuant to the Technical Requirements. To the extent that the commenter’s concerns and suggestions relate to the application of these standards by one of the Department’s programs, including the Site Remediation Program, these concerns can be addressed only in the context of the promulgation and implementation of a rule through which the Standards are applied.

That said, the Department has evaluated the economic impact and social impact of the proposed remediation standards and refers the commenter to these sections of the rule proposal. The Department disagrees that the new standards will deny Newark residents of much needed employment or the City of tax ratables. The Department has introduced adequately protective standards as required by Brownfields Act. As specified in the Brownfields Act, the Department has set minimum soil remediation health risk standards for human carcinogens, as categorized by the United States Environmental Protection Agency, which will result in an additional cancer risk of one in one million and for noncarcinogens, will limit the Hazard Index for any given effect to a value not exceeding one. The Department believes that a cleaner environment will benefit Newark residents and businesses alike.

<u>Work Load</u>

258. COMMENT: The Department’s soil remediation standards are so conservative that many more sites may be considered contaminated, not from direct discharges, but due to

ubiquitous/urban contaminants such as polyaromatic hydrocarbons (PAHs), atmospheric deposition of contaminants and the deposition of lead or other contaminants from roadways. With the addition of these types of sites the Department will be burdened to a point of inaction and will cause even longer delays than are already experienced. (16, 20, 38, 41, 52, 56, 59)

RESPONSE: The Department does not anticipate a significant increase in the number of sites that will require remediation.

The Department is adopting soil remediation standards for the direct contact pathway, which consists of ingestion-dermal pathway standards and inhalation standards for residential and non-residential use. As compared with the soil cleanup criteria, the Department's soil remediation guidance values, approximately half of the standards are being increased and half are being decreased for a wide variety of reasons such as changes in toxicity data and other factors. For the 102 residential direct contact standards, the Department proposes to increase the standards for 45 contaminants, decrease the standards for 48 contaminants, and leave the standards the same for 9 contaminants. For the 100 non-residential direct contact standards, the Department proposes to increase the standards for 44 contaminants, decrease the standards for 55 contaminants (16 by an order of magnitude or more), and leave the standard the same for 1 contaminant.

The Department has decided not to adopt the Impact to Ground Water pathway standards, but will continue to determine the impact of soil contamination on ground water on a site by site basis. However, based on the Department's experience, impact to ground water remediation standards that are developed using site specific information, including the standard for lead, will generally be higher than the generic impact to ground water standards proposed in Table 2B. As a result, the Department does not believe that there will be a substantial increase in the amount of contaminated soil generated by the remediation of contaminated sites.

With regard to ubiquitous/urban concentrations of PAHs, the Department is considering allowing the person responsible for conducting the remediation to conduct sampling at the site to determine levels of PAHs are consistent with regional anthropogenic concentrations. When the person determines that PAHs at the site are due to regional background conditions and not to a local discharge, then the Department will consider allowing the person to handle PAHs in the same way that natural background is handled. Stricter requirements may be imposed for sites that are being developed for schools or residential use.

Ground Water Remediation Standards

259. COMMENT: The New Jersey Legislature authorizes the Department to develop groundwater remediation standards that are based upon reasonably expected use of the water-bearing unit, N.J.S.A. 58:B10-12c(2). The Department should comply with this legislative requirement, as other states have done. The Department applies its numeric health-based criteria for drinking water protection to its Class II-A groundwater quality standards and to all zones and volumes of ground water. In defending this practice the Department has claimed that its narrative standards for groundwater remediation provide flexibility and relief to remediating parties.

The Brownfield Act provides for the use of differential remediation standards for surface water or groundwater that take into account the current, planned, or potential use of that water in accordance with the Clean Water Act and the Water Pollution Control Act, N.J.S.A. 58:10B-12c(2). A risk-based regulatory system that incorporates flexible approaches to meeting realistic narrative and numeric standards for groundwater remediation would foster cleanup of brownfields and contaminated sites and, thereby, help make New Jersey more economically competitive with other states that already have realistic groundwater protection and remediation policies and practices. Under current practice and in the proposal, the Department blindly applies numeric health-based criteria for drinking water protection regardless of the actual ability of the hydrogeologic unit to supply drinking water. Efforts to protect and remediate groundwater in New Jersey should instead consider use, value, and vulnerability of the resource, as well as social and economic values, consistent with Federal groundwater protection policies. (16, 20, 38, 41, 52, 56, 4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Ground Water Quality Standards and the Ground Water Remediation Standards make distinctions between the various classes of ground water and, therefore, the risk end-points. For Class I ground water, the risk endpoints are ecological, for Class III ground water the endpoints are for uses other than as a potable water supply. In addition, the Ground Water Remediation Standards contain narrative standards to assist in making distinctions between areas where there is actual ground water use and where there is not at N.J.A.C. 7:26D-2.2(a)4vii. In cases where ground water is not currently used and there is little potential for future use, the Department will consider natural ground water remediation as outlined in the Technical Requirements for Site Remediation.

The Department, consistent with the Legislature's direction in the Brownfield and Contaminated Site Remediation Act, adopted Ground Water Remediation Standards which consider "the location, the surroundings, the potential exposure to the discharge, and the ambient conditions, whether naturally occurring or man-made." N.J.S.A. 58:10B-12(a). The Department has accomplished this through the use of numeric standards as noted above, that incorporate designated ground water use classifications, and narrative standards that include the factors set forth in N.J.S.A. 58:10B-12. These narrative standards allow for greater flexibility in the remediation of contaminated sites based upon site-specific information. Some of these factors include: the location of the contaminated site relative to ground water use; the potential human and environmental exposure to the ground water contamination; the present, projected, and potential ground water use at the site and in the area surrounding the site; the ambient ground water quality at the site and in the area surrounding the site resulting from both natural and human activities; and the physical and chemical characteristics of the contaminants of concern.

The Department does not apply the numeric health-based criteria for drinking water protection to all zones and volumes of ground water. N.J.A.C. 7:26D-2.2(a)4vii indicates the factors considered when selecting an appropriate remedial action. The Department recognizes that the response required to remediate ground water may vary depending on the actual current or potential future use of the resource. The Department requires aggressive actions to limit or eliminate the impact of contaminated ground water on the users of drinking water through active ground water remediation and point of use treatment or installation of alternate water supply where ground water is being used for drinking water purposes.

However, the Department frequently allows for the temporary exceedance of ground water remediation standards at site remediation projects, even in Class II-A areas through its natural ground water remediation program when there are no present or future potential impacts to receptors. This program is outlined in the Technical Requirements at N.J.A.C. 7:26E-6.3(d)1i. In all cases, the sources of ground water contamination must be treated or removed where practicable or contained where treatment and removal are impracticable. However, the temporary exceedance of the ground water remediation standard is allowed. The Department believes that, by allowing for natural ground water remediation, rather than active ground water remediation, remediating parties are afforded flexibility and relief.

260. COMMENT: The Department should develop practical guidelines for data collection and submission to demonstrate on a site-specific basis that a given water-bearing unit is non-potable (Class III) due to natural or regional conditions, or that the drinking water pathway does not exist and is not reasonably expected to exist. Under such circumstances, the numeric drinking water criteria should not be applicable to the water-bearing unit. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Ground Water Quality Standards (GWQS) at N.J.A.C. 7:9C allow any interested party to provide evidence to the Department to demonstrate that an area meets the descriptive criteria of Class III-A. Upon review and verification of such evidence the Department may provide concurrence that the Class III-A classification applies to the area of interest.

The GWQS indicate that Class IIIA areas shall have the following characteristics; average at least 50 feet in thickness within the Class III-A area, have a typical hydraulic conductivity of approximately 0.1 ft/day or less within the Class III-A area, and have an a real extent within the Class III-A area of at least 100 acres.

Therefore, a remediating party wishing to provide evidence that a Class III-A area exists must provide:

A map and cross sections showing the location of boring logs that provide data indicating that an aquitard of at least 50 feet in thickness exists over an area of at least 100 acres.

Aquifer hydraulic test data indicating that the hydraulic conductivity is approximately 0.1 ft/day or less within the Class III-A area. A representative number of aquifer tests shall be performed to determine hydraulic conductivity across the entire proposed Class III-A area

The GWQS indicate that Class III-B ground water consists of all geologic formations or units which contain ground water having natural concentrations or regional concentrations (through the action of salt-water intrusion) exceeding 3,000 mg/l Chloride or 5,000 mg/l Total Dissolved Solids, or where the natural quality of ground water is otherwise not suitable for conversion to potable uses. The GWQS indicate that Class III-B areas are subject to field verification wherever necessary and that areas not indicated on the maps may also qualify as Class III-B, subject to Department concurrence through an applicable regulatory program.

The GWQS further indicate that any interested party may provide evidence to the Department to demonstrate that an area meets the descriptive criteria of Class III-B. Upon review and verification of such evidence the Department may provide concurrence that the Class III-B classification applies to the area of interest.

Therefore, a remediating party wishing to provide evidence that a Class III-B area exists must provide:

- Ground water analytical data that provide evidence that Chloride exceeds 3,000 mg/l;

- Ground water analytical data indicating that Total Dissolved Solids 5,000 mg/l; and

- Hydraulic data that prove that elevated chloride and TDS were the result of salt water intrusion and were not the result of any discharge that occurred at the site.

The Department does not believe that a separate guidance document is necessary to further explain these requirements.

The Department has developed practical guidelines for determining if the drinking water pathway exists. The Technical Rules require that current ground water use be evaluated by performing a well search. In addition, the Technical Rules require that potential future use be evaluated using a 25 year planning horizon and municipal and water purveyor planning data. This information may be used to help determine the appropriate ground water remediation. In cases where there is no impact to human health from the ground water plume and little potential for future impact, a natural ground water remediation program may be appropriate.

However, even in cases where the ground water pathway does not exist, the Department must ensure that ground water is restored and enhanced. In accordance with the Water Pollution Control Act, it is the policy of this State to restore, enhance and maintain the chemical, physical, and biological integrity of its waters, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial and other uses of water. The requirement to restore and enhance ground water quality is not strictly risk based. While the Department may allow for the temporary exceedance of a constituent standard, for example, through the natural ground water remediation program outlined in the Technical Rules, it may not allow for a continuing source of ground water contamination that would result in the long term impairment of the ground water resource.

<u>Styrene</u>

261. COMMENT: The commenter is extremely concerned that the Department's proposed soil remediation standards for styrene "are more stringent because the Department determined,

based on a review of pertinent toxicological studies, that it is appropriate to consider this contaminant as a carcinogen as compared with the USEPA's decision to use non-carcinogenic end points."

The commenter reviewed the three background documents identified in the draft regulation as setting out the Department's methodology for classifying styrene. The Department offers no basis for classifying styrene as a carcinogen, but it appears to stem from an erroneous listing of styrene on the USEP 1991 Health Effects Assessment Summary Tables (HEAST) which reported a potency for styrene of 5.7×10^{-7}. The USEPA recognized that it had not classified styrene, that the potency value was not valid, and removed styrene from the HEAST in 1992. Accordingly, the commenter submits that the Department should not rely on erroneous and withdrawn data to establish remediation standards for styrene.

In the absence of an accepted slope factor, the risk assessment for styrene should be based on the USEPA's Integrated Risk Information System (IRIS) Reference Dose (RfD) (or Reference Concentrations (RfC)) for non-carcinogenic effects, modified by an additional uncertainty factor of 10 to account for potential carcinogenic effects not addressed by the RfD. In this regard, the commenter would appreciate the opportunity to meet with key Department staffers to review and discuss the most up-to-date research on the health effects of styrene. In addition, the Department proposes to define carcinogens consistent with the EPA Guidelines for Carcinogen Risk Assessment, 51 Fed. Reg. 33932 (1986), "as amended and supplemented." The commenter would be very interested in discussing how the Department proposes to utilize the 2005 USEPA Guidelines and the relevance of the latest science on styrene. (60)

RESPONSE: The Department is aware that the Unit Risk Factor for styrene was deleted from HEAST in 1992. However, styrene is currently classified by the International Agency for Research on Cancer as 2B, possibly carcinogenic to humans. In order to have soil remediation standards for styrene, the Department determined that it was important to adopt remediation standards for styrene at this time. In light of the 2B classification, the Department felt that it was prudent to evaluate styrene as a carcinogen, and has adopted the soil remediation standard based on carcinogenic effects, as this endpoint yielded the most conservative standard (compared to noncarcinogenic effects).

In the near future, the Department will be considering the 2005 Guidelines and the relevance of the latest science on styrene and will amend these rules if it determines that the soil remediation standards for styrene should be changed.

Beryllium - Ingestion

262. COMMENT: The Department's Group C Carcinogen Policy should not be applied to establish ingestion-dermal remediation standards for beryllium. The Department calculates its proposed ingestion-dermal soil remediation standards for beryllium by applying a safety factor of 10 to USEPA's Soil Screening Levels (SSL) for beryllium. The Department's proposed non-residential standard for beryllium is 230 mg/kg as compared to EPA's SSL of 2,300 mg/kg. (64)

RESPONSE: It is the Department's policy to apply an additional uncertainty factor of 10 for Group C (1986) or Suggestive (2005) carcinogens to protect for possible carcinogenic effects. The proposed direct contact soil standard for beryllium is based on classification as Group C by the oral route. In addition, the USEPA Office of Water classified beryllium as Group C in development of a drinking water Maximum Contaminant Level (1992).

However, the Department's current review of the toxicological basis for this classification, as well as current USEPA IRIS and ATSDR evaluations indicate that the oral carcinogenicity data for beryllium does not warrant classification as Group C. The Department agrees that an additional uncertainty factor of 10 for possible carcinogenic effects should not be used in developing the direct contact soil standard for beryllium. The Department will conduct rulemaking in the near future to revise the ingestion-dermal soil beryllium standards without applying the uncertainty factor of 10. For the ingestion-dermal exposure pathway, the Department proposed a residential soil remediation standards of 16 mg/kg and a non-residential soil remediation standards of 230 mg/kg for beryllium. Based on eliminating the uncertainty factor, the Department will propose a residential soil remediation standard of 160 mg/kg for the ingestion-dermal exposure pathway and a non-residential soil remediation standard of 2,300 mg/kg for the ingestion-dermal exposure pathway for beryllium.

The Department considered not adopting the ingestion-dermal soil remediation standards for beryllium but has determined that the best course of action is to adopt the ingestion-dermal soil remediation standard as proposed, and conduct rulemaking in the near future to revise these standards. The toxicity basis for the inhalation soil remediation standards for beryllium is carcinogenicity which is supported by the International Agency for Research on Cancer (IARC) and USEPA. Based on this support, the Department does not intend to change the inhalation soil remediation standards for beryllium.

The proposed beryllium residential soil remediation standards were 16 mg/kg for the ingestion-dermal exposure pathway and 1,800 mg/kg for the inhalation exposure pathway, if the Department were to not adopt the residential ingestion-dermal standard for beryllium the remediation standard would default to the inhalation standard 1,800 mg/kg. This standard would not be adequately protective of the residential use at a site.

In the interim, the Department will consider petitions for alternative remediation standards for beryllium, until the Department is able to revise the beryllium soil remediation standards via rulemaking.

263. COMMENT: No cancer risk factor should be applied to USEPA's soil screening levels (SSLs) which have been calculated to protect against cancer risk. In applying a cancer risk safety factor of ten, the Department duplicates and compounds the cancer risk safety factor already contained in the USEPA inhalation and ingestion SSLs, which are designed to protect against a one-in-a-million cancer risk. See USEPA, Appendix A: Generic SSL for the Residential and Commercial/Industrial Scenarios, Exhibits A-1, A-2, footnote "e" (beryllium ingestion-dermal and inhalation SSLs "Calculated values correspond to a cancer risk of 1 in

1,000,000"). This duplication is improper and unnecessarily conservative, and the USEPA SSLs should not be reduced in this way. (64)

RESPONSE: Footnote e on USEPA Table A-1, Generic SSLs for Residential Standards is erroneous. Footnote e indicates that the soil screening level (SSL) is based on a cancer risk of 1 in 1,000,000. However, the Ingestion/Dermal SSL for beryllium of 160 mg/kg is not based on cancer risk, but rather is based on a Reference Dose of 0.002 mg/kg/day. It should be noted that the previous value for the USEPA Ingestion/Dermal SSL for beryllium was 0.1 mg/kg. This value was based on an oral cancer slope factor for beryllium, which is no longer supported, as shown in more recent versions of the Regulatory and Human Health Benchmarks Used for SSL Development table. See the response to comment 262 for a detailed discussion of the Department's intended future rulemaking for related to beryllium.

264. COMMENT: There is no evidence that beryllium is an ingestive carcinogen. There have been several oral feeding studies using beryllium compounds. None of the studies have resulted in the formation of cancerous tumors beyond those found in the control populations. There are no scientific studies implicating beryllium as an oral cancer hazard. There is no scientific basis to estimate beryllium cancer risks as a result of ingestion. As such, calculations used in the estimates for potential cancer risks are unfounded and should not be used to calculate soil standards.

The New York Department of Environmental Conservation recently declined to use an oral cancer potency factor in deriving Soil Cleanup Objectives for beryllium. See (Appendix A-129 November 25 Public Review Draft Technical Support Document for Development of Cleanup Objectives). The Department should do likewise.

The current Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profile for Beryllium notes the absence of any evidence of carcinogenicity caused by ingestion of beryllium by humans or animals. The ATSDR has concluded that no human studies investigating the carcinogenicity of ingested beryllium were located. Animal studies have not found significant associations between ingestion of beryllium in the diet and drinking water and increased incidence of neoplasms in rats, mice, or dogs. It should be noted that no toxic effects were observed in rat and mouse chronic-duration studies tested at low doses, and the duration of the dog study was too short to be predictive of late-term cancer. The USEPA concluded that the human carcinogenic potential of ingested beryllium cannot be determined.

The ATSDR also stated that beryllium has not been found to cause cancer in animals after oral exposure. This could be due to the poor absorption of beryllium compounds from the gastrointestinal tract. Nonsignificant increases in the number of lung reticulum cell carcinomas were observed in male rats exposed to 0.3 or 2.8 mg beryllium/kg/day as beryllium sulfate in the diet for 2 years; the incidences were 10/50, 17/50, 16/50, and 5/50 in males and 5/50, 7/5- and 5/50 in females in the 0, 0.3, 2.8, and 31 mg beryllium/kg/day groups, respectively (Morgareidge et al. 1975). No differences in the number of reticulum cell carcinoma bearing rats were observed in the beryllium-exposed rats (18/50, 16/50, and 13/50 for males and 11/50, 7/50, and 8/50 for females in the 0.3, 2.8 and 31 mg beryllium/kg/day groups, respectively) compared to controls (12/50 and 8/50 for males and females, respectively). The incidence of tumors in rats or mice exposed chronically to 1 mg beryllium/kg/day as beryllium sulfate in the drinking water was not significantly altered, although the incidence of total tumors in treated male rats (9/33) was slightly increased, compared to controls (4/26) (Schroeder and Mitchener 1975a, 1975b). The incidence of neoplasms was not significantly increased in dogs exposed to 12 or 1 mg/beryllium/kg/day as beryllium sulfate in the diet for 33 or 172 weeks, respectively (Morgareidge et al. 1976).

The commenter is not aware of the specific computational basis for the USEPA soil screening level (SSL) of 160 mg/kg based residential ingestion-dermal exposure nor the SSL of 2,300 mg/kg based upon non-residential ingestion-dermal exposure. The USEPA may have used either the maximum contaminant level (MCL) established by its drinking water standards of the Reference Dose (RfD) established by its Integrated Risk Information System (IRIS) program. In either event, both the MCL and RfD are highly protective exposure values because they are based on animal studies showing almost no effect due to beryllium ingestion and the application of several very conservative safety factors, as there are no studies which show any effects due to beryllium ingestion by humans. (64)

RESPONSE: The USEPA Integrated Risk Information System (IRIS) (1989) previously classified beryllium as a Group B carcinogen and developed an oral slope factor for it, and the USEPA Office of Water (1992) treated beryllium as a Group C carcinogen in developing its maximum contaminant level (MCL), incorporating an additional uncertainty factor to account for possible carcinogenic effects. The Department has reviewed the data on chronic oral exposure to beryllium and agrees with the current USEPA assessment (1998) that the human carcinogenic potential of ingested beryllium cannot be determined. The Department agrees that beryllium should be treated as a non-carcinogen in developing the Oral/Dermal Soil Standards and plans to revise the ingestion dermal remediation standards accordingly in future rulemaking. Based on the current information available from the Agency for Toxic Substances and Disease Registry (ATSDR) and USEPA. See the response to comment 262 for a detailed discussion of the Department's intended future rulemaking related to beryllium.

265. COMMENT: The Federal drinking water standard (maximum contaminant level - MCL) and Reference Dose (RfD) for beryllium reflect a high degree of conservatism which makes applying additional safety factors unrealistic and inappropriate. The MCL is based on a lifetime oral ingestion study of rats conducted by Schroeder, Mitchener, Life -term Effects of Mercury, Methyl Mercury, and Nine Other trace Metals on Mice, Journal of Nutrition 421-427, 452-458 (1975). The USEPA Integrated Risk Information System (IRIS) RfD for beryllium is based on a long-term oral ingestion study of dogs by Morgareidge, Gallo, and Cox, Chronic Feeding Studies with Beryllium in Dogs (1976). There are no known studies regarding human ingestion of beryllium. ATSDR Toxicological Profile for Beryllium 7 (Sept. 2002) ("Swallowing beryllium has not been reported to cause effects in humans because very little beryllium can move from the stomach or intestines into the blood stream."). There is no reported association between ingestion of beryllium and chronic or acute beryllium disease, which are risks associated with inhalation of beryllium. ASTDR at 3.2.2.1.

Both the MCL and RfD for beryllium are highly conservative. The beryllium MCL is so low that it overlaps with the range of naturally occurring levels of beryllium in water. See ATSDR at 6.4.2. Both the MCL and RfD are calculated by the safety and uncertainly factors applied to "No observable adverse effect level" (NOAEL) and "Lowest observed adverse effect level" (LOAEL) studies.

In the case of the drinking water standard for beryllium, excessive conservatism results chiefly from the use of the Schroeder and Mitchener study and the application by USEPA of the largest possible safety factor "for possible carcinogenic potential of this contaminant via ingestion" despite the fact that a Morgareidge rat study reported a substantially higher NOAEL and all animal ingestion carcinogenicity studies were negative. Id. at 3.2.2:1 through .7. Schroeder and Mitchener concluded that beryllium was "virtually innocuous" by ingestion and is not tumorogenic. Indeed "beryllium was noted for its lack of toxicity," and the authors concurred with previous studies indicating "that beryllium is poorly absorbed through the gut, and that ingestion is not a hazard."

In the case of the beryllium RfD, excessive conservatism is due chiefly to the selection and multiplier effect of a series of safety or uncertainty factors. In computing the drinking water standard, USEPA used an uncertainty factor of 100. In computing the RfD, USEPA has increased the uncertainty factor to 300. This increase is unwarranted as will be demonstrated by the following comments.

The commenter participated in that rulemaking and ultimately filed for judicial review of the drinking water standards. Research conducted by Morgareidge and his colleagues in the 1970s provided a more appropriate scientific basis for developing drinking water standards for beryllium. Judicial review of the 1992 standards has been stayed while the commenter pursued further discussions with USEPA. These discussions led to the selection of beryllium as one of the candidates for IRIS Pilot Study for revising IRIS health assessments. 64 Federal Register 14570 (April 12, 1996). In the revised IRIS health assessment for beryllium issued on April 3, 1998, an oral reference dose or RfD was established for beryllium using a 1976 chronic feeding study of dogs conducted by Morgareidge et al.

The commenter has sponsored basic research concerning the environmental and health effects of beryllium, including the impact of beryllium exposure on animals and freshwater organisms. This current research work is focused on understanding and preventing chronic beryllium-disease—an obstructive lung disease caused by inhalation of beryllium. Much of this cutting-edge research is being conducted in close collaboration with the National Institute for Occupational Safety and Health (NIOSH). Two employees from the commenter's company along with a colleague from NIOSH were awarded the 2002 Alice Hamilton Award from NIOSH for their efforts to identify an appropriate measure for assessing potential risk of chronic beryllium disease in workers. Their award-winning paper is published in the May 2001 edition of Applied Occupational and Environmental Hygiene.

The commenter’s research efforts are a testament to its belief that standards for exposure to beryllium should be protective of human health and environment. However, being heavily engaged in such research, the commenter is sensitive to the adverse consequences of risk-based standards that are set well below levels necessary for such protection. The commenter believes that the current drinking water standards and reference dose for beryllium fall into this category. (64)

266. COMMENT: In computing the reference dose for beryllium, the USEPA inappropriately applied an uncertainty factor of 3 for the completeness of the database. Using beryllium sulfate (a water soluble beryllium compound), the Morgareidge chronic rat study showed no toxic effects at up to 500 ppm (25 mg/kg/day) for 2 years and the dog study resulted in no systemic toxicity at up to 50 ppm for 3.5 years. Site of contact irritation/corrosion resulted in termination of the dogs exposed to 500 ppm after 33 weeks, and the study director and pathologist concluded that even in these dogs, the minor systemic effects observed were the result of systemic bacterial infection because of the damaged gastrointestinal tract. The systemic effects were not attributed to absorbed beryllium. This should be of no surprise since the commercial form of beryllium

sulfate has a pH of 1, meaning it is highly corrosive. As a sulfated compound, the corrosive nature alone can account for the gastrointestinal lesions. It is illogical to implicate beryllium as the source of toxicity under such circumstances.

Although no "developmental toxicity studies" meeting the USEPA guidelines have been reported, no abnormal pups or increased neonatal deaths were reported in the Morgareidge et al. dog study. In that study, there was no effect of long-term beryllium exposure of both males and females on reproduction. In the epidemiological study, no effect on reproduction as a result of maternal or paternal occupational exposure was reported (Savitz et al., 1989, cited in TERIS). In a single generation study of rats, a single intratracheal administration of beryllium oxide (0.6 mg/kg prior to mating) had no effect on pregnancy outcome (Clary et al., 1975, cited in ATSDR Toxicology Profile for Beryllium). In addition, no effect on reproductive organs was seen in either dogs exposed to beryllium for 50 ppm for 3.5 years or in rats exposed to 500 ppm for 2 years.

Uncertainty does not exist with respect to immunological effects from oral exposure. There are no specific immunologic assays of beryllium or its salts by oral administration; however, such testing is not necessary. Chronic studies of beryllium sulfate in rats and dogs did not reveal any evidence of immunologic effects. There was no difference in spleen or thymus, and no hematologic differences suggestive of immunologic effects. Intestinal absorption of orally administrated beryllium is very low; and there is no evidence that orally administered beryllium would reach sensitive cells in the lung where sensitization could occur. Therefore, immunologic testing by the oral route would be wasteful of animals and would not add to the understanding of beryllium toxicity.

In sum, the database for oral administration of beryllium is adequate to assess the reference dose; there is little uncertainty that could be reduced by additional studies. Therefore, the uncertainty factor for the completeness of the database should be 1 not 3, which is used by IRIS. (64)

RESPONSE to COMMENTS 265 and 266: The USEPA drinking water standard (maximum contaminant level - MCL) for beryllium (4 ug/l) is highly conservative due to choice of the study upon which it is based and classification as a possible human carcinogen. The uncertainty factors used in the Reference Dose developed by the USEPA Integrated Risk Information System (IRIS) are overly conservative. Specifically, the commenter disagrees with the uncertainty factor of 3 for database gaps including reproductive and developmental effects and for immunological effects. As noted by USEPA (1998), this uncertainty factor was used because of lack of multigenerational studies, studies on male reproductive toxicity, teratology, and postnatal development and concern about possible crossing of the placenta and greater absorption in young animals. Additionally, immunologic effects are the most sensitive endpoints of concern by the inhalation route. The Department agrees with USEPA that the uncertainty factor of 3 for database gaps is appropriate.

As discussed in more detail above, the Department agrees that the treatment of beryllium as a possible or suggestive carcinogen by the oral route is not appropriate and, based on this, the Department intends to revise its ingestion dermal soil remediation standards accordingly in future rulemaking. Both the drinking water MCL and the Reference Dose for beryllium are overly stringent. Specifically, the commenter disagrees with the Department's use of an uncertainty factor for possible carcinogenicity in developing soil standards for the oral/inhalation routes.

The Department is required to use USEPA's drinking water standard (MCL) and is prohibited from promulgating a drinking water standard that is less stringent than the Federal standard. As discussed above, the Department agrees that the use of an uncertainty factor for possible carcinogenicity for standards that are based on ingestion is not appropriate. Therefore, the Department will change the ingestion-dermal soil remediation standards for standard and the ground water quality standard for beryllium in future rulemaking, but does not plan to change the beryllium MCL.

267. COMMENT: In computing the Reference Dose (RfD) for beryllium, the USEPA Integrated Risk Information System (IRIS) used the highest possible uncertainty factor (10) for inter-species variation. This is unreasonable because the Morgareidge dog study was long-term (3+ years); because the rat data obtained by both Morgareidge and Schroeder and Mitchener were negative despite exposure at higher doses, and because dog studies are considered more representative of metal toxicity to humans than are rodent studies.

The nature of the feeding study and critical effect observed also warrant a lower uncertainty factor. The absorption of beryllium salts administered to the intestinal tract is very low. It is very unlikely that the intestinal effects in the Morgareidge et al. dog study occurred from systemic toxicity of beryllium. Instead, this appears to be a site of contact irritation/corrosive response to the beryllium salt. The gastrointestinal effects of minerals are normally due to corrosive properties of the salts. Indeed, the veterinary pathologist who reviewed the study for USEPA concluded that one cannot discern if lesions are due to a local toxic or irritant effect of beryllium (sulfate). For site of contact effects, humans are not more sensitive than dogs. Thus, there should not be an uncertainty factor of 10 for extrapolation from dogs to humans, as used by IRIS. A factor of 1 is more appropriate. (64)

268. COMMENT: In computing the Reference Dose (RfD) for beryllium, the USEPA Integrated Risk Information System (IRIS) used the highest possible uncertainty factor (10) for inter-species variation. This is unreasonable because it appears that the one dog in the Morgareidge study considered to be affected at 50 ppm dose already represents a sensitive population. Thus, there is no reason to assume the greatest uncertainty and apply the maximum uncertainty factor for intraspecies extrapolation, when the data shows that the administered dose did not affect 90 percent of the test species. In addition, the database uncertainty is reduced because the Morgareidge dog study is supported by a chronic rat study at three dose levels approaching the practical limit for dietary administration. (64)

RESPONSE to COMMENTS 267 and 268: The commenter disagrees with the use of uncertainty factors of 10 for interspecies and intraspecies variability in development of the Reference Dose for beryllium. The uncertainty factors for intraspecies and interspecies are standard values used in Reference Dose development from animal data. They are based on reasonable health protective assumptions. Only in very rare cases, where complete data are available, are values other than these standard values used. The Department agrees with USEPA's use of the standard uncertainty factors of 10 for intraspecies and interspecies variability for beryllium.

Beryllium – Inhalation

269. COMMENT: The Department should not adopt a non-residential inhalation health based criterion and standard that are more stringent than the USEPA inhalation soil screening level (SSL) for beryllium (N.J.A.C. 7:26D-4.2 and 4.3). The Department proposes to adopt a Non-Residential Direct Contact Soil Remediation Standard for Beryllium of 140 mg/kg. See N.J.A.C. 7:26D-4.2. This standard reflects the Inhalation Based Criterion of 140 mg/kg which the Department has calculated. The preamble to the proposal does not state the exact calculation used by the Department. Hence, it is not clear whether the Department began its calculation with the USEPA inhalation SSL for beryllium, which is 2600 mg/kg, or used a different toxicity source. If the Department used the USEPA inhalation SSL, it must have reduced that 2600 mg/kg by a factor of ten by applying the Department's Group C carcinogen policy and then further reduced the resultant value by using sandy loam soil as the default soil type appropriate for New Jersey as opposed to USEPA's use of loam soil in calculating the default SSLs.

Whatever approach was used, the Department should not have arrived at a lower inhalation criterion than the inhalation SSL, particularly, not by reducing the SSL by a cancer risk factor of ten. In applying a cancer risk safety factor of ten, the Department duplicates the cancer risk safety factor already contained in the USEPA inhalation and ingestion SSLs, which are designed to protect against a one-in-a-million cancer risk. See USEPA, Appendix A: Generic SSL for the Residential and Commercial/Industrial Scenarios, Exhibits A-1, A-2, footnote "e" (beryllium ingestion-dermal and inhalation SSLs "Calculated values correspond to a cancer risk of 1 in 1,000,000."). This duplication is improper and unnecessarily conservative, and the USEPA SSLs should not be reduced in this way. The Department should use the USEPA ambient air criteria for beryllium under the National Emissions Standards for Hazardous Air Pollutants (NESHAPs) program rather than the USEPA Integrated Risk Information System (IRIS) reference concentration (RfC) or any cancer slope value.

Similarly, the Department should also use the USEPA NESHAPs ambient air criteria if it were to recalculate the proposed Residential Inhalation Based Criterion of 1,800 mg/kg. N.J.A.C. 7:26D-4.2. Again, the Department does not disclose the basis for this criterion, but is it presumably based on and identical to the USEPA inhalation SSL for residential exposure. The fact that the Department's proposed Non-Residential Inhalation Based Criterion is more than an order of magnitude lower than the proposed Residential Inhalation Based Criterion indicates that the former is overly conservative and should not be adopted. (64)

RESPONSE: The exact calculations used to derive the Non-Residential Direct Contact Soil Remediation Standard for beryllium (and other chemicals) are described in both the rule (N.J.A.C 7:26D-Appendix 3, Equations 14 through 21) and the Inhalation Exposure Pathway Soil Remediation Standards Basis and Background document (Equations 14 through 21). The Inhalation Exposure Pathway Soil Remediation Standards Basis and Background document also lists the beryllium toxicity values used and their sources (USEPA Integrated Risk Information System - IRIS). It should be noted that for the inhalation exposure pathway, the Department considers beryllium a Group B2 carcinogen (as does USEPA). The inhalation pathway soil remediation standards for beryllium were based on a unit risk factor and not a reference concentration with an added safety factor of 10.

The proposed inhalation exposure pathway non-residential direct contact soil remediation standard for beryllium is 140 mg/kg. This is lower than the USEPA non-residential soil screening level for beryllium because the Department considers both vehicular traffic and wind as mechanisms for dust generation whereas the USEPA only considers wind generation of dust. This is also the reason why the proposed inhalation exposure pathway non-residential direct contact soil remediation standard for beryllium is lower than the inhalation exposure pathway Residential Direct Contact Soil Remediation Standard. The Department considers both vehicular traffic and wind as mechanisms for dust generation under non-residential conditions but only considers wind generation of dust under residential conditions.

National Emissions Standards for Hazardous Air Pollutants (NESHAPs) limit emissions from specific types of sources; they do not regulate soil contamination that then impacts human health via the inhalation pathway (See 38 FR 8826, Apr. 6, 1973, as amended at 65 FR 62151, 52, Oct. 17, 2000). Therefore, the Department does not believe it is appropriate to use these emissions standards to develop soil remediation standards for the inhalation exposure pathway.

270. COMMENT: The USEPA Ambient Air Standard for beryllium is a long established and protective standard. The Department should use in its calculations the established community exposure limit that has been shown to be effective over several decades in preventing chronic beryllium disease (CBD) in the general population. The United States ambient air standard for beryllium was originally recommended by Merril Eisenbud of the Atomic Energy Commission in 1949, and it has been a federally enforceable USEPA regulation under the National Emission Standards for Hazardous Air Pollutants (NESHAP) program since 1973. See 40 CFR 61.32. The commenter is aware of no cases of clinical CBD due to air pollution attributable to exposures after about 1960. The current ambient air standard for beryllium is 0.01 ug/m^3 as a 30-day average and incorporates a 20-fold safety factor (Eisenbud, M. 1998. The Standard for Control of Chronic Beryllium Disease. Appl. Occup. Environ. Hyg. 13(1):25-31 (1998)).

Eisenbud studied the Lorain population which was exposed to levels of beryllium well above the current USEPA NESHAP standard. For example, in 1948 the levels of airborne beryllium within one-quarter mile of the Lorain plant averaged about 1 ug/m^3 and in some instances exceeded 2 ug/m^3. Eisenbud estimated that ambient air levels of beryllium during the 10 years preceding 1948 were determined to likely be no more than 8 times higher than the 1948 levels.

It is also important to note that the 0.01 ug/m^3 ambient air standard is based on data which accounted for child health risks. An x-ray health survey was conducted in 1948 in the neighborhood surrounding a beryllium manufacturing facility in Lorain, Ohio. Approximately

10,000 persons were surveyed (20% of the population in the survey area). Nine thousand satisfactory films were obtained. Of those films, 2000 were of children. The report of this study was designed to detect clinical CBD, the appropriate health end-point. The study did not identify any cases of clinical CBD among the children x-rayed in the survey. (64)

271. COMMENT: The USEPA Integrated Risk Information System (IRIS) should not be used for setting inhalation based criteria - the use of the IRIS value for calculating non-cancer inhalation risks is ill founded. First, the IRIS value is higher than the current USEPA NESHAPs ambient air standard. Second, IRIS inappropriately uses the Kreiss occupational exposure study (Kreiss K., Mroz M.M., Newman L.S., et al. Machining Risk of Beryllium Disease and Sensitization with Median Exposures Below 2 ug/m^3. Am. J. Ind. Med. 30: 16-25 (1996)) and discounts the Eisenbud study on which the USEPA NESHAP standard is based. The Eisenbud study (Einsenbud M., Berghout C.F., Steadman L.T. Non-Occupational Berylliosis. J. Ind. Hyg. Toxicol. 31:282-294 (1949)) is a study of actual community exposure to beryllium using the most appropriate health end-point and is the basis for the current standard.

Not only is the IRIS value higher than the current USEPA ambient air standard, but also it inappropriately considers sensitization to beryllium as a health effect. Sensitization is an inappropriate end point because sensitization is not a health effect or a health risk (American Conference of Governmental Industrial Hygienists. Biological Exposure Index Feasibility Assessment for Beryllium and Inorganic Compounds, 2002). Sensitization is not simply or accurately determined and has a low positive predictive value for CBD (Deubner D., Goodman M, Iannuzzi J. Variability, Predictive Value, and Uses of the Beryllium Blood Lymphocyte Proliferation Test (BLPT): Preliminary Analysis of the Ongoing Workforce Survey. Appl. Occup. Environ. Hyg. 16(5):521-526 (2001)). Sensitization has been shown to reverse and has been measured in a non-occupationally exposed group at levels of 1-2% (Kolanz, M. Introduction to Beryllium: Uses, Regulatory History, and Disease. App. Occup. Environ. Hyg. 16(5) 559-567 (2001)). The non-cancer inhalation health effect end-point that should be used is clinical CBD (symptomatic) (Deubner D., Goodman M, Iannuzzi J. Variability, Predictive Value, and Uses of the Beryllium Blood Lymphocyte Proliferation Test (BLPT): Preliminary

Analysis of the Ongoing Workforce Survey. Appl. Occup. Environ. Hyg. 16(5):521-526 (2001)). (64)

RESPONSE to COMMENTS 270 and 271: The referenced value of 0.01 $\mu g/m^3$ is not a National Ambient Air Quality Standard. National Emissions Standards for Hazardous Air Pollutants (NESHAPs) limit emissions from specific types of sources (they do not regulate soil contamination that then impacts human health via the inhalation pathway (See 38 FR 8826, Apr. 6, 1973, as amended at 65 FR 62151, 52, Oct. 17, 2000).

In addition, the USEPA classifies beryllium as Class B2, a probable human carcinogen for the inhalation pathway. The toxicity information found in the USEPA Integrated Risk Information System (IRIS) is more recent, and more appropriate for development of soil remediation standards for beryllium via the inhalation exposure pathway. As mandated in the Brownfield and Contaminated Site Remediation Act, "[i]n developing minimum remediation standards the department shall . . . consider and utilize, in the absence of other standards used or developed by the Department of Environmental Protection and the United States Environmental Protection Agency, the toxicity factors, slope factors for carcinogens and reference doses for non-carcinogens from the United States Environmental Protection Agency's Integrated Risk Information System (IRIS)." This mandate clearly establishes a preference for USEPA-derived toxicity factors.

272. COMMENT: No inhalation cancer risk safety factor should be used for beryllium exposure in setting soil remediation standards, because beryllium does not present a cancer risk. The epidemiology evidence for classifying beryllium as a carcinogen by inhalation is very weak, and recent studies provide further indication that past classification of beryllium as a carcinogen was improper.

The human cancer studies involving beryllium exposure consist of a number of retrospective cohort mortality studies of workers in seven beryllium processing facilities in Pennsylvania and

Ohio. These workers were employed during the middle of the 20th century and exposed to airborne concentrations of beryllium which are orders of magnitude higher than the levels which have existed subsequently, especially after the adoption of the Occupational Safety and Health Administration (OSHA) standards in 1971. These studies are summarized and reviewed by the Agency for Toxic Substances and Disease Registry (ATSDR) in Section 3.2.1.7 of Toxicological Profile for Beryllium. As noted by ATSDR, the early studies, which were conducted prior to 1987, "have been inadequately controlled for confounding factors such as smoking, improperly calculated expected deaths from lung cancer … or used inappropriate controls." More recent studies, published between 1992 and 2001, attempted to address many of these issues, but, again as noted by ATSDR, these studies suffer from limitations including "poor exposure characterization, relatively low excess cancer risk, … lack of discussion of exposure to other lung carcinogens … [and] inadequate adjustment for smoking habits." See ATSDR at 3.2.1.7.

Both the International Agency for Research on Cancer (IARC) and the ACGIH have recognized that any association which may exist between beryllium and cancer exists only at the extremely high levels of exposure which existed in the 1940s. The IARC states: "the greater excess was in workers hired before 1950 when exposures to beryllium in the work place were relatively uncontrolled and much higher than in subsequent decades," and "the highest risk for lung cancer being observed among individuals diagnosed with acute beryllium-induced pneumonitis, who represent a group that had the most intense exposure to beryllium."

The IARC further noted that: "Prior to 1950, exposure to beryllium in working environments was usually very high, and concentrations exceeding 1 mg/m^3 [1000 micrograms per cubic meter] were not unusual."

There is no scientific basis to conclude that inhalation of very low concentrations of beryllium can result in cancer. In fact, both the Ward and the Levy study found no cancer risk in the five "modern plants" which first started operations after 1950. Inhalation exposures in these "modern plants" were typically 10 to 100 times lower than that experienced in the two oldest plants. However, beryllium concentrations in air exposures were still experienced above the current

Occupational Exposure Limit of 2 micrograms per cubic meter in these "modern plants", especially in the 1950s and 1960s.

Recent papers have further criticized the methodology of the Ward et al. (1992) and Steenland and Ward (1992) papers upon which the human cancer classification for beryllium has been based. The American Conference of Governmental Industrial Hygienists (ACGIH), the National Toxicology Program and IARC earlier classifications of beryllium as a human carcinogen are even more questionable based on the evidence presented in the scientific papers.

One such paper was written by Paul S. Levy and his colleagues entitled, "Beryllium and Lung Cancer: A Reanalysis of the NIOSH Cohort Mortality Study" (Levy P., Roth H., Hwang P., Powers T. Beryllium and Lung Cancer: A Reanalysis of a NIOSH Cohort Mortality Study. Inhalation Toxicology 14: 1003-1015 (2002)). The paper reanalyzes the data and conclusions of the 1992 study by Ward (Ward, E., et al. A Mortality Study of Workers at Seven Beryllium Processing Plants. Am J Ind Med 22: 885-904 (1992)) and her colleagues which was used to substantiate a causal relationship between beryllium exposure and lung cancer. The 1992 Ward study itself was not definitive in its conclusion regarding beryllium exposure stating only that: "occupational exposure to beryllium compounds is the most plausible explanation for the increased risk of lung cancer observed in the study."

Levy reevaluated the Ward data using more sophisticated methods to adjust for smoking, calculate appropriate expected lung cancer rates, and perform meta-analysis on the data. Levy concludes that "there is no statistical association between beryllium exposure in these workers and lung cancer when using the most appropriate population cancer rates."

Just recently Levy and other researchers published a paper which identified methodological problems in the way that controls were matched to cases in the Ward et al. (1992) study and Sanderson et al. (2001) study, which is based on the same cohort (Levy, P., Roth H., Deubner D. Exposure to Beryllium and Occurrence of Lung Cancer: A Reexamination of Findings From a Nested Case – Control Study, JOEM 49:96-101 (2007)). Beryllium compounds form a solid precipitate soon after they enter a neutral environment. Once precipitated, these compounds would be expected to remain bound to the soil and are not likely to move deeper and enter groundwater.

A third paper, which has been accepted for publication, analyzes the study design in the Steenland et al. and Sanderson et al. studies (Deubner D., Roth H., and Levy P. Empirical Evaluation of Complex Epidemiology Study Designs: Workplace Exposure and Cancer (accepted for publication)). Their empirical evaluation of the design of these cohort-nested case control studies demonstrates previously unrecognized design biases. Using randomly selected probands as cases, they found that this design produces "higher average exposures in probands compared to their matches even when this was clearly not the case." As a result, this study design was incapable of distinguishing qualitatively between null and alternate hypotheses.

In summary, the most recent analysis of the available beryllium data finds an absence of an association between beryllium and cancer. Also, all agencies reviewing the carcinogenicity of beryllium had previously found that any link to cancer exists only at the very high routine occupational exposures which have not been seen for over 50 years. The extensive reviews of beryllium carcinogenicity over the years make it very evident that the high beryllium exposures which could be linked to cancer have not and do not occur to the general public. (64)

RESPONSE: The International Agency for Research on Cancer (IARC) continues to classify beryllium as Group 1, carcinogenic to humans for the inhalation pathway. In addition, the USEPA classifies beryllium as Class B2, a probable human carcinogen for the inhalation pathway. As mandated in the Brownfield and Contaminated Site Remediation Act, “[i]n developing minimum remediation standards the department shall . . . consider and utilize, in the absence of other standards used or developed by the Department of Environmental Protection and the United States Environmental Protection Agency, the toxicity factors, slope factors for carcinogens and reference doses for non-carcinogens from the United States Environmental Protection Agency's Integrated Risk Information System (IRIS).” This mandate clearly establishes a preference for USEPA-derived toxicity factors. Therefore, the Department deems it appropriate to evaluate beryllium as an inhalation exposure pathway carcinogen using the cancer toxicity information contained in IRIS.

Dieldrin

273. COMMENT: The dieldrin slope factor should undergo reevaluation. A review of the pertinent toxicology and epidemiology literature on dieldrin indicates that, based on the recommended approaches described in USEPA's published Guidelines for Carcinogen Risk Assessment (2005), a strong case can be made that dieldrin is not a human carcinogen, and that the current slope factor should be withdrawn, and dieldrin should be re-classified as a Class D chemical.

The current USEPA slope factor is based on the observation that dieldrin induces liver tumors in mice. However, the mode of action for mouse liver tumor induction appears to be based on a non-genotoxic response to dieldrin, and this mode of action does not appear to be relevant to humans or to other species of experimental animals.

Extensive, long term information is available for two dieldrin manufacturing facilities, including dose information. These studies included long-term follow-up of workers for up to 40 years from the time of initial exposure. No evidence of increased mortality was seen in workers from either facility. Reviews by the International Agency for Research on Cancer (IARC) and the Agency for Toxic Substances and Disease Registry (ATSDR) also support the conclusion that tumors seen in mouse studies are not relevant to humans, and should not be used as the basis for classifying dieldrin as a potential human carcinogen. (24)

RESPONSE: The Department did not develop its soil remediation standards for dieldrin using the information that was submitted by the commenter. Rather, the Department used toxicological information listed in the USEPA Integrated Risk Information System (IRIS). The Department is interested in conducting a thorough review of this information, as well as the original research studies as appropriate. The Department intends to continue to review the toxicological basis for dieldrin and will revise the remediation standards in future rulemaking as needed. In the interim, it will go forward with the adoption of the standards for dieldrin, as the Department believes that these standards are protective of human health.

Lead

274. COMMENT: The Department's proposed residential direct contact soil remediation standard for lead is 400 mg/kg. As there is no exemption for residential properties, it appears that lead contamination of soil at residential properties must be remediated to the standard of 400 mg/kg even if the Department is not involved. This value is partially inconsistent with standards for lead in soil found elsewhere in state and Federal regulations related to lead based paint risk assessment and lead hazard abatement.

In 40 CFR Part 745.65, the USEPA defines a soil lead hazard as follows: "A soil-lead hazard is bare soil on residential real property or on the property of a child-occupied facility that contains total lead equal to or exceeding 400 parts per million (mg/g) in a play area or average of 1,200 parts per million of bare soil in the rest of the yard based on soil sample." These rules are referenced and incorporated elsewhere in both State and Federal rules such as the Lead Hazard Abatement Subcode, N.J.A.C. 5:17, and in numerous procedures and guidance documents related to control of lead hazards. The proposed rule does not address an allowance for a higher standard in areas presenting lower exposure potential. Additionally, the proposed procedures for case-by case determinations of alternative remediation standards, though possibly applicable, are not an appropriate to address this discrepancy since each affected residential property owner would be required to present a case for an alternate standard. Presumably the higher Federal standard for "other areas" relies upon the professional judgment of the licensed risk assessor to differentiate areas of residential soil that present a significant opportunity for exposure compared with those that present a lesser opportunity (grass cover, limited accessibility etc.). The Department should clarify whether the proposed rules supersede the rules and procedures established by USEPA, New Jersey Department of Community Affairs and others. What procedures should public health agencies follow when they discover lead levels exceeding the proposed standard during environmental lead investigations conducted pursuant to N.J.A.C. 8:51 but which do not present a soil lead hazard as previously defined? (23)

RESPONSE: The soil remediation standards are applied at sites conducting remediation pursuant environmental statutes and regulations administered by the Department. The Department believes that it is important to protect children from lead contaminated soil and will require remediation to the 400 mg/kg standard for lead at residential sites, schools and childcare centers. The 400 mg/kg standard for lead is also used by the USEPA Superfund Program.

The Department will continue its review of the lead abatement rules that the commenter cited, and discuss its remediation program with the agencies implementing those rules to ensure that all unacceptable risks that lead paint presents are addressed consistently.

Methylmercury

275. COMMENT: The Department should expand the current list of contaminants to include methylmercury which is of specific interest to both the Department and USEPA. Methylmercury is of concern due to its toxicity specifically to children and women of childbearing age and its potential to bioaccumulate when available in the environment. Currently, the proposed standards only address total mercury. The Department should include a remediation standard for methylmercury or at a minimum, provide guidance on how to address this chemical during soil remediation efforts. (46, 58)

RESPONSE: The Department agrees that methylmercury is of specific interest, particularly because it is a critical factor in determining fish consumption advisories. However, methylmercury is formed in aquatic environments rather than in soils. Despite limited historic production of methylmercury either as a product or a bi-product in a few locations worldwide, the Department is unaware of any historic or current production of methylmercury in New Jersey nor of any occurrence of methylmercury as a soil contaminant in New Jersey. Therefore, the Department does not believe it is appropriate to develop soil remediation standards for methylmercury at this time. If a need for a remediation standard is identified, the Department will develop an interim remediation standard pursuant to N.J.A.C. 7:26D-5, and ecological standards based on its authority pursuant to N.J.S.A. 58:10B-12.

Vanadium

276. COMMENT: The reference dose used to derive the proposed soil remediation standard for vanadium should be revised to reflect the new recommended reference dose suggested by USEPA National Center for Environmental Assessment (NCEA) in July 2007 or by the USDOE Risk Assessment Information System (RAIS) in June 2007. This would result in a soil cleanup standard for vanadium of 391 mg/kg, (RfD 5 x 10^{-3} mg/kg per day) and the RAIS reference dose suggested by RAIS, current as of June 2007, which would result in a soil cleanup standard of 548.4 mg/kg (RfD 7 x 10^{-3} mg/kg per day). The reference dose used by the Department to derive the residential direct contact soil cleanup standard for vanadium is based on a NCEA retired study. NCEA will no longer support the study. NCEA informed the commenter that an oral reference dose of 5 x 10^{-3} mg/kg-day should be used for vanadium, if no unusual salts are present at the site. Reference doses that exist from other USEPA approved agencies are less conservative than the one used by the Department and may be more appropriate for vanadium where unusual site conditions exist. (54)

RESPONSE: The Department has reviewed the information submitted by the commenter and will take these recommendations under advisement. The Department has contacted the USEPA National Center for Environmental Assessment (NCEA) requesting that the vanadium manuscript be updated and placed on the Provisional Peer Reviewed Toxic Values Status Table. When NCEA updates its vanadium information, the Department will revisit its remediation standard. Until that time, the remediation standards for vanadium will remain as proposed.

General Toxicity

277. COMMENT: The basis for the residential exposure scenario is a 1996a version of the USEPA Soil Screening Guidance while there are newer and updated releases of this document which should also be allowed to be used such as Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA 2002a) and the Exposure Factors Handbook (USEPA 1997). The Department needs to allow alternative approaches and not be limited to current or outdated approaches. (36)

RESPONSE: The Department strives to use the best available science in the development of its remediation standards and policy determinations. The Department will continue to use updated USEPA documents and alternative approaches when deemed appropriate and allowable under the Technical Requirements. The ingestion dermal pathway employed the 2002 Supplemental Guidance for Developing Soil Screening Levels and the 1997 Exposure Factors Handbook. For the evaluation of the inhalation pathway, the Department used, in part, the 1996 version of the USEPA Soil Screening Guidance. Because the portions of the 1996 guidance that were used by the Department did not change significantly in the 2002 Supplement, the Department did not feel it necessary to use the 2002 Supplement.

Specific Criteria for Slag

278. COMMENT: The Department should consider remediation goals based on material specific Hazard Index calculations and should consider alternative approaches not currently specified in the proposed remediation standards. A Hazard Quotient greater than one suggests that a hazard may exist and that further evaluation is warranted. Theoretical excess cancer risks should also be characterized using a cumulative cancer risk estimate in the range of one-in-a-million (1×10^{-6}) to one-in-ten-thousand (1×10^{-4}) to be considered negligible cancer risk, National Oil and Hazardous Substances Pollution Contingency Plan. (U.S. EPA, 55FR8666, March 8, 1990). The Department should consider material specific criteria, such as slag material, rather than rely on general assumptions related to remediating contaminated soils. (36)

RESPONSE: The Brownfield Act mandates that the Department derive soil remediation standards for individual chemicals that are based on a 10^{-6} cancer risk estimate and a Hazard Index of one for non-cancer effects, which precludes the commenter's recommendations. As the Brownfield Act mandates that the Department develop soil remediation standards for individual chemicals and not for mixtures of chemicals based on cumulative risk effects such as slag.

279. COMMENT: Many aspects of the remediation standards rest of the assumption that the bioavailability of metals in slag is similar to that of metals in soil; however, bioavailability of metals in slag are limited compared to metals in soil. (36, 14)

RESPONSE: The Department currently does not take bioavailability into account in the development of any of the remediation standards, except for lead. Please see the response to comments 295 through 299 for additional discussion of bioavailability.

Group C Carcinogen Policy

280. COMMENT: In determining the soil remediation standards for Group C carcinogens, "Possible Human Carcinogens," the Department has resorted to an overly conservative policy that is more conservative than the policies used by the USEPA's Office of Drinking Water and the USEPA's Superfund Program, and is not justifiable. As stated in the Department proposed new rules document, the USEPA Office of Drinking Water requires that the risk assessment for Group C carcinogens be based on the reference dose for non-carcinogenic effects, with an additional uncertainty factor of 10 to protect from possible carcinogenic effects. However, if no reference dose is available, the risk assessment is based on the carcinogenic slope factor using a lifetime cancer risk level of 1×10-5. On the other hand, the Superfund Program bases risk assessments for Group C carcinogens on the carcinogenic slope factor, if available, using a lifetime cancer risk level of 1×10-6. If no carcinogenic slope factor is available, the Superfund program requires that the reference dose for non-carcinogenic effects be used without incorporating an additional uncertainty factor. The Department has combined the most conservative elements of the policies developed by these USEPA programs (i.e., using the cancer

slope factor with a lifetime cancer risk level of 1×10-6, or if a slope factor is not available, using the reference dose with an additional uncertainty factor of 10), and used these in developing the new soil remediation standards. This is unnecessarily conservative and compounds uncertainty factors. This departure from USEPA's approach is not consistent with the mandates of the Brownfield Act, and the Department guidance should be revised to eliminate the additional 10-fold factor. (4, 5, 11, 15, 16, 18, 20, 24, 28, 29, 30, 32, 34, 38, 40, 41, 45, 51, 52, 54, 56, 59)

RESPONSE: The Department debated adopting either the USEPA's Superfund approach or its Office of Drinking Water's approach for addressing Group C carcinogens. The Department believes that Superfund's approach is not protective for those Group C carcinogens without a slope factor, but with qualitative data available that support a carcinogenic potential. For these, the Department has adopted the USEPA's Office of Water's approach to use the reference dose with an additional uncertainty factor. The Department strongly believes that a Group C carcinogen with an available slope factor should be treated as a carcinogen at a 10-6 risk management level that is mandated by the Brownfield Act. Chemicals are classified as Group C (possible human carcinogens) for a wide range of reasons, not simply because they have the weakest evidence. For example, when data suggest a carcinogenic effect, but are limited because the studies involve a single species, strain, or experiment and do not meet the criteria for sufficient evidence. The Department's risk assessment approach for chemicals classified as Group C (possible human carcinogens) under the 1986 guidelines or suggestive carcinogens under the 2005 guidelines is a science policy decision intended to be reasonable, public health protective, and consistent throughout various Department programs.

281. COMMENT: The RfD for naphthalene already has a 3,000-fold uncertainty factor to account for uncertainties in the analysis. The Department's approach essentially uses an uncertainty factor of 30,000, which is higher than is used by USEPA for any chemical and is therefore overly conservative. (11)

RESPONSE: The commenter is incorrect in saying that the reference dose used by the Department has a 3,000 fold uncertainty factor with an additional factor of 10 for possible carcinogenicity resulting in a total uncertainty of 30,000. Naphthalene is one of the chemicals addressed by the New Jersey Drinking Water Quality Institute (NJDWQI), and the Reference Dose for naphthalene was developed by the NJDWQI and differs from the Reference Dose given by the USEPA Integrated Risk Information System (IRIS). The uncertainty factor used in the New Jersey Reference Dose is 100 with an additional factor of 10 added for possible carcinogenicity for a total uncertainty factor of 1000. The basis for the naphthalene Reference Dose is found at http://www.nj.gov/dep/watersupply/1994-appendix.pdf.

282. COMMENT: The policy by which soil remediation standards for Group C carcinogens are developed when carcinogenic toxicity values are not available is a policy decision and is not based on science. Typically, if data are not available to allow an appropriate cancer slope factor to be developed, then the remediation goal for soils is based on the available science, namely, the non-cancer health endpoint and associated toxicity value, or reference dose (RfD). When a cancer slope factor is not available, applying an additional uncertainty factor of 10 has no scientific basis. The Department should derive the soil remediation standard using the RfD when a cancer slope factor is not available, and should note in the table that this value does not take into account possible carcinogenic effects, and a risk management policy decision can then be made to lower the soil remediation goal by implementation of a policy decision. (46, 58)

283. COMMENT: The Department provides no scientific basis for reducing the non-cancer reference dose by an additional uncertainty factor of 10 to account for potential cancer effects of Group C carcinogens, nor are the commenters aware of any scientific basis to support such an adjustment. As acknowledged by the Department, the USEPA “Superfund program requires that the reference dose for non-carcinogenic effects be used without the incorporation of an additional uncertainty factor.” (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE to COMMENTS 282 and 283: For chemicals classified as possible or suggestive carcinogens, there is some evidence suggesting their carcinogenic potential, but not enough to classify them as probable or likely carcinogens. For some of these chemicals, there is sufficient data to develop a scientifically defensible slope factor, while for others there is not. For chemicals in these groups for which no slope factor is developed, it is a prudent, public health protective approach to incorporate an additional uncertainty factor into the reference dose to account for potential carcinogenic effects. The USEPA Office of Water has followed this policy for many years in developing its human health-based risk assessments (Maximum Contaminant Level Goals, MCLGs). The commenters suggest that a risk management policy be made to reduce the Reference Dose for possible carcinogens on a case by case basis. The Department sees no benefit to the commenters' suggestion and believes that incorporating an extra uncertainty factor with an appropriate denotation accomplishes this goal.

284. COMMENT: The commenter notes that the USEPA no longer uses an alphabetical system of classification for carcinogens. Instead, it has employed a new system that qualitatively describes the chemicals as "Carcinogenic to Humans," "Likely to Be Carcinogenic to Humans," "Suggestive Evidence of Carcinogenic Potential," "Inadequate Information to Assess Carcinogenic Potential," and "Not Likely to Be Carcinogenic to Humans" (USEPA 2005). Although the Department acknowledges this inconsistency, they have provided no means to update their proposed system with the current USEPA classification system. As USEPA develops toxicity criteria for new chemicals, the Department's system will not be compatible. (21)

285. COMMENT: The commenters recommend updating all references to 'Group C carcinogens' to include the weight-of-evidence classifications outlined by the USEPA in the Guidelines for Carcinogen Risk Assessment (EPA/630/P-03/001B, March 2005). This document revises and replaces the previous USEPA guidelines (1986) in which "Class C carcinogens" are defined. (11, 21)

RESPONSE to COMMENTS 284 and 285: The USEPA recognizes that many existing risk assessments are based on the classification system described in its previous (1986) cancer risk assessment guidelines (e.g. Human Carcinogen, Group A; Probable Human Carcinogen, Group B; Possible Human Carcinogen, Group C; Not Classifiable, Group D; and Not Carcinogenic to Humans, Group E), while new risk assessments and updates of existing risk assessments will be done under the 2005 guidelines using the new descriptors mentioned by the commenters. On March 29, 2005, USEPA Acting Administrator Stephen L. Johnson issued a memorandum entitled "Application of the New Cancer Guidelines." The memorandum states that existing risk assessments that have not been reassessed under the new guidelines, "the current completed assessment will continue to considered scientifically sound based on the guidance used when the assessment was completed." Similarly, the Department will continue to use the existing risk assessments and carcinogenicity classifications for chemicals which have not been reassessed under the new guidelines. The Department does not have the resources to independently update the Group C carcinogens to include the weight-of evidence classification of USEPA's March 2005 Guidelines. The Department is committed to using the best toxicity information available to develop its standards, and will review each new USEPA Integrated Risk Information System (IRIS) profile as it relates to a particular chemical standard. The Department will consider adapting its policy for chemicals that are evaluated under the narrative descriptors found in the 2005 cancer guidelines, as new IRIS profiles become available.

286. COMMENT: The Department proposes to apply a conservative approach when calculating criteria for compounds it considers Class C carcinogens. Since the Department proposes to apply an additional safety factor in some instances for these compounds, the commenter feels that the regulated community should have the opportunity to review how the determination was made. For example, the Department proposes a soil standard for beryllium (ingestion-dermal pathway) that is more conservative than the USEPA's soil screening level. The basis for the Department's more conservative level is that the Department identified beryllium as a Class C carcinogen in this proposed rule. However, neither the proposed rule nor the three "basis and background" documents provide the reason for the Class C carcinogen determination. The USEPA's Integrated Risk Information System (IRIS) lists beryllium as a Class B1 carcinogen. The 2006 Edition of the Drinking Water Standards and Health Advisories does not include a weight-of-evidence classification for beryllium. As written, this standard is not clear and transparent and does not provide the regulated community with clear documentation as to the decisions made by the Department. We recommend that the Department

provide a complete reference for the documentation of all compounds that are identified in this proposed rule as Class of carcinogen different than the Class listed in IRIS. (21)

RESPONSE: Please see the response to comments 269 through 272 concerning the soil remediation standard for beryllium. Documentation and/or references have been provided for all remediation standards and are found in the Basis and Background documents. Specifically, Class C carcinogens are listed in Appendix B of the Inhalation Exposure Pathway Basis and Background document, and Table A-4 of the Ingestion-Dermal Exposure Pathway Basis and Background document. As noted in both of these Basis and Background documents, the Department is aware of the 2005 USEPA *Guidelines for Carcinogen Risk Assessment* (USEPA, 2005), and the recommendation of using narrative descriptors for weight of evidence of carcinogenicity in place of the existing alphabetic classification system. As noted in both of the Basis and Background documents, as the practical implications of the narrative descriptors in the new guidelines become clear, the Department will consider adapting its policy for chemicals that are evaluated under these narrative descriptors as they become available.

287. COMMENT: The commenter states that Group C carcinogens have the weakest basis for carcinogenicity, and the conservative assumptions incorporated into the development of non-cancer reference doses are protective based on the documented noncarcinogenic endpoints. Therefore, including an additional uncertainty factor for an undocumented endpoint (cancer) seems overly conservative. By taking this approach, the Department does not seem to have met its objective to avoid the use of redundant conservative assumptions. (21)

RESPONSE: Chemicals are classified as Group C (possible human carcinogens) or suggestive carcinogens for a wide range of reasons, not simply because they have the weakest evidence. Other reasons for a Group C classification include: when data suggest a carcinogenic effect, but are limited because the studies involve a single species, strain, or experiment and do not meet the criteria for sufficient evidence (e.g. to an unusual degree in a single experiment with regard to high incidence, unusual site, or type of tumor or early age at onset); experiments restricted by inadequate dosage levels, duration of exposure, period of follow up, poor survival, too few animals, or inadequate reporting; or an increase in the incidence of benign tumors only. The Department has determined that these chemicals warrant the incorporation of an additional uncertainty factor into the reference dose.

288. COMMENT: The commenter recommends that the equations in Appendices 2, 3, and 4 show where the adjustment was made by the Department for Class C carcinogens. If the Department does not change its policy about Class C carcinogens in the final rule, the commenter recommends updating these equations so the regulated community can clearly see where the additional “uncertainty factor” was applied by the Department. (21)

RESPONSE: The additional uncertainty factor for possible carcinogenicity for Group C carcinogens is not part of the equations in Appendixes 2, 3, and 4 of the rule proposal. As directly stated in both the Inhalation Exposure Pathway and Ingestion-Dermal Exposure Pathway Basis and Background documents, the uncertainty factor is already incorporated into both the reference dose (RfD, ingestion-dermal) and reference concentration (RfC; inhalation) for these chemicals by dividing the RfD or RfC value by 10. The Department believes that it is appropriate to leave information about the Group C determination in the Basis and Background documentation where all relevant sources of toxicology and carcinogenicity weight-of-evidence determinations are listed

289. COMMENT: It is also important to note that Group C carcinogens are defined by USEPA as possible (rather than probable) human carcinogens, based on limited evidence of carcinogenicity in animals and inadequate or lack of human data. It is now widely recognized, as discussed in USEPA’s 2005 Guidelines for Carcinogenicity Risk Assessment, that evidence of carcinogenicity in animals does not necessarily imply that a chemical is a human carcinogen. The USEPA is currently in the process of re-evaluating the relevance of mouse liver tumor data to human cancer, given that many chemicals identified as Group B and C carcinogens by USEPA are primarily based on mouse liver tumor data. With the backing of USEPA, the National Academy of Sciences will be addressing this issue in a focused review session this fall (November 2007). (24)

RESPONSE: The difficulty in demonstrating that a chemical is a carcinogen from epidemiology data is well recognized. Only a small group of chemicals are classified as known human carcinogens from human data. The reason for this is that there is a high background rate of cancer in the human population. Therefore, only chemicals that cause a rare type of tumor (e.g. mesothelioma caused by asbestos), which are very potent carcinogens, or for which exposure is high enough to cause a very high cancer incidence, can be identified from human data. For this reason, animal studies are used to identify potential human carcinogens, and it is a public health protective default assumption that a chemical that is an animal carcinogen poses a cancer risk to humans, unless specific mode of action information indicates otherwise.

290. COMMENT: The USEPA identifies the Group C chemicals as "possible" not "proven" carcinogens, as such they should not be treated as carcinogens. Use of Reference Doses recommended by the USEPA should be protective of human health. They should not be subject to any further uncertainty factor or treated equally as carcinogens with a risk factor of 1 in a million. When adequate evidence proves them to be carcinogens, they should be removed from the Group C and placed in the appropriate group of proven carcinogens for updating in the next revision of the standards. (1)

291. COMMENT: The commenters believe that contrary to USEPA and other states' policy, the Department is treating selected Class C carcinogens as if they were Class A or B carcinogens. This results in a 10 fold increase in the uncertainty factor applied by the Department to certain classified Class C carcinogens (16, 20, 38, 41, 52, 56)

RESPONSE to COMMENTS 290 and 291: There is some evidence of carcinogenicity of chemicals classified as Group C, Possible Human Carcinogens, but there is not enough evidence to classify them as Known or Probable Human Carcinogens (Group A or B). Therefore, it is appropriate to address them differently than chemicals classified as noncarcinogens (Groups D or E). Therefore, the Department has determined that in order to be protective, it is prudent include the additional uncertainty factor of 10.

292. COMMENT: The Department is proposing the development of soil remediation standards for chemicals classified as possible human carcinogens. The Department should submit these proposed risk assessment procedures to an independent peer review. In addition, the Department should rely upon USEPA's recommended hierarchy for sources of toxicity values as the basis for its numeric remediation standards and should develop (and submit for independent peer review) guidelines for technical acceptability of "available" toxicity factors from sources other than USEPA's Integrated Risk Information System (IRIS) program. (16, 20, 38, 41, 52, 56)

RESPONSE: The Department believes that it has adequate in-house expertise to determine classification of possible human carcinogens and the scientific validity of available toxicity factors from sources other than the USEPA Integrated Risk Information System (IRIS) program. The Department has intentionally allowed for the flexibility to review other sources of toxicity information recommended by persons within or outside of the Department through its established Alternative Remediation Standard (ARS) process.

293. COMMENT: The Department's proposed standards incorporate an additional safety factor of 10 for certain Class C carcinogens that the USEPA does not incorporate under its Superfund program. As such, the proposed rule would implicitly impose standards and requirements that exceed federal requirements. The Department's "Federal Standards Analysis" does not acknowledge this fact. The Department's proposed rule also makes no claim and provides no evidence that the additional 10-fold safety factor is necessary to protect human health, or that USEPA standards that do not incorporate this factor are not protective of human health. (16, 20, 38, 41, 52, 56)

RESPONSE: It should be noted that the additional uncertainty factor of 10 is used only for those possible (Group C) or suggestive carcinogens for which no slope factor is available. For chemicals in these categories with valid slope factors, the risk assessment is based on the 10^{-6} cancer risk, consistent with USEPA Superfund policy and the mandate of the New Jersey Legislature. For possible or suggestive carcinogens for which no cancer slope factor has been developed, it is prudent and health protective to incorporate an additional uncertainty factor into the Reference Dose instead of simply using the Reference Dose as if no carcinogenic effects had occurred. The Department discussed its reasons for adopting the Group C carcinogen policy in the Rule Summary in a General Discussion of C Carcinogens and again in the Federal Standards Analysis. The Group C carcinogen policy is a reasonable health protective policy that is grounded in the approach that New Jersey has used in developing its drinking water standards since 1987 as well as the policies of the USEPA's Office of Drinking Water.

294. COMMENT: The Department justifies use of the uncertainty factor for Class C carcinogens, in part, based on use of such factors in the USEPA's drinking water programs. The use of an uncertainty factor of 10 in developing cleanup standards for soil, however, is overly conservative and redundant. The USEPA's use of an uncertainty factor in developing drinking water standards does not justify use of the same factor in developing cleanup standards for soil. (16, 20, 38, 41, 52, 56)

RESPONSE: The Department uses the same risk assessment approaches and toxicity factors in developing all of its human health-based criteria and standards, including soil and drinking water, and uses exposure assumptions appropriate for each medium. Whether exposure is through drinking water or soil has no relevance to the use of an additional uncertainty factor for possible (Group C) and suggestive carcinogens which do not have a slope factor, as this approach relates to toxicity factor development, not the exposure assumptions.

Bioavailability

295. COMMENT: The commenter states that USEPA has recognized bioavailability as an important factor to consider for human health risk assessment of metals. In Region VIII, USEPA has used bioavailability data for risk assessment of arsenic in soil, in addition to lead (Casteel et al. 2001, 2003a,b) In addition, USEPA published several documents supporting the use of

bioavailability data for other chemicals in soil. In a memorandum regarding "Estimation of Relative Bioavailability of Lead in Soil and Soil-like Materials Using In Vivo and In Vitro Methods," USEPA comments that, over the years, much effort has been expended to validate laboratory methods (i.e., in vitro bioaccessibility) for determining bioavailability of soil-borne lead, arsenic, and other metals. With these laboratory methods being validated, USEPA states that "evaluating bioavailability data and incorporating them into site-specific risk assessments has become important". (11)

296. COMMENT: The commenter believes that restricting this Rule to lead is not justified, and if available, bioavailability data should be usable for any chemical for which systemic absorption is limited by adherence of the chemical to soil, and for which the regulatory toxicity criteria were derived using soluble forms of the metal. Use of bioavailability adjustments for other (i.e., non-lead) chemicals in soil is supported by new USEPA publications, such as the Guidance for Evaluating the Oral Bioavailability of Metals in Soils for use in Human Health Risk Assessment and the Framework for Metals Risk Assessment, and the USEPA Superfund and Region VIII websites, and also by established and emerging literature regarding the relative oral bioavailability of chemicals from soils. (11)

297. COMMENT: The USEPA affirms the importance of using bioavailability data in Guidance for Evaluating the Oral Bioavailability of Metals in Soils for use in Human Health Risk Assessment (USEPA 2007c). The toxicity of an ingested chemical depends on the degree to which it is absorbed from the gastrointestinal tract into the body. The USEPA states:

"Because oral reference doses (RfDs) and cancer slope factors (CSFs) are generally expressed in terms of ingested dose (rather than absorbed dose), accounting for potential differences in absorption between different exposure media can be important to site risk assessments. This is true for all chemicals, but is of special importance for metals. Thus, if the oral RfD or CSF for a metal is based on studies using the metal administered in water or food, risk from ingestion of metal in soil might be underestimated or overestimated. Even a relatively small adjustment in oral bioavailability can have significant impacts on estimated risks and cleanup goals".

Metals exist in a variety of chemicals and physical forms. However, not all forms are absorbed to the same extent in a given metal. For example, a metal in contaminated soil may be absorbed to a greater or lesser extent than when ingested in drinking water or food. Soil can significantly reduce the potential bioavailability of metals in the environment.

The USEPA recently recognized that metals present unique risk assessment issues in its new guidance, Framework for Metals Risk Assessment (USEPA 2007b). Under USEPA's Risk Assessment Forum, a Metals Action Plan was devised for establishing a process to ensure consistent application of scientific principles to metals risk assessment. The Metals Action Plan proposed that the Framework should offer general guidance to USEPA programs for considering the various properties of metals, such as environmental chemistry, bioavailability, and bioaccumulation (USEPA 2007b). In September 2002, the USEPA's Scientific Advisory Board reviewed the Metals Action Plan and agreed that "chemical speciation, bioavailability, bioaccumulation, and toxicity are key issues in assessing the hazards of metals, with qualifications" (USEPA 2007b, page xi). It was agreed that the form of the metal (chemical species, compound, matrix, particle size) can influence its bioaccessibility, bioavailability, fate, and effects.

In addition, the USEPA suggests that a distinction be made between the persistence of total metals in soil and the persistence of bioavailable forms of the metal. This is due to the fact that, as metals age in soils, they decrease in bioavailability.

Further, many peer-reviewed papers have been published in scientific journals regarding the bioavailability of metals and its implication for risk assessment (Dieter et al. 1993; Freeman et al. 1992, 1994; Oomen et al. 2003; Schoof and Nielson 1997). These publications have all reported that, depending on the matrix, bioavailability of a metal may be under- or overestimated. In traditional risk assessment practice, the oral bioavailability of the contaminant in soil was assumed to be equal to the oral bioavailability of the contaminant in the medium used in toxicity studies, such as water and food (Oomen et al. 2003). However, in vivo studies of laboratory animals suggest that the oral bioavailability of contaminants in soil might be significantly less than that for contaminants in other matrices such as food and liquids (Freeman et al. 1992, 1994; Dieter et al. 1993). Based on the available bioavailability studies, Canada's Ministry of Environment, in its Soil Investigation and Human Risk Assessment for the Rodney Street Community, Port Colborne: March 2002, agreed that, for both lead and arsenic, the bioavailability in soil was reduced when compared to the bioavailability of soluble forms (i.e., relative bioavailability from soil was less than the default value of 1.0. (11)

298. COMMENT: The commenter believes that the Department's proposed application of site-specific bioavailability data only to lead is not scientifically justified or consistent with current USEPA guidance. If available, bioavailability data should be considered for all chemicals for which the systemic absorption is limited by adherence to soil and for which the regulatory toxicity criteria were derived using soluble forms of the chemical. This is especially important for metals that may have very limited bioavailability when bound to soil. The Department's assumption of 100% bioavailability overestimates risk. Further, this issue highlights the need for flexibility in the proposed rule, because these guidance documents from the USEPA on risk assessment of metals and bioavailability were just released this year. As written, the proposed rule restricts the incorporation of new approaches, such as bioavailability, into the process of determining remediation standards. The rule should be revised to allow for new approaches and the inclusion of bioavailability for determining site-specific alternative remediation standard values. (11)

299. COMMENT: The commenter asserts that since 1984 thousands of scientific articles documenting that chemicals associated with soil are almost always less than 100% bioavailable; for some it may be less than 25% bioavailable. To continue to avoid the use of bioavailability in the development of soil remediation standards is not consistent with the Legislature's guidance on how to develop remediation standards or with the Department's Mission Statement that includes it will "define and publish reasonable, clear and predictable scientifically-based standards." Prior to enacting soil remediation standards, the Department has the responsibility to

develop soil remediation standards that include relevant bioavailability factors which will result in elimination of unneeded and expensive remediations. (55)

RESPONSE to COMMENTS 295 through 299: The Department recognizes the importance of considering bioavailability in evaluating exposure to metals in soil. It is important to recognize that bioavailability is implicitly considered to some degree in the standard slope factors and Reference Doses used in risk assessment. The chemical in soil or other media is assumed to be as bioavailable as it was in the study which forms the basis of the risk assessment, which is not necessarily 100%. Currently, the Department explicitly considers bioavailability in the models used to assess exposure to lead in soils and other media. The Department is aware of efforts toward developing in vitro methods for determining the relative bioavailability of metals from soils at sites of concern. At this time, these methods have not been fully validated and thus have not reached the stage where they can be utilized in regulatory decision making. Although they are not used by the Department in evaluating exposure from soils at this time, the Department is very interested in following developments in this area and utilizing these assays when they are fully validated. In vivo studies to determine bioavailability of metals in soils from specific sites, such as the studies by Casteel cited by the commenter, can provide site-specific bioavailability information suitable for consideration for risk assessment, but are generally too costly and time-consuming to be practical for determination of a bioavailability adjustment for a specific site. Such studies have not been conducted on specific New Jersey sites.

Toxicity Hierarchy

300. COMMENT: The USEPA recommends that the toxicity values used in the development of the remediation standards be peer reviewed, publicly available and represent the state of the science. The toxicity hierarchy identified in the rule states the toxicity data derived pursuant to the A280 amendments of the New Jersey Safe Drinking Water Act as the top tier. These values, however, have not been updated regularly and are not extensively peer reviewed. For example, USEPA's Integrated Risk Information System (IRIS) database contains toxicity values for benzene and vinyl chloride, two chemicals identified in the A280 amendments and which are

commonly found at Superfund sites. Within the past few years, both of these chemicals have been reviewed by the IRIS program and updated toxicological profiles have been developed and peer-reviewed. These two chemicals were found to have very unique toxicological effects - benzene, with a range of cancer slope factors depending the population of concern, and vinyl chloride, with a very specific and unique "window of effect" when children are exposed at a certain age - which were incorporated into their revised IRIS files. The toxicity values used in the New Jersey soil remediation standards that are based on the A280 amendments have not yet been reviewed to incorporate the state of the science. (46, 58)

RESPONSE: The toxicity factors developed by New Jersey pursuant to the Safe Drinking Water Act are currently being reviewed by the New Jersey Drinking Water Quality Institute (NJDWQI) and are being updated where appropriate. When the review is complete and the NJDWQI makes recommendations to the Department, the updated toxicity factors will be considered for incorporation into the soil remediation standards. It should be noted that the Health Effects Subcommittee of the NJDWQI has completed an extensive review two of the noted chemicals, vinyl chloride and benzene, and the review has not resulted in a recommendation for a less stringent toxicity factor for either of these chemicals.

301. COMMENT: The rule should also clearly state how chemical toxicity will be addressed with regard to sensitivity and/or susceptibility for children. As part of the effort to update its cancer guidelines, the USEPA developed a supplement that focused on the impact of a unique group of carcinogens on children. These carcinogens act via a mutagenic mode of action, and children, when exposed during specific times of their lives, are more sensitive and/or susceptible to the effects. The USEPA recommends dealing with these effects by implementing an Age-Dependent Adjustment Factor, or ADAF, when either estimating the excess lifetime cancer risks or developing remediation goals. The commenters strongly encourage the Department to consider the unique toxicity of these chemicals in the soil remediation standards. (46, 58)

RESPONSE: The Department agrees with the importance of addressing susceptibility of children to carcinogens which act through a mutagenic mode of action, and is aware of the supplement to the USEPA Cancer Guidelines addressing this issue. The Department understands that the USEPA is still developing the implementation of this guidance, and has not yet incorporated it into any of its risk assessments. The Department will continue to monitor USEPA's progress in implementing this guidance and will determine its appropriate use in the development of the standards on a chemical-specific basis.

302. COMMENT: It was difficult to ascertain whether and how the Department's committees that developed the standards utilized the USEPA 2005 Final Guidelines for Carcinogen Risk Assessment in their development of numerical standards. The USEPA Guidance may take a different approach to the assessment of certain carcinogens that have a mutagenic mode of action than was used by the Department. In reviewing these standards prior to adoption, would any of the numerical standards for certain chemicals change based on re-evaluation using the 2005 EPA Cancer Guidelines? If so, those standards should be adjusted unless Department scientists have a reasoned defense for not doing so. In short, the Department's numerical standards for carcinogens should reflect the guidance from the USEPA on Carcinogen Risk Assessment adopted in 2005. (25)

RESPONSE: As chemicals on the Integrated Risk Information System (IRIS) are updated or newly generated by USEPA using the 2005 Final Guidelines for Carcinogen Risk Assessment, the Department will review these profiles to determine whether this new information is appropriate to develop or update the Department's chemical specific standards. To date, USEPA has not applied their mutagenic mode of action guidance to any chemicals on IRIS. Such implementation will include how to decide which chemicals the guidance applies to and how to apply the guidance. It should be emphasized that this policy is intended to be applied only to chemicals that can be shown to have mutagenicity as a mode of action for tumor production, not simply for all chemicals that are positive in a mutagenicity test. Even for chemicals that are well accepted to act through mutagenicity, such as ethylene oxide, there is controversy as to how to apply this guidance. As USEPA begins to apply it guidance to its IRIS assessments, these assessments will be reviewed by the Department and utilized if judged appropriate to do so. It should be noted that a recent draft IRIS Toxicological Profile (2007) on a chemical which is a potent carcinogen and is clearly mutagenic and genotoxic, 1,2,3-trichloropropane, specifically DOES NOT recommend the use of the adjustment for chemicals with a mutagenic mode of action, with the rationale that the mutagenicity has not been proven to be the cause of the tumors.

303. COMMENT: The Department must re-evaluate its proposed soil remediation standards and current numeric groundwater quality standards in light of the USEPA's recommended hierarchy for sources of toxicity values and should subject all of its internal toxicity assessments and novel risk assessment procedures to independent peer review. (52)

RESPONSE: The toxicity factors that are used by the Department pursuant to the Safe Drinking Water Act are recommended to the Department by the New Jersey Drinking Water Quality Institute, an advisory group, and subsequently proposed for public comment prior to becoming final. The Department believes that adequate opportunity for public input into the toxicity factors is allowed through this process. The toxicity factors developed for interim specific ground water quality standards are normally for contaminants not addressed by USEPA's Integrated Risk Information System (IRIS) database. There is an opportunity for public comment on these standards when they are promulgated as final ground water quality standards.

The Ground Water Quality Standards, N.J.A.C. 7:9D, and the toxicity factors used to derive them, have been reviewed and approved by the State Supreme Court. The Legislature mandated that the soil standards also be protective of human health and the environment, so the Department employed a similar approach in determining the toxicity factors for these soil remediation standards.

304. COMMENT: The proposed regulation states that, "For each contaminant for which the Department calculated a soil remediation standard, the Department utilized the following hierarchy of toxicity data sources for the carcinogenic slope factor variable for carcinogens or the reference dose variable for non-carcinogens: (1) information which forms the basis for drinking water standards adopted by the Department pursuant to the Safe Drinking Water Act (SDWA);

(2) the USEPA's Integrated Risk Information System (IRIS); and (3) other pertinent health-based data."

Some of the primary resources for toxicity values are documents that were published in 1987 and 1994. There are instances in this proposed rule where toxicity values are used that have been superseded by updates (e.g., the use of the 1991 values from the USEPA's Health Effects Assessment Summary Tables [HEAST]). Since the toxicity criteria that form the basis for the State's drinking water standards do not seem to be reviewed and updated regularly, we recommend that the Department considers using toxicity information from the USEPA Integrated Risk Information System (IRIS) database as the primary resource, when available. (21)

305. COMMENT: The Department inappropriately gives the first priority, among sources of toxicity values, to toxicity values developed by the New Jersey Drinking Water Quality Institute (NJDWQI), rather than the current USEPA Integrated Risk Information System (IRIS) database, which represents the most widely-accepted, regulatory source for up-to-date toxicological information. There is no basis to suspect or believe that the Legislature intended or mandated that these A280 toxicity criteria be relied upon by the Department forever as a basis for drinking water standards or that their use be extended in the distant future to develop remediation standards. Some of the NJDWQI assessments are now outdated and should be replaced by more recent USEPA assessments that consider all recent and relevant studies that use up-to-date dose-response assessment methods. The Department must re-evaluate all of its current and proposed numeric groundwater quality standards and remediation standards in light of the USEPA's recommended hierarchy for sources of toxicity values. Given these deficiencies in the underlying toxicity criteria, the Department should substantially modify the proposed soil remediation standards and current groundwater quality standards before issuing a final soil remediation rule. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

306. COMMENT: The Department has used its A280 toxicity criteria to establish drinking water standards, groundwater quality standards (N.J.A.C. 7:26E-1.13(b)), and surface water

quality standards (N.J.A.C. 7:26E-1.13(e)). The proposed impact-to-groundwater soil remediation standards are back calculated using the current groundwater quality standards (N.J.A.C. 7:26E-1.13(b)), which are treated as groundwater remediation standards. The Department is mandated to "base the standards on generally accepted and peer reviewed scientific evidence or methodologies." Use of out-dated assessments and data is not "generally accepted" within the scientific community. For all of the foregoing reasons, the Department should rely instead upon USEPA's recommended hierarchy of sources for toxicity values (USEPA 2003) as the basis for its numeric water quality and remediation standards also. To knowingly base any of these standards on out-dated (1987, 1994) New Jersey Drinking Water Quality Institute (NJDWQI) toxicity assessments would constitute arbitrary and capricious action and would be contrary to legislative mandate provided in the enabling statute, as discussed above. The NJDWQI assessments should be replaced by up-to-date assessments by the USEPA that consider all relevant and available studies and current dose-response assessment methods. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE to COMMENTS 304 through 306: The New Jersey toxicity factors developed in 1987 were reviewed in 1994 and updated at that time as appropriate. Toxicity factors for some contaminants were first developed in 1994. The toxicity factors developed by New Jersey pursuant to the Safe Drinking Water Act are currently being reviewed by the New Jersey Drinking Water Quality Institute (NJWQDI) and are being updated where appropriate. When the NJDWQI makes recommendations to the Department, the updated toxicity factors will be considered for incorporation into the soil standards. The review includes extensive evaluation of any USEPA Integrated Risk Information System (IRIS) assessments for the chemical. It should be noted that for some of the chemicals for which the review has been completed, it was not recommended to accept the conclusions of the IRIS assessments because many IRIS assessments have not been updated in many years, and for some of the chemicals that the Department addresses under its Safe Drinking Water Act, the IRIS assessment has not been updated since the 1980s. New toxicity data are always being generated and many of the IRIS profiles have not been updated to include this toxicity information. When the NJWQDI updates its toxicity factors for a chemical, they consider the IRIS profile for that particular chemical, but also include any new studies that were not included in the IRIS profile. If the NJWQDI accepts the new study as a basis for the toxicity used to support a standard, then the conclusions of an outdated IRIS assessment would be dismissed.

307. COMMENT: The commenter strongly recommends that the Department consider revising their proposed hierarchy so that the most current, peer-reviewed toxicity information is used in the derivation of the State's criteria. USEPA's Provisional Peer Reviewed Toxicity Values (PPRTVs) could be used as such a resource. (21)

RESPONSE: The Department is mandated to use the best available science in the development of its remediation standards, and will continue to review new toxicity information through an Alternative Remediation Standard process outlined in the Rule. The USEPA's Provisional Peer Reviewed Toxicity Values (PPRTVs) are an acceptable source of toxicity information and are considered when available. These values currently serve as the bases of several remediation standards.

308. COMMENT: To facilitate timely modification of the proposed soil remediation standards to incorporate up-to-date risk assessment principles and practices, the Department should promptly establish an independent Risk Assessment and Risk Management Science Advisory Board to guide the Department and Governor in establishing policies regarding human health risk assessment. The Department should develop and implement procedures for independent peer review of the risk assessment data, methods, and assumptions that underlie the Department's current and proposed remediation standards and implement these procedures, before a final soil remediation rule is developed. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Department believes that the proposed standards are rooted in accepted risk assessment methodology and that the toxicity information has been adequately peer reviewed. The Department believes that it has adequate in-house expertise to facilitate timely modification of proposed soil remediation standards and does not require an additional independent advisory board. The Department has purposely developed an alternative soil remediation standard proposal process that will ensure incorporation of up-to-date principles and practices as well as new toxicity data. This alternative remediation standards process will result in timely modifications to the soil remediation standards when deemed appropriate by the Department.

309. COMMENT: The Department should develop (and submit for independent peer review) guidelines for technical acceptability of "available" toxicity factors from sources other than the USEPA Integrated Risk Information System program. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Department believes that it has adequate in-house expertise to determine the technical acceptability of "available" toxicity factors from sources other than the USEPA Integrated Risk Information System program. The Department has purposely allowed for the flexibility to review other sources of toxicity information recommended by persons within or outside of the Department through its established alternative soil remediation standard proposal process.

310. COMMENT: The Department's proposed toxicity hierarchy violates New Jersey law. As mandated in the Brownfield and Contaminated Site Remediation Act, "[i]n developing minimum remediation standards the department shall . . . consider and utilize, in the absence of other standards used or developed by the Department of Environmental Protection and the United States Environmental Protection Agency, the toxicity factors, slope factors for carcinogens and reference doses for non-carcinogens from the United States Environmental Protection Agency's Integrated Risk Information System (IRIS)." This mandate clearly establishes a preference for USEPA-derived toxicity factors, consistent with USEPA's toxicological hierarchy.

The Department was legislatively mandated in 1984 to derive the A280 toxicity data to support New Jersey's safe drinking water program. However, the A280 toxicity data are not standards used or developed by the Department of Environmental Protection and cannot be interpreted as such. Hence, the Department should not place them above USEPA-derived toxicity values in its hierarchy. To do so would be contrary to legislative intent. **(**4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Department believes that the cited portion of the Brownfield and Contaminated Site Remediation (Brownfield) Act has been misinterpreted. The Brownfield Act at N.J.S.A. 58:10B-12b(5) states "[i]n developing minimum remediation standards the department shall . . . consider and utilize, <u>in the absence of other standards used or developed by the Department of Environmental Protection</u> and the United States Environmental Protection Agency…" (emphasis added). The Department believes its use of the ground water quality standards and the surface water quality standards as remediation standards is in conformance with the Brownfield Act.

In addition, the Department disagrees that "the A280 toxicity data are not standards used or developed by the Department of Environmental Protection and cannot be interpreted as such." The toxicity factors recommended to the Department by the New Jersey Drinking Water Quality Institute (the "A280 toxicity data") form the human health basis for the drinking water standards developed and adopted by the Department. Support documents presenting in-depth information on the background and development of these toxicity factors are part of the Basis and Background for drinking water standards proposed by the Department. The Department uses the same toxicological basis for all human health-based criteria and standards which it develops for the oral route of exposure, including drinking water, surface water, ground water and soil, with the goal of consistency where possible and appropriate. As such, the Department believes the use of A280 toxicity data is totally appropriate for use in developing remediation standards.

311. COMMENT: Although the Department's A280 toxicity assessments were mandated more than 20 years ago, there is no basis to suspect or believe that the Legislature intended or mandated that the A280 toxicity criteria be relied upon by the Department forever as a basis for drinking water standards or that their use be extended in the distant future (today) to develop remediation standards. In the 1980s, federal drinking water standards were lacking for certain substances that had been detected in New Jersey water supplies (NJDWQI 1987), which has

since been rectified by the USEPA. At the time, USEPA's procedures for peer-reviewed toxicity assessments and USEPA's technical leadership in this area were less well established than they are now. Since then, important additional toxicological data have been collected for certain substances, methods for quantitative dose-response assessment have advanced, and several substances have been completely re-assessed by USEPA. As a result, at least some of the New Jersey Drinking Water Quality Institute assessments are now outdated. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The toxicity factors which form the basis for drinking water standards developed by New Jersey pursuant to its Safe Drinking Water Act are developed using the same risk assessment approaches as those used by the USEPA in developing its Integrated Risk Information System (IRIS) assessments. The basis for these New Jersey assessments has now been published, as they are available online at: http://www.nj.gov/dep/watersupply/njdwqinstitute.htm.

It should be noted that many of the IRIS assessments for these contaminants have not been updated for many years, in many cases longer than the most recent previous update of the New Jersey drinking water assessments in 1994. USEPA's progress in updating its IRIS assessments is very slow, to the point that concerns have been publicly expressed about the lack of progress by its previous Program Manager (Risk Analysis 26, p.1409, 2006).

312. COMMENT: Benzene provides an illustrative example of how outdated the New Jersey Drinking Water Quality Institute (NJDWQI) assessments are. The NJDWQI assessment was published in 1987. The latest citation listed in its bibliography is 1985 (NJDWQI 1987). By contrast, USEPA's latest dose-response assessments for benzene based upon non-cancer effects were published in April 2003 for both the ingestion and inhalation routes and a 1996 study was determined to provide the best data for these assessments (USEPA 2007). USEPA's latest assessments of the oral and inhalation carcinogenicity of benzene were published in January 2000 and September 1998, respectively, and were based upon exposure data that were developed in the 1990s. Unlike the Department, the NJDWQI acknowledged that the toxicological

database and toxicity assessment methods were evolving and would evolve; as a result, NJDWQI recommended that the New Jersey drinking water standards be re-evaluated "at least every three years to reflect the most current technical information." (NJDWQI 1987, at page xi). While the commenters acknowledge that the Safe Drinking Water Act did undergo the requisite notice and comment period, that type of review is not equivalent to subjecting the Department's A280 toxicity criteria to a complete re-evaluation and <u>independent</u> peer review; no such review has been conducted on the A280 toxicity criteria. **(**4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Department and the New Jersey Drinking Water Quality Institute (NJDWQI) are concerned about keeping up to date with toxicological advances. To that end the Institute recently completed an extensive and comprehensive review of all of the New Jersey drinking water standards, including benzene. The latest USEPA Integrated Risk Information System (IRIS) assessments were included in that review. Based on this review, the NJDWQI will make recommendations to the Department regarding changes to the existing New Jersey's drinking water standards. Any changes to the drinking water standards would go through formal rulemaking.

313. COMMENT: The proposed rule contains provisions under which the Department would update soil remediation standards, via a notice of administrative change, "as a result of a change in the carcinogenic slope factor or reference dose data contained in the USEPA's Integrated Risk Information System (IRIS) database . . .". This provision recognizes USEPA IRIS as the preferred source of toxicity data and that standards should be based upon the best available current data. There is no rational basis for the Department to issue new soil remediation standards or continue to use groundwater and surface water quality standards that are based upon out-dated toxicity assessments. The Department should re-evaluate its current numeric groundwater quality standards and remediation standards in light of the USEPA's recommended hierarchy and should subject any and all of its internal toxicity assessments that it determines to still be relevant today to an independent peer review separate and apart from the notice and comment procedure. **(**4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59**)**

RESPONSE: The toxicity factors developed by the Department pursuant to its Safe Drinking Water Act (SDWA) will remain first on their hierarchy of toxicity factors to be used for the basis of soil standards for pathways involving oral exposure. The fact that the proposed soil remediation standards contain a provision to update soil standards via notice of administrative change when the Integrated Risk Information System (IRIS) is revised for a chemical for which soil standards are based on IRIS (after review by the Department of the basis for the IRIS update) does not negate the technical validity of the toxicity factors developed by the Department pursuant to its SDWA. The Department will continue to use the best science available to develop its standards as they are updated and a strong effort will be made to use the same toxicity factors throughout the Department's standards for all media, as deemed appropriate.

Standards are Overly Conservative

314. COMMENT: The Department's proposed numeric soil remediation standards are based upon redundant conservative assumptions regarding when, how, and where exposures will occur, the amount of exposure, and the toxicity of chemicals, because they employ several features that individually are more than sufficient to ensure human health protection. As such, they are contrary to the legislative mandate to "avoid redundant conservative assumptions." (N.J.S.A. 58:10B-12).

By way of example, each of the numeric standards is based upon a toxicity value that is designed to over-state actual toxicity and, thereby, is intended to provide a margin of safety. As a result of this built-in conservatism, which pertains to the toxicity values derived by USEPA and listed in its Integrated Risk Information System (IRIS) database (USEPA 2007), the toxicity values can be considered to represent "parameters that provide an adequate margin of safety," as required by the Brownfield and Contaminated Site Remediation Act (N.J.S.A. 58:10B-12b(3)).

In addition, each of the proposed numeric standards for carcinogens is intended to be based upon a target cancer risk of one per million (1 x 10^{-6}) over a lifetime. The history of the 1 x 10^{-6} cancer risk management goal "does not reveal intent for use in any application other than safety of indirect and direct food additives," in the words of the Risk Assessment and Risk Management Study Commission (Commission 1995, page 8) that was mandated by the Industrial Site Recovery Act. The population expected to be exposed to indirect or direct food additives was estimated in the tens of millions. The Commission noted that "This level of population exposure potential does not exist at the vast majority of the remedial sites" in New Jersey. On this basis, the Commission concluded that a higher cancer risk management goal, such as 1 x 10-5 (ten per million or one per hundred thousand) can be justified by the Department as a protective policy for setting chemical-specific soil remediation standards. Indeed, the Department accepts a cancer risk range up to 1 x 10-4 (one hundred per million or one per ten thousand) for its air toxics program and USEPA accepts a cumulative cancer risk range up to 1 x 10-4 for CERCLA and RCRA sites under its supervision (see, e.g., the National Contingency Plan and USEPA (1991, 1997)). Because the proposed numeric standards for carcinogens are intended to be based upon a target cancer risk (i.e., 10-6) that is at the low (more protective) end of the range of what is deemed appropriate and acceptable by USEPA (and even by the Department under other environmental protection programs), these standards incorporate "parameters that provide an adequate margin of safety."

Because the toxicity values and the cancer risk management goal ensure a substantial amount of human health protection, use of additional conservative assumptions and inputs, for example in exposure assessment components of the derivation of numeric soil remediation standards, does not result in measurable, if any, incremental benefits to public health protection. The incremental health and environmental benefits of the more stringent numeric standards, if any, are not commensurate with the burdens, costs, and other adverse consequences they will cause. In particular, impeding brownfield development and site remediation is not in the public interest. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Legislature directed the Department to use toxicity values and cancer risk management goals that ensure a substantial amount of human health protection. The Legislature directed the Department to derive standards for carcinogenic contaminants at a target cancer risk of 10^{-6}. This risk level is the basis of other Department media standards as well as the risk level for remediation goals under the Federal Government's Superfund Program and the soil standards for many of the states across the country. The Department is obligated to follow the law as it currently exists. However, if changes are made to the current risk management goals as a result of the Site Remediation legislative reform, the Remediation Standards rules will be amended to reflect these changes.

The Legislature has also mandated that the Department use USEPA's exposure scenarios, input parameters, and models. As discussed in the Basis and Background documents that support the rulemaking, the values for the combined ingestion and dermal absorption pathway and the inhalation exposure pathways are based on equations and default assumptions found in USEPA guidance manuals. Use of these exposure assessment components is consistent with the legislative mandate and no more conservative than those routinely used by the Federal Government and other state agencies.

315. COMMENT: A comparison of the Department's proposed numeric standards to various benchmarks demonstrate the results of the Department's use of redundant conservative assumptions. The Department's proposed residential soil remediation standards based upon ingestion and dermal contact are more stringent (lower) than the USEPA Region 9 Preliminary Remediation Goals (PRGs) for these pathways for 78 substances (63% of the substances for which a comparison could be made) by factors ranging up to 360 times lower (i.e., for 1,1-dichloroethene). The Department's proposed soil remediation standards are identical to the PRGs for 41 substances and are higher than the PRGs, typically less than two times higher, for 30 substances. For the impact-to-groundwater pathway, the health-based proposed standards are more stringent (lower) than the default USEPA soil screening levels (SSLs) for that pathway for 45 of 52 substances (for which a comparison could be made) by factors ranging up to 120 times

(i.e., bromodichloromethane). This demonstrates that the Department's proposed numeric soil remediation standards are set at concentrations substantially below USEPA's SSLs or PRGs, respectively, for the same substance. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

RESPONSE: The Department disagrees that the proposed numeric standards were developed using "redundant conservative assumptions" based on the premise that they exceed other available benchmarks (USEPA Region 9 Preliminary Remediation Goals (PRGs) and USEPA soil screening levels (SSLs)). The major reasons for the differences in the Department's direct contact standards from other available benchmarks are due to the use of different or updated toxicity factors, the Department's C carcinogen policy, and the use of the outdoor worker scenario.

The Department is not adopting the soil remediation standards for the impact to ground water pathway and this pathway will be evaluated on a site-by-site basis using guidance that will be developed by the Department.

Impact to Ground Water Soil Remediation Standards

316. COMMENT: The alternative soil remediation standard approaches for impact to ground water rely on further studies, which increase costs, time and technical complexity to a cleanup project. Commenters believe the alternative soil remediation standard process as defined is cumbersome and should be modified to allow a more streamlined basis to select site specific modifiers. Commenters believe that the alternative soil remediation standard process will be fraught with delay and extensive case by case study and negotiations. (19, 22, 27, 45)

317. COMMENT: Commenters recommend another alternative soil remediation standard process that uses pre-approved generic modifiers to adjust the results of the equations being used to calculate the generic impact to ground water soil remediation standards. The modifiers would be developed based upon known soil and hydrogeologic conditions throughout New Jersey. This

information, in conjunction with the Department database from hundreds of site investigations, would form the technical basis for the development of generic modifiers.

The use of generic modifiers would work in a similar manner as other engineering functions, where agreed upon coefficients are used to modify basic equations to account for site specific or region specific conditions. Several of the input parameters to the basic partitioning equations such as organic carbon content of the soil, soil infiltration rate, hydraulic conductivity, dry bulk density of soil, soil pH and soil texture vary substantially across New Jersey. For example, the selection of “sandy loam” as the default soil texture for the entire state seems representative of only a few areas.

Using the above-mentioned maps, reports and databases, it is proposed that a public/private work group including a panel of experts be assembled to work with the Department. The goal of this work group is to identify soil types and regions with other input values for important variables in the simple partitioning equations and the dilution attenuation factor (DAF) calculation. These other input values would be based on existing variation of common environmental conditions derived from review of available information. Using these input values, specific numeric coefficients would be calculated and compared to the reference impact to ground water soil remediation standards. These conditions would then be translated into basic “look up” tables. By evaluating a site against these “look up” tables, site specific generic modifiers could be selected and used to calculate the alternative remediation standards. (19, 22, 27, 45)

318. COMMENT: The calculated impact to ground water soil remediation standards for mobile organic contaminants may not be applicable for all New Jersey sites. The rule allows alternatives to be developed using the calculations and procedures described in the document, most of which require additional site-specific information that needs to be gathered during the remedial investigation phase. It is very likely that the regulated community will choose to calculate site specific standards. This is especially true with mobile organic contaminants due to the large differences in some values from the current soil cleanup criteria mandated by the Department to the new proposed impact to ground water soil remediation criteria (i.e., much

lower values are proposed). For example, the current impact to ground water soil cleanup criterion for trichloroethene is 1 mg/kg and the proposed standard is 0.007 mg/kg, which presumably is achievable with standard analytical methods. The Department should realize that the potential for opting for site-specific impact to ground water values is high and this will increase the amount of resources necessary to review documents associated with site remediation. This will potentially result in a heavy burden for the Department's staff. (46, 58)

319. COMMENT: Based on the overly conservative nature of the proposed generic impact to ground water soil remediation standards, the Department should expect a flood of alternative remediation standards applications for the impact to ground water pathway. (16, 20, 38, 41, 52, 55, 66)

320. COMMENT: The re-opening of cases based on an order of magnitude decrease in the impact to ground water soil remediation standards will provide a significant administrative and economic burden without resulting in increased protection of human health and the environment. The Department should provide regulatory guidance that will allow all interested parties to determine in advance whether a particular site is a candidate to be re-opened. The re-opener provision could safely be limited to cases involving an unrestricted use direct contact remedy or where there is a demonstrated threat to public health or the environment. (16, 20, 38, 41 52, 55, 56)

321. COMMENT: The most restrictive numerical criteria for a significant number of parameters have decreased by an order of magnitude from the soil cleanup criteria to the proposed soil remediation standards for the impact to ground water pathway. As a result, it is a certainty that many case files that have been closed using the soil cleanup criteria as the acceptable cleanup levels will contain sample results which exceed the proposed soil remediation standards. As discussed below, there will be many examples of cases which might fall into this category, including cases where the method detection levels and practical quantitation levels (MDLs/PQLs) have changed; where laboratory data deliverables are no longer available; where sample collection locations are not well specified, etc. It is the commenters' belief that a

significant number of closed cases will qualify as cases eligible to be reopened, especially as criteria for several of the more common constituents (benzene, tetrachloroethene, trichloroethene) have decreased by an order of magnitude. (16, 20, 38, 41, 52, 55, 66)

322. COMMENT: The 1992 impact to ground water soil cleanup criteria assumed a 6-foot clean zone between the contaminant and the water table. The proposed impact to ground water remediation standards will be problematic, especially for lead, which is commonly found in urban environments. As a result, (re)developers will now be forced to rebut this "unreasonable " assumption and unattainable standard and submit to the alternative remediation standard. This will automatically add a great deal more time and cost without any significant reduction in risk and will severely strain the Department's resources. Also, the procedure for petitioning and demonstrating that alternative remediation standards for impact to ground water remediation standards should be clarified. (20, 24, 29, 43)

323. COMMENT: The Department should not limit the options to develop alternate remediation standards for impact to ground water to those provided by the rule. The provided options are very limiting and other approaches that are acceptable to USEPA or otherwise peer reviewed literature should also be considered. (14, 38)

324. COMMENT: The Department has based its derivation of soil remediation standards for the impact to ground water pathway on the methodologies used in the USEPA's soil screening level (SSL) guidance (1996). However, the Department has not fully adopted the methodologies outlined in the USEPA SSL guidance and has omitted incorporation of substantial steps in the methodology to ensure the proper evaluation of reasonable assumptions of exposure scenarios which is mandated by the Brownfield Act. N.J.S.A. 58:10B-12b(2). The USEPA says that its SSLs may be used provided the conditions found at a specific site are similar to the conditions assumed in developing the SSLs. The extent and magnitude of the contamination must be adequately characterized. Averaging of concentrations over the depth of a soil boring should be allowed. The Department should allow remediators to have the option to apply the numeric criteria on a point by point basis or to apply scientific methodologies for the proper

application of numeric screening levels and cleanup standards, using appropriate site characterization and geostatistical methodologies. The scientific methodologies to be used for site characterization and proper geostatistical analysis must both be available in order for the numeric standards to be properly used by the regulated community. However, the Department has failed to propose or implement these or any similar procedures. (16, 20, 38, 41, 52, 55, 66)

325. COMMENT: Based on a review of the Department's generic numeric standards and the alternative remediation standards process for the impact to ground water pathway, it is anticipated that an alternative soil remediation standard application will be needed for the majority of sites. Additionally, it is anticipated that the largest number of alternative soil remediation standard applications will be submitted for volatile organic compounds (VOCs). It is likely that the simpler alternative remediation standards approaches available for VOCs for the impact to ground water pathway will be of limited usefulness, and intensive use of alternative remediation standards Option IV, specifically the combined modeling of the unsaturated and saturated zones, will be required. (16, 20, 38, 41, 52, 55, 66)

326. COMMENT: The specified water-solid partitioning coefficient (K_d) for metals in soils found in the proposed rule for the impact to ground water pathway is substantially lower than water-solid partitioning coefficient K_d for metals in steel industry slag since the mobility of metals in the relatively alkaline slag is highly limited. For example the K_d value for manganese in soil in the proposed rule is 6.0E+01 while in steel slag the K_d value is 1.49E+07. (14, 38)

327. COMMENT: To provide technically appropriate relief, alternative remediation standards procedures listed in the final soil remediation rule should explicitly include impact to ground water modeling based upon mass conservation principles for all sites. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

328. COMMENT: Will the Department calculate site-specific impact to ground water alternative remediation standards if it feels site conditions warrant a more stringent standard? If

so, in which situations do the Department plan to take such actions and who will be responsible for the collection of the necessary site data? (16, 20, 38, 41 52, 55, 56)

329. COMMENT: The procedure for calculation of an alternative impact to ground water soil remediation standards using a site-specific K_d values (from the synthetic precipitation leaching procedure test) or fraction organic carbon values states that if K_d values vary by more than an order of magnitude, they can not be averaged and the lowest value must be selected. Larger data set have a greater tendency to produce statistical outliers and thus have an increased potential to range more than an order of magnitude. The proposed procedure is an incentive for remediating parties to collect the least amount of data for a given site. The commenters suggest the use of a statistical analysis to remove outliers from the data set and allow averaging of the resultant data, or selection of an averaging method that is not extremely sensitive to outlier values (e.g., geometric mean). (16, 20, 38, 41 52, 55, 56)

330. COMMENT: The impact to ground water basis and background document states "In all cases, the length of the area of concern parallel to the ground water flow, L, must be adjusted to reflect actual conditions." This statement implies that an alternative soil remediation standard will be required for all sites. The Department should clarify whether this statement only applies when calculating an alternative remediation standard. (16, 20, 38, 41 52, 55, 56)

331. COMMENT: Commenters suggest that the Department permit the use of New Jersey Geological Survey Report GSR-32 to calculate site specific infiltration rates. The collection of site-specific hydrogeological data (e.g., hydraulic conductivity and gradient) can add substantial cost to a site investigation, particularly at sites where no ground water investigation is ongoing or required. Commenters suggested that the Department allow the use of published literature values (on a regional basis, where available) of conductivity and gradient for use in the development of an alternative remediation standards. (16, 20, 38, 41 52, 55, 56)

332. COMMENT: It is not clear whether the Department intends to allow the use of combinations of two or more options in the development of a single impact to ground water

alternative remediation standard. For example, the determination of a site specific K_d using the synthetic precipitation leaching procedure option, combined with modification of the soil-water partitioning equation using site specific hydrological data, may be useful in the determination of a site-specific alternative remediation standards. While the commenter assumes this is allowed, confirmation is requested. (16, 20, 38, 41 52, 55, 56)

333. COMMENT: Section V.C. of the impact to ground water basis and background document under Option I states that "for metals and ionizable phenols, higher soil pH will have the greatest effect on raising the remediation standard." However, the document provides a procedure for adjustment of K_{oc} based on soil pH for ionizable phenols only. What is the justification for the omission of procedures for adjustment of K_{oc} for metals? (16, 20, 38, 41 52, 55, 56)

334. COMMENT: Vadose zone and ground water modeling (SESOIL and AT123D models) are presented as possible methods in developing alternate impact to ground water remediation standards in certain conditions. These conditions include; when soil contamination exists above standards but ground water has not yet been impacted and under another scenario with impacted ground water when a long list of certain conditions exist at a site. These are both approaches that will likely be used by the regulated community in many cases in an attempt to demonstrate that soil remediation is not necessary. Models can easily be manipulated and must be carefully reviewed by technical staff in these cases. To date, there has been little, if any, experience on the part of practitioners and regulators in the State of New Jersey on the development and application of vadose zone transport models to establish site-specific alternative remediation standards. It is not likely that this approach can be implemented on a routine or practical basis for a very large number of sites. Development of detailed methods, procedures and training are required for the benefit of both the regulatory community and the regulators. (16, 20, 38, 41, 49, 52, 55, 56, 61)

335. COMMENT: When modeling contaminant transport in the vadose zone and in ground water, the Department should allow and accept a range of models, including simple analytic models and complex numerical models, to be used to assess sub-surface fate and transport, as

part of alternative remediation standards development for the impact to ground water pathway. No simple model will be appropriate and adequate for all sites. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

336. COMMENT: Currently, only SESOIL modeling (for vadose zone) and AT123D (for ground water transport) are provided for development of the impact to ground water alternative remediation standards. In order to provide flexibility to the rule, the rule should provide that any model for vadose zone or ground water fate and transport can be used as long as such modeling is approved by the Department on a case by case basis. Other states have similar provisions in the development of cleanup levels that allow for the use of any model. Texas, Louisiana, Missouri and Illinois are examples of states that allow the use of any model (most requiring agency approval) to calculating cleanup levels. By allowing other models to be used, better results could be achieved by tailoring the model used to the site-specific conditions at the site. In addition, the use of only one vadose zone model tool (SESOIL) which is not in the public domain and therefore will cost not only the cost of parameter development but also to buy the software, there should be public domain software allowed as well. Public domain models available from the Environmental Protection Agency include VLEACH, CHEMFLO-2000. In addition, there are a number of models created by other governmental agencies that simulate the movement of pesticides through soil columns (e.g. PRZM, RZWQM, and LEACHP). The approval of only one analytical ground water model, AT123-D, is severely limiting for many of the situations that might be encountered in many complex hydrogeological situations and many complex chemicals. (23)

337. COMMENT: The use of site-specific and region-specific data in the SESOIL model (e.g. parameters representative of coastal plain sediments versus glacial lake deposits), instead of default input parameters, will generate more appropriate alternative remediation standards that are protective of human health. Site-specific values should be allowed for bulk density, intrinsic permeability, and effective porosity. The Department should allow the option of using site-specific values for these three soil parameters. (16, 20, 38, 41 52, 55, 56)

338. COMMENT: Using default values in the SESOIL model can lead to inaccurate results in both directions (conservative and non-conservative). For example, using a coarse-grained material like sand as a default soil type may lead, in some cases, to a higher (less conservative) alternative remediation standards for highly volatile compounds such as benzene. This counterintuitive result can occur because the model calculates a higher and significant contaminant loss to volatilization in a loose coarse-grained material compared to a finer-grained material. (16, 20, 38, 41 52, 55, 56)

339. COMMENT: When using the SESOIL model, the Department is requiring that all ratios of soil properties between soil layers are to be set to "1", meaning the soil and chemical properties are assumed to be uniform across the soil column. In addition, in order to allow the use of a soil texture in the SESOIL model other than sand, at least 75 percent of the soil vertical profile must be as fine as the selected soil texture. This means that significant low permeability silt and clay layers, or a significant fill layer, if less than 75 percent of the soil column, will not be considered by the model, potentially leading to results that are off by orders of magnitude. Even a very thin lens of low permeability material would significantly affect the rate of vertical infiltration through a sand unit. Using a ratio of one is logical for developing statewide generic leach-based soil values, however for site-specific values remediating parties should be able to use the full capabilities of the SESOIL model using site-specific soil conditions. A more logical requirement would be represented by language such as "...contiguous 25% of the soil vertical profile must be as fine as the selected soil texture...". (16, 20, 38, 41 52, 55, 56)

340. COMMENT: When using the SESOIL model, the Department requires that the remediating party use sand as the default soil texture and a default soil organic carbon content of 0.2 percent for the entire soil column. The only way to change these parameters is to conduct extensive site-specific sampling and analyses. It is suggested that the Department allow the use of three general default soil categories (e.g., sand & gravel, silty sand, and silts & clays). And also associated default organic carbon contents based on site and regional knowledge, with the option of collecting more detailed site-specific data if desired by the remediating party. (16, 20, 38, 41 52, 55, 56)

341. COMMENT: The Department is not allowing the use of the degradation of contaminants function in the SESOIL model, except for benzene, toluene, ethylbenzene and xylene (BTEX), and only when one can demonstrate aerobic conditions (greater than four percent oxygen) in the vadose zone. The requirement to measure oxygen in the vadose zone is excessive, and the Department should consider removing this requirement. (16, 20, 38, 41 52, 55, 56)

342. COMMENT: The procedures outlined under Option II of Section V. C. of the Basis and Background Document (Synthetic Precipitation Leaching Procedure) indicate that samples should be collected from the areas of the highest suspected contamination. This section also later indicates that additional soil samples may be required for synthetic precipitation leaching procedure testing. These statements seem to indicate that multiple mobilizations may be required to develop an alternative remediation standard. In fact, there is a distinct likelihood that as the site investigation or remedial investigation progresses (for larger sites or areas of concern) the alternative remediation standards could change several times. The Department should provide some guidance to this process so that the remediating party is not continually trying to "hit a moving target." (16, 20, 38, 41 52, 55, 56)

343. COMMENT: The procedures provided for adjustment of leachate concentrations for weakly adsorbed contaminants are unclear. The data presented in Table 7 of this section does not seem consistent with the formulas provided. Some examples of this calculation would be useful. (16, 20, 38, 41 52, 55, 56)

344. COMMENT: The synthetic precipitation leaching procedure option for volatile organic compounds (VOCs) should be allowed. Larger Encore samplers are available that can accommodate up to 25 g of soil and the zero headspace extractor used for the synthetic precipitation leaching procedure analysis can accommodate a maximum of 25 grams of solid. The Department has also developed a procedure for the adjustment of leachate concentrations for weakly adsorbed contaminants that can be applied to VOCs if specific compounds are weakly adsorbed. Also, the test measures the more relevant process of desorption (as opposed to

adsorption), and this process is equally applicable to mobile, as well as the immobile chemicals for which the test is allowed. (16, 20, 38, 41 52, 55, 56)

345. COMMENT: The Department states that the synthetic precipitation leaching procedure test is useful for assessing contaminant mobility because it measures the process of desorption, rather than adsorption of contaminants. Because the phenomenon of irreversible adsorption applies equally to mobile and immobile contaminants, the synthetic precipitation leaching procedure test should be allowed for both classes of contaminants. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

346. COMMENT: The proposed generic impact to ground water soil remediation standards are based on calculations that violate mass conservation principles, while the maximum leachate concentration in an synthetic precipitation leaching procedure test (arising from 100% leaching of the chemical) would be appropriately limited by the chemical mass in the soil. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

347. COMMENT: If all synthetic precipitation leaching procedure results are below the practical quantitation level or target ground water concentration (TGWC), the second sample is not necessary to develop an alternative remediation standard. (16, 20, 38, 41 52, 55, 56)

348. COMMENT: The synthetic precipitation leaching procedure test could be used to calculate an alternative soil remediation standard that is much higher than the generic standard, even when it is not appropriate. Consider a substance with a Ground Water Quality Standard (GWQS) of 1 µg/L and a default value of 13 for the dilution attenuation factor (DAF). This would result in a Target Ground Water Concentration (TGWC) of 13 µg/L. If one assumes all contaminant in the soil leaches into the extract, a volume of extractant of 500 ml, and a mass of soil of 25 g (the 20:1 ratio as required in the synthetic precipitation leaching procedure test), this would require 6.5 µg of contaminant in the soil (0.26 mg/kg) to yield a leachate concentration of 13 µg/L. The concentration in the soil that would actually generate the TGWC would be equal to or greater than this due to adsorption onto the soil during the synthetic precipitation leaching

procedure extraction. If one now considers the draft of impact to ground water standards for dichlorobromomethane (0.001 mg/kg with a practical quantitation level of 0.5 mg/kg and a GWQS of 1 µg/L) the calculations considered in the example above would result in a soil concentration of 0.26 mg/kg yielding the allowed leachate concentration of 13 µg/L. This concentration (0.26 mg/kg) would serve as an acceptable alternative remediation standard, even though it is more than two orders of magnitude higher than the draft generic soil standard of 0.001 mg/kg, and even though all contaminant is assumed to desorb from the soil. (16, 20, 38, 41 52, 55, 56)

349. COMMENT: The leachate standard is an unrealistic measure of the mobility of beryllium in the natural environment. The soil/water distribution coefficient for beryllium is dependent upon several factors and is highly variable based on pH. Because of this variability, it is unscientific and unreasonable to use unrealistically low pH values in setting a leachate standard for beryllium. The synthetic precipitation leaching procedure test uses a pH of 4.2, which the Department asserts as representative of Mid-Atlantic rainwater, but which, more accurately stated, is representative of worst-case rainwater, rather than the range of Mid-Atlantic rainwater. It is overly conservative to ignore the fact that this 4.2 pH leachate will start becoming neutralized as soon as it contacts less acidic soil and ground water. Because the precipitation of beryllium, like that of virtually all metals, is dependent upon pH, the use of unrealistically low pH levels in the synthetic precipitation leaching procedure produce an improperly conservative beryllium leachate criterion and standard. (64)

350. COMMENT: The Department should allow and accept a range of leaching test methods that can be used by the regulated community as part of alternative soil remediation standard development, including test methods that assess the fundamental leaching parameters of soil or waste material. The synthetic precipitation leaching procedure does not properly simulate leaching of substances from soil in all situations, in part because leaching is evaluated under oxidation/reduction (redox) conditions that may be different from in situ conditions, which can be particularly important for metals. Test methods that evaluate leaching from intact soil cores may also yield different results than the synthetic precipitation leaching procedure, but such

leaching conditions may be better representatives of in situ conditions. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

351. COMMENT: Development of impact to ground water criteria for inorganics and some less-mobile organics based on the synthetic precipitation leaching procedure analytical results will require two analytical tests for each sample for those compounds, thereby increasing both analytical and reporting costs to document compliance with the new standards.

In the discussion of economic impact of the proposed regulation, the Department estimates that the cost of the synthetic precipitation leaching procedure preparation process will be $100 per sample. The cost of analyzing the synthetic precipitation leaching procedure leachate will range from $60 to $500 per sample, depending on the number and types of contaminants being analyzed for. This is a fairly significant expense, which could double analytical costs for a typical investigation. It should be noted that for those compounds for which the Department has proposed the synthetic precipitation leaching procedure-based impact to ground water soil remediation standards, analytical results for "total" analysis would still be required to document compliance with the Inhalation Health-Based and Ingestion-Dermal Health-Based criteria. This would require multiple analytical samples be collected, plus additional analyses be performed for these parameters at each sample collection location. (50)

352. COMMENT: Development of impact to ground water soil remediation standards based on the synthetic precipitation leaching procedure analytical results will require significant rework for on-going remedial projects. Basing the new standard on synthetic precipitation leaching procedure analysis will not allow comparison of "apples to apples" when comparing new data to historic analytical results, thereby increasing liability associated with "closed" sites as well as on-going remedial actions. Unless samples are re-collected and analyzed under the new remedial protocol, it will not be possible for a property owner to fully document that no further action for sites with remedial closure based on total-concentration standards are still applicable. Further, additional field effort will be required for those sites where the remedial reports can not be submitted within 6-months of the effective date of the new regulations. It is anticipated that this

will significantly increase the time and expense of on-going remedial projects since field activities will have to be re-performed to collect samples for synthetic precipitation leaching procedure analysis in order to document compliance with the new leachate standards. (50)

353. COMMENT: The generic impact to ground water soil remediation standards are unnecessarily stringent for mobile chemicals, such as volatile organic compounds (VOCs), in part because they are based upon the Department's calculations that violate mass conservation principles. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

354. COMMENT: Overly conservative assumptions are used to calculate the proposed impact to ground water generic cleanup standards. The majority of sites do not have conditions that match the assumptions made by the Department for the generic standards. For the majority of sites, the Department likely would accomplish the same level of protection using more reasonable generic standards and appropriate scientific procedures, without the need for complicated and expensive development of alternative remediation standards. It is recommended that the Department recalculate the standards avoiding the use of redundant conservative assumptions. (4, 5, 11, 15, 18, 20, 24, 28, 29, 30, 32, 34, 40, 41, 43 45, 48, 51, 52, 54, 59)

355. COMMENT: The proposed generic impact to ground water soil remediation standards assume that contaminated soil is present at the water table. This overly conservative assumption may not be consistent with actual site conditions. The Department should promulgate standards that represent potential impacts based on whether or not there is direct ground water contact. The 1992 criteria assumed a 6-foot clean zone between the contaminant and the water table. (20, 24, 29, 43)

356. COMMENT: The elimination of the 6-foot clean zone between the contaminant and the water table would be especially problematic for lead, which is commonly found in urban environments. As a result, (re)developers will now be forced to frequently use an impact to ground water alternative remediation standards option for this contaminant. The proposed impact

to ground water standard is based on the assumption that all soil is in direct contact with the ground water. This is not a valid assumption for the vast majority of soil samples that are part of any site investigation. When developing impact to ground water cleanup standards, the Department should rely on actual data relating soil contamination to specific ground water contamination concentrations. A review of existing site data should be conducted to confirm that contamination found at concentrations at or just above the proposed impact to ground water standards actually resulted in ground water impacts. (20, 24, 29, 43)

357. COMMENT: The proposed rule requires that soil with a contaminant concentration which exceeds a proposed generic impact to ground water soil remediation standard would have to be excavated or treated even when the underlying ground water has not been contaminated, or is not reasonably expected to become contaminated. The proposed rule should allow for the elimination of the impact to ground water pathway and remediation to the residential direct contact soil remediation standard, if ground water is not present, used, or is not reasonably anticipated to be used. (15)

358. COMMENT: The Department should differentiate the impact to ground water soil remediation standards based on the probability of actual ground water contact. (20, 24, 29, 43)

359. COMMENT: The generic cleanup standards use only one soil type – sandy loam. The Department should propose standards based on soil types representative of the various regions of New Jersey. (20, 24, 29, 43, 48)

360. COMMENT: Upon review of the soils map from “Soils of New Jersey” by Tedrow (1985), the selection of “sandy loam” as the default soil texture for the entire state seems representative of relatively few areas. The majority of the area represented by this soil type selection is in the Pinelands areas (16, 20, 38, 41 52, 55, 56)

361. COMMENT: Several model input parameters used for calculation of the impact to ground water generic cleanup standards (i.e., bulk density, air and water contents and infiltration

rate) cannot be modified using site specific data. While a sensitivity analysis was performed for each of these parameters individually, no sensitivity analysis was performed for the effect of changes in multiple parameters as would result from selection of a different soil texture. The commenters suggest the Department conduct sensitivity analyses for the combination of effects of these parameters resulting from a change in soil texture. If this sensitivity analysis shows a significant possible variation, default values can be developed for the different soil types throughout the state based on previous soil studies, literature values or site-specific soil classifications. The commenters point out that the Department has calculated ground water-screening levels as a function of soil texture for its Vapor Intrusion Guidance. (16, 20, 38, 41 52, 55, 56)

362. COMMENT: For development of the impact to ground water soil remediation standards the Department appears to have accepted the USEPA's default value of 0.002 for soil organic carbon content in lieu of the findings of a large local database containing information on this parameter. Over 250 organic carbon analyses from a diverse cross-section of surface soils (0-6 in.) throughout New Jersey is compiled in three of the Department's publications on ambient levels of selected metals and other analytes in New Jersey soils. The mean, median, and geometric mean f_{oc} calculated for all of the data are 0.028, 0.016, and 0.017, respectively. Less than four percent of the samples analyzed in these studies exhibited f_{oc} less than the default value of 0.002.

It is generally acknowledged that the organic carbon content at depth is typically lower than that at the surface. A means of evaluating this assumption is available through review of summary statistics (again specific to New Jersey) provided in the New Jersey Geologic Survey report: Baseline Concentrations of Arsenic, Beryllium and Associated Elements in Glauconite and Glauconitic Soils in the New Jersey Coastal Plain, 2001. As part of this investigation, organic carbon content was measured in a total of 113 soil samples, collected from depths of 0-6 in., 12-18 in., 24-30 in., and deeper than 30 in., from the Adelphia, Colemantown, Collington, Freehold, Holmdel, Kresson, Marlton, and Shrewsbury soil series. The mean f_{oc} in these samples (across soil series) ranged from 0.009 to 0.032 and the median ranged from 0.005 to 0.021. This data generally support a decrease in f_{oc} at depth, but not uniformly, nor are they consistent with a default f_{oc} equal to 0.002. In sum, this data suggest that a more appropriate generic f_{oc} may be on the order of 0.01. (16, 20, 38, 41, 52, 55, 66)

363. COMMENT: Calculation of the impact to ground water soil cleanup standards is very sensitive to the fraction organic carbon (f_{oc}) term. Given a presumed relationship between organic carbon content and soil texture, it may be appropriate to define default f_{oc} values for sand, silt and clay soils. (16, 20, 38, 41, 52, 55, 66)

364. COMMENT: In the development of the impact to ground water remediation standards one strong element of conservatism in the Department's dilution attenuation factor (DAF) of 13 (compared to USEPA's soil screening level DAF of 20) is the soil pH value. In contract to the 6.8 pH, which the USEPA uses, the Department uses a pH value of 5.3. In addition, the Department uses a worst case geological scenario employing specific conservative numeric default values for aquifer gradient, aquifer thickness, mixing zone depth, infiltration rate and length parallel to ground water flow. In contrast, the USEPA uses a more reasonable Monte Carlo probabilistic approach which incorporates the wide range of numeric values for these elements which New Jersey geology exhibits. (64)

365. COMMENT: Under the proposed new approach for low mobility organic contaminants and inorganic contaminants, soil samples are now required to be tested using the Synthetic Precipitation Leaching Procedure, a USEPA SW-846 analytical method, to determine compliance with the impact to ground water pathway. The Department suggests that, at a minimum, one sample per area of concern and three samples per site, biased toward the highest concentrations, need to be collected and analyzed using the synthetic precipitation leaching procedure. It is highly likely that many more samples would be required at Superfund sites given their typical large size and in order to gather enough data that allows delineation of the extent of the area that would require remediation. Again, additional resources will be necessary

to ensure that an adequate number of samples are collected for the synthetic precipitation leaching procedure and that the appropriate areas are targeted for sample collection. (46, 58)

366. COMMENT: The proposed approach requires that synthetic precipitation leaching procedure samples be split, with one sample analyzed for total contaminant concentration (traditional analysis) and the other for synthetic precipitation leaching procedure. The rationale for requiring a total contaminant concentration sample for every synthetic precipitation leaching procedure sample is not clear in the document. This may lead to a large number of splits at Superfund sites. This needs to be explained more clearly. The Department might also consider recommending some percentage of splits at a lower frequency. (46, 58)

367. COMMENT: It should also be noted, according to information presented in the background report that accompanies the rule, that the average cost of the synthetic precipitation leaching procedure analysis is approximately $100 per sample. The analysis for the contaminants of concern may range from approximately $60 - $500 per sample, depending on the number and types of contaminants analyzed in each sample. These costs are in addition to the costs associated with analyzing soil samples for contaminants to determine the extent of contamination with regard to direct contact health risks. For large sites or sites with many identified areas of concern, this approach will likely have significant costs associated with the investigation of low mobility organics and inorganics, including metals. The Department is urged to offer alternate approaches to investigating the potential for impact to ground water for this group of contaminants that may utilize existing data, offer options in addition to the synthetic precipitation leaching procedure approach, and are in general more cost-effective. (46, 58)

368. COMMENT: Under the proposed new approach, the results of the synthetic precipitation leaching procedure soil analyses will be compared to new impact to ground water leachate standards, which have been calculated by multiplying the Department’s ground water quality standard by a default dilution attenuation factor (DAF) of 13. Allowances are made in the document for calculating a site-specific leachate standard using a site-specific DAF; it is likely

that site-specific values will need to be calculated for sites that have a high water table or, alternatively, for sites that have a very thick vadose zone. The Department should recognize that these site-specific factors will require moving off of the default generic soil remediation standards and will require additional resources to review site-specific information. (49)

369. COMMENT: As currently written, the proposed standard requires that the synthetic precipitate leaching procedure be conducted for any constituents listed in Appendix 1, Tables 2B and 2C. The intent is to verify that these contaminants which are less likely to leach into ground water will not leach to an extent with potential to contaminate ground water. Additionally, as currently written, this requirement applies regardless of the proximity of the concentration of the contaminate in the ground water or the distance to ground water. For example, it appears that the synthetic precipitation leaching procedure would be required for any detection of the listed chemicals. Even if located one foot below ground surface (bgs) and the ground water is 50 ft bgs and separated from the shallow contaminated soil by a thick clay layer. We do not believe it was the Department’s intent to require such additional efforts (and associated costs) in every case. We recommend that the Department allow other options for demonstrating that the constituents would not migrate to ground water and violate standards. (49)

370. COMMENT: Synthetic precipitation leaching procedure is an aggressive leaching procedure, especially considering the Department’s acknowledgement that these classes of contaminants are less likely to be transported from soil to ground water. The synthetic precipitation leaching procedure is not representative of a contaminant’s ability to leach from the soil in site-specific conditions. Furthermore, the procedure itself does not provide an insight into the contaminant’s ability to migrate to the ground water, which is dependent on site-specific factors including the depth of contaminant and depth to ground water. The use of synthetic precipitation leaching procedure to calculate alternative remediation standards also does not allow utilization of site-specific conditions to evaluate the potential for migration to ground water. (16, 20, 38, 41, 52, 55, 66)

371. COMMENT: The Department should provide the regulated community clear guidance on the usage of the synthetic precipitation leaching procedure, including which phase of investigation would it need to commence in. The Department has advised that the synthetic precipitation leaching procedure test is approximately $100, and the analyses for the contaminants of concern will vary from $60 to $500. If the Department's intent is for the synthetic precipitation leaching procedure test to be conducted in conjunction with the "direct" analysis for comparison with the direct contact standards for the low mobility and inorganic parameters, then two separate analyses will need to be conducted for these parameters for comparison with two different set of criteria. If initiated in the site investigation phase, this will result in significant additional costs to the potential responsible party. Will the Department consider a process whereby the synthetic precipitation leaching procedure samples are collected in field, but held on contingency in the lab pending the results of the direct analysis? (16, 20, 38, 41, 52, 55, 66)

372. COMMENT: Site investigation requirements for soils under Technical Regulations specify that initial characterization samples are collected at zero to six inches below grade. The use of the synthetic precipitation leaching procedure method and comparison to leachate standard will not be meaningful when the depth to water table is even as deep as 10 feet since a migration pathway does not exist to ground water. Will the Department require a ground water investigation in this scenario? The Site investigation requirements for ground water will need to be changed to reflect the Department's policy on utilizing the leachate standard. Another scenario which will lead to inconsistent evaluation by the Department's case managers is if a deeper synthetic precipitation leaching procedure sample (closer to the water table) is in conformance of the leachate standard but a shallow sample exceeds the leachate standard. Will the Department require a ground water investigation in this case? (16, 20, 38, 41, 52, 55, 66)

373. COMMENT: Consider the scenario where a soil sample result is below the direct contact standard but is above the leachate standard. The Department requires a ground water investigation which indicates that ground water quality meets the ground water quality standards. Will the site be given an unconditional No Further Action? (16, 20, 38, 41, 52, 55, 66)

374. COMMENT: The impact to ground water Basis and Background Document states that “samples must be biased to target the highest concentrations of the contaminants per the Technical Requirements for Site Remediation.” However N.J.A.C. 7:26E does not address sample collection for synthetic precipitation leaching procedure analysis. Further, this statement implies that a second mobilization will be required to collect the appropriate samples for synthetic precipitation leaching procedure analysis. It has been the Department’s policy in the past to encourage rapid site characterization whenever practical. The commenters request clarification of these issues. (16, 20, 38, 41, 52, 55, 66)

375. COMMENT: The proposed standards do not meet the criteria set forth by the legislature that “For contaminants that are mobile and transportable to ground water, the residential and nonresidential soil remediation standards shall be protective of ground water and surface water.” N.J.S.A. 58:10B-12(a)

In the Water Supply Management Act, the Legislature declared: “the water resources of the State are public assets of the State held in trust for its citizens and are essential to the health, safety, economic welfare, recreational and aesthetic enjoyment, and general welfare, of the people of New Jersey; that ownership of these assets is in the State as trustee of the people”. In the Water Quality Planning Act, the Legislature similarly articulated the state's public trust obligation in specifying the goal “to restore and maintain the chemical, physical, and biological integrity of the waters of the State, including ground waters, and the public trust therein.” In keeping with this public trust obligation the Brownfield Act directs that “For contaminants that are mobile and transportable to ground water, the residential and nonresidential soil remediation standards shall be protective of ground water and surface water.” N.J.S.A. 58:10B-12(a). There has been a dramatic and unexplained change from the Department’s interested party review proposal where an impact to ground water soils standards for all contaminants were proposed. In the current proposed standards the Department uses an indirect measure of soils contamination by measuring water leached through the soil for large classes of soil contaminants. A site-specific remediation standard is then derived from this on a case-by-case basis. In addition the proposed standards provide several “alternate remediation standard” option for the derivation of the case-by-case standard setting. The leachate testing method included in the proposal is a USEPA testing method designed to predict impacts of landfills on aquifers and is unsuitable to derive “minimum remediation standards.” The proposed standards include a dilution attenuation factor of 13, far higher than is protective of ground water over time. Moreover this is again case-by-case standard setting that is not in keeping with the Legislative mandate to establish “minimum remediation standards,” nor does it provide a clear and predictable standard setting for those who depend upon ground water for their water supply and livelihood. The Department should return to the soil water partition method that it put forward in the interested party review to establish soil minimum remediation standards for impact to ground water.

The Department's proposed new analysis approach causes concern because there is no direct relationship between the results obtained from the soil analysis approach under the Soil Cleanup Criteria and results that may be found using the new Synthetic Precipitation Leachate Procedure analysis. (46)

376. COMMENT: In the development of the impact to ground water soil remediation standards, the Department assumes that the contamination is in direct contact with the ground water. The commenters disagree with the Department’s use of overly conservative assumptions in the mathematical model used to calculate these proposed cleanup standards. One such example is the assumption that a contaminated soil sample is present at the water table. This overly conservative assumption may not be consistent with actual site conditions. The 1992 criteria assumed a 6-foot clean zone between the contaminant and the water table. This proposed change would be especially problematic for lead, which is commonly found in urban environments. As a result, (re)developers will now be forced to rebut this “unreasonable “assumption and unattainable standard and submit to the alternative remediation standards (alternative remediation standard). This will automatically add a great deal more time and cost without any significant reduction in risk and will severely strain the Department’s resources. Also, the procedure for petitioning and demonstrating that an alternative soil remediation standard should apply is not clear. (20, 24, 29, 43)

377. COMMENT: The Department has not "avoided the use of redundant conservative assumptions" in the development of the methods to derive the proposed impact to ground water soil remediation standards. This is significant, because the result has been the establishment of proposed standards that are not more protective than would be the case if such redundant assumptions had not been used. The resulting effect is excessive expenditures of manpower by both the regulated community and the Department to routinely develop and review alternative remediation standards for many sites. This statement is based on the fact that, to the best of the commenters' knowledge, there have been no circumstances where the use of the existing impact to ground water soil cleanup criteria (established over 14 years ago) have resulted in unacceptable impacts to ground water. (16, 20, 38, 41, 52, 55, 66)

378. COMMENT: The Department provided a list of immobile chemicals in its 2004 draft remediation standard proposal that was provided for public comment. Chemicals on the list would not require remediation to the generic impact to ground water soil remediation standards provided that all of the specified conditions were met, such as an adequate clean zone above the water table. This was called alternative soil remediation standard Option B. The Department has not included this Option B in these proposed rules.

This option should be included in the proposed regulation because for the listed immobile chemicals, this option will provide an easy and simple and less costly way to determine whether soil remediation is required. The cost to identify whether remediation is required for the immobile chemicals will be significantly less than the other site-specific methods. This is particularly important with respect to businesses and individuals with limited funds which should be put to remediation activities rather than excessive sampling cost for total contaminant concentration then separate analysis for synthetic precipitation leaching procedure method. (16, 20, 38, 41, 52, 55, 66)

379. COMMENT: Commenters have estimated the cost for compliance with the proposed impact to ground water standards will be over $116 per square foot for a warehouse site on a

typical brownfield as compared to $1.20 per square foot under the existing soil cleanup criteria. For a 500,000 square foot warehouse, the cost of compliance would be approximately an additional $57 million dollars. In addition, the proposed alternative remediation standards process could easily take an extra 3 years due to the time it takes to work with the consultants, collect monitoring well data, run the various analyses and go through the Department's review process. Faced with these huge added costs and time delays, most developers will steer clear of these sites, which is contrary to the Administration's commitment to smart growth through urban revitalization and brownfield cleanups. The proposed standards will automatically add a great deal more time and cost to the process of remediation without any significant reduction in risk and will severely strain the Department's resources. (20, 24, 29, 43)

380. COMMENT: The proposed leachate test and leachate standard are not an appropriate way to establish a ground water protection soil standard for beryllium. The leachate criterion, leachate standard and synthetic precipitation leaching procedure are overly conservative. Based on a combination of the ground water quality criteria, the dilution attenuation factor and the synthetic precipitation leaching procedure test, each of which employs conservative elements, the resultant leachate criterion and standard for beryllium are highly overly conservative and should not be adopted.

The immobility of beryllium in a neutral environment is well recognized. This fact is summarized in Section 6.3.2.2 of the Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profile for beryllium as follows: "In the range of 6-8, typical of most waters, the speciation of beryllium is controlled by the formation of solid beryllium hydroxide, $Be(OH)_2$, which has a very low solubility (solubility product $K_{sp} = 10^{-21}$)." The ATSDR further notes: "Other transformations of environmental importance are the insoluble basic carbonates, such as $(BECO_3)_2(OH)_2$, formed by reaction of dissolved carbonates with beryllium solutions and the formation of beryllium sulfate (i.e., $BeSO_4$) formed by reaction of soluble sulfates with beryllium solutions." Id.

The immobility of beryllium, particularly in the form of insoluble beryllium hydroxide and carbonates, in soils must be recognized in any proposed ground water protection standard for soils and the Department's proposed rules fail to do so, especially when several conservative elements are combined. Hence, for beryllium they are not reasonably predictive of ground water concentrations and should not be adopted. (64)

381. COMMENT: Regarding the AT123D Model inputs, the Department requires that "[f]irst order decay coefficients shall be set to zero". Relative to volatile organic compounds (VOCs), this appears to be another instance of an incremental, overly conservative assumption being applied to the technical approach for alternative remediation standards derivation. In practice, solute transport with no decay is applied only for conservative, non-degrading solutes (e.g., chloride). First-order decay coefficients for a range of biodegradable constituents are available from the literature (e.g., as cited in EPA/ 600/R-96/087, August 1996). More appropriately, first-order decay coefficients can be derived and calibrated in a straightforward manner from field-measured data on a site-specific basis. (16, 20, 38, 41, 52, 55, 66)

382. COMMENT: The approval of only an analytical ground water model is severely limiting for many of the situations that might be encountered in many complex hydrogeological situations and many complex chemicals. Also, as in vadose zone modeling, the selection of only one model for these efforts is rather limiting and should be expanded to allow the site specific model choice.

Requiring the source area to meet the ground water concentration within five years or less would seem to eliminate this option for many source areas where a longer time frame may be necessary for attenuation of residual contamination or for effects of treatment to be realized. Five years is a very short period of time in the context of environmental remediation. Unnecessarily restricting this time period could eliminate many effective as well as protective remedial options based on an arbitrary five-year timeframe. For instance, it would appear to eliminate an active in-situ treatment option followed by natural attenuation that exceeds five years. A five-year timeframe for compliance cannot be suitable at all remediation sites across New Jersey due to the site specific nature and complexity of environmental remediation.

It is recognized that the current Technical Rules do use a five-year period in assessing implementability in remedial selection at N.J.A.C. 7:26E-5.1. This section describes the selection factor of implementability and asserts that if the standard is attained in five years the proposed remedial action will be considered to be timely and hence weighs in favor of implementability. However, the Technical Rules clearly allow remedial action, which attains standards outside of the five-year period in the following section. N.J.A.C. 7:26E-5.2 requires remedial actions that take longer than five years to complete from the time remedial action is implemented to submit a remedial action selection report. The proposed rule would go much farther in that any remedial action that cannot achieve the ground water quality standard within five years to be eliminated from consideration when the alternative remediation standards is based on Option IV. Others options of developing an alternative remediation standards do not require any such compliance period for the ground water quality standards. (49)

383. COMMENT: It is unclear why Option IV is restrained to a five year compliance period due to the additional use of a ground water fate and transport modeling, while others options are not so constrained. At what time does the five-year period begin to run? The proposed rule requires the source area to meet the ground water quality standards within five years; however, no indication is given as to when the time period begins (e.g., at the start of remedy implementation, at the time the remedy is implemented, or at the time the remedy is completed). If this provision is continued into the final rule, clarification should be added. (49)

384. COMMENT: Commenters oppose the use of a leachate criteria's dilution attenuation factor of 13X and compliance averaging for ingestion, dermal and inhalation standards, which further weaken the standards. (25,31,44,65)

385. COMMENT: Commenters expressed concern that the arbitrary choice of 13 as a Dilution Attenuation Factor (DAF – or perhaps it should be DAFFY) represented a loophole in the regulations that will allow the infiltration of toxins into our ground water. The USEPA guidelines recommend a range from 1 to 20 for DAFs, with 1 being on the strict side and 20

being overly generous. When looking at the landscape, soil conditions, and geology of New Jersey, however, it does not appear that the selection of 13 as an appropriate DAF for the state. (65)

386. COMMENT: The impact to ground water soil remediation standards may not be protective enough. All of the waters of the state of New Jersey are considered potable, both for protective reasons and because the state is running out of areas to take water from, making the protection of urban ground water critical to preserving future potable and nonpotable sources. Many of our cities, such as Camden and Atlantic City, are currently on well water. In addition, most of New Jersey has seasonally high water tables, many to surface. This means that there is no mixing zone and that, instead, contamination of the soil will go directly into the aquifer. A large number of contaminated sites are in former wetlands or riparian corridor, where ground water will at times reach the surface and be in direct contact with the contaminated soil, resulting in a very limited dilution factor. (65)

387. COMMENT: It is inappropriate and inconsistent with New Jersey law and historical ground water protection policy to allow dilution in deriving the impact to ground water soil remediation standards. Pursuant to New Jersey law, all ground water is classified as potable (unless the aquifer is reclassified by the Department) and subject to a non-degradation standard. The point of compliance where this standard is enforced is at the point where the pollutant comes into contact with the ground water. This has been the longstanding law, policy, and practice of the Department. (65)

388. COMMENT: Even at times when the ground water level is not to surface, however, the calculation of infiltration rates and the dilution estimates included in the rules are incorrect. Because most of New Jersey’s contaminated sites are either in urban lands or have caps and cover, there is no infiltration of rainwater and much less dilution in these areas that the estimates indicate.

The dilution attenuation factor (DAF) should be 1, which is what is recommended for areas that have high ground water, urban lands, or caps – all of which we have here in New Jersey. Given the fact that we have a particularly urgent need to protect our ground water, we need to be much more conservative than this giant loophole, which would allow a flood of chemicals into that ground water. (65)

389. COMMENT: The Department does not consider that other contaminants that may be in the ground water from other sites and the cumulative and secondary effects of those contaminants mixing in the ground water. (65)

390. COMMENT: The use of the dilution attenuation factor will cause ground water contamination and will thereby create additional natural resource injury. The Department should not include the dilution attenuation factor in the development of the impact to ground water soil remediation standards. (68)

391. COMMENT: N.J.A.C. 7:26D Appendix 4, Equation 2, Dilution Attenuation Factor (DAF): This equation uses the hydraulic gradient of the ground water aquifers as part of the assumption that the hydraulic gradient is generally 50% of the land surface gradient (See Appendix G of the Ground Water Basis and Background document). Use of this rule of thumb is not credible when measured hydraulic gradient data are available. This generalization will result in approximate values of the dilution attenuation factor (DAF) which will in turn result in inaccurate, if not too stringent, soil cleanup standards using the ground water route of risk assessment. (1)

392. COMMENT: The impact to ground water soil remediation standards for mobile organic contaminants were calculated using a modified version of USEPA's Soil Screening Level Soil-Water Partition Equation. The Department's methodology back calculates a concentration in soil using an acceptable ground water concentration (New Jersey Class II-A ground water quality standards were used). The Department's Basis and Background Document indicates that the other input parameters were based on values more specific to New Jersey conditions, yet one

value was chosen to represent each of the conditions for the entire state [i.e., hydraulic conductivity, soil texture, soil porosity, dilution attenuation factor (DAF)]. New Jersey is a geologically diverse state with many different soil/lithological types and hydraulic characteristics, and certain parameters (for example, the DAF and hydraulic conductivity) may have a large range across the state. (46, 58)

393. COMMENT: In review of the results of the USEPA's Monte Carlo analyses, the Department notes that two of the eleven hydrogeologic regions identified by USEPA across the United States are applicable to New Jersey: Region 9 (Northeast and Superior Uplands) and Region 10 (Atlantic and Gulf Coast). The following is a summary of the median dilution attenuation factor (DAF) data derived from the USEPA databases from these two Regions (for source area sizes of 0.5 acres):

Median DAF Value Calculated by USEPA for Hydrogeologic Regions

	EPA Database	
	HGDB	DNAPL
Region 9 (Uplands)	13	23
Region 10 (Coastal Plain)	3	21

The Department tends to give less weight to the data derived from the DNAPL database, because none of the sites evaluated in that database are located in New Jersey. The commenters believe that it is not appropriate to assume that hydrogeologic conditions in neighboring areas of Pennsylvania, New York, and Delaware (along with adjacent New England and Mid-Atlantic states) differ in any significant way from analogous area in New Jersey, considering that the physiographic provinces and climatic regimes extant in New Jersey extend northeast to the Canadian Maritimes and southwest to Georgia. (16, 20, 38, 41, 52, 55, 66)

394. COMMENT: The Department suggests that the range of data (as calculated independently by the Department using data characteristic of the Kirkwood Cohansey aquifer in the New Jersey Coastal Plain) support a generic dilution attenuation factor (DAF) of 13. These data may be supportive of a DAF equal to 13 in the Coastal Plain, but that they clearly indicate a DAF on the order of 20 to be much more appropriate within the upland areas of New Jersey (which comprise nearly half of the State). This clear distinction is the logical result of the fundamental differences in bedrock and surficial geology between these two regions (and the associated differences in matrix characteristics, such as hydraulic conductivity and organic carbon content).

Over two-thirds (approximately 68%) of sites on New Jersey's Known Contaminated Sites List (2001) are located in the 12 northern counties located outside of the Coastal Plain. Moreover, as presented in the proposal, the generic impact to ground water soil remediation standards will not be applicable to Class 1 aquifers, which represent the same aquifers on which the Department based its conservative default assumptions for the DAF of 13. (16, 20, 38, 41, 52, 55, 66)

395. COMMENT: Other states in the Atlantic Coastal Plain province routinely apply a dilution attenuation factor (DAF) value that is greater than 13: Maryland uses DAF 20 based on USEPA Region III Soil Screening Levels (SSLs); Delaware uses USEPA Region III SSLs - DAF 20; Delaware - USEPA ROD for Dover Air Force Base uses DAF 20; Virginia uses values derived from the USEPA Soil Screening Guidance - DAF 20; North Carolina - uses values adapted from USEPA Region IX, 2002 Preliminary Remediation Goal Table (DAF 20). (16, 20, 38, 41, 52, 55, 66)

396. COMMENT: The Department has used Darcy velocity values for the Kirkwood-Cohansey aquifer system in the development of the default dilution attenuation factor (DAF) value for the entire state of New Jersey. While this may be the single largest and most used aquifer in the state, this aquifer also occurs largely within the Pinelands Protection and Preservation Areas. As such, ground water in these areas is not subject to the Class IIA ground

water quality criteria; rather they are considered Class I aquifers and must meet anti-degradation criteria. In accordance with the Basis and Background Document, impact to ground water soil remediation standards values for Class I aquifers must be calculated on a site-specific basis. The Department has ignored Darcy velocity values appropriate for the portions of the state that must comply with the proposed impact to ground water soil remediation standards values. The Department should justify the use of these values and presents this comment in support of the use of regional values in the development of an alternative remediation standards. (16, 20, 38, 41, 52, 55, 66)

397. COMMENT: The Department has modified the USEPA soil screening levels for the impact to ground water pathway by incorporating assumptions that are biased to be protective of conditions that occur in New Jersey's Pinelands, which is underlain primarily by ground water Classified as Class 1. However, since the impact to ground water standards only apply to Class 2A ground water, the use of the impact to ground water soil remediation standards would not apply in significant portions of the Pinelands. Therefore, when used in combination with the Department's ground water classification system, the impact to ground water soil remediation standards incorporate redundant conservative assumptions in conflict with the legislative mandate. N.J.S.A. 58:10B-12b(3). (16, 20, 38, 41, 52, 55, 66)

398. COMMENT: The USEPA performed a range of Monte Carlo simulations using the CMPT model to derive a generic dilution attenuation factor (DAF) of 20. Appendix E of the guidance document provides detailed information regarding sensitivity analyses performed within this context. Of particular note is the finding that "Overall, the Monte Carlo results were not very sensitive to…downstream distance of the receptor well". Specifically, of 14 model parameters evaluated, receptor well distance was ranked eleventh in relative sensitivity ([high value-low value]/median), with a value of 0.7. For comparison, infiltration rate was ranked first, with a relative sensitivity of 11.4.

Also of interest are the results of a range of specific model simulations that evaluated changes in DAF as a function of source area size and a series of 6 receptor well location scenarios. Scenario number 3 was defined as a well located “0 ft from the edge of the source and within the center of the contaminant plume”. Scenario 3 simulations derived a 90th percentile DAF of 17.9 for a source area of 150,000 ft^2 (corresponding to a source length of 387 ft). For the case of a source length equal to the Department default (100 ft) the derived 90th percentile DAF was in excess of 100. These data clearly suggest that a compliance point located immediately adjacent to the source (in compliance with N.J.A.C. 7:9-6) does not result in an a priori need to reduce the value of the DAF from the default established by USEPA. (16, 20, 38, 41, 52, 55, 66)

399. COMMENT: The leachate test and leachate standard are not a proper way to establish a ground water protection soil standard for beryllium. The leachate criterion, leachate standard and synthetic precipitation leaching procedure are overly conservative. Based on a combination of the ground water quality standards, dilution attenuation factor and synthetic precipitation leaching procedure, each of which employs conservative elements, the resultant leachate criterion and standard for beryllium are highly overly conservative and should not be adopted. (64)

400. COMMENT: Ground water standards must differentiate by use. The proposed impact to ground water soil remediation standards do not distinguish among waters based on whether or not they will serve as a potable water source. Instead, the Department has proposed to apply one set of impact to ground water soil remediation standards to all soils in the State, regardless of whether those soils are in a position to impact ground water that currently is or is proposed to be used for a drinking water supply. As proposed, the impact to ground water standards do not comport with the Brownfield Act. As the Department acknowledges, “more stringent remediation standards may increase the cost of remediation to the regulated community.” 39 N.J.R. 1585. It should, therefore, only selectively impose elevated standards. The impact to ground water soil remediation standards are universally, not selectively, applied irrespective of the current or planned use of the ground water. The proposed rule would compel remediation for all soil that exceeds the generic (or alternative) soil remediation standards that are based upon impact to ground water, which, under the proposed rule, are required to be based upon the Class II-A ground water quality standards. The final soil remediation rule should instead, as

authorized by N.J.S.A. 58:10B-12f, explicitly allow alternative remediation standards to be based upon ground water quality standards that are protective of non-potable uses at sites where potable use of ground water is not reasonably expected. (19, 22, 27, 45)

401. COMMENT: In defending its past and current practice of applying its numeric health-based criteria for drinking water protection (i.e., its Class IIA ground water quality standards) as ground water remediation standards to all zones and volumes, the Department has claimed that its narrative standards for ground water remediation provide flexibility and relief to remediating parties. The proposed rule provides no such flexibility or relief, however. Rather, the proposed regulation would compel remediation for all soil that exceeds the generic (or alternative) soil remediation standards that are based upon impact to ground water, which, under the proposed rule, are required to be based only upon the Class II-A ground water quality standards. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

402. COMMENT: Soils in areas with ground water that is not used (or proposed to be used) as a drinking water supply and soils in areas for which the ground water is otherwise unsuitable as a drinking water supply (e.g., insufficient in volume, proximity to saline surface waters, too shallow or otherwise inaccessible) should not be subject to impact to ground water standards. To be consistent with the Brownfield Act, the Department must differentiate by the water's use. It must limit the applicability of drinking water standards to those waters that are currently used as a potable water supply (i.e., in a Wellhead Protection area) or proposed to be used for drinking water in conformance with the Statewide Water Supply Plan. (19, 22, 27, 45)

403. COMMENT: The Department must clarify in regulatory format that the impact to ground water standards do not apply to areas with Class IIB, Class IIIA or Class IIIB ground water classifications. (19, 22, 27, 45)

404. COMMENT: To streamline review and approval of alternative remediation standards values based upon impact to ground water that is not used for drinking water purposes, the Department should establish a set of alternative soil remediation standards based upon ground

water remediation standards for non-potable uses, which are consistent with the principles described in this submittal. As part of a coherent and comprehensive framework for alternative remediation standards petitions for soil, the Department should also develop practical guidelines for data collection and submission to demonstrate on a site-specific basis that a given water-bearing unit is non-potable (Class III) due to natural or regional conditions, or that the drinking water pathway does not exist and is not reasonably expected to exist. Under such circumstances, the numeric drinking water criteria should not be applicable to the water-bearing unit and alternative remediation standards values based upon impact to ground water should be based upon risk-based criteria for non-potable exposures to ground water. As long as the petitioner meets such guidelines, there should be a presumption that an impact to ground water alternative remediation standards will be accepted readily and timely on the basis of a site-specific determination of its current and reasonably expected future use. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

405. COMMENT: In urban industrialized areas, such as the City of Newark, it is more likely that historical contamination will cause an exceedance of the impact to ground water soil remediation standard, which will require implementation of a ground water remedial investigation. The likelihood that all constituents for all samples will meet the ground water quality standards is less likely in areas where the Department has acknowledged there are impacts to ground water which could justify classifying the ground water as Class IIB.

Under the soil remedial standard regulation, the Department has indicated that where contaminated soils have impacted ground water, the soil must be either treated or removed. The impact to ground water is "proven" when ground water quality standards have been exceeded. Therefore, in areas where historic contamination has impacted the ground water on a regional level, the likelihood that a soil remedial action incorporating soil excavation or treatment is much higher than in non-urbanized areas, due to the presence of ground water exceedances which may not have any connection to the site specific soil exceedances of the impact to ground water soil remediation standards. (47)

406. COMMENT: The procedures and principles for alternative remediation standards for the impact to ground water pathway (proposed N.J.A.C. 7:26D-7, Appendix 7) should include the following:

Ground water quality standards (N.J.A.C. 7:26E-1.13(b)) and remediation standards based upon health-based criteria for protection drinking water protection should not be applied to zones of ground water that are not current or reasonably expected future sources of drinking water (Proposed N.J.A.C. 7:26D-2.2(a)4 provides a set of narrative criteria that may be used for selecting an appropriate ground water remedial action based upon "site-specific use and conditions." The commenters' recommendations for alternative remediation standards approaches for the impact to ground water soil remediation standards are consistent with a remedial action that is based upon site-specific use and conditions.) There should be mechanisms and procedures in the alternative remediation standards framework for establishing on a site-specific basis when the drinking water pathway does not exist or is not reasonably expected to exist or has been adequately and appropriately mitigated. Under such circumstances, the related drinking water criteria are not applicable to ground water. Examples include sites where engineering or institutional controls are already in place and will be maintained and sites where engineering or institutional controls are suitable and are being contemplated. Site-specific hydrogeologic features and other naturally occurring, site-specific conditions may also provide sound justification for eliminating certain exposure pathways. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

407. COMMENT: The Department's processes and principles associated with alternative remediation standards for the impact to ground water pathway are not supported by the findings of several independent panels, including panels sponsored by the National Academies of Science and Engineering and USEPA. Specifically, research has shown that restoring ground water throughout a plume to drinking water standards is impractical at a large number of sites (NRC 1994) and is generally not necessary to protect human health. At most sites where contaminated ground water creates a current threat to human health, protection is achieved by implementing institutional controls in combination with technologies that contain the plume. At such sites,

remediation targeted towards “source zones,” including areas impacted with non-aqueous-phase liquid (NAPL) if present, would not be essential for protection of public health. Indeed, most potential benefits of NAPL mass depletion are not directly related to protection of public health (Expert Panel 2003). As such, the amount of resources that should be dedicated to “source control” at a particular site should be based on what is practical and on other site-specific factors, rather than be dictated by policy as a required remedial component at all sites. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

408. COMMENT: Several sections of the impact to ground water basis and background document (including Sections IV.B. and V.C.) refer to N.J.A.C. 7:26E to determine appropriate numbers of samples based on site or area of concern size. In addition, when the size of an area of concern increases, based on new data, additional samples are required to be added (again in accordance with N.J.A.C. 7:26E) for the development of the alternative remediation standards. However, N.J.A.C. 7:26E does not currently address these issues. Specific proposed sample frequencies for each procedure should be provided before the soil remediation standards are adopted and implemented (16, 20, 38, 41, 52, 55, 66)

409. COMMENT: The commenter stated that implications of unrealistically conservative assumptions are most apparent in the impact to ground water soil remediation standards, which assume that all contaminated soils have a ground water impact. As a consequence, due diligence investigations will produce “false positives” even where the sampled soil is sufficiently distant that it can have no impact to ground water. Nevertheless, the commenter believes that signal will imply much higher remediation costs and terminate further interest in redevelopment of the site. (42)

410. COMMENT: The proposed numeric soil remediation standards that are based upon impact to ground water also assume 1) there is an infinite contaminant mass completely and readily available for leaching into ground water, whereas contaminated soil always contains a finite (or limited) mass of each contaminant, 2) contaminated soil is in direct contact with ground water, notwithstanding that many soil sources are located some distance away from ground water

and may be within the influence of engineering controls, and 3) contaminated soil and ground water are instantaneously and perpetually in chemical equilibrium, notwithstanding scientific evidence that adsorption and desorption processes are time-dependent and are not identical in their time-dependency.

Most of the numeric soil remediation standards based upon impact to ground water are substantially and unnecessarily more stringent (lower) than the soil cleanup criteria that the Department has applied since February 1992 and that were last updated in May 1999. For most substances, including many commonly occurring contaminants, the impact to ground water numeric standards are more stringent than those based upon direct contact or inhalation; therefore, these standards will govern soil remediation at the vast majority of sites according to the commenter. Many are lower by more than 10-fold. The commenters believe that investigation and remediation costs will increase, as a result. The commenters have estimated that the additional investigatory costs for an underground storage tank site with no ground water impact would be approximately $125,000 at a minimum; in this case, the additional effort in characterizing soil concentrations that exceed generic impact to ground water standards and expanding the associated ground water investigation is not warranted, because there is no ground water impact. Assuming that these additional remediation costs could reasonably be incurred at each of approximately 3,000 fuel retail sites in New Jersey and that sites with ground water impacts could incur higher incremental costs, the commenters estimate that the proposed rule would impose a minimum of approximately $375 million in additional remedial investigation costs at fueling stations alone. At two other example sites, the commenters have estimated that the additional remediation costs, due to excavation of soils to attain the proposed impact to ground water standards, would incur additional costs of between $2 and $3 million per site, but would not provide any human health benefits, because the impacted ground water is not used for drinking water, and would provide limited environmental benefits, because the ground water would be subject to a long-term natural attenuation remedy in any event. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

411. COMMENT: To be of practical use, commenters believe that the Department's numeric soil remediation standards based upon impact to ground water (and the methods for assessing compliance with those standards) should correctly categorize sites regarding the presence or absence of unacceptable ground water quality and the probability of mis-categorization should be very low. The commenters suggest that ideally no sites with uncontaminated ground water should be targeted for soil remediation based upon merely a hypothesized impact to ground water. The Department has access to a substantial database of ground water and soil sampling data for many sites in New Jersey, which the Department should utilize to validate its proposed soil remediation standards for impact to ground water before issuing a final soil remediation rule. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

412. COMMENT: Based upon a limited review of a small number of its sites, commenters readily identified situations where the proposed impact to ground water numeric standards were exceeded for certain volatile organic compounds (thus requiring soil excavation or treatment pursuant to the Department's proposed narrative standards), yet ground water is not contaminated with these substances at levels that are unsafe, based upon current and reasonably expected future uses. Such situations demonstrate that it is not necessary to attain the proposed impact to ground water standards at every site to ensure protection of ground water quality; on this basis, the commenters believe that proposed impact to ground water soil remediation standards are unnecessarily stringent. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

413. COMMENT: Commenters suggest that soil remediation for the impact to ground water pathway should not be required when ground water is not contaminated to unacceptable levels based on current and reasonably expected ground water use. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

414. COMMENT: The commenters believe that the Department's proposal suggests that use of engineering and institutional controls may not be permitted where contaminants exceed impact to ground water soil remediation standards, unless the remediating party demonstrates

that active remediation is not practicable. It has been the commenters' experience that the availability of "impracticability" determinations is very limited and requests for such determinations lead to delay and significant disagreements between the Department and remediating parties. The commenters suggest that use of engineering and institutional controls should be available to address exceedances of impact to ground water remediation standards, as well as the direct contact and inhalation pathways. (16, 20, 38, 41, 52, 55, 66)

415. COMMENT: Commenters stated that the Department's proposed impact to ground water soil remediation standards have features that will significantly impede brownfield redevelopment. Specifically, the Department has proposed standards have the effect of generally disallowing the use of engineering and institutional controls for the vast majority of sites. The commenters believe that this inflexible policy is contrary to legislative mandate and widely accepted principles and practices for risk-based remediation and is unnecessary to protect public health and the environment. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

416. COMMENT: The commenter stated that the proposed rule would have the effect of disallowing use of engineering and institutional controls to comply with the impact to ground water remediation standards at a vast majority of sites, which is contrary to the legislative intent and is unnecessary to protect human health. (52)

417. COMMENT: The proposed impact to ground water soil remediation standards, as currently written, will govern soil remediation decisions at the vast majority of sites. Many of these proposed numeric standards are set at the practical quantitation level. The proposed soil remediation standards state that only excavation and treatment are acceptable for soil areas that exceed an impact to ground water standard unless technical impracticality can be demonstrated. The commenters believe that at many sites, the required excavation or treatment will incur higher costs than would an engineering or institutional control. At certain sites, soil excavation or treatment may be infeasible due to the presence of buildings, utilities, or other infrastructure; engineering and institutional controls are the remedial options currently accepted by the Department to mitigate exposure for these situations. The commenters state that it is unclear

whether the Department would consider these situations to constitute “technical impracticality” under the proposed rule, because the proposed rule has no provision to address it. The commenters suggest that the Department should develop and issue for public review and comment a policy on what constitutes “technical impracticality” in the context of soil remediation. (4, 5, 11, 15, 18, 20, 28, 29, 30, 32, 34, 40, 41, 45, 51, 52, 54, 59)

418. COMMENT: The Department’s proposed over-reliance on alternate remediation standards to address impact to ground water concerns is, from a realistic and practical standpoint, unworkable. (3)

419. COMMENT: The Department has developed its generic state-wide impact to ground water soil remediation standards using default assumptions including a dilution attenuation factor (DAF) of 13, which is designed to protect ground water that occurs in the Pine Barrens of New Jersey (when, in fact, the use of these generic standards will not be permitted because of the occurrence of Class I ground water in this area). In contrast, USEPA and other coastal plain states use default assumptions including a DAF of 20 that the commenters state are more appropriate to protect New Jersey’s ground water. (16, 20, 38, 41, 52, 55, 66)

420. COMMENT: In addition, the rule proposal suggests that use of engineering and institutional controls may not be permitted where contaminants exceed impact to ground water soil remediation standards, unless the remediating party demonstrates that active remediation is not practicable. Experience has shown that “impracticability” determinations are very limited and requests for such determinations lead to delay and significant disagreements between the Department and remediating parties. Use of engineering and institutional controls should be available to address exceedance of impact to ground water standards, as well as the direct contact and inhalation pathways. (16, 20, 38, 41, 52, 55, 66)

RESPONSE: The Department believes that it is vitally important to protect ground water from discharges of hazardous substances in the environment. The exposure of ground water to contamination from contaminated soil is a valid exposure pathway. The purpose of the impact to ground water soil remediation standards is to prevent unacceptable risk to human health from the ingestion of contaminated ground water. These standards, which protect ground water from future impacts from contaminated soil, were back calculated from the Ground Water Quality Standards, N.J.A.C. 7:9C, for Class II-A ground water. The primary use for Class II-A ground water is potable water. Because Class II-A consists of all ground water of the State except for ground water designated in Classes I, II-B or III, the Department calculated the impact to ground water standards assuming that ingestion as drinking water is the primary human exposure pathway. The Class II-A ground water quality criteria are the applicable endpoints from which the impact to ground water remediation standards were calculated.

That being said, numerous commenters have raised concerns and questions regarding the proposed impact to ground water soil remediation standards at N.J.A.C. 7:26D-4.4. In consideration of those coments, the Department has determined to not adopt the proposed numeric standards that are based on this pathway at this time because further review is needed to address the issues raised by the commenters. In particular, the development of a more accurate risk based model for urbanized and industrialized areas requires futher investigation and analysis.

The Department will reevaluate the impact to ground water pathway and will develop technical guidance that will address both the Department’s and the regulated community’s concerns. The Department intends to evaluate different compliance options and other factors that affect the transport of contamination from soil to the ground water in order to develop a more workable approach for the impact to ground water pathway. The guidance will provide flexibility that will allow the consideration of site specific conditions and factors. It is anticipated that the Department and the regulated community will gain valuable data and information in applying the guidance at sites, which can then be used to develop future rules concerning impacts to ground water. Until new rules are adopted, the Department will continue to develop impact to ground water soil remediation standards on a site-by-site basis pursuant to its authority under the Brownfield Act, N.J.S.A. 58:10B-12.

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Summary of Agency-Initiated Changes:

1. N.J.A.C. 7:26D-1.5 sets forth the definitions of words and terms used in this chapter. The acronym "EPA," is being deleted on adoption and "USEPA" is being added to make references in the rules to the Federal agency consistent within the rule text.

2. The term "Method detection limit" or "MDL" is being deleted on adoption because this term is not used in the rules and is thus, extraneous.

3. The Department is correcting a typographical error at N.J.A.C. 7:26D-7.4(a). The cross-reference to N.J.A.C. 7:26D-7.2 is being corrected to N.J.A.C. 7:26D-7.3.

4. The Department is correcting two errors in the standards provided for toluene in Appendix 1 Tables 1A and 1B. In the proposal, two numbers appeared for the residential direct contact standard and for the non-residential direct contact standard, one of which appeared with a strike through demarcation. The respective correct numbers of 6,300 and 91,000 were also published in these tables. The stricken through numbers were printed in error and will be deleted on adoption. For toluene, the correct direct contact standard for residential exposure is 6,300 mg/kg and the correct direct contact standard for non-residential exposure is 91,000 mg/kg.

5. The Department is correcting an error in the standard provided for chlordane in Appendix 1 Table 1B. In the proposal, two numbers appeared for the non-residential direct contact standard, one of which appeared with a strike through demarcation. The stricken through standard was printed in error and will be deleted on adoption. For chlordane, the correct direct contact standard for non-residential exposure is 1 mg/kg.

6. The proposed residential and nonresidential standards for 4-chloroaniline were derived based on a USEPA Provisional Value (cancer slope factor) developed by the National Center for Environmental Assessment (NCEA), resulting in a residential standard of 9 mg/kg and a non-

residential standard of 66 mg/kg, as indicated in Appendix 1, Tables 1A and 1B, respectively. Subsequently, NCEA withdrew the provisional value, and the potential carcinogenic effects of 4-chloroaniline are currently under review. As a result, the Department is not adopting either the residential or the non-residential standards for 4-chloroaniline. Accordingly, the entire data line for 4-chloroaniline in Table 1A and the entire data line for 4-chloroaniline in Table 1b are being deleted on adoption. The Department intends to propose new standards for 4-chloroaniline based on USEPA Integrated Risk Information System (IRIS) toxicity values for non-cancer effects in the future.

7. The Department has corrected a typographical error in Appendix 1 Table 1A for Antimony. The number proposed was 36,000 mg/kg. The correct number is 360,000 mg/kg. The Department is correcting this on adoption. This has no impact on the remediation standard because the standard is determined by the ingestion/dermal pathway criterion of 31 mg/kg, and is not changing on adoption.

8. On adoption, the Department is correcting a cross reference provided at N.J.A.C. 7:26D-7.4(a), from N.J.A.C. 7:26D-7.2 to the correct citation - N.J.A.C. 7:26D-7.3.

Federal Standards Analysis

As discussed in response to comments 316 through 420, the Department has determined not to adopt the impact to ground water soil remediation standards. Additionally, as discussed in response to comment 201, the Department is modifying the criteria for 44 contaminants. Accordingly, the Federal Standards Analysis is being modified from the proposal to reflect these changes on adoption.

Executive Order No. 27 (1994) and N.J.S.A. 52:14B-1 et seq. require State agencies which adopt, readopt or amend State regulations that exceed any Federal standards, or requirements to include a Federal Standards Analysis in the rulemaking document.

The Remediation Standards, N.J.A.C. 7:26D, are adopted under the authority of the Brownfield and Contaminated Site Remediation Act, N.J.S.A. 58:10B-1 et seq., the Spill Compensation and Control Act, N.J.S.A. 58:10-23.11a et seq., and the Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq. These State statutes all refer to or incorporate Federal law, Federal standards or Federal requirements. Thus, in accordance with N.J.S.A. 52:14B-22 through 24 and Executive Order No. 27, the Department compared the adopted rules to the Federal rules and associated guidance documents issued pursuant to the following Federal laws: the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA) 42 U.S.C.§§ 9601 et seq., the Resource Conservation and Recovery Act (RCRA) of 1980; 42 U.S.C. § 6901, 42 U.S.C. §§ 6991 et seq. and the Federal Safe Drinking Water regulations 40 U.S.C. § 141, 142 and 143.

The soil remediation standards are not promulgated under the authority of, or in order to implement, comply with, or participate in any program established under Federal law. However, the Department compared the adopted soil remediation standards with the contaminants on EPA's list of Soil Screening Levels (SSL) (Draft Final, March 2001). The USEPA has not promulgated soil standards but has developed Soil Screening Levels under the CERCLA program, which are provided as guidance. The list of contaminants for which the Department is adopting remediation standards and the Federal list of generic SSLs are not the same. The Department is adopting remediation standards for 136 contaminants as compared with the SSL list which contains 108 contaminants. The Department included additional contaminants on the list because these contaminants are found at sites in New Jersey and thus require remediation standards. Similarly, USEPA has SSLs for contaminants for which the Department is not adopting remediation standards at this time.

Ingestion-Dermal Exposure Pathway

For the residential ingestion-dermal pathway, the Department compared the residential soil remediation standards (Appendix 1, Table 1A) with the EPA's SSLs for the residential exposure scenario. For the non-residential ingestion-dermal pathway, the Department compared the non-residential soil remediation standards (Appendix 1, Table 1B) with the EPA's SSLs for the commercial/industrial scenario, for the outdoor worker receptor. The Department determined that the majority of the adopted residential and non-residential soil remediation standards are the same or are less stringent than the USEPA soil screening levels. The Department is adopting remediation standards for 19 contaminants that are more stringent than EPA's soil screening levels for the ingestion dermal exposure pathway. These contaminants are as follows:

Benzene
Beryllium
Butyl benzyl phthalate
Chlordane
Chlorobenzene
1,2-Dichlorobenzene
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
1,2-Dichloroethene
Methylene chloride
2-Methylphenol
Thallium
Toluene
1,2,4-Trichlorobenzene
2,4,6-Trichlorophenol
Vanadium
Xylenes

There are two primary reasons that the adopted remediation standards could be more stringent then EPA's SSLs. First, the Department determined by policy to prioritize the toxicity information which forms the basis for drinking water standards adopted by the Department pursuant to the Safe Drinking Water Act (SDWA), which is in some cases different than the toxicity information used to develop the SSLs. Second, some of the adopted standards are more stringent due to the implementation of the Department's Group C carcinogen policy. The use of SDWA toxicity data and the Department's Group C carcinogen policy were discussed in further detail in the proposal.

For example, the proposed ingestion-dermal remediation standard for beryllium for the residential exposure scenario is 16 mg/kg as compared with the USEPA SSL of 160 mg/kg. The Department's adopted non-residential standard for beryllium is 230 mg/kg as compared to EPA's SSL of 2,300 mg/kg. The more stringent adopted standard is the result of the application of the Department's Group C carcinogen policy. Because beryllium is a Group C carcinogen, the Department applied a safety factor of 10 which results in a remediation standard that is an order of magnitude more stringent than the USEPA SSL.

The Department's adopted residential ingestion-dermal soil remediation standard for benzene of three mg/kg for the ingestion-dermal exposure pathway, as compared to EPA's SSL for benzene, which is 12 mg/kg. The Department's adopted non-residential standard for benzene is 14 mg/kg as compared to EPA's SSL of 58 mg/kg. The Department's standard for benzene is more stringent than EPA's SSL because the toxicity factor used to develop the remediation standard is based on the toxicity factor that the Department uses to develop drinking water maximum contaminant levels (MCL), which is more stringent than the slope factor provided by IRIS which USEPA used. The cost-benefit analysis provided at the end of the Federal Standards Analysis discusses the costs and benefits for the soil remediation standards in general, including the Ingestion-Dermal Exposure and the Inhalation Exposure Pathways and the Impact to Ground Water Pathway.

Inhalation Exposure Pathway

For the residential exposure scenario, the Department compared the residential inhalation soil remediation standards (Table 1A) to EPA's SSLs for the residential scenario. For the non-residential exposure scenario, the Department compared the non-residential inhalation soil remediation standards for sites that are less than two acres in size (Table 1B) to EPA's SSLs for the commercial/industrial scenario for the outdoor worker receptor. The Department determined that it was appropriate to use the standards developed for sites that are less than two acres in size for comparison because these standards are based solely on wind generation of dust, as are the EPA's inhalation exposure pathway SSLs.

EPA's list of SSLs and the Department's list of adopted remediation standards are not identical. EPA's list contains contaminants that Department's list does not and the Department's list contains contaminants that EPA's list does not.

For 54 contaminants, the Department is adopting residential inhalation standards that are more stringent than EPA's SSLs. Of the 54, the Department is adopting standards for 47 contaminants for which EPA has no standards. Seven of the Department's adopted standards are more stringent than EPA's SSLs. The table below, which compares the Department's criteria for the listed contaminants with the EPA inhalation SSLs, is slightly different than the table concerning this topic as published in the proposal at 39 N.J.R. 1584. These two tables differ for four reasons. First, the Department has corrected a typographical error in its Residential Inhalation Based Criterion for Antimony. Second, the Department discovered that the following contaminants have SSLs, and these SSLs are more stringent than the Department's criteria, so they should be deleted from the table. These contaminants are Bromomethane and Chloroform. Third, the Department determined that six contaminants, Indeno(1,2,3-cd)pyrene, Lead, Lindane, Manganese, Pentachlorophenol, and Tetrachloroethene, should have appeared on this table. Fourth, the Department notes that the entries for 1,2-Dichloroethene should have distinguished between the (cis) and (trans) isomers of these contaminants.

Contaminant	DEP Residential Inhalation Health Based Criterion	EPA Residential Inhalation

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

		SSLs
Acetophenone	2	NA
Acrolein	0.5	NA
Acrylonitrile	0.9	NA
Anthracene	380,000	NA
Antimony	360,000	NA
Benzidine	0.004	NA
Benzo(a)anthracene	38,000	NA
Benzo(a)pyrene	3,800	NA
Benzo(b)fluoranthene	38,000	NA
Benzo(ghi)perylene	380,000	NA
Benzo(k)fluoranthene	38,000	NA
Bis(2-chloroisopropyl)ether	23	NA
Bromodichloromethane	1	NA
Cadmium	1,000	1,800
Carbazole	740,000	NA
4-Chloroaniline	26	NA
Chloromethane	4	NA
2-Chlorophenol	910	NA
Chrysene	380,000	NA
Cobalt	9,100	NA
4,4'-DDD	61,000	NA
4,4'-DDE	670	NA
4,4'-DDT	44,000	NA
Dibenz(a,h)anthracene	3,500	NA
Dibromochloromethane	3	NA
1,2-Dibromo-3-chloropropane	0.08	NA
1,2-Dibromoethane	0.1	NA
1,4-Dichlorobenzene	5	NA
3,3'-Dichlorobenzidine	3	NA
Dichlorodifluoromethane	490	NA
1,1-Dichloroethane	8	1,200
1,2-Dichloroethene (cis)	230	NA
1,2-Dichloroethene (trans)	300	NA
1,2-Dichloropropane	2	15
4,6-Dinitro-2-methylphenol	730,000	NA
2,4-Dinitrotoluene	6	NA
2,6-Dinitrotoluene	2	NA
1,2-Diphenylhydrazine	5	NA
Indeno(1,2,3-cd)pyrene	38,000	NA
Lead	44,000	NA
Lindane	3	NA
Manganese	91,000	NA
Methyl tert-butyl ether	110	NA

Naphthalene	6	170
2-Nitroaniline	39	NA
N-Nitrosodimethylamine	0.02	NA
N-Nitrosodi-n-propylamine	0.2	NA
Pentachlorophenol	590	NA
Polychlorinated biphenyls	20	NA
Styrene	90	1,500
Tertiary butyl alcohol	4,800	NA
Tetrachloroethene	2	10
Thallium	360,000	NA
Toxaphene	70	87

NA = No Standard Developed

For 71 contaminants, the Department is adopting non-residential inhalation standards that are more stringent than EPA's SSLs. Of the 71, the Department is adopting standards for 61 contaminants for which EPA has no standards. Ten of the Department's adopted standards are more stringent than EPA's SSLs. The table below, which compares the Department's criteria for the listed contaminants with the EPA inhalation SSLs, is slightly different than the table concerning this topic as published in the proposal at 39 N.J.R. 1585. These two tables differ for four reasons. First, as discussed in response to comment 201, the Department is modifying the criteria for 44 contaminants, which are identified with a "*" below. Second, the Department discovered that the following contaminants have SSLs, and these SSLs are more stringent than the Department's criteria, so they should be deleted from the table. These contaminants are Bromomethane, Chlordane, Chloroform, 1,2-Dichloroethane, and 1,1-Dichloroethene. Third, the Department determined that two contaminants, nickel and tetrachloroethene, should have appeared on this table. Fourth, the Department notes that the entries for 1,2-Dichloroethene should have distinguished between the (cis) and (trans) isomers of these contaminants.

Contaminant	**DEP Non-Residential Inhalation Health Based Criterion**	**EPA Inhalation SSLs**
Acenaphthene	300,000	NA

Contaminant	**DEP Non-Residential Inhalation Health Based Criterion**	**EPA Inhalation SSLs**
Acenaphthylene	300,000	NA
Acetophenone	5*	NA
Acrolein	1	NA
Acrylonitrile	3*	NA
Anthracene	30,000	NA
Antimony	23,000	NA
Arsenic	76	1,400
Barium	59,000	1,000,000
Benzidine	0.01	NA
Benzo(a)anthracene	3,000	NA
Benzo(a)pyrene	300	NA
Benzo(b)fluoranthene	3,000	NA
Benzo(ghi)perylene	30,000	NA
Benzo(k)fluoranthene	3,000	NA
Beryllium	140	2,600
Bis(2-chloroisopropyl)ether	67*	NA
Bis(2-ethylhexyl) phthalate	140,000	NA
Bromodichloromethane	3	NA
Cadmium	78	3,400
Carbazole	58,000	NA
4-Chloroaniline	74*	NA
Chloromethane	12*	NA
2-Chlorophenol	2,200*	NA
Chrysene	30,000	NA
Cobalt	590	NA
Copper	280,000	NA
4,4'-DDD	4,800	NA
4,4'-DDE	3,400	NA
4,4'-DDT	3,400	NA
Dibenz(a,h)anthracene	270	NA
Dibromochloromethane	8*	NA

Contaminant	DEP Non-Residential Inhalation Health Based Criterion	EPA Inhalation SSLs
1,2-Dibromo-3-chloropropane	0.2	NA
1,2-Dibromoethane	0.3	NA
1,4-Dichlorobenzene (p-Dichlorobenzene)	13*	NA
3,3'-Dichlorobenzidine	960	NA
1,1-Dichloroethane	24*	1,700
1,2-Dichloroethene (cis)	560*	NA
1,2-Dichloroethene (trans)	720*	NA
1,2-Dichloropropane	5	21
4,6-Dinitro-2-methylphenol (4,6-Dinitro-o-cresol)	47,000	NA
2,4-Dinitrophenol	820,000	NA
2,4-Dinitrotoluene	16*	NA
2,6-Dinitrotoluene	7*	NA
1,2-Diphenylhydrazine	13*	NA
Endrin	120,000	NA
Fluoranthene	300,000	NA
Fluorene	300,000	NA
beta-HCH (beta-BHC)	620	NA
Indeno(1,2,3-cd)pyrene	3,000	NA
Lead	12,000	NA
Lindane	10*	NA
Manganese	5,900	NA
2-Methylnaphthalene	300,000*	NA
Methyl tert-butyl ether	320*	NA
Naphthalene	17*	240
Nickel	23,000	26,000
2-Nitroaniline	23,000*	NA
N-Nitrosodimethylamine	0.04	NA
N-Nitrosodi-n-propylamine	0.5*	NA

Contaminant	**DEP Non-Residential Inhalation Health Based Criterion**	**EPA Inhalation SSLs**
N-Nitrosodiphenylamine	130,000*	NA
Pentachlorophenol	1,700*	NA
Phenanthrene	300,000	NA
Polychlorinated biphenyls	57*	NA
Pyrene	300,000	NA
Styrene	260*	1,500
Tertiary butyl alcohol	11,000*	NA
Tetrachloroethene	5	18
Thallium	23,000	NA
Vanadium	470,000	NA
Zinc	110,000	NA

NA = No standard developed
* = Standard as modified on adoption

The differences between the Department's adopted standards and USEPA SSLs are due, in part, to the use of sandy loam soil as the default soil type appropriate for New Jersey as compared with EPA's use of loam soil. The selection of sandy loam results in different soil input parameters, including the values for soil texture, organic soil content and soil porosity. The Department also used local weather conditions in the calculations used to develop inhalation standards as opposed to weather conditions measured in the mid-west that were used by EPA.

The toxicity hierarchy used by the Department for the inhalation pathway is similar to the one used for the other exposure pathways except that the Department did have a preference for inhalation-based toxicity data as opposed to oral-based data. In several cases the Department chose to use a different toxicity source than EPA. Some of the adopted standards are more stringent due to the implementation of the Department's Group C carcinogen policy. The Department's Group C carcinogen policy is discussed in further detail in the proposal.

By way of example, the adopted residential inhalation standard for heptachlor epoxide is four mg/kg as compared with EPA's SSL of five mg/kg. The difference in the standard is due to the different soil parameters and weather conditions. The differences between the adopted residential standard for naphthalene is six mg/kg as compared with EPA's SSL of 170 mg/kg is due to both different soil parameters and the Department's Group C carcinogen policy.

Two of the Department's adopted standards, for 1,2-dichloropropane and styrene, are more stringent because the Department determined, based on a review of pertinent toxicological studies, that it is appropriate to consider these contaminants as carcinogens as compared with EPA's decision to use non-carcinogenic end points.

Impact to Ground Water

As indicated in the responses to comments, the Department has determined not to adopt the soil remediation standards proposed for the impact to ground water pathway. Because the protection of ground water is a vital part of remediating contaminated sites, the Department will continue to develop impact to ground water soil remediation standards on a site-by-site basis pursuant to its authority under the Brownfield Act, N.J.S.A. 58:10B-12.

Ground Water Remediation Standards

The Department is recodifying N.J.A.C. 7:26E-1.13(b) from the Technical Requirements for Site Remediation to N.J.A.C. 7:26D-2. The ground water remediation standards are linked directly to New Jersey's Ground Water Quality Standards (GWQS). The GWQS provide the basis for protection of ambient ground water quality in New Jersey by establishing constituent standards for ground water pollutants. These constituent standards are applicable to the development of effluent limitations and discharge requirements pursuant to the New Jersey Pollutant Discharge Elimination System (NJPDES), N.J.A.C. 7:14A; to develop minimum ground water remediation standards pursuant to the Brownfield and Contaminated Site

Remediation Act, N.J.S.A. 58:10B-1 et seq.; and other requirements and regulatory actions applicable to discharges that cause or may cause pollutants to enter the ground waters of the State. The authority for setting these standards comes solely from New Jersey law and has no Federal counterpart. The GWQS are not promulgated under the authority of, or in order to implement, comply with, or participate in any program established under Federal law or under a State statute that incorporates or refers to Federal law, Federal standards or Federal requirements. The GWQS do not contain any standards or requirements that exceed those required by Federal law. The GWQS provide the associated ground water standards that are relevant to the New Jersey Underground Injection Control program, RCRA D, and RCRA C ground water monitoring programs at 40 CFR 144-146, 258, and 264. These Federal programs are implemented through the NJPDES program.

Surface Water Remediation Standards

The Department is recodifying N.J.A.C. 7:26E-1.13(e) from the Technical Requirements for Site Remediation to N.J.A.C. 7:26D-3. The surface water remediation standards are linked directly to New Jersey's Surface Water Quality Standards (SWQS). Subchapter 3 references the State criteria and establishes the minimum surface water remediation standards for New Jersey. The Department reviewed the Federal regulation and guidance concerning surface water and provides the following analysis.

The Federal Interim Final Rule, 60 CFR 22229 (May 4, 1995) and the National Toxics rule, 60 CFR 44120 (August 24, 1995) are collectively known as the National Toxics Rule (NTR). The Department adopted numerical criteria for toxics identified in the NTR applicable to New Jersey as the toxics criteria for New Jersey. See 37 N.J.R. 3487(a) (September 18, 2005) for the proposal, and 38 N.J.R. 4449(a) (October 16, 2006) for the adoption. Therefore, no further analysis under Executive Order 27 No. or (1994) N.J.S.A. 52:14B-1 et seq. is required.

The Department's analysis comparing State and Federal standards concluded that, while there are differences in numeric criteria, the use of more stringent criteria will not result in significantly increased cost to the regulated community. The benefit of including these more stringent State standards in these rules is to ensure the consistent application of the standards and to further the Department's goal of clean and plentiful water. For a more detailed discussion of this issue see at 30 N.J.R. 1778 (May 18, 1998) and 32 N.J.R. 4397 (December 18, 2000).

Description of Amendments on Adoption

Remediation Standards N.J.A.C. 7:26D

Subchapter 1. General Information

N.J.A.C. 7:26D-1.1(a) sets forth the purpose of these rules. As proposed, this section stated that these rules establish the minimum standards for the remediation of contaminated ground water, surface water and soil. However, because the Department is not adopting soil remediation standards for the impact to ground water pathway, this section is being amended on adoption to specify that, for the remediation of soil, these rules only establish standards for residential and non-residential land use for the direct contact exposure pathway.

Because the remediation standards for the impact to ground water pathway are not being adopted, a new subsection at N.J.A.C. 7:26D-1.1(b) is being added to clarify that these rules do not establish the minimum impact to ground water soil remediation standards. Minimum impact to ground water soil remediation standards will continue to be developed by the Department on a site-by-site basis, pursuant to the Department's authority under Brownfield Act, N.J.S.A. 58:10B-12a. Section N.J.A.C. 7:26D-1.1(b) will be recodified as N.J.A.C. 7:26D-1.1(c) with no change from the proposal.

N.J.A.C. 7:26D-1.2 sets forth the scope of these rules and states that this chapter constitutes the minimum standards for the remediation of ground water, surface water and soil. On adoption, the Department is amending this section to except the impact to ground water soil remediation standards from the scope of these rules.

N.J.A.C. 7:26D-1.2(b) states that any person conducting remediation is not relieved from complying with more stringent requirements or provisions imposed under any other Federal, State, or local applicable statutes or regulations. On adoption, the Department is adding a new N.J.A.C. 7:26D-1.2(b)2 to clarify that a person conducting remediation must also comply with minimum impact to ground water soil remediation standards that are developed by the Department on a site-by-site basis, pursuant to its authority under Brownfield Act, N.J.S.A. 58:10B-12a. N.J.A.C. 7:26D-1.2(b)2 will be recodified as N.J.A.C. 7:26D-1.1(b)3 with no change from the proposal.

N.J.A.C. 7:26D-1.4 sets forth the applicability of these rules and states that this chapter constitutes the minimum remediation standards for ground water, surface water and soil for any contaminated site in New Jersey. On adoption, the Department is amending this section to except the impact to ground water soil remediation standards from the applicability of these rules.

N.J.A.C. 7:26D-1.5 sets forth the definitions of words and terms used in this chapter. The definition of "Alternative remediation standard" or "ARS" is being amended to reflect the deletion of N.J.A.C. 7:26D-7, Appendix 7 which contained the alternative remediation standards procedures for the impact to ground water pathway, which is not being adopted.

Several terms are being deleted on adoption because they are only used in reference to the impact to ground water soil remediation standards, which are not being adopted. These terms include "Effective solubility, "Impact to ground water pathway," and "Leachate criteria"

The definition of "Exposure pathways" is being amended on adoption to delete reference to the impact to ground water pathway because that exposure pathway is not being adopted.

The term "Impact to ground water remediation standard" is being amended on adoption. The definition will no longer state that impact to ground water soil remediation standards are established by these rules. The amended definition will clarify that impact to ground water soil remediation standards are developed by the Department pursuant to its authority under N.J.S.A. 58:10B-12a.

Subchapter 4. Minimum Soil Remediation Standards

On adoption, the Department is deleting the reference to the impact to ground water soil remediation standards at N.J.A.C. 7:26D-4.1(a)3 to clarify that these rules do not establish any minimum impact to ground water soil remediation standards. Minimum impact to ground water soil remediation standards will continue to be developed by the Department on a site-by-site basis, pursuant to the Department's authority under Brownfield Act at N.J.S.A. 58:10B-12a.

The Department is deleting section N.J.A.C. 7:26D-4.4, Impact to ground water soil remediation standards, in its entirety, and is also deleting corresponding Tables 2A, 2B and 2C from Chapter Appendix 1, because these tables contain the impact to ground water human health-based criteria for Class IIA ground water that no longer apply. In addition, Appendix 4, that contains the equations, data sources, and conventions for the development of the human health-based soil criteria for the impact to ground water pathway, is also being deleted.

Subchapter 5. Interim Soil Remediation Standards

On adoption, the Department is amending N.J.A.C. 7:26D-5.1 to add the phrase, "Except as provided at N.J.A.C. 7:26D-1.1(**b),** this," to clarify that the procedures set forth in Subchapter 5 will be used to establish interim soil remediation standards for the direct contact exposure pathway, but not for the impact to ground water pathway. Cross-references to the impact to ground water soil remediation standards in Chapter Appendix 1, Tables 2A, 2B, and 2C is being deleted from N.J.A.C. 7:26D-5.2. Related formatting changes will also be made to this subchapter. The Department is deleting N.J.A.C. 7:26D-5.2(b)3 which makes reference to the impact to ground water pathway which is being deleted. The Department is adding the phrase "developed pursuant to this chapter" to N.J.A.C. 7:26D-5.3(a) and (b) on adoption to clarify that the procedures that the Department will use to develop interim soil remediation standards pertain only to the direct contact remediation standards.

Subchapter 6. Updating Soil Remediation Standards

On adoption, the Department is adding the phrase “developed pursuant to this chapter” to N.J.A.C. 7:26D-6.1 to clarify that the procedures that the Department will use to update soil remediation standards pertain only to the direct contact remediation standards. In addition, cross-references to the impact to ground water soil remediation standards Chapter Appendix 1, Tables 2A, 2B, or 2C are also being deleted. Related formatting changes are being made to this subchapter. As proposed, N.J.A.C. 7:26D-6.2(a)2 states that the Department would update a soil remediation standard for the impact to ground water pathway when a new criterion in the Ground Water Quality Standards at N.J.A.C. 7:9C is promulgated. This provision is being deleted because it will no longer be necessary because the Department is not adopting the impact to ground water soil remediation standards.

Subchapter 7. Alternative Soil Remediation Standards

At N.J.A.C. 7:26D-7.1, the Department will add the phrase “Except as provided at N.J.A.C. 7:26D-1.1(b), this” to clarify that the procedures set forth in Subchapter 7 will be used to develop alternative remediation standards for the direct contact exposure pathway but not for the impact to ground water pathway. The Department will add the phrase “developed pursuant to this chapter” to N.J.A.C. 7:26D-7.2 to clarify that the procedures used to develop alternative soil remediation standards pertain only to the direct contact remediation standards. Cross-references to Appendix 7, and Appendix 7 itself, entitled Methods for the Development of Alternative Impact to Ground Water Alternative Remediation Standards, is also being deleted. Related formatting changes will also be made on adoption.

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

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

As part of the amendments being made on adoption that necessarily result from the Department's determination to delete the remediation standards for the impact to ground water pathway, the Department is amending N.J.A.C. 7:26E-1.3(d) to delete the word "soil" and to add the phrase "and the impact to ground water soil remediation standards set by the Department for a particular site pursuant to its authority under N.J.S.A. 58:10B-12a" at N.J.A.C. 7:26E-1.3(d)1. These amendments clarify that the person responsible for conducting remediation must remediate soil to the site specific standards developed by the Department for that particular site.

Full text of the adoption follows (additions to proposal indicated in boldface with asterisks *thus*; deletions from proposal indicated in brackets with asterisks *[thus]*):

CHAPTER 26D REMEDIATION STANDARDS

SUBCHAPTER 1. GENERAL INFORMATION

7:26D-1.1 Purpose

(a) This chapter implements the provisions of the Brownfield and Contaminated Site Remediation Act, N.J.S.A. 58:10B-1.1 et seq., and other statutes, by establishing minimum standards for the remediation of contaminated ground water*[,]* *and* surface water, and *by establishing the minimum residential direct contact and non-residential direct contact* soil *remediation standards*.

(b) This chapter does not establish the minimum impact to ground water soil remediation standards; these standards shall be developed by the Department on a site-by-site basis, pursuant to the Department's authority under N.J.S.A. 58:10B-12a.

(b) Recodify as (c) (No change from proposal.)

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

7:26D-1.2 Scope

(a) *[Unless]* *Except as provided in N.J.A.C. 7:26D-1.1(b) and unless* otherwise provided by rule or statute, this chapter shall constitute the rules of the Department concerning minimum standards for the remediation of ground water, surface water and soil.

(b) Remediating ground water, surface water, or soil to any applicable standard set forth in this chapter shall not relieve any person from:

1. Complying with more stringent requirements or provisions imposed under any other Federal, State, or local applicable statutes or regulations; *[and]*

2. Complying with any impact to ground water soil remediation standard established by the Department as provided in N.J.A.C. 7:26D-1.1(b); and

2. Recodify as 3. (No change from proposal.)

(c) through (e) (No change from proposal.)

7:26D-1.4 Applicability

(a) *[This]* *Except as provided in N.J.A.C. 7:26D-1.1(b), this* chapter establishes the minimum remediation standards for ground water, surface water and soil for any contaminated site in New Jersey including, without limitation, those sites subject to:

1. through 10. (No change from proposal.)

(b) through (c) (No change from proposal.)

7:26D-1.5 Definitions

The following words and terms, when used in this chapter, shall have the following meanings unless the context clearly indicates otherwise:

"Alternative remediation standard" or "ARS" means a residential use or non-residential use soil remediation standard that is established using site specific factors following the procedures set forth in N.J.A.C. 7:26D-7, Appendices 5 *[through 7]* *and 6*, pursuant to this chapter.

…

["Effective solubility" means effective solubility as defined pursuant to the Technical Requirements for Site Remediation rules at N.J.A.C. 7:26E-1.8.]

["EPA" means the United States Environmental Protection Agency.]

"Exposure pathways" means the methods by which humans can come into contact with contamination including, but not limited to, the ingestion-dermal exposure pathway*[,]* *and* the inhalation exposure pathway*[, and the impact to ground water pathway]*.

...

["Impact to ground water pathway" means process by which soil contamination is transported to ground water, which is then ingested by humans.]

"Impact to ground water remediation standard" means a vadose zone soil remediation standard established or developed *[pursuant to this chapter]* *by the Department pursuant to its authority under N.J.S.A. 58:10B-12a* that is designed to limit the amount of contaminant that leaches from the vadose zone to ground water such that the resulting ground water concentration will not exceed the applicable ground water remediation standard.

…

*[“Leachate criteria” means the human health-based criteria for the impact to ground water pathway that are evaluated from the analysis of the leachate of the less mobile and inorganic contaminants from the synthetic precipitation leaching procedure.

“Method detection limit” or “MDL” means a method detection limit or MDL as defined pursuant to the Technical Requirements for Site Remediation rules at N.J.A.C. 7:26E-1.8.]*

…

“Residential direct contact soil remediation standard” means a soil remediation standard for the ingestion-dermal and inhalation exposure pathways established or developed pursuant to this chapter that is designed to protect human health at residential use sites, schools (*pre-* K-12) and childcare centers.

…

“USEPA” means the United States Environmental Protection Agency.

SUBCHAPTER 4 MINIMUM SOIL REMEDIATION STANDARDS

7:26D-4.1 Purpose

(a) This subchapter establishes minimum soil remediation standards, including:

1. Residential direct contact soil remediation standards; *and*
2. Non-residential direct contact soil remediation standards*[; and
3. Impact to ground water soil remediation standards]*.

*[7:26D-4.4 Impact to ground water soil remediation standards

(a) The Department developed the impact to ground water human health-based criteria for Class IIA ground water in Appendix 1, Tables 2A, 2B and 2C as follows:

1. The human health-based soil criteria for the impact to ground water pathway, based on the equations, data sources, and conventions provided in Appendix 4; and

2. The human health-based leachate criteria for the impact to ground water pathway, based on the equations, data sources, and conventions provided in Appendix 4.

(b) The impact to ground water soil remediation standard for each contaminant listed in Tables 2A, 2B or 2C, or the PQL if the PQL is less stringent than the corresponding human health-based criterion.]*

SUBCHAPTER 5 INTERIM SOIL REMEDIATION STANDARDS

7:26D-5.1 Purpose

[This] *Except as provided at N.J.A.C. 7:26D-1.1(b), this* subchapter sets forth the procedures that the Department will use to establish interim soil remediation standards.

7:26D-5.2 Development of an interim soil remediation standard

(a) The Department may establish an interim remediation standard for soil when a contaminant is not listed in Appendix 1, Tables 1A, *or* 1B *[, 2A, 2B, or 2C]* of this chapter.

(b) An interim remediation standard shall be developed for soil as follows:

1. For the ingestion-dermal pathway, using the procedures set forth in Appendix 2; *and*

2. For the inhalation pathway, using the procedures set forth in Appendix 3*[; and

3. For the impact to ground water pathway, using the procedures set forth in Appendix 4]*.

(c) *[The]* *For the two pathways listed in (b)1 above, the* person responsible for conducting a remediation may request that the Department develop an interim soil remediation standard under this section.

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

7:26D-5.3 Publication of interim soil remediation standards; promulgation

(a) The Department shall publish on its web site a listing of all interim soil remediation standards *developed pursuant to this chapter* and the technical basis used in their derivation.

(b) Interim soil remediation standards *developed pursuant to this chapter* shall be replaced with duly promulgated soil remediation standards as soon as reasonably possible.

SUBCHAPTER 6 UPDATING SOIL REMEDIATION STANDARDS

7:26D-6.1 Purpose

This subchapter sets forth the procedures that the Department will use to update remediation standards for soil *developed pursuant to this chapter*.

7:26D-6.2 Notice of administrative change to update promulgated soil remediation standards

(a) The Department shall post on its web site and publish in the New Jersey Register a notice of administrative change to modify a soil remediation standard in Table 1A, 1B*[, 2A, 2B or 2C]* when*[:

1. The]* *the* USEPA revises the carcinogenic slope factor or reference dose data contained in the Integrated Risk Information System (IRIS) database on which a remediation standard in Table 1A or 1B is based*[; or

2. The Department promulgates a new criterion in the Ground Water Quality Standards at N.J.A.C. 7:9C on which an impact to ground water soil remediation standard is based.]*

(b) The notice of administrative change shall identify the contaminant, the basis for the administrative change, and the revised criterion to be listed in Appendix 1, Table 1A, *and* 1B*[, 2A, 2B or 2C]*.

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

SUBCHAPTER 7 ALTERNATIVE SOIL REMEDIATION STANDARDS

7:26D-7.1 Purpose

[This] *Except as provided at N.J.A.C. 7:26D-1.1(b) this* subchapter sets forth the circumstances in which the Department may require the person responsible for conducting the remediation to develop an alternative soil remediation standard, the procedures that the person responsible for conducting the remediation shall use to apply for permission to use an alternative soil remediation standard, and the procedures the Department shall use to evaluate an application for the use of an alternative soil remediation standard that is proposed by the person responsible for conducting the remediation.

7:26D-7.2 Applicability

An alternative soil remediation standard *developed pursuant to this chapter* may only be numeric and may only be used at the site for which it is approved and is not applicable at any other site.

7:26D-7.3 Basis for an alternative soil remediation standard

(a) The person responsible for conducting the remediation may propose, in accordance with N.J.A.C. 7:26D-7.4, an alternative soil remediation standard based on the following:

1. For the ingestion-dermal exposure pathway, the procedures set forth in Appendix *[5]* *4*; *and*

2. For the inhalation pathway, the procedures set forth in chapter Appendix *[6]**5.* *[; and

3. For the impact to ground water pathway, the procedures set forth in Appendix 7.]*

(b) – (c) (No change from proposal.)

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

7:26D-7.4 Alternative soil remediation standards application and approval process

(a) The person responsible for conducting the remediation may seek Department approval for an alternative soil remediation standard based on the criteria in N.J.A.C. 7:26D-7.*[2]**3* (a) and (b) above by completing the application in Appendix *[8]**6* and submitting the completed application in accordance with (c), below.

(b) and (c) (No change from proposal.)

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

APPENDIX 1

SOIL REMEDIATION STANDARDS TABLES

Table 1A – Residential Direct Contact Health Based Criteria and

Soil Remediation Standards (mg/kg)

Contaminant	**CAS No.**	**Ingestion-Dermal Heath Based Criterion**	**Inhalation Health Based Criterion**	**Soil PQL**	**Residential Direct Contact Soil Remediation Standard**
…					
Antimony	7440-36-0	31	*[36,000]* *360,000*	6	31
…					
*[4-Chloroaniline (p-Chloroaniline)	106-47-8	9	26	0.2	9]*
…					
Toluene	108-88-3	*[~~16,000~~]* 6,300	NA	0.005	*[~~16,000~~]* 6,300
…					

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Table 1B – Non-Residential Direct Contact Health Based Criteria and

Soil Remediation Standards (mg/kg)

Contaminant	CAS No.	Ingestion-Dermal Health Based Criterion	Inhalation Health Based Criterion	Soil PQL	Non-Residential Direct Contact Soil Remediation Standard
…					
Acetophenone	98-86-2	68,000	*[4]* *5*	0.2	*[4]* *5*
…					
Acrylonitrile	107-13-1	6	*[2]* *3*	0.5	*[2]* *3*
Aldrin	309-00-2	0.2	*[13]* *14*	0.002	0.2
…					
Benzene	71-43-2	14	*[4]* *5*	0.005	*[4]* *5*
…					
Bis(2-chloroethyl)ether	111-44-4	2	*[1]* * 2*	0.2	*[1]* *2*
Bis(2-chloroisopropyl)ether	108-60-1	27,000	*[60]* *67*	0.2	*[60]* *67*
…					
Bromoform	75-25-2	400	*[250]* *280*	0.005	*[250]* *280*
Bromomethane (Methyl bromide)	74-83-9	1,600	*[53]* *59*	0.005	*[53]* *59*
…					
Chlordane (alpha and gamma)	57-74-9	*[~~0.9~~]* 1	3,300	0.002	*[~~0.9~~]* 1
*[4-Chloroaniline (p-Chloroaniline)	106-47-8	2,700	66	0.2	66]*
…					
Chloromethane (Methyl chloride)	74-87-3	NA	*[11]* *12*	0.005	*[11]* *12*
2-Chlorophenol (o-Chlorophenol)	95-57-8	3,400	*[2,000]* *2,200*	0.2	*[2,000]* *2,200*

Contaminant	CAS No.	Ingestion-Dermal Health Based Criterion	Inhalation Health Based Criterion	Soil PQL	Non-Residential Direct Contact Soil Remediation Standard
…					
Dibromochloromethane (Chlorodibromomethane)	124-48-1	38	*[7]* *8*	0.005	*[7]* *8*
…					
1,4-Dichlorobenzene (p-Dichlorobenzene)	106-46-7	6,800	*[12]* *13*	0.005	*[12]* *13*
…					
1,1-Dichloroethane	75-34-3	7,400	*[21]* *24*	0.005	*[21]* *24*
1,2-Dichloroethane	107-06-2	26	*[2]* *3*	0.005	*[2]* *3*
1,1-Dichloroethene	75-35-4	160	*[130]* *150*	0.005	*[130]* *150*
1,2-Dichloroethene (cis) (c-1,2-Dichloroethylene)	156-59-2	11,000	*[500]* *560*	0.005	*[500]* *560*
1,2-Dichloroethene (trans) (t-1,2-Dichloroethylene)	156-60-5	19,000	*[650]* *720*	0.005	*[650]* *720*
…					
1,3-Dichloropropene (cis and trans)	542-75-6	32	*[6]* *7*	0.005	*[6]* *7*
…					
2,4-Dinitrotoluene	121-14-2	3	*[15]* *16*	0.2	3
2,6-Dinitrotoluene	606-20-2	3	*[6]* *7*	0.2	3
…					
1,2-Diphenylhydrazine	122-66-7	2	*[12]* *13*	0.7	2
…					
Heptachlor	76-44-8	0.7	*[16]* *18*	0.002	0.7
Heptachlor epoxide	1024-57-3	0.3	*[12]* *13*	0.002	0.3
…					

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Contaminant	CAS No.	Ingestion-Dermal Health Based Criterion	Inhalation Health Based Criterion	Soil PQL	Non-Residential Direct Contact Soil Remediation Standard
Hexachloro-1,3-butadiene	87-68-3	25	*[31]* *<u>35</u>*	0.2	25
Hexachlorocyclopentadiene	77-47-4	4,100	*[97]* *<u>110</u>*	0.2	*[97]* *<u>110</u>*
…					
Lindane (gamma-HCH) (gamma-BHC)	58-89-9	2	*[9]* *<u>10</u>*	0.002	2
…					
Methylene chloride (Dichloromethane)	75-09-2	230	*[87]* *<u>97</u>*	0.005	*[87]* *<u>97</u>*
…					
2-Methylnaphthalene	91-57-6	2,400	*[250,000]* *<u>300,000</u>*	0.17	2,400
…					
Methyl tert-butyl ether (MTBE)	1634-04-4	11,000	*[290]* *<u>320</u>*	0.005	*[290]* *<u>320</u>*
Naphthalene	91-20-3	25,000	*[16]* *<u>17</u>*	0.2	*[16]* *<u>17</u>*
…					
2-Nitroaniline	88-74-4	NA	*[83]* *<u>23,000</u>*	0.3	*[83]* *<u>23,000</u>*
Nitrobenzene	98-95-3	340	*[350]* *<u>390</u>*	0.2	340
N-Nitrosodimethylamine	62-75-9	0.06	*[0.04]* *<u>0.05</u>*	0.7	0.7
N-Nitrosodi-n-propylamine	621-64-7	0.3	*[130,000]* *<u>0.5</u>*	0.2	0.3
N-Nitrosodiphenylamine	86-30-6	390	*[1,500]* *<u>130,000</u>*	0.2	390
Pentachlorophenol	87-86-5	10	*[300,000]* *<u>1,700</u>*	0.3	10
…					
Polychlorinated biphenyls (PCBs)	1336-36-3	1	*[52]* *<u>57</u>*	0.03	1

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Contaminant	**CAS No.**	**Ingestion-Dermal Health Based Criterion**	**Inhalation Health Based Criterion**	**Soil PQL**	**Non-Residential Direct Contact Soil Remediation Standard**
…					
Styrene	100-42-5	230,000	*[230]* *260*	0.005	*[230]* *260*
Tertiary butyl alcohol (TBA)	75-65-0	20,000	*[10,000]* *11,000*	0.1	*[10,000]* *11,000*
…					
Toluene	108-88-3	*[~~230,000~~]* 91,000	NA	0.005	*[~~230,000~~]* 91,000
…					
Toxaphene	8001-35-2	3	*[180]* *200*	0.2	3
…					
1,1,2-Trichloroethane	79-00-5	440	*[5]* *6*	0.005	*[5]* *6*
Trichloroethene (TCE) (Trichloroethylene)	79-01-6	100	*[18]* *20*	0.005	*[18]* *20*
…					
2,4,6-Trichlorophenol	88-06-2	74	*[870]* *960*	0.2	74
…					

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

***[Table 2A – Impact to Ground Water (GW) Health Based Soil Criteria and Soil Remediation Standards for Mobile Organic Chemicals (mg/kg)**

Contaminant	CAS Number	Impact to GW Health Based Soil Criterion	Soil PQL	Impact to GW Soil Remediation Standard
Acenaphthene	83-32-9	74	0.2	74
Acenaphthylene	208-96-8	NA	0.2	NA
Acetone (2-propanone)	67-64-1	12	0.01	12
Acetophenone	98-86-2	2	0.2	2
Acrolein	107-02-8	0.008	0.5	0.5
Acrylonitrile	107-13-1	0.0001	0.5	0.5
Atrazine	1912-24-9	0.03	0.2	0.2
Benzaldehyde	100-52-7	NA	0.2	NA
Benzene	71-43-2	0.0008	0.005	0.005
Benzidine	92-87-5	0.0000006	0.7	0.7
1,1'-Biphenyl	92-52-4	90	0.2	90
Bis(2-chloroethyl)ether	111-44-4	0.00007	0.2	0.2
Bis(2-chloroisopropyl)ether	108-60-1	3	0.2	3
Bromodichloromethane (Dichlorobromomethane)	75-27-4	0.002	0.005	0.005
Bromoform	75-25-2	0.02	0.005	0.02
Bromomethane (Methyl bromide)	74-83-9	0.03	0.005	0.03
2-Butanone (Methyl ethyl ketone) (MEK)	78-93-3	0.6	0.01	0.6
Caprolactam	105-60-2	NA	0.2	NA
Carbazole	86-74-8	NA	0.2	NA
Carbon disulfide	75-15-0	4	0.5	4
Carbon tetrachloride	56-23-5	0.003	0.005	0.005
4-Chloroaniline (p-Chloroaniline)	106-47-8	0.1	0.2	0.2
Chlorobenzene	108-90-7	0.4	0.005	0.4
Chloroethane	75-00-3	NA	0.005	NA
Chloroform	67-66-3	0.2	0.005	0.2
Chloromethane (Methyl chloride)	74-87-3	NA	0.005	NA
2-Chlorophenol (o-Chlorophenol)	95-57-8	0.5	0.2	0.5
Dibromochloromethane (Chlorodibromomethane)	124-48-1	0.001	0.005	0.005
1,2-Dibromo-3-chloropropane	96-12-8	0.00008	0.005	0.005
1,2-Dibromoethane	106-93-4	0.000001	0.005	0.005
1,2-Dichlorobenzene (o-Dichlorobenzene)	95-50-1	11	0.005	11
1,3-Dichlorobenzene (m-Dichlorobenzene)	541-73-1	12	0.005	12
1,4-Dichlorobenzene (p-Dichlorobenzene)	106-46-7	1	0.005	1
3,3'-Dichlorobenzidine	91-94-1	0.002	0.2	0.2
Dichlorodifluoromethane	75-71-8	25	0.005	25

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Contaminant	CAS Number	Impact to GW Health Based Soil Criterion	Soil PQL	Impact to GW Soil Remediation Standard
1,1-Dichloroethane	75-34-3	0.2	0.005	0.2
1,2-Dichloroethane	107-06-2	0.0008	0.005	0.005
1,1-Dichloroethene (1,1-Dichloroethylene)	75-35-4	0.005	0.005	0.005
1,2-Dichloroethene (cis) (c-1,2-Dichloroethylene)	156-59-2	0.2	0.005	0.2
1,2-Dichloroethene (trans) (t-1,2-Dichloroethylene)	156-60-5	0.4	0.005	0.4
2,4-Dichlorophenol	120-83-2	0.1	0.2	0.2
1,2-Dichloropropane	78-87-5	0.002	0.005	0.005
1,3-Dichloropropene (cis and trans) (summed)	542-75-6	0.002	0.005	0.005
Diethyl phthalate	84-66-2	57	0.2	57
2,4-Dimethyl phenol	105-67-9	0.7	0.2	0.7
4,6-Dinitro-2-methylphenol (4,6-Dinitro-o-cresol)	534-52-1	NA	0.3	NA
2,4-Dinitrophenol	51-28-5	0.02	0.3	0.3
2,4-Dinitrotoluene	121-14-2	NA	0.2	NA
2,6-Dinitrotoluene	606-20-2	NA	0.2	NA
2,4-Dinitrotoluene/2,6-Dinitrotoluene (mixture)	25321-14-6	0.0002	0.2	0.2
1,2-Diphenylhydrazine	122-66-7	0.0008	0.7	0.7
Endosulfan I and Endosulfan II (alpha and beta) (summed)	115-29-7	2	0.003	2
Endosulfan sulfate	1031-07-8	1	0.003	1
Endrin	72-20-8	0.6	0.003	0.6
Ethyl benzene	100-41-4	8	0.005	8
Fluorene	86-73-7	110	0.2	110
alpha-HCH (alpha-BHC)	319-84-6	0.0002	0.002	0.002
beta-HCH (beta-BHC)	319-85-7	0.0007	0.002	0.002
Hexachloroethane	67-72-1	0.1	0.2	0.2
Isophorone	78-59-1	0.1	0.2	0.2
Lindane (gamma-HCH) (gamma-BHC)	58-89-9	0.0009	0.002	0.002
Methyl acetate	79-20-9	14	0.005	14
2-Methylnaphthalene	91-57-6	5	0.17	5
Methylene chloride (Dichloromethane)	75-09-2	0.007	0.005	0.007
2-Methylnaphthalene	91-57-6	5	0.17	5
2-Methylphenol (o-cresol)	95-48-7	NA	0.2	NA
4-Methylphenol (p-cresol)	106-44-5	NA	0.2	NA
Methyl tert-butyl ether (MTBE)	1634-04-4	0.2	0.005	0.2
Naphthalene	91-20-3	16	0.2	16
2-Nitroaniline	88-74-4	NA	0.3	NA
Nitrobenzene	98-95-3	0.01	0.2	0.2
N-Nitrosodimethylamine	62-75-9	0.000001	0.7	0.7
N-Nitrosodi-n-propylamine	621-64-7	0.00001	0.2	0.2

Contaminant	**CAS Number**	**Impact to GW Health Based Soil Criterion**	**Soil PQL**	**Impact to GW Soil Remediation Standard**
N-Nitrosodiphenylamine	86-30-6	0.2	0.2	0.2
Pentachlorophenol	87-86-5	0.04	0.3	0.3
Phenol	108-95-2	5	0.2	5
Styrene	100-42-5	2	0.005	2
Tertiary butyl alcohol (TBA)	75-65-0	0.2	0.1	0.2
1,1,2,2-Tetrachloroethane	79-34-5	0.004	0.005	0.005
Tetrachloroethene (PCE) (Tetrachloroethylene)	127-18-4	0.003	0.005	0.005
Toluene	108-88-3	4	0.005	4
1,2,4-Trichlorobenzene	120-82-1	0.4	0.005	0.4
1,1,1-Trichloroethane	71-55-6	0.2	0.005	0.2
1,1,2-Trichloroethane	79-00-5	0.01	0.005	0.01
Trichloroethene (TCE) (Trichloroethylene)	79-01-6	0.007	0.005	0.007
Trichlorofluoromethane	75-69-4	22	0.005	22
2,4,5-Trichlorophenol	95-95-4	44	0.2	44
2,4,6-Trichlorophenol	88-06-2	0.03	0.2	0.2
Vinyl chloride	75-01-4	0.0003	0.005	0.005
Xylenes (total)	1330-20-7	12	0.005	12

NA = Standard not available

Table 2B - Impact to Ground Water (GW) Health Based Leachate* Criteria and Leachate Standards for Low Mobility Organic Contaminants (ug/L)

Contaminant	CAS Number	Impact to GW Health Based Leachate Criterion	Aqueous PQL	Impact to GW Leachate Standard
Aldrin	309-00-2	0.03	0.04	0.04
Anthracene	120-12-7	26,000	5	26,000
Benzo(a)anthracene (1,2-Benzanthracene)	56-55-3	0.6	0.1	0.6
Benzo(a)pyrene	50-32-8	0.06	0.1	0.1
Benzo(b)fluoranthene (3,4-Benzofluoranthene)	205-99-2	0.6	0.2	0.6
Benzo(ghi)perylene	191-24-2	NA	0.2	NA
Benzo(k)fluoranthene	207-08-9	6	0.3	6
Bis(2-ethylhexyl)phthalate	117-81-7	26	3	26
Butyl benzyl phthalate	85-68-7	1300	1	1,300
Chlordane (alpha and gamma)	57-74-9	0.1	0.05	0.1
Chrysene	218-01-9	65	0.2	65
4,4'-DDD	72-54-8	1	0.02	1
4,4'-DDE	72-55-9	1	0.01	1
4,4'-DDT	50-29-3	1	0.1	1
Dibenz(a,h)anthracene	53-70-3	0.06	0.3	0.3
Dieldrin	60-57-1	0.03	0.02	0.03
Di-n-butyl phthalate	84-74-2	9,100	5	9,100
Di-n-octyl phthalate	117-84-0	1,300	5	20
Fluoranthene	206-44-0	3,900	5	3,900
Heptachlor	76-44-8	0.1	0.05	0.1
Heptachlor epoxide	1024-57-3	0.05	0.02	0.05
Hexachlorobenzene	118-74-1	0.3	0.02	0.3
Hexachloro-1,3-butadiene	87-68-3	5	1	5
Hexachlorocyclopentadiene	77-47-4	520	0.5	520
Indeno(1,2,3-cd)pyrene	193-39-5	0.6	0.2	0.6
Methoxychlor	72-43-5	520	0.1	520
Phenanthrene	85-01-	NA	0.4	NA
Polychlorinated biphenyls (PCBs)	81336-36-3	0.3	0.5	0.5
Pyrene	129-00-0	2,600	0.1	2,600
Toxaphene	8001-35-2	0.4	2.0	2.0

NA = Standard not available

* The leachate standard is based on analysis of leachate resulting from the synthetic leaching procedure conducted on contaminated soil.

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Table 2C - Impact to Ground Water (GW)Health Based Leachate* Criteria and Leachate Standards for Inorganic Contaminants (ug/L)

Contaminant	CAS Number	Impact to GW Health Based Leachate Criteria	Aqueous PQL	Leachate Standard
Aluminum	7429-90-5	2,600	20	2,600
Antimony	7440-36-0	78	3	78
Arsenic	7440-38-2	0.3	0.5	0.5
Barium	7440-39-3	91,000	1	91,000
Beryllium	7440-41-7	13	0.3	13
Cadmium	7440-43-9	52	1	52
Cobalt	7440-48-4	NA	2	NA
Copper	7440-50-8	16,900	3	16,900
Cyanide	57-12-5	1,300	6	1,300
Lead	7439-92-1	65	5	65
Manganese	7439-96-5	650	0.4	650
Mercury	7439-97-6	26	0.2	26
Nickel (Soluble salts)	7440-02-0	1,300	4	1,300
Selenium	7782-49-2	520	4	520
Silver	7440-22-4	520	1	520
Thallium	7440-28-0	6	0.7	6
Vanadium	7440-62-2	NA	3	NA
Zinc	7440-66-6	26,000	2	26,000

* The leachate standard is based on analysis of leachate resulting from the synthetic leaching procedure conducted on contaminated soil.]*

APPENDIX 3
Methods for the Development of Inhalation Remediation Standards
Residential and Non-residential Use (Equations 1 through 25)

III. Methods for the Development of Inhalation Standards for Particulate Contaminants for Exposure Scenarios for Non-Residential Sites

(Equations 14 through 21)

Equation 14
Inhalation Soil Remediation Standards for Non-Residential Sites for Carcinogenic Particulate Contaminants

Source: Derived from Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Peer Review Draft, OSWER 9355.4-24 (March 2001), Equation 4-3

$$Inh_pSRS_c = \frac{TR}{CSF * DOSE} * \frac{10^6\ mg}{kg}$$

Parameter	**Definition**	**Units**	**Default**
Inh_pSRS_c	Health-based soil cleanup level for carcinogens	mg/kg	Chemical-specific
TR	Target cancer risk	unitless	$1x10^{-6}$
CSF	Cancer slope factor	$(mg/kg\text{-}day)^{-1}$	Chemical-specific
DOSE	Exposure dose calculation	mg/kg-day	*[0.00105]* *0.000871*

Equation 15
Inhalation Soil Remediation Standards for Non-Residential Sites for Non-Carcinogenic Particulate Contaminants

Source: Derived from Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Peer Review Draft, OSWER 9355.4-24 (March 2001), Equation 4-4

$$Inh_pSRS_n = \frac{1}{DOSE/RfD} * \frac{10^6\ mg}{kg}$$

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Parameter	Definition	Units	Default
Inh_pSRS_n	Health-based soil cleanup level for noncarcinogens	mg/kg	Chemical-specific
DOSE	Exposure dose calculation	mg/kg-day	*[0.00294]* *0.00244*
RfD	Reference dose	mg/kg-day	Chemical-specific

Equation 18
Exposure Dose

Source: Derived from Guidelines for Exposure Assessment, EPA/600/2-92/001 (May 1992); Equation 2-5

$$DOSE = \frac{PEF_s * IR * EF * ED}{BW * AT}$$

Parameter	Definition	Units	Default
DOSE	Exposure dose calculation	mg/kg-day	*[0.00105]* *0.000871* (Carcinogenic) *[0.00294]* *0.00244*(Non-carcinogenic)
PEF_s	Particulate emission factor from site activity; differs from "PEF" noted in Equations 10 and 11	mg/m^3	*[0.0167]* *0.0139*
IR	Inhalation rate	m^3/day	20
EF	Exposure frequency	days at site per year	225
ED	Exposure duration	Years	25
BW	Body weight	kg	70
AT	Averaging time	days	25,550 (Carcinogenic) 9,125 (Non-carcinogenic)

Equation 19
Particulate Emission Factor From Site Activity (PEF_s)

Source: Derived from Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Peer Review Draft, OSWER 9355.4-24 (March 2001), Equation 5-9

$$PEF_s = CF * \left[(D_{isc} * ER_{wind}) + (D_{isc} * ER_{traffic}) * \left(\frac{A_{traf}}{A_s} \right) \right]$$

Parameter	Definition	Units	Default
PEF_s	Particulate emission factor from site activity	mg/m^3	*[0.0167]* *0.0139*
CF	Conversion factor	mg/µg	10^{-3}
D_{isc}	Air dispersion factor for unit emission rate of one g/s	(µg-sec)/(m^3-g)	170
ER_{wind}	Wind generated particulate emission rate per year	g/s	0.0528
$ER_{traffic}$	Particulate emission rate for site traffic	g/s	*[0.0453]* *0.0286*
A_{traf}	Area of traffic	m^2	8,093.65
A_s	Site area	m^2	8,093.65

Equation 20
Particulate Emission Rate ($ER_{traffic}$)

Source: Derived from Equation 21, below - conversion of units in Equation 21 from g/VKT to g/s

$$ER_{traffic} = \frac{E_{10} * TC * D * TF}{(28{,}800 \text{ seconds/8-hr day}) * EF}$$

Parameter	Definition	Units	Default
$ER_{traffic}$	Particulate emission rate for site traffic	g/s	*[0.0453]* *0.0286*
E_{10}	Particulate emission factor	g/VKT	*[579.3]* *277.8*

TC	Daily traffic count for the unpaved area	vehicles/day	33
D	Average distance a vehicle travels through the unpaved area	km	0.09
TF	Traffic frequency	days with traffic/year	225
EF	Exposure frequency	days at site/year	225

Equation 21
Particulate Emission Factor from vehicles per kilometer traveled (from USEPA 2003c)

Source: AP-42, Chapter 13.2.2.2; Equations 1a and 2

$$E_{10} = (281.9\ g/VKT) * \left[k(s/12)^{0.9} * (W/3)^{0.45}\right] * \left[\frac{(365-p)}{365\ days}\right]$$

Parameter	Definition	Units	Default
E_{10}	Particulate emission factor per kilometer traveled	g/VKT (grams per vehicle-kilometer-traveled)	*[579.3]* *277.8*
K	Particle size multiplier	unitless	1.5 for PM10
S	Silt content of unpaved surface	%	11
W	Mean vehicle weight	tons	3.1
P	days with at least 0.254 mm (0.01 in) precipitation per year	days	121.3

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

*[APPENDIX 4

Methods for the Development

Impact to Ground Water Soil Remediation Standards for Class II A Ground Water

Equation 1

Soil-Water Partition Equation
Generic Impact to Ground Water Soil Remediation Standards for Mobile Organic Chemicals

Source: USEPA. Soil Screening Guidance: Technical Background Document, May 1996. U.S. Environmental Protection Agency, Office of Emergency Response: Washington, D.C., EPA/540/R-95/128 PB96-963502

$$\text{Impact to Ground Water Soil Remediation Standard } (IGWSRS) = GWQC\left\{(K_{oc}f_{oc}) + \frac{\theta_w + \theta_a H'}{\rho_b}\right\}DAF$$

Parameter	Definition	Units	Default
GWQC	Health Based Ground Water Quality Criterion (N.J.A.C. 7:9C-1.6 *et seq.*)	mg/L	Chemical-specific
K_{oc}	Soil organic carbon-water partition coefficient	L/kg	Chemical-specific
f_{oc}	Fraction organic carbon	dimensionless	0.002
θ_w	Water filled soil porosity	dimensionless	0.23
θ_a	Air filled soil porosity	dimensionless	0.18
H'	Henry's Law Constant	dimensionless	Chemical specific
ρ_b	Dry soil bulk density	kg/L	1.5
DAF	Dilution attenuation factor	dimensionless	13 (see eq. 2)

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Equation 2
Dilution-Attenuation Factor (DAF):

Source: USEPA. Soil Screening Guidance: Technical Background Document, May 1996. U.S. Environmental Protection Agency, Office of Emergency Response: Washington, D.C., EPA/540/R-95/128 PB96-963502

$$\text{Dilution Attenuation Factor}\,(DAF) = 1 + \frac{Kid}{IL}$$

Parameter	Definition	Units	Default
Ki product	Aquifer Hydraulic Conductivity (m/yr)* hydraulic gradient (dimensionless)	m/yr	30
D	Mixing zone depth	m	3.5 (See eq. 3)
I	Infiltration rate	m/yr	0.28
L	Length of area of concern parallel to ground water flow direction	m	30.5

Equation 3
Aquifer mixing zone depth, *d*

Source: USEPA. Soil Screening Guidance: Technical Background Document, May 1996. U.S. Environmental Protection Agency, Office of Emergency Response: Washington, D.C., EPA/540/R-95/128 PB96-963502

$$\text{Mixing zone depth}\left(d\right) = (0.0112L^2)^{0.5} + d_a\left\{1 - \exp\left[(-LI)/(Kid_a)\right]\right\}$$

Parameter	Definition	Units	Default
L	Length of area of concern parallel to ground water flow	m	30.5

	direction		
d_a	Aquifer thickness	m	3.5
I	Infiltration rate	m/yr	0.28
Ki Product	Aquifer hydraulic conductivity (m/yr) multiplied by the hydraulic gradient (dimensionless)	m/yr	30

Equation 4
Leachate Standards

Source: NJDEP Derived equation

$$\text{Leachate Standard}\left(LS\right) = GWQC * DAF$$

Parameter	**Definition**	**Units**	**Default**
GWQC	Health Based Ground Water Quality Criterion (N.J.A.C. 7:9C-1.4)	µg/l	Chemical Specific
DAF	Dilution Attenuation Factor (see equation 2)	dimensionless	13 (see eq. 2)]*

APPENDIX *[5]**4*

Methods for the Development of

Alternative Ingestion-Dermal Soil Remediation Standards

(No change from proposal.)

APPENDIX *[6]**5*

Methods for the Development of

Alternative Inhalation Soil Remediation Standards

(No change from proposal.)

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

*[APPENDIX 7

Methods for the Development of

Alternative Impact to Ground Water Soil Remediation Standards

Pursuant to N.J.A.C. 7:26D-7, the person responsible for conducting the remediation may propose, for the Department's approval, an alternative soil remediation standard (ARS) for the impact to ground water exposure pathway for a site or an area of concern based on one of the options provided in this Appendix.

A. General Requirements

The impact to ground water exposure pathway has several ARS options. Soil remediation standards developed for this pathway are based on established risk assessment methods that employ some factors that are not site-specific. In addition, the default input parameters for these factors are generally accepted and used by EPA and other state agencies. The Department does not believe it is practicable to develop a site-specific ARS through the modification of these standard default input parameters. Therefore, ARS options for the impact to ground water pathway are limited to the options listed below.

The concentration of any alternative soil remediation standard derived pursuant to this Appendix shall not exceed the contaminant's C_{sat} value (Table 1).

A generic dilution-attenuation factor of 13 may be used for mobile chemicals in the ARS options or a site specific dilution-attenuation factor (*DAF*) may be determined pursuant to Option I below.

A site specific leachate standard may be developed for low mobility and inorganic chemicals using a site specific *DAF*. The criterion is determined by multiplying the Class IIA health based Ground Water Quality Criterion by the site specific *DAF* determined pursuant to Option I below.

Alternative remediation standards calculated pursuant to this Appendix are applicable to impact to ground water remediation standards only. The person responsible for conducting the remediation is required to evaluate an impact to ground water ARS to determine if the ARS would impact 1) human health via the ingestion-dermal and inhalation exposure pathways or 2) ecological receptors.

B. Alternative soil remediation standard Options

Option I. Site Specific Modification of Soil-Water Partition Equation Input Parameters for Mobile Chemicals

1. An ARS may be developed for mobile chemicals by site-specifically modifying one or more of the input parameters used in the Soil-Water Partition Equation (SPE), Appendix 3, Equation 1. The options available are listed below. Adjust the SPE input parameters for site specific conditions as follows:

i. Soil organic carbon content (f_{oc}):

(1) Collect a minimum of 3 samples from locations at the site that are representative of the area of concern including soil type and contaminant depth. Samples may not be collected from areas with high levels of organic contamination (greater than 1,000 ppm).

(2) Analyze samples for soil organic carbon content using the Lloyd Kahn Method[1].

(3) Use the average soil organic carbon content as f_{oc} in the Soil-Water Partition Equation (Appendix 3, Equation 1) to develop an alternative remediation standard. If f_{oc} values vary by more than an order of magnitude, they may not be averaged to calculate an ARS. In this case, the lowest f_{oc} value must be used to develop the alternative remediation standard.

ii. Soil pH (for ionizable phenols):

(1) Collect a minimum of 3 samples from locations at the site that are representative of the area of concern including soil type and contaminant depth.

(2) Measure the pH in each sample using standard methods.

(3) Use the pH value for each sample to select a soil organic carbon-water partition coefficient (K_{oc}) from Table 2 below reproduced from USEPA "Soil Screening Guidance: User's Guide"[2]. If the measured pH is less than 4.9, use the pH 4.9 K_{oc}. If the measured pH is higher than 8.0, use the K_{oc} value for pH 8.0.

(4) Use the resulting K_{oc} value in the Soil-Water Partition Equation (Appendix 3 Equation 1) to develop an alternative soil remediation standard for each sample. If the calculated ARS values vary by less than an order of magnitude, they may be averaged to determine the site specific ARS. If they vary by more than an order of magnitude, the lowest calculated ARS value must be used.

iii. Dilution Attenuation Factor (*DAF*) - The Dilution Attenuation Factor may be adjusted to reflect site-specific conditions. The following parameters in the *DAF* equations

[1] Determination of Total Organic Carbon in Sediment (Lloyd Khan Method). U.S. Environmental Protection Agency, Region II, Edison, New Jersey,1988. (http://www.epa.gov/region02/qa/documents.htm)
[2] Soil Screening Guidance: User's Guide, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC, 1996, Table C-2

(Appendix 3, Equations 2 and 3) may be adjusted and substituted into equations for the mixing zone depth and the attenuation factor:

(1) Area of concern length (*L*):

(A) Measure the length of the area of concern parallel to ground water flow.

(B) Use the length to develop a site-specific aquifer mixing zone depth using Equation 3. If the calculated aquifer mixing zone depth is greater than the aquifer thickness, set the mixing zone depth equal to the aquifer thickness.

(C) Substitute the site-specific values for the mixing zone depth and *L* into the equation for the dilution-attenuation factor (*DAF*) Appendix 3, Equation 2; and

(D) Use the resulting *DAF* value in the Soil-Water Partition Equation (Appendix 3 equation 1) to develop an alternative remediation standard.

(2) Ground water velocity parameters, (hydraulic conductivity, *K* and gradient, *i*):

(A) Determine *K* and *i* from field measurements pursuant to the Technical Requirements for Site Remediation N.J.A.C. 7:26E-3.7(e)3iv, 7:26E-4.4(h)3ii and 7:26E-4.4(h)3iii.

(B) Measure the length (*L*) of the area of concern parallel to ground water flow.

(C) Substitute the above values into the mixing zone equation (Appendix 3, Equation 3) to determine a site-specific aquifer mixing zone depth. If the calculated aquifer mixing zone depth is greater than the aquifer thickness, set the mixing zone depth equal to the aquifer thickness.

(D) Substitute the site-specific values for *K, i, L* and the mixing zone depth into the equation for the dilution-attenuation factor (*DAF*) (Appendix 3, Equation 2) to calculate a site specific *DAF*.

(E) Substitute the *DAF* value into the Soil-Water Partition Equation (Appendix 3 Equation 1) to develop an alternative remediation standard.

(3) Aquifer thickness (d_a):

(A) Aquifer thickness shall be measured in the field by logging continuous core in accordance with the Department's Field Sampling Procedures Manual or shall be determined using available data from the New Jersey Geological Survey or the United States Geological Survey where available.

(B) Measure the length (*L*) of the area of concern parallel to ground water flow.

(C) Use the site-specific aquifer thickness and the actual length of the area of concern in the mixing zone equation (Appendix 3, Equation 3) to calculate a site-specific mixing zone depth. If the calculated aquifer mixing zone depth is greater than the aquifer thickness, set the mixing zone depth equal to the aquifer thickness.

(D) Use the calculated site specific mixing zone depth, and the site specific value for L in the *DAF* equation to calculate a site specific *DAF* (Appendix 3, Equation 2).

(E) Substitute the site specific *DAF* into the Soil-Water Partition Equation (Appendix 3 Equation 1) to develop an alternative remediation standard.

Option II. Synthetic Precipitation Leaching Procedure

1. This option is not appropriate for volatile organic chemical contamination. After completing sections 2i through v below, one or more of the options described in sections 2vi through viii below may be used to calculate an ARS using the Synthetic Precipitation Leaching Procedure.

2. Develop an alternative soil remediation standard using SPLP as follows:

i. Collect soil samples for the site or each area of concern. The number of samples collected shall be determined by the size of the area initially being investigated pursuant to the Department's Technical Requirements for Site Remediation, N.J.A.C. 7:26E. A minimum of three samples must be collected, and should include the highest suspected concentrations of the contaminants on site. Additional samples that represent a range of contaminant concentrations will be useful in using options 2vi through viii below if some or all of the SPLP results exhibit unacceptable leachate concentrations. The samples should be representative of the variation in soil conditions over the area of concern, including variation with soil depth.

ii. Split each sample and analyze as follows:

(1) Analyze one sub-sample for total contaminant concentrations pursuant to the Technical Rules.

(2) Submit the other sub-sample for testing using the SPLP procedure described in USEPA SW-846, Analytical Method 1312, and analyze the leachate using appropriate analytical methods.

(3) Measure the pH of the resulting leachate sample at the end of the extraction.

iii. Report the following information for each sample collected for SPLP analysis:

(1) The total contaminant concentration in the soil, C_T.

(2) The leachate concentration C_L; and the adjusted leachate concentration C_{adj}, if necessary (see section iv below).

(3) The final pH of the leachate.

(4) The volume of the leachate, V_L.

(5) The dry weight of the soil sub-sample used in the SPLP test, M_S.

iv. The Department may require an alternative soil remediation standard to be developed using adjusted leachate concentrations when site conditions indicate that contaminants may be weakly adsorbed to soil. Leachate concentrations measured in the SPLP test may need to be adjusted to reflect the soil-to-water ratios that exist under field conditions.

(1) The leachate concentration must be adjusted when greater than 25% of the contaminant mass is in the leachate solution at the conclusion of the SPLP test.

(2) Determine the percent concentration of the contaminant in SPLP leachate using Equation 1 below:

$$(C_L \text{ x } V_L)/(C_T \text{ x } M_S) \text{ x } 100 = \text{percent concentration of contaminant in leachate} \qquad \text{Equation 1}$$

Where:

V_L = volume of leachate in liters (2 L)
M_S = mass of the soil sample in kilograms (0.1 kg)
C_L = leachate concentration (mg/L)
C_T = total soil concentration (mg/kg)

(3) If the percent contaminant in the leachate is 25 or greater, calculate a K_d value for the contaminant in each sample using Equation 2 below:

$$Kd = \left[\frac{(C_T M_S - C_L V_L)/M_S}{C_L} \right] \qquad \text{Equation 2}$$

Where:

K_d = is the soil water partition coefficient (L/kg)
C_T = the total concentration of the contaminant in the SPLP soil sample (mg/kg)

M_S = the total weight of the soil sample submitted for SPLP analysis (kg)

C_L = the concentration of contaminant in the SPLP leachate (mg/L)

V_L = the volume of the SPLP leachate (L)

(4) For each sample, substitute the K_d value in the following equation to calculate an adjusted leachate concentration:

Equation 3

$$C_{adj} = C_T[\rho_b/(K_d \text{ x } \rho_b + \theta_w)]$$

Where:

ρ_b = bulk density of the soil (1.5 kg/L)

θ_w = soil moisture (0.23)

C_{adj} = adjusted leachate concentration (mg/L)

(5) Use C_{adj} as C_L in sections vi. and vii below.

v. If option vi or viii below are to be used to calculate an alternate remediation standard, determine a "Leachate standard (LS)" for a contaminant of concern by using a generic LS (see Appendix 3, Table 2B or Table 2C for low mobility chemicals and inorganics respectively) or calculate it as follows:

(1) Determine the health-based Ground Water Quality Criterion, N.J.A.C. 7:9-6, Table 1, for each contaminant.

(2) Multiply the Ground Water Quality Criterion by the generic dilution attenuation factor of 13 or by a site specific *DAF* as described in Option I above to determine the LS.

(3) If the Practical Quantitation Limit (PQL) for the contaminant is higher than the Leachate standard, use the PQL.

vi. Compare the SPLP leachate (or adjusted leachate) concentration for each sample, to the Leachate standard (LS) to determine if existing contaminant levels in soil can be used as a site specific alternative soil remediation standard as follows:

(1) If all SPLP leachate (or adjusted leachate) concentrations are at or below the LS, the highest soil concentration tested can be used as a site-specific ARS. If this ARS represents the highest concentration of contaminant on site, no further investigation is required for the impact to ground water pathway.

(2) If one or more of the SPLP leachate (or adjusted leachate) concentrations are above the LS, identify the highest soil concentration for which this and all lower soil concentrations give leachate (or adjusted leachate) concentrations at or below the LS. This concentration can be used as a site specific alternative remediation standard.

vii. A site specific alternative soil remediation standard may also be calculated as follows:

(1) Use the total contaminant concentration in a soil sample (C_T), and the corresponding SPLP leachate concentration (C_L) in Equation 2 above to calculate a sample-specific soil-water partition coefficient (K_d).

(2) If the K_d values of all the samples vary by less than an order of magnitude, calculate the average K_d. If the K_d values of all the samples vary by more than an order of magnitude, select the lowest calculated K_d.

(3) Substitute the site-specific partition coefficient (K_d) determined in (2) above into Equation 4 to calculate a site-specific alternative remediation standard:

$$ARS = C_{gw}\left\{\left[K_d\right] + \frac{\theta_w + \theta_a H'}{\rho_b}\right\}DAF \qquad \text{Equation 4}$$

Where:

ARS = alternative soil remediation standard (mg/kg)

K_d = is the average, or lowest, calculated sample specific soil-water partition coefficient (L/kg)

θ_w = the water-filled soil porosity (0.23)

θ_a = the air-filled soil porosity (0.18)

H' = the dimensionless Henry's law constant for the contaminant of interest

ρ_b = dry soil bulk density (1.5 kg/L)

DAF = the dilution-attenuation factor (default DAF of 13, or site specific DAF)

C_{gw} = the ground water criteria for the contaminant (mg/L)

viii. A linear regression technique may be used to determine an alternative soil remediation standard if an adequate linear correlation exists between leachate (or adjusted leachate) concentrations and the corresponding total soil contaminant concentrations. Determine an adequate linear correlation as follows:

(1) For all samples where both the total soil concentration and the leachate (or adjusted leachate) concentration are above the PQL, plot all the leachate (or adjusted leachate) concentration data (in units of µg/L) on the y-axis as the dependent variable versus the total soil concentration for all samples (in units of mg/kg) on the x-axis as the independent variable.

(2) For the data to qualify for the linear regression technique:

(A) At least half of the total soil concentrations data points must lie at or above the midpoint of the range.

(B) The calculated Leachate standard (*LS*) must lie within the range of measured leachate (or adjusted leachate) concentrations.

(C) Conduct a linear least-squares regression analysis of the plotted points. If the R-square value is 0.7 or higher, the calculated linear regression line may be used to determine the acceptable total soil concentration.

(3) Calculate the acceptable total soil concentration using Equation 5 below:

$$ARS = \frac{LS - b}{m} \qquad \text{Equation 5}$$

Where:

ARS = the impact to ground water alternative soil remediation standard (mg/kg)
m = the slope of the best fit line obtained via linear regression analysis ((µg/L)/(mg/kg))
b = the intercept of the best fit line obtained via linear regression analysis (µg/L)
LS = the Leachate standard (µg/L)

Option III. Vadose Zone Transport Modeling using the SESOIL Model

1. An alternative soil remediation standard may be developed using the Seasonal Soil Compartment Model (SESOIL), version 6.2 or later, when clean soil exists between the soil contamination and the seasonal high water table. The SESOIL model shall be run per the following instructions:

i. Run the model in the monthly mode.

ii. Use climate data from the weather station nearest to the site. Use the climate databases that are included with model software.

iii. Use chemical properties as required for the model.

(1) Use default values for water solubility, Henry's law constant, and diffusion coefficients from Table 1 below.

(2) For mobile organic chemicals, use K_{oc} values from Table 1.

(3) For low mobility organic chemicals, use K_{oc} values from Table 1, or develop a site specific K_d value using the SPLP test (Option II above).

(4) For ionizable phenols, a pH-dependant site specific K_{oc} value may be developed as described in Option I above.

(5) For inorganic chemicals, use K_d values from Table 1, or develop a site specific K_d value using the SPLP test (Option II above).

(6) Degradation of contaminants may not be included except for benzene, toluene, ethylbenzene and xylene (BTEX). For BTEX contaminants use a one month half life biodegradation rate (biodegradation rate constant of 0.023 $days^{-1}$) in both the liquid and solid phases if aerobic conditions (>4 percent oxygen) can be demonstrated in the vadose zone.

(7) Hydrolysis rate constants may not be used.

iv. Use default soil properties for bulk density, intrinsic permeability, soil pore disconnectedness index, and effective porosity as contained in the model documentation. The cation exchange capacity shall be set to zero. The Freundlich exponent shall be set to one. The default soil texture shall be sand. The default soil organic carbon content shall be set to 0.2 percent. The same soil properties must be used for all existing soil layers. Site-specific values for soil texture and soil organic carbon content may be developed.

(1) To establish soil texture, collect soil cores using a Shelby Tube, direct push sampler, or split-spoon. The soil cores collected should be representative of the variation that occurs within the area of concern. The soil cores/samples shall be collected continuously (every two or four feet depending on the length of the sampling device) from the soil surface to the surface of the static water level. A soil texture analysis is then completed on the cores/samples. Samples should be analyzed every two feet or for each distinct soil layer. To determine soil texture, the Department will consider any of the following techniques acceptable: sieve analysis

for the sand and gravel portions of a given sample with pipette or hydrometer measurements of the silt and clay fractions, rapid sediment analyzers, or electro-resistance multichannel particle size analyzers.

The percentages of sand, silt and clay for each sample are compared to the USDA Soil Texture Triangle to determine the soil texture classification (Figure 1 below). Using the USDA Soil Texture Triangle below, sands are considered particles between 0.05 mm and 2 mm, silts are between 0.05 mm and 0.002 mm and clays are less than 0.002 mm in size.

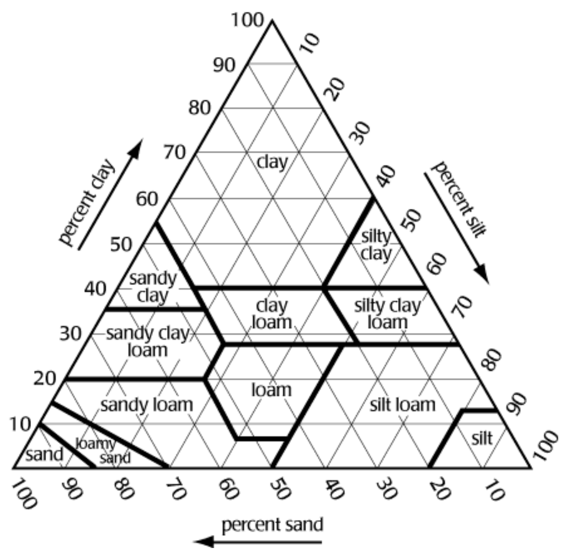

Figure 1

To allow the use of a soil texture in the SESOIL model other than sand, at least 75 percent of the soil vertical profile must be as fine as the selected soil texture. Otherwise, the coarsest soil texture measured must be used for modeling.

The Department's GIS Soil Survey Geographic Database (SSURGO) data layer should be examined in conjunction with the soil boring logs for a particular site of interest as a cross check to confirm that the correct soil texture is being used. This data may also provide a basis for requiring multiple soil boring locations if it indicates horizontal changes in soil texture are likely across the building footprint.

(2) Set the organic carbon content at the generic value of 0.2 percent, or use a site-specific value determined under Option I above. The Freundlich exponent must be set to "1" and soil properties must the same in all layers.

v. The sediment washload option shall not be used.

vi. One foot soil sublayers must be used with the model, and should cover the entire soil column from the soil surface to the water table.

vii. The “Load area” or “Application Area” in the model shall be set equal to the size of the Area of Concern., the appropriate latitude of the site shall be entered, and “instantaneous release” of contaminant at Time 0 of the simulation shall be selected.

viii. Contaminant concentrations (either existing concentrations or proposed remediation standards) must be entered as initial concentrations in the appropriate soil layers.

ix. All ratios of soil properties between soil layers shall be set to “1”.

x. The contaminant load parameters POLIN, TRANS, LIG, ISRM and ASL must be set to zero. The VOLF parameter must be set to “1”.

xi. Set the model run time at 100 years for low mobility contaminants. For all other contaminants, the model run time must be long enough to achieve peak concentrations in ground water.

xii. Compare the time-dependant concentration of the contaminant in the soil moisture in the deepest soil layer to the Leachate standard (LS) to determine compliance with ground water criteria. To determine the Leachate standard, multiply the GWQC by the generic or site specific DAF. If this product is lower than the PQL, the PQL is used as the LS.

If the model predicts that the concentration will not exceed the LS, then the soil contaminant concentration distribution as used in the model (either existing concentrations or proposed remediation standards) is an acceptable ARS.

xiii. If the model predicts that the ground water concentration will exceed the LS, then soil remediation is necessary.

xiv. The SESOIL model may be rerun varying the concentration distribution in soil in order to identify a distribution that will not result in an exceedance. This identified soil concentration distribution is an acceptable alternative soil remediation standard.

xv. Report the following information for the SESOIL runs submitted for NJDEP consideration:

(1) The value of all input parameters, and their source.

(2) Output of the soil moisture concentration for the bottom soil sublayer as a function of time. Graphical output is preferred.

(3) Other output summaries as provided by the software.

Option IV. Development of an alternative soil remediation goal using Vadose Zone /Ground Water Modeling (SESOIL/AT123D)

1. An alternative soil remediation standard for the impact to ground water pathway may be developed with the linked SESOIL/AT123D vadose zone/ground water contaminant transport model when:

i. Ground water quality is already degraded by contamination emanating from soil at the area of concern.

ii. The vertical and horizontal extent of ground water contamination emanating from the area of concern has been fully delineated pursuant to N.J.A.C. 7:26E-4.4(h)3i.

iii. A natural ground water remediation or active ground water remediation is approved by the Department.

iv. The Department has established a ground water classification exception area pursuant to N.J.A.C. 7:26E 8.3 as part of the remedy.

v. Ground water contaminated above the applicable ground water remediation standard will not reach the nearest downgradient receptor, as estimated by an appropriate ground water flow/contaminant transport model selected pursuant to N.J.A.C. 7:26E-4.4(h)3iv.

vi. The fate of the contaminant plume has been documented pursuant to N.J.A.C. 7:26E-8.3(b)2.

vii. Contaminant levels in ground water do not present a vapor risk to any receptors in accordance with the Department’s vapor intrusion guidance. This determination shall be made on a case-by-case basis.

viii. Predicted impacts to potential receptors are consistent with the current and potential ground water uses based on a 25-year planning horizon as projected by local and county land use documents. This shall include, without limitation, information pertaining to the existence of water lines, proposed future installation of water lines, local and/or county ordinances restricting installation of potable wells.

2. The SESOIL vadose zone transport model (Version 6.2 or later) shall be used to generate the contaminant source input data for the AT123D ground water transport model as described in Option III.

3. The concentration of soil contamination shall be varied in the SESOIL model until the compliance objectives outlined in 4i and ii, below are met.

i. If the AT123D model predicts that the compliance objectives detailed in 4i and 4ii below will be met, then the soil contaminant concentration distribution as used in the SESOIL model (either existing concentrations or proposed remediation standards) is an acceptable ARS.

ii. If the model predicts that the compliance objectives detailed 4i and 4ii below will not be met, then soil remediation is necessary.

iii. The SESOIL model may be rerun varying the concentration distribution in soil in order to identify a distribution that will meet the compliance objectives detailed in 4i and 4ii below. This identified soil concentration distribution is an acceptable alternative soil remediation standard.

4. Compliance with the Ground Water Quality Standards must be demonstrated by AT123D at two locations. the source area, and the downgradient compliance point.

i. The AT123D predicted concentrations of contaminants at the source area must meet the ground water quality standards within five years or less.

ii. The location of the downgradient compliance point shall be the downgradient edge of the delineated ground water contaminant plume. The peak ground water concentration predicted by AT123D at the downgradient compliance point shall never exceed the health based Ground Water Quality Criterion.

5. Run the AT123D model as follows:

i. The following input parameters shall be measured at the site:

(1) Hydraulic conductivity, pursuant to N.J.A.C. 7:26E-4.4(h)3iii.

(2) Hydraulic gradient, pursuant to N.J.A.C. 7:26E-4.4(h)3iii.

(3) Organic carbon content using the Lloyd Kahn Method[3]. A default value of 0.2 percent (0.002) may also be used.

[3] (Determination of Total Organic Carbon in Sediment (Lloyd Khan Method). U.S. Environmental Protection Agency, Region II, Edison, New Jersey,1988). (http://www.epa.gov/region02/qa/documents.htm).

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

(4) Longitudinal dispersivity shall be estimated based on the measured plume length using the following equation:

$$\alpha_L = 0.83(\log_{10} L)^{2.414} \qquad \text{Equation 6}$$

where:
α_L = longitudinal dispersivity
L = length of contaminant plume

(5) Transverse dispersivity shall be calculated as 1/10th the longitudinal dispersivity.

(6) Vertical dispersivity shall be calculated as 1/100th the longitudinal dispersivity.

(7) Aquifer thickness shall be measured in the field by logging continuous core in accordance with the Department's Field Sampling Procedures Manual or shall be determined using available data from the New Jersey Geological Survey or the United States Geological Survey where available.

ii. The following input parameter from a peer reviewed reference:

(1) Effective porosity.

iii. The following input parameters fixed as follows:

(1) Soil bulk density.

(2) Aquifer width shall be set to "infinite".

(3) Eigen values shall be set between 500 and 1,000.

(4) Error tolerance shall be set to 0.001.

(5) First-Order decay coefficient shall be set to zero.

(6) AT123D release coordinates shall be identical to SESOIL source configuration.

(7) AT123D load parameters shall be set in the SESOIL model.

iv. The following input parameters shall be copied from Table 1:

(1) K_{oc} values.

(2) K_d values.

(3) Water diffusion coefficient.

6. A Department approved ground water monitoring program designed to monitor the predictions of the AT123D model shall be implemented.

7. Additional remediation is required when ground monitoring does not agree with AT123D predictions.

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Table 1. Chemical Properties for Calculation of Generic and Alternative
Impact to Ground Water Soil Remediation Standards

Chemical	*CAS Number*	*Henry's law constant (atm-m^3/mol)*	*Henry's law constant (dimensionless)*	*Water solubility (mg/L)*	*Diffusion coefficient in air (cm^2/sec)*	*Diffusion coefficient in water (cm^2/sec)*	*K_{oc} or K_d (L/kg)[a]*	*Soil Saturation Limit (mg/kg)*
Acenaphthene	83-32-9	1.55E-04	6.36E-03	4.24E+00	4.21E-02	7.69E-06	7.08E+03	-
Acenaphthylene	208-96-8	1.11E-04	4.51E-03	1.60E+01	4.40E-02	7.50E-06	2.76E+03	-
Acetone (2-propanone)	67-64-1	3.88E-05	1.59E-03	1.00E+06	1.24E-01	1.14E-05	5.75E-01	1.55E+05
Acetophenone	98-86-2	1.10E-05	4.51E-04	6.10E+03	6.00E-02	8.70E-06	3.70E+01	1.39E+03
Acrolein	107-02-8	1.20E-04	4.92E-03	2.10E+05	1.05E-01	1.20E-05	1.00E+00	3.27E+04
Acrylonitrile	107-13-1	1.00E-04	4.10E-03	7.40E+04	1.22E-01	1.30E-05	2.00E+00	1.17E+04
Aldrin	309-00-2	1.70E-04	6.97E-03	1.80E-01	1.32E-02	4.86E-06	2.45E+06	-
Aluminum (total)	7429-90-5	-	-	-	-	-	*1.50E+03*	-
Anthracene	120-12-7	6.50E-05	2.67E-03	4.34E-02	3.24E-02	7.74E-06	2.95E+04	-
Antimony (total)	7440-36-0	-	-	-	-	-	*4.50E+01*	-
Arsenic (total)	7440-38-2	-	-	-	-	-	*2.60E+01*	-
Atrazine	1912-24-9	2.96E-09	1.21E-07	7.00E+01	2.60E-02	6.70E-06	3.60E+02	-
Barium (total)	7440-39-3	-	-	-	-	-	*1.70E+01*	-
Benzaldehyde	100-52-7	2.67E-05	1.09E-03	3.00E+03	7.30E-02	9.10E-06	2.90E+01	6.34E+02
Benzene	71-43-2	5.55E-03	2.28E-01	1.75E+03	8.80E-02	9.80E-06	5.89E+01	5.22E+02
Benzidine	92-87-5	3.90E-11	1.60E-09	5.00E+02	3.40E-02	1.50E-05	4.70E+01	-
Benzo(a)anthracene (1,2-Benzanthracene)	56-55-3	3.35E-06	1.37E-04	9.40E-03	5.10E-02	9.00E-06	3.98E+05	-
Benzo(a)pyrene	50-32-	1.13E-	4.63E-05	1.62E-03	4.30E-02	9.00E-06	1.02E+	-

Chemical	*CAS Number*	*Henry's law constant (atm-m^3/mol)*	*Henry's law constant (dimensionless)*	*Water solubility (mg/L)*	*Diffusion coefficient in air (cm^2/sec)*	*Diffusion coefficient in water (cm^2/sec)*	*K_{oc} or K_d (L/kg)[a]*	*Soil Saturation Limit (mg/kg)*
	8	06					06	
Benzo(b)fluoranthene (3,4-Benzofluoranthene)	205-99-2	1.11E-04	4.55E-03	1.50E-03	2.26E-02	5.56E-06	1.23E+06	-
Benzo(ghi)perylene	191-24-2	1.40E-07	5.74E-06	2.60E-04	2.01E-02	5.30E-06	3.86E+06	-
Benzo(k)fluoranthene	207-08-9	8.29E-07	3.40E-05	8.00E-04	2.26E-02	5.56E-06	1.23E+06	-
Beryllium	7440-41-7	-	-	-	-	-	*3.50E+01*	-
1,1'-Biphenyl	92-52-4	3.00E-04	1.23E-02	6.00E+00	4.04E-02	8.20E-06	8.56E+03	-
Bis(2-chloroethyl)ether	111-44-4	1.80E-05	7.38E-04	1.72E+04	6.92E-02	7.53E-06	1.55E+01	3.17E+03
Bis(2-chloroisopropyl)ether (2,2'-oxybis(1-chloropropane))	108-60-1	7.40E-05	3.03E-03	1.30E+03	6.02E-02	6.40E-06	3.60E+02	1.14E+03
Bis(2-ethylhexyl)phthalate	117-81-7	1.02E-07	4.18E-06	3.40E-01	3.51E-02	3.66E-06	1.51E+07	1.03E+04
Bromodichloromethane (Dichlorobromomethane)	75-27-4	1.60E-03	6.56E-02	6.74E+03	2.98E-02	1.06E-05	5.50E+01	1.83E+03
Bromoform	75-25-2	5.35E-04	2.19E-02	3.10E+03	1.49E-02	1.03E-05	8.71E+01	1.02E+03
Bromomethane (Methyl bromide)	74-83-9	6.24E-03	2.56E-01	1.52E+04	7.28E-02	1.21E-05	1.05E+01	3.12E+03
2-Butanone (Methyl ethyl ketone) (MEK)	78-93-3	5.60E-05	2.30E-03	2.20E+05	8.08E-02	9.80E-06	1.00E+00	3.42E+04
Butylbenzyl phthalate	85-68-7	1.26E-06	5.17E-05	2.69E+00	1.74E-02	4.83E-06	5.75E+04	3.10E+02
Cadmium	7440-43-9	-	-	-	-	-	*2.30E+01*	-
Caprolactam	105-60-2	3.66E-09	1.50E-07	3.01E+05	6.50E-02	9.00E-06	6.00E+00	-
Carbazole	86-74-8	1.53E-08	6.27E-07	7.48E+00	3.90E-02	7.03E-06	3.39E+03	-
Carbon disulfide	75-15-0	3.03E-02	1.24E+00	1.19E+03	1.04E-01	1.00E-05	4.57E+01	4.68E+02
Carbon tetrachloride	56-23-5	3.04E+02	1.25E+00	7.93E+02	7.80E-02	8.80E-06	1.74E+02	5.17E+02
Chlordane (alpha and gamma forms summed)	57-74-9	4.86E-05	1.99E-03	5.60E-02	1.18E-02	4.37E-06	1.20E+05	-

Chemical	CAS Number	Henry's law constant (atm-m^3/mol)	Henry's law constant (dimensionless)	Water solubility (mg/L)	Diffusion coefficient in air (cm^2/sec)	Diffusion coefficient in water (cm^2/sec)	K_{oc} or K_d (L/kg)[a]	Soil Saturation Limit (mg/kg)
4-Chloroaniline (p-Chloroaniline)	106-47-8	3.31E-07	1.36E-05	5.30E+03	4.83E-02	1.01E-05	6.61E+01	-
Chlorobenzene	108-90-7	3.70E-03	1.52E-01	4.72E+02	7.30E-02	8.70E-06	2.19E+02	2.88E+02
Chloroethane	75-00-3	8.80E-03	3.61E-01	5.70E+03	2.71E-01	1.10E-05	1.50E+01	-
Chloroform	67-66-3	3.67E-03	1.50E-01	7.92E+03	1.04E-01	1.00E-05	3.98E+01	1.99E+03
Chloromethane (Methyl chloride)	74-87-3	8.80E-03	3.61E-01	5.30E+03	1.26E-01	6.50E-06	6.00E+00	-
4-Chloro-3-methyl phenol (p-Chloro-m-cresol)	59-50-7	4.00E-07	1.64E-05	3.80E+03	4.20E-02	9.50E-06	1.12E+03	-
2-Chlorophenol (o-Chlorophenol)	95-57-8	3.91E-04	1.60E-02	2.20E+04	5.01E-02	9.46E-06	3.98E+02	2.09E+04
Chromium (III) (Trivalent chromium)	16065-83-1	-	-	-	-	-	*8.10E+03*	-
Chromium (VI) (Hexavalent chromium)	18540-29-9	-	-	-	-	-	*2.80E+01*	-
Chromium (total)	7440-47-3	-	-	-	-	-	*2.80E+01*	-
Chrysene	218-01-9	9.46E-05	3.88E-03	1.60E-03	2.48E-02	6.21E-06	3.98E+05	-
Cobalt (total)	7440-48-4	-	-	-	-	-	*4.50E+01*	-
Copper (total)	7440-50-8	-	-	-	-	-	*4.30E+02*	-
Cyanide	57-12-5	-	-	-	-	-	*9.90E+00*	-
4,4'-DDD (p,p'-TDE)	72-54-8	4.00E-06	1.64E-04	9.00E-02	1.69E-02	4.76E-06	1.00E+06	-
4,4'-DDE (p,p'-DDX)	72-55-9	2.10E-05	8.61E-04	1.20E-01	1.44E-02	5.87E-06	4.47E+06	-
4,4'-DDT	50-29-3	8.10E-06	3.32E-04	2.50E-02	1.37E-02	4.95E-06	2.63E+06	-
Dibenz(a,h)anthracene	53-70-3	1.47E-08	6.03E-07	2.49E-03	2.02E-02	5.18E-06	3.80E+06	-
Dibenzofuran	132-64-9	1.30E-05	5.33E-04	1.00E+01	2.67E-02	6.00E-06	1.35E+04	2.71E+02
Dibromochloromethane	124-	7.83E-	3.21E-02	2.60E+03	1.96E-02	1.05E-05	6.31E+	7.37E+

Chemical	*CAS Number*	*Henry's law constant (atm-m³/mol)*	*Henry's law constant (dimensionless)*	*Water solubility (mg/L)*	*Diffusion coefficient in air (cm²/sec)*	*Diffusion coefficient in water (cm²/sec)*	*K_{oc} or K_d (L/kg)[a]*	*Soil Saturation Limit (mg/kg)*
(Chlorodibromomethane)	48-1	04					01	02
1,2-Dibromo-3-chloropropane	96-12-8	1.50E-04	6.15E-03	1.20E+03	2.12E-02	7.00E-06	7.90E+01	3.74E+02
1,2-Dibromoethane	106-93-4	7.40E-04	3.03E-02	4.20E+03	2.87E-02	8.10E-06	4.60E+01	1.05E+03
1,2-Dichlorobenzene (o-Dichlorobenzene)	95-50-1	1.90E-03	7.79E-02	1.56E+02	6.90E-02	7.90E-06	6.17E+02	2.18E+02
1,3-Dichlorobenzene (m-Dichlorobenzene)	541-73-1	3.10E-03	1.27E-01	1.30E+02	6.92E-02	7.90E-06	7.08E+02	2.06E+02
1,4-Dichlorobenzene (p-Dichlorobenzene)	106-46-7	2.43E-03	9.96E-02	7.38E+01	6.90E-02	7.90E-06	6.17E+02	-
3,3'-Dichlorobenzidine	91-94-1	4.00E-09	1.64E-07	3.11E+00	1.94E-02	6.74E-06	7.24E+02	-
Dichlorodifluoromethane	75-71-8	3.40E-01	1.39E+01	2.80E+02	5.20E-02	1.00E-05	6.60E+01	-
1,1-Dichloroethane	75-34-3	5.62E-03	2.30E-01	5.06E+03	7.42E-02	1.05E-05	3.16E+01	1.24E+03
1,2-Dichloroethane	107-06-2	9.79E-04	4.01E-02	8.52E+03	1.04E-01	9.90E-06	1.74E+01	1.64E+03
1,1-Dichloroethene (1,1-Dichloroethylene)	75-35-4	2.61E-02	1.07E+00	2.25E+03	9.00E-02	1.04E-05	5.89E+01	8.99E+02
1,2-Dichloroethene (cis) (c-1,2-Dichloroethylene)	156-59-2	4.08E-03	1.67E-01	3.50E+03	7.36E-02	1.13E-05	3.55E+01	8.55E+02
1,2-Dichloroethene (trans) (t-1,2-Dichloroethylene)	156-60-5	9.38E-03	3.85E-01	6.30E+03	7.07E-02	1.19E-05	5.25E+01	1.92E+03
2,4-Dichlorophenol	120-83-2	3.16E-06	1.30E-04	4.50E+03	3.46E-02	8.77E-06	1.59E+02	-
1,2-Dichloropropane	78-87-5	2.80E-03	1.15E-01	2.80E+03	7.80E-02	8.73E-06	4.37E+01	7.13E+02
1,3-Dichloropropene (cis and trans) (summed)	542-75-6	1.77E-02	7.26E-01	2.80E+03	6.26E-02	1.00E-05	4.57E+01	9.29E+02
Dieldrin	60-57-1	1.51E-05	6.19E-04	1.95E-01	1.25E-02	4.74E-06	2.14E+04	-
Diethylphthalate	84-66-2	4.50E-07	1.85E-05	1.08E+03	2.56E-02	6.35E-06	2.88E+02	7.88E+02
2,4-Dimethylphenol	105-67-9	2.00E-06	8.20E-05	7.87E+03	5.84E-02	8.69E-06	2.09E+02	-
Dimethylphthalate	131-11-3	1.10E-07	4.51E-06	4.00E+03	5.68E-02	6.30E-06	3.70E+01	9.09E+02

Chemical	*CAS Number*	*Henry's law constant (atm-m^3/mol)*	*Henry's law constant (dimensionless)*	*Water solubility (mg/L)*	*Diffusion coefficient in air (cm^2/sec)*	*Diffusion coefficient in water (cm^2/sec)*	*K_{oc} or K_d (L/kg)[a]*	*Soil Saturation Limit (mg/kg)*
Di-n-butyl phthalate	84-74-2	9.38E-10	3.85E-08	1.12E+01	4.38E-02	7.86E-06	3.39E+04	7.61E+02
4,6-Dinitro-2-methylphenol	534-52-1	4.30E-07	1.76E-05	2.00E+02	2.93E-02	6.90E-06	1.16E+02	-
2,4-Dinitrophenol	51-28-5	4.43E-07	1.82E-05	2.79E+03	2.73E-02	9.06E-06	1.78E-02	-
2,4-Dinitrotoluene	121-14-2	9.26E-08	3.80E-06	2.70E+02	2.03E-01	7.06E-06	9.55E+01	-
2,6-Dinitrotoluene	606-20-2	7.47E-07	3.06E-05	1.82E+02	3.27E-02	7.26E-06	6.92E+01	-
2,4-Dinitrotoluene/2,6-Dinitrotoluene (mixture)	25321-14-6	4.20E-07	1.72E-05	2.26E+02	1.18E-01	7.16E-06	8.24E+01	-
Di-n-octyl phthalate	117-84-0	6.68E-05	2.74E-03	2.00E-02	1.51E-02	3.58E-06	8.32E+07	3.33E+03
Dioxin (TCDD) (2,3,7,8-Tetrachlorodibenzo-p-dioxin)	1746-01-6	7.90E-05	3.24E-03	7.90E-06	1.04E-01	5.60E-06	2.45E+06	-
1,2-Diphenylhydrazine	122-66-7	1.50E-06	6.15E-05	6.80E+01	3.17E-02	7.40E-06	7.10E+02	-
Endosulfan I and Endosulfan II (alpha and beta) (summed)	115-29-7	1.12E-05	4.59E-04	5.10E-01	1.15E-02	4.55E-06	2.14E+03	-
Endosulfan sulfate	1031-07-8	2.10E-03	8.61E-02	6.40E+00	1.10E-02	4.40E-06	1.02E+03	-
Endrin	72-20-8	7.52E-06	3.08E-04	2.50E-01	1.25E-02	4.74E-06	1.23E+04	-
Ethylbenzene	100-41-4	7.88E-03	3.23E-01	1.69E+02	7.50E-02	7.80E-06	3.63E+02	1.55E+02
Fluoranthene	206-44-0	1.61E-05	6.60E-04	2.06E-01	3.02E-02	6.35E-06	1.07E+05	-
Fluorene	86-73-7	6.36E-05	2.61E-03	1.98E+00	3.63E-02	7.88E-06	1.38E+04	-
alpha-HCH (alpha-BHC)	319-84-6	1.06E-05	4.35E-04	2.00E+00	1.42E-02	7.34E-06	1.23E+03	-
beta-HCH (beta-BHC)	319-85-7	7.43E-07	3.05E-05	2.40E-01	1.42E-02	7.34E-06	1.26E+03	-
Heptachlor	76-44-8	1.09E-03	4.47E-02	1.80E-01	1.12E-02	5.69E-06	1.41E+06	-
Heptachlor epoxide	1024-57-3	9.50E-06	3.90E-04	2.00E-01	1.32E-02	4.23E-06	8.32E+04	-
Hexachlorobenzene	118-	1.32E-	5.41E-02	6.20E+00	5.42E-02	5.91E-06	5.50E+	-

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Chemical	*CAS Number*	*Henry's law constant (atm-m^3/mol)*	*Henry's law constant (dimensionless)*	*Water solubility (mg/L)*	*Diffusion coefficient in air (cm^2/sec)*	*Diffusion coefficient in water (cm^2/sec)*	*K_{oc} or K_d (L/kg)[a]*	*Soil Saturation Limit (mg/kg)*
	74-1	03					04	
Hexachloro-1,3-butadiene	87-68-3	8.15E-03	3.34E-01	3.23E+00	5.61E-02	6.16E-06	5.37E+04	3.48E+02
Hexachlorocyclopentadiene	77-47-4	2.70E-02	1.11E+00	1.80E+00	1.61E-02	7.21E-06	2.00E+05	7.21E+02
Hexachloroethane	67-72-1	3.89E-03	1.59E-01	5.00E+01	2.50E-03	6.80E-06	1.78E+03	-
2-Hexanone	591-78-6	9.30E-05	3.80E-03	1.80E+04			2.40E+01	3.63E+03
Indeno(1,2,3-cd)pyrene	193-39-5	1.60E-06	6.56E-05	2.20E-05	1.90E-02	5.66E-06	3.47E+06	-
Isophorone	78-59-1	6.64E-06	2.72E-04	1.20E+04	6.23E-02	6.76E-06	4.68E+01	2.96E+03
Lead (total)	7439-92-1	-	-	-	-	-	*9.00E+02*	-
Lindane (gamma-HCH) (gamma-BHC)	58-89-9	1.40E-05	5.74E-04	6.80E+00	1.42E-02	7.34E-06	1.07E+03	-
Manganese (total)	7439-96-5	-	-	-	-	-	*6.50E+01*	-
Mercury (total)	7439-97-6	-	-	-	-	-	*2.00E-01*	-
Methoxychlor	72-43-5	1.58E-05	6.48E-04	4.50E-02	1.56E-02	4.46E-06	9.77E+04	-
Methyl acetate	79-20-9	1.15E-04	4.72E-03	2.40E+05	1.04E-01	1.00E-05	2.00E+00	3.79E+04
Methylcyclohexane	108-87-2	4.30E-01	1.76E+01	1.40E+01	9.86E-02	8.50E-06	8.65E+02	5.59E+01
Methylene chloride (Dichloromethane)	75-09-2	2.19E-03	8.98E-02	1.30E+04	1.01E-01	1.17E-05	1.17E+01	2.44E+03
2-Methylnaphthalene	91-57-6	5.2E-04	2.13E-02	2.5E+01	5.22E-02	7.75E-06	6.82E+03	-
4-Methyl-2-pentanone (MIBK)	108-10-1	1.40E-04	5.74E-03	1.90E+04	7.50E-02	7.80E-06	1.50E+01	3.50E+03
2-Methylphenol (o-cresol)	95-48-7	1.20E-06	4.92E-05	2.60E+04	7.40E-02	8.30E-06	9.12E+01	-
4-Methylphenol (p-cresol)	106-44-5	7.90E-07	3.24E-05	2.20E+04	7.40E-02	1.00E-05	7.40E+01	-
MTBE (tert-butyl methyl ether)	1634-04-4	5.87E-04	2.40E-02	4.80E+04	1.02E-01	1.00E-05	8.00E+00	8.27E+03

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Chemical	*CAS Number*	*Henry's law constant (atm-m^3/mol)*	*Henry's law constant (dimensionless)*	*Water solubility (mg/L)*	*Diffusion coefficient in air (cm^2/sec)*	*Diffusion coefficient in water (cm^2/sec)*	*K_{oc} or K_d (L/kg)[a]*	*Soil Saturation Limit (mg/kg)*
Naphthalene	91-20-3	4.83E-04	1.98E-02	3.10E+01	5.90E-02	7.50E-06	2.00E+03	-
Nickel (total)	7440-02-0	-	-	-	-	-	*2.40E+01*	-
2-Nitroaniline	88-74-4	1.81E-08	7.42E-07	2.90E+02	7.30E-02	8.00E-06	7.40E+01	-
Nitrobenzene	98-95-3	2.40E-05	9.84E-04	2.09E+03	7.60E-02	8.60E-06	6.46E+01	5.91E+02
4-Nitrophenol	100-02-7	4.20E-10	1.72E-08	1.20E+04	4.30E-02	9.60E-06	7.40E+01	-
N-Nitrosodimethylamine	62-75-9	1.20E-06	4.92E-05	1.00E+06	1.13E-01	1.20E-05	3.00E-01	1.54E+05
N-Nitrosodi-n-propylamine	621-64-7	2.25E-06	9.23E-05	9.89E+03	5.45E-02	8.17E-06	2.40E+01	-
N-Nitrosodiphenylamine	86-30-6	5.00E-06	2.05E-04	3.51E+01	3.12E-02	6.35E-06	1.29E+03	-
PCBs (Polychlorinated biphenyls) (summed)	1336-36-3	2.60E-03	1.07E-01	7.00E-01	1.75E-02	8.00E-06	3.09E+05	4.33E+02
Pentachlorophenol	87-86-5	2.44E-08	1.00E-06	1.95E+03	5.60E-02	6.10E-06	5.10E+03	-
Phenanthrene	85-01-8	2.30E-05	9.43E-04	1.10E+00	3.33E-02	7.50E-06	2.65E+04	-
Phenol	108-95-2	3.97E-07	1.63E-05	8.28E+04	8.20E-02	9.10E-06	2.88E+01	-
Pyrene	129-00-0	1.10E-05	4.51E-04	1.35E-01	2.72E-02	7.24E-06	1.05E+05	-
Selenium (total)	7782-49-2	-	-	-	-	-	*1.40E+01*	-
Silver (total)	7440-22-4	-	-	-	-	-	*2.60E-01*	-
Styrene	100-42-5	2.75E-05	1.13E-01	3.10E+02	7.10E-02	8.00E-06	7.76E+02	5.33E+02
Tertiary butyl alcohol (TBA)	75-65-0	9.05E-06	3.71E-04	1.00E+06	9.85E-02	1.14E-05	2.00E+00	-
1,1,2,2-Tetrachloroethane	79-34-5	3.45E-04	1.41E-02	2.97E+03	7.10E-02	7.90E-06	9.33E+01	1.01E+03
Tetrachloroethene (PCE) (Tetrachloroethylene)	127-18-4	1.84E-02	7.54E-01	2.00E+02	7.20E-02	8.20E-06	1.55E+02	1.11E+02
Thallium (total)	7440-	-	-	-	-	-	*4.80E+*	-

Chemical	*CAS Number*	*Henry's law constant (atm-m^3/mol)*	*Henry's law constant (dimensionless)*	*Water solubility (mg/L)*	*Diffusion coefficient in air (cm^2/sec)*	*Diffusion coefficient in water (cm^2/sec)*	*K_{oc} or K_d (L/kg)[a]*	*Soil Saturation Limit (mg/kg)*
	28-0						*01*	
Toluene	108-88-3	6.64E-03	2.72E-01	5.26E+02	8.70E-02	8.60E-06	1.82E+02	2.89E+02
Toxaphene	8001-35-2	6.00E-06	2.46E-04	7.40E-01	1.16E-02	4.34E-06	2.57E+05	-
1,2,4-Trichlorobenzene	120-82-1	1.42E-03	5.82E-02	3.00E+02	3.00E-02	8.23E-06	1.78E+03	1.12E+03
1,1,1-Trichloroethane	71-55-6	1.72E-02	7.05E-01	1.33E+03	7.80E-02	8.80E-06	1.10E+02	6.09E+02
1,1,2-Trichloroethane	79-00-5	9.13E-04	3.74E-02	4.42E+03	7.80E-02	8.80E-06	5.01E+01	1.14E+03
Trichloroethene (TCE) (Trichloroethylene)	79-01-6	1.03E-02	4.22E-01	1.10E+03	7.90E-02	9.10E-06	1.66E+02	5.90E+02
Trichlorofluoromethane	75-69-4	9.70E-02	3.98E+00	1.10E+03	4.26E-02	1.00E-05	1.14E+02	9.44E+02
2,4,5-Trichlorophenol	95-95-4	4.33E-06	1.78E-04	1.20E+03	2.91E-02	7.03E-06	2.34E+03	-
2,4,6-Trichlorophenol	88-06-2	7.79E-06	3.19E-04	8.00E+02	3.18E-02	6.25E-06	9.99E+02	-
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	4.80E-01	1.97E+01	1.70E+02	7.80E-02	8.20E-06	4.10E+02	5.67E+02
Vanadium (total)	7440-62-2	-	-	-	-	-	*1.00E+03*	-
Vinyl chloride	75-01-4	2.70E-02	1.11E+00	2.76E+03	1.06E-01	1.23E-06	1.86E+01	-
Xylenes (total)	1330-20-7	6.73E-03	2.76E-01	1.75E+02	7.69E-02	8.44E-06	3.86E+02	1.68E+02
Zinc (total)	7440-66-6	-	-	-	-	-	*2.30E+01*	-

a Values in italics are Kd values

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Table 2. K_{oc} Values (L/kg) for Ionizing Organics as a Function of pH

pH	Benzoic Acid	2-Chloro-phenol	2,4-Dichloro-phenol	2,4-Dinitro-phenol	Pentachloro-phenol	2,3,4,5-Tetrachloro-phenol	2,3,4,6-Tetrachloro-phenol	2,4,5-Trichloro-phenol	2,4,6 Trichloro-phenol
4.9	5.54E+00	3.98E+0	1.59E+02	2.94E-02	9.05E+03	1.73E+04	4.45E+03	2.37E+03	1.04E+03
5.0	4.64E+00	3.98E+0	1.59E+02	2.55E-02	7.96E+03	1.72E+04	4.15E+03	2.36E+03	1.03E+03
5.1	3.88E+00	3.98E+0	1.59E+02	2.23E-02	6.93E+03	1.70E+04	3.83E+03	2.36E+03	1.02E+03
5.2	3.25E+00	3.98E+0	1.59E+02	1.98E-02	5.97E+03	1.67E+04	3.49E+03	2.35E+03	1.01 E+03
5.3	2.72E+00	3.98E+0	1.59E+02	1.78E-02	5.10E+03	1.65E+04	3.14E+03	2.34E+03	9.99E+02
5.4	2.29E+00	3.98E+0	1.58E+02	1.62E-02	4.32E+03	1.61 E+04	2.79E+03	2.33E+03	9.82E+02
5.5	1.94E+00	3.97E+0	1.58E+02	1.50E-02	3.65E+03	1.57E+04	2.45E+03	2.32E+03	9.62E+02
5.6	1.65E+00	3.97E+0	1.58E+02	1.40E-02	3.07E+03	1.52E+04	2.13E+03	2.31E+03	9.38E+02
5.7	1.42E+00	3.97E+0	1.58E+02	1.32E-02	2.58E+03	1.47E+04	1.83E+03	2.29E+03	9.10E+02
5.8	1.24E+00	3.97E+0	1.58E+02	1.25E-02	2.18E+03	1.40E+04	1.56E+03	2.27E+03	8.77E+02
5.9	1.09E+00	3.97E+0	1.57E+02	1.20E-02	1.84E+03	1.32E+04	1.32E+03	2.24E+03	8.39E+02
6.0	9.69E-01	3.96E+0	1.57E+02	1.16E-02	1.56E+03	1.24E+04	1.11 E+03	2.21 E+03	7.96E+02
6.1	8.75E-01	3.96E+0	1.57E+02	1.13E-02	1.33E+03	1.15E+04	9.27E+02	2.17E+03	7.48E+02
6.2	7.99E-01	3.96E+0	1.56E+02	1.10E-02	1.15E+03	1.05E+04	7.75E+02	2.12E+03	6.97E+02
6.3	7.36E-01	3.95E+0	1.55E+02	1.08E-02	9.98E+02	9.51 E+03	6.47E+02	2.06E+03	6.44E+02
6.4	6.89E-01	3.94E+0	1,54E+02	1.06E-02	8.77E+02	8.48E+03	5.42E+02	1.99E+03	5.89E+02
6.5	6.51 E-01	3.93E+0	1.53E+02	1.05E-02	7.81 E+02	7.47E+03	4.55E+02	1.91	5.33E+02
6.6	6.20E-01	3.92E+0	1.52E+02	1.04E-02	7.03E+02	6.49E+03	3.84E+02	1.82E+03	4.80E+02
6.7	5.95E-01	3.90E+0	1.50E+02	1.03E-02	6.40E+02	5.58E+03	3.27E+02	1.71E+03	4.29E+02
6.8	5.76E-01	3.88E+0	1.47E+02	1.02E-02	5.92E+02	4.74E+03	2.80E+02	1.60E+03	3.81 E+02
6.9	5.60E-01	3.86E+0	1.45E+02	1.02E-02	5.52E+02	3.99E+03	2.42E+02	1.47E+03	3.38E+02
7.0	5.47E-01	3.83E+0	1.41	1.02E-02	5.21 E+02	3.33E+03	2.13E+02	1.34E+03	3.00E+02
7.1	5.38E-01	3.79E+0	1.38E+02	1.02E-02	4.96E+02	2.76E+03	1.88E+02	1.21E+03	2.67E+02
7.2	5.32E-01	3.75E+0	1.33E+02	1.01 E-	4.76E+02	2.28E+03	1.69E+02	1.07E+03	2.39E+02
7.3	5.25E-01	3.69E+0	1.28E+02	1.01E-02	4.61 E+02	1.87E+03	1.53E+02	9.43E+02	2.15E+02
7.4	5.19E-01	3.62E+0	1.21	1.01 E-	4.47E+02	1.53E+03	1.41 E+02	8.19E+02	1.95E+02
7.5	5.16E-01	3.54E+0	1.14E+02	1.01 E-	4.37E+02	1.25E+03	1.31 E+02	7.03E+02	1.78E+02
7.6	5.13E-01	3.44E+0	1.07E+02	1.01 E-	4.29E+02	1.02E+03	1.23E+02	5.99E+02	1.64E+02
7.7	5.09E-01	3.33E+0	9.84E+01	1.00E-02	4.23E+02	8.31 E+02	1.17E+02	5.07E+02	1.53E+02
7.8	5.06E-01	3.19E+0	8.97E+01	1.00E-02	4.18E+02	6.79E+02	1.13E+02	4.26E+02	1.44E+02
7.9	5.06E-01	3.04E+0	8.07E+01	1.00E-02	4.14E+02	5.56E+02	1.08E+02	3.57E+02	1.37E+02

8.0	5.06E-01	2.86E+02	7.17E+01	1.00E-02	4.10E+02	4.58E+02	1.05E+02	2.98E+02	1.31 E+02]*

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

APPENDIX *[8]* *6*

Alternative Soil Remediation Standard Application

(No change from proposal.)

TECHNICAL REQUIREMENTS FOR SITE REMEDIATION N.J.A.C. 7:26E

SUBCHAPTER 1 GENERAL INFORMATION

7:26E-1.3 Applicability

(a) - (c) (No change from proposal.)

(d) The person responsible for conducting the remediation of a site shall remediate *[soil]*:

1. To meet the remediation standards at N.J.A.C. 7:26D *and the impact to groundwater soil remediation standards set by the Department for a particular site pursuant to its authority under N.J.S.A. 58:10B-12a*; or

2. To meet the Standards or criteria developed by the Department under N.J.S.A. 58:10B-12a for that site prior to (effective date of N.J.A.C. 7:26D) provided:

i. - ii. (No change from proposal.)

iii. The standards or criteria developed by the Department under N.J.S.A. 58:10B-12a for the site are not greater by an order of magnitude or more, than the *[soil]* remediation standards otherwise applicable under N.J.A.C. 7:26D.

(e) (No change from proposal.)

NOTE: THIS IS A COURTESY COPY OF THIS RULE ADOPTION. THE OFFICIAL VERSION WILL BE PUBLISHED IN THE JUNE 2, 2008 NEW JERSEY REGISTER. SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE OFFICIAL VERSION OF THE ADOPTION, THE OFFICIAL VERSION WILL GOVERN.

Based on consultation with staff, I hereby certify that the above statements, including the Federal Standards Analysis addressing the requirements of Executive Order 27 (1994), permit the public to understand accurately and plainly the purpose and expected consequences of this adoption. I hereby authorize this adoption.

Date:______________ ____

Lisa P. Jackson Commissioner