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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION III  
841 Chestnut Building  
Philadelphia, Pennsylvania 19107

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December 31, 1992

In Reply Refer to: 3HW21

Ms. Tamara C. Royer, Project Coordinator  
Ruetgers-Nease  
201 Struble Road  
State College, PA 16801

Re: Centre County Kepone Site

Dear Ms. Royer:

We have completed our review of the Initial Preliminary Identification of Potential Applicable or Relevant and Appropriate Requirements (ARARs) and Remedial Action Objectives (RAOs) Report prepared by SMC Environmental Services Group. The purpose of this letter is to forward the review comments provided by members of the EPA project team.

Please feel free to contact me at (215) 597-8309 if you have any questions or wish to discuss the enclosed comments.

Sincerely,

David G. Byro, Project Manager  
S.E. Pennsylvania Remedial Section

Enclosures

cc: Greg Smoot, SMC  
Doug Overdorf, PADER  
Tad Yancheski, Tetra Tech Inc.  
Howard Greenberg, Esq., Ruetgers-Nease

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Project Coordinator  
Rutgers Nease  
201 Struble Road  
State College, PA 16801

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**INITIAL PRELIMINARY IDENTIFICATION OF POTENTIAL ARARS AND  
REMEDIAL ACTION OBJECTIVES REPORT REVIEW COMMENTS  
CENTRE COUNTY KEPONE SITE**

1. **pg. 1, Section 1.0** - The site description is inaccurate in that it coincides with the Ruetgers-Nease property only. In accordance with the National Contingency Plan (NCP) at 40 C.F.R. § 300.5, the site must include the areal extent of contamination, including but not limited to the aquifer, Thornton Spring and that section of Spring Creek which is designated as a no-kill zone.

The only criterion to be used for this initial medium-specific screening step is technical implementability. This is because this report proceeds only up to the point of identifying remedial technologies and process options and the initial screening of the process options. It appears, however, that the report does identify the process options that will be screened in more detail prior to assembling the alternatives that will undergo a detailed analysis. Consequently, during the next step, the process options retained based on technical implementability will need to be further evaluated based on effectiveness, implementability and cost to preferably select one process for each technology type (see Section 4.2.5 of EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA).

2. **pg. 2, Section 2.1** - A brief description of the major source of mirex contamination is needed.
3. **pg. 3, Section 2.1** - Significant cleanup of the aquifer by the ongoing pump and treat activity has not been statistically substantiated as of this time. Therefore, the word significant must be deleted in reference to this activity throughout the document or else quantified. Likewise, "significant" is inappropriate when discussing levels of contamination (e.g., soil). This needs to be deleted or changed throughout the document.
4. **pg. 4, Section 2.1.2** - Concentrations should be referenced to MCLG's and to background concentrations, not primary drinking water standards.

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5. **pg. 5, Section 2.1.4** - A discussion of the special fish regulations in effect on Spring Creek and the reason for the no-kill zone is needed to completely summarize the existing environmental conditions.

The flow relationship(s) between Thornton Spring and Spring Creek have not been fully characterized yet.

It is inappropriate to say "a dilution effect is occurring which significantly reduces the impact of flow from Thornton Spring".

Thornton Spring (and the fresh water drainage ditch) is considered a "water of the Commonwealth" and must be protected as such.

The use of "on-site" and "off-site" is incorrect in this section and throughout the document (see comment 1 above).

6. **pg. 5, Section 2.2** - The first sentence "on-site surface soils and sediments associated with Thornton Spring and Spring Creek have been impacted by past operations at the site" (i.e. facility). This discussion must include the impacts to the aquatic community of Thornton Spring, Spring Creek, and Bald Eagle Creek.
7. **pg. 6, Section 2.3** - This discussion should also include migration of the chemicals of concern due to biota migration. Once again, the discussion concerning the effectiveness of the groundwater pump and treat system having a "significant" impact on the groundwater aquifer needs to be quantified statistically or else the statement needs to be deleted.
8. **pg. 7, Table 1** - In the 90% Draft RI report, Table 5.1 contains the same list of chemicals as this table. However, in Table 5.1 both 1,2-dichloroethene and xylene were analyzed for the total fraction. This should be consistent.

9. **pg. 8, Section 3.0 (ARARs), general comment** - The listing and discussion of ARARs appears very incomplete and deficient, especially with regard to Commonwealth of Pennsylvania ARARs. The PADER guidance document Applicable or Relevant and Appropriate Requirements (ARARs) for Cleanup Response and Remedial Actions in Pennsylvania should be carefully reviewed, and relevant findings incorporated into the ARARs listing. It should also be noted that a thorough understanding and awareness of one very important Pennsylvania ground water ARAR, which essentially requires cleanup of groundwater to "background" [see attached letter regarding Pennsylvania Title 25. Environmental Resources, Chapter 264.100 (a), (9)], is required to formulate any viable remedial action alternatives (note that for organics, background is essentially zero, also expressed as laboratory instrument (IDL) or analytical method detection limits [MDL]). Addressing this ARAR can become a complex issue during the FS, ROD, and RD/RA activities.

10. **pg. 8, Section 3.1** - The first paragraph does not make sense. ARARs and cleanup goals are not necessarily one in the same. ARARs are standards, requirements, criteria or limitations promulgated under Federal or State law. Cleanup goals may be based on site specific or risk calculations as well as upon Federal or State laws.

Remediation of the site must at least attain the applicable, relevant and appropriate standard, requirement, criteria, or limitation, in accordance with Section 121(d) of CERCLA. ARARs are not goals; they are standards which must be satisfied or waived.

11. **pg. 9, Section 3.2** - Please note that once the Record of Decision (ROD) is signed, ARARs are not subject to "change" as discussed here.

12. **Table 2, Section 3.2** -

a) The list and discussion of ARARs is inadequate in that cursory attention is given to Pennsylvania laws. Enclosed is a copy of "ARARs for Cleanup Response and Remedial Actions in Pennsylvania" dated April 1991, which identifies state ARARs. The Department's preliminary ARARs for this site is also enclosed.

b) Further specificity is needed in the citations. Citations to entire chapters are not sufficient. Subchapters, sections and subsections should also be included in the citations.

c) The citation for MCLGs should be to 40 C.F.R. Part 141, Subpart F.

d) According to the NCP Preamble, OSHA is not an ARAR.

e) For State delegated programs (such as RCRA or NPDES), citations will generally be to the State regulations and not the Federal ones.

f) The chemical-specific ARARs should be further organized by media.

g) During the detailed analysis of the FS, much more specificity is needed when determining ARARs on an alternative-specific basis.

13. **pg. 14, Section 3.2.1** - The statement that soil ARARs have not been determined by the Commonwealth of Pennsylvania is not entirely correct. PADER has historically used an approach of developing soil criteria based on the protection of groundwater, which will ultimately meet the Pennsylvania "background" groundwater quality ARAR. Compliance with the groundwater quality ARAR requires that no contaminants leach from soil at concentrations above background levels. Therefore, soil clean-up levels can be indirectly inferred. For example, PADER has developed soil cleanup criteria for virgin fuel contaminated soil (see attached technical background document). While these fuel contaminated soil criteria are not directly applicable to the situation at the Centre County site, the approach presented in the technical background document can provide a basis for the development of site specific soil ARARs which meet both human and ecological risk based requirements, and the important Pennsylvania groundwater quality ARAR.

Alternatively, a mass-balance approach known as the Summers method can be utilized for the development of soil cleanup levels based upon the ingestion of contaminated groundwater. This approach estimates the chemical concentration in the infiltrate at the saturated-unsaturated zone interface, which, upon mixing with groundwater, would result in an estimated concentration of each chemical of concern in the groundwater.

Guidance on the use of the Summers method can be found in the document titled "Determining Soil Response Action Levels based on Potential Contaminant Migration to Groundwater: A Compendium of Examples" (EPA/540/2-89/057).

Given the above, the fourth sentence of this paragraph needs to be changed to, "Appropriate cleanup standards for soil and sediment will be developed after the BRA is completed." The last sentence of the paragraph needs to be deleted or revised to reflect the fact that soil clean-up standards may be based on criteria other than risk based numbers.

14. pg. 14, Section 3.2.2. - The concentrations presented on Table 3 are not the only chemical-specific surface water and groundwater ARARs. First, for some analytes in surface water, the water quality criteria for protection of human health and aquatic life (Clean Water Act [40 CFR AWQC], 25 Pa. Code Chapter 16, and Chapter 93, etc.) are more stringent than the drinking water standards. For example, the AWQC for chlorobenzene for the protection of aquatic life is 236 ug/l (continuous) or 1,180 ug/l (maximum)[source: 25 Pa. Code Chapter 16], which is much less than the 10,000 ug/l value presented on Table 3. Therefore, the appropriate criteria need to be identified and the appropriate list of surface water ARARs should be further developed independent of the groundwater ARARs(see comment 9).

The Pennsylvania ARAR for groundwater for hazardous substances is that all groundwater be remediated to "background" quality as specified by 25 PA Code, Sections 264.90-264.100 and in particular, by 25 PA Code, Sections 264.97(i), (j), and 264.100(a)(9). The Commonwealth also maintains that the requirements to remediate to background are also found in other legal authorities. The Department's "Ground Water Quality Protection Strategy", dated February 1992, is a "to be considered" (TBC) requirement setting out the background quality requirement as a remediation goal and provides for protection levels above background when the background groundwater quality goal cannot feasibly be achieved.

The last sentence, first paragraph, needs to be deleted or changed to read, "Cleanup goals will be determined following the completion of the BRA and the identification of Pennsylvania ARARs.", since ARARs are determined irregardless of the risk assessment results. Similarly, the last sentence of the second paragraph needs to be deleted or revised.

The statement, "extremely remote potential source of future drinking water", is inconsequential in Pennsylvania since all surface water is to be protected for potability.

14. **pg. 16, Section 4.1** - According to the EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, page 4-11, remedial action objectives consist of medium-specific or operable unit-specific goals for protecting human health and the environment. They are not merely goals "to reduce the threat of receptor exposure to COCs". Please correct the text.

**General Comments** - RAOs are designed not only to prevent releases of contaminants of concern (COCs) but also to prevent exposures to unacceptable levels of contaminants and to restore the resource to acceptable levels of COCs. Each media must be protected for current and future use.

Once the RI and Risk Assessment is complete, specific cleanup goals can be established and then the RAOs should be refined to incorporate site specific numeric cleanup levels.

Risk-based cleanup goals are absent from this document (correctly) because the baseline risk assessment is still under revision. The FS should incorporate a risk evaluation based on (1) the results of the final baseline risk assessment (when available) and (2) recommendations in the Risk Assessment Guidance for Superfund, Volume I, Part C. It is suggested that EPA be consulted before deciding whether to perform a quantitative or qualitative risk evaluation for the FS.

15. **pg. 16, Section 4.2.1** - The principal RAOs for soil/sediments at the site should be: 1) to prevent current or future exposure to contaminants of concern above acceptable levels; 2) to prevent migration of contaminants to groundwater above background levels; 3) to prevent migration of contaminants to surface water above the cleanup goals; and 4) to protect environmental receptors. Soil and sediment remedial action objectives should be developed to prevent ingestion and inhalation as well as direct contact.

16. **pg. 16, Section 4.2.2** - The RAOs for groundwater should include: 1) preventing exposure to COCs above the site specific cleanup goals via ingestion, inhalation or direct contact with the groundwater; 2) restoration of the groundwater to background levels of contaminants; 3) protect uncontaminated ground and surface water for current and future use; and 4) protect environmental receptors.

These remedial action objectives should be achieved throughout the area of attainment which encompasses the area outside the boundary of any waste remaining in place and up to the



boundary of the contaminant plume. Estimates of restoration time-frames, the period of time required to achieve cleanup levels in the groundwater throughout the area of attainment, should also be developed in the FS to permit comparison of cleanup time-frames for the various alternatives.

Further guidance on these issues can be found in the document titled, Guidance on Remedial Actions for contaminated Groundwater at Superfund Sites, (EPA/540/G-88/003).

17. **pg. 17, Section 4.2.3** - Last sentence, "The effectiveness of remedial action in preventing the release of the COCs that would result in surface water levels in excess of ARARs will be based upon the results of surface water monitoring." Fish tissue monitoring is also needed because it takes into consideration biomagnification of the contaminants of concern. Additionally, there may be a need to remediate surface water itself (i.e. Thornton Spring) to prevent the release of COCs to Spring Creek. Surface water ARARs must be met.

The RAOs for surface water should be: 1) prevention of ingestion, inhalation and direct contact with COCs in surface water above acceptable levels; 2) to restore the resource to the site specific cleanup goals; and 3) protect environmental receptors.

18. **pg. 17, Section 4.2.4** - The RAOs for air should be to reduce emission levels to background, or to levels which are protective of human health and the environment.

Even if the remedial actions directed at other media mitigate COC releases to the air, RAOs for the air medium should still be defined. This will be important when evaluating potential air emissions from an air stripper.

19. **Table 4** - One remedial action objective that is not discussed concerns reducing the level of COCs in surface water/sediment such that COC fish tissue levels decrease to the point where they fall below FDA action levels. The no-kill fish zone could then be lifted on Spring Creek.

The word "contact" as used in the RAOs should be more precisely defined to include ingestion, inhalation and direct contact as appropriate for each medium and the COCs present in the medium.

20. **pg. 20, Section 5.1** - General response actions addressing sediments should be considered for inclusion in this section. Although it appears that sediments are inferred to be considered the same as "soil" as a media for remedial consideration, sediment should be addressed separately than soil. Separation of these media will be advantageous in remedial alternative development. Therefore, each time soil is referenced, sediment should also be referenced.

21. **pg. 20, Section 5.3** - The term "technical effectiveness" should read "technical implementability".
22. **Table 5** - Use the term Thermal Destruction when referring to incineration as the process option. Likewise, low temperature thermal stripping should be included in the Thermal category. Also, why are no other thermal technologies other than incineration (i.e., vitrification, infrared thermal treatment) listed under the process options?

On-site disposal should be considered along with off-site disposal.

Under Surface Water Process Options, change "NPDES discharge" to "Surface Water Discharge".

Table 5 should also list any innovative technologies which might be appropriate for this site.

23. **pg. 24, Section 5.4** - See comment 1. regarding the correct evaluation criterion for the screening of remedial technologies.
24. **pg. 24, Section 5.4.1** - It should be noted that the no-action alternative presented would likely be considered a limited action alternative, since it includes several action elements. The no-action alternative typically includes no specific actions.

The remedial alternative titled "no further action" should be considered as a substitute for the "no-action" alternative, given that remedial actions have been previously conducted at the site. The current no-action alternative listed in the document would actually be defined as a "limited action," or a "no further action with monitoring" alternative according to applicable EPA guidance. Long-term fish tissue analyses also need to be conducted as part of the monitoring program.

25. **pg. 26, Section 5.4.2** - Is the Sediment Trap containment strategy retained for further consideration? It is not included in Table 6. Sediment traps should indicate a disposal or treatment method for the sediment.
26. **pg. 27, Section 5.4.3** - Under Collection, the sentence "subsurface drains essentially function like an infinite line of extraction wells" is misleading and needs further clarification.
27. **pg. 27, Section 5.4.4.1** - Why aren't any of the other thermal treatment processes evaluated in addition to incineration?

28. **pg. 28, Section 5.4.4.2** - Bioventing, an emerging remedial technology for the in-situ remediation of volatile compounds, should be considered for detailed evaluation at the Centre County site (see attached reference list for information regarding this technology). Bioventing is being developed and used extensively at several United States Air Force installations and has promising applications for remediation of organics (primarily volatiles) in low permeability soils similar to those found at the Ruetgers-Nease site.
29. **pg. 29, Section 5.4.4.2** - Change "mobilizing" to "immobilizing" in the first sentence under Stabilization/Solidification, Initial Technology Screening.
- Also, there is not enough justification offered in the text for dropping in-situ stabilization. Please provide additional information to justify elimination of this technology.
30. **pg. 30, Section 5.4.4.2** - It should be noted in the first sentence under the Air Stripping heading that this technology may be applied to both groundwater and surface water.
31. **pg. 31, Section 5.4.4.2** - The existence of a treatment system already on-site is not justification for elimination of UV/Oxidation and Reverse Osmosis from further consideration. These technologies appear to be effective in removing contamination. Please provide additional information to justify their elimination.
32. **pg. 32, Section 5.4.4.3** - The Biological Treatment process should be retained and evaluated since it may be able to be successfully used in conjunction with other technologies.
32. **pg. 32, Section 5.4.5** - The Excavation with Disposal and/or Treatment alternative could be effective for treating the shallow surface soils and stream sediments.
33. **pg. 33, Section 5.4.6.2** - The report states that discharge to a POTW is not viable for the treatment of ground or surface water, and has been eliminated from further consideration. This option should be reevaluated as a disposal alternative for treated ground or surface water. Consequently, the POTW disposal option should not be screened from further consideration at this point because it may be an effective disposal option for treated water.
34. **Table 6, Section 5.4.7** - A process option that appears to be left out of this section is excavation with disposal/treatment. In addition, the options (e.g., biodegradation, discharge to POTW, etc...) recommended for retention should be included here for the reasons stated in earlier comments.

35. **Section 5, General Comment** - It does not appear that this report is intended to identify the alternatives that will be retained for detailed analysis. Rather, it appears that the report identifies the technologies that will be screened in more detail prior to the determination of the alternatives that will undergo a detailed analysis.

Another deliverable identifying the alternatives that will be retained for detailed analysis (i.e. evaluated with regard to the nine evaluation criteria of long/short-term effectiveness, implementability, compliance with ARARs, etc.) should be considered for submission and review prior to the start of the detailed FS analysis. The total number of alternatives retained for detailed analysis should not exceed 10 according to general EPA guidance. This will ensure that all parties are clear on the direction and requirements of the FS, especially with regard to remedial action objectives for each media and relevant ARARs.

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December 12, 1990

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**APPLICABLE OR RELEVANT AND APPROPRIATE  
REQUIREMENTS (ARARs)  
FOR  
CLEANUP RESPONSE AND REMEDIAL ACTIONS  
IN PENNSYLVANIA**

**DEPARTMENT OF ENVIRONMENTAL RESOURCES  
BUREAU OF WASTE MANAGEMENT  
HAZARDOUS SITES CLEANUP PROGRAM**

Final

April 1991

AR306378

Recycled Paper 

Preliminary Pennsylvania State ARARs for  
Ruetgers-Nease Chemical Co.  
College Township, Centre County

Hazardous Waste Management Regulations, Article VII, Chapters 260 - 270 (25 Pa. Code 260.1 - 270.1 et seq.).

Article VII applies to the identification and listing, generation, transportation, storage, treatment and disposal of hazardous waste, and, contains the requirements under the federal RCRA program for the state to implement an approved hazardous waste program.

The Pennsylvania ARAR for groundwater for hazardous substances is that all groundwater must be remediated to "background" quality as specified by 25 Pa. Code 264.90 - 264.100 and in particular, by 25 Pa. Code 264.97(i), (j) and 264.100(a)(9). The Commonwealth also maintains that the requirements to remediate to background is also found in other legal authorities.

Pennsylvania also certifies that the background groundwater quality ARAR becomes an ARAR for soils by reason of the hydrogeologic link to the groundwater from the site soils. Soils should be remediated to ensure that migration of soil contaminants to groundwater do not cause groundwater contamination concentrations to exceed background.

Residual Waste Management Regulations, Chapter 287, 288, 289, 291, 293, 297 and 299 (25 Pa. Code 287.1, 288.1, 289.1, 291.1, 293.1, 297.1 and 299.1 et seq.).

Water Quality Management Regulations, Chapters 91, 92, 93, 94, 95, 97, and 101 (25 Pa. Code 91.1, 92.1, 93.1, 94.1, 95.1, 97.1, and 101.1 et seq.).

Air Quality Control Regulations, Chapters 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142 and 143 (25 Pa. Code 121.1, 122.1, 123.1, 124.1, 125.1, 126.1, 127.1, 128.1, 129.1, 130.1, 131.1, 132.1, 133.1, 134.1, 135.1, 136.1, 137.1, 138.1, 139.1, 140.1, 141.1, 142.1, 143.1, et seq.).

Water Supply and Community Health Regulations, Chapter 109 (25 Pa. Code 109.1 et seq.).

Soil and Water Conservation Regulations, Chapter 102 (25 Pa. Code 102.1 et seq.).

Water Resources Management Regulations, Chapter 105 (25 Pa. Code 105.1).

Pennsylvania Scenic Rivers Act, Act of Dec. 5, 1972, P.L. 1277, as amended, 32 P.S. §§820.21 et seq.

Historic Preservation Act of Nov. 22, 1978, P.L. 1160, as amended, 71 P.S. §§1047.1 et seq.,

AR306379

ATTACHMENT

Preliminary Pennsylvania State ARARs for  
Ruetgers-Nease Chemical Co.  
College Township, Centre County

Page 2

The Fish and Boat Code, Act of Oct. 16, 1980, P.L. 996, as amended, 30 Pa. C.S. §§ 101 et. seq.

The Game and Wildlife Code, Act of July 8, 1986, P.L. 1225, 34 Pa. C.S. §§101 et. seq.

The Soil Conservation Law, Act of May 15, 1945, P.L. 547, as amended, 3 P.S. 849.

Pennsylvania Dept. of Transportation, Act of June 1, 1945 (P.L. 1242, No. 428) (36 P.S. §§670-411, 670-420, 670-421 and 670-702).

Pennsylvania State Police, Title 37, Part I, Chapters 11 and 13. Flammable and Combustible Liquids.

Additional requirements and standards relating to this site may be obtained from the guidance document, ARARs for Cleanup Response and Remedial Actions in Pennsylvania, which is included with this submission.

cc: Larry Newcomer  
Doug Overdorff  
John Hamilton  
L. Richard Adams  
Richard Maxwell  
Larry Welfer  
Diana Brems - Central Office HSCP  
Justina Wasicek - HSSE  
John Arway - PA Fish & Boat Commission  
Greg Grabowicz - PA Game Commission

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**APPENDICES:**

**Federal and State Statute/Regulation Guide**

**ARAR Matrices**

- A. Chemical Specific Matrix
  - Table 1, Water Quality Criteria for Toxic Substances
  - Table 2, Community Environmental Control Water Supply Criteria
- B. Location Specific Matrix
- C. Action Specific Matrix

INTRODUCTION

This document contains a list of state standards and requirements for cleanup related activities at waste sites in the Commonwealth of Pennsylvania. The purpose of this document is to identify, in a general fashion, state standards and requirements that will serve as a starting point for the determination of site specific cleanup related criteria.

The development and specific identification of cleanup criteria is a dynamic process. Some standards and requirements can be readily identified (i.e., ambient water quality criteria and promulgated drinking water standards.) Most, however, can only be derived after submittal and review of detailed information regarding site location, system design, and development of contaminant-specific discharge limits.

It should be noted that this document is a comprehensive list of environmental cleanup standards and requirements, however, the document is not inclusive. Additionally, regulatory standards and requirements are subject to change. Therefore, further consultation with and analysis by the appropriate Department and other Commonwealth personnel will be required.

Finally, this document is advisory and does not represent any determination made by the Department of Environmental Resources. This document shall in no way be construed or understood to create any duty or obligation upon the Department of Environmental Resources or the Commonwealth of Pennsylvania.

## DEFINITION OF ARARs

### Background

Section 121(d) the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), (as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA)) and the Hazardous Sites Cleanup Act (HSCA or Act 108) Section 504, requires that Fund-financed, enforcement, and Federal facility remedial cleanup actions comply with requirements or standards under Federal and State environmental laws. The requirements that must be complied with are those that are applicable, or relevant and appropriate, to the hazardous substances, pollutants, or contaminants at a site or to the circumstances of the release. Compliance is required at the completion of the remedial action for hazardous substances, pollutants, or contaminants that remain on-site.

[Section 504 of the Pennsylvania Hazardous Sites Cleanup Act (HSCA) provides that final remedial action under HSCA shall meet applicable and relevant and appropriate cleanup standards. Furthermore, cleanup standards promulgated under HSCA shall be consistent with State standards permitted under 121 (d) of the federal Superfund Act. HSCA further provides that DER may promulgate, by rulemaking, cleanup standards that are generally applicable to remedial responses to the releases of hazardous substances or contaminants.]

Applicable requirements means that those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA or HSCA site. "Applicability" implies that the remedial action or the circumstances at the site satisfy all of the jurisdictional prerequisites of a requirement.

Relevant and appropriate requirements means those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that, while not 'applicable' to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA or HSCA site, address problems or situations sufficiently similar to those encountered, and that their use is well suited to the particular site.

The relevance and appropriateness of a requirement can be judged by comparing a number of factors, including the characteristics of the remedial action, the hazardous substances in question, or the physical circumstances of the site, with those addressed in the requirement. It is also helpful to look at the objective and origin of the requirement. For example, while RCRA regulations may not be applicable to closing undisturbed hazardous waste in place, the RCRA regulation for closure by capping may be deemed relevant and appropriate.

A requirement that is judged to be relevant and appropriate must be complied with to the same degree as if it were applicable. However, there is more discretion in this determination: it is possible for only part of a requirement to be considered relevant and appropriate, the rest being dismissed if judged not to be relevant and appropriate in a given case.

Non-promulgated or non-regulatory documents (health advisories, guidances, proposed regulations) issued by the State or Federal government are not considered potential ARARs and are referred to as "to be considered" requirements or TBCs. TBCs are evaluated along with ARARs and are considered appropriate in the absence of a specific ARAR or where ARARs are not sufficiently protective in developing cleanup goals.

#### Types of ARARs

There are several different types of requirements that Cleanup actions may have to comply with. The classification of ARARs are listed below with specific matrices attached as appendices to this document:

Chemical-specific requirements set legal (background), health or risk-based concentration limits, or ranges in various environmental media for specific hazardous substances, pollutants, or contaminants. Examples: Maximum Contaminant Levels, national Ambient Air Quality Standards.

These requirements may set protective cleanup levels for the chemical of concern in the designated media, or else indicate an acceptable level of discharge (e.g., air emission or wastewater discharge taking into account water quality standards) where one occurs in a remedial activity. If a chemical has more than one such requirement, the more stringent ARAR should be complied with.

In accordance with, among others, Article 1, Section 27 of the Pennsylvania Constitution, Sections 301, 307, 401 and 402 of the Pennsylvania Clean Streams Law, and the Solid Waste Management Act, the legal liability of any responsible party for groundwater contamination is to remediate any contamination to background water quality. Nothing in this document or the accompanying materials should be deemed to constitute any modification to a responsible party's legal liability to restore contaminated waters to background.

Action-specific requirements or design specifications set controls or restrictions on particular kinds of activities related to management of hazardous substances, pollutants, or contaminants. Examples: RCRA regulations for closure of hazardous waste storage or disposal units; RCRA incineration standards; Clean Water Act pretreatment standards for discharges to POTWs.

These requirements are triggered not by the specific chemicals present at a site but rather by the particular remedial activities that are selected to accomplish a remedy. Since there are usually several alternative actions for any remedial site, very different requirements can come into play. These action-specific requirements may specify particular performance levels, actions, or technologies, as well as specific levels (or a methodology for setting specific levels) for discharged or residual chemicals.

Location specific requirements set restrictions on activities depending on the characteristics of a site. Examples: Federal and State siting laws for hazardous waste facilities; sites on National Register of Historic Places.

These requirements function like action-specific requirements. Alternative remedial actions may be restricted or precluded depending on the location or characteristics of the site and the requirements that apply to it.

Specific Standards, Special Standard, and Modifications

- A. **Chemical, Location and Action Specific Matrices** - The Specific Matrices attached to this document and referenced above represent identifications of ARARs at the time this document was prepared. This information shall not be construed as establishing a complete or final list of Pennsylvania ARARs. In addition to the

numbers or description of ARARs contained in the Matrices, other ARARs may exist which are derived from Pennsylvania statutes and regulations which may not be identifiable except in the context of a specific case. The Department reserves the right to identify additional ARARs at any time.

**B. Special Standards** - Section 504 of HSCA allows the Department to establish additional standards, without rulemaking, on a case-by-case basis where any of the following apply:

1. The circumstances at the site are such that the applicable general standards, as applied, would not provide the degree of protection to public health or the environment intended by the general standards.
2. The degree of additional environmental protection provided by the special standard is significant in relation to the cost of implementing it.

**C. Modification of ARARs** - The Department may modify an ARAR if any of the following apply:

1. Compliance with a requirement at a site will result in greater risk to the public health and safety of the environment than alternative options.
2. Compliance with a requirement at a site is technically infeasible from an engineering perspective.
3. The remedial actions selected will attain a standard of performance that is equivalent to that required under the otherwise applicable requirement through use of another method or approach.
4. The remedial action selected will not provide for cost-effective response.

**D. Fund Money Modification** - The Department may modify an ARAR where the site is being remediated through the use of fund money where the Department determines that such a modification is in the public interest.

- E. **Effect of modification under C and D** - Where the Department allows a modification to any ARAR, such modification shall not be construed to constitute a modification of any responsible person's legal liability unless a waiver of liability is expressly stated in writing by the Department. Such a modification shall therefore only constitute an authorization by the Department to proceed with a cleanup plan in accordance with the modification and such conditions as the Department may proscribe.

DER's Bureau of Waste Management

A. Statutory Authority:

The Department's major source of standards and requirements governing waste sites are found under the Solid Waste Management Act (35 P.S. §§6018.101 - 6018.1003).

B. Regulations:

Numerous requirements are promulgated under the Solid Waste Management Act; these regulations are found in the Pennsylvania Bulletin, and are also codified in Title 25 of the Pennsylvania Code. Relevant chapters are as follows:

1. Chapter 75 (25 Pa. Code, Chapter 75 Subchapter A and C).

Subchapter C along with A (25 Pa. Code §§75.21 - 75.38) - sets forth provisions relative to management of municipal and residual waste; applies to any person, municipality, county or authority storing, collecting, transporting, processing or disposing of non-hazardous wastes. All provisions pertaining to municipal waste will be superceded by Chapters 271, 273, 275, 277, 279, 283, and 285 discussed below.

2. Article VII, Chapters 260-270, Hazardous Waste Management Regulations

(a) 25 Pa. Code, Chapters 260-265 and 270 - applies to the identification and listing, generation, transportation, storage, treatment and disposal of hazardous waste; contains the requirements under the federal Resource, Conservation and Recovery Act for a state to implement a federally-approved hazardous waste program.

(b) Chapter 267 (25 Pa. Code §§267.1 - 267.60) - sets forth the minimum requirements for demonstrating sufficient financial responsibility to operate a hazardous waste storage, treatment or disposal facility by providing bond guarantees for the operation, closure, and post-closure requirements of a hazardous waste storage, treatment or disposal



facility, and by providing insurance protection for personal injury and property damage arising out of operation of a hazardous waste storage, treatment or disposal facility.

- (c) Chapter 269 (25 Pa. Code §§269.1 - 269.163) - sets forth requirements that apply to siting of hazardous waste treatment and disposal facilities; divides the criteria for siting hazardous waste treatment and disposal facilities into two phases (Phase I exclusionary criteria which prohibit the siting of a new hazardous waste treatment or disposal facility in an excluded area delineated under these criteria, and Phase II criteria which identify environmental, social, and economic factors which may effect the suitability of a location for a proposed facility and apply to new hazardous waste treatment or disposal facilities and modifications to existing facilities).

3. **Municipal Waste Regulations**

- (a) Chapter 271 25 Pa. Code §§271.1 - 271.506)

Chapter 271 sets forth provisions that are generally applicable to all municipal waste management activities, including definitions for all chapters (Subchapter A), general requirements for permits and permit applications (Subchapter B), permit review procedures and standards (Subchapter C), bonding and insurance requirements (Subchapter D), civil penalties and enforcement (Subchapter E), and requirements for demonstration facilities (Subchapter F). This chapter applies in conjunction with later chapters that are specifically applicable to particular types of facilities.

- (b) Chapter 273 (25 Pa. Code §§273.1 - 273.52).

This chapter sets forth the Department's application and operating requirements for municipal waste landfills. This chapter is divided in five major parts: Subchapter A (relating to general requirements), Subchapter B (relating to application requirements), Subchapter C (relating to operating requirements), Subchapter D (relating to

additional application requirements for special handling and residual waste) and Subchapter E (relating to additional operating requirements for special handling and residual waste). This chapter is generally applicable to all operations at a municipal waste landfill, not merely the specific disposal area.

(c) Chapter 275 (25 Pa. Code §§275.1 - 275.614)

Chapter 275 sets forth the Department's regulations concerning land application of sewage sludge. Subchapter B sets out general application requirements for the three recognized methods of land application of sewage sludge, which are agricultural utilization, land reclamation, and land disposal. Subchapter C sets forth general operating requirements for all three methods of land application of sewage sludge. Subchapter D sets forth additional application and operating requirements for the agricultural utilization of sewage sludge. Additional application and operating requirements for the land disposal of sewage sludge are set forth in Subchapter F. Finally, Subchapter G sets forth the Department's requirements for the sewage sludge distribution program.

(d) Chapter 277 (25 Pa. Code §§277.1 - 277.312)

Chapter 277 sets forth application and operating requirements for construction and demolition waste landfills. Construction/demolition waste is solid waste resulting from the construction or demolition of buildings and other structures, including but not limited to wood, plaster, metals, asphaltic substances, bricks, block and unsegregated concrete. The term also includes dredging wastes. Subchapter B sets out application requirements, and Subchapter C sets out operating requirements.

(e) Chapter 279 (25 Pa. Code 279.1 - 279.262)

Chapter 279 sets forth application and operating requirements for transfer facilities. Subchapter B sets forth application requirements

for transfer stations, and Subchapter C sets forth operating requirements for transfer facilities.

(f) Chapter 281 (25 Pa. Code 281.1 - 281.282)

Chapter 281 contains permitting requirements for composting facilities.

(g) Chapter 283 (25 Pa. Code 283.1 - 283.403)

Chapter 283 concerns resource recovery and other processing facilities. This chapter is applicable to a number of municipal waste processing facilities, including resource recovery facilities, that are not transfer stations or composting facilities. Subchapter B sets forth application requirements stating what an applicant must submit to the Department in order to obtain a permit. Subchapter C sets forth operating requirements for persons or municipalities that operate such facilities. Subchapter D sets forth additional application requirements for special handling wastes. Subchapter E sets forth additional operating requirements for special handling wastes.

(h) Chapter 285 (285.1 - 285.222)

Chapter 285 sets forth standards for storage, collection and transportation of municipal wastes. Subchapter A sets forth standards for storage of municipal waste. Subchapter B sets forth standards for collection and transportation of municipal wastes.

4. Residual Waste Regulations

Proposed rulemaking approved by the EQB in February 1989, published in the Pa. Bulletin as proposed rulemaking on February 24, 1990. The proposed residual waste regulations would create Chapters 287, 288, 289, 291, 293, 295, 297, and 299 to replace Chapter 75, Subchapter C; amend Section 101 of Chapter 101 and also amend Chapters 271, 273, 277, 279, 281 and 283 to delete existing reference to residual waste.

The proposed regulations are organized as follows:

Chapter 287 - Standards applicable to residual waste facilities in general.

Chapter 288 - Residual Waste Landfills

Chapter 289 - Residual Waste Disposal Impoundments

Chapter 291 - Land Application of Residual Waste

Chapter 293 - Transfer Facilities for Residual Waste

Chapter 295 - Composting Facilities for Residual Waste

Chapter 297 - Incinerators and Other Processing Facilities

Chapter 299 - Standards for Collection, Storage and Transportation of Residual Waste.

C. Guidance Documents:

1. Guidance Manual for Groundwater Monitoring, July 1985.
2. Guidance Manual for Landfill Gas Management.
3. Guidelines for the Development and Implementation of Preparedness, Prevention and Contingency (PPC), Plans.
4. Environmental Assessment Process (Module 9) Guidance Manual.
5. Guidelines for Benthic Macroinvertebrate Stream Surveys for Landfills, June 1988.
6. Interim Policy for the Storage of Waste Tires and Tire-Derived Materials, July 1988.

7. Management Policy for Ash Residue from Municipal Waste Incineration Resource Recovery Facilities.
8. Interim Policy for the Beneficial Use of Residual Waste, September 1987.
9. Application for Storage, Treatment, Disposal of Hazardous Waste - Module #1.
10. Ground Water Remediation, December 20, 1990. DER Secretary memo establishes ground water remediation levels.
11. Policy and Procedure for the Disposal of Fuel Contaminated Soils. May 1990.

DER's Bureau of Water Quality Management

A. Statutory Authority:

1. The Department's major source of standards and requirements governing water quality are found under the Clean Streams Law, Act of June 22, 1937, P.L. 1987, as amended, 35 P.S. §§691.1 et. seq.
2. Additional requirements specific to community and individual sewage treatment and disposal systems are found under the Sewage Facilities Act (537), Act of January 24, 1966, P.L. 1535, as amended, 35 P.S. §§750.9 et seq.
3. Storage Tank and Spill Prevention Act (32), Act of July 6, 1989.

B. Regulations:

The regulations for the Storage Tank and Spill Prevention Act are under development.

Numerous requirements are promulgated under the Clean Streams Law, the Sewage Facilities Act and the Administrative Code; refer to the Pa. Bulletin and Title 25 of the Pa. Code. Relevant chapters are as follows:

1. Chapter 71 (25 Pa. Code §§71.1 et seq.) - This chapter sets forth regulations requiring Planning Requirements for Sewage Facilities, administration of permits for individual and community sewage systems, and the powers and duties of the Certification Board.
2. Chapter 72 (25 Pa. Code §§72.1 et. seq.) - This chapter sets forth regulations governing the issuance of permits by local agencies for retaining tanks, and individual and community on-lot sewage systems which handle less than 10,000 gallons per day and utilize subsurface absorption areas for effluent renovation.
3. Chapter 73 (25 Pa. Code §§73.1 et. seq.) - This chapter sets forth regulations pertaining to site and soil suitability for on-lot sewage disposal, the size and

type of treatment tanks, treatment tank effluent dosing and distribution requirements, absorption area requirements, retaining tank standards, and experimental and alternate systems.

4. Chapter 91 (25 Pa. Code §§91.1 et. seq.) - This chapter sets forth general provisions for administration and enforcement of Pennsylvania's water pollution control program, and establishes specific application requirements and conditions for the approval and permitting of the construction and operation of waste treatment projects.
5. Chapter 92 (25 Pa. Code §§92.1 et. seq.) - This chapter sets forth provisions for the administration of the National Pollutant Discharge Elimination System (NPDES) Program within Pennsylvania, and establishes criteria for the content of NPDES permit applications, effluent standards, monitoring requirements, standard permit conditions, public notification procedures, and other requirements related to the NPDES Program.
6. Chapter 93 (25 Pa. Code §§93.1 et. seq.) - This chapter sets forth general and specific standards for the quality of Pennsylvania's waters and includes specific water quality criteria and designated water use protection for each stream in Pennsylvania. It is reviewed and updated, as necessary, at least once every three years.
7. Chapter 94 (25 Pa. Code §§94.1 et. seq.) - This chapter sets forth provisions for municipalities to address pretreatment and other management requirements for wastewaters discharged into municipal sewage collection and treatment systems.
8. Chapter 95 (25 Pa. Code §§95.1 et. seq.) - This chapter sets forth waste treatment requirements for all dischargers including general requirements for "High Quality Waters" and "Exceptional Value Waters" and procedures for dealing with special circumstances, such as developing wasteload allocations, discharges to acid impregnated streams and discharges to lakes, ponds, and impoundments.

9. Chapter 97 (25 Pa. Code §§97.1 et. seq.) - This chapter sets forth specific provisions concerning the discharge of industrial wastes to Pennsylvania waters.
10. Chapter 101 (25 Pa. Code §§101.1 et. seq.) - This chapter sets forth special provisions for incidences which would endanger downstream users of Pennsylvania waters, and specifies actions to be taken when such emergency incidences occur.
11. Chapter 102 (25 Pa. Code §§102.1 et. seq.) - This chapter sets forth requirements for the control of soil erosion and sedimentation resulting in earthmoving activities.

Note: The administration of Chapter 102, in most cases, has been delegated to County Conservation Districts working in cooperation with the DER's Bureau of Soil and Water Conservation.

C. Guidances and Strategies:

1. 25 Pa. Chapter 16, Statement of Policy.
2. Industrial Waste Manual.
3. Sewerage Manual.
4. Spray Irrigation Manual.
5. Strategy for Making Water Quality Management Plan Amend./Consistency.
6. Toxics Management Strategy.
7. Technical Guidance for NPDES Permitting of Landfill Leachate Discharges.



8. Wastewater Treatment Technology Assessment for Municipal Waste Landfills.
9. Staff Guidance For Underground Storage Systems in Pennsylvania.

DER's Bureau of Community Environmental Control

A. Statutory Authority:

Pennsylvania Safe Drinking Water Act, Act of May 1, 1984, P.L. 206, 35 P.S. §§721.1 et. seq.

B. Regulations:

Regulations promulgated under the Safe Drinking Water Act; refer to the Pa. Bulletin and Title 25 of the Pennsylvania Code:

Chapter 109 (25 Pa. Code §§109 et. seq.) - This chapter sets forth drinking water quality standards at least as stringent as federal standards: maximum contaminant levels (MCLs), and additional state requirements: secondary maximum contaminant levels (SMCLs) for public water systems including permit design and construction, source quality and siting requirements. Chapter 109 is undergoing revision.

C. Guidance Documents:

The guidance for limiting unregulated contaminants in public water supplies is referenced in Chapter 109.203 and in the following:

1. Unregulated Contaminants Guidance and Health Effects Information Document.

Public water systems shall supply finished water that complies with the maximum unregulated contaminant concentrations (MUCC) determined as follows:

- (a) The MUCC will be the concentration at which EPA has proposed to set or is considering setting a primary MCL for the contaminant; or
- (b) If EPA has not established a concentration as set forth in (a) above, the MUCC will be the concentration associated with a lifetime cancer risk

of  $10^{-6}$  for carcinogenic contaminants or the concentration equal to the lifetime health advisory concentration for non-carcinogenic contaminants, provided that this concentration is equal to or greater than the practical quantitation level and achievable through the use of available treatment technology; or

- (c) If the concentration specified in (b) above is not equal to or greater than the practical quantitation level or is not achievable through the use of available treatment technology, the MUCC will be set at the lowest concentration these limiting factors will allow.

2. DER Public Water Supply Manual

In an effort to develop, maintain and attain the above drinking water quality requirements, the Bureau has developed a Public Water Supply Manual. The Manual contains siting, treatment design and construction standards which the Department finds to be acceptable.

DER's Bureau of Air Quality Control

A. Statutory Authority:

The Department's major source of standards and requirements governing air quality are found under the Air Pollution Control Act, Act of January 8, 1960, P.L. 2119, 35 P.S. §§4001, et. seq.

B. Regulations:

Numerous requirements are promulgated under the Air Pollution Control Act; refer to the Pa. Bulletin and Title 25 of the Pennsylvania Code. Relevant chapters are as follows:

1. Chapter 123 (25 Pa. Code §§123.1 et. seq.) - This chapter on "Standards for Contaminants" sets forth requirements for fugitive emissions, including open burning and demolition activities; specific limitations for particulate matter sulfur dioxide, odor, and visible emissions.
2. Chapter 127 (25 Pa. Code §§127.1 et. seq.) - This chapter on "Construction, Modification, Reactivation and Operation of Sources" requires the use of Best Available Technology (BAT) for control of new sources, plan approval and operating permit requirements, and special requirements for sources in nonattainment areas.

25 Pa. Code §§127.12(a)(5) requires that new air contaminant sources reduce emissions to the minimum attainable level through the use of best available technology (BAT). Applicants are responsible for demonstrating that BAT will be utilized on the sources in its plan approval application. BAT is defined in 25 Pa. Code 121.1. In order to determine that a plan approval application has demonstrated that the source will control emissions of air contaminants to the appropriate level, the Department needs to review each plan approval application on a case-by-case basis. Source-specific factors can impact on what devices, methods or techniques are needed to control emissions. The Department bases its case-by-case determinations of BAT on the engineering judgment of the plan approval application reviewers. The

Department needs to review each plan approval application to apply the BAT requirement. If plan approvals (construction permits) will not be required, the Department will need to evaluate plan approval type technical information regarding the source to make a BAT determination.

3. Chapter 129 (25 Pa. Code §§129.1 et. seq.) - This chapter on "Standards for Sources" governs for open burning and specific industrial sources.
4. Chapter 131 (25 Pa. Code §§131.1 et. seq.) - This chapter on "Ambient Air Quality Standards" adopts Federal ambient air quality standards plus sets forth additional State standards for settled particulate, beryllium, sulfates, fluorides, and hydrogen sulfide.
5. Chapter 135 (25 Pa. Code §§135.1 et. seq.) - This chapter on "Reporting of Sources" requires the submission of data necessary for the identification and quantification of potential and actual air contaminant emissions.
6. Chapter 137 (25 Pa. Code §§137.1 et. seq.) - This chapter on "Air Pollution Episodes" sets forth requirements for standby plans and the implementation of emission reduction procedures to prevent the excessive buildup of air pollutants during air pollution episodes.
7. Chapter 139 (25 Pa. Code §§139.1 et. seq.) - This chapter on "Sampling and Testing" sets forth requirements for sampling of facilities, sampling methods and analytical procedures.
8. Chapter 141 (25 Pa. Code §§139.1 et. seq.) - This chapter on "Variances and Alternative Standards" establishes that the Department may impose more stringent standards than set forth in other Bureau of Air Quality regulations where 1) the standard is related to achieving ambient air quality standards, 2) the standard can be achieved through BAT, or 3) the standard is necessary to protect the public health, safety or welfare.

C. Guidance Documents:

1. "Hazardous Waste and Petroleum Products Contamination Cleanup Projects" requires plan approval and BAT for air strippers and other equipment designed to remove volatile contaminants from soil, water, and other materials.
2. "BAT criteria for Municipal Incinerators."
3. "BAT criteria for Hospital/Infectious Waste Incinerators."
4. "Interim Operating Guidance for Air Toxic Substances", provides a consistent procedure for permitting new and modified sources that emit air toxic substances. The guidance specifies how to evaluate sources, based mainly on the chronic (annual) low level exposure air quality guidelines for approximately 99 compounds. It also requires an acute (weekly) exposure assessment for formaldehyde and nickel compounds. This guidance is intended to provide a framework to assess the potential for public health hazards from the emissions of air toxic substances. The guidance provides criteria for the acceptance/rejection of plan approval applications for air contaminant sources. The requirements are both site and source specific, being established on a case by case basis.
5. "Air Quality Permitting Criteria for Remediation Projects Involving Air Strippers and Soil Decontamination Units." Provides a permit exemption policy for remediation projects involving the Bureau of Air Quality Control.
6. "Air Quality Permitting Criteria Including Best Available Technology Criteria for Municipal Waste Landfills." This document specifies plan approval requirements and guidelines to satisfy BAT requirements as established by 127.12(a)(5) for municipal waste landfills.

DER's Bureau of Soil and Water Conservation

A. Statutory Authority:

The Clean Streams Law, the Act of June 22, 1937, as amended, P.L. 1987,  
35 P.S. 691.1 et. seq.

B. Regulations:

Requirements promulgated under the Clean Streams Law; see the Pa. Bulletin and  
Title 25 of the Pennsylvania Code:

Chapter 102 (25 Pa. Code §§102.1 et. seq.) - This chapter sets forth provisions that  
impose requirements on earth moving activities which create accelerated erosion  
or danger of accelerated erosion and which require planning and implementation of  
effective soil conservation measures. The Bureau administers a program for the  
control of erosion and sedimentation in cooperation with County Conservation  
Districts. Chapter 102 is undergoing revision.

C. Guidance Document:

Soil Erosion and Sedimentation Control Manual.

DER's Bureau of Dams and Waterway Management

A. Statutory Authority:

1. The Flood Plain Management Act, Act of October 4, 1978, P.L. 851, No. 166, 32 P.S. §§679.101 et. seq.
2. The Dam Safety and Encroachments Act, Act of 1978, P.L. 1375, as amended, 32 P.S. §§693.1 et. seq.
3. The Storm Water Management Act, Act of October 4, 1978, P.L. 864, No. 167, as amended, 32 P.S. §§680.1 - 680.17.
4. The Clean Streams Law of Pennsylvania, Act of June 22, 1937, P.L. 1987, 35 P.S. §§691.1 et. seq.

B. Regulations:

1. Regulations promulgated under the Dam Safety and Encroachments Act; see the Pa. Bulletin and Title 25 of the Pennsylvania Code:

Chapter 105 (25 Pa. Code §§105.1 et. seq.) - This chapter sets forth provisions for the regulation and supervision of dams, reservoirs, water obstructions, encroachments, and wetlands in the Commonwealth. (Wetlands protection is under the jurisdiction of the Bureau of Water Resources Management, Division of Rivers and Wetlands).

2. Regulations promulgated under the Flood Plain Management Act; see the Pa. Bulletin and Title 25 of the Pa. Code:

Chapter 106 (25 Pa. Code §§106.1 et. seq.) - This chapter sets forth provisions for the regulation of obstructions and highway obstructions constructed, owned or maintained by a political subdivision of the Commonwealth, or a public utility, and located in the 100 year floodplain as delineated by FEMA Flood Hazard Boundary Maps.



3. Regulations promulgated under the Storm Water Management Act; see the Pa. Bulletin and Title 25 of the Pa. Code:

Chapter 111 (25 Pa. Code §§111.1 et. seq.) - This chapter sets forth provisions governing the awards of grants to counties and municipalities for preparing and implementing storm water management plans.

DER's Bureau of Water Resources Management

A. Statutory Authority

The Dam Safety and Encroachments Act, Act of 1978, P.L. 1375, as amended,  
32 P.S. §§693.1 et. seq.

B. Regulations:

The Bureau's Division of Rivers and Wetlands is enforcing the regulations promulgated under the Dam Safety and Encroachments Act for the preservation of designated rivers and wetlands; see the Pa. Bulletin and Title 25 of the Pennsylvania Code:

Chapter 105 (25 Pa. Code §§105.1 et. seq.) - This chapter sets forth provisions for the regulation and supervision of dams, reservoirs, water obstructions, encroachments, and wetlands in the Commonwealth. Chapter 105 is under revision.

C. Guidance:

1. DER Wetlands Action Plan, 1988.
2. Wetlands Protection: A Handbook for Local Government Officials.

AR306407

DER's Bureau of Radiation Protection

A. Statutory Authority:

The Radiation Protection Act, Act of July 10, 1984, P.L. 688, 35 P.S. §§7110.101 et. seq.

B. Regulations:

Several regulations promulgated under the authority of the Atomic Energy Development and Radiation Control Act; see the Pa. Bulletin and Title 25 of the Pennsylvania Code.

1. Chapter 215 (25 Pa. Code §§215.1 et. seq.) - This chapter sets forth general provisions for all persons who use, manufacture, produce, transport, transfer, receive, acquire, possess or dispose of any radiation source.
2. Chapter 217 (25 Pa. Code §§217.1 et. seq.) - This chapter sets forth provisions for application and licensing requirements for persons who manufacture, produce, transport, transfer, receive, acquire, possess or dispose of any radioactive material.
3. Chapter 219 (25 Pa. Code §§219.1 et. seq.) - This chapter sets forth provisions for individual exposure limits, emission standards, and safety requirements.

C. Additional Requirements:

1. Chapter 403 - This chapter sets forth the Pennsylvania Department of Transportation requirements for transporting radioactive materials.
2. The Nuclear Regulatory Commission should be notified if high level wastes are involved.

DER's Bureau of Topographic and Geologic Survey

A. Statutory Authority:

The Water Well Drillers License Act, Act of May 29, 1956, P.L. 1840, 32 P.S.  
§645.1 et. seq.

B. Regulations:

Requirements promulgated under the Water Well Driller License Act; see the Pa.  
Bulletin and Title 25 of the Pennsylvania Code:

Chapter 107 (25 Pa. Code §§107.1 et. seq.) - This chapter sets forth requirements  
for the licensing of water well drillers, prevention of pollution of underground  
waters, submittal of well construction records and well abandonment notification.

DER's Bureau of Oil and Gas Management

A. Statutory Authority:

1. The Oil and Gas Act of 1984, Act of December 19, 1984, P.L. 1140, as amended, 58 P.S. §§ 601.101 et. seq. The Oil and Gas Act is the fundamental law governing activities for the oil and gas industry. It sets forth permitting, drilling, operating, casing, plugging, reporting, financial responsibility, gas storage, well location restrictions, and other requirements.
2. The Coal and Gas Coordination Act, Act of December 18, 1984, P.L. 1069, 58 P.S. §§501 et. seq. The Coal and Gas Coordination Act coordinates the activities of coal mines and gas wells dealing with non-conservation wells that penetrate a working coal seam.
3. The Oil and Gas Conservation Law of 1961, Act of July 25, 1961, P.L. 825, 58 P.S. §§401 et. seq.
4. The Clean Streams Law (35 P.S. §§641.1-691.1001).
5. The Solid Waste Management Act (35 P.S. §§6018.101-6018.1003).
6. Article XIX-A of The Administrative Code of 1929 (71 P.S. §§510.1-510.108).

B. Regulations:

Chapter 78 (25 PA Code §§78.1 et. seq.) - This chapter regulates the drilling and production of oil and gas wells. Included in this chapter are regulations concerning environmental protection and well drillings, operations and plugging.

Chapter 79 (25 Pa. Code §§179.1 et. seq.) - This chapter regulates conservation wells, those wells which penetrate the Onondaga or deeper horizon, or are drilled to greater than 3,800 ft.

C. Guidance Documents:

DER Oil and Gas Operator Manual

Note: The sections of these acts, regulations and guidelines which are most likely to be used as ARARs in a cleanup response action are the requirements for plugging of oil and gas wells, as follows:

- (a) 58 P.S. §§601.210 - Plugging requirements; and 610.211 - Alternative methods
- (b) 25 Pa. Code §§78.91-.98 - Well Plugging
- (c) 25 Pa. Code Chapter C, "Environmental Protection Performance Standards."

DER's Bureau of Mining and Reclamation

A. Statutory Authority:

1. The Surface Mining Conservation and Reclamation Act, Act of May 31, 1945, P.L. 1198, as amended, 52 P.S. §§1396.1 et. seq.
2. The Coal Refuse Disposal Control Act, Act of September 28, 1968, P.L. 1080, as amended, 52 P.S. §§30.51 et. seq.
3. The Bituminous Mine Subsidence and Land Conservation Act, Act of April 22, 1966, P.L. 30-1, as amended, 52 P.S. §§1406.1 et. seq.
4. The Administrative Code, Act of April 9, 1929, P.L. 177, as amended, 71 P.S. §§510 et. seq.
5. The Clean Streams Law, Act of June 22, 1937, P.L. 1987, as amended, 35 P.S. §§691.1 et. seq.
6. Noncoal Surface Mining Conservation and Reclamation Act, Act of December 19th, 1984, P.L. 1093, 52 P.S. §§3301 et. seq.

B. Regulations:

Numerous regulations promulgated under the above statutes; see the Pa. Bulletin and Title 25 of the Pennsylvania Code:

1. Chapter 77 (25 Pa. Code §§77.1 et. seq.) - This chapter sets forth procedures and regulations for non-coal mining activities and establishes informational requirements for permit applicants, siting criteria, and operational standards.
2. Chapter 86 (25 Pa. Code §§86.1 et. seq.) - This chapter sets forth general permit application requirements for all coal mining activities, permit procedures and siting criteria.

3. Chapter 87 (25 Pa. Code §§87.1 et. seq.) - This chapter sets forth informational requirements to support permit applications for bituminous surface mining operations and establishes land reclamation and environmental protection standards, including requirements for the preservation of hydrologic balances.
4. Chapter 88 (25 Pa. Code §§88.1 et. seq.) - This chapter sets forth requirements governing anthracite surface and deep mining activities. Chapter 88 establishes mine siting criteria and environmental protection performance standards, including requirements for the preservation of a hydrologic balance, proper closure of mines, and subsidence control.
5. Chapter 89 (25 Pa. Code §§89.1 et. seq.) - This chapter governs bituminous deep mining activities. Chapter 89 establishes mine siting criteria and environmental protection performance standards, including requirements for the preservation of a hydrologic balance, proper closure of mines, and subsidence control.
6. Chapter 90 (25 Pa. Code §§90.1 et. seq.) - This chapter sets forth requirements regarding coal refuse disposal in surface and deep mines, including provisions for application requirements and environmental performance standards.

C. Guidance Documents:

1. Bureau of Mining and Reclamation Program Guidance Manual.
2. Program Guidance Manual for Surface Bituminous Coal Mining.



DER's Bureau of Abandoned Mine Reclamation

No regulations. This Bureau should be notified of Superfund site work in abandoned mine areas.

Other Potential Applicable or Relevant and Appropriate Requirements

Pennsylvania Scenic Rivers Act, Act of Dec. 5, 1972, P.L. 1277, as amended, 32 P.S. §§820.21 et. seq.

Historic Preservation Act of Nov. 22, 1978, P.L. 1160, as amended, 71 P.S. §§1047.1 et. seq.

The Fish and Boat Code, Act of Oct. 16, 1980, P.L. 996, as amended, 30 Pa. C.S. §§101 et. seq.

The Game and Wildlife Code, Act of July 8, 1986, P.L. 1225, 34 Pa. C.S. §§101 et. seq.

The Soil Conservation Law, Act of May 15, 1945, P.L. 547, as amended, 3 P.S. 849.

Pennsylvania Dept. of Transportation, Act of June 1, 1945 (P.L. 1242, No. 428) (36 P.S. §§670-411, 670-420, 670-421 and 670-702).

Pennsylvania State Police, Title 37, Part I, Chapters 11 and 13. Flammable and Combustible Liquids.

FEDERAL AND STATE STATUTE/REGULATION GUIDE

Program	Federal		State		Roles of Federal and State Governments
	Statute	Regulation	Statute	Regulation	
Water Pollution	33 U.S.C. §1251	40 C.F.R. Parts 100-149 and 400-471	35 P.S. §591.1 et seq. 35 P.S. §751.1 et seq.	25 PA Code, Chapter(s) 92 Chapter(s) 71, 73 Chapter(s) 94, 95	Federal Government's role in water pollution is almost exclusively oversight when NPDES permits have been delegated to a state as they have in PA. PA administrators permit program for direct discharges and in conjunction with local government administers septic tank program.
Air Pollution	42 U.S.C. §7401 et seq.	40 C.F.R. Parts 50-87	35 P.S. §4001 et seq.	25 PA Code, Chapter(s) 127, 143 Chapter(s) 122, 124	Federal Government adopts National Ambient Standards, certain New Source Standards, and certain Hazardous Waste Standards and acts in major oversight role of State activities. PA develops state implementation plan to meet federal ambient standards and issues permits for point sources. Federal government retains some enforcement authority but major authority exercised by State.
Mining	30 U.S.C. §1201 et seq.	30 C.F.R. Parts 761-955	52 P.S. §1396 et seq. 52 P.S. §1406.1 et seq.	25 PA Code, Chapter(s) 86-90	State has been delegated authority to implement mining law with the Department of Interior playing oversight role.
Waste Management (Hazardous Waste except Superfund)	42 U.S.C. §6901 et seq. 15 U.S.C. §2601 et seq.	40 C.F.R. Parts 240-280 40 C.F.R. Parts 702-799	35 P.S. §6018.101 et seq.	25 PA Code, Chapter(s) 75, 260-270	State implements RCRA after federal delegation. Pennsylvania has been delegated most but not all of federal RCRA. State implements independent program for other portions of solid waste management not covered by federal law.
Drinking Water	42 U.S.C. §300f-300j	40 C.F.R. Parts 141-147	35 P.S. §750.1 et seq.	25 PA Code, Chapter(s) 109	State implements program after federal delegation. Federal role in Pennsylvania is largely oversight.
Superfund/Hazardous Sites Cleanup Act	42 U.S.C. §9601 et seq.	40 C.F.R. Parts 300, 306	35 P.S. §6020.101 et seq.	Regulations in development	Federal superfund almost exclusively implemented by federal government. State pays limited support role. State statute created an independent state program. (Hazardous Sites Cleanup Act).
Wetlands Protection	33 U.S.C. §404 33 U.S.C. §401	33 C.F.R. Parts 300, 306	35 P.S. §693.1 et seq.	25 PA Code, Chapter(s) 105	Both state and federal permits are required to fill wetlands.
General Environmental Impact Analysis	42 U.S.C. §4321		PA Const. Art 1, §27	Self executing	Federal government is required under NEPA to develop environmental impact statement for federal actions. Constitution requires that state and local government comply with environmental provision of constitution.
Flood Plain Management	42 U.S.C. §4001	44 C.F.R. Part 60	32 P.S. §679.101 et seq.	25 PA Code, Chapter(s) 105 16 PA Code, Chapter(s) 38	State law requires that municipalities pass regulations that comply with federal law.
Dam Safety & Encroachment	33 U.S.C. §404	33 C.F.R. Part 320, 330	32 P.S. §693.1 et seq.	25 PA Code, Chapter(s) 105	Army Corps of Engineers issues "404" permits in wetlands. Pennsylvania independent authority.
Oil & Gas Management	..	..	58 P.S. §601.101 et seq. 58 P.S. §501. et seq. 58 P.S. §471. et seq.	25 PA Code, Chapter(s) 78, 79	No express federal program except to the extent groundwater regulated under other federal statutes.
Stormwater	33 U.S.C. §402	40 C.F.R. §122.21	32 P.S. §680.1 et seq.	25 PA Code, Chapter(s) 111	Federal permits not required until 10/1/92 but federal government can require if stormwater creates pollution. State law requires municipalities to prepare stormwater management plans.

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## Appendix A

### Water Quality Criteria for Toxic Substances

Table 1 lists the human health and aquatic life criteria for toxic substances which the Department will use in development of effluent limits in NPDES permits. The human health criteria are further defined as to the specific effect (that is, carcinogenicity, taste and odor, general health). For those aquatic life criteria which are hardness related and specified as a formula, such as several of the heavy metals, criteria for hardness values of 50, 100 and 200 are provided as examples. The Department will use the specific hardness of the receiving stream in calculating criteria on a case-by-case basis for these substances. The parameters are grouped according to chemical/analytical properties and denoted alphanumerically: M = Metals; A = Acid Soluble; V = Volatile; B = Base Neutral; and P = Pesticide. Some of these criteria may be superseded for Drainage Lists W (Ohio River Basin) and X (Lake Erie Basin) under interstate and international compact agreements with Ohio River Valley Sanitation Commission and International Joint Commission, respectively. See Section 93.9 (relating to designated water uses and water quality criteria) for specific parameters and criteria.

#### Acronyms and Footnotes to Table 1

- H = Threshold effect human health criterion.
- CRL = Cancer risk level criterion at  $1 \times 10^{-6}$ .
- T&O = Taste and odor criterion.
- $\ln H$  = Natural logarithm of the hardness of stream as mg/l  $\text{CaCO}_3$ .
- N/A = Insufficient data to develop criterion.
- b = Criterion is for total of halomethanes (5V + 8V + 12V + 20V + 21V) present.
- c = Criterion is for total dichlorobenzenes (20B + 21B + 22B) present.
- d = Criterion is for total PCBs (18P + 19P + 20P + 21P + 22P + 23P + 24P).

See 25 Pa. Code Chapter 16 for specific details.

Refer to 25 Pa. Code Chapter 93 for other specific Water Quality Standards.

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**Potential Chemical - Specific Applicable or Relevant/Appropriate Requirements**

**APPENDIX A**

**Table 1  
Water Quality Criteria for Toxic Substances**

PP No.	Chemical Name	CAS Number	Fish and Aquatic Life Criteria			Human Health Criteria (ug/l)
			Criteria Continuous Concentrations (ug/l)	Criteria Maximum Concentrations (ug/l)		
1M	Antimony	07440360	219	1095	145	H
2M	Arsenic	07440382	190 (As3 +)	360 (As3 +)	50	H
3M	Beryllium	07440417	0.01 x 96Hr LC50	0.05 x 96hr LC50	0.007	CRL
4M	Cadmium	07440439	Exp (0.7852[1nH] - 3.490) @H = 50 Crit = 0.66	200 100 1.1 2.0	200 100 3.9 8.6	H
5M	Chromium, Total	07440473	11 + Exp (0.8190[1nH] + 1.561) @H = 50 Crit = 131	100 221 381	200 100 1716 3116	H
5M	Chromium, VI	07440473	11	16	50	H
6M	Copper	07440508	Exp (0.8545[1nH] - 1.465) @H = 50 Crit = 6.5	100 12 21	200 100 18 34	1,000 T&O
7M	Lead	07439921	Exp (1.266[1nH] - 4.661) @H = 50 Crit = 1.3	100 3.2 7.7	200 100 82 200	50 H
8M	Mercury	07439976	0.012	2.4	0.144	H
9M	Nickel	07440020	Exp (0.8460[1nH] + 1.1645) @H = 50 Crit = 88	100 160 280	200 100 1,400 2,500	632 H

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Table 1 (Continued)

PP No.	Chemical Name	CAS Number	Fish and Aquatic Life Criteria		Human Health Criteria (ug/l)
			Criteria Continuous Concentrations (ug/l)	Criteria Maximum Concentrations (ug/l)	
10M	Selenium	07782492	5	20	10 H
11M	Silver	07440224	0.2	Exp (1.72[lnH] - 6.52) @H = 50 100 200 Crit = 1.2 4.1 1.3	50 H
12M	Thallium	07440280	18	90	13 H
13M	Zinc	07440666	Exp (0.8473[lnH] + 0.7614) @H = 50 100 200 Crit = 59 110 190	Exp (0.8473[lnH] + 0.8604) @H = 50 100 200 Crit = 65 120 210	5,000 T&O
14M	Cyanide, Free	00057125	5	22	200 H
15M	Phenolics (Total Phenols)	---	20	100	5 (at water supply intake) T&O
1A	2-Chlorophenol	00095578	20	100	0.1 T&O
2A	2,4-Dichlorophenol	00120832	337	1685	0.3 T&O
3A	2,4-Dimethylphenol	00105679	132	660	400 T&O
4A	4,6-Dinitro-o-Cresol	00534521	16	80	13.4 H
5A	2,4-Dinitrophenol	00051285	131	655	70 H
6A	2-Nitrophenol	00088755	20	100	N/A -
7A	4-Nitrophenol	00100027	467	2335	N/A -
8A	p-Chloro-m-Cresol	00059507	31	155	3,000 T&O
9A	Pentachlorophenol	00087865	Exp (1.005[pH] - 5.290) @pH = 6.5 7.8 9.0 Crit = 3.5 13 43	Exp (1.005[pH] - 4.830) @pH = 6.5 7.8 9.0 Crit = 5.5 20 68	30 T&O

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Table 1 (Continued)

PP No.	Chemical Name	CAS Number	Fish and Aquatic Life Criteria			Human Health Criteria (ug/l)
			Criteria Continuous Concentrations (ug/l)	Criteria Maximum Concentrations (ug/l)		
10A	Phenol	00108952	20	100	300	T&O
11A	2,4,6-Trichlorophenol	00088062	91	455	1	CRL
1V	Acrolein	00107028	1	5	320	H
2V	Acrylonitrile	00107131	129	645	0.06	CRL
3V	Benzene	00071432	128	640	1	CRL
4V	(Deleted)					
5V	Bromoform	00075252	365	1,825	0.2(b)	CRL
6V	Carbon Tetrachloride	00056235	556	2,780	0.3	CRL
7V	Chlorobenzene	00108907	236	1,180	20	T&O
8V	Chlorodibromomethane	00124481	N/A	N/A	0.2(b)	CRL
9V	Chloroethane	00075003	N/A	N/A	N/A	-
10V	2-Chloroethyle Vinyl Ether	00110758	3,500	17,500	N/A	-
11V	Chloroform	00067663	389	1,945	0.2	CRL
12V	Dichlorobromomethane	00075274	N/A	N/A	0.2(b)	CRL
14V	1,1-Dichloroethane	00075343	N/A	N/A	N/A	-
15V	1,2-Dichloroethane	00107062	3,088	15,440	0.4	CRL
16V	1,1-Dichloroethylene	00075354	1,492	7,460	0.06	CRL
17V	1,2-Dichloropropane	00078875	2,165	10,825	N/A	-
18V	1,3-Dichloropropylene	00542756	61	305	87	H

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Table 1 (Continued)

PP No.	Chemical Name	CAS Number	Fish and Aquatic Life Criteria			Human Health Criteria (ug/l)
			Criteria Continuous Concentrations (ug/l)	Criteria Maximum Concentrations (ug/l)		
19V	Ethylbenzene	00100414	580	2,900	1,400	H
20V	Methyl Bromide	00074839	110	550	0.2(b)	CRL
21V	Methyl Chloride	00074873	5,500	27,500	0.2(b)	CRL
22V	Methylene Chloride	00075092	2,368	11,840	5	CRL
23V	1,1,2,2-Tetrachloroethane	00079345	208	1,040	0.2	CRL
24V	Tetrachloroethylene	00127184	139	695	0.7	CRL
25V	Toluene	00108883	330	1,650	14,300	H
26V	1,2-trans-Dichloroethylene	00156605	1,350	6,750	350	H
27V	1,1,1-Trichloroethane	00071556	605	3,025	1,000	H
28V	1,1,2-Trichloroethane	00079005	678	3,390	0.6	CRL
29V	Trichloroethylene	00079016	450	2,250	3	CRL
30V	(Deleted)					
31V	Vinyl Chloride	00075014	N/A	N/A	0.02	CRL
1B	Acenaphthene	00083329	17	85	20	T&O
2B	Acenaphthylene	00208968	N/A	N/A	0.003	CRL
3B	Anthracene	00120127	N/A	N/A	0.003	CRL
4B	Benizidine	00092875	59	295	0.0001	CRL
5B	Benzo(a)Anthracene	00056553	0.1	0.5	0.003	CRL
6B	Benzo(a)Pyrene	00050328	N/A	N/A	0.003	CRL

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Table 1 (Continued)

PP No.	Chemical Name	CAS Number	Fish and Aquatic Life Criteria		Human Health Criteria (ug/l)
			Criteria Continuous Concentrations (ug/l)	Criteria Maximum Concentrations (ug/l)	
7B	3,4-Benzofluoranthene	00205992	N/A	N/A	0.003 CRL
8B	Benzo(ghi)Perylene	00191242	N/A	N/A	0.003 CRL
9B	Benzo(k)Fluoranthene	00207089	N/A	N/A	0.003 CRL
10B	Bis(2-Chloroethoxy) Methane	00111911	N/A	N/A	N/A -
11B	Bis(2-Chloroethyl) Ether	00111444	6,000	30,000	0.03 CRL
12B	Bis(2-Chloroisopropyl) Ether	00108601	N/A	N/A	34.7 H
13B	Bis(2-Ethylhexyl) Phthalate	00117817	909	4,545	15,000 H
14B	4-Bromophenyl Phenyl Ether	00101553	54	270	N/A -
15B	Butylbenzyl Phthalate	00085687	35	140	N/A -
16B	2-Chloronaphthalene	00091587	N/A	N/A	N/A -
17B	4-Chlorophenyl Phenyl Ether	07005723	N/A	N/A	N/A -
18B	Chrysene	00218019	N/A	N/A	0.003 CRL
19B	Dibenzo (a,h) Anthracene	00053703	N/A	N/A	0.003 CRL
20B	1,2-Dichlorobenzene	00095501	164	820	400(c) H
21B	1,3-Dichlorobenzene	00541731	69	345	400(c) H
22B	1,4-Dichlorobenzene	00106467	146	730	400(c) H
23B	3,3'-Dichlorobenzidine	00091941	N/A	N/A	0.01 CRL

Table 1 (Continued)

PP No.	Chemical Name	CAS Number	Fish and Aquatic Life Criteria			Human Health Criteria (ug/l)
			Criteria Continuous Concentrations (ug/l)	Criteria Maximum Concentrations (ug/l)		
24B	Diethyl Phthalate	00084662	800	4,000	350,000	H
25B	Dimethyl Phthalate	00131113	495	2,475	313,000	H
26B	Di-n-Butyl Phthalate	00084742	21	105	34,000	H
27B	2,4-Dinitrotoluene	00121142	318	1,590	0.1	CRL
28B	2,6-Dinitrotoluene	00606202	198	990	N/A	-
29B	Di-n-Octyl Phthalate	00117840	N/A	N/A	N/A	-
30B	1,2-Diphenylhydrazine	00122667	3	15	0.04	CRL
31B	Fluoranthene	00206440	40	200	42	H
32B	Fluorene	00086737	N/A	N/A	0.003	CRL
33B	Hexachlorobenzene	00118741	N/A	N/A	0.0007	CRL
34B	Hexachlorobutadiene	00087683	2	10	0.5	CRL
35B	Hexachlorocyclopentadiene	00077474	1	5	1	T&O
36B	Hexachloroethane	00067721	12	60	2	CRL
37B	Indeno (1,2,3-cd) Pyrene	00193395	N/A	N/A	0.003	CRL
38B	Isophorone	00078591	2,080	10,400	5,200	H
39B	Naphthalene	00091203	43	135	10	T&O
40B	Nitrobenzene	00098953	808	4,040	30	T&O

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Table 1 (Continued)

PP No.	Chemical Name	CAS Number	Fish and Aquatic Life Criteria		Human Health Criteria (ug/l)
			Criteria Continuous Concentrations (ug/l)	Criteria Maximum Concentrations (ug/l)	
41B	N-Nitrosodimethylamine	00062759	3,420	17,100	0.001 CRL
42B	N-Nitrosodi-n-Propylamine	00621647	N/A	N/A	0.0008 CRL
43B	N-Nitrosodiphenylamine	00086306	59	295	5 CRL
44B	Phenanthrene	00085018	1	5	0.003 CRL
45B	Pyrene	00129000	N/A	N/A	0.003 CRL
46B	1,2,4-Trichlorobenzene	00120821	26	130	700 H
1P	Aldrin	00309002	0.1	0.5	0.00007 CRL
2P	alpha-BHC	00319846	N/A	N/A	0.009 CRL
3P	beta-BHC	00310857	N/A	N/A	0.02 CRL
4P	gamma-BHC (Lindane)	00058899	0.08	2	0.02 CRL
5P	delta-BHC	00319868	N/A	N/A	N/A -
6P	Chlordane	00057749	0.0043	2.4	0.0005 CRL
7P	4,4'-DDT	00050293	0.001	1.1	0.00002 CRL
8P	4,4'-DDE	00072559	0.001	1.1	N/A -
9P	4,4'-DDD	00072548	0.001	1.1	N/A -
10P	Dieldrin	00060571	0.0019	2.5	0.00007 CRL
11P	alpha-Endosulfan	00095988	0.056	0.22	74 H
12P	beta-Endosulfan	33212659	0.056	0.22	74 H
13P	Endosulfan Sulfate	01031078	N/A	N/A	74 -

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Table 1 (Continued)

PP No.	Chemical Name	CAS Number	Fish and Aquatic Life Criteria			Human Health Criteria (ug/l)
			Criteria Continuous Concentrations (ug/l)	Criteria Maximum Concentrations (ug/l)		
14P	Endrin	00072208	0.0023	0.18	1	H
15P	Endrin Aldehyde	07421934	N/A	N/A	N/A	-
16P	Heptachlor	00076448	0.0038	0.52	0.0003	CRL
17P	Heptachlor Epoxide	01024573	0.1	0.5	N/A	-
18P	PCB-1242	53469219	0.014	2	0.00008(d)	CRL
19P	PCB-1254	11097691	0.014	2	0.00008(d)	CRL
20P	PCB-1221	11104282	0.014	2	0.00008(d)	CRL
21P	PCB-1232	11141165	0.014	2	0.00008(d)	CRL
22P	PCB-1248	12672296	0.014	2	0.00008(d)	CRL
23P	PCB-1260	11096825	0.014	2	0.00008(d)	CRL
24P	PCB-1016	12674112	0.014	2	0.00008(d)	CRL
25P	Toxaphene	08001352	0.0002	0.73	0.0007	CRL
PP	2,3,7,8-TCDD	01746016	N/A	N/A	1 x 10E - 8	CRL

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Note: At present these are potential ARARs, consider as TBCs.

APPENDIX A

Potential Chemical-Specific  
Applicable or Relevant/Appropriate Requirements

Table 2  
Community Environmental Control  
Water Supply Criteria

<u>Chemical</u>	<u>Water Supply Criteria (Mg/l)</u>
Arsenic and Compounds	0.05
Asbestos (fibers >10um long)	7.0 million fibers per liter
Barium and Compounds	1.0
Benzene	0.005
Cadmium and Compounds	0.010
Carbon Tetrachloride	0.005
Chlordane	0.002
Chlorobenzene (Mono)	0.1
Chlorodibromomethane	0.1
Chloroform	0.1
Chromium <sup>+3, +6</sup> and compounds	0.05
Cyanide	0.2
1,2 - Dichlorobenzene	0.6
1,3 - Dichlorobenzene	0.6
1,4 - Dichlorobenzene	0.075
1,2 - Dichloroethane (EDC)	0.005
1,1 - Dichloroethylene	0.007
2,4 - Dichlorophenoxyacetic Acid (2,4-D)	0.1
1,3 Dichloropropene	0.005
Dieldrin	10 <sup>-6</sup> CRL=0.000002 (probably below PQL)
Fluoride	2.0
Heptachlor	0.0004
Hexachlorobenzene	10 <sup>-6</sup> CRL=0.00002 (probably below PQL)
Gamma-HCCH (Lindane) (Hexachlorocyclohexane)	0.004
Lead and Compounds (Total)	0.005 (entering dist. system) 0.05 (at tap)
Mercury and Compounds (Total)	0.002
Methoxychlor	0.1
Nickel and Compounds	0.1

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Nitrate (as N)	10.0
Para(1,4) Dichlorobenzene	0.075
Pentachlorophenol	0.2
PCB	0.0005
Radionuclides, Gross alpha Activity	15 pCi/l
Radium 226 and 228	5 pCi/l
Selenium and Compounds	0.01
Silver and Compounds	0.05
Strontium - 90	8 pCi/l
2,3,7,8, -TCDD (Dioxin)	10 <sup>-6</sup> CRL = 2.0 x 10 <sup>-10</sup> (probably below PQL)
Tetrachloroethylene	0.005
Toluene	2.0
Toxaphene	0.005
Tribromomethane (Bromoform)	0.1
1,1,1 - Trichloroethene	0.2
Trichloroethylene (TCE)	0.005
2,4,5 - Trichlorophenoxy-propionic Acid	0.01
Trihalomethanes (Total)	0.1
Vinyl Chloride	0.002

**Secondary Maximum Contaminant Levels  
For Public Water Systems**

<u>Contaminant</u>	<u>Level</u>
Chloride	250 mg/l
Color	15 color units
Copper	1 mg/l
Corrosivity	Noncorrosive
Fluoride	2.0 mg/l
Foaming agents	0.5 mg/l
Iron	0.3 mg/l
Manganese	0.05 mg/l
Odor	3 threshold odor number
pH	6.5 - 8.5
sulfate	250 mg/l
Total dissolved solids (TDS)	500 mg/l
Zinc	5 mg/l

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APPENDIX B

POTENTIAL LOCATION-SPECIFIC  
 APPLICABLE OR REVELANT APPROPRIATE REQUIREMENTS

Location	Requirement	Prerequisite	Citation
Within 50 feet of property line	Must maintain a 50 ft. buffer zone between property line and treatment, storage, disposal activities unless variance is granted. Note: Ignitables/ Reactives in containers - no variance allowed	Activities within 50 ft. of property line	PA SWMA, Act 97 Ch. 264 or 265
Within 1 mile of a fault displaced in Holocene time	Disposal prohibited unless demonstration is made that unit is designed to withstand fault activity	Disposal within 1 mile of fault. NOTE: Disposal 1 mile or more from a fault acceptable with no demonstration	PA SWMA, Act 97 Ch. 269
Within 100-year floodplain	No treatment or disposal within 100 yr. Floodplain. Storage units must withstand 100 yr. flood forces. Obstructions must comply with Ch. 105 requirements.	None	PA SWMA, Act 97, Ch. 269
Within floodway	No treatment or disposal within floodway. Obstructions and encroachments must comply with Ch. 105 requirements	Record of flood indicates inundation beyond 100 yr. floodplain. Obstructions, encroachments or other construction in floodway	Floodplain Mgmt. Act of 1978. PL 851, No. 166 Dam Safety & Encroachment Act of 1978, PL 1375  PA SWMA, Act 97 Ch. 269

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APPENDIX B

POTENTIAL LOCATION-SPECIFIC  
 APPLICABLE OR REVELANT APPROPRIATE REQUIREMENTS

Location	Requirement	Prerequisite	Citation
<p>Within area where action may cause irreparable harm, loss, or destruction of significant artifacts</p>	<p>Coal Mining Prohibited            Prohibition of adverse environmental visual or traffic impacts - must provide impact analysis</p>	<p>Surface Mining and valid existing rights            Activity within one mile of property owned by PA Historical &amp; Museum Comm.            Activity within 1/4 mile of site listed in PA Inventory of Historic Places or in PA Archaeological Site Survey</p>	<p>Surface Mining Conservation &amp; Reclamation Act            PA SWMA, Act 97            Ch. 269</p>
<p>Historic project owned or controlled by Federal or State agency</p>	<p>Prohibition of adverse environmental, visual or traffic impacts-must provide impact analysis. Treatment &amp; Disposal prohib.</p>	<p>Activity within one mile of property owned by PA Historical &amp; Museum Comm. or on Natl Register of Historic Places.</p>	<p>PA SWMA, Act 97            Ch. 269</p>
<p>AR3064            Critical habitat upon which endangered species or threatened species depends</p>	<p>Coal Mining prohibited unless approved jointly by DER and agency with jurisdiction over the property/place</p>	<p>Surface Mining/Valid Existing Rights</p>	<p>Surface Mining Conservation &amp; Reclamation Act</p>
<p>Wetlands</p>	<p>Action to conserve endangered species or threatened species including consultation with DER Bureau of Forestry.            No treatment or disposal within Wetland Area.            Obstructions and encroachments must comply with Ch. 105 requirements</p>	<p>Determination of presence of endangered or threatened species            Must be a wetland area as defined by State and Federal Law</p>	<p>Wild Resource Conservation Act,            P.L. 547, No. 170, 32            P.S. 5301-5314            PA SWMA, Act 97,            Ch. 269</p>
			<p>Dam Safety &amp; Encroachment Act of 1978, PL 1375</p>



APPENDIX

POTENTIAL LOCATION-SPECIFIC  
APPLICABLE OR REVELANT APPROPRIATE REQUIREMENTS

Location	Requirement	Prerequisite	Citation
Wilderness area	Coal Mining Prohibited  Prohibition of adverse environmental, visual or traffic impacts-must provide impact analysis. No Disposal or Treatment in Landmark Areas	Surface Mining/Valid Existing Rights  Activity within one mile of wild, natural or Landmark area.	Surface Mining Conservation & Reclamation Act  PA SWMA, Act 97, Ch. 269
Wildlife refuge, fish hatchery	Same as Wilderness area, also no disposal or treatment in National or State refuges or hatcheries		PA SWMA, Act 97, Ch. 269
Area affecting stream or river	Obstructions and encroachments must comply with Ch. 105 requirements  Water Quality Criteria must be met in stream  Mining Prohibited unless variance granted if no adverse hydrologic or water quality impact.	Obstruction or encroachment at or in regulated waters of the State  Activity potentially affecting stream or river  Surface Mining within 100 ft. of stream	Dam Safety & Encroachment Act of 1978, PL 1375  25 PA Code 93.4, 93.7, 93.8(a), 93.9 25 PA Code 16  Surface Mining Conservation and Reclamation Act
Within area affecting national or State wild, scenic, or recreational river	Prohibit activities that may create adverse environmental, visual or traffic impacts on a river.  Coal Mining Prohibited	River or river corridor designated pursuant to the PA. Scenic Rivers Act or listed as a 1-A priority for study by DER  Surface Mining/Valid Existing Rights	The PA Scenic Rivers A and all subsequent legislation designatin waterways as scenic. SWMA, Act 97 Ch. 75. 450(b)(1) and (2)  Surface Mining Conservation and Reclamation Act

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APPENDIX B

POTENTIAL LOCATION-SPECIFIC  
 APPLICABLE OR REVELANT APPROPRIATE REQUIREMENTS

Location	Requirement	Prerequisite	Citation
Within coastal zone	Conduct activities consistent with state program requirement	Activities affecting designated PA Coastal Zones	Final Program EIS, PA Coastal Zone Management Program, 1980.
Agricultural areas	Treatment and Disposal prohibited in Agricultural Areas established under PA Ag. Area Security Law or in farmland classified as Class I agricultural land by SCS. For storage activities provide analysis on land use compatibility	Area must be designated by Soil Conservation Service or under PA Ag. Area Security Law.	PA SWMA, Act 97, Ch. 428, 450(b)(15)
Exceptional value watershed	Treatment or disposal prohibited	Must be designated exceptional value	PA SWMA, Act 97 Ch. 269
	Impact analysis on pending designated exceptional value watershed	DER/EQB must have received a written request for designation	PA SWMA, Act 97 Ch. 269
	Maintain existing quality	Designated in 25 PA Code Section 93.9	25 PA Code 5.1(c)
Oil and gas wells	Disposal prohibited over active or inactive oil and gas wells or gas storage areas located within or beneath site. If abandoned facilities exist, <u>but not below disposal unit</u> , need analysis of expected sub surface discharges for approval of unit.	Active, Inactive, Abandoned oil and gas wells and gas areas must meet definition in Oil & Gas Act of 1984.	PA SWMA, Act 97 Ch. 269

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APPENDIX B

POTENTIAL LOCATION-SPECIFIC  
 APPLICABLE OR REVELANT APPROPRIATE REQUIREMENTS

Location	Requirement	Prerequisite	Citation
Underlain by fractured bedrock	Disposal prohibited over areas of coarse unconsolidated deposits including heavily fractured bedrock. Other activities acceptable if subsurface conditions pose no threat.	Existence of geologic condition	PA SWMA, Act 97, Ch. 269
Underlain by carbonate or limestone formations (>5 feet)	Disposal prohibited over these formations: Areas mapped by PA Geologic Survey.	Formations must be > 5 feet thick and be the topmost geologic unit	PA SWMA, Act 97 Ch. 269
Landside prone area	Treatment and Disposal activities: must provide impact analysis on unit design with respect to landslide	Unit must be in or adjacement to landslide prone area.	PA SWMA, Act 97 Ch. 269
Within 5 miles of Earthquake epicenter	Treatment and Disposal activities: demonstrate unit design can withstand seismic activities	Earthquake Epicenter mapped by USGS or PA Geologic Survey	PA SWMA, Act 97 Ch. 269
Deep mines/Surface mines	Treatment and Disposal activities: provide analysis of subsidence risk. Future mining of minerals providing support of unit prohibited	Existence of deep or surface mines	PA SWMA, Act 97 Ch. 269

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APPENDIX B

POTENTIAL LOCATION-SPECIFIC  
 APPLICABLE OR REVELANT APPROPRIATE REQUIREMENTS

Location	Requirement	Prerequisite	Citation
OTHER			
State Forest Natural Areas State Forest Wild Areas	Area must be administered in such a manner so as to leave it unimpaired as a Natural or Wild Area and to preserve its unique features for which it was designated.	Commonwealth-owned area designated as a Natural or Wild Area.	Administrative Code of 1929, P.L. 177 and 1902 A.
Public or Private Wild Plant Sanctuary	Area must be administered in such a manner as will leave it unimpaired as a wild plant sanctuary and to preserve its unique habitat values for which it was designated.	Area designated by DER, Bureau of Forestry as a Public or Private Wild Plant Sanctuary.	Wild Resource Conservation Act, P.L. 597, No. 170, 32 P.S. 5301-5314.
Park, Forest, Gameland, Appalachian Trail (or other State Trail)	Prohibit activities that may create adverse environmental, visual or traffic impacts	Within one mile of facility.	PA SWMA, Act 97 Ch. 269
Rare, threatened, endangered species habitat	Coal Mining Prohibited unless DER and Dept. of Interior find no values incompatible with coal operations (National Forest)	Surface Mining/Valid existing rights	Surface Mining Conservation & Reclamation Act
	Prohibition of adverse impacts on species or habitat	Habitat or species protected by Fed. Endangered Species Act, Wild Res. Conservation Act or recognized by PA Fish & Game Commissions.	PA SWMA, Act 97 Ch. 269

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APPENDIX B

POTENTIAL LOCATION-SPECIFIC  
APPLICABLE OR REVELANT APPROPRIATE REQUIREMENTS

Location	Requirement	Prerequisite	Citation
Water Supply Area	Disposal prohibited unless permanent alternative supply provided	1/2 mile of well, spring used for community water supply.	PA SWMA, Act 97, Ch. 269
		1/2 mile of stream or impoundment located 5 miles upstream of water intake.	
		1/2 mile of private well or spring used as water supply.	
40 ft. setback from Building	Containers holding ignitables and reactives must maintain a 40 ft. setback from a building for outdoor storage	Outdoor storage in containers	PA SWMA, Act 97, Ch. 264 and 265

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APPENDIX C

POTENTIAL ACTION-SPECIFIC  
 APPLICABLE OR REVELANT APPROPRIATE REQUIREMENTS

Action	Requirement	Prerequisite	Citation
Air stripping	Use BAT. Meet "Haz. Waste and Petroleum Products Contamination Clean-up" Procedures, and Air Toxics Substance Guidance limits.	Air Pollution Control Act (APCA)	
Capping (see also Closure with Waste in Place for additional associated requirements)	Meet design & performance standards in Ch.264 Table 3. Final grade 2-15%; cover soils USDA class. loams. Permeability of cap $\leq$ permeability of liner. Vegetation based on Penn Dot Form 408 or Penn State Agronomy Guide.	PA SWMA, Act 97 Ch. 264 or 265	
Clean Closures (removal of waste and contaminated soils - no groundwater contamination)	Demonstrate no subsoil contamination and no groundwater contamination from that unit. Use sampling grid to determine sampling locations.	PA SWMA, Act 97 Ch. 264 or 265	
Closure with Waste In Place (including capping and groundwater monitoring, pumping)	Stabilize waste to support cap. Must withstand dynamic and static loading with a minimum F.O.S. of 1.5. Install gas monitoring and venting systems if appropriate. Install groundwater monitoring system - minimum three(3) downgradient, one(1) upgradient per aquifer. Prepare and implement assessment and abatement plan if contamination is detected. Need approval	PA SWMA, Act 97 Ch. 264 or 265	Clean Streams Law

APPENDIX C

POTENTIAL ACTION-SPECIFIC  
 APPLICABLE OR REVELANT APPROPRIATE REQUIREMENTS

Action	Requirement	Prerequisite	Citation
	of groundwater treatment plant design. 30 yr. post-closure monitoring; notice in property deed. Leachate storage capacity-1000 gal/acre of closed unit		
Closure of Land Treatment Units	Establish/Maintain Vegetative cover; maintain run-on, run-off control, wind dispersal; prohibit growth of food chain crops		PA SWMA Ch. 264 or 265
Consolidation within a Unit	Closure of old units: either clean closure or capping		PA SWMA, Act 97
Consolidation between Units	Disposal in a different unit prohi- bited unless unit meets "permit" standards. Old unit must meet closure standards.		
Containment Storage	Meet spacing and set back require- ments, secondary containment. Con- tainers must be in good condition and labeled. Cannot store over 1 yr. without cause.		PA SWMA Ch. 264 or 265

APPENDIX C

POTENTIAL ACTION-SPECIFIC  
APPLICABLE OR REVELANT APPROPRIATE REQUIREMENTS

Action	Requirement	Prerequisite	Citation
Tank Storage	Meet generally accepted industry standards: ULL42, API650 etc. Have: secondary containment, alarms, pressure/overflow controls, min. shell thickness established, meet NFPA Code 30 standard, Tank Evaluation Repair Plan, VONC plan, standby equipment. VOC emission control device.		PA SWMA Ch. 264
Tank treatment (neutralization, filtration, separation, chemical treatment, dewatering)	See tank storage. Also have treatability study program/waste analysis trial treatment test. VOC, fugitive emission controls		PA SWMA Ch. 264 or 265
Construction of New Landfill On-Site (see Closure with Waste in Place).	Meet design & performance standards for liners in Ch.264. Meet groundwater isolation distance- no groundwater manipulation allowed. Meet buffer zone, sub-base slope and flow zone permeability requirements. Meet leachate and run-off storage requirements. Meet EPA's CQA and MTR. Develop and implement groundwater monitoring program (see closure with waste in place).		PA SWMA Ch. 264

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APPENDIX C

POTENTIAL ACTION-SPECIFIC  
 APPLICABLE OR REVELANT APPROPRIATE REQUIREMENTS

Action	Requirement	Prerequisite	Citation
Construction of a New Surface Impoundment (see Closure with Waste in Place and Closure with no Post-Closure Care)	See above, plus meet dike slope limitation: <20% for disposal impoundment, <33% for storage/treatment impoundment. Also prepare Surface Impoundment Evaluation and Repair Plan.		PA SWMA Ch. 264 or 265
Dike Stabilization	Construct dikes with sufficient strength to prevent failure. Meet dike slope limitations for impoundments.		Dam Safety & Encroachments Act PA SWMA Ch. 264 or 265
Discharge of Treatment System Effluent	Bureau of Water Quality authorization of NPDES discharge and treatment facility construction.		25PA Code Ch. 91,92
Incineration	Need approval from Bureau's of Air Quality and Waste Mgmt. Meet Air Toxics Substances Guidance limits. Prepare Trial Burn Plan: establish POHC's, demonstrate 99.99% DRE. See also tank storage. Use BAT. Meet buffer zone, odor and noise control.		PA SWMA Act 97 Ch. 264 or 265

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POTENTIAL ACTION-SPECIFIC  
 APPLICABLE OR REVELANT APPROPRIATE REQUIREMENTS

Action	Requirement	Prerequisite	Citation
Thermal treatment (Pryolysis, Virtification, etc.)	Obtain Air Quality Plan approval. Meet buffer zone. Develop test plans. See also tank storage. Note: No open burning except of detonation of explosives - meet specific buffer zones.		APCA PA SWMA, Act 97 Ch. 264 or 265
Land Treatment	Bureau of Water Quality author- ization of any treatment facility construction. Meet food-chain crop prohibition, cadmium restric- tion. Prepare unsaturated zone monitoring Plan, VONC plan. Meet setback requirements. Applica- tion rates consistent with DER's "Sewage Septic Tank and Holding Tank Waste Use on Agricultural Land" Guide.		25PA Code Ch.91 PA SWMA, Act 97 Ch. 264 or 265
Treatment (when Waste will be Land Disposed)	See Tank Treatment. Prepare Treat- ability Study Plan. Meet EPA's Land Disposal Restriction Treatment Standard. Prepare Waste Analysis Plan for QA/QC of treatment process. For landfills, meet 20% min. solids content.		PA SWMA, Act 97 Ch. 264 or 265
Underground Injection of Wastes and Treated Ground Water	Bureau of Water Quality authori- zation of any treatment facility construction. Note: This is prohibited for	Must be a treated waste or groundwater	25PA Code Ch.91 PA SWMA, Act 97 Ch. 264 or 265

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APPENDIX C

POTENTIAL ACTION-SPECIFIC  
APPLICABLE OR REVELANT APPROPRIATE REQUIREMENTS

Action	Requirement	Prerequisite	Citation
	listed or "derived-from" listed wastes. No Waste Mgmt. standards except groundwater monitoring at 25 PA Code 75.264(n).		
Waste Piles	Meet liner standards, leachate and run-off storage requirements as for landfills. Meet groundwater isolation distance and setback. Prepare Waste Pile Evaluation & Repair Plan.	Indoor piles have less stringent requirements	PA SWMA, Act 97 Ch. 264 or 265
Biological Treatment (soils or groundwater)	Meet Air Quality "Haz. Waste and Petroleum Product Contamination Clean-up" procedures. Prepare treatability study plan. See Tank Treatment. Prepare groundwater abatement plan.		PA SWMA, Act 97 Ch. 264 or 265
Stabilization	Prepare treatability study plan. See Tank Treatment.		PA SWMA, Act 97 Ch. 264 or 265
Activated carbon treatment of ground/surface water	See above. May need Air Quality approval if VOC's are treated.		PA SWMA, Act 97 APCA

APPENDIX C

POTENTIAL ACTION-SPECIFIC  
 APPLICABLE OR REVELANT APPROPRIATE REQUIREMENTS

Action	Requirement	Prerequisite	Citation
Recovery/Reclamation (solvents, metals, oils)	Air Quality Plan Approval Note: No specific Waste Mgmt. ARAR's if legitimate. Recycling - must demonstrate as per 25 PA Code Ch.261 If sludge or listed waste, must meet ARAR's. If not legitimate recycling, must meet treatment ARAR's.		PA SWMA, Act 97 Ch. 261
Mining and Reclamation Facility Involvement	Mined land must be restored to approximate original contour (AOC) except areas previously mined prior to current practices and standards may be restored by terracing. Alternatives to AOC and terracing may be approved for certain mining when proposed in conjunction with achieving postmining land use.	Lands affected by "surface mining" as defined in SMCRA and Noncoal SMCRA. Waters affected by mining operations. Mining subsidence damage to surface land.	Surface Mine Conservation and Reclamation Act (SMCRA) Sec. Noncoal SMCRA Sec. 7 Coal Refuse Disposal Act Bituminous Mine Subsidence and Land Conservation Act Clean Streams Law
OTHER			
Non-specific Earthmoving Activity	Meet Chapter 102 requirements, develop Erosion & Sedimentation Control Plan.		Chapter 102.4,.31

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PROTECTIVE LEVELS AND CRITERIA  
FOR  
THE EXCAVATION, TREATMENT, CLEANUP AND DISPOSAL  
OF  
VIRGIN FUEL CONTAMINATED SOIL

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

OCTOBER 1991

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AR306442



1. **PURPOSE**

This policy and procedure describes the Department's protective levels and criteria for the excavation, treatment, cleanup, and disposal of virgin fuel contaminated soil and gives practical field guidance for the implementation of these protective levels and criteria.

This document is a statement of policy designed to interpret and implement the authorities identified in Paragraph 2 (below). While this document announces the policy which the Department intends to apply to virgin fuel spill remediation actions, it does not prohibit the Department from exercising sound judgment or discretion in addressing virgin fuel spills. This policy establishes a framework, within which the Department will exercise its administrative discretion in the future. The Department reserves the discretion to deviate from this statement of policy if circumstances warrant.

2. **AUTHORITY**

This policy and procedure was prepared in accordance with Article I, Section 27 of the Pennsylvania Constitution; P.L. 169 (1989), the Storage Tank and Spill Prevention Act; Section 104, P.L. 97 (1980), the Solid Waste Management Act; and P.L. 1987 (1937), the Pennsylvania Clean Streams Law.

3. **APPLICABILITY**

This policy and procedure applies to all activities and personnel in the Department.

4. **REFERENCES**

The Pennsylvania Department of Environmental Resources - Ground Water Quality Protection Strategy.

PHC Soil Workgroup - Ground Water Protection Criteria for Virgin Fuel Contaminated Soil (hereinafter, the "Background Document").

5. **DEFINITIONS AND TERMS**

"Virgin fuels" are defined for this document as unused distillate and residual petroleum fuels, including, but not limited to, heating or fuel oils, diesel fuels, aviation fuels, kerosene or gasoline. Virgin fuels do not include blended fuels containing used oil or other waste materials.

6. **SCOPE**

This document identifies and explains the Department's policy and procedures for the excavation, treatment, cleanup and disposal of virgin fuel contaminated soil in the Commonwealth. This policy applies to virgin fuel contaminated soils which are excavated, treated or removed for disposal or beneficial reuse. Soils contaminated with mixed hydrocarbon wastes and fuels blended from mixtures of virgin fuel and waste constituents are not intended to be covered by this policy.

7. **POLICY**

Although there are many other constituents present in petroleum fuels, benzene, toluene, ethylbenzene and xylenes ("BTEX") present the greatest risk to human health and the environment (see Background Document). Set forth below are numeric levels for BTEX and

total petroleum hydrocarbons ("TPH") in virgin fuel contaminated soil which the Department has concluded are protective of human health and the environment and are also consistent with the Department's Ground Water Quality Protection Strategy.<sup>1</sup> These Protection Levels should be consulted for all Department decisions relating to (1) the excavation, (2) the cleanup, (3) the extent of treatment or (4) the method of disposal of virgin fuel contaminated soil. The Department believes that these Protection Levels are achievable based on current technology.

**TABLE 1**

Constituent	Ground Water Protection Levels (mg/kg) (Dry Weight Basis)	
	Level A	Level B
Benzene	0.01	0.1
Toluene	0.02	0.2
Ethylbenzene	0.02	0.2
Xylenes	0.07	0.7
TPH (GC-FID)*	10.0	100.0

\*See Footnote<sup>2</sup>

**A. "Level A" Protection Levels**

Level A represents the Department's most stringent Protection Level for the excavation, cleanup, treatment and disposal of virgin fuel contaminated soils. Soil which has been excavated and treated to Level A will be considered "clean fill" for purposes of its subsequent use and disposal. This is because soil which has been excavated and treated to meet the Level A Protection Levels, which is placed in direct contact with ground water, will not cause the leaching of contaminants into the ground water at or above the Department's specified method detection limit ("MDL").

Soils treated to Level A can be used on site or off site. Treatment of soils to meet the Level A Protection Levels will result in a release of liability for those soils.

**B. "Level B" Protection Levels**

Where an owner/operator is able to achieve the Level B Protection Levels (but not the Level A Protection Levels) through the excavation, cleanup or treatment of virgin fuel contaminated soils, the Department will impose more restrictive conditions on the management and disposal of Level B soil (either excavated or left in the ground).

1. It should be noted that the Department also considered the risks to human health and the environment from air exposure to, direct contact with or ingestion of Levels A, B and C soil (see Background Document). The Level A and B Ground Water Protection Levels are hereinafter referred to as "Protection Levels". The Department reserves its right to require any additional excavation, cleanup, treatment or disposal of contaminated soils which cause odor or aesthetic problems.
2. TPH (GC-FID) stands for Total Petroleum Hydrocarbons detected through the Gas Chromatography Flame Ionization Detector Method (see Background Document).

Level B soil will not cause the BTEX constituents to leach into ground water at levels at or above the Department's specified MDL provided that there are four vertical feet of clean soil between the Level B soil and the ground water. More specifically, soil that meets the Level B Protection Levels should not cause contaminants to become present in the pore water leaving that soil at a level which will contaminate the ground water after passing through four vertical feet of clean soil. This is because the concentrations of contaminants in the pore water leaving the Level B soil will be attenuated to non-detectable levels by the four vertical feet of clean soil.

The Department does not consider soils which meet the Level B Protection Levels to be "clean fill." Instead, the Department will require management techniques to maintain a proper isolation distance from the waters of the Commonwealth. These management techniques may include, but are not limited to:

- 1) Level B soils cannot be placed in direct contact with or within four vertical feet of ground water existing in a saturated zone (including the seasonal high water table);
- 2) Land application of soils meeting the Level B Protection Levels should be prohibited within 25 feet of bedrock outcrop, within 100 feet of a sinkhole or carbonate areas subject to dissolution, within 100 feet of a wetland, or within 100 feet of an intermittent or perennial stream; or
- 3) Other management techniques which are necessary to provide adequate isolation distance based on site characteristics.

The Department will prefer that an owner/operator keep Level B soil on site rather than transport Level B soil off site. In all instances, the Department will retain its authority to determine whether the use of Level B Protection Levels is permissible and whether a proposed disposal method is appropriate. The Department will also retain its authority to require additional management techniques which are necessary and appropriate based on site characteristics. When reviewing proposed management techniques for Department approval, the Department will take into account the location and use of the Level B soils and, in particular, whether the Level B soils should be disposed on or off site.

Where the Department has determined that an owner/operator has implemented the applicable management techniques for Level B soils, the Department will consider that, consistent with the Ground Water Quality Protection Strategy, no further actions be taken against the owner/operator with respect to liability for those Level B soils. When an owner/operator has demonstrated to the satisfaction of the Department that all virgin fuel contaminated soil has been treated to meet the Level B criteria and full compliance with applicable management techniques for Level B soils has been achieved, the Department may, upon request, grant a partial release of liability for those soils by entering into a covenant not to sue with the owner/operator.



C. "Level C" Criteria and Feasibility Analyses

The Level A and B Protection Levels represent the Department's "generic" cleanup levels which, if properly implemented and managed, will protect human health and the environment and protect ground waters to levels consistent with the Ground Water Quality Protection Strategy at any site in the Commonwealth. By meeting these "generic" Protection Levels, the owner/operator will not be required to submit a feasibility study and remediation plan to the Department.

Although the Department believes that the Level A and B Protection Levels are achievable based on current technology, there may be some instances where an owner/operator is able to demonstrate to the satisfaction of the Department that the excavation or treatment of contaminated soils to meet the Level A or B Protection Levels is not feasible. In those instances, the Department will look to the Level C Criteria and the site-specific conditions when evaluating an owner/operator's proposed feasibility study and remediation plan.

- 1) Soils which fail to meet the Level B Protection Levels but which meet the Level C Criteria

Where an owner/operator demonstrates to the satisfaction of the Department that the excavation or treatment of virgin fuel contaminated soils to meet the Level A or B Protection Levels is not feasible, the Department will require the owner/operator to evaluate all measures which may protect human health and the environment from the contaminated soils. Set forth below at Table 2 are the Department's Level C Criteria.<sup>3</sup> In most instances where the contaminated soils fail to meet the Level B Protection Levels but meet the Level C Criteria, the Department will require the owner/operator to submit a site specific feasibility study and remediation plan.<sup>4</sup>

3. Soil that meets the Level C Criteria should not cause contaminants to become present in the pore water leaving that soil at a level which will exceed the United States Environmental Protection Agency's Maximum Contaminant Limits ("MCLs"). However, contamination of ground waters of the Commonwealth to MCL levels is contrary to the nondegradation goal of the Department's Ground Water Quality Protection Strategy.
4. The Level C Criteria do not include a TPH (GC-FID) constituent level. This because the Level C Criteria are health based and there are no health based Protective Levels or criteria for TPH (GC-FID) (see Background Document). The Department will require owner/operators to achieve as close to the 100 mg/kg TPH (GC-FID) (the Level B Protection Level) in virgin fuel contaminated soil as is feasible at each site.

Table 2

Constituent	Level C Criteria (mg/kg) (Dry Weight Basis)
Benzene	0.4
Toluene	90
Ethylbenzene	90
Xylenes	100

In some instances, however, where the owner/operator's contaminated soil fails to meet the Level B Protection Levels, but is very close to meeting the Level B Protection Levels, and where the Department determines that there is no risk to human health and the environment at the owner/operator's site, the Department may conclude that a site specific feasibility study and remediation plan is not required. However, the owner/operator must demonstrate to the satisfaction of the Department that all applicable management techniques for Level B soil have been met for the on site contaminated soils before the Department will consider waiving the requirement to submit a site specific feasibility study and remediation plan.

The Department will encourage owner/operators to keep soils which narrowly exceed the Level B Protection Levels on site. Where soils are to be moved off site, the Department will require that soils which exceed the Level B Protection Levels be managed or disposed at a permitted facility or otherwise in accordance with Department regulations. The Department will not grant a release from liability for a site containing soil which fails to meet the Level B Protection Levels.

2) Soils which fail to meet the Level C Criteria

In instances where the owner/operator demonstrates to the satisfaction of the Department that the excavation or treatment of virgin fuel contaminated soils to meet the Level C Criteria is not feasible, the owner/operator must submit a site specific feasibility study and remediation plan to the Department. The owner/operator's site specific feasibility analysis and remediation plan should include all measures necessary to protect human health and the environment. The Department may require that engineering and institutional controls such as soil capping be put in place. The Department may also require the owner/operator to install ground water monitoring wells.

As mentioned above, the Department may grant a partial release from liability for a site containing virgin fuel contaminated soils which meet the Level B Protection Levels. The Department will not grant a release for soils that exceed the Level B Protection Levels. Therefore, the Department will not grant a release from

liability for a site containing soil which exceeds the Level C Criteria. Where soils are to be moved off site, the Department will require that soils which exceed the Level C Criteria be managed or disposed at a permitted facility or otherwise in accordance with Department regulations.

**GROUND WATER PROTECTION CRITERIA FOR  
VIRGIN FUEL CONTAMINATED SOIL**

**TECHNICAL BACKGROUND DOCUMENT**

**Prepared for:**

**Department of Environmental Resources**

**Prepared by:**

**PHC Soil Workgroup**

**Comprised of:**

**Bureau of Water Quality Management**

**Bureau of Air Quality Control**

**Bureau of Community Environmental Control**

**Bureau of Waste Management**

**Advanced Science and Research**

**October 11, 1991**

**AR306449**

## LIST OF ABBREVIATIONS

BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CRL	Cancer Risk Level
EQL	Estimated Quantitation Limit
GSSPC	Generic Surface Soil Protection Criteria
GWPS	Groundwater Protection Standard
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDL	Method Detection Limit
RfD	Reference Dose
TEX	Toluene, Ethylbenzene, Xylenes
TPH	Total Petroleum Hydrocarbon
Xylenes	The sum of the concentration of all three isomers

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benzene which had been previously promulgated). The MDLs have been taken from EPA (1990 as revised). The EQLs are estimated by the procedure given in EPA (1990 as revised), i.e., multiplication of the MDL by a factor of 10.

TABLE 1  
GROUNDWATER PROTECTION STANDARD (mg/l)

Constituent	MDL	EQL	MCL
Benzene	0.0002	0.002	0.005
Toluene*	0.0002	0.002	1
Ethylbenzene*	0.0002	0.002	0.7
Xylenes*	0.0005	0.005	10

\* MCL value is also the final MCLG.

**Determination of Soil Concentrations:** In determining the concentrations in soil (Protective Levels A, B and C for BTEX), partition coefficients and equations have been used in conjunction with an assumed soil organic carbon content of 0.1%. Also, for the TPH levels for Levels A and B soils, the same partitioning methodology has been used. This methodology is discussed in detail in Chapter 4 (Generic Soil Criteria Based on Potential Migration to Groundwater) of DER (1991) which is currently in draft form.

The following two equations from Chapter 4 of DER (1991) are the basis from which Levels A, B and C have been estimated for each of the BTEX constituents:

$$C_{soil} = C_{water} (K_{app} + 0.17)$$

$$\log K_{app} = 0.63 (\log K_{oc}) + 0.59$$

Substituting;

$$C_{soil} = C_{water} (10^{0.63(\log K_{oc}) + 0.59} + 0.17)$$

Where:  $C_{soil}$  = contaminant concentration in soil in mg/kg dry weight

$C_{water}$  = contaminant concentration in soil pore water in mg/l

$K_{app}$  = apparent partition coefficient

$K_{oc}$  = organic carbon partition coefficient

By substituting the  $K_{oc}$  value (from Table 2) and the MDL, EQL and MCL (from Table 1) for each of the BTEX constituents into the equation, estimates of Levels A, B and C can be made.

TABLE 2

Constituent	K <sub>oc</sub> *
Benzene	100
Toluene	158
Ethylbenzene	240
Xylenes	320

\*From DER (1990)

**Level A Estimation Procedure for BTEX Constituents:** By using the following equation, the Level A values are estimated as indicated:

$$\text{Level A} = \text{MDL} (10^{0.63(\log K_{oc}) + 0.59} + 0.17)$$

Benzene

$$\text{Level A} = 0.0002 (10^{0.63(\log 100) + 0.59} + 0.17) = 0.014$$

**Benzene Level A = 0.01 mg/kg**

Toluene

$$\text{Level A} = 0.0002 (10^{0.63(\log 158) + 0.59} + 0.17) = 0.019$$

**Toluene Level A = 0.02 mg/kg**

Ethylbenzene

$$\text{Level A} = 0.0002 (10^{0.63(\log 240) + 0.59} + 0.17) = 0.0246$$

**Ethylbenzene Level A = 0.02 mg/kg**

Xylenes

$$\text{Level A} = 0.0005 (10^{0.63(\log 320) + 0.59} + 0.17) = 0.074$$

**Xylenes Level A = 0.07 mg/kg**

Soils contaminated with BTEX at Level A values should not cause detectable levels of BTEX in groundwater even if placed in direct contact with groundwater.

**Level B Estimation Procedure for BTEX Constituents:** The basis for the Level B values differs somewhat from that for Level A values. First, a condition which requires at least four feet between fuel-contaminated soil and groundwater was applied. This requirement was based on a similar requirement for application of sewage sludge onto the surface of the ground (Section 275.203 of the Department's Municipal Waste Management Regulations). Second, a soil contaminant level for BTEX constituents which would result in contaminants in soil pore water at or below quantifiable levels in the soil four feet above groundwater was estimated. It was presumed that such levels would not result in BTEX contaminants at detectable levels in groundwater via vertical migration from the soil. This was verified with fate and transport modeling scenarios.

By using the following equation, the Level B values are estimated as indicated:

$$\text{Level B} = \text{EQL} (10^{0.63(\log K_{oc}) + 0.59} + 0.17)$$

Benzene

$$\text{Level B} = 0.002 (10^{0.63(\log 100) + 0.59} + 0.17) = 0.14$$

**Benzene Level B = 0.1 mg/kg**

Toluene

$$\text{Level B} = 0.002 (10^{0.63(\log 158) + 0.59} + 0.17) = 0.19$$

**Toluene Level B = 0.2 mg/kg**

Ethylbenzene

$$\text{Level B} = 0.002 (10^{0.63(\log 240) + 0.59} + 0.17) = 0.246$$

**Ethylbenzene Level B = 0.2 mg/kg**

Xylenes

$$\text{Level B} = 0.005 (10^{0.63(\log 320) + 0.59} + 0.17) = 0.74$$

**Xylenes Level B = 0.7 mg/kg**

Soils contaminated with BTEX at Level B values should not cause quantifiable levels of BTEX in soil pore water or detectable levels of BTEX in groundwater if located no closer than four feet to groundwater.



Level C Estimation Procedure for BTEX Constituents: By using the following equation, the Level C values are estimated as indicated:

$$\text{Level C} = \text{MCL} (10^{0.63(\log K_{oc}) + 0.59} + 0.17)$$

Benzene

$$\text{Level C} = 0.005 (10^{0.63(\log 100) + 0.59} + 0.17) = 0.355$$

**Benzene Level C = 0.4 mg/kg**

Toluene

$$\text{Level C} = 1 (10^{0.63(\log 158) + 0.59} + 0.17) = 94.6$$

**Toluene Level C = 90 mg/kg**

Ethylbenzene

$$\text{Level C} = 0.7 (10^{0.63(\log 240) + 0.59} + 0.17) = 86$$

**Ethylbenzene Level C = 90 mg/kg**

Xylenes

$$\text{Level C} = 10 (10^{0.63(\log 320) + 0.59} + 0.17) = 1475$$

**Xylenes Level C = 100 mg/kg**

The estimated Level C for xylenes is 1475 mg/kg which exceeds the organic carbon content of the soil assumed in this estimation procedure, i.e., 0.1%. As the concentration of an organic contaminant in soil approaches the naturally occurring organic carbon content of the soil, it is uncertain whether the kinetic desorption process (upon which the partitioning portion of this estimation procedure is based) is altered. Therefore, an organic contaminant concentration of 100 mg/kg in soil (one-tenth of the assumed available organic carbon content of the soil) is conservatively applied.

Soils contaminated with BTEX at Level C values should not cause levels of BTEX in soil pore water or groundwater above the MCL for each of the BTEX constituents.

**Estimation Procedure for Level A and B TPH Values:** The major contaminants of concern in the lighter fuels such as gasoline, kerosene and jet fuel are BTEX which have been addressed above; however, additional constituents do exist in these fuels as well as in heavier fuels which are of concern and must therefore be addressed. Requiring a responsible party to analyze contaminated soil for each of these additional contaminants would be very costly, time-consuming and counterproductive since most of these

contaminants have little or no toxicological data on which to base a cleanup level. It would be more appropriate and efficient to address these contaminants based on a "gross indicator" of fuel contamination. TPH is typically the indicator which is used for this purpose. Since TPH represents dozens (if not hundreds) of specific constituents in fuel, estimation of Level A and B values is not as straightforward as it is for BTEX constituents. Also, a Level C value does not apply to TPH, because TPH does not represent a specific constituent for which toxicological data or an MCL exist.

The following discussion is based on No. 2 fuel oil (diesel fuel) and describes the methodology used to estimate A and B levels for TPH in fuel-contaminated soils.

According to California (1989), the major constituents of diesel fuel are straight chain alkanes especially in the range of n-nonane (C<sub>9</sub>) to n-heneicosane (C<sub>21</sub>). Available aqueous solubility data indicate that the most soluble of these is n-tridecane (C<sub>13</sub>) with an aqueous solubility of 0.013 mg/l (Verschueren, 1983). Using this aqueous solubility to estimate a K<sub>OC</sub> value (according to the regression equation method in Lyman et al, 1982) yields a K<sub>OC</sub> of approximately 47,600.

Assuming that n-tridecane represents diesel fuel, A and B levels can be estimated for it provided that an MDL and EQL exist. According to California (1989), the EQL for TPH in water is 0.05 mg/L. This would make the MDL 0.005 mg/l if the methodology in EPA (1990 as revised) is applied. This results in a Level A for TPH of 10 mg/kg for diesel fuel (14.7 mg/kg) and a Level B of 100 mg/kg (147 mg/kg).

In reality, n-tridecane constitutes up to 10% of diesel fuel which means that other less soluble alkanes make up the largest fraction. In addition, fuels heavier than diesel fuel (fuel oil numbers 3 through 6) would be even less soluble.

**Verification of Protectiveness for Other Routes of Exposure:** In order to ensure the overall protectiveness of these health-based levels, other major routes of potential human exposure have been evaluated. This was necessary because the Level C values are based solely on migration of BTEX from contaminated soil to groundwater which could then become a potential route of human exposure (i.e., ingestion of groundwater). The routes of exposure that were evaluated are (1) direct contact with soil contaminated at Level C values and (2) inhalation of vapors which could potentially be released from soil contaminated at Level C values.

**Direct Contact Evaluation:** In this evaluation it is assumed that the soil is contaminated with each of the BTEX constituents each at the Level C value. A cancer risk level (CRL) is estimated for benzene, and a hazard index is estimated for the combination of toluene, ethylbenzene and xylenes. The general methodology employed is comparison of the Level C values to the Generic Surface Soil Protection Criterion (GSSPC) for each of the contaminants which are estimated according to the procedures described in Chapter 3 of DER (1991). Chapter 3 of DER (1991) should be consulted for the exposure assumptions incorporated into estimating GSSPCs. Table 3 lists the Level C values and GSSPC for each of the BTEX constituents.

The GSSPC for benzene is based on protection of human health to a cancer risk level of  $1 \times 10^{-6}$ . Therefore, the Level C value for benzene is protective to a cancer risk level of  $4 \times 10^{-8}$  (based on direct contact and the same exposure assumptions used for the estimation of the GSSPC).

The overall hazard index for Level C values for TEX (based on direct contact exposure assumptions) is estimated by the following:

$$\text{Hazard Index} = \frac{\text{Level C (Toluene)}}{\text{GSSPC (Toluene)}} + \frac{\text{Level C (Ethylbenzene)}}{\text{GSSPC (Ethylbenzene)}} + \frac{\text{Level C (Xylene)}}{\text{GSSPC (Xylene)}}$$

$$\text{Hazard Index} = (90/10,000) + (90/5,000) + (100/100,000)$$

$$\text{TEX Hazard Index (direct contact)} = 0.028$$

A Hazard Index value of less than 1 is considered safe.

TABLE 3

Constituent	Oral Chronic RfD mg/kg/day	Oral Cancer Slope Factor (mg/kg/day) <sup>-1</sup>	Level C mg/kg	GSSPC mg/kg
Benzene	NA	0.029	0.4	10
Toluene	0.2	NA	90	10,000
Ethylbenzene	0.1	NA	90	5,000
Xylenes	2	NA	100	100,000

**Air Inhalation Evaluation:** In this evaluation it is assumed that the soil is contaminated with each of the BTEX constituents each at the Level C value. A cancer risk level (CRL) is estimated for benzene, and a hazard index is estimated for the combination of toluene, ethylbenzene and xylenes. The general methodology is to estimate an air concentration for each contaminant and then use that contaminant concentration in air as input for a risk estimate. This requires the use of models AIR.WK1, CRISK.WK1 and NCRISK.WK1 which are described in DER (1990).

Table 4 contains the contaminant-specific values used for the air modeling as well as the concentration estimates for each contaminant in air.

TABLE 4

Constituent	H atm- m <sup>3</sup> /mol	K <sub>app</sub> ml/g	Dei cm <sup>2</sup> /sec	VP mm Hg	MW g/mol	Estimated Concentration in Air mg/m <sup>3</sup>
Benzene	0.00555	71	0.088	76	78	5.36E-06
Toluene	0.0059	94	0.087	22	92	2.22E-03
Ethylbenzene	0.00644	123	0.075	10	106	1.89E-03
Xylenes	0.0053	147	0.077	6.5	106	1.76E-03

H = Henry's Law Constant  
 Dei = Effective Air Diffusivity  
 VP = Vapor Pressure  
 MW = Molecular Weight

Where:

Total soil porosity = 0.35  
 Soil bulk density = 1.5 g/cc  
 Duration of air emission = 30 years (for carcinogens)  
 = 7 years (for non-carcinogens)  
 Surface area of contamination = 500 m<sup>2</sup>  
 Length of site parallel to direction of wind = 22.4 m  
 Wind velocity = 3 m/s  
 Height of box = 2 m

The estimated contaminant concentrations from Table 4 are then used as input for estimating risk using the exposure assumptions for outdoor vapor inhalation in the examples in Chapters 9 and 10 of DER (1990) (except that an absorption factor of 1 is used instead of 0.5). Table 5 contains the resulting cancer risk level for benzene and the individual hazard index for each of the TEX constituents.

TABLE 5

Constituent	Inhalation Chronic RfD mg/kg/day	Inhalation Cancer Slope Factor (mg/kg/day) <sup>-1</sup>	Cancer Risk Level	Hazard Index
Benzene	NA	0.029	4E-08	NA
Toluene	0.571	NA	NA	0.0013
Ethylbenzene	0.1	NA	NA	0.0063
Xylenes	0.4	NA	NA	0.0015

The cancer risk level for the inhalation pathway of exposure is  $4 \times 10^{-8}$ . The overall hazard index for inhalation exposure is 0.009.

For Level C soils, this yields an overall cancer risk level of  $8 \times 10^{-8}$  for direct contact and inhalation exposures combined and an overall hazard index of approximately 0.04.

**Summary of Numeric Criteria for Soils:** Table 6 contains the recommended A, B and C Levels for BTEX constituents in virgin fuel contaminated soil and the recommended A and B levels for TPH in virgin fuel contaminated soil.

TABLE 6

Contaminant	Level A mg/kg	Level B mg/kg	Level C mg/kg
Benzene	0.01	0.1	0.4
Toluene	0.02	0.2	90
Ethylbenzene	0.02	0.2	90
Xylenes	0.07	0.7	100
TPH (GC-FID)*	10	100	—

\*The TPH Level A and B values apply only to TPH as determined by the analytical methodology specified within this document.

#### Analytical Methodology:

**BTEX:** Acceptable methods for determination of BTEX are the EPA approved gas chromatographic or gas chromatographic/mass spectrographic methods (EPA 3050/8020 and 8240).

**TPH (GC-FID):** The total petroleum hydrocarbon determinations by gas chromatography using a flame ionization detector (TPH GC-FID), developed for the American Petroleum Institute\* was chosen in lieu of methods currently used in Departmental programs, such as EPA 418.1, for the following reasons:

1. The API methods are based on approved EPA methods from SW-846 (Test Methods for Evaluating Solid Waste).
2. The API methods have Practical Quantitation Limits (PQL) below the Level A TPH limit.
3. With addition of an optional photoionization detector (PID), the API method for gasoline range organics can be extended for the determination of BTEX as specified in EPA Method 8020. This would allow simultaneous determination of TPH and BTEX and should decrease the cost of analysis.
4. Methods currently utilized by the Departmental programs require use of freon. These methods will be dropped in the near future by EPA in support of the Montreal Protocol on Substances That Deplete the Ozone Layer.

\*Measurement of Petroleum Hydrocarbons: Report on Activities to Develop a Manual,  
American Petroleum Institute, November 1990.

Methods other than those specified above for TPH and BTEX may be used if approved by the Department, provided the quantitation levels do not exceed the Level A protection levels.



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL RESOURCES

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(717) 787-9368  
June 15, 1990

Joe Donovan, Esq.  
U.S. EPA -- Region III  
841 Chestnut Building  
Philadelphia, PA

Re: ARARs Determinations

Dear Joe:

I am sending this letter as you requested before I leave on vacation. This confirms the agreement that I believe we reached yesterday concerning Pennsylvania's ARAR for groundwater. I believe there was an agreement on the following:

1. The Pennsylvania ARAR for groundwater would be recognized for hazardous substances to be as expressly provided in 25 Pa. Code §264(n)(23)(ix) i.e., "background" for groundwater quality. *(reference has changed to §264.100(a)(4))*
2. Pennsylvania recognizes that EPA may choose in certain cases, to waive the Pennsylvania ARAR in accordance with section 121 (d)(4)(C), among other sections, of CERCLA if it determines that reaching the Pennsylvania ARAR is not "practicable."
3. Although based upon past experience, Pennsylvania may agree with EPA's waiver of the Pennsylvania ARAR, there may be some cases where Pennsylvania disagrees with EPA practicability analysis. In these cases, Pennsylvania would simply reserve any rights to disagree with EPA's determination as provided in section 121 of CERCLA.
4. As far as an ARAR for soils, Pennsylvania will not certify that the Pennsylvania ARAR for soils is "background", however, in cases where we determine that leaching from contaminated soils will create groundwater contamination from contaminated soils we may certify to the "background" standard for

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Joe Donovan, Esq.  
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groundwater. Of course, we may also certify to any other existing state ARAR that relates to soil such as the Pennsylvania RCRA regulations or Chapter 101 regulations on impoundments.

EPA did not agree at the meeting that for all pollutants other than hazardous substances, it would recognize the Pennsylvania position on "background" for groundwater. As you know, Pennsylvania structures its position on "background" as our ARAR for groundwater not only on §264(n), but also on the Pennsylvania Constitution, the Clean Streams Law, the Solid Waste Management Act and relevant case law. I agreed to provide for you a legal memorandum that would 1) define our legal position on "background" all pollutants in for groundwater; and 2) enable you to better evaluate our legal position in the event that some future disagreement about this issue were to surface because case concerned nonhazardous substance pollutants.


I also agreed to provide you with sample language that we would use as Pennsylvania's ARAR certification for groundwater for hazardous substances. That paragraph is as follows:

The Pennsylvania ARAR for groundwater for hazardous substances is that all groundwater must be remediated to "background" quality.

I believe the above is in accordance with the agreements reached at our meeting yesterday. Please thank Larry Starfield and Abe Ferdas for their help on this very important matter to Pennsylvania.

I also thank you for your help.

Sincerely,

  
Donald A. Brown  
Director

DAB/km

CC: Bridget Hofman  
All HSCA Lawyers

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COMMONWEALTH OF PENNSYLVANIA  
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July 2, 1990



Mr. Joseph C. Donovan  
Acting Chief  
Remedial Enforcement Section  
U.S. EPA -- Region III  
841 Chestnut Building  
Philadelphia, PA 19107

Re: ARARs Determinations

Dear Joe:

This letter clarifies my June 15, 1990 letter concerning Pennsylvania's ARARs.

Paragraph 4 of my earlier letter is not intended to suggest that background is not Pennsylvania's ARAR for soils. Rather, paragraph 4 simply reflects the agreement you and I reached concerning remediation of soils in cases where we determine that contaminated soils threaten to contaminate groundwater. Where this is the case, background becomes an ARAR for soil by reason of the hydrogeologic nexus to groundwater both independent of and in addition to other legal bases supporting a background standard as a Pennsylvania ARAR for soils.

Thank you for your attention to this issue.

Sincerely,

Donald A. Brown / *DAB*  
Donald A. Brown  
Director

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determination, submit to the Department a written report containing an assessment of the groundwater quality. As a milestone in the partial fulfillment of the provisions of this paragraph, the owner or operator shall submit the sample results required by subsection (a)(2) and (5)(ii) and (iii) within 60 days of plan implementations.

(c) If the owner operator believes that the statistically significant increase was caused by a source other than the hazardous waste management facility, or that the increase resulted from errors in sampling, analysis, or evaluation, the owner or operator may submit, as a part of the report described in subsection (b), data to support the demonstration. While the owner or operator may submit data as part of the groundwater assessment report, he is not relieved of the requirements of subsections (a) and (b) unless otherwise approved in writing by the Department.

**Cross References**

This section cited in 25 Pa. Code § 264.97 (relating to general groundwater monitoring requirements); 25 Pa. Code § 264.98 (relating to detection monitoring program); and 25 Pa. Code § 264.100 (relating to corrective action program).

**§264.100. Corrective action program.**

(a) If in reviewing the groundwater quality, assessment report, the owner or operator or the Department determines that hazardous waste, hazardous constituents or decomposition byproducts have entered the groundwater, then the owner or operator shall submit to the Department a plan for the abatement of groundwater contamination. This abatement plan shall:

- (1) Be submitted to the Department within 30 days after submission of the assessment report described in § 264.99(b) (relating to compliance monitoring program).
- (2) Include an engineering feasibility analysis.
- (3) Begin to be implemented within 30 days after Department approval.
- (4) Result in the abatement of groundwater contamination by the removal or treatment of hazardous wastes, hazardous constituents or decomposition byproducts in groundwater that are attributable to the facility.
- (5) Establish and implement a groundwater monitoring program to demonstrate the effectiveness of the abatement program.
- (6) Ensure that the proposed abatement procedures will continue to the extent necessary to insure that the concentration levels of hazardous wastes, hazardous constituents or decomposition byproducts are being reduced.

(7) Include the submission of a written quarterly report to the Department that describes the effectiveness of the abatement program and the results of the groundwater monitoring program.

(8) Be modified when the Department determines that the abatement program is ineffective.

(9) Be terminated when it can be demonstrated, from the groundwater monitoring data submitted under subsection (a)(7), that the concentration levels of hazardous wastes, hazardous constituents or decomposition byproducts in monitoring points have remained at background levels for a period of 3-consecutive years.

(10) Be extended beyond the 30-year postclosure period, under § 264.117(c) (relating to postclosure care and use of property), if the conditions of paragraph (9) cannot be demonstrated.

(b) If, after review of the groundwater quality assessment report the Department determines that hazardous waste, hazardous constituents or decomposition byproducts have not entered the groundwater, then the owner or operator shall:

- (1) Notify the Department of proposed modifications to the facility's groundwater monitoring program.
- (2) Reinstate the original or an approved modified groundwater monitoring program for the facility.
- (3) Begin the implementation of proposed modifications to the facility's groundwater monitoring program within 30 days of Department approval.
- (c) At least annually by January 31, the owner or operator shall evaluate the data on groundwater elevations obtained under § 264.98(b) (relating to detection monitoring program), to determine whether the requirements under § 264.97(a) (relating to general groundwater monitoring requirements), for locating the monitoring wells continues to be satisfied. If the evaluation shows that § 264.97(a), is no longer satisfied, or the Department determines that § 264.97(a) is no longer satisfied, the owner or operator shall immediately modify the number, location or depth of the monitoring wells to bring the groundwater monitoring system into compliance with this requirement. These modifications will be approved in writing by the Department before construction begins.
- (d) At least annually by January 31, the owner operator shall determine the groundwater flow rate and direction and report the determinations to the Department. The initial determination shall be based on in situ testing, but subsequent determinations may be based on the analysis of those water level elevations obtained in response to § 264.98(c) and application of Darcy's Law.

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