RULES AND REGULATIONS

Title 25—ENVIRONMENTAL PROTECTION

ENVIRONMENTAL QUALITY BOARD

[25 PA. CODE CH. 250]

Administration of the Land Recycling Program (Act 2)

The Environmental Quality Board (Board) by this order adopts Chapter 250 (relating to the administration of the Land Recycling Program). The regulations implement the Land Recycling and Environmental Remediation Standards Act (Act 2) (35 P. S. §§ 6026.101—6026.909) by creating subchapters to establish general provisions, cleanup standards, requirements for special industrial areas, risk assessment requirements and requirements for demonstrating attainment of cleanup standards.

This order was adopted by the Board at its meeting of June 17, 1997.

A. *Effective Date*

These regulations will go into effect upon publication in the *Pennsylvania Bulletin* as final rulemaking.

B. *Contact Persons*

For further information, contact Thomas K. Fidler, Chief, Division of Land Recycling and Cleanup Program, Rachel Carson State Office Building, P.O. Box 8471, Harrisburg, PA 17105-8471, (717) 783-7816; or Michelle M. Moses, Assistant Counsel, Bureau of Regulatory Counsel, Rachel Carson State Office Building, P.O. Box 8464, Harrisburg, PA 17105-8464, (717) 787-7060. Persons with a disability may use the AT&T Relay Service by calling (800) 654-5984 (TDD users) or (800) 654-5988 (voice users). This rulemaking is available electronically through the Department of Environmental Protection's (Department) rulemaking Web site (http://www.dep.state.pa.us).

C. *Statutory Authority*

This final rulemaking is being made under the authority of sections 104(a), 301(c) and 303(a) of Act 2 (35 P. S. §§ 6026.104(a), 6026.301(c) and 303(a)). Section 104(a) of Act 2 authorizes the Board to adopt Statewide health standards, appropriate mathematically valid statistical tests to define compliance with Act 2 and other regulations that may be needed to implement Act 2. Section 301(c) of Act 2 authorizes the Department to establish by regulation procedures for determining attainment of remediation standards when practical quantitation limits set by the United States Environmental Protection Agency (EPA) have a health risk that is greater than the risk levels established in Act 2. Section 303(a) of Act 2 authorizes the Board to promulgate Statewide health standards for regulated substances for each environmental medium and methods used to calculate the Statewide health standards. This rulemaking also is being made under the authority of section 105(a) of the Solid Waste Management Act (SWMA) (35 P. S. § 6018.105(a)). Section 105(a) grants the Board the power and duty to adopt the rules and regulations of the Department to carry out the provisions of SWMA. In addition, this rulemaking is being made under the authority of section 1917-A of The Administrative Code of 1929 (71 P. S. § 510-17). Section 1917-A of The Administrative Code of 1929 authorizes the Department to protect the public from nuisances.

D. *Background and Summary*

The final-form regulations were developed to implement Act 2, which became effective July 18, 1995. Act 2 establishes a framework for developing remediation standards that can be applied to any release of regulated substances. Regulated substances include hazardous substances and contaminants regulated under the SWMA (35 P. S. §§ 6018.101—6018.1003), the Hazardous Sites Cleanup Act (HSCA) (35 P. S. §§6020.101—6020.1305), the Air Pollution Control Act (APCA) (35 P. S. §§ 4001—4005), The Clean Streams Law (CSL) (35 P. S. §§ 691.1—691.1001), the Storage Tank and Spill Prevention Act (STSPA) (35 P. S. §§ 6020.101—6020.2105) and the Infectious and Chemotherapeutic Waste Act (ICWA) (35 P. S. §§ 6019.1—6019.6). The environmental remediation standards established under Act 2 must be used whenever a site remediation is voluntarily conducted or is required to be conducted under one of the laws stated in this paragraph, to qualify for a release of liability. The final-form regulations encourage the recycling and redevelopment of industrial sites, preserving existing uses of land, and encourage persons to perform cleanups by providing the opportunity for a release of liability.

A person who intends to perform a remediation in accordance with Act 2 should consult the statute, these regulations and the *Land Recycling Technical Guidance Manual (Manual)* developed by the Department. The regulations are not repetitive of the statute. For example, procedural requirements such as deed notices or notices of intent to remediate are addressed more directly in the statute or the *Manual*. The regulations do address limited issues concerning procedures, such as what must be contained in plans and reports that are submitted to the Department. Compliance with all procedural requirements in the statute and these final-form regulations is required in order to meet a remediation standard. Appropriate uses of engineering or institutional controls with regard to the specific remediation standards and permit waivers are addressed in the statute, not the regulations.

Chapter 5 of Act 2 (35 P. S. §§ 6026.501—6026.506) affords liability protection from further cleanup obligations if a person demonstrates compliance with any, or a combination, of the three environmental remediation standards: the background standard; Statewide health standard; and site-specific standard. Act 2 also affords liability protection for the remediation of special industrial areas. To receive the liability protection, a person must comply with the requirements of Act 2 and this chapter, including the administrative requirements, unless the site is placed on the Pennsylvania Priority List under the HSCA or the release is subject to the corrective action regulations of the STSPA. In these two cases, a person shall use the cleanup levels as described in Act 2 and Chapter 250 and should use the administrative requirements of the HSCA or the STSPA to qualify for liability protection. A person who is eligible for cleanup liability protection will have no further liability for remediation of the site for contamination identified in the required reports and will not be subject to citizen suits or contribution actions brought by responsible parties.

An important element of any remediation is the site characterization or remedial investigation. A thorough investigation of the site is necessary to identify specific contaminant concentrations, the extent of contamination throughout soil and groundwater media, discharges to surface water and site conditions that may pose an unacceptable human health or environmental risk. It is important to perform a thorough investigation because the liability protection only applies to contamination identified in reports submitted to and approved by the Department to demonstrate compliance with a standard. In the case of a special industrial area, the liability protection applies to any contamination identified in the baseline environmental report, other than immediate, direct and imminent threats to public health and the environment. The final-form regulations provide some performance standards that must be met to properly characterize the site. A detailed explanation of how to perform a remedial investigation, however, may be found in the *Manual.*

Act 2 created the Cleanup Standards Scientific Advisory Board (SAB) for the purpose of assisting the Department in developing Statewide health standards, determining the appropriate statistically and scientifically valid procedures to be used, determining the appropriate risk factors and providing other technical and scientific advice as needed to implement the act. Throughout the development of these regulations, the SAB and its subcommittees provided many significant technical recommendations. In addition, the SAB reviewed drafts of the proposed and final-form regulations and provided comments to the Department on the drafts.

E. Summary of Comments and Responses on the Proposed Rulemaking

Notice of proposed rulemaking was published at 26 Pa.B. 3985 (August 17, 1996). The proposal set forth a 60-day public comment period. The Board held three public hearings (Whitehall, Mars and York).

During the public comment period, the Board and the Department received written comments from 46 individuals or groups and 8 individuals or groups presented testimony at the public hearings.

The Board and the Department considered the comments received at the public hearings and the written comments in formulating the final-form regulations. The Department has completed a review of the comments and has prepared a comment and response document that addresses each comment on the proposed regulations.

The following is a summary of major comments received and changes which have been made to the proposed rulemaking. The summary is listed in the same order as the final-form regulations.

Subchapter A. General Provisions

On final rulemaking, three proposed sections in this subchapter were deleted. The proposed § 250.4 (relating to groundwater determinations) was deleted based on comments received. On proposed, this section was included to explain when a regulated substance that is in contact with groundwater is considered contaminated media subject to the cleanup standards of Act 2, and when it is considered waste subject to regulation under the applicable waste laws and regulations.

Commentators indicated that they believe it is beyond the statutory authority and improper to regulate nonaqueous phase liquids as waste. In addition, concern was raised about the lack of guidance in the regulations to assist in the determination of when removal would be required. The Board has deleted the section relating to groundwater determinations on final rulemaking and has incorporated information that pertains to cleanup of separate phase liquids into the Statewide health and site-specific standards. The final-form regulations treat the regulated substances that are found in separate phase liquids the same as any other regulated substance. Information regarding the feasibility of removal of separate phase liquids in a site-specific cleanup will be included in the *Manual.*

With regard to the final rulemaking, the regulated substances contained in separate phase liquids will be required to meet the applicable Statewide health standards in soil and groundwater, including the saturation and solubility limits, if that standard is chosen. If engineering controls are required to maintain a remediation standard, a postremediation care plan must be implemented.

Proposed § 250.5 (relating to aquifer determinations) was moved to Subchapter C, § 250.303 (relating to aquifer determination; current use and currently planned use of aquifer groundwater). On final rulemaking, this regulation was made applicable only to the Statewide health standards. Further discussion of aquifer determinations can be found under § 250.303.

The proposed § 250.6 (relating to current use and future use of aquifer groundwater) was deleted from Subchapter A and added to Subchapter C. This change was made because the section no longer discusses "probable future use," a term that applies to the site-specific standard. The new section only applies to the Statewide health standard. Changes to this section are discussed in this Preamble under Subchapter C.

Section 250.1. Definitions.

This section includes definitions for terms that are not found in the statute but were needed to clarify language in the statute and the regulations. The terms included in the proposal were as follows: "anisotropy," "ASTM," "enterprise zone," "heterogeneity," "property," "risk assessment," "saturated soils," "special industrial area" and "volatile compound." The term "volatile compound" was defined to limit the universe of regulated substances that have to be evaluated for human exposure from inhalation and volatilization of regulated substances in soil and groundwater.

The Board received several comments regarding the definitions section. The comments and the Department's responses are as follows:

Commentators indicated that all statutory definitions should be included in the rulemaking for purposes of ease of understanding and compliance. The Department believes that the addition of statutory definitions is unnecessary because they are already in Act 2.

Commentators stated that with regard to the definition of "property," some sites have many parcels combined from former parcels comprising a single industrial site and would be forced to target remediation at a number of different points of compliance. Act 2 uses the term "property" in the definition of "point of compliance" and it is the Department's interpretation that the intention of Act 2 was to prevent persons from purchasing tracts of land after contamination was discovered in order to move the point of compliance. However, for situations where these large tracts existed prior to the discovery of a release and were owned by the same party, the regulations will allow movement of the point of compliance

under §§ 250.302 and 250.407 (relating to point of compliance; and relationship to surface water quality requirements).

One commentator suggested that the regulations should define the term "contaminated media." The Department does not believe a definition for this term is necessary because several environmental statutes are affected by Act 2 and it would be difficult to capture the various materials and activities that would be included in this broad term. For example, contaminated soil that is managed at the site of remediation is considered contaminated media and subject to Act 2 while it is being managed onsite. However, if the same material is removed for off-site disposal, it is considered "waste."

Commentators indicated that the following terms need clarification: "minimum threshold standards," "minimum threshold values," "exceptional value wetlands," "important habitats," "nonparametric upper tolerance limit," "prediction limit" and "nondetect." It is the Department's intention to minimize the number of terms that must be defined in the regulations. These concepts will be discussed further in the *Manual*. With regard to exceptional value wetlands, a description of these wetlands can be found in § 105.17 (relating to wetlands). The term "important habitats" was not used in the proposed or final-form regulations.

On final rulemaking, changes were made to the definitions of "VOC—volatile compound" and "special industrial area." The definition for "VOC—volatile compound" was changed to be consistent with the distinction made between volatile and semivolatile compounds by the analytical methodologies used in EPA's Resource Conservation and Recovery Act (RCRA) program (SW-846 methodologies). Typographical errors were corrected in the definition of "special industrial area." On final rulemaking, definitions for the following terms were added for further clarification of the regulations: "community water system," "environmental protection acts," "EQL," "habitats of concern," "regulated discharge," "secondary contaminants" and "species of concern."

Section 250.2. Application of remediation standards.

This section explains the requirement that remediations performed under an enforcement action meet one of the standards—background, Statewide health or site-specific. It also states that requirements and procedures under Act 2 and this chapter must be met to qualify for liability protection.

The Board received several comments regarding this section. The comments and the Department's responses are as follows:

Commentators stated that sections 102 and 301 of Act 2 (35 P. S. §§ 6026.102 and 6026.301) clearly indicate that the General Assembly intended that individuals who voluntarily remediate a site are eligible for the release from liability. The section lacks the necessary clarity to indicate this intent and it was recommended that the section be amended. The Department has incorporated the following language into a new subsection: "This chapter provides remediation standards which shall be used whenever site remediation is voluntarily conducted or is required under environmental statutes listed in section 106 of the act." This language reiterates what is contained in section 106 of Act 2 (35 P. S. § 6026.106).

Commentators recommended that the Department establish procedures to allow individuals who have previously remediated a site to obtain liability protection under Act 2. The Department believes that the regulations do not prohibit any person from seeking liability protection from environmental releases which occurred in the past by complying with Act 2 and the land recycling regulations.

On final rulemaking, a cross reference in new subsection (c) was changed to reflect numbering changes in § 250.2. Also, a reference to Chapter 245, Subchapter D (relating to the corrective action process in the storage tanks program) was deleted to allow corrective actions that began prior to the effective date of Chapter 245, Subchapter D regulations to continue to use the process that was in place prior to those regulations and still qualify for a release of liability under Act 2.

Section 250.4. Limits relating to practical quantitation limits.

This section establishes the sources for identification of the practical quantitation limits (PQLs) for regulated substances in soil and groundwater. Also, PQLs are considered threshold concentration levels for establishing attainment of remediation standards. On proposed, the regulations indicated that PQLs may not be used for attainment purposes in the following instances: 1) PQLs that fall outside the maximum allowable health risk levels identified in sections 303(c) and 304(b) and (c) of Act 2 (35 P. S. §§ 6026.303(c) and 6026.304(b) and (c)) may not be used; 2) if a maximum contaminant level (MCL) has been promulgated under the Safe Drinking Water Act for the regulated substance; and 3) if a lifetime health advisory level (HAL) has been established under the Safe Drinking Water program. Under each of these circumstances, a person was required to demonstrate attainment with the MSC.

Commentators suggested that the PQL should be the floor for measurements for attainment, even when the PQL exceeds the risk range or the MCL or HAL. One commentator indicated that the Board must demonstrate a compelling public need for the establishment of quantitation limits where EPA's PQLs exceed the statutorily established maximum allowable health risk levels. It is the Board's position that the goal of any remediation is always to demonstrate attainment of the selected standard. If the limits imposed by the selected standard prevent this, then attainment may be demonstrated by attaining the limit relating to the PQL. Section 301 of Act 2 authorizes the Department to establish, by regulation, procedures for determining attainment of remediation standards when PQLs set by the EPA have a health risk that is greater than the risk levels set in sections 303(c) and 304(b) and (c) of Act 2. Commentators requested that a list of the PQLs be published in the final-form regulations. The Department intends to publish the numeric values in its update to the *Manual*. By publishing the numbers in the *Manual*, the numbers can be updated regularly, as PQLs are developed.

On final rulemaking, the title to this section was changed from "standards" to "limits" related to the PQLs because the Board wants to avoid confusion between the meaning of a cleanup standard and the use of a quantitation limit for purposes of attainment of a standard. The final-form regulations no longer provide for the use of the PQL value as a default value to meet the background standard. Also, for attainment purposes, the final-form regulations do not allow the use of a PQL if it falls outside the maximum allowable health risk levels identified in sections 303(c) and 304(b) and (c) of Act 2. Procedures to develop limits related to a PQL have been established by the Department to ensure that quantitation limits fall within the risk range.

No changes were made to subsection (a) on final rulemaking. A new subsection (b) was added on final rulemaking to ensure that for substances which have MCLs or HALs, the PQLs fall at or below the respective MCLs or HALs. The Board decided to use the same methodology for establishing PQLs for substances with an MCL or HAL as for other regulated substances, except that if the MCL or HAL is below the level of the PQL established by EPA's SW-846 methodologies, the PQL methodologies published under EPA's drinking water program must be used for those substances. Also, if a PQL determined under the drinking water program is not below a HAL, the methodologies in subsection (c)(1) or (2) must be used unless those quantitation limits are higher than the PQL determined under the drinking water program.

The use of PQLs for these substances, instead of the MCLs or HALs themselves, is important for the background standard because the PQLs may more closely represent the true site conditions than the higher MCL or HAL. For example, for xylene, the MCL is 10,000 micrograms per liter (µg/l.). The PQL is 5 µg/l, which is a closer sensoring level for determining the background conditions. By developing PQLs for substances with MCLs and HALs in this manner, the need for proposed subsection (c) was eliminated and it was deleted.

On proposed, subsection (b) required the use of the Statewide health standard, itself, if the estimated quantitation limits (EQLs established by the EPA) fell outside the risk range established in Act 2. On final rulemaking, in subsection (c), a methodology was established for developing a quantitation limit that always falls within the risk range, so the default to the Statewide health standard was eliminated. A new subsection (d) was added to indicate that if a limit related to a PQL is not available for regulated substances under the methodologies in subsection (c), the site-specific or background standard must be used to demonstrate attainment. New subsection (e) was added to clarify that quantitation limits are not applicable in the demonstration of attainment of minimum threshold medium-specific concentrations (MSCs). The minimum threshold MSCs are used because it is not known, due to the lack of toxicological data, whether the quantitation limits fall within the risk range identified in Act 2.

Section 250.5. Public notice by applicant

This section explains when the opportunity to request public participation is initiated. For cleanups under the site-specific standard and special industrial areas, the notice of intent to remediate (NIR) must include a 30-day period in which the municipality, where the remediation site is located, may request to be involved in the development of the remediation and reuse plans for the site. No plans and reports associated with the remediation may be submitted to the Department prior to the end of that 30-day period.

Commentators stated that public notice in the proposed regulations was inadequate because the method of publication in the newspaper was lacking. The Department will address procedures for notification, including publication in a newspaper of general circulation, in the *Manual.*

Commentators suggested that public notice requirements that cross program boundaries (that is, public notice requirements required by acts other than Act 2) should be consolidated with this rulemaking. It is the Department's position that notice requirements under Act 2 are only applicable to activities undertaken to comply with Act 2. The notice requirements under Act 2 may not be adequate to meet the requirements under other laws and regulations. For example, § 101.2 (relating to incidents causing or threatening pollution) require reporting in many circumstances, including reporting at the time of an accident. Accordingly, submitting an NIR under Act 2 when remediation is undertaken may not satisfy the requirements of § 101.2.

Commentators recommended that the regulations require the preparation of notices in plain language. Section 901 of Act 2 (35 P. S. § 6026.901) requires that notices and reports submitted to implement Act 2 contain a summary or special section that includes a plain language description of the information. The Department believes it is not necessary to repeat this requirement in the regulations.

Section 250.6. Public participation.

This section establishes the starting date for the commencement of the 30-day public and municipal comment period during which a municipality may request to be involved in the development of the remediation and reuse plans. The comment period will begin on the publication date of the summary of the NIR in a newspaper of general circulation. This section also provides minimum contents for a public involvement plan and requires submission of the plan with the first report due to the Department for either a site-specific standard or special industrial area cleanup.

Commentators suggested that the regulations clarify that an NIR is required for all cleanups under Act 2. Language has been added to subsection (a) that indicates an NIR is required for cleanups to the background, Statewide health and site-specific standards and under a special industrial area cleanup.

One commentator recommended that the regulations provide an opportunity for a community veto of a remediation measure based on various criteria. It is the Board's position that matters relating to the public's involvement are better addressed in a public involvement plan that is developed by the person performing remediation and the public. A public involvement plan can be tailored to meet the needs of the parties.

Commentators indicated the Board should clarify that subsection (b)(1) and (2) must be satisfied before a public involvement plan is necessary. The words "both of" have been added to the language in subsection (b).

Section 250.7. Fees.

On proposed, this section provided that resubmissions of reports and plans, except for a site-specific standard final report, require payments of the appropriate fee identified in Act 2. On final rulemaking, there are no exceptions for payments on resubmissions. The statute does not require the exception proposed.

Section 250.9. Interaction with other environmental statutes.

This section was titled "applicability to solid waste facilities" in the proposed regulations and was located under proposed § 250.12. The title was changed because the section is no longer limited to the application of land recycling regulations to solid waste facilities.

The proposed regulations identified several trigger dates for deciding when releases at municipal, residual and hazardous waste facilities were completely subject to Chapter 250 and Act 2 and when releases were only subject to certain elements of the cleanup standards.

Commentators indicated that proposed § 250.12(b) exceeded statutory authority since it restricted how cleanup standards and points of compliance under Act 2 would be used to address releases of regulated substances at solid waste facilities. In addition, concern was expressed that requiring cleanups to satisfy the background standard was expensive and beyond what is required to protect human health and the environment. The final-form regulations provide more flexibility than the proposed regulations by providing the option of either the Statewide health or background standard, including the points of compliance under Subchapters B and C (relating to background standards; and Statewide health standards), for abatement of releases during the operational life of the solid waste facility. In addition, the final-form regulations include the use of the site-specific standard as an option for remediations of spills or releases at closure for solid waste facilities.

Commentators recommended adding a definition of "solid waste facility" to the regulations. A new definition for this term is not necessary because a "facility" is defined within each of the municipal waste, residual waste and hazardous waste regulations. In addition, the final-form regulations clarify that if a release occurs outside a disposal or processing unit, then any of the remediation standards may be used for the remediation in accordance with this chapter and Act 2.

Commentators indicated that subsections (b) and (c) of proposed § 250.12 were inconsistent with existing regulations because solid waste monitoring points were considered the points of compliance, instead of the points of compliance under Act 2. Further, it was stated that the EPA recognizes that it may not be appropriate to set a point of compliance at a monitoring well. Since the SWMA addresses the management of wastes that would not be present but for the operation of a permitted facility, it is the intention of the Department to minimize impacts caused by an unregulated release from these facilities and to abate pollution on the property where the site is located. On final rulemaking, a release at a solid waste facility during its operational life is subject to the points of compliance under Subchapters B and C of the land recycling regulations. In limited circumstances, the point of compliance for groundwater may be extended beyond the property boundary. This position is consistent with the best available technology philosophy embodied in the Department's permitting and groundwater protection requirements. The monitoring wells required under the solid waste regulations will continue to apply as a tool to monitor compliance with performance, design and operational standards required under the solid waste regulations. At closure, a release is subject to the points of compliance under Subchapters B—D (relating to background Statewide health and site-specific standards).

On final rulemaking, subsection (a) states that facilities that did not receive waste after September 7, 1980, are subject to Chapter 250 and Act 2 in its entirety. The proposed waste-specific trigger dates were deleted on final rulemaking. New subsection (b) indicates that the permitting, performance, operation, design and closure requirements under the environmental protection acts are not affected by Chapter 250 and Act 2. The groundwater standards in Subchapters B and C apply as part of a Department-approved assessment and abatement plan that is implemented prior to closure of a solid waste facility and apply as the standards that must be demonstrated to qualify for liner and leachate system waivers or modifications as specified in Chapter 287 (relating to residual waste management—general provisions). The groundwater standards in Subchapters B—D apply to the remediation of a release at closure but may not be substituted for design and performance standards required under the solid waste management regulations. Remediations performed at hazardous waste facilities must comply with the requirements of the Federal Resource Conservation and Recovery Act (42 U.S.C.A. §§ 6091—6986). For residual waste facilities, groundwater parameters and human health environmental protection levels no longer apply to groundwater remediations.

Subsection (c) was replaced with new language that addresses unpermitted releases or spills at a permitted solid waste facility. If the release is outside a disposal or processing unit, including surface impoundments, waste storage areas, associated piping and underlying containment systems, then it must be remediated in accordance with Chapter 250 and Act 2.

Section 250.10. Measurement of regulated substances in media.

This section sets out procedures for sampling of regulated substances. To eliminate differences based on moisture content, it provides that analyses of soils and sediments be done on a dry weight basis. The proposed regulations required total metals analysis for most substances, and required field filtering and field acidification of groundwater samples for metals analysis.

Commentators supported the requirement that groundwater samples for metals analyses be field filtered. The final-form regulations establish separate requirements for groundwater when monitoring is being performed at a drinking water well. At these wells, samples for metals analyses must be unfiltered. This change was made because in a drinking water well, an unfiltered sample best represents the actual exposure of the regulated substances to humans.

Commentators requested that appropriate methodologies for surface water be added to this section. The final-form regulations include a requirement that will provide consistency in the sampling of surface water.

Subsection (f) of the final-form regulations includes a cross reference to a sampling methodology for air samples in this section.

Subchapter B. Background Standard

The background standard is one of the three cleanup standards available under Act 2. Background is defined by Act 2 as the concentration of a regulated substance determined by appropriate statistical methods that is present at the site, but is not related to the release of regulated substances at the site. The determination of a background concentration must be based on levels of naturally occurring substances and concentrations of regulated substances originating from sources on other properties. Under Act 2, persons are not responsible for abating releases originating from other properties.

Section 250.202. Establishing background concentrations.

On proposed, this section created two methods for determining background standards: the use of practical quantitation limits as the default background standard or the use of a remedial investigation to establish background. If a person is using a remedial investigation to establish background, samples must be taken in an area unaffected by a release on the property. In some cases, this may require off-property sampling. Criteria are included to determine the number of samples necessary to determine background levels in groundwater.

Commentators indicated that the word "determined" should be replaced with "established" throughout the section. This language is changed on final rulemaking.

Commentators stated that sampling and statistical methodologies should be included in this section. This information is already described in Subchapter G (relating to demonstration of attainment).

On final rulemaking, the default background concentrations were eliminated. The default background concentrations were developed for use during the interim period prior to final rulemaking. With this final rulemaking, the availability of the Statewide health numerical standards eliminates the need for default values. An additional change to this section is the replacement of the words "a remedial investigation" with the words "a site characterization." The words "remedial investigation" are used as a term of art in the site-specific standards section of Act 2. To avoid confusion, the language was changed in this section of the background standard. Other minor revisions were made to this section.

Section 250.203. Points of compliance.

The point of compliance is the location in the environmental media where attainment of the standard must be met. In surface water, the proposed points of compliance for point source discharges are the points of discharge in accordance with the limits specified in a National Pollutant Discharge Elimination System (NPDES) permit. The proposed regulations also indicated that the following points of compliance apply to surface water: 1) nonpoint source or diffuse groundwater discharges to surface water were required to meet instream surface water quality standards through the use of mass balance techniques; and 2) when groundwater discharges to the surface, thus creating a spring, the point of discharge to the surface was the point of compliance. For outdoor air quality, the proposed point of compliance was cross referenced to the applicable air quality regulations.

To attain the background standard for groundwater, the point of compliance is throughout the contaminant plume, including areas of the plume that are outside the property boundary. For soil, the point of compliance is throughout the area of the soil that has become contaminated as a result of releases on the property. The final rulemaking has not changed these requirements.

Commentators indicated that the point of compliance for groundwater cannot, under Act 2, be brought inside the property boundary. They point to the definition of "point of compliance" in the statute which provides that the point of compliance for groundwater is at the property boundary or a point beyond the property boundary that the Department may determine to be appropriate. Section 302 of Act 2 (35 P. S. § 6026.302) states that "attainment of the background standard shall be demonstrated . . . in the area where the contamination occurs . . ." It is the Department's interpretation that the area where groundwater contamination occurs is throughout the plume, including areas of the plume that are outside the property boundary. Another commentator supported the application of the point of compliance throughout the plume because the landowner should be responsible for remediation of all of the contaminant plume under the background standard.

On final rulemaking, the Department deleted the points of compliance for diffuse groundwater discharges and for springs. The reason for this change is that under the definition of "background," if the groundwater meets the background standard, remedial obligations to address the groundwater are satisfied under Act 2, even if surface water quality standards are not met. In addition, minor revisions were made to this section.

Section 250.204. Final report.

Under the background standard, the final report is the only report that must be submitted to and approved by the Department. The final report must document the following: site investigation activities including all laboratory results; the means for establishing background concentrations; the remediation activities; the demonstration of attainment with the standard; and any postremediation activities, such as engineering or institutional controls, that are necessary to maintain attainment.

Commentators have stated that documentation in § 250.204(f)(6) and (7) requires that the background area shall be free of contamination from any release at the site. It has been suggested that this language does not take historical releases into consideration. Act 2 defines background as the concentration that is "not related to the release of regulated substances at the site." Historical contamination at the site is related to releases at the site, and cannot be considered background. The regulations do not require that background areas be free of any release, but they do require that background comparison areas be free from the effects of the releases on the subject property. No change to the section is needed in response to the comment.

A commentator has suggested the use of side-gradient locations, where no hydrogeologically upgradient points are available for determining background. If there is not a hydrogeologically upgradient release of a regulated substance, then it is not possible for a property owner to obtain a background standard release for groundwater. A person demonstrates background by showing that contamination is migrating onto their property or that levels of contaminants on the property are naturally occurring. A side-gradient concentration does not demonstrate that the contamination is migrating onto the subject property. If there are no conditions that cause contamination from an adjacent site to move onto the property or the regulated substances are naturally occurring then the background standard is not available.

On final rulemaking, changes were made in subsection (a) to provide more direction in a site investigation to the characterization of the rate of movement, extent and fate of contaminants, as required by Act 2 in a final report. A fate and transport analysis should delineate the extent of contamination over the period of its transport to ensure continued attainment of the remediation standard. In subsection (b), the words "above the selected standard" were deleted in paragraph (2) because it is more important to know this information at the attainment stage. A complete site characterization, prior to remediation, should include all areas where the regulated substance is present. In subsection (b)(3), the words "and fate and transport of all contaminants" were added to more fully describe what information is expected to be submitted for the site characterization.

In subsection (f), clarifications were made to the requirement for additional information. The methodology and analytical results used during remediation must be documented. The determination that the remediation met the cleanup standard and can be maintained must be justified with this data. Also, the types of information required to be submitted when a fate and transport analysis is used were added. The word "reference" was inserted in several locations within this subsection to

distinguish between requirements that relate to the identification of a background "reference" area and requirements that apply to the area where the background standard is being implemented.

In subsection (g), additional criteria were established to determine when a postremediation care plan is required. Also, additional requirements were added to the postremediation care plan. These requirements include the following: the performance of monitoring that demonstrates the effectiveness of the remedy and periodic reporting of monitoring results and analysis; and documentation of financial ability, if requested by the Department, to implement the remedy and the postremediation care plan.

Subchapter C. Statewide health standards

The Statewide health standard is one of the three cleanup standards available under Act 2. The Statewide health standards were developed in consultation with SAB, established by Act 2. Act 2 mandates the use of MCLs and HALs adopted by the Department and by the Federal Government by regulation or statute and mandates the development of health-based concentrations for Statewide health standards that eliminate any substantial present or probable future risk to human health and the environment. This rulemaking finalizes the health-based concentrations adopted by the Department. The MSCs included in Tables 1—4 and 6 are the concentrations that must be met in order to demonstrate attainment of a Statewide health standard, along with a screening protocol for the protection of ecological receptors.

To select the appropriate concentration from Tables 1—4, determinations must be made concerning the land use of the property, the background groundwater quality of the aquifer for total dissolved solids, depth of the soil contamination and the use or planned use of the aquifer.

On final rulemaking, the Board has chosen the use of a cancer risk factor of 1×10^{-5} for the development of soil and groundwater medium-specific concentrations. 1×10^{-5} means there is risk of one excess cancer in 100,000 in the human population. This risk factor was chosen because it falls within the risk range identified in Act 2, and it has been adopted by several other states, including California, Indiana, Massachusetts and Michigan, for use in the development of cleanup standards. Although the Statewide health standard does not take into account cumulative effects, one could have up to 10 regulated substances at a given site and, if the Statewide health standards are used, the cumulative excess cancer risk level would still not exceed the 1 in 10,000 limit of the acceptable risk range in Act 2.

The Board has not included soil and groundwater standards based on the dermal absorption route of exposure. Soils contaminated by regulated substances that meet ingestion and inhalation based standards would not pose a substantive dermal risk because of low bioavailability, low moisture content of surface soils, and short exposure periods for actual adherence of soil to the skin. For sediments, exposure is less frequent and of shorter duration than soils. For groundwater, the ingestion and inhalation standards provide adequate protection from the dermal contact route of exposure.

It cannot always be assumed that the Statewide health standards that are protective for humans will also be protective of ecological receptors. The complexity of how different substances interact with different species makes it very difficult to establish Statewide health standards protective of ecosystems in general. Therefore, an ecological screening procedure has been included to evaluate the effects of regulated substances on ecological receptors.

On final rulemaking, the section titled "radionuclide numeric values" and the MSCs for radionuclides in soil were deleted because the Board decided that the substances addressed by this section have not been commonly encountered in remediations in this Commonwealth. If a remediation is necessary with regard to these substances, the background or site-specific standards are available. Deletion of this section will avoid confusion with regard to the Nuclear Regulatory Commission's jurisdiction over the management of these materials.

Two new sections were added to this subchapter: "current use and currently planned use of aquifer groundwater," which is located in § 250.303 (relating to aquifer determinations; current use and currently planned use of aquifer groundwater); and "MSCs for surface water," which is located in § 250.309 (relating to MSCs for surface water). The subchapter was renumbered on final rulemaking and the summary which follows is based on the renumbered and retitled sections.

Section 250.301. Scope.

This section explains that the Statewide health standards are addressed in Subchapter C. References to the appropriate Tables for choosing a Statewide health standard are included. On final rulemaking, subsection (c) was added to this section to clarify that for regulated substances which do not have an MSC for the relevant medium listed on a Table, the background standard or site-specific standard must be met to qualify for a release of liability under Act 2.

Section 250.302. Point of compliance.

The points of compliance for surface water have been deleted on final rulemaking. Regulations concerning surface water have been established in a new section, § 250.309. This new section was added to implement Section 303(b)(1) of Act 2, which discusses the establishment of MSCs for any regulated discharge into surface water.

For groundwater MSCs, the point of compliance is the property boundary that existed at the time the contamination was discovered. The Statewide health standard must be attained at and beyond the point of compliance. The Department may determine, in writing, a point of compliance beyond the property boundary to be appropriate under certain specific situations. The point of compliance for soil MSCs is the concentration of the medium specific value at the depth specified in § 250.305 (relating to MSCs of soil). On final rulemaking, minor word changes were made to this section for clarification. In addition, subsection (a)(1) was deleted on final rulemaking because technology exists to meet a remediation standard at the property boundary even if the source of the contamination is at the property boundary. With the exception of the presence of secondary contaminants, the point of compliance can only be moved based on physical obstructions that prevent attainment at the property boundary.

Commentators indicated that the points of compliance should be uniform, regardless of which standard is used. It complicates the monitoring and remediation process to have different points of compliance apply to different parameters at a single site. Act 2 specifically creates a different point of compliance for the background standard by using the words "in the area where the contamination occurs" when describing the demonstration of attainment

in section 302(b)(1) of Act 2. For the Statewide health standard and the site-specific standard, Act 2 states that a demonstration of attainment takes place at "the point of compliance," which is a statutorily defined term. The differences in the points of compliance are based on the language of Act 2.

Commentators were concerned that the proposed language allowed the adjustment of the point of compliance only when SMCLs exist without the presence of other contaminants. On final rulemaking, subsection (a)(5) was modified to state that the point of compliance may be moved for measuring compliance with the groundwater MSCs that apply to secondary contaminants. "Secondary contaminants" is now a defined term in § 250.1.

Comments concerning the points of compliance for surface water are addressed under § 250.309.

Section 250.303. Aquifer determinations; current use and currently planned use of aquifer groundwater.

The aquifer determination section of the proposed regulations (§ 250.4), which was relocated to subsection (a) of this section, was changed substantially on final rulemaking. The proposed regulations referred to a yield of 200 gallons/day. Remediation standards applied only if a well had the specified yield and the groundwater was in an aquifer used or currently planned to be used. An inhalation exposure screen, however, was applied to groundwater that was not subject to remediation standards. On proposed, all drinking water and agricultural uses of water that existed as of the effective date of the rulemaking would have continued to be protected as "currently used" aquifer groundwater, regardless of the yield.

Commentators stated that the proposed yield was so low that performance of attainment in low permeability zones would be prolonged and costs associated with the cleanup would be too high with no benefit. The Department has reevaluated how to classify aquifers. The Department reviewed a United States Geological Survey field-verified groundwater site inventory and the water well inventory of the Pennsylvania Topographic and Geologic Survey. It is the Department's opinion that this Commonwealth is hydrogeologically best described as underlain by saturated unconsolidated or consolidated geologic formations, or both, or groups of formations which have the potential to yield sustainable, significant supplies of water to wells anywhere. Because of the local variability in well yield that can occur over short horizontal and vertical distances, attempting to assign a nonaquifer status to a geologic formation or subsurface interval based on the yield of one or more wells at a single site would very likely not be a valid indication of the hydrogeologic potential of the underlying formation nearby that site or well as a whole.

Commentators stated that the proposed yield was so low that it cannot be field tested and raised issues as to its potential enforceability. Demonstration of attainment will be required in all low yielding subsurface saturated intervals where they can be shown to have significant impact on the usability of the resource as a whole. The *Manual* will address the details for demonstrating attainment, such as placement of monitoring intervals, with the objective of providing protection to drinking water and agricultural uses of water.

Commentators indicated that water quality requirements for drinking water and for agricultural uses may be different and these differences should be recognized by the regulations. Section 303(b)(3) of Act 2 states that the MSCs for regulated substances in groundwater in aquifers used or currently planned to be used for drinking water or for agricultural purposes shall meet the MCLs or HALs established for drinking water.

The Board has decided to base the application of groundwater standards on whether the groundwater is currently used or planned to be used for drinking water or agricultural purposes, rather than on the yield of one or more wells at a specific location.

The new language for aquifer determination, in § 250.303(a), states that all geologic formations or parts of or groups of formations which are saturated are presumed to be aquifers for the purpose of applying the Statewide health standards. Geologic deposits overlying the bedrock formations which are hydrologically connected to the bedrock formations are also considered aquifers. The only groundwater that is not subject to remediation standards is seasonal, localized and hydrologically isolated perched systems under a property.

Subsections (b)—(e) replace the proposed regulation in § 250.6. On final rulemaking, the regulations were changed to indicate that groundwater in aquifers is presumed to be used or currently planned for use. In subsection (b), a person may request a determination be made by the Department that the aquifer is not used or currently planned to be used. If an aquifer is not used or currently planned for use, higher MSCs ranging from 1x to a 1,000x the MSCs may be used as alternatives to those that apply in aquifers used or currently planned for use. The methodology for these alternative MSCs and the standards can be found in § 250.304(d) and in Appendix A, Tables 1 and 2.

To qualify to use the higher MSCs for groundwater, a demonstration must be made that an aquifer is not used or currently planned to be used within the area defined as the property and a radius of 1,000 feet downgradient of the points of compliance plus any additional areas to which the contamination has migrated and might reasonably migrate at concentrations that exceed the MSC for an aquifer used or currently planned to be used. The Board recognized that an attenuation zone was needed between areas where higher nonuse aquifer MSCs would be applied and lower MSCs where aquifers are used or planned to be used would be applied. The primary purpose of the attenuation zone is to allow for time and distance before the substance reaches an area where the MSC for groundwater in an aquifer used or currently planned to be used applies. The exposure assumptions for the area defined by subsection (b) are no human ingestion and agricultural use of groundwater within the area.

To demonstrate that the aquifer is not used or currently planned to be used, subsection (c) requires that the following must be met within the area described above: 1) no groundwater derived from wells or springs is used or currently planned to be used for drinking water or agricultural purposes; 2) all downgradient properties are connected to a community water system; 3) the area described does not intersect a radius of 1/2 mile from a community water supply well source or does not intersect an area designated by the Department as a Zone 2 wellhead protection area in accordance with § 109.1. If any of the criteria is not met within the defined area, the MSC for groundwater in an aquifer used or currently planned to be used applies.

Section 250.304. MSCs for groundwater.

For groundwater in aquifers used or currently planned to be used, the MSCs are developed on the basis of the following hierarchy: 1) the use of MCLs; 2) when no MCL has been established, the use of lifetime HALs; 3) when no MCL or HAL exists, the use of the lowest concentration calculated by the equations in §§ 250.306 and 250.307 (relating to ingestion numeric values; and inhalation numeric values). Sites with groundwater that naturally exceeds 2,500 milligrams per liter for total dissolved solids may use an adjusted Statewide health standard. If this situation is occurring at a given site, the adjusted Statewide health standard shall be used as the basis for the development of a soil standard that is protective of groundwater.

A commentator stated that it is not clear what MSCs for groundwater apply if groundwater is not currently used and is restricted from future use. The final-form regulations establish MSCs for all groundwater, with a very limited exception for localized and hydrologically isolated perched systems under a property. The aquifer determination has been broadened significantly to include virtually all groundwater based upon information obtained on formations from the United States Geological Survey. Under the final-form regulations, a distinction between the use or nonuse of an aquifer and land use in the area of the release will determine which MSC for groundwater applies.

A commentator indicated that there should be residential and nonresidential MSCs where the numbers are based on MCLs or HALs, rather than just one number that applies to both. Section 303(b)(3) of Act 2 specifically states that the MSC of a regulated substance in groundwater in aquifers used or currently planned to be used for drinking water or for agricultural purposes shall comply with the MCL or HAL established for drinking water.

Commentators suggested that the vapor intrusion evaluation requirements are overly stringent because they are not limited to circumstances where vapor intrusion poses an actual risk to human health. The Board has deleted the screen from the final-form regulations, but the final-form regulations continue to protect against vapor intrusion by applying MSCs to all groundwater. Also, a solubility cap has been applied to the MSCs that will limit the formation of separate phase liquids, which are believed to be the primary cause of vapor intrusion problems.

Several changes were made to this section on final rulemaking. In subsections (b) and (e), references to a solubility limit for all groundwater MSCs were added to the text of the regulations. These references were inadvertently omitted from the proposed regulations. The numbers in Table 2 of the proposed regulations included the numerical limits.

In subsection (c), the words "by the EPA" were deleted because the Department may also establish MCLs under the State Safe Drinking Water Act.

A new subsection (d) was added to establish MSCs for groundwater in aquifers not used or currently planned to be used. Upon a determination under § 250.303 that an aquifer is not used or currently planned to be used, the MSCs in subsection (d) of § 250.304 may be used. In general, a natural attenuation factor was relied upon for developing the MSCs which was based on the adsorption and biodegradation processes. The MSCs are based on consideration of the organic carbon partitioning coefficient (Koc) and the first order decay coefficient (lambda). Koc and lambda were multiplied together (where data was available) to yield an attenuation factor. The product of these two factors gives an estimation of the mobility of the substances in groundwater. In the case of certain chlorinated volatile organic substances, which degrade into undesirable byproducts, the lambda was adjusted by dividing by 10. If the attenuation factor was less than 20, the MSC for groundwater in aquifers used or currently planned to be used was multiplied by 10 to yield the MSC for groundwater in aquifers not used or currently planned to be used. The attenuation factor of 20 is a reasonable cutoff to define mobility of volatile materials because it approximates where differences can be observed between categories of volatiles.

In subsection (d)(1), for volatile organic regulated substances with an attenuation factor of less than 20, the appropriate residential or nonresidential MSC is ten times the MSC for groundwater in aquifers used or currently planned to be used. In paragraph (2), for volatile organic regulated substances with an attenuation factor of greater than or equal to 20, the MSC is 100 times the appropriate residential or nonresidential MSC for groundwater in aquifers used or currently planned to be used. In paragraph (3), for semivolatile organic and inorganic regulated substances, the MSC is 1,000 times the appropriate residential or nonresidential MSC for groundwater in aquifers used or currently planned to be used, regardless of the attenuation factor. In general, the multipliers are an order of magnitude difference between categories of substances that must be supported on a site-specific basis, based on factors as soil type and groundwater flow and velocity. The multiplier for semivolatiles was based on the adsorbtive potential of the substance to soil. For benzene, the calculated attenuation factor was 19.8 and rounded off at 20, allowing a multiplier of 100. The higher multiplier is further substantiated by studies conducted by the University of Texas (R.E. Mace, et al., "Extent, Mass and Duration of Hydrocarbon Plumes from Leaking Petroleum Storage Tank Sites in Texas," Geological Circular 97-1) and the California Environmental Protection Department (D.W. Rice, et al., "California Leaking Underground Fuel Tank (LUFT) Historical Case Analyses," November 16, 1995), which show attenuation of benzene in plumes of petroleum releases in most cases at less than 1,000 feet. In paragraph (6), a statement was added that 5 micrograms per liter in groundwater must be used as the minimum threshold MSC for groundwater in an aquifer that is not used or currently planned for use.

The calculated MSC for groundwater in an aquifer not used or currently planned to be used is within the statutory risk range since there is no risk to humans if there are no exposure pathways (that is, no one uses the water).

Section 250.305. MSCs for soil.

Standards for soil are developed based on residential and nonresidential land uses. Along with changes in exposure factors, the depth to which the human health standards will apply varies based on land use. The standards are protective of human health through the ingestion, inhalation and volatilization routes of exposure. The standards are developed to ensure that future leaching of contaminants through soil will not exceed the groundwater standard as established in § 250.304.

To determine the depth at which the ingestion and inhalation standards apply, the Board decided that the depth should vary based on land use patterns and deed notice provisions. For residential land uses, one must

remediate to the full depth of 15 feet from the existing ground surface. For nonresidential land uses, one must remediate to a depth of 2 feet from the existing ground surface, based on the lower of the ingestion or inhalation numeric value. Only the inhalation numeric value applies to the 2—15 foot depth interval.

Commentators suggested that in cases where soil contamination is located beneath a building, inhalation numeric values which consider volatilization to the indoor air should be established. In lieu of meeting a standard, indoor air sampling could be performed. The direct contact soil numbers consider inhalation health threats to a depth of 15 feet under both the residential and nonresidential standard. In addition to having the standards be protective of inhalation, the final-form regulations include a saturation cap which provides additional protection against vapor problems. The final-form regulations also include soil-to-groundwater pathway standards that apply below 15 feet and include the same saturation cap.

Commentators indicated that the proposed regulations did not provide for the severability of the soil-to-groundwater pathway numeric values from the direct contact soil standards if the person has selected to use a combination of cleanup standards. According to the commentators, current wording precludes a person from selecting the Statewide health standard for direct contact soils and a site-specific standard for soil-to-groundwater. Commentators also recommended that in cases where groundwater is not an issue, the regulations should allow persons to eliminate the application of the soil-to-groundwater pathway numeric value. Under the Statewide health standard, the soil standard includes both the direct contact and the soil-to-groundwater pathway. Section 303(b)(4) and (5) of Act 2 requires that the soil MSC not exceed either the soil-to-groundwater pathway numeric value or the direct contact value. They are not severable. However, the revisions to the soil-to-groundwater numeric values in the final-form regulations allow for greater flexibility in their application.

In subsection (b), the proposed saturation limit, which designated the physical capacity of the soil to contain a regulated substance, was retained on final rulemaking for regulated substances other than those which are organics and liquids. This limitation results in a dry soil concentration limit of 190,000 mg/kg. In effect, this physical limitation on the concentration of a regulated substance that could occur in soil was calculated to serve as an upper limit for direct contact MSCs in soil. On final rulemaking, a new saturation limit was included for regulated substances which are organics and liquids at standard temperature and pressure. For organic liquids, further limitation of the concentration beyond the 190,000 mg/kg was necessary to prevent liquids from coming out of the soil matrix, thereby causing additional exposure and risk to human health not considered by the generic assumptions used to derive the MSCs for soil. This physical limitation is based on an assumed porosity for the soil equal to 0.35, an assumed dry bulk density of soil equal to 1.8 kg/L, an assumed regulated substance density of 1.0 kg/L and an assumption of a residual saturation ratio of substance volume to soil void volume of 0.051.

In subsection (c), the word "within" was deleted and replaced with "throughout the soil column" to clarify the application of the standard. Also, the option to demonstrate a soil-to-groundwater pathway soil buffer or show a soil-to-groundwater pathway equivalency demonstration are included as alternatives to meeting the soil-to-groundwater pathway numeric value.

In subsection (d), the soil-to-groundwater pathway numeric value was inadvertently omitted on proposed for determining the nonresidential soil MSC for surface soils. On final rulemaking, this numeric pathway is included and, in addition, the option to demonstrate a soil-to-groundwater pathway soil buffer or show a soil-to-groundwater pathway equivalency demonstration are included as alternatives to meeting the soil-to-groundwater pathway numeric value. In subsection (e), the alternatives to the soil-to-groundwater pathway numeric value are also included.

A new subsection (f) is added to clarify that in all cases one of the following applies as the MSC for a regulated substance in soil at a depth greater than 15 feet: 1) the soil-to-groundwater pathway numeric value as determined by § 250.308(a); 2) the soil-to-groundwater pathway soil buffer; and 3) the soil-to-groundwater pathway equivalency demonstration.

Sections 250.306 and 250.307. Ingestion Numeric Values and Inhalation Numeric Values.

The algorithms or equations in §§ 250.306 and 250.307 are based on those presented in EPA's risk assessment guidance for the "Superfund" program, under the Comprehensive Environmental Response, Compensation and Liability Act, 42 United StatesC.A. §§ 9601—9675. The equations attempt to replicate how the average person is expected to come into contact with regulated substances in soil or groundwater and how the contact will impact human health. The equations include consideration of assumptions as to body weight, exposure frequency and duration, inhalation and ingestion rates and toxicity data. The protection goals of section 303 of Act 2 are built into the equations. Further discussion of the exposure assumptions used for the development of the numeric values can be found in the Preamble to the proposed regulations at 26 Pa.B. 3985. On final rulemaking, the only change to these sections is the deletion of § 250.306(d). This change was made because based on the Statewide health standards in the final-form regulations, nonaqueous phase liquids should not be present due to the saturation and solubility caps applied to the soil and groundwater standards.

A commentator indicated that the absorption rate of 1.0 in the default exposure assumptions should be modified to include actual absorption values readily available for regulated substances. For the purpose of developing generic assumptions, the absorption value of 1 was chosen. Values are currently not available for all compounds.

A commentator stated that the Department used invalid models to derive the soil MSC for lead since EPA's IEUBK model has been updated several times and the Department has not used the most updated model. In addition, the Department should adopt a preliminarily promulgated standard by EPA under the Toxic Substances Control Act (TSCA) or adopt a standard not less than 5,000 mg/kg. The final-form regulations are based on two state-of-the-art models for estimation of MSCs for lead in residential and nonresidential soils. Although more recent versions of EPA's IEUBK model have been developed, the use of the most recent version would result in a residential MSC for lead that is lower than the 500 mg/kg level. The TSCA notice in the *Federal Register*, September 11, 1995, recommends a range of lead concentrations in soil of 400 mg/kg to 5,000 mg/kg. The notice also includes recommendations for interim controls to reduce exposure of children to contaminated soil within that range. Under the final-form regulations, the Statewide health standards fall within the range identified in the EPA notice.

In addition, exceedance of the 500 mg/kg residential soil MSC is not precluded under the site-specific standard. The interim controls identified in the EPA notice could be used under the site-specific standard in conjunction with a lead concentration in soil that is higher than 500 mg/kg.

Section 250.308. Soil-to-groundwater pathway numeric values.

The statute provides three options for the development of soil-to-groundwater pathway numeric values. Values in Appendix A, Tables 3 and 4, include concentrations developed using the following: 1) a concentration which is 100 times the MSC for groundwater; and 2) a concentration developed using an equilibrium partitioning method which would be protective of the MSC for groundwater. As a third option, the person remediating may use the Synthetic Precipitation Leaching Procedure in order to determine a level which would not produce a leachate in excess of the MSC for groundwater.

Commentators stated that the proposed soil-to-groundwater numeric values were too stringent, that the values should not apply when groundwater is not a medium of concern and that the methods used to calculate them are inappropriate. Based upon the many comments received, the method of calculating the soil-to-groundwater numeric values has been revised to provide for more achievable standards. The default dilution factor for unsaturated soils has been increased to 100 for all regulated substances. This value is less stringent than the EPA's default value of 10 in its Soil Screening Guidance. In addition, the calculation of these numeric values is linked to the appropriate residential or nonresidential groundwater MSC. To provide additional flexibility for meeting the soil-to-groundwater pathway requirement, the final-form regulations include a soil buffer option and an equivalency demonstration option as alternatives to meeting the numeric value.

Commentators also suggested that the soil-to-groundwater numeric values may be calculated for metals by substituting Kd values, as calculated in the EPA Soil Screening Guidance, for the Koc*foc term in the soil-to-groundwater equation. This suggestion has been incorporated into the final-form regulations.

In subsection (a)(3), the dilution factor was changed from one that varied based on the organic carbon partition coefficient for that substance and based on whether the soils were saturated or unsaturated to a default value of 100 for all substances. This change was made because it is more relevant to use the same dilution factor for all compounds.

In subsection (a)(4), the equilibrium partitioning coefficient method is applied to inorganic compounds. This methodology is used by the EPA in its Soil Screening Guidance. The difference between the application of this method to organic and inorganic compounds is that the fraction of organic carbon does not control the partitioning of inorganic compounds.

In subsections (b)—(d), demonstrations of equivalency can be made to show that groundwater will be protected. The demonstrations are available as substitutions for meeting the protectiveness of the soil-to-groundwater numeric values.

Subsections (b) and (c) provide a method for determining soil buffer zone thicknesses for some regulated substances which would ensure protection of groundwater even for levels in soil that exceed the soil-to-groundwater pathway numeric values for these regulated substances. The estimation of buffer zone thicknesses is based on the same equations and coefficients used for the development of the soil-to-groundwater numeric values. In the estimation of the buffer zone thicknesses, five different partition coefficients have been used. Each coefficient is used to represent the lower end of a range of coefficients. Regulated substances which possess partition coefficients which fall within a given range are assigned the buffer distance estimated from the coefficient used to represent that range. This accounts for five different buffer zone thicknesses: 30 feet for each regulated substance with a partition coefficient between 2.5 and 5; 20 feet for each regulated substance with a partition coefficient between 5 and 10; 15 feet for each regulated substance with a partition coefficient between 10 and 100; 10 feet for each regulated substance with a partition coefficient between 100 and 1,000; and 5 feet for each regulated substance with a partition coefficient exceeding 1,000. In determining the buffer zone thicknesses, the distance that the regulated substance travels over a period of 30 years in the soil column at a concentration of 1 part per billion or greater in soil pore water has been estimated. This estimation was then determined to be the approximate buffer zone thickness.

Subsection (d) provides the option of an equivalency demonstration to meet the protectiveness of the soil-to-groundwater pathway numeric value. To qualify to use this option, a person must first demonstrate that groundwater directly beneath the area of soil contamination does not exceed background or Statewide health MSCs prior to remediation. If a person demonstrates attainment with the direct contact soil standard, a demonstration may be made, by use of a fate and transport analysis, that groundwater is protected. Site specific data collected during the site characterization must be applied to the analysis. In addition, the analysis must demonstrate that the residual contamination will attenuate or stabilize over a period of 30 years and not cause an elevation of contaminant concentration in the groundwater above the MSC or the background standard, whichever is highest. Reporting and monitoring for eight quarters is required to show no exceedances of groundwater MSCs or the background standard for groundwater beneath the contaminated soil and to show no indications of an increasing trend of concentration over time that may exceed the standard.

Section 250.309. MSCs for surface water.

The proposed regulations identified points of compliance for surface water in § 250.302. Act 2 provides that for any regulated discharge into surface water, compliance with applicable laws and regulations relating to surface water discharges must be used to establish the MSCs for surface water. Therefore, a new section was developed on final rulemaking for MSCs for surface water.

A commentator stated that the potential for diffuse groundwater discharges to impact surface water bodies should be assessed using concentrations of regulated substances attributable solely to the site. The final-form regulations have been revised to include language that limits the determination of the expected instream concentrations of regulated substances to the concentrations attributable to releases at the site.

A commentator questioned the appropriateness of establishing the point of compliance for a spring where it is discharged from the ground. On final rulemaking, except where an NPDES permit is required, compliance with surface water quality standards in a spring must be

measured at the point of first designated or existing use, as defined in §§ 93.1, 93.4 and 93.9 (relating to scope; Statewide water uses; and designated water uses and water quality criteria). When the point of first designated or existing use occurs in a surface water into which a spring flows, compliance with surface water quality standards must be determined in the same manner as required for diffuse discharges.

Commentators indicated that proposed § 250.302(b)(3) was too restrictive by not allowing the point of compliance to be moved if a site involves contaminants other than those identified as secondary contaminants. On final rulemaking, the word "only" was deleted in subsection (b)(5). While other contaminants may be present at a site, the point of compliance may be moved for substances that are secondary contaminants.

The final-form regulations, in subsection (a), require that any regulated discharge to surface water must comply with the applicable provisions of Chapters 91—105, including the antidegradation requirements.

Subsection (b) requires compliance with an NPDES permit for point source discharges to surface water. This requirement was in the proposed rulemaking in § 250.302(d)(1).

Subsection (c) is similar to the requirement proposed in § 250.302(d)(2). On final rulemaking, the regulations require a person to determine the expected instream regulated substance concentrations that are attributable to the site. If mass balance techniques indicate that instream surface water quality standards are not met, then the person has an opportunity to conduct sampling. If sampling indicates that the standards are being met, there is no requirement for further remediation. If the results of the modeling, and sampling if any, indicate that surface water quality standards are not being met, further remediation will be required.

In subsection (d), except where an NPDES is required, compliance with surface water quality standards in a spring must be measured at the point of first designated or existing use, as defined in §§ 93.1, 93.4 and 93.9.

Section 250.310. Minimum threshold MSCs.

This section provides cleanup standards for regulated substances where no toxicological data is available for the substances. The numbers are based solely on ingestion. After considering the United States Food and Drug Administration's final rule, Threshold of Regulation for Substances Used in Food-Contact Articles (*Federal Register*, Vol. 60, No. 136, July 17, 1995, pp. 36582-36596) and back-calculating the threshold numbers derived from the regulations to cleanup standards at 1×10^{-5} risk level, Statewide health standards were developed for regulated substances where no toxicological data exists. Further information regarding the development of the minimum threshold MSCs can be found at 26 Pa.B. 3991.

The minimum threshold MSCs may be used only when no toxicological data is available for the regulated substance. Under Act 2, the Department may require additional remediation for the regulated substances that meet a minimum threshold MSC if new chemical-specific toxicological information is obtained which revises the exposure assumptions beyond the acceptable risk.

Commentators indicated that by requiring the use of the lowest of the ingestion numeric value or the soil-to-groundwater pathway numeric value, the minimum threshold numeric value would not be used because the soil-to-groundwater value is significantly more restrictive. Section 303(b)(4) of Act 2 states that an MSC for soil shall not exceed either the direct contact soil MSC or the soil-to-groundwater pathway numeric value. Alternatives to the numeric value for protecting groundwater through the soil-to-groundwater pathway, which are not as restrictive, have been included in the final rulemaking at § 250.308.

On final rulemaking, language was added to subsection (c)(1) that requires the soil-to-groundwater pathway value to be calculated by either using a concentration in soil at the site which does not produce a leachate in excess of the MSC for groundwater or by using a value which is 100 times the MSC for groundwater, expressed in milligrams per kilogram of soil. An equivalency demonstration under § 250.308(d) may be substituted for the soil-to-groundwater numeric value. This new language was added to explain which soil-to-groundwater protection methodologies can be used for regulated substances which have no KOC values. Also, proposed subsection (c) was deleted. Since the ecological screen applies to all MSCs, it was not necessary to repeat that requirement here.

Section 250.311. Evaluation of ecological receptors.

SAB and the Department were unable to identify a method to develop generic Statewide health standards that are protective of ecological receptors to cover the effects of all combinations of species and substances. On final rulemaking, the Board adopted a screening protocol for identification of ecological receptors of concern. A person conducting a remediation under the Statewide health standard must address those receptors that are identified for protection at the end of the screening process.

Commentators stated that Act 2 does not authorize the Department to require the evaluation of ecological receptors, or if it does, the evaluation should only apply to sites remediated under the site-specific standard. Section 301(a)(2) of Act 2 requires that a Statewide health standard be adopted by the Board which achieves a uniform Statewide health-based level so that any substantial present or future risk to human health and the environment is eliminated.

Commentators recommended that the identification of receptors should be better defined. The final-form regulations include new definitions for "species of concern" and "habitats of concern."

Commentators suggested that the requirements of the screening process are complex, burdensome and costly. The screen takes into account several circumstances that will not require an ecological evaluation. Therefore, the number of sites that will require more thorough evaluation and some type of activity to address impacts will be minimal. In addition, the cost of collecting appropriate data for the screen should be minimal, as most of the necessary data will be collected as part of the site characterization activities. On final rulemaking, the screen has been substantially modified to identify only the most important steps of the screening process. Any additional explanatory details needed will be included in the *Manual.*

Commentators stated that the first step of the screen, the exemption for sites contaminated only with certain types of petroleum products, is inappropriate. This step was included based on the SAB's recommendation that a cleanup to the Statewide health standards identified for those regulated substances would be protective of the environment. The substances listed in this step of the

screen are limited to a subset of petroleum products for which the chemical makeup and concentrations can be reliably predicted.

Commentators indicated that sites without constituents of potential ecological concern (CPECs) should not be required to undergo further evaluation. Sites contaminated with substances other than CPECs, such as petroleum hydrocarbons, may cause direct impacts from physical stress.

The ecological receptors screening procedure was substantially revised on final rulemaking. Many of the screening steps have been renumbered. In some cases, small word changes were made to clarify or simplify a concept.

In subsection (a), the list of ecological receptors to be evaluated was revised to delete paragraph (2), individuals of species of special concern as identified by the Game Commission and the Fish and Boat Commission, because these species are now included within the definition of "species of concern."

In subsection (b), the procedures were revised to include an additional circumstance for determining that no ecological evaluation is required. The final-form regulations state that no additional evaluation is required if the remediation attains a level equal to 1/10 of the value in Tables 3 and 4, if the regulated substance in question is not a CPEC. (This value is equal to the 1×10^{-6} cancer risk level for humans.) It is the expectation of the Department that the lower human cancer risk level will temporarily serve as a margin of safety to protect ecological receptors until SAB is able to study ecological protection more thoroughly and recommend appropriate standards that are protective of ecological receptors. In subsection (b)(1), the reference to "no nonaqueous phase liquids are present" was deleted because based on the the soil saturation limit in the Statewide health standards, nonaqueous phase liquids are not expected to be present at those levels.

In subsection (e), if ecological impacts are identified from the screening process that must be addressed, a person must do one of the following: 1) demonstrate that attainment of the Statewide health standard MSCs are protective of the ecological receptors; 2) if it cannot be shown that the Statewide health standard MSCs are protective, demonstrate that the postremedy use will eliminate complete exposure pathways at the time of the final report or in accordance with a postremediation care plan, or that mitigative measures have been instituted and are subject to postremediation care plan requirements; 3) demonstrate attainment of the background standard; or 4) follow the procedures in §§ 250.402(c) and 250.409 (relating to human health and environmental protection goals; and risk assessment report) and demonstrate attainment with the site-specific standard. On final rulemaking, subsection (f) specifies the requirements that must be met if a person performs mitigation to address the ecological impacts.

Section 250.312. Final report.

Under the Statewide health standard, the final report is the only report that must be submitted to and approved by the Department. The final report must document the site investigation activities including all laboratory results, the remediation activities, the demonstration of attainment of the standard and any postremediation activities, such as engineering or institutional controls, that are necessary to maintain attainment. The final report must also include information supporting the use of residential or nonresidential standards.

The final-form regulations contain several revisions. Subsection (a) contains a number of revisions for clarification. In subsection (b), there are new final report requirements where mitigation measures are used for protection of ecological receptors. There is a new subsection (d) which explains the types of information that must be submitted in a final report with respect to a demonstration of attainment. Subsection (e) identifies additional circumstances where a postremediation care plan must be documented in a final report. New subsections (f) and (g) contain additional final report requirements where soil-to-groundwater pathway buffer distances or an equivalency demonstration is used. New subsection (h) provides that documentation of access to property owned by a third party must be included as part of a final report when needed for remediation or monitoring.

Subchapter D. Site-Specific Standard

Certain sections under this subchapter, Subchapter F and Subchapter G (relating to exposure and risk determinations; and demonstration of attainment) of the final-form regulations refer to Department-approved guidance documents or references. The Department intends to list guidance documents that it approves in the *Manual.* The Department also may approve the use of other documents on a case-by-case basis. The Department will work with the SAB to identify guidance documents or references for the *Manual.*

Section 250.402. Human health and environmental protection goals.

This section defines the level of protection that is afforded to humans from threats posed by soil and groundwater contaminated with regulated substances which are known or suspected carcinogens or systemic toxicants. This section also includes a process to address risks to ecological receptors.

Commentators indicated a concern with doing a risk assessment if pathways will be eliminated in the future. Section 304(l) of Act 2 requires a risk assessment report if exposure pathways exist. The Department intends to allow an abbreviated risk assessment if the proposed remedy will eliminate pathways.

On final rulemaking, an ecological risk assessment and use of Department-approved EPA or ASTM guidance documents to quantify the risk to ecological receptors are required. Subsections (c) and (d) no longer require an evaluation to be performed under the ecological screening protocol in § 250.311. New language was added to subsection (d)(3) to allow for mitigation measures to be implemented for environmental protection. In addition, subsection (e), which contained specific EPA and ASTM referenced documents, was deleted. This change was made in response to comments that the list of references was too limited. The Department intends to publish Department-approved guidance documents in the *Manual.*

Section 250.403. Use of groundwater.

This section requires compliance with MCLs at all points of exposure, at a minimum, to protect the use of groundwater for drinking water purposes. Groundwater that has naturally occurring total dissolved solids above 2,500 parts per million (ppm) will not be considered a drinking water source in accordance with Act 2.

Commentators suggested that the requirement to meet SMCLs would complicate and increase costs of cleanups. Water is typically treated to achieve SMCLs before delivery at the tap. The final-form regulations allow the

SMCLs to be met up to a point of use, rather than at the property boundary, if approved by the Department.

This section was changed on final rulemaking to refer to use of all groundwater, not just groundwater in aquifers. Section 304(d) of Act 2 establishes standards for both groundwater in aquifers and groundwater not in aquifers. On final rulemaking, this section focuses on current and probable future uses of the groundwater for determining cleanup standards. Subsection (b) was changed to delete the reference to § 250.6 for determining "current and probable future use" of aquifer groundwater, since that section was deleted on final rulemaking. New language in this subsection requires a determination of current and probable future use on a case-by-case basis. In addition, subsection (d) was added on final rulemaking to require the protection of current drinking water or agricultural uses of groundwater.

Section 250.404. Pathway identification and elimination.

On proposed, subsection (a) required the use of the most recent EPA or ASTM guidance in order to identify potential current and future exposure pathways to humans and ecological receptors. Commentators suggested that the Department should allow the use of EPA or ASTM guidance that becomes available after the effective date of the regulations. On final rulemaking, the language was changed to require the use of "Department approved" EPA or ASTM guidance. The list of references in subsection (d) was deleted. It is the Department's intention to provide a list of approved guidance documents in its *Manual.*

New subsection (c) was added to identify a streamlined process for the site-specific reporting requirements where no exposure pathway exists and no remedy is required to be proposed and completed.

Section 250.405. When to perform a risk assessment.

Persons who choose to develop a site-specific standard, or concentration level, must do so by conducting a risk assessment under Subchapter F (relating to exposure and risk determinations). Submission of a baseline risk assessment report is not required where it can be demonstrated in the remedial investigation report or cleanup plan that there are no current or future exposure pathways or where identified current or future pathways are eliminated through the implementation of a specific remediation measure. These remediation measures must be proposed to the Department in a cleanup plan prior to implementation.

Commentators stated that the phrase "future exposure pathways" is too broad. The Department's risk assessment guidance will clarify "future exposure pathways" to address this concern. No changes were made to the proposed regulations.

Section 250.406. Relationship to surface water quality requirements.

This section was added on final rulemaking to clarify the relationship between the surface water quality standards and Act 2. The final-form regulations, in subsection (a), require that any regulated discharge to surface water must comply with the applicable provisions of Chapters 91—105, including the antidegradation requirements. Subsection (b) requires compliance with an NPDES permit for point source discharges to surface water. This requirement was in the proposed rulemaking at § 250.406(a).

Subsection (c) is similar to the requirement proposed in § 250.406(b). On final rulemaking, the regulations require a person to determine the expected instream regulated substance concentrations that are attributable to the site. If mass balance techniques indicate that instream surface water quality standards are not met, then the person has an opportunity to conduct sampling. If sampling indicates that the standards are being met, there is no requirement for further remediation. If the results of the modeling, and sampling if any, indicate that surface water quality standards are not being met, further remediation will be required unless a waiver of the surface water quality standards under section 902(b) of Act 2 is obtained. Section 902(b) of Act 2 authorizes the Department to waive applicable requirements where responsible persons can demonstrate, among other things, that the proposed remedial action will attain a standard of performance that is equivalent to that required under the otherwise applicable requirement through the use of an alternative method or approach. In the case of surface water standards, the final-form regulations allow for a waiver if it is demonstrated that the proposed remedial action will result in attainment of a concentration in the stream that does not exceed human health criteria and aquatic life criteria in accordance with the requirements set forth in Chapter 93 (relating to water quality standards). Alternative site-specific exposure factors or design conditions may be proposed that will demonstrate attainment of the human health criteria.

In subsection (d), except where an NPDES permit is required, compliance with surface water quality standards in a spring must be measured at the point of first designated or existing use, as defined in §§ 93.1, 93.4 and 93.9. When the point of first designated use occurs in a surface water into which a spring flows, compliance with surface water quality standards must be determined in the same manner as that which applies to diffuse discharges.

Section 250.407. Point of compliance.

Commentators were concerned that the proposed language allowed the adjustment of the point of compliance only when SMCLs exist without the presence of other contaminants. On final rulemaking, § 250.407(a)(5) was modified to state that the point of compliance may be moved for measuring compliance with the groundwater MSCs that apply to secondary contaminants. "Secondary contaminants" is now a defined term in § 250.1.

A commentator suggested that it is not necessary to investigate soil quality down to 15 feet if it can be shown by sampling, and by the absence of releases, that groundwater is not impacted. Once the groundwater is found to be uncontaminated, and proper controls are applied to the soil to eliminate any ingestion and inhalation pathway, then it should not be necessary to investigate soil anymore. It was further stated that what the proposed regulations are indicating is that while it may be safe to drink water with these compounds at or below MCLs, a person can't breathe the vapors from the water you are drinking. The regulations indicate that if the inhalation pathway has not been eliminated, then a person must provide protection for the inhalation route of exposure.

A commentator recommended that the final-form regulations include a reference for the air quality regulations that apply to air quality standards. In subsection (f), the reference to Chapters 121—143 is included.

On final rulemaking, proposed subsections (a)—(c) were deleted and requirements relating to surface water were placed in § 250.406. In new subsection (a), the words "for ingestion and inhalation exposures" were deleted for purposes of simplicity and clarity. The language relating to measuring compliance at intervals was deleted and will be discussed in the *Manual.* New subsection (a) was further changed to clarify that the point of compliance is the property boundary that existed at the time the contamination was discovered. The site-specific standard must be attained at and beyond the point of compliance. Subsection (a)(1) was deleted on final rulemaking because technology exists to meet a remediation standard at the property boundary even if the source of the contamination is at the property boundary. With the exception of the presence of secondary contaminants, the point of compliance can only be moved based on physical obstructions that prevent attainment at the property boundary.

Section 250.408. Remedial investigation report.

Persons electing to remediate a site to the site-specific standard must submit a remedial investigation report to the Department for review and approval. On final rulemaking, changes were made in subsection (a) to provide more direction in a site investigation to the characterization of the rate of movement, extent, and fate of contaminants, as required by Act 2 in a final report. A fate and transport analysis should delineate the extent of contamination over the period of its transport to ensure continued attainment of the remediation standard.

Commentators stated that they did not believe Act 2 required a determination of appropriate technology for each media of concern in the remedial investigation report. In subsection (b), the word "determination" was deleted and replaced with the word "identification." The Board believes it is a good idea to evaluate remediation technology options during the investigation stage.

Section 250.410. Cleanup plan.

The site-specific standard is the only one of the three standards which requires Department approval of the cleanup plan prior to implementation. On proposed, the plan was required to describe those alternatives which were evaluated and the alternative which the remediator is proposing to implement, along with an analysis of how these alternatives were evaluated using the remedy selection criteria of section 304(j) of Act 2.

Commentators indicated that the Department's approval of a cleanup plan should be based solely on its concurrence that the plan will attain the site-specific standard. They suggest that the Department should not have the ability to require a person preparing a cleanup plan to evaluate additional alternatives requested by the Department. Section 304(l) of Act 2 authorizes the Department to require further evaluation of the selected remedy or an evaluation of one or more additional remedies in response to comments received from the community through the community involvement plan or as a result of its own analysis.

On final rulemaking, subsection (b) was deleted to indicate that an indepth analysis of alternative remedies is not automatically required with the submission of a cleanup plan. The Department will evaluate the proposed remedial measure in the cleanup plan based on the criteria in section 304(j) of Act 2. If the Department requests further evaluation of alternatives, based on section 304(l) of Act 2, then the evaluation will also be reviewed in accordance with the same criteria as the proposed remedial measure.

Under new subsection (b), paragraph (3) was deleted and replaced with a requirement for submission of adequate design plans and specifications sufficient to evaluate the proposed remedy.

Subsection (d) was renumbered as subsection (c) and the language was slightly revised to state that when a person proposes a remedy that relies on access for remediation or monitoring on properties owned by third parties, documentation of that cooperation or agreement must be submitted as part of the cleanup plan. This provision would be relevant in cases including extension of water supplies, installation of home treatment units for water supply wells and water use restrictions on other properties.

Section 250.411. Final report.

Final reports submitted under the site-specific standard must contain the information necessary to document that the remedy, as approved by the Department in the cleanup plan, was implemented. In subsection (c), a cross reference to § 250.204 was expanded to include a new subsection.

In subsection (d), additional criteria were established to determine when a postremediation care plan is required. Also, additional requirements were added to the postremediation care plan through the cross reference to § 250.204(g).

Subsection (f) was added on final rulemaking to allow for mitigation measures to be implemented to protect ecological receptors identified by the environmental risk assessment. A postremediation monitoring plan must be documented in the final report that includes a plan to maintain the mitigated ecological resource and reporting of the ongoing success or failure of the mitigation measure implemented.

Subchapter E. Special Industrial Areas.

Special incentives were provided by Act 2 to encourage the cleanup and reuse of orphan sites and sites located in an enterprise zone. These incentives include streamlined cleanup requirements that apply only to the portions of the property that would prevent the property from being occupied for its intended purpose. While off-property releases must be investigated, the threats posed from these off-property areas are not required to be addressed by persons entering into special industrial area agreements. These incentives are only available to persons who did not cause or contribute to the contamination at the site and are only available for certain sites that have been used for industrial purposes.

On final rulemaking, there were only minor revisions made to this subchapter. In § 250.503 (relating to remediation requirements), the words "and other media" were added and the words "migration of" were deleted in subsection (c)(4).

Commentators were concerned that § 250.503(c)(1) was too broad in its requirement to include interviews with any person knowledgeable of the site. The Board believes that the language adequately reflects the need to consult persons who have knowledge of the property during the baseline remedial investigation.

A commentator recommended that § 250.503(e) be revised to more broadly reflect protection from liability afforded under Act 2, rather than be limited to protection from cleanup liability. This subsection was deleted on final rulemaking to avoid confusion about the liability protection.

Commentators stated that Act 2 identifies drummed waste as the only immediate, direct or imminent threat that must be addressed. In addition, it is recommended that "direct threats" be defined. The Board believes that Act 2 refers to drummed waste as an example of the types of threats that must be addressed in a remediation of a special industrial area. The Department will provide guidance on direct threats in the *Manual.*

Subchapter F. Exposure and Risk Determinations

Section 250.601. Scope.

Subsection (c)(3) was deleted on final rulemaking because an indepth risk assessment is not required for each remediation alternative unless the Department requests the evaluation of additional remediation alternatives.

Section 250.602. Risk assessment procedures.

A risk assessment must define unacceptable risks to both humans and ecological receptors. Language has been added to subsection (a) to explain that the risk assessment is required when using a site-specific standard under Subchapter D (relating to site-specific standard). This change was made in response to comments received that interpreted the proposed language to also apply to the background and Statewide health standards.

Commentators suggested that the guidelines referred to in subsection (b) and listed in subsection (g) be modified to state that they serve as examples of appropriate guidance, but are not all inclusive. The references in subsection (g) have been deleted on final rulemaking and the language in subsection (b) has been changed to refer to EPA or ASTM guidelines approved by the Department. The Department intends to publish approved guidelines in its *Manual.*

Section 250.603. Exposure factors for site-specific standards.

This section explains which exposure factors should be used to perform an exposure assessment. The proposed regulations stated that site-specific exposure factors must be used and must be clearly justified by supporting data. On proposed, if site-specific exposure factors were not used, the exposure assessment was required to be based on the standard exposure factors used to develop the Statewide health standards.

Commentators suggested that a reference to the EPA's Final Guidelines for Exposure Assessment be used for the application of site-specific exposure factors to a risk assessment. This reference is included in the final rulemaking in subsection (a).

Commentators indicated that proposed subsections (a) and (b) were confusing in their description of when site-specific exposure factors could be used. On final rulemaking, subsection (b) was changed to clarify that either site-specific exposure factors or the standard exposure factors used to develop the Statewide health standards shall be used.

Section 250.604. Fate and transport modeling requirements for exposure assessments.

This section explains which models may be used to estimate site-specific, soil-to-groundwater leaching potential for organic contaminants. The soil-to-groundwater model in the Statewide health standards may be used in site-specific exposure assessment. Because the model was based on a number of assumptions, only the values of Koc, water-filled soil porosity, dry soil bulk density, fraction organic carbon and the default dilution factor in the model may be varied based on site-specific measurements.

This section also recognizes that many fate and transport models and methods are available in the EPA and ASTM guidelines. To ensure the proper application of groundwater models, the Department requires that the EPA or ASTM quality assurance/quality control criteria, such as model verification, model calibration and model validation shall be followed.

Commentators recommended that modeling references be more inclusive and allow for use of appropriate alternative models. In response to the comments, all references in subsection (c) have been deleted and the final-form regulations refer to the use of criteria and models approved by the Department. The Department intends to publish a list of approved criteria and models in its *Manual.*

One minor revision was made in subsection (a)(3). The word "nonaqueous" was deleted and replaced with "separate." This change was made to describe in plain language the category of liquids.

Section 250.605. Sources of toxicity information.

When conducting the toxicity assessment, this section establishes sources of toxicology data that are acceptable for use and a hierarchy within these sources for selection of the most appropriate oral reference dose and cancer slope factor. This is the same protocol which was used to select the toxicity values used in generation of the Statewide health standards.

If no toxicity data is available in any of these defined sources, a person may use the background standard or may develop, for the Department's review, one of the following: 1) chemical-specific toxicity values in accordance with the EPA guidance and based on published, peer-reviewed scientific literature; or 2) toxicity values developed from appropriately justified surrogates. If toxicity information is not available from any of the above sources, then the person must use the minimum threshold standard for regulated substances listed in Table 6.

Commentators recommended inserting "or from other credible and relevant information that is available" at the end of subsection (a). The list of the EPA guidelines or protocols for chemical-specific toxicity values was extended by adding the words "approved by the Department" in subsection (b)(1)(i) and by deleting the references in subsection (c). The Department intends to publish approved guidelines in its *Manual.*

Section 250.606. Development of site-specific standards.

If an unacceptable risk is identified through the risk assessment, a person may choose to eliminate the pathway or implement a remedy which abates the risks posed by that pathway to the protection levels established for site-specific standard remedies.

Specific factors must be considered in the assessment of risks posed by contamination that include consideration of the fate and transport of released regulated substances through the environment, natural conditions that may affect this fate and transport, specified exposure pathways, current and future land use and the effectiveness of institutional or legal controls placed on the use of the land.

Commentators recommended adding the phrase "for present or currently planned future use of the property" after the phrase "future exposure pathways" in subsection (a)(1). The Board does not believe that currently planned future land use will be sufficient to address reasonable future pathways. If necessary, the Department may elaborate on the meaning of future exposure pathways in the *Manual.*

On final rulemaking, minor revisions were made to this section.

Section 250.607. Risk assessment of remediation alternatives.

This section was deleted on final rulemaking because an indepth risk assessment is not required for each remediation alternative unless the Department requests the evaluation of additional remediation alternatives.

Subchapter G. Demonstration of Attainment

Section 250.701. Scope.

This section describes the scope of the subchapter for demonstration of attainment. The subchapter clarifies what information and procedures are necessary to demonstrate attainment with the cleanup standards, where a release of a regulated substance has occurred.

A change was made to subsection (c) to use the phrase "limits relating to the PQLs" to be consistent with the title change in § 250.5.

Section 250.702. Attainment requirements.

This section explains that attainment will apply to the horizontal and vertical extent of soil and groundwater identified as contaminated. In the proposed regulations, the areas defined as contaminated were those areas that exceed the cleanup standard selected. Where separate zones of contamination exist on a property from multiple releases, attainment applies to each individual separate zone.

This section also identifies what is required to be included in a final report to demonstrate attainment. The report must include a demonstration that the cleanup standard has been met, based on an analysis of data through the application of statistical tests, and must include a demonstration of a statistical trend analysis, knowledge of the plume stability or other acceptable method that shows that the standard will not be exceeded at the point of compliance. For attainment of the site-specific standard, a demonstration of pathway elimination, if applicable, and a demonstration that the site does not exceed the least protective risk level provided for in Act 2, must be provided.

As requested by commentators, subsection (a) is changed to provide that attainment of a standard shall be demonstrated using appropriate data quality objectives and data quality assessment processes as specified by the EPA. Incorporation of the EPA DQO process responds to the concerns for specifying parameters, spatial and temporal boundaries defining the scale of the decision making process, and identifying practical constraints on data collection.

Subsection (a) is further changed to clarify that attainment of the Statewide health standard and site-specific standard attainment in soil is demonstrated in the vertical and horizontal extent of the soil contaminated from the release above the selected standard, and groundwater attainment is demonstrated at the point of compliance and beyond. This means that the groundwater contamination that has migrated beyond the point of compliance must also attain the standard. For the background standard, the subsection clarifies that attainment of the standard applies to the vertical and horizontal extent of soil and water identified as contaminated from the release across the site. These changes were made in response to comments that the section should identify what the attainment demonstration is required to address.

Subsection (b)(2) has been changed to clarify that the plume stability analysis is applied to groundwater attainment and that the statistical trend is a temporal trend. This subsection has been changed to provide that demonstration of attainment includes an analysis that indicates continued attainment over time. These changes respond to comments concerning the need for spatial and temporal boundaries in statistical analysis. These comments also are addressed in the changes to § 250.707(d)(3)(ii) (relating to statistical tests).

Section 250.702 (b)(3)(ii) has been changed to clarify that calculated site-specific standards are attained using the procedures in § 250.707(c) and (d), rather than a general reference to this subchapter. Section 250.702(b)(3)(ii) and subsection (b)(4) also have been changed to state that for calculated numerical site-specific standards, and for background and Statewide health standards, attainment shall be demonstrated within the soil and groundwater directly impacted by separate phase liquids. This change was to clarify that random sampling should also occur in the soil and groundwater directly impacted by separate phase liquids.

Section 250.703. General attainment requirements for soil.

In the proposed regulations, this section explained that the data collected to demonstrate attainment of a cleanup standard for soil must be random, both horizontally and vertically, over the areal extent which was shown to be contaminated above the selected cleanup standard during the site characterization. This data varies spatially and is used to determine statistically whether or not attainment has been demonstrated. This data is not the same as the data used to characterize the site. The data is collected specifically for the demonstration of attainment. The number of samples needed is dependent on the size of the area.

A comment was made that the regulation should specify particular EPA guidance documents to demonstrate attainment. Methodologies and acceptable references are discussed later in the subchapter. In general, the Department intends to list the guidances it will accept in its *Manual.*

A commentator suggested that subsection (b) should be changed to specify the uncertainty associated with the estimation of the volume of contaminated soil. The uncertainty estimation would be burdensome in most cases; therefore, no uncertainty is specified in the final-form regulations.

Subsection (c) has been changed to provide that soil sampling is to be random and representative, both horizontally and vertically, based on systematic random sampling. Additionally, the section has been changed to provide that the Department may require additional sampling if three or more adjacent samples exceed the standard by more than 10 times. This provision would allow the Department to require additional characterization and remediation, if there is a localized area of exceedances of the standard in the area that has been remediated. This change responds to the comment that those areas should be addressed.

Subsection (d) has been changed. Eight samples still are required for contaminated soil volumes of less than 125 cubic yards or less, although a commentator noted that fewer samples have been sufficient for some tank closures. Section 250.707(b)(1)(iii) of the final-form regulations allows fewer samples to be taken in accordance with a Department technical guidance document for localized storage tank contamination. Under that circumstance no exceedances of the standard are allowed. For other methods, eight samples are usually required, in part because this is a minimum number to allow the 75%/10X statistical rule to function appropriately. Under that rule, two samples could exceed the standard, but not by more than 10 times. Thus, eight as the number of samples has been retained in subsection (d)(1).

Subsection (d)(2) now provides that at least 12 sample points must be used for contaminated areas of up to 3,000 cubic yards. Subsection (d)(3) provides that for each additional soil volume up to 3,000 cubic yards, an additional 12 sample points will be required. These two changes respond to the comment that an upper limit should be set to the soil volume that a minimum of 12 samples was initially meant to characterize. This subsection also has other minor changes.

Section 250.704. General attainment requirements for groundwater.

This section contains general attainment requirements for groundwater and provides that a sufficient number of sampling points must be installed to demonstrate attainment with a cleanup standard.

Subsection (b) was revised to state that wells should be located so that there is sufficient groundwater to be tested; that is, the water being tested should not merely be condensate on the walls of the well.

Subsections (c) and (d) in the proposed rulemaking had required attainment demonstrations for each aquifer, and required clusters of compliance wells where there was significant vertical migration of contamination within a single aquifer. Commentators had asked for greater specificity. These sections have been deleted, but a requirement has been added in subsection (b) that monitoring should be sufficient to demonstrate attainment within each plume of contamination.

Also, the section was changed to make it clear that the new subsection (d), relating to the 75%/10x test for groundwater, applies to demonstration of attainment for groundwater, rather than "groundwater subject to remediation" as stated in the proposed regulations. This responds to the comment that attainment will be demonstrated at some sites where no remediation is performed.

Commentators expressed concern with the requirement in subsection (d) of eight quarters of sampling to demonstrate attainment of groundwater remediation standards. Commentators indicated that a reduced number of samples should be allowed in certain circumstances. This requirement for eight quarters of sampling only applies to the 75%/10x rule and is generally necessary for that rule to function. As an alternative to the 75%/10x rule, under certain circumstances, four quarters only, or fewer, may be required. This subsection has been amended to allow fewer than four quarters of sampling if written approval is obtained from the Department. In order to use only four or fewer quarters of data as an alternative to the 75%/10x rule, conditions regarding the knowledge of the stability and decreasing trend of the plume must be demonstrated, and there can be no exceedances of the groundwater standard or the limit related to the PQL.

This approach is similar to other circumstances where eight samples may be taken over only four quarters or fewer, or sampling may be accelerated, where conditions are satisfied regarding the knowledge and stability of the plume. This occurs in § 250.707(a)(2)(x) and (3)(v) when a person is demonstrating attainment with some background demonstrations.

If statistical tests other than the 75%/10x rule referred to in subsection (d) are used, the documentation of the chosen method dictates the number of required samples. This responds to the comment that the number and type of samples should meet the specified decision error criteria. Additionally, § 250.707(d)(2)(vi) requires tests to control for seasonal and spatial variability, and temporal correlation. This means that methods, other than the 75%/10X rule, must rely on data that is taken over a period of seasons. The period of seasons is determined under the data quality objectives process for those methods, while the period is defined explicitly for the 75%/10X rule in § 250.704(d).

Minor changes were made to subsections (d)(1) and (3) and (e).

Section 250.705. Attainment requirements for groundwater in aquifers not used or currently planned to be used.

This is a new section which establishes requirements for demonstrating attainment, under the Statewide health standards, for groundwater that is in aquifers that are not used or are not currently planned to be used. This section provides that, in addition to the sampling and statistical analyses that apply to attainment of the Statewide health standards in this subchapter, a fate and transport analysis must be conducted, based on sufficient sampling and monitoring data to calibrate the model. The fate and transport analysis must show that the MSC pertinent to groundwater in an aquifer used or currently planned for use must be attained no later than 30 years from the final report approval, at all points at and beyond a radius of 1,000 feet downgradient from the property boundary. This section is designed to respond to persons who prefer to use the Statewide health standard in an area where groundwater is not being used for drinking water or agricultural purposes.

Section 250.706. Demonstration of attainment of surface water and air quality standards.

This section requires that all applicable State and Federal laws and regulations related to surface water and air must be met to demonstrate attainment within the surface water and air media. A minor clarification has been added to indicate that surface water and air are media, as requested by a commentator.

Section 250.707. Statistical tests.

This section specifies the requirements for using and applying statistical tests to demonstrate attainment. The statistical tests may also be used to establish background concentrations at a site, as required by the background standard subchapter. The statistical test used to establish background must correspond with the statistical test used to demonstrate attainment with that standard.

The final-form regulations allow a person to choose between the 75%/10X rule for demonstrating attainment with the Statewide health standard, or a 95% Upper Confidence Level (UCL) of the mean statistical test, or other methods that meet specified performance standards, for demonstrating attainment with the Statewide health and site-specific standards. For the background standard in soil, a person may use a test which compares the

highest measurements, or a combination of the Wilcoxon rank-sum test and quantile test, or other methods that compare the population of analytical results of background samples with a population of the medium of concern and meet specified performance standards. For the background standard in groundwater, a person may use the nonparametric Tolerance Intervals, or a retesting strategy using nonparametric Prediction Limits in accordance with the EPA guidance or other statistical methods that meet specified performance standards. A nonparametric statistical test compares distributions rather than parameters and is intended to apply to a large class of distributions rather than a single distribution. A parametric statistical test estimates parameters, such as arithmetic average, and tests hypotheses concerning them. The assumptions generally specify the form of distribution.

The 95% UCL test is documented in Federal guidances. The 95% UCL of the mean test is a parametric statistical procedure for determining whether the mean (average) concentration in the area of concern attains the cleanup standard. If the 95% upper confidence limit of the mean value is below the cleanup standard, the area of concern would be considered clean.

The 75%/10x rule requires that 75% of all samples collected for attainment purposes must be equal to or less than the standard with no individual sample exceeding ten times the standard. This rule requires that a sufficient number of samples be collected in the field to provide an acceptable result in the test. Therefore, a minimum of eight samples must be collected in order to reduce the false positive rate in the test. A false positive conclusion means that the statistical finding of clean is not representative of the overall field conditions at the site. To substantially reduce the false positive rate, the regulations require a minimum of eight samples in groundwater and a minimum of eight samples in soil equal to or less than 125 cubic yards.

On proposed rulemaking, using statistical simulations based on the median, the tests were evaluated using log normal distributions with coefficients of variation (Cv) ranging from 0.5 to 4.0, and with the number of samples ranging from 5 to 40. The conclusions were discussed more specifically in the preamble to the proposed rulemaking at 26 Pa.B. 3985. Since the time of the proposed rulemaking, the Department obtained additional information regarding the 75%/10x rule, based on additional simulation studies to evaluate the true arithmetic mean at a site that meets the cleanup standard. Specific changes to each subsection are as follows.

Subsection (a) has been changed to clarify the demonstration of attainment of the background standard. When the site involves naturally occurring substances, the area to which the site is being compared must be representative of naturally occurring regulated substances on the site. When the substances are not naturally occurring, the background area to which the site is being compared must be an area from which the contamination is migrating. The background areas to which the site is being compared are termed the background "reference" areas; this clarification occurs throughout this section.

Subsection (a)(1) provides that attainment of background in soil may be demonstrated by using the highest measurement comparison, a combination test, or other methods meeting general requirements. Subsubsection (a)(1)(i) has been modified to clarify that it is the obligation of the person demonstrating attainment to show that the highest measurement of contamination onsite is not higher than the highest measurement from the background area. In response to commentators, subsubsection (a)(1)(i) also has been changed to state that the Department may accept insignificant variations in the numbers.

Alternatively, a person may demonstrate attainment of background in soil by using a combination of the Wilcoxon rank-sum test and the Quantile test, and showing that background is not exceeded. This is a change from proposed rulemaking, when the nonparametric upper tolerance limit was required in conjunction with the Wilcoxon rank-sum test. This change was in response to a request from a commentator. Additionally, the clause relating to the percentage of nondetect data was deleted because it would be more appropriate to discuss the use of a combination of the Quantile and Wilcoxon tests in the *Manual*. The final-form regulations in subsubsections (a)(1)(iv) and (vi) provide that the application of this method, along with other methods, must also use a false positive rate not greater than 0.2, with a minimum number of 10 samples from the background area and 10 from each area of contamination, and that it must meet the requirements of subsection (d), which relates to the null hypothesis, the alternative hypothesis, and performance standards for statistical tests.

Also, in regard to the false-positive (Type I) error rate in subsection (a)(1)(iv), a commentator requested that the Department consider attainment based on a controlling constituent, rather than each constituent, to control the effect of multiple constituents on the decision error of the process. The Department believes that the overall error rate should be controlled, and the Type I error for each individual constituent can be adjusted to meet that goal as long as the power to detect contamination is not compromised and the overall error rate does not exceed 0.20.

Several commentators indicated that ten background samples and ten impacted area samples were excessive. The Department retained this requirement, however, because it was needed to provide sufficient power in the statistical method to detect contamination.

Other statistical methods besides the highest measurement comparison test and the combined Wilcoxon-Quantile test can be used, but both parametric and nonparametric methods must meet the conditions to which the combination Wilcoxon-Quantile test is subject regarding the false positive rate, number of samples, the null and alternative hypotheses, and the performance standards for statistical tests. In addition, if a parametric method is chosen, subsubsection (a)(1)(v) has been changed to provide that the censoring level for each nondetect shall be an assigned value that is randomly generated that is between zero and the limit related to the PQL.

Minor changes were made to subsections (a)(1)(iv)—(vi) to clarify what standards apply to various statistical methods.

Subsection (a)(2) governs the demonstration of attainment of background groundwater quality when there is a known upgradient release of a regulated substance. Subsection (a)(2)(ii) has been modified to provide that the upgradient concentration must be representative of concentrations in groundwater that are migrating onto the site. Attainment of background where groundwater is affected by substances migrating from an upgradient release must be demonstrated by sampling taken over eight quarters in both the background reference wells and

the onsite wells, as clarified in the change to subsection (a)(2)(iii). The attainment method is applied to each monitoring well over eight quarters. In lieu of the eight quarters of sampling, the Department may accept eight samples over four quarters or, under the change in subsection (a)(2)(x), fewer than four quarters with written Department approval, if certain conditions, such as knowledge of the plume and parameters affecting fate and transport, are satisfied.

In addition to a minor change, subsection (a)(2)(ix) has been modified to say that the censoring level for nondetects is randomly generated between zero and the limit related to the PQL. Subsection (a)(2)(x)(C) has been modified to provide that the coefficient of variation may not exceed 1.0 for metals and 2.0 for organics, rather than using 1.0 for certain organic compounds as was done on proposed rulemaking. This change was made for the sake of simplicity. Another minor change was made to subsection (a)(2)(ix).

Subsection (a)(3) relates to the determination of background conditions due to naturally occurring or areawide contamination. The person using this subsection needs to obtain the Department's approval that the site is appropriate for the areawide contamination process. At least twelve samples are required, but sampling may be accelerated as long as serial correlation in the data does not result. Subsection (a)(3)(iv) was modified to clarify that all samples do not have to be taken simultaneously. Subsection (a)(3)(v) was modified for clarity; the substance remains unchanged. Subsection (a)(3)(vi) has been clarified to say that the values may be used with appropriate methods to compare the populations. Subsection (a)(3)(vii) has been changed. The proposed language provided that the sampling could not have "extreme values." It has been changed to provide that the sampling results in the plume onsite may not exceed the sum of the background arithmetic average and three times the standard deviation calculated for the background area. This is in response to a comment asking the Department to explain what is meant by "extreme values." Subsection (a)(3)(ix) has been modified to reflect the change of the censoring level to a random value, consistent with other sections.

Subsection (a)(2) of the proposed regulations has been deleted. This subsection related to the use of the standard related to the PQL as a default background standard for substances that are coming from a release somewhere off-property. This provision is not necessary since persons can sample reference areas to determine the background levels.

Subsection (b) sets out the statistical tests which may be accepted by the Department to demonstrate attainment with the Statewide health standard. The statistical tests apply to each area of soil contamination and to each groundwater well. Tests are performed individually for each regulated substance identified as present at the site, for which a person wants relief from liability under the act.

Subsection (b) has been modified to delete the application of the 75%/10X rule to attainment demonstrations of standards relating to PQLs and to the site-specific standard. This was done because the Department obtained additional information, since the time of proposed rulemaking, involving simulation studies of the tests based on the arithmetic mean. These simulations indicated that a site could pass the 75%/10X rule, although the true site arithmetic average concentrations could exceed the cleanup standard by two to three times, if the coefficient of variation is small. Because the Department believes that the Statewide health standards are based on conservative assumptions this concern is not as significant for that standard. However, under the site-specific standard, exposure assumptions are based on site-specific conditions. Therefore, although commentators supported the use of the 75%/10X rule for site-specific remediations, it was determined that the 75%/10X rule was appropriate only for the Statewide health standard. Subsection (b) was also modified to make it clear that the statistical test applies to each well used for monitoring compliance, as opposed to wells that are irrelevant because they are not within the area of contamination.

Subsection (b)(1) governs attainment of the standard in soil. Subsection (b)(1)(i) has been changed in the description of the requirements for the 75%/10X rule. The changes make it clear that the samples must be randomly collected, during a single event, and 75% of these samples must be equal to or less than the Statewide health standard or the limit related to PQLs, with no individual sample exceeding 10 times the Statewide health standard.

Subsection (b)(1)(ii) has been changed in regard to the use of the 95% UCL test for demonstrating attainment with the Statewide health standard for soil. The change allows the 95% UCL of the arithmetic mean to be at or below the Statewide health standard. This was made specifically in response to a request from a commentator to clarify whether the arithmetic mean or the geometric mean is of concern, and to a comment asking that the arithmetic mean be used. It is the arithmetic average concentration that represents the exposure to a receptor. Geometric average concentration is not representative of exposure. The Department considers a site to be adequately remediated when the true site arithmetic average concentration, not geometric average concentration, of a site is at or below the numerical standard.

Subsection (b)(1)(iii) includes a new procedure for demonstrating attainment with the Statewide health standard for soils. For sites that are localized storage tank contamination sites, if samples are taken in accordance with closure guidance for underground storage tanks, then that process may be used if the remediator takes fewer samples than would be required under the other tests in this section. Attainment can be demonstrated under Act 2 if no samples exceed the standard. This allows the use of fewer samples for storage tank sites. The concern that the statistical method would not have a large enough base is resolved by the requirement that none of the samples exceed the standard.

Attainment of the Statewide health standard in groundwater is discussed in subsection (b)(2). The first change to paragraph (2) makes it clear that attainment is demonstrated at each monitoring well used for compliance. Subsection (b)(2)(i) describes the functioning of the 75%/10X rule. Changes here clarify that 75% of the samples collected within each monitoring well over time shall be equal to or less than the Statewide health standard or the limit related to PQLs. No individual sample may exceed ten times the Statewide health standard on the property, or two times the Statewide health standard beyond the property boundary. For clarification, "at the point of compliance" was deleted.

In subsection (b)(2)(ii), the use of the 95% UCL for demonstration that the Statewide health standard has been achieved in groundwater has also been changed to clarify that the 95% UCL of the arithmetic mean must be at or below the Statewide health standard.

A new subsection, that allows the use of other statistical tests that satisfy the requirements of subsection (d), is provided for in subsection (b)(3).

Demonstration of attainment methods for the site-specific standard is discussed in subsection (c). This section allows the use of the 95% UCL for soil or groundwater, or a statistical test that meets the general requirements for other methods in subsection (d). The 75%/10X rule is not available for demonstrating attainment with the site-specific standard. This subsection also sets forth the requirement that the method used to demonstrate attainment must be the same as the method used in the risk assessment.

Subsection (d) sets forth the general requirements that apply to attainment tests other than the 75%/10X rule or the highest measurement comparison for demonstrating attainment in soil and groundwater. Subsection (d)(1) relates to methods for demonstrating attainment of the Statewide health standard or the site-specific standard. The application of these methods to background standards after remediation and to standards relating to PQLs is deleted. For the Statewide health and site-specific standards, the statistical method must employ a null hypothesis (Ho) that the true site arithmetic average concentration is at or above the cleanup standard, rather than that the null hypothesis is that the cleanup is not achieved. The final rule states that the alternative hypothesis (Ha) is that the true site arithmetic average concentration is below the cleanup standard, rather than that the alternative hypothesis is that the cleanup standard is achieved. The new language regarding the true site arithmetic average does not change the hypothesis, but clarifies that the intent of the section is that the true site arithmetic average is the statistical parameter of interest. The regulation incorporates a commentator's request to reverse the hypothesis statements for attainment of the postremediation background standard. This is because the proposed rulemaking would have required the person to do a remediation that could have resulted in actual site conditions being cleaner than the background area. Reversing the hypothesis for background using current methods allows some on-property measurements to exceed background concentrations and still demonstrate attainment. This is appropriate because it is accepted by the EPA and because it is more reasonable on a consideration of cost, to allow a small number of exceedances of the background standard, than to require a degree of cleanup that would result in all on-property sample concentrations to be at or below the background conditions. As a result of this reversal, both the initial determination and the postremediation determination of the background standard have the same hypothesis statements. Therefore, the word "initially" has been deleted from the phrase "when statistical methods are to be used to initially determine that the background standard other than the limit related to the PQL is exceeded" in subsection (d) (1).

Another general requirement for statistical methods is that they must be recommended for the particular use in a Department approved guidance or regulation rather than a relevant Federal guidance. This requirement is found in subsection (d)(2)(ii).

In regard to subsection (d)(2)(iii), commentators felt that compositing of the surface soil should be allowed. The Department agreed that composite sampling may be used under these regulations, but for situations other than those involving VOCs or the use of nonparametric methods. A change was made to subsection (d)(2)(iii) that compositing cannot be used for VOCs.

Subsection (d)(2)(iv) was changed to delete the requirement that statistical parameters shall be protective of human health and the environment. Additionally, the language regarding the censoring levels for nondetects was changed to be consistent with other subsections governing this issue.

Subsection (d)(2)(v) allows the Department to approve tests that do not need to account for seasonal and spatial variability and temporal correlation, where appropriate. The word "account" was substituted for "control" for purposes of readability.

Subsection (d)(2)(vi) has been changed to say that all tests, not just initial tests, used to demonstrate that background is exceeded shall maintain adequate power to detect contamination in accordance with current EPA guidance, regulations, or protocols. "1-Beta" was deleted since the power is described in the supporting guidance documents.

Subsection (d)(2)(viii) has been modified to clarify that statistical testing is done for each regulated substance.

In response to a comment, subsection (d)(3)(ii) requires new information to be documented in a final report when a statistical method is applied: it must include a clear statement of the applicable decision rule in the form of statistical hypotheses for each spatial unit and temporal boundary, including the applicable statistical parameter of interest and the specific cleanup standard.

A requirement is added to subsection (d)(3)(v) to specify false negative rates for demonstrating attainment with the background standard. This requirement is added to the general requirements for specification of false positive rates in methods used to demonstrate attainment with background and other standards.

Other minor changes were made to subsection (d).

Section 250.708. Postremediation care attainment.

Section 250.708 applies to remediations that require the use of engineering or institutional controls to attain and maintain a cleanup standard beyond the time that a final report is reviewed and approved by the Department. Implementation of a postremediation care plan is required if engineering or institutional controls are utilized to demonstrate attainment with a cleanup standard.

Commentators recommended that postremediation care requirements should not apply to passive engineering controls or to institutional controls other than those that require security measures. The wording was not changed because passive engineering controls, such as a slurry wall or cap, still require maintenance and care after the final report is approved. The regulation was not changed to limit postremediation care to institutional controls only if they involve security measures because a wide range of institutional measures are possible, and the postremediation care plan need only address applicable care requirements. Deed restrictions need no maintenance and thus would not have to be addressed in the postremediation care plan.

In response to a comment, subsection (a) was revised to clarify that the statistical test (to show that substances do not exceed the standard at the point of compliance) is done after engineering controls are in place and concentration levels have stabilized following any effects from the remediation. This revision is a change from the less precise language on proposed rulemaking that the groundwater has reached a "consistent concentration level." Subsection (e) was clarified to allow persons to terminate postremediation care when they document that

the standard is not expected to be exceeded in the future, through use of a fate and transport analysis.

Appendix A, Tables 1—8

On proposed, Table 1 included MSCs for groundwater in aquifers used or currently planned to be used, considering residential and nonresidential land use. On final rulemaking, the table also includes MSCs for groundwater in aquifers not used or currently planned to be used, considering residential and nonresidential land use. Table 1 is limited to organic regulated substances. In addition, columns have been added to distinguish between aquifers with less than or greater than 2,500 mg/L total dissolved solids, instead of addressing the distinction with a footnote.

A new Table 2 has been added which includes the MSCs for inorganic substances in groundwater. The table follows the same format as Table 1. In addition, a subtable containing substances with secondary MCLs has been added.

Table 3, formerly Table 2 in the proposed regulations, presents the MSCs for organic regulated substances in soil. This table has been divided into two categories: A) direct contact numeric values; and B) soil-to-groundwater numeric values. In addition, soil buffer distances have been added to Table 3, B. for each substance, in accordance with § 250.308(b) and (c). The MSCs for inorganic regulated substances in soil have been moved to Table 4 for the convenience of the user.

A new Table 4 has been added which identifies the MSCs for inorganic substances in soil and follows the format of Table 3. This table has been divided into two categories: A) direct contact values; and B) soil-to-groundwater numeric values.

Table 5, formerly Table 3 in the proposed regulations, has been modified to indicate the aqueous solubility for each regulated substance, which is used by § 250.304(b) as a cap to the MSCs for groundwater. A column has been added to indicate those substances that are liquids at standard temperature and pressure for the purpose of determining the appropriate saturation cap to be applied under § 250.305(b). A column has been added to indicate the boiling point of each substance to determine which are volatile organic substances for the purpose of implementing §§ 250.304(d) and 250.307.

Table 6, formerly Table 4 in the proposed regulations, has been modified to provide threshold of regulation soil-to-groundwater numeric values based solely on 100X the groundwater MSC.

Table 5 in the proposed regulations, relating to MSCs for radionuclides, was deleted because of the deletion of the MSCs for radionuclides in the final rulemaking.

Table 6 in the proposed regulations, relating to exposure assumptions for lead, was renumbered Table 7.

Table 7 in the proposed regulations, relating to the identification of constituents of potential ecological concern, was renumbered Table 8.

F. Benefits, Costs and Compliance

Executive Order 1996-1 requires a cost/benefit analysis of the final-form regulation.

Benefits

The final-form regulations provide significant benefits to the public, local government and the private sector. The public and local government are notified of plans to remediate sites, by the person who intends to perform the remediation, prior to the initiation of the cleanup. In the past, this notice was not required. In addition, for cleanups that involve the site-specific standard or special industrial areas, a person who is remediating a site must publish the availability of the opportunity for a municipality to become involved in the remediation and reuse plans for the site.

These final-form regulations will encourage the voluntary cleanup and reuse of contaminated sites, restoring these sites to safe and productive uses, while promoting additional employment and tax revenues to distressed communities. The reuse of these sites will also reduce industrial development of greenfields sites.

Compliance Costs

The Department does not anticipate any new compliance costs associated with the final-form regulations. Costs to remediate contaminated sites should be reduced based on the availability of a release of liability for compliance with the cleanup standards. Act 2, however, does impose fees for the submission of plans and reports that are reviewed by the Department. These fees will be collected by the Department and will be used to implement the provisions of Act 2, including implementation of these final-form regulations.

Compliance Assistance Plan

Act 2 establishes an Industrial Sites Cleanup Fund, which is administered by the Department of Community and Economic Development. The fund provides financial assistance to persons who did not cause or contribute to contamination on a property used for industrial activity and who propose to undertake a voluntary cleanup of the property.

The Department of Environmental Protection has developed a *Manual* for the land recycling program. The *Manual* provides detailed, technical information on how to comply with Act 2 and the final-form regulations.

Paperwork Requirements

The paperwork required by these final-form regulations is based on statutory requirements. Act 2 requires notices of intent to remediate and final reports for remediations. In addition, Act 2 requires the preparation of remedial investigation reports, risk assessment reports and cleanup plans for remediations that will attain the site-specific standard. For the remediation of special industrial areas, Act 2 requires the preparation of a work plan and a baseline remedial investigation report. Also, a person undertaking the reuse of a special industrial site is required to enter into an agreement with the Department based on the baseline remedial investigation report. The reports are an important aspect of the cleanup program because releases of liability will be based on the Department-approved reports that identify contamination and demonstrate compliance with a cleanup standard. The final-form regulations do not require additional paperwork beyond what is established by statute.

G. Pollution Prevention

Pollution prevention approaches to environmental management often provide environmentally sound and longer-term solutions to environmental protection because pollution is prevented at the source. Generally speaking, pollution prevention refers to measures taken to avoid or reduce the generation of all types of pollution at their points of origin. These final-form regulations will be applied after the pollution has been generated and a person is remediating the property. It should be noted, however, that these final-form regulations are intended to

encourage the reuse of contaminated sites and prevent the generation of pollution at a site that is no longer contaminated.

H. Sunset Review

These final-form regulations will be reviewed in accordance with the sunset review schedule published by the Department to determine whether the regulations effectively fulfill the goals for which is was intended.

I. Regulatory Review

Under section 5(a) of the Regulatory Review Act (71 P. S. § 745.5(a)), on June 18, 1997, the Department submitted a copy of the proposed rulemaking to the Independent Regulatory Review Commission (IRRC), and the Chairpersons of the Senate and House Environmental Resources and Energy Committees. In compliance with section 5(b.1) of the Regulatory Review Act, the Department also provided IRRC and the Committees with copies of the comments, as well as other documentation.

In preparing these final-form regulations, the Department has considered the comments received from IRRC and the public. These comments are addressed in the comment and response document and Section E of this preamble. The Committees did not provide comments on the proposed rulemaking.

These final-form regulations were deemed approved by the House and Senate Environmental Resources and Energy Committees on July 8, 1997. IRRC met on July 17, 1997, and deemed approved the final-form regulations in accordance with section 5(c) of the Regulatory Review Act.

J. Findings of the Board

The Board finds that:

(1) Public notice of proposed rulemaking was given under sections 201 and 202 of the act of July 31, 1968 (P. L. 769, No. 240) (45 P. S. §§ 1201 and 1202) and regulations promulgated thereunder at 1 Pa. Code §§ 7.1 and 7.2.

(2) A public comment period was provided as required by law, and all comments were considered.

(3) These final-form regulations do not enlarge the purpose of the proposed regulations published at 26 Pa.B. 3985.

(4) These final-form regulations are necessary and appropriate for administration and enforcement of the authorizing acts identified in Section C of this Preamble.

K. Order of the Board

The Board, acting under the authorizing statutes, orders that:

(a) The regulations of the Department, 25 Pa. Code are amended by adding §§ 250.1—250.10, 250.201—250.204, 250.301—250.312, 250.401—250.411, 250.501—250.503, 250.601—250.606 and 250.701—250.708 to read as set forth in Annex A.

(*Editor's Note*: The addition of §§ 250.11—250.13, included in the proposal at 26 Pa.B. 3985, has been withdrawn by the Board. The addition of §§ 250.312, 250.411, 250.607 and 250.708 was not included in the proposal at 26 Pa.B. 3985.)

(b) The Chairperson of the Board shall submit this order and Annex A to the Office of General Counsel and the Office of Attorney General for review and approval as to legality and form, as required by law.

(c) The Chairperson of the Board shall submit this order and Annex A to IRRC and the Senate and House Environmental Resources and Energy Committees as required by the Regulatory Review Act.

(d) The Chairperson of the Board shall certify this order and Annex A and deposit them with the Legislative Reference Bureau, as required by law.

(e) This order shall take effect immediately upon publication.

JAMES M. SEIF
Chairperson

(*Editor's Note*: For the text of the order of the Independent Regulatory Review Commission relating to this document, see 27 Pa.B. 4052 (August 9, 1997).)

Fiscal Note: Fiscal Note 7-300 remains valid for the final adoption of the subject regulations.

Annex A

TITLE 25. ENVIRONMENTAL PROTECTION

PART I. DEPARTMENT OF ENVIRONMENTAL PROTECTION

Subpart D. ENVIRONMENTAL HEALTH AND SAFETY

ARTICLE VI. GENERAL HEALTH AND SAFETY

CHAPTER 250. ADMINISTRATION OF LAND RECYCLING PROGRAM

Subch.

Subchapter A. GENERAL PROVISIONS

Sec.

§ 250.1. Definitions.

In addition to the words and terms defined in the act, the following words and terms, when used in this chapter, have the following meanings, unless the context clearly indicates otherwise:

ASTM—The American Society for Testing and Materials.

Act—The Land Recycling and Environmental Remediation Standards Act (35 P. S. §§ 6026.101—6026.909).

Anisotropy—The variability of a physical property based on direction, for example, variation in permeability in relation to direction of groundwater flow.

Community water system—As defined in the Pennsylvania Safe Drinking Water Act (35 P. S. §§ 721.1—721.17), a public water system, which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

Enterprise zone—An area specially designated as an enterprise zone under requirements determined by the Department of Community and Economic Development.

Environmental protection acts—Includes:

(i) The Clean Streams Law (35 P. S. §§ 691.1—691.1001).

(ii) The Municipal Waste Planning, Recycling and Waste Reduction Act (53 P. S. §§ 4001.101—4001.1904).

(iii) The Hazardous Sites Cleanup Act (35 P. S. §§ 6020.101—6020.1305).

(iv) The Low-Level Radioactive Waste Disposal Act (35 P. S. §§ 7130.101—7130.906).

(v) The act of July 13, 1988 (35 P. S. §§ 6019.1—6019.6), known as the Infectious and Chemotherapeutic Waste Disposal Law.

(vi) The Air Pollution Control Act (35 P. S. §§ 4001—4015).

(vii) The Surface Mining Conservation and Reclamation Act (52 P. S. §§ 1396.1—1396.31).

(viii) The Noncoal Surface Mining Conservation and Reclamation Act (35 P. S. §§ 3301—3326).

(ix) The Dam Safety and Encroachments Act (32 P. S. §§ 693.1—693.27).

(x) The Solid Waste Management Act (35 P. S. §§ 6018.101—6018.1003).

(xi) Other State or Federal statutes relating to environmental protection or the protection of public health.

EQL—Estimated quantitation limit.

Habitats of concern—A habitat defined as one of the following:

(i) Typical wetlands with identifiable function and value, except for exceptional value wetlands as defined in § 105.17 (relating to wetlands).

(ii) Breeding areas for species of concern.

(iii) Migratory stopover areas for species of concern.

(iv) Wintering areas for species of concern.

(v) Habitat for State endangered plant and animal species.

(vi) Federal, State and local parks and wilderness areas, and areas designated as wild, scenic or recreational.

(vii) Areas otherwise designated as critical or of concern by the Game Commission, the Fish and Boat Commission or the Department of Conservation and Natural Resources.

Heterogeneity—Nonhomogeneous structure, composition and physical properties.

MCL—Maximum contaminant level.

MSC—Medium-specific concentration.

NIR—Notice of Intent to Remediate.

NPDES—National Pollutant Discharge Elimination System.

PQL—Practical quantitation limit.

Property—A parcel of land defined by the metes and bounds set forth in the deed for that land.

Regulated discharge—A point or nonpoint source discharge subject to the permit or approval requirements of Chapters 91—105 and any diffuse surface or groundwater discharge to surface waters which has the potential to cause an exceedance of the water quality standards in Chapter 93 (relating to water quality standards).

Risk assessment—A process to quantify the risk posed by exposure of a human or ecological receptor to regulated substances. The term includes baseline risk assessment, development of site-specific standards and risk assessment of the remedial alternatives.

SIA—special industrial area—Property where there is no financially viable responsible person to perform remediation or property located within an enterprise zone, and where the property was used for industrial activity.

Secondary contaminants—A regulated substance for which a secondary MCL exists, and no lifetime health advisory level exists.

Site—The extent of contamination originating within the property boundaries and all areas in close proximity to the contamination necessary for the implementation of remediation activities to be conducted under the act.

Species of concern—Species designated as of special concern, rare, endangered, threatened or candidate by the Game Commission, the Fish and Boat Commission or the Department of Conservation and Natural Resources, if the species has not also been designated threatened or endangered by the Federal government.

TF—Transfer factor.

Volatile compound—A chemical compound with a boiling point less than 200° centigrade at 1 atmosphere.

§ 250.2. Application of remediation standards.

(a) This chapter provides remediation standards which shall be used whenever site remediation is voluntarily conducted or is required under environmental statutes in section 106 of the act (35 P. S. § 6026.106).

(b) A person who is required to perform a site remediation under an enforcement action of the Department shall meet the following:

(1) Select one or a combination of the background standards contained in Subchapter B (relating to background standard), Statewide health standards contained in Subchapter C (relating to Statewide health standards) and site-specific standards, contained in Subchapter D (relating to site-specific standards).

(2) Demonstrate compliance with the substantive, procedural and notice requirements of the act and this chapter.

(c) To qualify for liability protection under the act, a person conducting remediation shall comply with this chapter and the act. Administrative and procedural requirements for remediations in paragraphs (1) and (2) shall be used in lieu of those requirements listed in this chapter to qualify for liability protection under the act.

(1) Persons remediating sites placed on the Pennsylvania Priority List shall comply with the Hazardous Sites Cleanup Act (35 P. S. §§ 6020.101—6020.1305), except for the cleanup levels which are set by the act.

(2) Persons remediating releases from storage tanks regulated under the Storage Tank and Spill Prevention Act (35 P. S. §§ 6021.101—6021.2104) shall comply with the requirements of the corrective action process under the Storage Tank and Spill Prevention Act, except for the cleanup levels which are set by the act.

§ 250.3 Management of contaminated media.

(a) Contaminated media removed for reuse, treatment or disposal shall be managed in accordance with the Solid Waste Management Act (35 P. S. §§ 6018.101—6018.1003), The Clean Streams Law (35 P. S. §§ 691.1—691.1001), the act of July 13, 1988 (P. L. 525, No. 93) (35 P. S. §§ 6019.1—6019.6), known as the Infectious and Chemotherapeutic Waste Law, the Air Pollution Control Act (35 P. S. §§ 4001—4015) and the regulations thereunder.

(b) The Department may waive procedural and operating requirements for onsite remediation activities based on a written demonstration of any of the criteria in section 902(b) of the act (35 P. S. § 6026.902).

§ 250.4. Limits related to PQLs.

(a) The PQLs shall be selected from the PQLs specified by the EPA as EQLs in the most current version of the EPA RCRA Manual SW-846 (U. S. EPA, 1990. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* Third Edition. Office of Solid Waste and Emergency Response) for soil listed as "low level soil" and for groundwater listed as "groundwater" in accordance with the following:

(1) For inorganic compounds, the PQLs under this chapter shall be the values listed for methods associated with analysis by Inductively Coupled Plasma (ICP) with the following exceptions:

(i) For lead, cadmium, arsenic and selenium, values listed for the atomic absorption graphite furnace methods for water shall be used.

(ii) Mercury shall be the value listed for the cold vapor method.

(2) For organic compounds, the PQLs shall be the EQLs listed for the GC/Mass spec methods—for example, Method 8240 for volatile organic compounds.

(b) If the PQL selected under subsection (a) is higher than the MCL or HAL for an organic regulated substance in groundwater, the PQLs shall be derived from the analytical methodologies published under the drinking water program in the most current version of *Methods for the Determination of Organic Compounds in Drinking Water* (U. S. EPA, 1988, Environmental Monitoring Systems Laboratory, EPA/600/4-88/039). If a PQL determined under this subsection is not below a HAL, the methodologies in subsection (c)(1) or (2) shall be used unless those quantitation limits are higher than the PQL determined under this subsection.

(c) For regulated substances when EQLs set by the EPA have a health risk that is greater (less protective) than the risk levels set in sections 303(c) and 304(b) and (c) of the act (35 P. S. §§ 6026.303(c) and 6026.304(b) and (c)) or for substances when no EQL has been established by the EPA, the limits related to the PQL shall be the quantitation limits established by the methodologies in paragraph (1) or (2).

(1) A level set by multiplying 3.18 by the published method detection limit (MDL) of the most recently approved EPA methodology.

(2) A level representing the lowest calibration point that can consistently be determined to have a percent relative standard deviation (%RSD) of less than 30% or correlation coefficient of greater than 0.995 using reagent water.

(d) For regulated substances which have no limits related to PQLs identified in subsection (c)(1) or (2), a person shall demonstrate attainment under the site-specific standard or the background standard.

(e) When a minimum threshold MSC is used as a Statewide health standard, the minimum threshold MSC is the Statewide health standard regardless of whether it is higher or lower than a quantitation limit established by this section.

(f) Nothing in this section restricts the selection of valid and generally accepted methods to be used to analyze samples of environmental media.

§ 250.5. Public notice by applicant.

(a) Public notice under the background, Statewide health or site-specific standard and under a special industrial area cleanup shall be initiated by the applicant through an NIR. For remediations proposing the use of a site-specific standard or, for remediations under an SIA agreement, the public and the municipality where the site is located shall be provided a 30-day period, in the NIR, in which the municipality may request to be involved in the development of the remediation and reuse plans for the site.

(b) The remedial investigation report, the risk assessment report and the cleanup plan, prepared under a site-specific remediation, may not be submitted to the Department until after the initial 30-day public and municipal comment period following the submission of the NIR has expired.

(c) The baseline environmental report, prepared under an SIA remediation, shall be submitted after the initial 30-day public and municipal comment period has expired.

§ 250.6. Public participation.

(a) The publication date of the summary of the NIR in a newspaper of general circulation in the area of the site shall initiate the 30-day public and municipal comment period during which the municipality can request to be involved in the development of the remediation and reuse plans for a site being remediated to a site-specific standard or for remediation at an SIA.

(b) The person proposing remediation shall be responsible for developing and implementing a public involvement plan if both of the following circumstances exist:

(1) The remediation involves a site-specific standard or an SIA cleanup.

(2) A municipality, through its official representatives, has requested, in writing, to be involved in the development of the remediation and reuse plans within the 30-day public and municipal comment period identified in the notice to the municipality and the newspaper notice.

(c) If a public involvement plan has been initiated, the person proposing remediation shall, at a minimum, provide:

(1) Public access at convenient locations for document review.

(2) Designation of a single contact person to address questions from the community.

(3) A location near the remediation site for any public hearings and meetings that may be part of the public involvement plan.

(d) If a public involvement plan has been requested, it shall be submitted with one of the following:

(1) A remedial investigation report under a site-specific remediation.

(2) A baseline environmental report under an SIA cleanup.

§ 250.7. Fees.

(a) Resubmission of a cleanup plan, remedial investigation, risk assessment or final report will require payment of the appropriate fee identified in the act for each resubmission.

(b) The Department will disapprove a plan or report that is submitted without the appropriate fee.

§ 250.8. Publication.

The Department will publish a notice of its final actions on plans and reports in the *Pennsylvania Bulletin*.

§ 250.9. Interaction with other environmental statutes.

(a) A release of a regulated substance at a solid waste facility which did not receive waste after September 7, 1980, shall be remediated in accordance with this chapter and the act.

(b) Nothing in this chapter affects the permitting, operation, design, performance or closure requirements under the environmental protection acts or regulations thereunder. The groundwater standards in Subchapters B and C (relating to background standards; and Statewide health standards) apply as part of a Department-approved assessment and abatement plan that is implemented prior to closure of a solid waste facility and apply as the standards that shall be demonstrated to qualify for liner and leachate treatment system waivers or modifications as specified in Chapter 287 (relating to residual waste management—general provisions). The standards in Subchapters B—D (relating to site-specific standards) apply as groundwater standards for remediation of a release of a regulated substance at closure of a solid waste facility but do not substitute for design and performance standards required under the solid waste management regulations. See Articles VII—IX. In the case of hazardous waste facilities, remediations shall comply with requirements applicable under the Resource Conservation and Recovery Act (42 United StatesC.A. §§ 6091—6986). The groundwater parameters and human health and environmental protection levels in Article IX (relating to residual waste) do not apply to groundwater remediations.

(c) An unpermitted release or spill of a regulated substance at a permitted solid waste facility that is outside a disposal or processing unit, including surface impoundments, waste storage areas, associated piping and underlying containment systems, shall be remediated in accordance with this chapter and the act.

§ 250.10. Measurement of regulated substances in media.

(a) For measuring regulated substances in soil and sediments, analyses shall be performed on a dry weight basis.

(b) For metals in soil, analyses shall be performed on total metals, except for hexavalent and trivalent chromium, which analyses shall be performed individually.

(c) For groundwater, samples for metals analysis shall be field filtered and field acidified in accordance with the most current version of the *Groundwater Monitoring Guidance Manual*, Department of Environmental Protection, 3610-BK-DEP1973.

(d) For groundwater where monitoring is being performed at a drinking water well, samples for metals analysis shall be field acidified and unfiltered in accordance with the most current version of *Groundwater Monitoring Guidance Manual*, Department of Environmental Protection, 3610-BK-DEP1973.

(e) For surface water, samples for metals analysis shall be field acidified in accordance with approved EPA analytical methods in § 16.102 (relating to approved EPA analytical methods and detection limits).

(f) For air, samples and analyses shall be performed in accordance with Chapters 131 and 139 (relating to ambient air quality standards; and sampling and testing).

Subchapter B. BACKGROUND STANDARD

Sec.
250.201. Scope.
250.202. Establishing background concentrations.
250.203. Points of compliance.
250.204. Final report.

§ 250.201. Scope.

This subchapter sets forth requirements and procedures for a person selecting the background standard, as provided in § 250.2 (relating to application of remediation standards).

§ 250.202. Establishing background concentrations.

(a) Background concentrations shall be established based on a site characterization, as set forth in § 250.204(a)—(e) (relating to final report).

(b) The background concentrations shall be established using analysis of samples of regulated substances present at the property but not related to any release at the property. If all areas on the property are affected by a release, background shall be determined at points off the property in accordance with § 250.204(f)(7) and (8).

(c) Background concentrations shall be established by a methodology that is statistically valid and consistent with the methodology used to demonstrate attainment under Subchapter G (relating to demonstration of attainment).

§ 250.203. Points of compliance.

(a) For attainment of the background standard for groundwater, the point of compliance shall be throughout the contaminant plume, including areas of the plume that are outside the property boundary, as determined by the site characterization.

(b) For attainment of a background soil standard, the point of compliance shall be throughout the area of the soil that has become contaminated as a result of releases on the property.

(c) For attainment of a surface water quality standard, compliance shall be measured for point source discharges at the point of discharge in accordance with limits specified in the NPDES permit.

(d) For the emission of regulated substances to outdoor air, the point of compliance for any applicable air quality standard shall be as specified in the air quality regulations in Subpart C, Article III (relating to air resources).

§ 250.204. Final report.

(a) For sites remediated under the background standard, the person conducting the remediation shall submit a final report to the Department which documents attainment of the selected standard. The final report shall include site characterization information in subsections (b)—(e). The site characterization shall be conducted in accordance with scientifically recognized principles, standards and procedures. The level of detail in the investigation, and the selected methods and analyses, that may

include models, shall sufficiently define the rate of movement and the present and future extent and fate of contaminants to ensure continued attainment of the remediation standard. Interpretations of geologic and hydrogeologic data shall be prepared by a professional geologist licensed in this Commonwealth.

(b) As derived from specific knowledge of the subject property, historic use of the subject property or regulated substance usage information regarding the subject property, an appropriate number of sample locations should be investigated from the identified media of concern to characterize the nature and composition of the contaminants including the following:

(1) Source characterization or development of a conceptual site model.

(2) The vertical and horizontal extent of contamination within each media of concern.

(3) The direction and rate of contaminant movement and fate and transport of all contaminants within each media of concern.

(4) A determination of the appropriate remedial technology for each media of concern.

(c) Descriptions of sampling and decontamination methodologies and analytical quality assurance/quality control procedures should be included within a Sampling and Analysis Plan and Quality Assurance Plan. Copies of soil and geologic boring descriptions and as-built construction drawings of wells used for site characterization should be included in the report. Copies of laboratory analytical results and applicable laboratory quality control results should be included within the report, including historical data and data eliminated from consideration based on data validation protocols. Analytical results should be presented within the report in table form.

(d) If soil is determined to be a media of concern, the site characterization shall determine the relative location of soil samples necessary to characterize the horizontal and vertical extent of contamination based on factors such as hydraulic conductivity of the soils, heterogeneity of the soils and the nature of the contaminants. The horizontal and vertical extent of soil with concentrations of regulated substances above the selected standard shall be defined by an appropriate number of samples inside and outside of the area that exceeds the standard. Soil samples from the area with the anticipated highest levels of contamination shall be obtained, as appropriate, to determine the applicability of the proposed remedial action or handling and disposal requirements, or both, for that soil during remediation.

(e) If groundwater is determined to be a media of concern, the site characterization shall characterize the effects of a release on groundwater to adequately determine how naturally occurring physical and geochemical characteristics define the movement of groundwater and contaminants beneath the surface, including the delineation of the position of aquifers, as well as geologic units which inhibit groundwater flow. The site characterization shall meet the following conditions:

(1) If appropriate, the characterization shall consider the heterogeneity and anisotropy of aquifer materials based on hydraulic conductivity values (measured or published), and the effect of local and regional groundwater flow directions and any influence from pumping wells.

(2) Defining the horizontal extent of concentrations of regulated substances above the standard shall require more than one round of groundwater sampling from properly constructed and developed monitoring wells taken a sufficient number of days apart to yield independently valid results.

(3) When characterizing the vertical extent of groundwater contamination, the person shall perform more than one round of groundwater sampling and shall consider the specific gravity of the regulated substances identified in the groundwater in the site, and the potential for naturally occurring or induced downward vertical hydraulic gradients.

(4) When characterizing the vertical extent of groundwater contamination, properly constructed monitoring wells or nested monitoring wells should be utilized to focus groundwater sampling in zones of potential contaminant accumulation such as zones directly above a confining layer. Samples shall be taken a sufficient number of days apart to yield independently valid results.

(f) Final reports for the background standard shall include the following additional information:

(1) Descriptions of treatment, removal or decontamination procedures performed in remediation. The description shall include the methodology and analytical results used to direct the remediation and determine the cessation of remediation.

(2) Descriptions of the sampling methodology and analytical results, including the appropriate statistical methodologies, which pertain to whether the remediation has attained the selected standard, following the requirements of Subchapter G (relating to demonstration of attainment).

(3) Documentation of compliance with postremediation care requirements, if they are needed to maintain the selected standard.

(4) All sampling data.

(5) For fate and transport analyses, submission of the following information:

(i) The name and version of the analysis, a description of the analysis, and the name of the organization or person which developed the analysis, if modeling is used.

(ii) The site characterization data used in the analysis.

(iii) Any assumptions used in the analysis and justification for the assumptions.

(iv) Appropriate documentation of the quality assurance and quality control of the analysis.

(v) Documentation of the results of the analysis in appropriate figures and tables.

(6) A summary of sampling methodology and analytical results that relate to the determination of the background concentration. The summary shall contain the following:

(i) For soil, the final report shall identify the background reference region within which all background samples were collected.

(ii) For groundwater, the final report shall identify background reference wells.

(7) Documentation that background reference areas for soil meet the following criteria:

(i) The background reference region and background reference areas shall be free of contamination from any release at the site.

(ii) Sampling at the background reference area and the contaminated area shall be comparable and random.

(iii) A background reference area selected for comparison with a given contaminated area may not differ significantly from that contaminated area in physical, chemical or biological characteristics that might cause measurements in the background reference area and the contaminated area to differ.

(8) Documentation that background reference groundwater concentrations have been determined at hydrogeologically upgradient points that characterize the groundwater flow onto the site that are not affected by any release at the property.

(g) If engineering controls are needed to attain or maintain a standard, if institutional controls are needed to maintain a standard, if the fate and transport analysis indicates that the remediation standard may be exceeded at the point of compliance in the future, or, if the remediation relies on natural attenuation, a postremediation care plan shall be documented in the final report. The plan shall include the following:

(1) Reporting of any instance of nonattainment.

(2) Reporting of measures to correct nonattainment conditions.

(3) Monitoring on a quarterly basis, or as otherwise approved by the Department, that demonstrates the effectiveness of the remedy and periodic reporting of monitoring results and analysis.

(4) Maintenance of records at the property where the remediation is being conducted for monitoring, sampling and analysis.

(5) A schedule for operation and maintenance of the controls and submission of proposed changes.

(6) If requested by the Department, documentation of financial ability to implement the remedy and the postremediation care plan.

Subchapter C. STATEWIDE HEALTH STANDARDS

Sec.

§ 250.301. Scope.

(a) This subchapter sets forth generic Statewide health standards as one of three remediation standards that a person may select. The Statewide health standards are concentrations of regulated substances associated with a specific environmental medium, and are designated as the MSCs. The values used to determine the MSCs are contained in Appendix A, Tables 1—4 and 6 and are the concentrations of regulated substances that shall be met to demonstrate attainment of a Statewide health standard. Appendix A, Table 5 presents the toxicological and physical parameters used to calculate the MSCs in Appendix A, Tables 1—4.

(b) This subchapter sets forth minimum threshold MSCs for soil and groundwater that shall be met to demonstrate attainment of the Statewide health standards for regulated substances in Appendix A, Table 6. Minimum threshold MSCs are standards developed for regulated substances for which no chemical-specific toxicological data exist.

(c) For regulated substances which do not have an MSC for the relevant medium on Appendix A, Tables 1—4 or 6, the background standard or site-specific standard shall be met to qualify for a release of liability under the act.

§ 250.302. Point of compliance.

(a) For attainment of the Statewide health standard for groundwater, the point of compliance is the property boundary that existed at the time the contamination was discovered. Statewide health standards shall be attained at and beyond the point of compliance. The Department may determine, in writing, a point of compliance beyond the property boundary to be appropriate if one of the following situations is demonstrated:

(1) Structures are located on the property boundary which prohibit internal or external access for a drill rig.

(2) The property is a small parcel of land with limited space for onsite monitoring wells.

(3) It is not physically possible to monitor groundwater quality at the property boundary.

(4) The downgradient property was owned by the same party at the time the contamination was discovered and the use of the groundwater on the downgradient property can be controlled to prevent unacceptable exposure.

(5) For measuring compliance with the groundwater MSCs that apply to secondary contaminants.

(b) For attainment of the Statewide health standard for soil, the MSC as determined in § 250.305 (relating to MSCs for soil) shall be met at the specified depth.

(c) For the emission of regulated substances to outdoor air, the point of compliance for any applicable air quality standard shall be as specified in the air quality regulations.

§ 250.303. Aquifer determination; current use and currently planned use of aquifer groundwater.

(a) With the exception of seasonal, localized and hydrologically isolated perched systems under a property, all geologic formations or parts or groups of formations in this Commonwealth which are saturated are presumed to be aquifers for the purpose of applying the Statewide health standards. The term includes saturated residuum such as saprolite and other weathered rock strata or intervals developed from underlying bedrock and other saturated deposits overlying these formations to which the geologic formations are hydrologically connected.

(b) All groundwater in aquifers is presumed to be used or currently planned for use. The Department may determine, in writing, based on a demonstration by the person remediating the site that groundwater is not used or currently planned to be used, if the requirements in subsection (c) are met within the property and within a radius of 1,000 feet downgradient of the points of compliance plus any additional areas to which the contamination has migrated and might reasonably migrate at concentrations that exceed the MSC for groundwater used or currently planned to be used.

(c) The following requirements shall be met within the area described in subsection (b):

(1) No groundwater derived from wells or springs is used or currently planned to be used for drinking water or agricultural purposes.

(2) All downgradient properties are connected to a community water system.

(3) The area described in subsection (b) does not intersect a radius of 1/2 mile from a community water supply well source or does not intersect an area designated by the Department as a zone 2 wellhead protection area under Chapter 109 (relating to safe drinking water).

(d) If the Department determines that groundwater is not used or currently planned to be used, the following requirements apply within the area identified in subsection (b):

(1) The requirements in § 250.309 (relating to MSCs for surface water).

(2) The ecological screening process identified in § 250.311 (relating to evaluation of ecological receptors).

(e) The MSCs for groundwater in an aquifer that is not used or currently planned for use, under § 250.304(d) (relating to MSCs for groundwater), shall be met at the points of compliance identified in § 250.302 (relating to point of compliance).

§ 250.304. MSCs for groundwater.

(a) A person shall implement a remedy under the Statewide health standard that is protective of human health and the environment.

(b) The MSCs for regulated substances in groundwater are presented in Appendix A, Tables 1 and 2. The methodology used by the Department for calculating MSCs in groundwater is detailed in subsections (c)—(f).

(c) The MSCs for regulated substances contained in groundwater in aquifers used or currently planned to be used for drinking water or for agricultural purposes is the MCL as established by the Department or the EPA (U. S. EPA, 1996. Drinking Water Regulations and Health Advisories. Office of Water. EPA 822-R-96-001). For a regulated substance where no MCL has been established, the MSC is the lifetime health advisory level (HAL) for that compound. For a regulated substance where neither an MCL nor a lifetime HAL is established, the MSC is the lowest concentration calculated using the appropriate residential and nonresidential exposure assumptions and the equations in §§ 250.306 and 250.307 (relating to ingestion numeric values; and inhalation numeric values).

(d) For regulated substances contained in aquifers not used or currently planned to be used, the MSCs in Appendix A, Tables 1 and 2 are calculated by the following:

(1) For volatile organic regulated substances with an attenuation factor of less than 20, as calculated by the methodology in paragraph (7), ten times the appropriate residential or nonresidential MSC for groundwater in aquifers used or currently planned to be used containing less than 2,500 mg/l total dissolved solids.

(2) For volatile organic regulated substances with an attenuation factor of greater than or equal to 20, as calculated by the methodology in paragraph (7), 100 times the appropriate residential or nonresidential MSC for groundwater in aquifers used or currently planned to be used containing less than 2,500 mg/l total dissolved solids.

(3) For semivolatile organic and inorganic regulated substances, regardless of the attenuation factor, 1,000 times the appropriate residential or nonresidential MSC for groundwater in aquifers used or currently planned to be used containing less than 2,500 mg/l total dissolved solids.

(4) For benzene, 100 times the appropriate residential or nonresidential MSC for groundwater in aquifers used or currently planned to be used containing less than 2,500 mg/l total dissolved solids.

(5) For regulated substances with no calculated attenuation factor because of a lack of data in Howard, P. H., R. S. Boethling, W. F. Jarais, W. M. Meylan and E. M. Michalenko. 1991. *Handbook of Environmental Degradation Rates.* Lewis Publishers, Inc., Chelsea, MI., the appropriate residential or nonresidential MSC for groundwater in aquifers used or currently planned to be used containing less than 2,500 mg/l total dissolved solids.

(6) For minimum threshold MSCs, 5 micrograms per liter in groundwater shall be used.

(7) The attenuation factor (AF) for an organic regulated substance shall be calculated according to the following formula:

$$AF = K \times KOC$$

Where:

$$K = \text{degradation coefficient} = \frac{0.693}{T_{1/2}}$$

$T_{1/2}$—half-life of organic regulated substance in groundwater as reported in Howard, P. H., R. S. Boethling, W. F. Jarais, W. M. Meylan and E. M. Michalenko, 1991. *Handbook of Environmental Degradation Rates*. Lewis Publishers, Inc., Chelsea, MI.

KOC—organic carbon partitioning coefficient (See Appendix A Table 5)

(e) If the groundwater in aquifers used or currently planned for use at the site has naturally occurring background total dissolved solids concentrations greater than 2,500 milligrams per liter, the Statewide health standard for a regulated substance dissolved in the groundwater may be adjusted by multiplying the MSC for groundwater in aquifers by 100. The adjusted Statewide health standard shall then be used in calculating the soil to groundwater pathway numeric value as specified in § 250.308 (relating to soil to groundwater pathway numeric values).

(f) In addition to the requirements in this section, the MSCs are further limited by solubility as identified in Appendix A, Table 5. The solubility limits are derived from the following references, which are keyed to the numbers in Table 5:

(1) Howard, P. H. 1991. *Handbook of Environmental Fate and Exposure Data for Organic Chemicals. Vol. III. Pesticides*. Lewis Publishers.

(2) Lyman, W. J., W. F. Reehl, and D. H. Rosenblatt. 1982. *Handbook of Chemical Property Estimation Methods*. McGraw-Hill Book Co. NY.

(3) Mabey, et al. 1982. *Aquatic Fate Process Data for Organic Priority Pollutants*. SRI. EPA Contract Nos. 68-01-3867, 68-03-2981.

(4) Milne, G.W.A., Ed. 1995. *CRC Handbook of Pesticides*. CRC Press, Inc.

(5) Montgomery, J. H. 1991. *Groundwater Chemicals Desk Reference*. Vol. II. Lewis Publishers.

(6) Montgomery, J. H., and L. M. Welkom. 1990. *Groundwater Chemicals Desk Reference. Vol. 1*. Lewis Publishers.

(7) Montgomery, J. H. 1993. *Agrochemicals Desk Reference, Environmental Data*. Lewis Publishers.

(8) National Library of Medicine (Grateful Med). *Hazardous Substances Databank*.

(9) Nirmalakhandan, N. N., and R. E. Speece. 1988a. *Prediction of Aqueous Solubility of Organic Chemicals Based on Molecular Structure*. ES&T 22:328-337.

(10) Nirmalakhandan, N. N., and R. E. Speece. 1988b. *Prediction of Aqueous Solubility of Organic Chemicals Based on Molecular Structure. 2. Application to PNAS, PCBs, PCDDs, etc*. ES&T. 23:708-713.

(11) Sax, N. I. 1989. *Dangerous Properties of Industrial Materials*. Seventh Edition. Vol. 1-3. Van Nostrand Reinhold.

(12) Environmental Protection Agency. Undated. *IRIS—The Integrated Risk Information System*.

(13) Environmental Protection Agency. 1985. *Physical/Chemical Properties and Characterization of RCRA Wastes According to Volatility. Office of Air Quality and Planning and Standards*. EA 450/3-85-007.

(14) Environmental Protection Agency. 1989. *Database of Chemical Properties for SARA. Section 313 Chemicals*.

(15) Environmental Protection Agency. 1992. *Handbook of RCRA Ground-water Monitoring Constituents: Chemical & Physical Properties*. 40 CFR Part 264, Appendix IX. Office of Solid Waste. Permits and State Programs Division. EPA 530-R-92-022.

(16) EPA. 1994. *Superfund Chemical Data Matrix. Office of Solid Waste and Emergency Response*. EPA 540-R-94-009.

(17) Verschueren, K. 1977. *Handbook of Environmental Data on Organic Chemicals*. Van Nostrand Reinhold.

(18) Windholz. M., ED. 1976. *The Merck Index*. 9th ED. Merck and Co.

§ 250.305. MSCs for soil.

(a) A person shall implement a remedy under the Statewide health standard that is protective of human health and the environment.

(b) The MSCs for regulated substances in soil are presented in Appendix A, Tables 3 and 4. The methodology for calculating MSCs in soil is detailed in subsections (c)—(e) and the MSCs are further limited to not exceed the physical capacity of the soil to contain a regulated substance. This physical limitation is based on an assumed porosity of 0.35, an assumed dry bulk density of soil of 1.8 kilograms per liter and an assumed density of a regulated substance of 1.0 kilograms per liter. This is calculated according to the equation in paragraph (1). For regulated substances which are organics and liquids at standard temperature and pressure (STP) as identified in Appendix A, Table 5 (Chemical Properties), the physical limitation is further limited based on residual saturation with the additional assumption of a residual saturation ratio of substance volume to soil volume of 0.051, as calculated in Equation (2).

(1) $$C_{PL} = \frac{\rho_{RS} n}{\rho_B}$$

(2) $$MSC = Sr * \frac{\rho_{RS} n}{\rho_B} * 1{,}000{,}000\ mg/kg = 10{,}000\ mg/kg$$

where:

ρ_{rs} = density of the regulated substance = 1.0 kg/L

n = porosity of the soil = 0.35

ρ_B = dry bulk density of the soil = 1.8 kg/L

Sr = residual saturation ratio (substance vol./soil vol.) = 0.051

(c) For the residential standard, the MSC for regulated substances contained in soil is one of the following:

(1) The lowest of the following:

(i) The ingestion numeric value throughout the soil column to a depth of up to 15 feet from the existing ground surface as determined by the methodology in § 250.306 (relating to ingestion numeric values), using the appropriate default residential exposure assumptions contained in § 250.306(e).

(ii) The inhalation numeric value throughout the soil column to a depth of up to 15 feet in soil from the existing ground surface, which considers volatilization into the outdoor air and inhalation of particulates, as determined by the methodology in § 250.307 (relating to inhalation numeric values), using the appropriate default residential exposure assumptions contained in § 250.307(d).

(iii) The soil-to-groundwater pathway numeric value throughout the entire soil column as determined by the methodology in § 250.308 (relating to soil to groundwater pathway numeric values).

(2) The lowest of paragraph (1)(i) and (ii) and, in addition, one of the following:

(i) A demonstration of the soil-to-groundwater pathway soil buffer as identified in § 250.308(b), if applicable.

(ii) A soil-to-groundwater pathway equivalency demonstration as identified in § 250.308(d).

(d) For the nonresidential standard, the MSC for regulated substances contained in soil throughout the soil column to a depth of 2 feet from the existing ground surface is one of the following:

(1) The lowest of the following:

(i) The ingestion numeric value as determined by the methodology in § 250.306, using the appropriate default nonresidential exposure assumptions contained in § 250.306(e).

(ii) The inhalation numeric value which is the lower of the values for volatilization into the outdoor air and the inhalation of particulates, as determined by the methodology in § 250.307, using the appropriate default nonresidential exposure assumptions contained in § 250.307(d).

(iii) The soil-to-groundwater pathway numeric value throughout the entire soil column as determined by the methodology in § 250.308.

(2) The lowest of paragraph (1)(i) or (ii) and, in addition, one of the following:

(i) A demonstration of the soil-to-groundwater pathway soil buffer as identified in § 250.308(b), if applicable.

(ii) A soil-to-groundwater pathway equivalency demonstration as identified in § 250.308(d).

(e) For the nonresidential standard, the MSC for regulated substances contained in soils at depths greater than 2 feet through 15 feet from the existing ground surface, is one of the following:

(1) The lowest of the following:

(i) The inhalation numeric value which considers volatilization to the outdoor air, as determined by the methodology in § 250.307, using the appropriate default nonresidential exposure assumptions contained in § 250.307(d), and using a transfer factor (TF) based upon the calculated emission rate from subsurface soil as specified in the method of Jury, et al. 1990. *Water Resources Research*, Vol. 26, No. 1, pp. 13—20.

(ii) The soil-to-groundwater pathway numeric value throughout the entire soil column as determined by the methodology in § 250.308.

(2) The value identified in paragraph (1)(i) and one of the following:

(i) A demonstration of the soil-to-groundwater pathway soil buffer as identified in § 250.308(b), if applicable.

(ii) A soil-to-groundwater pathway equivalency demonstration as identified in § 250.308(d).

(f) The MSC for regulated substances contained in soil at depths greater than 15 feet is one of the following:

(i) The soil-to-groundwater pathway numeric value as determined by § 250.308(a).

(ii) A demonstration of the soil-to-groundwater pathway soil buffer as identified in § 250.308(b), if applicable.

(iii) A soil-to-groundwater pathway equivalency demonstration as identified in § 250.308(d).

(g) A person conducting a remediation of soils contaminated with a substance having a secondary MCL will not be required to comply with the soil-to-groundwater pathway requirements for those substances to protect groundwater in aquifers for drinking water.

§ 250.306. Ingestion numeric values.

(a) For a regulated substance which is a systemic toxicant, the ingestion numeric value for that substance was calculated using the appropriate residential or nonresidential exposure assumptions from subsection (d) according to the following equation:

$$MSC = \frac{THQ \times RfD_o \times BW \times AT_{DC} \times 365\ days/year}{Abs \times EF \times ED \times IngR \times CF}$$

(b) For a regulated substance which is a carcinogen, the ingestion numeric value for that substance was calculated using the appropriate residential or nonresidential exposure assumptions from subsection (d) according to the following equation:

$$MSC = \frac{TR \times AT_c \times 365\ days/year}{CSF_o \times Abs \times EF \times IF_{adj} \times CF}$$

(c) For a regulated substance that has both an oral reference dose and an oral cancer slope factor, the ingestion numeric value is the lower of the two numbers as calculated by the equations in subsections (a) and (b).

(d) The default exposure assumptions used to calculate the ingestion numeric values are as follows:

Term		*Residential*		*Nonresidential (Onsite Worker)*
		Systemic[1]	*Carcinogens*[2]	
THQ	Target Hazard Quotient	1	N/A	1
RfD_o	Oral Reference Dose (mg/kg-day)	Chemical-specific	N/A	Chemical-specific
BW	Body Weight (kg)		N/A	
	Soil	15		70
	Groundwater	70		70
AT_{DC}	Averaging Time for systemic toxicants (yr)			
	Soil	6	N/A	25
	Groundwater	30	N/A	25
Abs	Absorption (unitless)[3]	1	1	1
EF[5]	Exposure Frequency (d/yr)			
	Soil	250	250	180
	Groundwater	350	350	250
ED	Exposure Duration (yr)			
	Soil	6	N/A	25
	Groundwater	30	N/A	25
IngR	Ingestion Rate			
	Soil (mg/day)	100	N/A	50
	GW (L/day)	2	N/A	1
CF	Conversion Factor			
	Soil (kg/mg)	1×10^{-6}	1×10^{-6}	1×10^{-6}
	GW (unitless)	1	1	1

Term		Residential		Nonresidential (Onsite Worker)
		Systemic[1]	Carcinogens[2]	
TR	Target Risk	N/A	1×10^{-5}	1×10^{-5}
CSF_o	Oral Cancer Slope Factor (mg/kg-day)$^{-1}$	N/A	Chemical-specific	Chemical-specific
At_c	Averaging Time for carcinogens (yr)	N/A	70	70
If_{adj}[4]	Ingestion Factor	N/A		
	Soil (mg-yr/kg-day)		57.1	17.9
	GW (L-yr/kg-day)		1.1	0.4

Notes:
[1]Residential exposure to noncarcinogens is based on childhood (ages 1-6) exposure for soil, and adult exposure for groundwater, consistent with USEPA (1991).
[2]Residential exposure to carcinogens is based on combined childhood and adult exposure.
[3]The oral absorption factor takes into account absorption and bioavailability. In cases where the oral RfD or CSF is based on administered oral dose, the absorption factor would be limited to bioavailability. The default value is 1.
[4]The Ingestion Factor for the residential scenario is calculated using the equation $If_{adj} = ED_c \times IR_c/BW_c + ED_a \times IR_a/Bw_a$, where ED_c = 6 yr, IR_c = 100 mg/day for soils and 1 L/day for groundwater, BW_c = 15 kg, ED_a = 24 yr, IR_a = 50 mg/day for soils and 2 L/day for groundwater, and BW_a = 70 kg. The ingestion factor for the nonresidential scenario is calculated using the equation $If_{adj} = ED \times IR/BW$, where ED = 25 yr, IR = 50 mg/day for soils and 1 L/day for groundwater, and BW = 70 kg.
[5]In cases where the inhalation RfD or CSF is based on absorbed dose, this factor can be applied in the exposure algorithm. The default value is 1.

(e) The residential ingestion numeric value for lead in soil was developed using the Uptake Biokinetic (UBK) Model for Lead (version 0.4) developed by the EPA (U. S. Environmental Protection Agency. (1990). Uptake Biokinetic (UBK) Model for Lead (version 0.4). U. S. EPA/ECAO. August 1990, in lieu of the algorithms presented in subsections (a) and (b). Default input values are identified in Appendix A, Table 7. Because the UBK model is applicable only to children, the nonresidential ingestion numeric value was calculated according to the method developed by the Society for Environmental Geochemistry and Health (Wixson, B. G. (1991)). The Society for Environmental Geochemistry and Health (SEGH) Task Force Approach to the Assessment of Lead in Soil. *Trace Substances in Environmental Health*. (11-20), using the following equations:

$$S = \frac{1000\left[\left(\frac{T}{G^n}\right) - B\right]}{\delta}$$

Table 7 identifies each of the variables in this equation.

§ 250.307. Inhalation numeric values.

(a) For a regulated substance which is a systemic toxicant, the following applies:

(1) For a volatile compound, the numeric value for inhalation from soil shall be calculated using the appropriate residential or nonresidential exposure assumptions from subsection (d) according to the following equation using TF for volatiles:

$$MSC = \frac{THQ \times RfD_i \times BW \times AT_{nc} \times 365\ days/yr \times TF}{Abs \times ET \times EF \times ED \times IR}$$

(2) For a regulated substance attached to particulates, the numeric value for inhalation from soil was calculated using the appropriate residential or nonresidential exposure assumptions from subsection (d) according to the equation in paragraph (1) using TF for particulates.

(b) For a regulated substance which is a carcinogen, the following apply:

(1) For a volatile compound, the numeric value for inhalation from soil was calculated using the appropriate residential or nonresidential exposure assumptions from subsection (d) according to the following equation using TF for volatiles:

$$MSC = \frac{TR \times AT_c \times 365\ days/year \times TF}{CSF_i \times Abs \times ET \times EF \times If_{adj}}$$

(2) For a regulated substance attached to particulates, the numeric value for inhalation from soil was calculated using the appropriate residential or nonresidential exposure assumptions from subsection (d) according to the equation in paragraph (1) using TF for particulates.

(c) For a regulated substance which is both a systemic toxicant and a carcinogen, the inhalation numeric value is the lower of the two numbers as calculated by the equations in subsections (a) and (b).

(d) The default exposure assumptions used to calculate the inhalation numeric values for soil are as follows:

Term		Residential		Nonresidential (Onsite Worker)
		Systemic[1]	Carcinogens[2]	
THQ	Target Hazard Quotient	1	N/A	1
RfD_i	Inhal. Reference Dose (mg/kg-day)	Chemical-specific	N/A	Chemical-specific
BW	Body Weight (kg)	70	N/A	70
AT_{nc}	Averaging Time for systemic toxicants (yr)	30	N/A	25
TF	Transport Factor (mg/kg)/(mg/m^3) Volatilization[3] Particulate[4]	Chemical-specific 1×10^{10}	Chemical-specific 1×10^{10}	Chemical-specific 1×10^{10}
Abs	Absorption (unitless)[5]	1	1	1
ET	Exposure Time (hr/day)	24	24	8
EF	Exposure Frequency[6] (d/yr)	250	250	180
ED	Exposure Duration (yr)	30	N/A	25
IR	Inhalation Rate (m^3/hr)	0.8[3]	N/A	1.25
TR	Target Risk	N/A	1×10^{-5}	1×10^{-5}
CSF_i	Inhalation Cancer Slope Factor (mg/kg-day)$^{-1}$	N/A	Chemical-specific	Chemical-specific
AT_c	Averaging Time for carcinogens (yr)	N/A	70	70
If_{adj}	Inhalation Factor[7] (m^3-yr/kg-hr)	N/A	0.5	0.4

Notes: Modified from USEPA Region III Risk-based Concentration Table, dated October 20, 1995.
N/A = Not Applicable
[1]Residential exposure to systemic toxicants is based on adult exposure, consistent with USEPA (1991).
[2]Residential exposure to carcinogens is based on combined child and adult exposure.
[3]Volatilization transport factor is calculated using TF = (ER × DF)$^{-1}$, where DF = 12 (mg/m^3)/(m^2-sec). See soil depth-specific algorithm for the calculation of ER.
[4]Particulate transfer factor was calculated using TF = (ER × DF)$^{-1}$, where ER = 8.25×10^{-12} (mg/m^2-sec)/(mg/kg) and DF = 12(mg/m^3)/(mg/m^2-sec).
[5]In cases where the inhalation RfD or CSF is based on absorbed dose, this factor can be applied in the exposure algorithm. The default value is 1.
[6]Assumes approximately 100 days/yr with the ground being frozen. Exposure to surficial soils when the ground is frozen is considered *de minimis*. The nonresidential exposure frequency is defined as 5/7 x 250 days/yr.
[7]The inhalation factor for the residential scenario is calculated using the equation $IF_{adj} = ED_c \times IR_c/BW_c + ED_a \times IR_a/Bw_a$, where ED_c = 6 yr, IR_c = 0.5 m^3/hr, BW_c = 15kg, ED_a = 24 yr, IR_a = 0.83 m^3/hr, and BW_a = 70 kg. The inhalation factor for the nonresidential scenario is calculated using the equation IF_{adj} = ED × IR/BW, where ED = 25 yr, IR = 1.25 m^3/hr and BW = 70 kg.

(e) For the inhalation numeric values in subsections (a) and (b), the TF was calculated by the following equation:

$$TF = (ER \times DF)^{-1}$$

The Dispersion Factor (DF) value of 12 (mg/m^3)/(mg/m^2/sec) is taken from the default value in the EPA Draft Soil Screening Guidance (U. S. EPA, 1994. *Technical Background Document for Soil Screening Guidance*. Review Draft. Office of Emergency and Remedial Response. EPA-540/R-94/106) and the Emission Rate (ER) is calculated by the following equations (from Jury et al. 1990. *Water Resources Research*, Vol. 26. No. 1. pp. 13-20):

(i) For surficial soils:

$$ER = \frac{1}{T}\int_0^T \left(\frac{C_O}{C_S}\right)(D_E/\pi t)^{0.5}\left[1 - \exp^{(-L^2/(4D_E t))}\right] \bullet (10^3)\, dt$$

$$D_E = \frac{D_G}{\frac{\rho_b K_d}{H} + \frac{\theta_m}{H} + \theta_a} + \frac{D_L}{\rho_b K_d + \theta_m + \theta_a H}$$

where:

$$D_G = \left(\frac{\theta_a^{10/3}}{\theta^2}\right) D_{ai}$$

$$D_L = \left(\frac{\theta_m^{10/3}}{\theta^2}\right) D_{Li}$$

(ii) For subsurface soils:

$$ER = \frac{1}{T}\int_{o}^{T}\left(\frac{C_O}{C_S}\right)(D_E/\pi t)^{0.5}\left[\exp^{(-1^2/4D_E t)} - \exp^{(-(1+W)^2/(4D_E t))}\right] \bullet (10^3)\, dt$$

$$D_E = \frac{D_G}{\frac{\rho_b K_d}{H} + \frac{\theta_m}{H} + \theta_a} + \frac{D_L}{\rho_b K_d + \theta_m + \theta_a H}$$

where:

$$D_G = \left(\frac{\theta_a^{10/3}}{\theta^2}\right) D_{ai}$$

$$D_L = \left(\frac{\theta_m^{10/3}}{\theta^2}\right) D_{Li}$$

Parameter	*Definition*	*Unit*	*Recommended Value*[1]
ER	Chemical vapor emission rate from surface soil or subsurface soil	mg/m^2-sec per mg/kg	Chemical-specific
C_o	Chemical concentration in soil, $C_o = C_S\rho_b$	g/m^3	1.8
C_S	Chemical concentration in soil	mg/kg (ppm)	1
D_E	Effective diffusion coefficient	m^2/sec	Chemical-specific
D_{ai}	Air diffusivity for chemical i	m^2/sec	Chemical-specific
D_{Li}	Water diffusivity for chemical i	m^2/sec	Chemical-specific
t	Time	sec	N/A
T	Emission averaging time	sec	Equal to exposure duration
θ	Total soil porosity, $\theta = \theta_a + \theta_m$	cm^3/cm^3	0.32[2]
θ_a	Air-filled soil porosity	cm^3/cm^3	0.12[2]
θ_m	Moisture-filled soil porosity, $\theta_m = w\rho_b$	cm^3/cm^3	0.20[2]
w	Moisture content for soil	g water/g soil	0.11
ρ_b	Dry bulk density of soil, $\rho_b = (1-\theta)\ \rho$	g/cm^3	1.8[2]
ρ	Soil particle density	g/cm^3	2.65
K_d	Partition coefficient, $K_d = K_{oc}f_{oc}$	cm^3/g	Chemical-specific
H	Henry's Law constant	dimensionless	Chemical-specific
D_G	Effective gas-phase diffusion coefficient	m^2/sec	Chemical-specific
D_L	effective liquid-phase diffusion coefficient	m^2/sec	Chemical-specific
L	Depth of the contaminated surface soil	m	0.6[3]
l	Depth of the clean soil cover	m	0.6[3]
W	Thickness of the contaminated subsurface soil	m	4.0[3]
K_{OC}	Organic carbon partition coefficient for chemical i	cm^3/g	Chemical-specific
f_{OC}	Fraction of organic carbon in soil	dimensionless	0.005[4]

[1]All default values from USEPA (1994) Draft Soil Screening Guidance, EPA-540/R-94/106, except as noted.
[2]Consistent with Standards Subcommittee recommendation.
[3]Based on Act 2 SAB-agreed depths.
[4]The Risk Assessment Subcommittee selected a f_{oc} of 0.005, which falls between f_{oc}'s of 0.006 for surface soil and 0.002 for subsurface soil.

(f) For a regulated substance which is a systemic toxicant and is a volatile compound, the numeric value for the inhalation of volatiles from groundwater was calculated by using the appropriate residential or nonresidential exposure assumptions from subsection (h) according to the following equation:

$$MSC = \frac{THQ \times RfDi \times BW \times ATnc \times 365\ days/yr}{Abs \times ET \times EF \times ED \times IR \times TF}$$

(g) For a regulated substance which is a carcinogen and is a volatile compound, the numeric value for the inhalation of volatiles from groundwater shall be calculated by using the appropriate residential or nonresidential exposure assumptions from subsection (h) according to the following equation:

$$MSC = \frac{TR \times ATc \times 365\ days/yr}{CSFi \times ABs \times ET \times EF \times IFadj \times TF}$$

(h) The default exposure assumptions used to calculate the inhalation numeric values for the inhalation of volatiles from groundwater are as follows:

Term		*Residential*		*Nonresidential (Onsite Worker)*
		Systemic[1]	*Carcinogens*[2]	
THQ	Target Hazard Quotient	1	N/A	1
RfD_i	Inhal. Reference Dose (mg/kg-day)	Chemical-specific	N/A	Chemical-specific
BW	Body Weight (kg)	70	N/A	70
AT_{nc}	Averaging Time for systemic toxicants (yr)	30	N/A	25
Abs	Absorption (unitless)[3]	1	1	1
ET	Exposure Time (hr/day)	24	24	8
EF	Exposure Frequency[6] (d/yr)	350	350	250
ED	Exposure Duration (yr)	30	N/A	25
IR	Inhalation Rate (m^3/hr)	0.625	N/A	1.25
TF	Transfer Factor (L/m^3)[4]	0.5	0.5	0.5
TR	Target Risk	N/A	1×10^{-5}	1×10^{-5}
CSF_i	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	N/A	Chemical-specific	Chemical-specific
AT_c	Averaging Time for carcinogens (yr)	N/A	70	70
If_{adj}	Inhalation Factor[5] (m^3-yr/kg-hr)	N/A	0.4	0.4

Notes: Modified from USEPA Region III Risk-based Concentration Table, dated October 20, 1995.
N/A = Not Applicable
[1]Residential exposure to systemic toxicants is based on adult exposure, consistent with USEPA (1991).
[2]Residential exposure to carcinogens is based on combined child and adult exposure.
[3]In cases where the inhalation RfD or CSF is based on absorbed dose, this factor can be applied in the exposure algorithm.
[4]Default Transfer Factor is as presented in USEPA's RAGS, Part B.
[5]The inhalation factor for the residential scenario is calculated using the equation $IF_{adj} = ED_c \times IR_c/BW_c + ED_a \times IR_a/Bw_a$, where ED_c = 6 yr, IR_c = 0.5 m^3/hr, BW_c = 15 kg, ED_a = 24 yr, IR_a = 0.625 m^3/hr, and BW_a = 70 kg. The inhalation factor for the nonresidential scenario is calculated using the equation IF_{adj} = ED × IR/BW, where ED = 25 yr, IR = 1.25 m^3/hr and BW = 70 kg.

§ 250.308. Soil to groundwater pathway numeric values.

(a) A person may use the soil-to-groundwater pathway numeric values listed in Appendix A, Table 3B, as developed using the methods contained in paragraph (1), (2) or (4), may use a concentration in soil at the site which does not produce a leachate in excess of the MSC for groundwater contained in Appendix A, Tables 1 and 2, when subjected to the Synthetic Precipitation Leaching Procedure (Method 1312 of SW-846, Test Methods for Evaluating Solid Waste, promulgated by the U. S. EPA), or may use the soil-to-groundwater pathway soil buffer criteria in subsection (b) or may use the soil-to-groundwater pathway equivalency demonstration in subsection (d).

(1) A value which is 100 times the applicable MSC for groundwater identified in § 250.304(c) or (d) (relating to MSCs for groundwater), expressed as milligrams per kilogram of soil.

(2) For organic compounds, a generic value determined not to produce a concentration in groundwater in the aquifer in excess of the MSC for groundwater as calculated by the equation in paragraph (3).

(i) For soil not in the zone of groundwater saturation, the generic value shall be calculated by the equation in paragraph (3).

(ii) For soil in the zone of groundwater saturation, the standard is 1/10th of the generic value calculated by the equation in paragraph (3).

(3) The equation referenced in paragraphs (1) and (2) is the following:

$$MSC_S = MSC_{GW} ((K_{oc} * f_{oc}) + \theta_w/\rho_b) DF$$

where: MSC_S (mg/kg) = the generic value for a regulated substance in soil

MSC_{GW} (mg/L) = MSC of a regulated substance in groundwater

K_{oc} (L/kg) = organic carbon partition coefficient for a regulated substance

f_{oc} = fraction of organic carbon in soil (default value = 0.0025)

θ_w = water-filled porosity of soil (default value = 0.2)

ρ_b (kg/L) = dry bulk density of soil (default value = 1.8 kg/l)

DF = dilution factor (default value = 100)

(4) For inorganic regulated substances, a generic value determined not to produce a concentration in groundwater in the aquifer in excess of the MSC for groundwater as calculated by the equation in paragraph (5) and listed in Appendix A, Table 4B.

(i) For soil not in the zone of groundwater saturation, the generic value shall be calculated by the equation in paragraph (5).

(ii) For soil in the zone of groundwater saturation, the standard is 1/10th of the generic value calculated by the equation in paragraph (5).

(5) The equation referenced in paragraph (4) is the following:

$$MSC_S = MSC_{GW} (K_d + \theta_w/\rho_b) DF$$

where: MSC_S (mg/kg) = the generic value for the inorganic regulated substance in soil

MSC_{GW} (mg/L) = MSC of the inorganic regulated substance in groundwater

K_d (L/kg) = soil to water partition coefficient for the inorganic regulated substance

θ_w = water-filled porosity of soil (default value = 0.2)

ρ_b (kg/L) = dry bulk density of soil (default value = 1.8 kg/L)

DF = dilution factor (default value = 100)

(b) The soil-to-groundwater pathway soil buffer is the entire area between the bottom of the area of contamination and the groundwater or bedrock and shall meet the following criteria:

(1) The soil depths established in Appendix A, Tables 3B and 4B for each regulated substance.

(2) The concentration of the regulated substance cannot exceed the limit related to the PQL or background throughout the soil buffer.

(3) No Karst carbonate formation underlies or is within 100 feet of the perimeter of the contaminated soil area.

(c) The soil-to-groundwater pathway soil buffer distances were developed by using the following equations.

(1) The following equations were used iteratively for each layer of soil for each time increment in a total time period of 30 years and pertain to a soil column where the first 4 feet of soil are contaminated with a regulated substance at a concentration of 10,000 mg/kg.

$$C_{soil(it)} = C_{soil(i(t-1))} - \frac{(TI)(R)(C_{aq(i(t-1))} - C_{aq(i+1)(t-1)})}{(360)(DI)(\rho_b)}$$

$$TI = (360)(DI)(\theta_w)/R$$

$$C_{aq(i(t-1))} = \frac{(\rho_b)(C_{soil(i(t-1))})}{(K_d)(\rho_b) + \theta_w}$$

$$C_{aq(i+1)(t-1)} = \frac{(\rho_b)(C_{soil(i+1)(t-1)})}{(K_d)(\rho_b) + \theta_w}$$

where: $C_{soil(it)}$ (mg/kg) = concentration of regulated substance in soil at layer i at time increment TI

$C_{soil(i(t-1))}$ (mg/kg) = concentration of regulated substance in soil at layer i at time increment immediately preceding TI

$C_{soil(i+1)(t-1)}$ (mg/kg) = concentration of regulated substance in soil at layer immediately above layer i at time increment immediately preceding TI

R (cm/yr) = recharge rate of water infiltrating soil (default value = 33 cm/yr)

DI (feet) = thickness of each layer i of soil (default value = 1 foot)

ρ_b (kg/L) = dry bulk density of soil (default value = 1.8 kg/L)

360 (month-cm/yr-ft) = conversion factor

TI (months) = time duration of each time increment

θ_w = water-filled porosity (default value = 0.2)

$C_{aq(i(t-1))}$ (mg/L) = concentration of regulated substance in soil pore water at layer i at time increment immediately preceding TI

$C_{aq(i+1)(t-1)}$ (mg/L) = concentration of regulated substance in soil pore water at layer immediately above layer i at time increment immediately preceding TI

K_d (L/kg) = soil to water partition coefficient for the regulated substance where five different contaminant-specific values are used: 2.5, 5, 10, 100 and 1,000.

K_d values of organic regulated substances are based on the following equation:

$$K_d = (f_{oc})(K_{oc})$$

where: f_{oc} = fraction of organic carbon in soil (default value = 0.005)

K_{oc} (L/kg) = organic carbon partition coefficient for a regulated substance

(2) The buffer distances listed for regulated substances in Tables 3B and 4B were determined by the Department using these equations to model the distance that the regulated substance travels from the bottom of the first 4 feet of contaminated soil through the soil column in 30 years at a concentration at or above 1 µG/L in the water infiltrating the soil.

(d) For any regulated substance, an equivalency demonstration may be substituted for the soil-to-groundwater numeric value throughout the site and the soil-to-groundwater pathway soil buffer if the groundwater is below the MSC value or the background standard prior to remediation. This equivalency demonstration shall include the following:

(1) Fate and transport analysis of the regulated substance from the deepest point of contamination in the soil

through unsaturated zone soil and shall include the use of soil-to-water partition coefficients. The analysis shall demonstrate that the regulated substances will not migrate to bedrock or the groundwater within 30 years at concentrations exceeding the greater of the groundwater MSC or background in groundwater as the endpoint in soil pore water directly under the site.

(2) In addition to sampling required for attainment of the inhalation or ingestion numeric values for soils up to 15 feet, as applicable, reporting and monitoring for eight quarters that shows no exceedances of the greater of the groundwater MSCs or of the background standard for groundwater beneath the contaminated soil and no indications of an increasing trend of concentration over time that may exceed the standard.

§ 250.309. MSCs for surface water.

(a) Any regulated discharge to surface waters shall comply with the applicable provisions of Chapters 91—105, including antidegradation requirements, and may not cause an exceedance of the applicable water quality standards for the surface water in question.

(b) For point source discharges to surface water, compliance shall be measured at the point of discharge in accordance with limits specified in the NPDES permit.

(c) For purposes of determining compliance with surface water quality standards from a diffuse surface or groundwater discharge, the person shall determine the expected instream regulated substance concentrations, that are attributable to releases at the site, using mass balance techniques for groundwater/surface water mixing at design flow conditions.

(1) If the results indicate that surface water quality standards are being achieved, no action is required.

(2) If results indicate that surface water quality standards are not being achieved, additional sampling may be performed to help evaluate whether surface water quality standards are being achieved.

(3) If the results of the sampling indicate surface water quality standards are being met, no further action is required.

(4) If the results of the modeling, and sampling if any, indicate that surface water quality standards are not being met, the person shall perform further remedial action to attain the surface water quality standards.

(d) Except if an NPDES permit is required, for purposes of complying with surface water quality standards in a spring, the point of compliance is the point of first designated or existing use, as defined in §§ 93.1, 93.4 and 93.9 (relating to definitions; Statewide water uses; and designated water uses and water quality criteria). If the point of first designated or existing use occurs in a surface water into which a spring flows, compliance with surface water quality standards shall be determined in the manner specified in subsection (c).

§ 250.310. Minimum threshold MSCs.

(a) For regulated substances listed in Appendix A, Table 6 that are found in groundwater, the minimum threshold MSC of 5 micrograms per liter in groundwater, shall be used.

(b) For regulated substances listed in Appendix A, Table 6 that are found in soil, the lowest of one of the following values shall be used as the minimum threshold MSC:

(1) An ingestion numeric value of 100 milligrams per kilogram in soil.

(2) The soil-to-groundwater pathway numeric value throughout the soil column as determined by the methodology in § 250.308 (relating to soil-to-groundwater pathway numeric values), but substituting 5 micrograms per liter in groundwater for the groundwater MSC. The soil-to-groundwater pathway numeric value shall be calculated by using a concentration in soil at the site which does not produce a leachate in excess of the MSC for groundwater or by using a value which is 100 times the MSC for groundwater, expressed in milligrams per kilogram of soil. An equivalency demonstration under § 250.308(d) may be substituted for the soil-to-groundwater numeric value.

(c) The minimum threshold MSC in subsection (a) and the ingestion numeric value in subsection (b)(1) are calculated according to the following exposure assumption and equation: 0.50 ppb dietary intake corresponds to a 1×10^{-6} risk (USFDA Threshold of Regulation Final Rule July 17, 1995) assuming the substance is a carcinogen. Correcting this value (or 5.0 ppb) to the 10^{-5} risk level, in Statewide health standard formulation, the threshold of regulation concentrations are determined by the following exposure assumptions and calculations:

Five µg/kg (substance of concern) threshold level corresponding to 1×10^{-5} risk

Dietary intake 2 kg/day × 5 µg/kg (substance − 10 µg/day (daily intake of substance of concern)

For soil ingestion: 10 µg/100 mg soil or 100 mg/kg = Threshold concentration for soils

For groundwater ingestion: 10 µg/2L water = 5 µg/L − Threshold concentration for water

The 100 mg soil and 2L water factors are the default ingestion rates from § 250.306(c) (relating to ingestion numeric values).

§ 250.311. Evaluation of ecological receptors.

(a) In addition to any protection afforded under other requirements for meeting surface water and air quality standards and MSCs under this chapter, based on the screening process in this section, direct impacts from regulated substances to the following receptors shall be assessed and addressed to implement a remedy that is protective of the environment:

(1) Individuals of threatened or endangered species as designated by the United States Fish and Wildlife Service under the Endangered Species Act (16 United StatesC.A. §§ 1531—1544).

(2) Exceptional value wetlands as defined in § 105.17 (relating to wetlands).

(3) Habitats of concern.

(4) Species of concern.

(b) For purposes of determining impacts on ecological receptors, no additional evaluation is required if the remediation attains a level equal to $1/10^{th}$ of the value in Appendix A, Tables 3 and 4, except for constituents of potential ecological concern identified in Table 8, or if the criteria in paragraphs (1), (2) or (3) are met. Information that supports a determination that no additional evaluation is required shall be documented in the final report.

(1) Jet fuel, gasoline, kerosene, number two fuel oil or diesel fuel are the only constituents detected onsite.

(2) The area of contaminated soil is less than 2 acres and the area of contaminated sediment is less than 1,000 square feet.

(3) The site has features, such as buildings, parking lots or graveled paved areas, which would obviously eliminate the specific exposure pathways, such as soils exposure.

(c) If none of the criteria in subsection (b) are met and if no Constituents of Potential Ecological Concern (CPECs), as identified in Appendix A, Table 8, are detected onsite, an onsite evaluation shall be conducted to document any indications of ecological impact. Ecological impacts requiring more detailed evaluation exist if there are differences of greater than 50% in the density or diversity of species or habitats of concern when compared with nearby reference areas representing equivalent ecological areas without contamination, if available. This evaluation shall also document the presence of threatened and endangered species and exceptional value wetlands. If no ecological impacts requiring further evaluation are identified, and no threatened and endangered species exist within a 2,500-foot radius of the site and no exceptional value wetlands exist on the site, no further evaluation is required and that determination shall be documented in the final report.

(d) If none of the criteria in subsection (b) are met and if CPECs are detected onsite or ecological impacts requiring more detailed evaluation, threatened and endangered species, or exceptional value wetlands as identified in subsection (c) exist, a detailed onsite evaluation shall be conducted by a person qualified to perform environmental risk assessments to document any substantial ecological impacts. Substantial ecological impacts exist if there are differences of greater than 20% in the density of species of concern or greater than 50% in the diversity and extent of habitats of concern when compared with nearby reference areas representing equivalent ecological areas without contamination, if available. If there are no substantial ecological impacts identified and there are no threatened or endangered species on or within a 2,500-foot radius of the site and no exceptional value wetlands on the site, that determination shall be provided in the final report.

(e) If the person cannot demonstrate that they meet the criteria in subsection (b), and cannot demonstrate that the evaluation performed under subsection (c) identified no ecological impacts requiring more detailed evaluation under subsection (d), or cannot demonstrate that the evaluation performed under subsection (d) identified no substantial ecological impacts, or threatened or endangered species or exceptional value wetlands, one of the following shall be met:

(1) A person shall demonstrate in the final report that attainment of the Statewide health standard MSCs are protective of the ecological receptors.

(2) If a demonstration cannot be made that the Statewide health standard MSCs are protective of ecological receptors, a person shall demonstrate in the final report that postremedy use will eliminate complete exposure pathways at the time of the final report or in accordance with a postremediation care plan, or that mitigative measures identified in subsection (f) have been instituted and are subject to postremediation care plan requirements as described in § 250.312(b) (relating to final report).

(3) A person shall demonstrate attainment of the background standard.

(4) A person shall follow the procedures in §§ 250.402(c) and 250.409 (relating to human health and environmental protection goals; and risk assessment report) and demonstrate attainment of the site-specific standard for protection of ecological receptors.

(f) Mitigation measures to restore or replace equivalent ecological resources in the local area of the site may be applied if the following are met:

(1) No exceptional value wetlands have been identified by the screening process.

(2) No Federal or State laws and regulations prohibit or restrict the elimination of habitats or species identified by the screening process.

(3) A mitigation measure is selected based on the following hierarchy:

(i) Restoration onsite of species and habitats identified in the screening process.

(ii) Replacement onsite of species and habitats identified in the screening process.

(iii) Replacement on an adjacent area to the site of species and habitats identified in the screening process.

(iv) Replacement at a location within the municipality where the site is located of species and habitats identified in the screening process.

(4) The Department will review and approve mitigation measures prior to implementation to ensure that the proposed remedy and intended use of the property minimize the impacts to ecological receptors identified in the screening procedure.

(5) The postremediation care plan requirements in § 250.312(e) or 250.411(f) (relating to final report) are implemented.

§ 250.312. Final report.

(a) For sites remediated under the Statewide health standard, the person conducting the remediation shall submit a final report to the Department which documents attainment of the selected standard. This final report shall include site characterization information identified in § 250.204(b)—(e) (relating to final report). The site characterization shall be conducted in accordance with scientifically recognized principles, standards and procedures. The level of detail in the investigation, and the selected methods and analyses, that may include models, shall sufficiently define the rate of movement and the present and future extent and fate of contaminants to ensure continued attainment of the remediation standard. Interpretations of geologic and hydrogeologic data shall be prepared by a professional geologist licensed in this Commonwealth.

(b) The final report for the Statewide health standard shall include the results of the evaluation of ecological receptors. If a person relies on a postremedy use to eliminate complete exposure pathways that is not implemented at the time of the final report submission, a postremediation care plan shall be submitted to document that the postremedy use is implemented within 1 year from final report approval, unless the Department approves an extension of time. If mitigation measures are implemented under § 250.311 (relating to evaluation of ecological receptors), a postremediation care plan shall be documented in the final report that includes the following:

(1) A plan to maintain the mitigated ecological resource.

(2) Reporting of the ongoing success or failure of the mitigation measure implemented.

(3) Mitigation measures, instituted at the time of the final report, shall be successfully accomplished and sustained up to 5 years from final report approval.

(c) Final reports for the Statewide health standard shall include information on the basis for selecting residential or nonresidential standards and the additional information identified in § 250.204(f)(1)—(5).

(d) The final report for the Statewide health standard shall include all sampling data and descriptions of the sampling methodology and analytical results, including the appropriate statistical methodologies, which pertain to whether the remediation has attained the selected standard, following the requirements of Subchapter G (relating to demonstration of attainment).

(e) If engineering controls are needed to attain or maintain a standard, if institutional controls are needed to maintain a standard, if the fate and transport analysis indicates that the remediation standard, including the solubility limitation in § 250.304(b), may be exceeded at the point of compliance in the future, or if the remediation relies on natural attenuation, a postremediation care plan shall be documented in the final report that includes the information identified in § 250.204(g).

(f) If the soil-to-groundwater pathway soil buffer distances are used, as identified in § 250.308 (relating to soil-to-groundwater pathway numeric values), the following information shall be included in the final report:

(1) Information demonstrating that the actual site soil column thickness below the contaminated soil by the information gathered from soil sample borings conducted during the site characterization is at least the thickness identified in Appendix A, Tables 3 and 4.

(2) Information gathered during the field investigation phase and the laboratory analyses conducted on the soil samples.

(3) The boring logs and all other data presented in appropriate maps, cross sections, figures and tables.

(g) If an equivalency demonstration is used under § 250.308(d), the following information shall be included in the final report:

(1) Information describing the actual site soil column below the contaminated soil determined by soil sample borings conducted during the site characterization.

(2) Information gathered during the field investigation phase and the laboratory analyses conducted on the groundwater samples beneath the contaminated soil.

(3) The boring logs and all other data presented in appropriate maps, cross sections, figures and tables.

(4) Sampling data, in a tabular format, that shows no exceedances of groundwater MSCs or the background standard, under § 250.308(d)(2).

(5) A demonstration, submitted in a graphic format, that sampling data indicates no increasing trend of concentration over time that may exceed the standard.

(h) When a person implements a remedy that relies on access to properties owned by third parties, for remediation or monitoring, documentation of cooperation or agreement shall be submitted as part of the final report.

Subchapter D. SITE-SPECIFIC STANDARD

Sec.

§ 250.401. Scope.

(a) This subchapter sets forth requirements and procedures for any person selecting the site-specific standards.

(b) The Department may approve or disapprove a remedial investigation report, a risk assessment report or cleanup plan based on consideration of all subsections in section 304 of the act (35 P. S. § 6026.304).

§ 250.402. Human health and environmental protection goals.

(a) Site-specific standards shall be developed that meet the human health and environmental protection goals specified in this section. The development of site-specific standards shall be based on a site-specific risk assessment, if required.

(b) The site-specific standard shall be a protective level that eliminates or reduces any risk to human health in accordance with the following:

(1) For known or suspected carcinogens, soil and groundwater cleanup standards shall be established at exposures which represent an excess upperbound lifetime risk of between 1 in 10,000 and 1 in 1 million. The cumulative excess risk to exposed populations, including sensitive subgroups, may not be greater than 1 in 10,000.

(2) For systemic toxicants, soil and groundwater cleanup standards shall represent the level to which the human population could be exposed on a daily basis without appreciable risk of deleterious effect to the exposed population. Where several systemic toxicants affect the same target organ or act by the same method of toxicity, the hazard index may not exceed one.

(c) In addition to any protection afforded under other requirements for meeting surface water and air quality standards under this chapter, direct impacts resulting from a release of regulated substances to the receptors identified in § 250.311(a) (relating to evaluation of ecological receptors) shall be assessed and addressed in the remedial investigation, risk assessment and cleanup plans.

(d) If a person is using the site-specific standard to protect ecological receptors under this subchapter or in accordance with § 250.311(e), the following shall be performed:

(1) An ecological risk assessment to determine if an impact has occurred or will occur if the release of a regulated substance goes unabated.

(2) An ecological risk assessment conducted in accordance with Department-approved EPA or ASTM guidance to establish acceptable remediation levels or alternative remedies based on current and future use that are protective of the ecological receptors.

(3) Implementation of the selected remedy, which may include mitigation measures under § 230.311(f), that is protective of the ecological receptors.

§ 250.403. Use of groundwater.

(a) Groundwater will not be considered a current or potential source of drinking water where groundwater has a background total dissolved solids concentration greater than 2,500 milligrams per liter.

(b) Except as provided in subsection (a), current and probable future use of groundwater shall be determined on a site-specific basis.

(c) Drinking water use of groundwater shall be made suitable by at least meeting the primary and secondary MCLs at all points of exposure identified in § 250.404 (relating to pathway identification and elimination).

(d) Current drinking water or agricultural uses of groundwater, at the time contamination was discovered, shall be protected.

§ 250.404. Pathway identification and elimination.

(a) The person shall use Department-approved EPA or ASTM guidance to identify any potential current and future exposure pathways for both human receptors and environmental receptors identified in § 250.402 (relating to human health and environmental protection goals).

(b) The person shall summarize pathways for current land use and any probable future land use separately in the site-specific remedial investigation report.

(c) If no exposure pathway exists, and no remedy is required to be proposed and completed, the following apply:

(1) The remedial investigation report shall contain information necessary to determine that no current or future exposure pathway exists.

(2) A risk assessment, including an ecological risk assessment, and cleanup plan are not required.

(3) The remedial investigation report and the final report may be submitted simultaneously.

(d) Prior to performing a risk assessment as required in § 250.405 (relating to when to perform a risk assessment), the person may take into account the effect of engineering and institutional controls in eliminating pathways identified in subsection (b) and include this evaluation in the remedial investigation report.

§ 250.405. When to perform a risk assessment.

(a) Except as specified in subsections (b) and (c), a person who remediates under this subchapter shall develop site-specific standards based on a risk assessment. The person shall conduct the risk assessment according to the procedures specified in Subchapter F (relating to exposure and risk determinations).

(b) The risk assessment report is not required if a fate and transport analysis which takes into account the effects of engineering and institutional controls demonstrates that neither present nor future exposure pathways exist. This demonstration shall follow the procedures described in § 250.404 (relating to pathway identification and elimination).

(c) The baseline risk assessment report is not required if the Department, in its remedial investigation report or cleanup plan approval, determines that a specific remediation measure that eliminates all pathways, other than a no-action remedial alternative, can be implemented to attain the site-specific standard in accordance with the requirements of attainment demonstration as specified in Subchapter G (relating to demonstration of attainment). A baseline risk assessment is that portion of a risk assessment that evaluates a risk in the absence of the proposed site-specific measure.

§ 250.406. Relationship to surface water quality requirements.

(a) A regulated discharge to surface waters shall comply with the applicable provisions of Chapters 91—105, including antidegradation requirements.

(b) For point source discharges to surface water, compliance shall be measured at the point of discharge in accordance with limits specified in the NPDES permit.

(c) For purposes of determining compliance with surface water quality standards from a diffuse surface or groundwater discharge, the person shall determine the expected instream regulated substance concentrations, that are attributable to releases at the site, using mass balance techniques and appropriate sampling for groundwater/surface water mixing at design flow conditions. If the results indicate that surface water quality standards are being achieved, no action is required. If results indicate that surface water quality standards are not being achieved, additional sampling may be performed to help evaluate whether surface water quality standards are being achieved. If the results of the sampling indicate the surface water quality standards are being met, no further action is required. If the results of the modeling, and sampling if any, indicate the surface water quality standards are not being met, the person shall perform further remedial action to attain the surface water quality standards, unless a waiver of the surface water quality standards is obtained under paragraphs (1) and (2).

(1) In the case of a diffuse surface or groundwater discharge which existed at the time contamination was discovered, the Department may waive any otherwise applicable provisions, including the provisions of Chapter 93 (relating to water quality standards), under section 902(b) of the act (35 P. S. § 6026.902(b)).

(2) An applicant for a waiver of provisions in Chapter 93 shall demonstrate to the Department that the proposed remedial alternative will result in attainment of a concentration in the stream that does not exceed human health criteria and aquatic life criteria under the requirements in Chapter 93. The person may propose the use of alternative site-specific exposure factors or design conditions that will demonstrate attainment of the human health criteria.

(d) Except if an NPDES permit is required, for purposes of complying with surface water quality standards in a spring, the point of compliance is the point of first designated or existing use, as defined in §§ 93.1, 93.4 and 93.9 (relating to definitions; Statewide water uses; and designated water uses and water quality criteria). Where the point of first designated or existing use occurs in a surface water into which a spring flows, compliance with surface water quality standards shall be determined in the manner specified in subsection (c).

§ 250.407. Point of compliance.

(a) For attainment of a site-specific standard in groundwater, the point of compliance is the property boundary that existed at the time the contamination was discovered. Site-specific standards shall be attained at and beyond the point of compliance. The Department may determine in writing a point of compliance beyond the property boundary to be appropriate if one of the following situations is demonstrated:

(1) Structures are located on the property boundary which prohibit internal or external access for a drill rig.

(2) The property is a small parcel of land with limited space for onsite monitoring wells.

(3) It is not physically possible to monitor groundwater quality at the property boundary.

(4) The downgradient property was owned by the same party at the time the contamination was discovered and the use of the groundwater on the downgradient property can be controlled to prevent unacceptable exposure.

(5) For measuring compliance with secondary contaminants.

(b) For attainment of a site-specific standard in residential areas for volatilization directly to indoor air, the point of compliance is the point of exposure where there is exposure on the site in a below-grade occupied space.

(c) For attainment of site-specific soil standards in residential areas, the point of compliance for ingestion and inhalation exposure is up to 15 feet below the existing surface unless bedrock or physical structures are encountered which prevent safe continued remediation.

(d) For attainment of site-specific soil standards in nonresidential areas, the point of compliance for ingestion, inhalation and volatilization is the point of exposure as identified in an approved risk assessment report, if required.

(e) For attainment of soil-to-groundwater soil standards in both residential and nonresidential areas, the point of compliance is throughout the soil column.

(f) For the emission of regulated substances to outdoor air, the point of compliance for the air quality standard shall be as specified in the air quality regulations. See Article III (relating to air resources).

§ 250.408. Remedial investigation report.

(a) Persons electing to remediate a site to the site-specific standard shall submit a remedial investigation report to the Department for review and approval. This report shall include documentation and a description of the procedures and conclusions from the site characterization conducted according to the requirements of subsections (b)—(e). The site characterization shall be conducted in accordance with scientifically recognized principles, standards and procedures. The level of detail in investigation, and the selected methods and analyses, that may include models, shall sufficiently define the rate of movement and the present and future extent and fate of contaminants, to ensure continued attainment of the remediation standard. Interpretations of geologic and hydrogeologic data shall be prepared by a professional geologist licensed in this Commonwealth.

(b) As directed from specific knowledge of the subject property, historic use of the subject property or regulated substance usage information regarding the subject property, an appropriate number of sample locations should be investigated from the identified media of concern to characterize the nature and composition of the contaminants including:

(1) Source characterization or development of a conceptual site model.

(2) The vertical and horizontal extent of contamination above the selected standard within each medium of concern.

(3) The direction and rate of contaminant movement within each medium of concern.

(4) Identification of the appropriate remedial technology options for each medium of concern.

(c) Descriptions of sampling and decontamination methodologies and analytical quality assurance/quality control procedures should be included within a sampling and analysis plan and quality assurance plan. Copies of soil and geologic boring descriptions and as-built construction drawings of wells used for site characterization should be included in the report. Copies of all laboratory analytical results and applicable laboratory quality control results should be included within the report, including all historical data and data eliminated from consideration based on data validation protocols. Analytical results should be presented within the report in table form.

(d) If soil is determined to be a medium of concern, the site characterization shall determine the relative location of the soil samples necessary to characterize the horizontal and vertical extent of contamination, and factors which could relate to the movement of the contamination. The horizontal and vertical extent of soil with concentrations of regulated substances above the selected standard shall be defined by an appropriate number of samples inside and outside of the area that exceeds the standard. Soil samples from the area with the anticipated highest levels of contamination shall be obtained, as appropriate, to determine the applicability of the proposed remedial action and handling and disposal requirements for that soil during remediation.

(e) If groundwater is determined to be a medium of concern, the site characterization shall characterize the effects of a release on groundwater to adequately determine how naturally occurring physical and geochemical characteristics define the movement of groundwater and contaminants beneath the surface, including the delineation of the position of aquifers, as well as geologic units which inhibit groundwater flow. When appropriate, the characterization shall consider the heterogeneity and anisotropy of aquifer materials based on hydraulic conductivity values (measured or published), and the effect of local and regional groundwater flow directions and influence from pumping wells. Defining the horizontal extent of concentrations of regulated substances above the standard shall require more than one round of groundwater sampling from properly constructed and developed monitoring wells taken with a sufficient number of days apart to yield independently valid results. When characterizing the vertical extent of groundwater contamination, the person shall perform more than one round of groundwater sampling and shall consider the specific gravity of the regulated substances identified in the groundwater in the site, and the potential for naturally occurring or induced downward vertical hydraulic gradients. When characterizing the vertical extent of groundwater contamination, properly constructed monitoring wells or nested monitoring wells should be utilized to focus groundwater sampling in zones of potential contaminant accumulation (that is, directly above a confining layer) and sampling shall be taken with a sufficient number of days apart to yield independently valid results.

(f) The comments obtained as a result of a public involvement plan, if any, and the responses to those public comments shall be included in a remedial investigation report.

§ 250.409. Risk assessment report.

The risk assessment report shall conform to this subchapter and Subchapter F (relating to exposure and risk determinations), and shall include the following unless not required under § 250.405 (relating to when to perform a risk assessment):

(1) A risk assessment report that describes the potential adverse effects, including the evaluation of ecological receptors, under both current and planned future conditions caused by the presence of regulated substances in the absence of any further control, remediation or mitigation measures.

(2) The development of the site-specific standards risk assessment report that describes the methods used to calculate a concentration level at which human health and the environment are protected.

(3) The comments obtained as a result of a public involvement plan, if any, and the responses to those public comments.

§ 250.410. Cleanup plan.

(a) A cleanup plan is required to be submitted to the Department for approval when the site-specific standard is selected as the remediation goal. The cleanup plan shall evaluate the relative abilities of the alternative remedies to achieve the site-specific standard and propose a remedial measure which shall achieve the standard established according to the procedures contained in this subchapter. The person submitting the plan shall evaluate additional alternative remedies that have been requested for evaluation by the Department in accordance with the act.

(b) Other components of the cleanup plan include:

(1) Site maps.

(2) The results of treatability, bench scale or pilot scale studies or other data collected to support the remedial actions.

(3) Adequate design plans and specifications sufficient to evaluate the proposed remedy.

(4) The comments obtained as a result of a public involvement plan and the responses to those public comments.

(5) Documentation of proposed postremediation care requirements if they are needed to maintain the standard.

(c) When a person proposes a remedy that relies on access to properties owned by third parties, for remediation or monitoring, documentation of cooperation or agreement shall be submitted as part of the cleanup plan.

(d) A cleanup plan is not required and no remedy is required to be proposed or completed if no current or future exposure pathways exist.

§ 250.411. Final report.

(a) For sites remediated under the site-specific standard, the person conducting the remediation shall submit a final report to the Department which documents attainment of the selected standard.

(b) Final reports shall demonstrate that the remedy has been completed in accordance with an approved cleanup plan.

(c) Final reports shall include the information identified in § 250.204(f)(1)—(5) (relating to final report).

(d) If engineering or institutional controls are needed to maintain a standard, if the fate and transport analysis indicates that the remediation standard may be exceeded at the point of compliance in the future, or, if the remediation relies on natural attenuation, a postremediation care plan shall be documented in the final report that includes the information identified in § 250.204(g).

(e) The comments obtained as a result of a public involvement plan and the responses to those public comments shall be included in a final report.

(f) If mitigation measures are implemented in accordance with § 250.311(f) (relating to evaluation of ecological receptors), a postremediation care plan shall be documented in the final report that includes the following:

(1) A plan to maintain the mitigated ecological resource.

(2) Reporting of the ongoing success or failure of the mitigation measure implemented.

(3) Mitigation measures instituted at the time of the final report which shall be successfully accomplished and sustained up to 5 years from final report approval.

Subchapter E. SIA STANDARDS

Sec.
250.501. Scope.
250.502. Eligibility determinations.
250.503. Remediation requirements.

§ 250.501. Scope.

(a) This subchapter sets forth requirements and procedures for any person who conducts remediation activities for property located in an SIA.

(b) A person who conducts remediation activities in an SIA shall comply with the requirements for notifying municipalities, the public and the Department.

§ 250.502. Eligibility determinations.

The person proposing remediation shall demonstrate:

(1) The property was used for industrial activity.

(2) The person did not cause or contribute to contamination on the property.

(3) There is no financially viable responsible person to clean up the contamination; or the property is located within a designated enterprise zone.

§ 250.503. Remediation requirements.

(a) A person proposing remediation of an SIA shall perform a baseline remedial investigation that establishes a reference point for existing contamination.

(b) A work plan shall be prepared that will define the scope of the baseline remedial investigation and shall be submitted to the Department for approval prior to the initiation of the investigation.

(c) At a minimum, a baseline remedial investigation shall include the following:

(1) Identification of the historical regulated substance use, handling and disposal activities on the property and any known or suspected releases associated with these activities by conducting environmental site assessment research and interviews with any person who may have knowledge of the property.

(2) If indicated by the investigation, performance of environmental sampling, within all potential media of concern, to confirm that the releases have occurred.

(3) Identification of potential migration pathways off the property and associated potential receptors of any confirmed releases on the property.

(4) If migration pathways and associated potential receptors have been identified, performance of environmental sampling of groundwater and other media at the downgradient property boundary to determine if regulated substances from the releases on the property have migrated off the property.

(5) Evaluation of exposure conditions within the portion of the property to be reused to identify existing contamination that poses an immediate, direct or imminent threat to public health or the environment which is inconsistent with the intended reuse of that portion of the property.

(d) The results of the baseline remedial investigation shall be included in a baseline environmental report. At a minimum, the baseline environmental report shall include the following:

(1) A description of the location and boundaries of the SIA.

(2) Identification of all areas of contamination.

(3) A description of the intended reuse of the property and exposure patterns.

(4) A remediation plan for the property that addresses all immediate, direct or imminent threats to public health and the environment which would prevent the property from being occupied for its intended purpose and delineates methods of compliance monitoring. At a minimum, immediate, direct or imminent threats will entail:

(i) Containerized wastes not intended in the property reuse, such as wastes in drums, above or below ground tanks and small containers.

(ii) Wastes not contained which present a direct threat to workers or other users or occupants of the property.

(iii) Contaminated soil presenting a direct threat to workers or other users or occupants of the property. The depth of consideration shall be the first 2 feet from the ground surface, unless reuse of the property presents exposure threats from depths greater than 2 feet.

(iv) Contaminated groundwater, if groundwater use will expose persons on the property to contaminants.

(v) Contaminated surface water and sediments, if use will expose persons on the property to contaminants.

(5) A remediation plan to prevent access to portions of the property containing contaminated media that is not being required to be remediated and that poses unacceptable health risks to trespassers or workers on the site.

(6) A description of the existing or potential public benefits of the reuse of the property, such as employment, housing, open space or recreation.

(7) The comments obtained as a result of a public involvement plan and the responses to these public comments.

(e) A person that changes the use of the property from nonresidential to residential, or changes the use of the property to create substantial changes in exposure conditions to contamination that existed prior to the person's reuse shall notify the Department of the changes and may be required to implement a remediation plan to address any new imminent, direct or immediate threats to human health and the environment resulting from the changes.

(f) The baseline environmental report shall include and address any municipal and public comments and the response to those comments as developed by the public involvement plan.

(g) The baseline environmental report shall be submitted to the Department after the date of approval of the baseline remedial investigation work plan, and the public participation period.

Subchapter F. EXPOSURE AND RISK DETERMINATIONS

Sec.

§ 250.601. Scope.

(a) This subchapter specifies the information and procedures necessary to conduct a risk assessment.

(b) A risk assessment shall ensure adequate evaluation of the risks associated with human and ecological receptors exposed to regulated substances at contaminated sites.

(c) A risk assessment may include one or more of the following:

(1) A baseline risk assessment.

(2) A risk assessment to develop site-specific standards.

§ 250.602. Risk assessment procedures.

(a) Except as specified in § 250.405 (relating to when to perform a risk assessment), a person shall perform a risk assessment when using a site-specific standard under Subchapter D (relating to site-specific standards) to determine if there are unacceptable exposures to humans or unacceptable exposures to ecological receptors, or both.

(b) A person who proposes to perform a risk assessment under the site-specific standard shall use the methodologies used to develop the Statewide health standards contained in Subchapter C (relating to Statewide health standards) to conduct the risk assessment. If methodologies are not specified in Subchapter C or this subchapter, the risk assessment shall be conducted in accordance with the methodology specified in EPA or ASTM guidelines approved by the Department.

(c) A risk assessment for human exposure shall include the following components:

(1) Data collection, including source characterization and development of a conceptual site model, and evaluation to identify contaminants of concern.

(2) Exposure assessment that considers ingestion, inhalation and volatilization pathways and exposure assumptions based on land use.

(3) Toxicity assessment that includes the use of toxicity information from sources identified in § 250.605 (relating to sources of toxicity information).

(4) Risk characterization that evaluates if the risks meet the human health protection goals and ecological receptor protection specified in § 250.402 (relating to human health and environmental protection goals).

(d) An exposure assessment that is based on sampling shall use a data handling methodology that is consistent with the statistical method used to demonstrate attainment.

(e) When performing an exposure assessment, a person shall use the appropriate exposure factors identified in § 250.603 (relating to exposure factors for site-specific standards) and meet the requirements of § 250.604 (relating to fate and transport modeling requirements for exposure assessments).

(f) The risk assessment report shall discuss the degree of uncertainty associated with the risk assessment.

§ 250.603. Exposure factors for site-specific standards.

(a) A risk assessment for the site-specific standard shall use site-specific exposure factors under the EPA's *Final Guidelines for Exposure Assessment*, 1992 (57 FR 22888—22938) or exposure factors used in the development of the Statewide health standards identified in Subchapter C (relating to Statewide health standards).

(b) If a person uses site-specific exposure factors that deviate from the standard exposure factors in Subchapter C, the site-specific exposure factors shall be clearly justified by supporting data. The person shall provide the supporting data in the site-specific risk assessment report.

(c) The exposure factors shall be selected based on the land use of the site with reference to current and currently planned future land use and the effectiveness of institutional or legal controls placed on the future use of the land.

(d) The person shall document in the site-specific risk assessment report the future use of the site.

§ 250.604. Fate and transport modeling requirements for exposure assessments.

(a) A person may use the soil-to-groundwater model in § 250.308(a)(2) (relating to soil-to-groundwater pathway numeric values) to estimate site-specific, soil-to-groundwater leaching potential for organic contaminants if the following conditions are met:

(1) Site-specific values of water-filled soil porosity, dry soil bulk density, dilution factors (DF) and fraction organic carbon in soil beneath the source of contamination (that is, not from top soil) are appropriately justified and the person provides supporting data to the Department.

(2) Koc values as provided in § 250.308(a)(2) are used or site-specific values which are appropriately justified are used and the person provides supporting data to the Department.

(3) There is no identified separate phase liquid contamination at the site.

(4) Other processes such as colloidal transport or transport by means of dissolved organic matter (DOM) are not significant at the site.

(5) The application of the soil-to-groundwater model shall meet the most current EPA or ASTM quality assurance/quality control criteria approved by the Department.

(b) Except for the soil-to-groundwater model in § 250.308(a)(2), a person planning to use other fate and transport models and methods to estimate exposure concentrations and to develop site-specific standards shall use appropriate models or methods approved by the Department. The application of groundwater models shall meet the most current EPA or ASTM quality assurance/quality control criteria approved by the Department.

§ 250.605. Sources of toxicity information.

(a) For site-specific standards, the person shall use appropriate reference doses and cancer slope factors identified in Subchapter C (relating to Statewide health standards), unless the person can demonstrate that published data, available from one of the following sources, provides more current reference doses or cancer slope factors:

(1) Integrated Risk Information System (IRIS).

(2) Health Effects Assessment Summary Table (HEAST).

(3) United States Environmental Protection Agency, National Center for Environmental Assessment (NCEA) provisional values.

(4) Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profiles.

(5) California EPA, California Cancer Potency Factors.

(6) EPA criteria documents, including drinking water criteria documents, drinking water health advisory summaries, ambient water quality criteria documents and air quality criteria documents.

(b) If no toxicity values are available from sources identified in subsection (a), the person may use the background standard or meet one of the following:

(1) Develop for the Department's review in the risk assessment report one of the following:

(i) Chemical-specific toxicity values in accordance with the methods in the most current EPA guidelines or protocols, approved by the Department, using corroborated peer-reviewed data published in a scientific journal, if they exist.

(ii) Toxicity values developed from appropriately justified surrogates.

(2) Use the minimum threshold medium-specific concentration, as the site-specific standard, with an assumed risk of 1×10^{-5} for purposes of calculating cumulative risk for the regulated substances identified in Appendix A, Table 6.

§ 250.606. Development of site-specific standards.

(a) If an unacceptable risk is identified by the assessments described in § 250.602 (relating to risk assessment procedure), a person shall perform one of the following:

(1) A remediation that eliminates all current and probable future exposure pathways.

(2) A remediation utilizing a standard developed under a site-specific risk assessment that is protective of human health and the environment.

(b) A person who chooses to use a standard developed under a site-specific risk assessment shall meet the human health and environmental protection requirements identified in § 250.402 (relating to human health and environmental protection goals).

(c) The development of site-specific standards shall be based on the standard in § 250.605(b)(2) (relating to sources of toxicity information) or the components of risk

assessment in § 250.602, the appropriate exposure factors identified in § 250.603 (relating to exposure factors for site-specific standards), the fate and transport modeling requirements of § 250.604 (relating to fate and transport modeling requirements for exposure assessments) and the toxicity values of § 250.605 (relating to source of toxicity information).

(d) The following factors shall be considered in the development of the risk assessment and in the development of site-specific standards:

(1) Groundwater in aquifers.

(i) Natural environmental conditions that affect the fate and transport of contaminants, such as natural attenuation, shall be determined.

(ii) The person shall identify routes of exposure for aquifer groundwater such as human exposure to groundwater by ingestion, human inhalation of regulated substances from volatilization and migration of these substances into buildings or other areas where humans could be exposed, human ingestion of regulated substances in surface water or other site-specific surface water exposure pathways with respect to groundwater discharges or releases to surface water, human inhalation of regulated substances in air, or other site-specific air exposure pathways with respect to release of regulated substances from groundwater to air.

(2) Nonaquifer groundwater. The persons shall consider current and probable future exposure scenarios, such as human exposure as described in paragraph (1)(ii).

(3) The person shall consider current and probable future exposure scenarios, such as:

(i) Human ingestion of soil when direct contact exposure to the soil may reasonably occur.

(ii) Exposure to groundwater by ingestion with respect to leaching of regulated substances from soils to groundwater.

(iii) Human inhalation of regulated substances from volatilization and migration of these substances into below grade occupied space.

(iv) Human ingestion of regulated substances in surface water or other site-specific surface water exposure pathways with respect to regulated substances migration from soil to surface water.

(v) Human inhalation of regulated substances in air or other site-specific air exposure pathways with respect to the release of regulated substances from soil to air.

(4) If ecological receptors have been identified under § 250.311 (relating to evaluation of ecological receptors) or § 250.402, and are impacted, a remedial activity that eliminates current or future exposure pathways, or a standard, shall be developed to protect the receptors from the direct impacts.

(e) In determining soil and groundwater site-specific standards, the person shall identify the land use of the site with reference to current and currently planned future land use and the effectiveness of institutional or legal controls placed on the future use of the land.

(f) In determining soil and groundwater site-specific standards, the person shall use appropriate statistical techniques, including Monte Carlo simulations as appropriate, to establish statistically valid cleanup standards. The report for a risk assessment to develop site-specific standards shall discuss the degree of uncertainty associated with the risk assessment.

Subchapter G. DEMONSTRATION OF ATTAINMENT

Sec.

§ 250.701. Scope.

(a) This subchapter specifies the information and procedures necessary to demonstrate attainment with one or a combination of the background standard, Statewide health standard, site-specific standard and the minimum threshold standard, when a release of a regulated substance has occurred.

(b) This subchapter applies to persons who undertake a remediation in accordance with the act and this chapter.

(c) For purposes of determining attainment of one or a combination of remediation standards, the concentration of a regulated substance is not required to be less than the limits relating to the PQLs for a regulated substance in accordance with § 250.4 (relating to limits related to PQLs).

(d) Attainment of a standard shall be demonstrated at the point of compliance, as identified in § 250.203, 250.302 or 250.407 (relating to point of compliance), whichever is applicable.

§ 250.702. Attainment requirements.

(a) Attainment of a standard shall be demonstrated with adherence to Data Quality Objectives (DQO) and Data Quality Assessment (DQA) processes as specified by the EPA, as appropriate. Attainment of the Statewide health or site-specific standard will apply to the vertical and horizontal extent of soil identified as contaminated from the release of a regulated substance above the selected standard and of groundwater at the point of compliance and beyond in a site characterization. Attainment of the background standard will apply to the vertical and horizontal extent of soil and water identified as contaminated from the release across the site. Where multiple releases occur on a property which produce distinctly separate zones of contamination, the characterization and subsequent attainment demonstrations apply individually to the separate zones.

(b) Demonstration of attainment in a final report shall include the following:

(1) A demonstration that the analysis of the data, through the application of statistical tests provided for in § 250.707 (relating to statistical tests), indicates that the standard has been met.

(2) For groundwater, a demonstration of a statistical time trend analysis, knowledge of the plume stability or other acceptable method that shows contaminant concentration at the point of compliance will not exceed the selected standard. A statistical analysis shall be applied that indicates continued attainment of the standard.

(3) For the site-specific standard, the following apply:

(i) If pathway elimination is part of the remediation, it shall be demonstrated on the basis of either an engineering or hydrogeologic analysis, or both, which includes fate and transport analysis that some or all of the exposure pathways have been eliminated.

(ii) If pathway elimination is not part of the remediation or it cannot be demonstrated that all pathways have been eliminated, it shall be demonstrated that the calculated numerical site-specific standards for the remaining pathways have been attained in accordance with paragraphs (1) and (2), using the procedures in § 250.707(c) and (d), or that the risk level remaining at a site does not exceed a risk level of 1×10^{-4} and a hazard index of 1, provided for in the act. If separate phase liquids are present, it shall also be demonstrated that calculated site-specific numeric standards are attained within the soil and groundwater directly impacted by the separate phase liquids when those numeric standards are associated with exposure to separate phase liquids.

(4) For the background and Statewide health standards, if separate phase liquids are present, attainment at the point of compliance shall also be demonstrated within the soil and groundwater directly impacted by separate phase liquids.

§ 250.703. General attainment requirements for soil.

(a) For any standard selected, the attainment demonstration for the soil media shall be made at the point of compliance as defined in Subchapters B—D (relating to background standards; Statewide health standards; and site-specific standards).

(b) The volume of soil to which the attainment criteria is applied shall be determined by circumscribing with an irregular surface those concentrations detected during characterization which exceed the selected standard.

(c) Sampling points for demonstration of attainment of soils shall be selected to be random and representative both horizontally and vertically based on a systematic random sampling as set forth in a Department approved reference. If exceedances of a standard occur in a localized area, the Department may require additional characterization and remediation if three or more adjacent samples exceed the standard by more than ten times.

(d) For statistical methods under § 250.707(b)(1)(i) (relating to statistical tests), the number of sample points required for each distinct area of contamination to demonstrate attainment shall be determined in the following way:

(1) For soil volumes equal to or less than 125 cubic yards, at least eight samples.

(2) For soil volumes up to 3,000 cubic yards, at least 12 sample points.

(3) For each additional soil volume of up to 3,000 cubic yards, an additional 12 sample points.

(4) Additional sampling points may be required based on site-specific conditions.

(e) For statistical methods under § 250.707(b)(1)(ii) and (c), the minimum number of samples required for demonstrating attainment shall be as specified by the documentation of the chosen method.

§ 250.704. General attainment requirements for groundwater.

(a) For any standard selected, the attainment demonstration for the groundwater media shall be made at the point of compliance as defined in Subchapters B—D (relating to background standards; Statewide health standards; and site-specific standards).

(b) A sufficient number and location of monitoring wells necessary to demonstrate attainment of each plume of contamination shall be installed at the point of compliance for each aquifer based on site-specific conditions. Well locations shall be selected to yield an adequate amount of water to produce statistically valid results.

(c) In cases where the site characterization has determined the groundwater contamination (plume) extends beyond the property boundary, and the concentration of regulated substances beyond the property is above the cleanup levels of the standard selected, then the location and number of wells shall determine compliance:

(1) At and beyond the property boundary.

(2) Within the area of property shown, in the site investigation report, to be contaminated with regulated substances above the selected standard.

(d) For statistical methods under § 250.707(b)(2)(i) (relating to statistical tests), the demonstration of attainment for groundwater shall be based on at least eight consecutive quarters of groundwater data. As an alternative, the Department may accept four consecutive quarterly sampling events or less with written approval from the Department under the following conditions:

(1) There is adequate spatial monitoring of the plume upgradient which indicates a decreasing concentration trend toward the downgradient property boundary.

(2) Parameters affecting the fate and transport of regulated substances within the plume have been fully evaluated.

(3) Concentrations of regulated substances in the plume at the point of compliance monitoring wells along the downgradient property boundary are all less than or equal to the groundwater standard or the limit relating to the PQL, whichever is higher, in all samples collected during the quarters of monitoring.

(4) One of the following requirements are met:

(i) The age of the plume is sufficiently well known to permit a judgment to be made regarding its stability.

(ii) The remediation includes source removal or containment actions which would reduce the chemical flux into the plume.

(e) For statistical methods under § 250.707(b)(2)(ii) and (c), the minimum number of samples required for demonstrating attainment shall be as specified by the documentation of the chosen method.

§ 250.705. Attainment requirements for groundwater in aquifers not used or currently planned to be used.

In addition to sampling and statistical analyses that apply to attainment of the Statewide health standards for groundwater in this subchapter, attainment of the MSC for aquifers not used or currently planned to be used shall include the following:

(1) A scientifically valid and applicable fate and transport analysis, based on sufficient sampling and monitoring data to calibrate the model.

(2) Based on the fate and transport analysis in paragraph (1), a demonstration that the MSC for groundwater in an aquifer used or currently planned for use is not exceeded at and beyond all points on a radius of 1,000 feet, downgradient from the property boundary within a period of no more than 30 years.

§ 250.706. Demonstration of attainment of surface water and air quality standards.

A person shall demonstrate attainment within the surface water and the air media by demonstrating compliance with the applicable State and Federal laws and regulations.

§ 250.707. Statistical tests.

(a) For regulated substances which are naturally occurring, the person shall compare the analytical results of background reference samples, that are representative of naturally occurring concentrations of regulated substances on the site, with the analytical results of the medium of concern onsite. For nonnaturally occurring regulated substances for which a known background condition exists, the person shall compare the analytical results of background reference samples, which are related to the migration of contaminants onto the site, with the analytical results of the medium of concern onsite. In addition, application of statistical tests for the background standard shall be as follows:

(1) *Soil.* For soil, a person shall use one of the following statistical methods in subparagraphs (i)—(iii) and conditions relating to subparagraphs (i)—(iii) as described in subparagraphs (iv)—(vi) to demonstrate attainment of the background standard:

(i) The person shall demonstrate that the highest measurement from the area of concern is not greater than the highest measurement from the background area. The Department may accept insignificant variances in numbers. The minimum number of samples to be collected is ten from the background reference population and ten from each distinct area of contamination.

(ii) The Department may accept the use of a combination of the Wilcoxon rank-sum test (equivalent to the Mann-Whitney U test) and the quantile test for data from two populations. The application of these tests shall meet the criteria in subparagraphs (iv) and (vi).

(iii) The Department may accept other appropriate statistical methods that meet the requirements of subparagraphs (iv)—(vi).

(iv) For nonparametric and parametric methods under subparagraphs (ii) and (iii), the false-positive rate for a set of data applied to a statistical test may not be greater than 0.20. The minimum number of samples to be collected is ten from the background population and ten from each distinct area of contamination.

(v) For parametric methods under subparagraph (iii), the censoring level for each nondetect (ND) shall be the assigned value randomly generated that is between zero and the limit related to the PQL.

(vi) For nonparametric and parametric methods under subparagraphs (ii) and (iii), the application of a statistical method shall meet the criteria in subsection (d).

(2) *Groundwater for known upgradient release of a regulated substance.*

(i) The Department may accept the use of the nonparametric tolerance intervals that are applied in accordance with the procedures in subparagraphs (ii)—(vi) and (viii)—(x).

(ii) The upgradient concentration shall be determined by sampling in a background reference well shown on the basis of characterization to exhibit the highest concentration and by demonstrating that the groundwater is representative of concentrations in groundwater that are migrating onto the site.

(iii) The background reference well shall be sampled over a period of eight quarters to provide eight samples.

(iv) From these eight samples, the highest concentration for each regulated substance shall be selected as the upper tolerance limit.

(v) In each onsite well, eight samples shall also be collected during the same eight-quarter period.

(vi) The upper tolerance limit shall be met in each onsite well. The maximum of data collected from each onsite well shall be at or below the upper tolerance limit.

(vii) In lieu of subparagraphs (iv)—(vi), the Department may accept a retesting strategy using nonparametric prediction limit in accordance with current EPA guidance (EPA, Office of Solid Waste Management Division. "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities;" Addendum to Interim Final Guidance, EPA, Washington, D. C. June 1992). For each regulated substance, the highest concentration of the eight background reference samples shall be selected as the upper prediction limit, as determined by the most current EPA guidance.

(viii) The application of a statistical method for groundwater background standard shall meet the criteria in subsection (d).

(ix) For parametric methods, the censoring level for each nondetect (ND) shall be the assigned value randomly generated that is between zero and the limit related to the PQL.

(x) In lieu of eight-quarter sampling in subparagraphs (iii) and (v), the Department may allow the eight samples to be taken during a period of four quarters, or less with written approval from the Department if the following criteria can be met:

(A) There is adequate spatial monitoring of the plume upgradient of the property on which the release occurred which indicates a stable plume condition.

(B) Parameters affecting the fate and transport of regulated substances within the plume have been fully evaluated.

(C) Coefficient of variation for the eight samples collected over a four-quarter period may not exceed 1.0 for metals and 2.0 for organic compounds.

(D) The age of the plume is sufficiently well known to permit a judgment to be made regarding its stability and remediation of the source associated with the upgradient contamination is not currently or has not recently occurred.

(3) *Background groundwater conditions due to naturally occurring or areawide contamination.*

(i) To use this subparagraph for areawide contamination, the person performing remediation shall demonstrate to the Department, in writing, that the site conditions are due to areawide contamination and shall obtain the Department's approval to use this subsection.

(ii) A minimum of 12 samples shall be collected from any combination of monitoring wells, including upgradient locations, if all data collected is used in determination of background concentrations.

(iii) The same number of samples shall be collected within and representative of the area of groundwater contamination (plume) onsite as were collected in the upgradient sampling for each sampling event.

(iv) The samples from the upgradient wells and the wells in the plume onsite shall be collected during the same sampling event.

(v) Sampling may be accelerated so that all sampling events occur in as short a period of time as possible so as not to result in serial correlation in the data.

(vi) The resulting values may be used with appropriate nonparametric or parametric methods to compare the two populations.

(vii) The sampling results in the plume onsite may not exceed the sum of the background arithmetic average and three times the standard deviation calculated for the background area.

(viii) The application of a statistical method for groundwater background standard shall meet the criteria in subsection (d).

(ix) For parametric methods, the censoring level for each nondetect (ND) shall be the assigned value randomly generated that is between zero and the limit related to the PQL.

(b) The following statistical tests may be accepted by the Department to demonstrate attainment of the Statewide health standard. The statistical test for soil shall apply to each distinct area of contamination. The statistical test for groundwater will apply to each compliance monitoring well. Testing shall be performed individually for each regulated substance identified in the final report site investigation as being present at the site for which a person wants relief from liability under the act. The application of a statistical method shall meet the criteria in subsection (d).

(1) For soil attainment determination at each distinct area of contamination, subparagraph (i), (ii) or (iii) shall be met in addition to the attainment requirements in §§ 250.702 and 250.703 (relating to attainment requirements; and general attainment requirements for soil).

(i) Seventy-five percent of all samples, which shall be randomly collected in a single event from the site, shall be equal to or less than the Statewide health standard or the limit related to PQLs with no individual sample exceeding ten times the Statewide health standard.

(ii) As applied in accordance with EPA approved methods on statistical analysis of environmental data, as identified in subsection (e), the 95% UCL of the arithmetic mean shall be at or below the Statewide health standard.

(iii) For sites that qualify as localized contamination sites under the document entitled "Closure Requirements for Underground Storage Tank Systems" (DEP Technical Guidance Document No. 2530-BK-DEP2008), where samples are taken in accordance with that document that result in fewer samples being taken than otherwise required in this section, no sample may exceed the Statewide health standard.

(2) For groundwater attainment determination at each compliance monitoring well, subparagraph (i) or (ii) shall be met in addition to the attainment requirements in § 250.702 and § 250.704 (relating to general attainment requirements for groundwater).

(i) Seventy-five percent of all samples collected within each monitoring well over time shall be equal to or less than the Statewide health standard or the limit related to PQLs with no individual sample exceeding both of the following:

(A) Ten times the Statewide health standard on the property.

(B) Two times the Statewide health standard beyond the property boundary.

(ii) As applied in accordance with EPA approved methods on statistical analysis of environmental data, as identified in subsection (e), the 95% UCL level of the arithmetic mean shall be at or below the Statewide health standard.

(3) In addition to the statistical tests identified in paragraphs (1) and (2), a person may use a statistical test that meets the requirements of subsection (d) to demonstrate attainment.

(c) To demonstrate attainment of the site-specific standard, a person may use a statistical test identified in subsection (b)(1)(ii) and (2)(ii) where the 95% UCL of the arithmetic mean is below the site-specific standard or a statistical test that meets the requirements of subsection (d). The attainment test and the methodology used in the risk assessment to evaluate exposure concentrations shall be the same.

(d) Except for the statistical methods identified in subsections (a)(1)(i) and (b)(1)(i) and (2)(i), a demonstration of attainment of one or a combination of remediation standards shall comply with the following:

(1) When statistical methods are to be used for demonstration of attainment of Statewide health or site-specific standards, the null hypotheses (Ho) shall be that the true site arithmetic average concentration is at or above the cleanup standard, and the alternative hypothesis (Ha) shall be that the true site arithmetic average concentration is below the cleanup standard. When statistical methods are to be used to determine that the background standard is exceeded, the null hypothesis (Ho) shall be that the background standard is achieved and the alternative hypothesis (Ha) shall be that the background standard is not achieved.

(2) A statistical method chosen shall comply with the following performance standards:

(i) The underlying assumptions of the statistical method shall be met, such as data distribution.

(ii) The statistical method shall be recommended for this use in Department-approved guidance or regulation and shall be generally recognized as appropriate for the particular remediation implemented at the site.

(iii) Compositing cannot be used with nonparametric methods or for volatile organic compounds.

(iv) For parametric methods, the censoring level for each nondetect shall be the assigned value randomly generated that is between zero and the limit related to the PQL.

(v) Tests shall account for seasonal and spatial variability as well as temporal correlation of data, unless otherwise approved by the Department.

(vi) Tests used to determine that the background standard is exceeded shall maintain adequate power to detect contamination in accordance with current EPA guidances, regulations or protocols.

(vii) For the limits relating to the PQLs, Statewide health and site-specific standards, the false-positive rate for a statistical test may not be greater than 0.20 for nonresidential and 0.05 for residential.

(viii) Statistical testing shall be done individually for each regulated substance present at the site.

(3) The following information shall be documented in a final report when a statistical method is applied:

(i) A description of the statistical method.

(ii) A clear statement of the applicable decision rule in the form of statistical hypotheses for each spatial unit and temporal boundary including the applicable statistical parameter of interest and the specific cleanup standard.

(iii) A description of the underlying assumptions of the method.

(iv) Documentation showing that the sample data set meets the underlying assumptions of the method and demonstrating that the method is appropriate to apply to the data.

(v) Specification of false positive rates and, in addition for the background standard, specification of false negative rates.

(vi) Documentation of input and output data for the statistical test, presented in tables or figures, or both, as appropriate.

(vii) An interpretation and conclusion of the statistical test.

(e) The references identified in subsection (b)(1)(ii) and (2)(ii) are as follows:

(1) EPA, Office of Policy, Planning and Evaluation, *Methods for Evaluating the Attainment of Cleanup Standards*, Volume 1: Soils and Solid Media, EPA 230/02-89-042, Washington, D. C. 1989.

(2) EPA, Office of Solid Waste Management Division, *Test Methods for Evaluating Solid Waste*, SW-846 Volume II: Field Methods, EPA, November 1985, Third Edition.

(3) EPA, Office of Solid Waste Management Division, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities*, Interim Final Guidance, EPA, Washington, D. C., April, 1989.

(4) EPA, Office of Solid Waste Management Division, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities*, Addendum to Interim Final Guidance, EPA, Washington, D. C., June, 1992.

(5) 40 CFR 264 and 265 (relating to standards for owners and operators of hazardous waste treatment, storage, and disposal facilities; and interim status standards for owners and operators of hazardous waste treatment, storage, and disposal facilities).

§ 250.708. Postremediation care attainment.

(a) After engineering controls are in place and the groundwater concentration levels have stabilized following any effects from the remediation, a statistical test shall be used to demonstrate that regulated substances in groundwater do not exceed the selected standard at the point of compliance. A statistical trend analysis, knowledge of the plume stability, or other acceptable method shall be used to demonstrate that contaminant concentration at the point of compliance will not exceed the selected standard in the future.

(b) If engineering or institutional controls are utilized at a site to maintain the nonresidential Statewide health standard or the site-specific standard, a postremediation care program shall be implemented to protect human health and the environment.

(c) A person implementing engineering controls shall ensure the ongoing achievement of the performance standards in order to maintain attainment.

(d) A person shall implement a postremediation care plan, as identified in an approved final report.

(e) A person may terminate postremediation care as approved in the final report if the person can demonstrate attainment under this chapter without the engineering controls in place, and document a fate and transport analysis that shows the standard will not be exceeded in the future.

APPENDIX A

Table 1—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Groundwater

REGULATED SUBSTANCE	*CASRN*	*USED AQUIFERS*								*NON-USE AQUIFERS*			
		TDS ≤ 2500				*TDS > 2500*							
		R		*NR*		*R*		*NR*		*R*		*NR*	
ACENAPHTHENE	83329	2,200	G	3,500	S	3,500	S	3,500	S	3,500	S	3,500	S
ACENAPHTHYLENE	208968	2,200	G	3,900	S	3,900	S	3,900	S	3,900	S	3,900	S
ACETALDEHYDE	75070	19	N	57	N	1,900	N	5,700	N	19	N	57	N
ACETONE	67641	3,700	G	10,000	G	370,000	G	1,000,000	G	37,000	G	100,000	G
ACETONITRILE	75058	58	N	120	N	5,800	N	12,000	N	580	N	1,200	N
ACETOPHENONE	98862	3,700	G	10,000	G	370,000	G	1,000,000	G	3,700	G	10,000	G
ACETYLAMINOFLUORENE, 2- (2AAF)	53963	0.17	G	0.68	G	17	G	68	G	170	G	680	G
ACROLEIN	107028	0.055	N	0.12	N	5.5	N	12	N	0.55	N	1.2	N
ACRYLAMIDE	79061	0.033	N	0.14	N	3.3	N	14	N	0.033	N	0.14	N
ACRYLIC ACID	79107	2.8	N	5.8	N	280	N	580	N	280	N	580	N
ACRYLONITRILE	107131	0.63	N	2.7	N	63	N	270	N	63	N	270	N
ALACHLOR	15972608	2	M	2	M	200	M	200	M	2	M	2	M
ALDICARB	116063	7	M	7	M	700	M	700	M	7,000	M	7,000	M
ALDRIN	309002	0.0087	N	0.037	N	0.87	N	3.7	N	0.87	N	3.7	N
ALLYL ALCOHOL	107186	49	N	100	N	4,900	N	10,000	N	4,900	N	10,000	N
AMINOBIPHENYL, 4-	92671	0.031	G	0.12	G	3.1	G	12	G	31	G	120	G
AMITROLE	61825	0.7	G	2.8	G	70	G	280	G	700	G	2800	G
ANILINE	62533	2.8	N	5.8	N	280	N	580	N	2.8	N	5.8	N
ANTHRACENE	120127	43	S	43	S	43	S	43	S	43	S	43	S
ATRAZINE	1912249	3	M	3	M	300	M	300	M	3	M	3	M

All concentrations in µG/L
R = Residential
NR = Non-Residential
M = Maximum Contaminant Level
H = Lifetime Health Advisory Level
G = Ingestion
N = Inhalation
S = Aqueous Solubility Cap

APPENDIX A

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REGULATED SUBSTANCE	*CASRN*	*USED AQUIFERS*								*NON-USE AQUIFERS*			
		TDS ≤ 2500				*TDS > 2500*							
		R		*NR*		*R*		*NR*		*R*		*NR*	
BENZENE	71432	5	M	5	M	500	M	500	M	500	M	500	M
BENZO[A]ANTHRACENE	56553	0.9	G	3.6	G	14	S	14	S	14	S	14	S
BENZO[A]PYRENE	50328	0.2	M	0.2	M	3.8	S	3.8	S	3.8	S	3.8	S
BENZO[B]FLUORANTHENE	205992	0.9	G	1.2	S	1.2	S	1.2	S	1.2	S	1.2	S
BENZO[GHI]PERYLENE	191242	0.26	S	0.26	S	0.26	S	0.26	S	0.26	S	0.26	S
BENZO[K]FLUORANTHENE	207089	0.55	S	0.55	S	0.55	S	0.55	S	0.55	S	0.55	S
BENZOIC ACID	65850	150,000	G	410,000	G	3,400,000	S	3,400,000	S	150,000	G	410,000	G
BENZYL ALCOHOL	100516	11,000	G	31,000	G	1,100,000	G	3,100,000	G	11,000	G	31,000	G
BENZYL CHLORIDE	100447	0.87	N	3.7	N	87	N	370	N	87	N	370	N
BHC, ALPHA-	319846	0.1	G	0.41	G	10	G	41	G	100	G	410	G
BHC, BETA-	319857	0.37	G	1.4	G	37	G	140	G	370	G	1,400	G
BHC, DELTA-	319868	11	G	31	G	1,100	G	3,100	G	11,000	G	21,000	S
BHC, GAMMA (LINDANE)	58899	0.2	M	0.2	M	20	M	20	M	200	M	200	M
BIS(2-CHLORO-ISOPROPYL)ETHER	108601	300	H	300	H	30,000	H	30,000	H	30,000	H	30,000	H
BIS(2-CHLOROETHYL)ETHER	111444	0.13	N	0.55	N	13	N	55	N	13	N	55	N
BIS(CHLOROMETHYL)ETHER	542881	0.00069	N	0.0029	N	0.069	N	0.29	N	0.069	N	0.29	N
BIS[2-ETHYLHEXYL] PHTHALATE	117817	6	M	6	M	340	S	340	S	340	S	340	S
BROMODICHLOROMETHANE	75274	100	M	100	M	10,000	M	10,000	M	100	M	100	M
BROMOMETHANE	74839	10	H	10	H	1,000	H	1,000	H	1,000	H	1,000	H
BUTYL ALCOHOL, N-	71363	970	N	2,000	N	97,000	N	200,000	N	9,700	N	20,000	N

All concentrations in µG/L
R = Residential
NR = Non-Residential
M = Maximum Contaminant Level
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APPENDIX A

Table 1—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Groundwater

REGULATED SUBSTANCE	*CASRN*	*USED AQUIFERS*								*NON-USE AQUIFERS*			
		TDS ≤ 2500				*TDS > 2500*							
		R		*NR*		*R*		*NR*		*R*		*NR*	
BUTYL PHTHALATE, DI-N-	84742	3,700	G	10,000	G	13,000	S	13,000	S	13,000	S	13,000	S
BUTYLBENZYL PHTHALATE	85687	2,700	S	2,700	S	2,700	S	2,700	S	2,700	S	2,700	S
CAPTAN	133062	190	G	740	G	3,300	S	3,300	S	3,300	S	3,300	S
CARBARYL	63252	700	H	700	H	70,000	H	70,000	H	83,000	S	83,000	S
CARBOFURAN	1563662	40	M	40	M	4,000	M	4,000	M	40	M	40	M
CARBON DISULFIDE	75150	1,900	N	4,100	N	190,000	N	410,000	N	1,900	N	4,100	N
CARBON TETRACHLORIDE	56235	5	M	5	M	500	M	500	M	50	M	50	M
CHLORDANE	57749	2	M	2	M	56	S	56	S	56	S	56	S
CHLORO-1-PROPENE, 3- (ALLYL CHLORIDE)	107051	2.8	N	5.8	N	280	N	580	N	280	N	580	N
CHLOROANILINE, P-	106478	150	G	410	G	3,900	S	3,900	S	150	G	410	G
CHLOROBENZENE	108907	55	N	120	N	5,500	N	12,000	N	5,500	N	12,000	N
CHLOROBENZILATE	510156	2.4	G	9.6	G	240	G	960	G	2,400	G	9,600	G
CHLORODIBROMOMETHANE	124481	100	M	100	M	10,000	M	10,000	M	10,000	M	10,000	M
CHLOROETHANE	75003	28,000	N	58,000	N	2,800,000	N	5,700,000	S	2,800,000	N	5,700,000	S
CHLOROETHYL VINYL ETHER, 2-	110758	240	N	510	N	24,000	N	51,000	N	240	N	510	N
CHLOROFORM	67663	100	M	100	M	10,000	M	10,000	M	1,000	M	1,000	M
CHLORONAPHTHALENE, 2-	91587	2,900	G	6,700	S	6,700	S	6,700	S	2,900	G	6,700	S
CHLOROPHENOL, 2-	95578	40	H	40	H	4,000	H	4,000	H	40	H	40	H
CHLOROPRENE	126998	19	N	41	N	1,900	N	4,100	N	1,900	N	4,100	N
CHLORPYRIFOS	2921882	20	H	20	H	1,300	S	1,300	S	20	H	20	H

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		TDS ≤ 2500				*TDS > 2500*							
		R		*NR*		*R*		*NR*		*R*		*NR*	
CHRYSENE	218019	1.8	S	1.8	S	1.8	S	1.8	S	1.8	S	1.8	S
CRESOL(S)	1319773	49	N	100	N	4,900	N	10,000	N	4,900	N	10,000	N
CRESOL, P-CHLORO-M-	59507	180	G	510	G	18,000	G	51,000	G	180	G	510	G
CROTONALDEHYDE	4170303	0.079	N	0.34	N	7.9	N	34	N	7.9	N	34	N
CUMENE	98828	25	N	52	N	2,500	N	5,200	N	2,500	N	5,200	N
CYCLOHEXANONE	108941	49,000	N	100,000	N	4,900,000	N	5,000,000	S	49,000	N	100,000	N
DDD, 4,4'-	72548	0.62	N	2.7	N	62	N	160	S	62	N	160	S
DDE, 4,4'-	72559	1.3	S	1.3	S	1.3	S	1.3	S	1.3	S	1.3	S
DDT, 4,4'-	50293	1.7	S	1.7	S	1.7	S	1.7	S	1.7	S	1.7	S
DIALLATE	2303164	2.5	N	10	N	250	N	1,000	N	250	N	1,000	N
DIAZINON	333415	0.6	H	0.6	H	60	H	60	H	0.6	H	0.6	H
DIBENZO[A,H]ANTHRACENE	53703	0.09	G	0.36	G	0.5	S	0.5	S	0.5	S	0.5	S
DIBROMO-3-CHLOROPROPANE, 1,2-	96128	0.2	M	0.2	M	20	M	20	M	20	M	20	M
DIBROMOETHANE, 1,2- (ETHYLENE DIBROMIDE)	106934	0.05	M	0.05	M	5	M	5	M	5	M	5	M
DIBROMOMETHANE	74953	97	N	200	N	9,700	N	20,000	N	9,700	N	20,000	N
DICHLOROBENZENE, 1,2-	95501	600	M	600	M	60,000	M	60,000	M	60,000	M	60,000	M
DICHLOROBENZENE, 1,3-	541731	600	H	600	H	60,000	H	60,000	H	60,000	H	60,000	H
DICHLOROBENZENE, P-	106467	75	M	75	M	7,500	M	7,500	M	7,500	M	7,500	M
DICHLOROBENZIDINE, 3,3'-	91941	1.5	G	5.8	G	150	G	580	G	1,500	G	5,800	G

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		TDS ≤ 2500				*TDS > 2500*							
		R		*NR*		*R*		*NR*		*R*		*NR*	
DICHLORODIFLUOROMETHANE (FREON 12)	75718	1,000	H	1,000	H	100,000	H	100,000	H	100,000	H	100,000	H
DICHLOROETHANE, 1,1-	75343	27	N	110	N	2,700	N	11,000	N	270	N	1,100	N
DICHLOROETHANE, 1,2-	107062	5	M	5	M	500	M	500	M	50	M	50	M
DICHLOROETHYLENE, 1,1-	75354	7	M	7	M	700	M	700	M	70	M	70	M
DICHLOROETHYLENE, CIS-1,2-	156592	70	M	70	M	7,000	M	7,000	M	700	M	700	M
DICHLOROETHYLENE, TRANS-1,2-	156605	100	M	100	M	10,000	M	10,000	M	1,000	M	1,000	M
DICHLOROMETHANE (METHYLENE CHLORIDE)	75092	5	M	5	M	500	M	500	M	500	M	500	M
DICHLOROPHENOL, 2,4-	120832	20	H	20	H	2,000	H	2,000	H	20,000	H	20,000	H
DICHLOROPHENOXYACETIC ACID, 2,4- (2,4-D)	94757	70	M	70	M	7,000	M	7,000	M	7,000	M	7,000	M
DICHLOROPROPANE, 1,2-	78875	5	M	5	M	00	M	500	M	50	M	50	M
DICHLOROPROPIONIC ACID, 2,2- (DALAPON)	75990	200	M	200	M	20,000	M	20,000	M	20,000	M	20,000	M
DICHLORVOS	62737	0.52	N	2.2	N	52	N	220	N	0.52	N	2.2	N
DIELDRIN	60571	0.041	G	0.16	G	4.1	G	16	G	41	G	160	G
DIETHYL PHTHALATE	84662	5000	H	5000	H	500,000	H	500,000	H	900,000	S	900,000	S
DIMETHOATE	60515	7.3	G	20	G	730	G	2,000	G	7,300	G	20,000	G
DIMETHYLAMINOAZOBENZENE, P-	60117	0.14	G	0.57	G	14	G	57	G	140	G	230	S
DIMETHYLHYDRAZINE, 1,1-	57147	0.087	N	0.37	N	8.7	N	37	N	0.87	N	3.7	N
DIMETHYLPHENOL, 2,4-	105679	730	G	2000	G	73,000	G	200,000	G	730,000	G	2,000,000	G

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		R		*NR*		*R*		*NR*		*R*		*NR*	
DINITROBENZENE, 1,3-	99650	1	H	1	H	100	H	100	H	1,000	H	1,000	H
DINITROPHENOL, 2,4-	51285	19	N	41	N	1,900	N	4,100	N	190	N	410	N
DINITROTOLUENE, 2,4-	121142	2.1	G	8.4	G	210	G	840	G	2,100	G	8,400	G
DINITROTOLUENE, 2,6- (2,6-DNT)	606202	37	G	100	G	3,700	G	10,000	G	37,000	G	100,000	G
DINOSEB	88857	7	M	7	M	700	M	700	M	700	M	700	M
DIOXANE, 1,4-	123911	5.6	N	24	N	560	N	2,400	N	56	N	240	N
DIPHENYLAMINE	122394	200	H	200	H	20,000	H	20,000	H	200,000	H	200,000	H
DIPHENYLHYDRAZINE, 1,2-	122667	0.83	G	3.3	G	83	G	330	G	830	G	3,300	G
DIQUAT	85007	20	M	20	M	2,000	M	2,000	M	20	M	20	M
DISULFOTON	298044	0.3	H	0.3	H	30	H	30	H	30	H	30	H
DIURON	330541	10	H	10	H	1,000	H	1,000	H	10	H	10	H
ENDOSULFAN I (ALPHA)	959988	220	G	530	S	530	S	530	S	220	G	530	S
ENDOSULFAN II (BETA)	33213659	220	G	280	S	280	S	280	S	220	G	280	S
ENDOSULFAN SULFATE	1031078	120	S	120	S	120	S	120	S	120	S	120	S
ENDOTHALL	145733	100	M	100	M	10,000	M	10,000	M	100	M	100	M
ENDRIN	72208	2	M	2	M	200	M	200	M	2	M	2	M
EPICHLOROHYDRIN	106898	2.8	N	5.8	N	280	N	580	N	280	N	580	N
ETHION	563122	18	G	51	G	600	S	600	S	18	G	51	G
ETHOXYETHANOL, 2- (EGEE)	110805	3,900	N	8,200	N	390,000	N	820,000	N	390,000	N	820,000	N
ETHYL ACETATE	141786	8,700	N	18,000	N	870,000	N	1,800,000	N	870,000	N	1,800,000	N

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ETHYL ACRYLATE	140885	3.1	N	13	N	310	N	1,300	N	310	N	1,300	N
ETHYL BENZENE	100414	700	M	700	M	70,000	M	70,000	M	70,000	M	70,000	M
ETHYL ETHER	60297	1,900	N	4,100	N	190,000	N	410,000	N	1,900	N	4,100	N
ETHYLENE GLYCOL	107211	7,000	H	7,000	H	700,000	H	700,000	H	700,000	H	700,000	H
FENAMIPHOS	22224926	2	H	2	H	200	H	200	H	2	H	2	H
FLUORANTHENE	206440	270	S	270	S	270	S	270	S	270	S	270	S
FLUORENE	86737	190	S	190	S	190	S	190	S	190	S	190	S
FLUOROTRICHLOROMETHANE (FREON 11)	75694	2,000	H	2,000	H	200,000	H	200,000	H	200,000	H	200,000	H
FONOFOS	944229	10	H	10	H	1,000	H	1,000	H	10	H	10	H
FORMALDEHYDE	50000	1,000	H	1,000	H	100,000	H	100,000	H	100,000	H	100,000	H
FORMIC ACID	64186	19,000	N	41,000	N	1,900,000	N	4,100,000	N	190,000	N	410,000	N
FURFURAL	98011	110	G	290	N	11,000	G	29,000	N	110	G	290	N
GLYPHOSATE	1071836	700	M	700	M	70,000	M	70,000	M	700	M	700	M
HEPTACHLOR	76448	0.4	M	0.4	M	40	M	40	M	180	S	180	S
HEPTACHLOR EPOXIDE	1024573	0.2	M	0.2	M	20	M	20	M	200	M	200	M
HEXACHLOROBENZENE	118741	1	M	1	M	6.2	S	6.2	S	6.2	S	6.2	S
HEXACHLOROBUTADIENE	87683	1	H	1	H	100	H	100	H	1,000	H	1,000	H
HEXACHLOROCYCLOPENTADIENE	77474	50	M	50	M	3,400	S	3,400	S	3,400	S	3,400	S
HEXACHLOROETHANE	67721	1	H	1	H	100	H	100	H	100	H	100	H
HEXANE	110543	550	N	1200	N	9,500	S	9,500	S	550	N	1,200	N

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		R		*NR*		*R*		*NR*		*R*		*NR*	
INDENO[1,2,3-CD]PYRENE	193395	0.9	G	3.6	G	62	S	62	S	62	S	62	S
ISOBUTYL ALCOHOL	78831	2,900	N	6,100	N	290,000	N	610,000	N	290,000	N	610,000	N
ISOPHORONE	78591	100	H	100	H	10,000	H	10,000	H	100,000	H	100,000	H
KEPONE	143500	0.041	G	0.16	G	4.1	G	16	G	41	G	160	G
MALATHION	121755	200	H	200	H	20,000	H	20,000	H	20,000	H	20,000	H
MALEIC HYDRAZIDE	123331	4,000	H	4,000	H	400,000	H	400,000	H	4,000	H	4,000	H
METHACRYLONITRILE	126987	1.9	N	4.1	N	190	N	410	N	1.9	N	4.1	N
METHANOL	67561	4,900	N	10,000	N	490,000	N	1,000,000	N	490,000	N	1,000,000	N
METHOMYL	16752775	200	H	200	H	20,000	H	20,000	H	200	H	200	H
METHOXYCHLOR	72435	40	M	40	M	100	S	100	S	100	S	100	S
METHYL CHLORIDE	74873	3	H	3	H	300	H	300	H	300	H	300	H
METHYL ETHYL KETONE	78933	2,800	N	5,800	N	280,000	N	580,000	N	280,000	N	580,000	N
METHYL ISOBUTYL KETONE	108101	220	N	470	N	22,000	N	47,000	N	22,000	N	47,000	N
METHYL METHACRYLATE	80626	780	N	1600	N	78,000	N	160,000	N	78,000	N	160,000	N
METHYL METHANESULFONATE	66273	6.7	G	26	G	670	G	2600	G	6.7	G	26	G
METHYL PARATHION	298000	2	H	2	H	200	H	200	H	200	H	200	H
METHYL TERT-BUTYL ETHER (MTBE)	1634044	20	H	20	H	2,000	H	2,000	H	200	H	200	H
METHYLNAPHTHALENE, 2-	91576	1,500	G	4,100	G	25,000	S	25,000	S	1,500	G	4,100	G
NAPHTHALENE	91203	20	H	20	H	2,000	H	2,000	H	20,000	H	20,000	H
NAPHTHYLAMINE, 1-	134327	0.37	G	1.4	G	37	G	140	G	370	G	1,400	G

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		R		*NR*		*R*		*NR*		*R*		*NR*	
NAPHTHYLAMINE, 2-	91598	0.37	G	1.4	G	37	G	140	G	370	G	1,400	G
NITROANILINE, M-	99092	2.1	G	5.8	G	210	G	580	G	2.1	G	5.8	G
NITROANILINE, O-	88744	2.1	G	5.8	G	210	G	580	G	2.1	G	5.8	G
NITROANILINE, P-	100016	2.1	G	5.8	G	210	G	580	G	2.1	G	5.8	G
NITROBENZENE	98953	18	G	51	G	1,800	G	5,100	G	18,000	G	51,000	G
NITROPHENOL, 2-	88755	2,300	G	6,300	G	230,000	G	630,000	G	2,100,000	S	2,100,000	S
NITROPHENOL, 4-	100027	60	H	60	H	6,000	H	6,000	H	60,000	H	60,000	H
NITROPROPANE, 2-	79469	0.016	N	0.068	N	1.6	N	6.8	N	0.16	N	0.68	N
NITROSODI-N-PROPYLAMINE, N-	621647	0.094	G	0.37	G	9.4	G	37	G	94	G	370	G
NITROSODIETHYLAMINE, N-	55185	0.001	N	0.0043	N	0.1	N	0.43	N	0.01	N	0.043	N
NITROSODIMETHYLAMINE, N-	62759	0.0031	N	0.013	N	0.31	N	1.3	N	0.031	N	0.13	N
NITROSODIPHENYLAMINE, N-	86306	130	G	530	G	13,000	G	35,000	S	35,000	S	35,000	S
OCTYL PHTHALATE, DI-N-	117840	730	G	2000	G	3,000	S	3,000	S	3,000	S	3,000	S
OXAMYL (VYDATE)	23135220	200	M	200	M	20,000	M	20,000	M	200	M	200	M
PARATHION	56382	220	G	610	G	6,500	S	6,500	S	220	G	610	G
PCB-1016 (AROCLOR)	12674112	2.6	G	7.2	G	49	S	49	S	2.6	G	7.2	G
PCB-1221 (AROCLOR)	11104282	1.3	G	5.2	G	130	G	200	S	1.3	G	5.2	G
PCB-1232 (AROCLOR)	11141165	1.3	G	5.2	G	130	G	520	G	1.3	G	5.2	G
PCB-1242 (AROCLOR)	53469219	1.3	G	5.2	G	130	G	240	S	1.3	G	5.2	G
PCB-1248 (AROCLOR)	12672296	0.37	G	1.4	G	6	S	6	S	0.37	G	1.4	G

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PCB-1254 (AROCLOR)	11097691	0.37	G	1.4	G	12	S	12	S	0.37	G	1.4	G
PCB-1260 (AROCLOR)	11096825	0.25	N	1.1	N	25	N	80	S	0.25	N	1.1	N
PENTACHLOROBENZENE	608935	29	G	82	G	240	S	240	S	240	S	240	S
PENTACHLORONITROBENZENE	82688	2.5	G	10	G	250	G	590	S	590	S	590	S
PENTACHLOROPHENOL	87865	1	M	1	M	100	M	100	M	1000	M	1000	M
PHENACETIN	62442	300	G	1200	G	30,000	G	120,000	G	300,000	G	760,000	S
PHENANTHRENE	85018	1,200	S	1,200	S	1,200	S	1,200	S	1,200	S	1,200	S
PHENOL	108952	4,000	H	4,000	H	400,000	H	400,000	H	400,000	H	400,000	H
PHENYLENEDIAMINE, M-	108452	220	G	610	G	22,000	G	61,000	G	220,000	G	610,000	G
PHORATE	298022	1.9	N	4.1	N	190	N	410	N	1.9	N	4.1	N
PHTHALIC ANHYDRIDE	85449	73,000	G	200,000	G	6,200,000	S	6,200,000	S	6,200,000	S	6,200,000	S
PRONAMIDE	23950585	50	H	50	H	5,000	H	5,000	H	50	H	50	H
PROPYLENE OXIDE	75569	2.8	G	11	G	280	G	1,100	G	3	G	11	G
PYRENE	129000	13	S	13	S	13	S	13	S	13	S	13	S
PYRIDINE	110861	9.7	N	20	N	970	N	2,000	N	97	N	200	N
SIMAZINE	122349	4	M	4	M	400	M	400	M	4	M	4	M
STRYCHNINE	57249	11	G	31	G	1,100	G	3,100	G	11,000	G	31,000	G
STYRENE	100425	100	M	100	M	10,000	M	10,000	M	10,000	M	10,000	M
TERBUFOS	13071799	0.9	H	0.9	H	90	H	90	H	0.9	H	0.9	H

All concentrations in µG/L
R = Residential
NR = Non-Residential
M = Maximum Contaminant Level
H = Lifetime Health Advisory Level
G = Ingestion
N = Inhalation
S = Aqueous Solubility Cap

APPENDIX A

Table 1—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Groundwater

REGULATED SUBSTANCE	*CASRN*	*USED AQUIFERS*								*NON-USE AQUIFERS*			
		TDS ≤ 2500				*TDS > 2500*							
		R		*NR*		*R*		*NR*		*R*		*NR*	
TETRACHLORODIBENZO-P-DIOXIN, 2,3,7,8- (TCDD)	1746016	0.00003	M	0.00003	M	0.003	M	0.003	M	0.019	S	0.019	S
TETRACHLOROETHANE, 1,1,2,2-	79345	0.74	N	3.2	N	74	N	320	N	74	N	320	N
TETRACHLOROETHYLENE (PCE)	127184	5	M	5	M	500	M	500	M	50	M	50	M
TETRACHLOROPHENOL, 2,3,4,6-	58902	290	N	610	N	29,000	N	61,000	N	29,000	N	61,000	N
TETRAETHYL LEAD	78002	0.0037	G	0.01	G	0.37	G	1	G	3.7	G	10	G
THIRAM	137268	180	G	510	G	18,000	G	30,000	S	180	G	510	G
TOLUENE	108883	1,000	M	1,000	M	100,000	M	100,000	M	100,000	M	100,000	M
TOLUIDINE, M-	108441	2.8	G	11	G	280	G	1,100	G	2.8	G	11	G
TOLUIDINE, O	95534	3.7	G	14	G	370	G	1,400	G	3,700	G	14,000	G
TOLUIDINE, P-	106490	3.5	G	14	G	350	G	1,400	G	3.5	G	14	G
TOXAPHENE	8001352	3	M	3	M	300	M	300	M	3	M	3	M
TRIBROMOMETHANE (BROMOFORM)	75252	100	M	100	M	10,000	M	10,000	M	10,000	M	10,000	M
TRICHLOROBENZENE, 1,2,4-	120821	70	M	70	M	7,000	M	7,000	M	49,000	S	49,000	S
TRICHLOROBENZENE, 1,3,5-	108703	40	H	40	H	4,000	H	4,000	H	40	H	40	H
TRICHLOROETHANE, 1,1,1-	71556	200	M	200	M	20,000	M	20,000	M	2,000	M	2,000	M
TRICHLOROETHANE, 1,1,2-	79005	5	M	5	M	500	M	500	M	50	M	50	M
TRICHLOROETHYLENE (TCE)	79016	5	M	5	M	500	M	500	M	50	M	50	M
TRICHLOROPHENOL, 2,4,5-	95954	3,700	G	10,000	G	370,000	G	1,000,000	G	1,200,000	S	1,200,000	S
TRICHLOROPHENOL, 2,4,6-	88062	60	G	240	G	6,000	G	24,000	G	60,000	G	240,000	G

All concentrations in µG/L
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M = Maximum Contaminant Level
H = Lifetime Health Advisory Level
G = Ingestion
N = Inhalation
S = Aqueous Solubility Cap

APPENDIX A

Table 1—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Groundwater

REGULATED SUBSTANCE	*CASRN*	*USED AQUIFERS*								*NON-USE AQUIFERS*			
		TDS ≤ 2500				*TDS > 2500*							
		R		*NR*		*R*		*NR*		*R*		*NR*	
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	93765	70	H	70	H	7,000	H	7,000	H	70,000	H	70,000	H
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)	93721	50	M	50	M	5,000	M	5,000	M	50	M	50	M
TRICHLOROPROPANE, 1,2,3-	96184	40	H	40	H	4,000	H	4,000	H	4,000	H	4,000	H
VINYL ACETATE	108054	550	N	1,200	N	55,000	N	120,000	N	550	N	1,200	N
VINYL CHLORIDE	75014	2	M	2	M	200	M	200	M	20	M	20	M
WARFARIN	81812	0.00000092	S	0.00000092	S	0.00000092	S	0.00000092	S	0.00000092	S	0.00000092	S
XYLENES (TOTAL)	1330207	10,000	M	10,000	M	180,000	S	180,000	S	180,000	S	180,000	S

All concentrations in µG/L
R = Residential
NR = Non-Residential
M = Maximum Contaminant Level
H = Lifetime Health Advisory Level
G = Ingestion
N = Inhalation
S = Aqueous Solubility Cap

APPENDIX A

Table 2—Medium-Specific Concentrations (MSCs) for Inorganic Regulated Substances in Groundwater

REGULATED SUBSTANCE	*CASRN*	*USE AQUIFERS*								*NON-USE AQUIFERS*			
		TDS ≤ 2500				*TDS > 2500*							
		R		*NR*		*R*		*NR*		*R*		*NR*	
ANTIMONY	7440360	6	M	6	M	600	M	600	M	6,000	M	6,000	M
ARSENIC	7440382	50	M	50	M	5,000	M	5,000	M	50,000	M	50,000	M
ASBESTOS	1.2E+07	7,000,000 fibers/L	M	7,000,000 fibers/L	M	7,000,000 fibers/L	M	7,000,000 fibers/L	M	7,000,000 fibers/L	M	7,000,000 fibers/L	M
BARIUM AND COMPOUNDS	7440393	2,000	M	2,000	M	200,000	M	200,000	M	2,000,000	M	2,000,000	M
BERYLLIUM	7440417	4	M	4	M	400	M	400	M	4,000	M	4,000	M
BORON AND COMPOUNDS	7440428	600	H	600	H	60,000	H	60,000	H	600,000	H	600,000	H
CADMIUM	7440439	5	M	5	M	500	M	500	M	5,000	M	5,000	M
CHROMIUM (III)	1.6E+07	100	M	100	M	10,000	M	10,000	M	100,000	M	100,000	M
CHROMIUM (VI)	1.9E+07	180	G	510	G	18,000	G	51,000	G	180,000	G	510,000	G
COBALT	7440484	2,200	G	6,100	G	220,000	G	610,000	G	2,200,000	G	6,100,000	G
COPPER	7440508	1,000	M	1,000	M	100,000	M	100,000	M	1,000,000	M	1,000,000	M
CYANIDE, FREE	57125	200	M	200	M	20,000	M	20,000	M	200,000	M	200,000	M
LEAD	7439921	5	M	5	M	500	M	500	M	5,000	M	5,000	M
MERCURY	7439976	2	M	2	M	200	M	200	M	2,000	M	2,000	M
NICKEL	7440020	100	H	100	H	10,000	H	10,000	H	100,000	H	100,000	H
NITRATE NITROGEN	1.5E+07	10,000	M	10,000	M	1,000,000	M	1,000,000	M	10,000,000	M	10,000,000	M
NITRITE NITROGEN	1.5E+07	1,000	M	1,000	M	100,000	M	100,000	M	1,000,000	M	1,000,000	M
SELENIUM	7782492	50	M	50	M	5,000	M	5,000	M	50,000	M	50,000	M
SILVER	7440224	100	H	100	H	10,000	H	10,000	H	100,000	H	100,000	H
SULFATE		500,000	M	500,000	M	50,000,000	M	50,000,000	M	500,000,000	M	500,000,000	M

All concentrations in µg/L (except asbestos)
M = Maximum Contaminant Level
H = Lifetime Health Advisory Level
SMCL = Secondary Maximum Contaminant Level
G = Ingestion
N = Inhalation

APPENDIX A

Table 2—Medium-Specific Concentrations (MSCs) for Inorganic Regulated Substances in Groundwater

REGULATED SUBSTANCE	*CASRN*	*USE AQUIFERS*								*NON-USE AQUIFERS*			
		TDS ≤ 2500				*TDS > 2500*							
		R		*NR*		*R*		*NR*		*R*		*NR*	
THALLIUM	7440280	2	M	2	M	200	M	200	M	2,000	M	2,000	M
TIN	7440315	22,000	G	61,000	G	2,200,000	G	6,100,000	G	22,000,000	G	61,000,000	G
VANADIUM	7440622	2.1	G	5.8	G	210	G	580	G	2,100	G	5,800	G
ZINC AND COMPOUNDS	7440666	2,000	H	2,000	H	200,000	H	200,000	H	2,000,000	H	2,000,000	H

Secondary Contaminants

REGULATED SUBSTANCE	*SMCL*
ALUMINUM	200
CHLORIDE	250,000
FLUORIDE	2,000
IRON	300
MANGANESE	50

All concentrations in µg/L (except asbestos)
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H = Lifetime Health Advisory Level
SMCL = Secondary Maximum Contaminant Level
G = Ingestion
N = Inhalation

APPENDIX A
Table 3—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Soil
A. Direct Contact Numeric Values

REGULATED SUBSTANCE	*CASRN*	*Residential*		*Non-Residential*			
				Surface Soil		*Subsurface Soil*	
		0-15 feet		*0-2 feet*		*2-15 feet*	
ACENAPHTHENE	83329	13,000	G	170,000	G	190,000	C
ACENAPHTHYLENE	208968	13,000	G	170,000	G	190,000	C
ACETALDEHYDE	75070	140	N	520	N	600	N
ACETONE	67641	10,000	C	10,000	C	10,000	C
ACETONITRILE	75058	400	N	1,100	N	1,300	N
ACETOPHENONE	98862	10,000	C	10,000	C	10,000	C
ACETYLAMINOFLUORENE, 2- (2AAF)	53963	4.7	G	21	G	190,000	C
ACROLEIN	107028	0.38	N	1.1	N	1.2	N
ACRYLAMIDE	79061	4	G	18	G	190,000	C
ACRYLIC ACID	79107	19	N	53	N	60	N
ACRYLONITRILE	107131	4.7	N	24	N	28	N
ALACHLOR	15972608	220	G	990	G	190,000	C
ALDICARB	116063	220	G	2,800	G	190,000	C
ALDRIN	309002	1.1	G	4.7	G	190,000	C
ALLYL ALCOHOL	107186	330	N	930	N	1,100	N
AMINOBIPHENYL, 4-	92671	0.85	G	3.8	G	190,000	C
AMITROLE	61825	19	G	84	G	190,000	C
ANILINE	62533	19	N	53	N	60	N
ANTHRACENE	120127	66,000	G	190,000	C	190,000	C
ATRAZINE	1912249	81	G	360	G	190,000	C
BENZENE	71432	38	N	200	N	230	N
BENZO[A]ANTHRACENE	56553	25	G	110	G	190,000	C
BENZO[A]PYRENE	50328	2.5	G	11	G	190,000	C
BENZO[B]FLUORANTHENE	205992	25	G	110	G	190,000	C
BENZO[GHI]PERYLENE	191242	13,000	G	170,000	G	190,000	C
BENZO[K]FLUORANTHENE	207089	250	G	1,100	G	190,000	C
BENZOIC ACID	65850	190,000	C	190,000	C	190,000	C
BENZYL ALCOHOL	100516	10,000	C	10,000	C	10,000	C

All concentrations in mg/kg
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A. Direct Contact Numeric Values

REGULATED SUBSTANCE	*CASRN*	*Residential*		*Non-Residential*			
				Surface Soil		*Subsurface Soil*	
		0-15 feet		*0-2 feet*		*2-15 feet*	
BENZYL CHLORIDE	100447	6.4	N	33	N	38	N
BHC, ALPHA	319846	2.8	G	13	G	190,000	C
BHC, BETA-	319857	9.9	G	44	G	190,000	C
BHC, DELTA-	319868	66	G	840	G	190,000	C
BHC, GAMMA (LINDANE)	58899	16	G	72	G	190,000	C
BIS(2-CHLORO-ISOPROPYL)ETHER	108601	2,700	N	7,400	N	8,500	N
BIS(2-CHLOROETHYL)ETHER	111444	0.96	N	5	N	5.7	N
BIS(CHLOROMETHYL)ETHER	542881	0.0051	N	0.027	N	0.031	N
BIS[2-ETHYLHEXYL] PHTHALATE	117817	1,300	G	5,700	G	10,000	C
BROMODICHLOROMETHANE	75274	8.6	N	45	N	51	N
BROMOMETHANE	74839	95	N	270	N	300	N
BUTYL ALCOHOL, N-	71363	6,600	N	10,000	C	10,000	C
BUTYL PHTHALATE, DI-N-	84742	10,000	C	10,000	C	10,000	C
BUTYLBENZYL PHTHALATE	85687	10,000	C	10,000	C	10,000	C
CAPTAN	133062	5,100	G	23,000	G	190,000	C
CARBARYL	63252	22,000	G	190,000	C	190,000	C
CARBOFURAN	1563662	1,100	G	14,000	G	190,000	C
CARBON DISULFIDE	75150	10,000	C	10,000	C	10,000	C
CARBON TETRACHLORIDE	56235	21	N	110	N	120	N
CHLORDANE	57749	13	G	61	G	190,000	C
CHLORO-1-PROPENE, 3- (ALLYL CHLORIDE)	107051	19	N	53	N	61	N
CHLOROANILINE, P-	106478	880	G	11,000	G	190,000	C
CHLOROBENZENE	108907	4,400	G	10,000	C	10,000	C
CHLOROBENZILATE	510156	66	G	290	G	10,000	C
CHLORODIBROMOMETHANE	124481	12	N	61	N	70	N
CHLOROETHANE	75003	10,000	C	10,000	C	10,000	C
CHLOROETHYL VINYL ETHER, 2-	110758	1,700	N	4,700	N	5,400	N
CHLOROFORM	67663	14	N	72	N	82	N

All concentrations in mg/kg
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APPENDIX A
Table 3—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Soil
A. Direct Contact Numeric Values

REGULATED SUBSTANCE	*CASRN*	*Residential*		*Non-Residential*			
				Surface Soil		*Subsurface Soil*	
		0-15 feet		*0-2 feet*		*2-15 feet*	
CHLORONAPHTHALENE, 2-	91587	18,000	G	190,000	C	190,000	C
CHLOROPHENOL, 2-	95578	330	N	920	N	1,100	N
CHLOROPRENE	126998	130	N	370	N	430	N
CHLORPYRIFOS	2921882	660	G	8,400	G	190,000	C
CHRYSENE	218019	2,500	G	11,000	G	190,000	C
CRESOL(S)	1319773	330	N	920	N	1,100	N
CRESOL, P-CHLORO-M-	59507	1,100	G	14,000	G	190,000	C
CROTONALDEHYDE	4170303	9.4	G	42	G	10,000	C
CUMENE	98828	170	N	480	N	550	N
CYCLOHEXANONE	108941	10,000	C	10,000	C	10,000	C
DDD, 4,4'-	72548	75	G	330	G	190,000	C
DDE, 4,4'-	72559	53	G	230	G	190,000	C
DDT, 4,4'-	50293	53	G	230	G	190,000	C
DIALLATE	2303164	18	N	93	N	110	N
DIAZINON	333415	200	G	2,500	G	190,000	C
DIBENZO[A,H]ANTHRACENE	53703	2.5	G	11	G	190,000	C
DIBROMO-3-CHLOROPROPANE, 1,2-	96128	3.8	N	11	N	12	N
DIBROMOETHANE, 1,2- (ETHYLENE DIBROMIDE)	106934	0.21	G	0.93	G	8.6	N
DIBROMOMETHANE	74953	670	N	1,900	N	2,100	N
DICHLOROBENZENE, 1,2-	95501	3,800	N	10,000	C	10,000	C
DICHLOROBENZENE, 1,3-	541731	5,900	N	10,000	C	10,000	C
DICHLOROBENZENE, P-	106467	750	G	3,300	G	190,000	C
DICHLOROBENZIDINE, 3,3'-	91941	40	G	180	G	190,000	C
DICHLORODIFLUOROMETHANE (FREON 12)	75718	3,800	N	10,000	C	10,000	C
DICHLOROETHANE, 1,1-	75343	200	N	1,000	N	1,200	N
DICHLOROETHANE, 1,2-	107062	12	N	63	N	73	N
DICHLOROETHYLENE, 1,1-	75354	6.4	N	33	N	38	N
DICHLOROETHYLENE, CIS-1,2-	156592	670	N	1,900	N	2,100	N

All concentrations in mg/kg
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C = Cap

APPENDIX A
Table 3—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Soil
A. Direct Contact Numeric Values

REGULATED SUBSTANCE	*CASRN*	*Residential*		*Non-Residential*			
				Surface Soil		*Subsurface Soil*	
		0-15 feet		*0-2 feet*		*2-15 feet*	
DICHLOROETHYLENE, TRANS-1,2-	156605	1,300	N	3,700	N	4,300	N
DICHLOROMETHANE (METHYLENE CHLORIDE)	75092	670	N	3,500	N	4,000	N
DICHLOROPHENOL, 2,4-	120832	660	G	8,400	G	190,000	C
DICHLOROPHENOXYACETIC ACID, 2,4- (2,4-D)	94757	2,200	G	28,000	G	190,000	C
DICHLOROPROPANE, 1,2-	78875	16	N	85	N	97	N
DICHLOROPROPIONIC ACID (DALAPON), 2,2-	75990	2,000	N	5,500	N	6,300	N
DICHLORVOS	62737	62	G	270	G	190,000	C
DIELDRIN	60571	1.1	G	5	G	10,000	C
DIETHYL PHTHALATE	84662	10,000	C	10,000	C	10,000	C
DIMETHOATE	60515	44	G	560	G	190,000	C
DIMETHYLAMINOAZOBENZENE, P-	60117	3.9	G	17	G	190,000	C
DIMETHYLHYDRAZINE, 1,1-	57147	0.64	N	3.3	N	3.8	N
DIMETHYLPHENOL, 2,4-	105679	4,400	G	10,000	C	10,000	C
DINITROBENZENE, 1,3-	99650	22	G	280	G	190,000	C
DINITROPHENOL, 2,4-	51285	440	G	5,600	G	190,000	C
DINITROTOLUENE, 2,4-	121142	58	G	260	G	190,000	C
DINITROTOLUENE, 2,6- (2,6-DNT)	606202	220	G	2,800	G	190,000	C
DINOSEB	88857	220	G	2,800	G	190,000	C
DIOXANE, 1,4-	123911	41	N	210	N	240	N
DIPHENYLAMINE	122394	5,500	G	70,000	G	190,000	C
DIPHENYLHYDRAZINE, 1,2-	122667	22	G	99	G	190,000	C
DIQUAT	85007	480	G	6,200	G	190,000	C
DISULFOTON	298044	2.7	N	7.6	N	8.7	N
DIURON	330541	440	G	5,600	G	190,000	C
ENDOSULFAN I (ALPHA)	959988	1,300	G	17,000	G	190,000	C
ENDOSULFAN II (BETA)	33213659	1,300	G	17,000	G	190,000	C
ENDOSULFAN SULFATE	1031078	1,300	G	17,000	G	190,000	C
ENDOTHALL	145733	4,400	G	56,000	G	190,000	C

All concentrations in mg/kg
G = Ingestion
N = Inhalation
C = Cap

APPENDIX A
Table 3—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Soil
A. Direct Contact Numeric Values

REGULATED SUBSTANCE	*CASRN*	*Residential*		*Non-Residential*			
				Surface Soil		*Subsurface Soil*	
		0-15 feet		*0-2 feet*		*2-15 feet*	
ENDRIN	72208	66	G	840	G	190,000	C
EPICHLOROHYDRIN	106898	19	N	53	N	60	N
ETHION	563122	110	G	1,400	G	10,000	C
ETHOXYETHANOL, 2- (EGEE)	110805	10,000	C	10,000	C	10,000	C
ETHYL ACETATE	141786	10,000	C	10,000	C	10,000	C
ETHYL ACRYLATE	140885	23	N	120	N	140	N
ETHYL BENZENE	100414	10,000	C	10,000	C	10,000	C
ETHYL ETHER	60297	10,000	C	10,000	C	10,000	C
ETHYLENE GLYCOL	107211	10,000	C	10,000	C	10,000	C
FENAMIPHOS	22224926	55	G	700	G	190,000	C
FLUORANTHENE	206440	8,800	G	110,000	G	190,000	C
FLUORENE	86737	8,800	G	110,000	G	190,000	C
FLUOROTRICHLOROMETHANE (FREON 11)	75694	10,000	C	10,000	C	10,000	C
FONOFOS	944229	140	N	380	N	440	N
FORMALDEHYDE	50000	24	N	130	N	150	N
FORMIC ACID	64186	10,000	C	10,000	C	10,000	C
FURFURAL	98011	660	G	2,600	N	3,000	N
GLYPHOSATE	1071836	22,000	G	190,000	C	190,000	C
HEPTACHLOR	76448	4	G	18	G	190,000	C
HEPTACHLOR EPOXIDE	1024573	2	G	8.7	G	190,000	C
HEXACHLOROBENZENE	118741	11	G	50	G	190,000	C
HEXACHLOROBUTADIENE	87683	44	G	560	G	10,000	C
HEXACHLOROCYCLOPENTADIENE	77474	1,500	G	10,000	C	10,000	C
HEXACHLOROETHANE	67721	220	G	2,800	G	190,000	C
HEXANE	110543	3,800	N	10,000	C	10,000	C
INDENO[1,2,3-CD]PYRENE	193395	25	G	110	G	190,000	C
ISOBUTYL ALCOHOL	78831	10,000	C	10,000	C	10,000	C
ISOPHORONE	78591	10,000	C	10,000	C	10,000	C
KEPONE	143500	1.1	G	5	G	190,000	C

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APPENDIX A
Table 3—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Soil
A. Direct Contact Numeric Values

		Residential		*Non-Residential*			
REGULATED SUBSTANCE	*CASRN*	*0-15 feet*		*Surface Soil 0-2 feet*		*Subsurface Soil 2-15 feet*	
MALATHION	121755	1,300	N	4,000	N	4,600	N
MALEIC HYDRAZIDE	123331	110,000	G	190,000	C	190,000	C
METHACRYLONITRILE	126987	13	N	37	N	43	N
METHANOL	67561	10,000	C	10,000	C	10,000	C
METHOMYL	16752775	5,500	G	70,000	G	190,000	C
METHOXYCHLOR	72435	1,100	G	14,000	G	190,000	C
METHYL CHLORIDE	74873	180	N	920	N	1,000	N
METHYL ETHYL KETONE	78933	10,000	C	10,000	C	10,000	C
METHYL ISOBUTYL KETONE	108101	1,500	N	4,300	N	4,900	N
METHYL METHACRYLATE	80626	5,300	N	10,000	C	10,000	C
METHYL METHANESULFONATE	66273	180	G	800	G	190,000	C
METHYL PARATHION	298000	17	N	48	N	55	N
METHYL TERT-BUTYL ETHER (MTBE)	1634044	10,000	C	10,000	C	10,000	C
METHYLNAPHTHALENE, 2-	91576	8,800	G	10,000	C	10,000	C
NAPHTHALENE	91203	8,800	G	110,000	G	190,000	C
NAPHTHYLAMINE, 1-	134327	9.9	G	44	G	190,000	C
NAPHTHYLAMINE, 2-	91598	9.9	G	44	G	190,000	C
NITROANILINE, M-	99092	13	G	160	G	190,000	C
NITROANILINE, O-	88744	13	G	160	G	190,000	C
NITROANILINE, P-	100016	13	G	160	G	190,000	C
NITROBENZENE	98953	110	G	1,400	G	10,000	C
NITROPHENOL, 2-	88755	14,000	G	170,000	G	190,000	C
NITROPHENOL, 4-	100027	14,000	G	170,000	G	190,000	C
NITROPROPANE, 2-	79469	0.12	N	0.61	N	0.69	N
NITROSODI-N-PROPYLAMINE, N-	621647	2.6	G	11	G	10,000	C
NITROSODIETHYLAMINE, N-	55185	0.0073	N	0.038	N	0.043	N
NITROSODIMETHYLAMINE, N-	62759	0.023	N	0.12	N	0.13	N
NITROSODIPHENYLAMINE, N-	86306	3,700	G	16,000	G	190,000	C
OCTYL PHTHALATE, DI-N-	117840	4,400	G	10,000	C	10,000	C

All concentrations in mg/kg
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APPENDIX A
Table 3—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Soil
A. Direct Contact Numeric Values

REGULATED SUBSTANCE	*CASRN*	*Residential* *0-15 feet*		*Non-Residential* *Surface Soil 0-2 feet*		*Non-Residential* *Subsurface Soil 2-15 feet*	
OXAMYL (VYDATE)	23135220	5,500	G	70,000	G	190,000	C
PARATHION	56382	1,300	G	10,000	C	10,000	C
PCB-1016 (AROCLOR)	12674112	15	G	200	G	10,000	C
PCB-1221 (AROCLOR)	11104282	36	G	160	G	10,000	C
PCB-1232 (AROCLOR)	11141165	36	G	160	G	10,000	C
PCB-1242 (AROCLOR)	53469219	36	G	160	G	10,000	C
PCB-1248 (AROCLOR)	12672296	9.9	G	44	G	10,000	C
PCB-1254 (AROCLOR)	11097691	4.4	G	44	G	10,000	C
PCB-1260 (AROCLOR)	11096825	30	G	130	G	190,000	C
PENTACHLOROBENZENE	608935	180	G	2,200	G	190,000	C
PENTACHLORONITROBENZENE	82688	69	G	310	G	190,000	C
PENTACHLOROPHENOL	87865	150	G	660	G	190,000	C
PHENACETIN	62442	8,100	G	36,000	G	190,000	C
PHENANTHRENE	85018	66,000	G	190,000	C	190,000	C
PHENOL	108952	130,000	G	190,000	C	190,000	C
PHENYLENEDIAMINE, M-	108452	1,300	G	17,000	G	190,000	C
PHORATE	298022	13	N	37	N	43	N
PHTHALIC ANHYDRIDE	85449	190,000	C	190,000	C	190,000	C
PRONAMIDE	23950585	17,000	G	190,000	C	190,000	C
PROPYLENE OXIDE	75569	75	G	330	G	500	N
PYRENE	129000	6,600	G	84,000	G	190,000	C
PYRIDINE	110861	67	N	190	N	210	N
SIMAZINE	122349	150	G	660	G	190,000	C
STRYCHNINE	57249	66	G	840	G	190,000	C
STYRENE	100425	10,000	C	10,000	C	10,000	C
TERBUFOS	13071799	1.7	N	4.6	N	5.3	N
TETRACHLORODIBENZO-P-DIOXIN, 2,3,7,8- (TCDD)	1746016	0.00012	G	0.00053	G	190000	C
TETRACHLOROETHANE, 1,1,2,2-	79345	5.5	N	28	N	33	N
TETRACHLOROETHYLENE (PCE)	127184	340	G	1,500	G	3,300	N

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APPENDIX A
Table 3—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Soil
A. Direct Contact Numeric Values

REGULATED SUBSTANCE	*CASRN*	*Residential*		*Non-Residential*			
				Surface Soil		*Subsurface Soil*	
		0-15 feet		*0-2 feet*		*2-15 feet*	
TETRACHLOROPHENOL, 2,3,4,6-	58902	6,600	G	84,000	G	190,000	C
TETRAETHYL LEAD	78002	0.022	G	0.28	G	10,000	C
THIRAM	137268	1,100	G	14,000	G	190,000	C
TOLUENE	108883	7,600	N	10,000	C	10,000	C
TOLUIDINE, M-	108441	75	G	330	G	10,000	C
TOLUIDINE, O-	95534	99	G	440	G	10,000	C
TOLUIDINE, P-	106490	94	G	420	G	190,000	C
TOXAPHENE	8001352	16	G	72	G	190,000	C
TRIBROMOMETHANE (BROMOFORM)	75252	290	N	1,500	N	1,700	N
TRICHLOROBENZENE, 1,2,4-	120821	2,200	G	10,000	C	10,000	C
TRICHLOROBENZENE, 1,3,5-	108703	2,200	G	28,000	G	190,000	C
TRICHLOROETHANE, 1,1,1-	71556	10,000	C	10,000	C	10,000	C
TRICHLOROETHANE, 1,1,2-	79005	20	N	100	N	120	N
TRICHLOROETHYLENE (TCE)	79016	190	N	970	N	1,100	N
TRICHLOROPHENOL, 2,4,5-	95954	22,000	G	190,000	C	190,000	C
TRICHLOROPHENOL, 2,4,6-	88062	1,600	G	7,200	G	190,000	C
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	93765	2,200	G	28,000	G	190,000	C
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)(SILVEX)	93721	1,800	G	22,000	G	190,000	C
TRICHLOROPROPANE, 1,2,3-	96184	0.16	N	0.82	N	0.95	N
VINYL ACETATE	108054	3,800	N	10,000	C	10,000	C
VINYL CHLORIDE	75014	3.8	N	20	N	22	N
WARFARIN	81812	66	G	840	G	190,000	C
XYLENES (TOTAL)	1330207	10,000	C	10,000	C	10,000	C

All concentrations in mg/kg
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APPENDIX A
Table 3—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Soil
B. Soil to Groundwater Numeric Values[1]

REGULATED SUBSTANCE	*CASRN*	*Used Aquifers*												*Non-Use Aquifers*						*Soil Buffer Distance (feet)*
		TDS ≤ 2500						*TDS > 2500*												
		Residential			*Non-Residential*			*Residential*			*Non-Residential*			*Residential*			*Non-Residential*			
		100 X GW MSC	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		
ACENAPHTHENE	83329	220	2700	E	350	4,300	E	350	4,300	E	350	4,300	E	350	4,300	E	350	4,300	E	15
ACENAPHTHYLENE	208968	220	2,500	E	390	4,400	E	390	4,400	E	390	4,400	E	390	4,400	E	390	4,400	E	15
ACETALDEHYDE	75070	1.9	0.23	E	5.7	0.69	E	190	23	E	570	69	E	1.9	0.23	E	5.7	0.69	E	NA
ACETONE	67641	370	41	E	1,000	110	E	10,000	4,100	E	10,000	10,000	C	3,700	410	E	10,000	1,100	E	NA
ACETONITRILE	75058	5.8	0.65	E	12	1.3	E	580	65	E	1200	130	E	58	6.5	E	120	13	E	NA
ACETOPHENONE	98862	370	200	E	1000	550	E	10,000	10,000	C	1,000	10,000	C	370	200	E	1,000	550	E	NA
ACETYLAMINOFLUORENE, 2- (2AAF)	53963	0.017	0.069	E	0.068	0.28	E	1.7	6.9	E	6.8	28	E	17	69	E	68	280	E	20
ACROLEIN	107028	0.0055	0.00062	E	0.012	0.0014	E	0.55	0.062	E	1.2	0.14	E	0.055	0.0062	E	0.12	0.014	E	NA
ACRYLAMIDE	79061	0.0033	0.00057	E	0.014	0.0024	E	0.33	0.057	E	1.4	0.24	E	0.0033	0.00057	E	0.014	0.0024	E	NA
ACRYLIC ACID	79107	0.28	0.051	E	0.58	0.11	E	28	5.1	E	58	11	E	28	5.1	E	58	11	E	NA
ACRYLONITRILE	107131	0.063	0.0088	E	0.27	0.038	E	6.3	0.88	E	27	3.8	E	6.3	0.88	E	27	3.8	E	NA
ALACHLOR	15972608	0.2	0.077	E	0.2	0.077	E	20	7.7	E	20	7.7	E	0.2	0.077	E	0.2	0.077	E	NA
ALDICARB	116063	0.7	0.12	E	0.7	0.12	E	70	12	E	70	12	E	700	120	E	700	120	E	NA
ALDRIN	309002	0.00087	0.1	E	0.0037	0.44	E	0.087	10	E	0.37	44	E	0.087	10	E	0.37	44	E	10
ALLYL ALCOHOL	107186	4.9	0.58	E	10	1.2	E	490	58	E	1000	120	E	490	58	E	1,000	120	E	NA
AMINOBIPHENYL, 4-	92671	0.0031	0.0012	E	0.012	0.0045	E	0.31	0.12	E	1.2	0.45	E	3.1	1.2	E	12	4.5	E	NA
AMITROLE	61825	0.07	0.028	E	0.28	0.11	E	7	2.8	E	28	11	E	70	28	E	280	110	E	NA
ANILINE	62533	0.28	0.16	E	0.58	0.34	E	28	16	E	58	34	E	0.28	0.16	E	0.58	0.34	E	NA

[1] For other options see Section 250.308
All concentrations in mg/kg
E = Number calculated by the soil to groundwater equation in Section 250.308
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NA = The soil buffer distance option is not available for this substance

APPENDIX A
Table 3—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Soil
B. Soil to Groundwater Numeric Values[1]

REGULATED SUBSTANCE	*CASRN*	*Used Aquifers*												*Non-Use Aquifers*						*Soil Buffer Distance (feet)*
		TDS ≤ 2500						*TDS > 2500*												
		Residential			*Non-Residential*			*Residential*			*Non-Residential*			*Residential*			*Non-Residential*			
		100 X GW MSC	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		
ANTHRACENE	120127	4.3	230	E	4.3	230	E	4.3	230	E	4.3	230	E	4.3	230	E	4.3	230	E	10
ATRAZINE	1912249	0.3	0.13	E	0.3	0.13	E	30	13	E	30	13	E	0.3	0.13	E	0.3	0.13	E	NA
BENZENE	71432	0.5	0.13	E	0.5	0.13	E	50	13	E	50	13	E	50	13	E	50	13	E	NA
BENZO[A]ANTHRACENE	56553	0.09	80	E	0.36	320	E	1.4	1,200	E	1.4	1,200	E	1.4	1,200	E	1.4	1,200	E	5
BENZO[A]PYRENE	50328	0.02	46	E	0.02	46	E	0.38	870	E	0.38	870	E	0.38	870	E	0.38	870	E	5
BENZO[B]FLUORANTHENE	205992	0.09	120	E	0.12	160	E	0.12	160	E	0.12	160	E	0.12	160	E	0.12	160	E	5
BENZO[GHI]PERYLENE	191242	0.026	180	E	0.026	180	E	0.026	180	E	0.026	180	E	0.026	180	E	0.026	180	E	5
BENZO[K]FLUORANTHENE	207089	0.055	600	E	0.055	600	E	0.055	600	E	0.055	600	E	0.055	600	E	0.055	600	E	5
BENZOIC ACID	65850	15000	2,900	E	41,000	7,900	E	190,000	65,000	E	190,000	65,000	E	15,000	2,900	E	41,000	7,900	E	NA
BENZYL ALCOHOL	100516	1100	400	E	3100	1100	E	10000	10000	C	10000	10,000	C	1,100	400	E	3,100	1,100	E	NA
BENZYL CHLORIDE	100447	0.087	0.051	E	0.37	0.22	E	8.7	5.1	E	37	22	E	8.7	5.1	E	37	22	E	NA
BHC, ALPHA	319846	0.01	0.046	E	0.041	0.19	E	1	4.6	E	4.1	19	E	10	46	E	41	190	E	20
BHC, BETA-	319857	0.037	0.22	E	0.14	0.82	E	3.7	22	E	14	82	E	37	220	E	140	820	E	15
BHC, DELTA-	319868	1.1	5.4	E	3.1	15	E	110	540	E	310	1,500	E	1,100	5,400	E	2,100	10,000	E	20
BHC, GAMMA (LINDANE)	58899	0.02	0.071	E	0.02	0.071	E	2	7.1	E	2	7.1	E	20	71	E	20	71	E	20
BIS(2-CHLORO-ISOPROPYL)ETHER	108601	30	8	E	30	8	E	3,000	800	E	3,000	800	E	3,000	800	E	3,000	800	E	NA
BIS(2-CHLOROETHYL) ETHER	111444	0.013	0.0039	E	0.055	0.017	E	1.3	0.39	E	5.5	1.7	E	1.3	0.39	E	5.5	1.7	E	NA

[1] For other options see Section 250.308
All concentrations in mg/kg
E = Number calculated by the soil to groundwater equation in Section 250.308
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APPENDIX A
Table 3—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Soil
B. Soil to Groundwater Numeric Values[1]

REGULATED SUBSTANCE	*CASRN*	*Used Aquifers*												*Non-Use Aquifers*						*Soil Buffer Distance (feet)*
		TDS ≤ 2500						*TDS > 2500*												
		Residential			*Non-Residential*			*Residential*			*Non-Residential*			*Residential*			*Non-Residential*			
		100 X GW MSC	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		
BIS(CHLOROMETHYL) ETHER	542881	0.000069	0.00001	E	0.00029	0.000044	E	0.0069	0.001	E	0.029	0.0044	E	0.0069	0.001	E	0.029	0.0044	E	NA
BIS[2-ETHYLHEXYL] PHTHALATE	117817	0.6	130	E	0.6	130	E	34	7400	E	34	7,400	E	34	7,400	E	34	7,400	E	10
BROMODICHLORO-METHANE	75274	10	3.4	E	10	3.4	E	1,000	340	E	1,000	340	E	10	3.4	E	10	3.4	E	NA
BROMOMETHANE	74839	1	0.54	E	1	0.54	E	100	54	E	100	54	E	100	54	E	100	54	E	NA
BUTYL ALCOHOL, N-	71363	97	12	E	200	24	E	9,700	1,200	E	10,000	2,400	E	970	120	E	2,000	240	E	NA
BUTYL PHTHALATE, DI-N-	84742	370	1,500	E	1,000	4,100	E	1,300	5,300	E	1,300	5,300	E	1,300	5,300	E	1,300	5,300	E	20
BUTYLBENZYL PHTHALATE	85687	270	10,000	C	270	10,000	C	270	10,000	C	270	10,000	C	270	10,000	C	270	10,000	C	10
CAPTAN	133062	19	12	E	74	45	E	330	200	E	330	200	E	330	200	E	330	200	E	NA
CARBARYL	63252	70	42	E	70	42	E	7,000	4,200	E	7,000	4,200	E	8,300	5,000	E	8,300	5,000	E	NA
CARBOFURAN	1563662	4	0.87	E	4	0.87	E	400	87	E	400	87	E	4	0.87	E	4	0.87	E	NA
CARBON DISULFIDE	75150	190	160	E	410	350	E	10,000	10,000	C	10,000	10,000	C	190	160	E	410	350	E	NA
CARBON TETRACHLORIDE	56235	0.5	0.26	E	0.5	0.26	E	50	26	E	50	26	E	5	2.6	E	5	2.6	E	NA
CHLORDANE	57749	0.2	49	E	0.2	49	E	5.6	1,400	E	5.6	1,400	E	5.6	1,400	E	5.6	1,400	E	10
CHLORO-1-PROPENE, 3-(ALLYL CHLORIDE)	107051	0.28	0.065	E	0.58	0.13	E	28	6.5	E	58	13	E	28	6.5	E	58	13	E	NA
CHLOROANILINE, P-	106478	15	19	E	41	51	E	390	490	E	390	490	E	15	19	E	41	51	E	NA
CHLOROBENZENE	108907	5.5	3.4	E	12	7.5	E	550	340	E	1,200	750	E	550	340	E	1,200	750	E	NA
CHLOROBENZILATE	510156	0.24	1.6	E	0.96	6.4	E	24	160	E	96	640	E	240	1,600	E	960	6,400	E	15

[1] For other options see Section 250.308
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E = Number calculated by the soil to groundwater equation in Section 250.308
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APPENDIX A
Table 3—Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Soil
B. Soil to Groundwater Numeric Values[1]

REGULATED SUBSTANCE	CASRN	Used Aquifers												Non-Use Aquifers						Soil Buffer Distance (feet)
		TDS ≤ 2500						TDS > 2500												
		Residential			Non-Residential			Residential			Non-Residential			Residential			Non-Residential			
		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		
CHLORODIBROMO-METHANE	124481	10	3.2	E	10	3.2	E	1,000	320	E	1,000	320	E	1,000	320	E	1,000	320	E	NA
CHLOROETHANE	75003	2,800	600	E	5,800	1,200	E	10,000	10,000	C	10,000	10,000	C	10,000	10,000	C	10,000	10,000	C	NA
CHLOROETHYL VINYL ETHER, 2-	110758	24	3.1	E	51	6.5	E	2,400	310	E	5,100	650	E	24	3.1	E	51	6.5	E	NA
CHLOROFORM	67663	10	2.5	E	10	2.5	E	1,000	250	E	1,000	250	E	100	25	E	100	25	E	NA
CHLORONAPHTHALENE, 2-	91587	290	6,200	E	670	14,000	E	670	14,000	E	670	14,000	E	290	6,200	E	670	14,000	E	15
CHLOROPHENOL, 2-	95578	4	4.4	E	4	4.4	E	400	440	E	400	440	E	4	4.4	E	4	4.4	E	NA
CHLOROPRENE	126998	1.9	0.45	E	4.1	0.97	E	190	45	E	410	97	E	190	45	E	410	97	E	NA
CHLORPYRIFOS	2921882	2	23	E	2	23	E	130	1,500	E	130	1,500	E	2	23	E	2	23	E	15
CHRYSENE	218019	0.18	220	E	0.18	220	E	0.18	220	E	0.18	220	E	0.18	220	E	0.18	220	E	5
CRESOL	1319773	4.9	0.85	E	10	1.7	E	490	85	E	1,000	170	E	490	85	E	1000	170	E	NA
CRESOL, P-CHLORO-M-	59507	18	37	E	51	100	E	1,800	3,700	E	5,100	10,000	E	18	37	E	51	100	E	30
CROTONALDEHYDE	4170303	0.0079	0.00099	E	0.034	0.0043	E	0.79	0.099	E	3.4	0.43	E	0.79	0.099	E	3.4	0.43	E	NA
CUMENE	98828	2.5	18	E	5.2	37	E	250	1,800	E	520	3,700	E	250	1,800	E	520	3,700	E	15
CYCLOHEXANONE	108941	4,900	1,400	E	10,000	2,800	E	10,000	10,000	C	10,000	10,000	C	4,900	1,400	E	10,000	2,800	E	NA
DDD, 4,4'-	72548	0.062	6.8	E	0.27	29	E	6.2	680	E	16	1,700	E	6.2	680	E	16	1,700	E	10
DDE, 4,4'-	72559	0.13	28	E	0.13	28	E	0.13	28	E	0.13	28	E	0.13	28	E	0.13	28	E	10
DDT, 4,4'-	50293	0.17	100	E	0.17	100	E	0.17	100	E	0.17	100	E	0.17	100	E	0.17	100	E	5
DIALLATE	2303164	0.25	0.15	E	1	0.59	E	25	15	E	100	59	E	25	15	E	100	59	E	NA

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		TDS ≤ 2500						*TDS > 2500*												
		Residential			*Non-Residential*			*Residential*			*Non-Residential*			*Residential*			*Non-Residential*			
		100 X GW MSC	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		
DIAZINON	333415	0.06	0.082	E	0.06	0.082	E	6	8.2	E	6	8.2	E	0.06	0.082	E	0.06	0.082	E	30
DIBENZO[A,H]ANTHRACENE	53703	0.009	41	E	0.036	160	E	0.05	230	E	0.05	230	E	0.05	230	E	0.05	230	E	5
DIBROMO-3-CHLOROPROPANE, 1,2-	96128	0.02	0.0091	E	0.02	0.0091	E	2	0.91	E	2	0.91	E	2	0.91	E	2	0.91	E	NA
DIBROMOETHANE, 1,2- (ETHYLENE DIBROMIDE)	106934	0.005	0.0012	E	0.005	0.0012	E	0.5	0.12	E	0.5	0.12	E	0.5	0.12	E	0.5	0.12	E	NA
DIBROMOMETHANE	74953	9.7	3.7	E	20	7.7	E	970	370	E	2,000	770	E	970	370	E	2,000	770	E	NA
DICHLOROBENZENE, 1,2-	95501	60	60	E	60	60	E	6,000	6,000	E	6,000	6,000	E	6,000	6,000	E	6,000	6,000	E	NA
DICHLOROBENZENE, 1,3-	541731	60	61	E	60	61	E	6,000	6,100	E	6,000	6,100	E	6,000	6,100	E	6,000	6,100	E	NA
DICHLOROBENZENE, P-	106467	7.5	10	E	7.5	10	E	750	1,000	E	750	1,000	E	750	1,000	E	750	1,000	E	30
DICHLOROBENZIDINE, 3,3'-	91941	0.15	8.4	E	0.58	33	E	15	840	E	58	3,300	E	150	8,400	E	580	33,000	E	10
DICHLORODIFLUOROMETHANE (FREON 12)	75718	100	100	E	100	100	E	10,000	10,000	C	10,000	10,000	C	10,000	10,000	C	10,000	10,000	C	NA
DICHLOROETHANE, 1,1-	75343	2.7	0.65	E	11	2.7	E	270	65	E	1,100	270	E	27	6.5	E	110	27	E	NA
DICHLOROETHANE, 1,2-	107062	0.5	0.1	E	0.5	0.1	E	50	10	E	50	10	E	5	1	E	5	1	E	NA
DICHLOROETHYLENE, 1,1-	75354	0.7	0.19	E	0.7	0.19	E	70	19	E	70	19	E	7	1.9	E	7	1.9	E	NA
DICHLOROETHYLENE, CIS-1,2-	156592	7	1.6	E	7	1.6	E	700	160	E	700	160	E	70	16	E	70	16	E	NA
DICHLOROETHYLENE, TRANS-1,2-	156605	10	2.3	E	10	2.3	E	1,000	230	E	1,000	230	E	100	23	E	100	23	E	NA
DICHLOROMETHANE (METHYLENE CHLORIDE)	75092	0.5	0.075	E	0.5	0.075	E	50	7.5	E	50	7.5	E	50	7.5	E	50	7.5	E	NA

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		TDS ≤ 2500						TDS > 2500												
		Residential			Non-Residential			Residential			Non-Residential			Residential			Non-Residential			
		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		
DICHLOROPHENOL, 2,4-	120832	2	1	E	2	1	E	200	100	E	200	100	E	2,000	1,000	E	2,000	1,000	E	NA
DICHLOROPHENOXYACETIC ACID, 2,4- (2,4-D)	94757	7	1.8	E	7	1.8	E	700	180	E	700	180	E	700	180	E	700	180	E	NA
DICHLOROPROPANE, 1,2-	78875	0.5	0.11	E	0.5	0.11	E	50	11	E	50	11	E	5	1.1	E	5	1.1	E	NA
DICHLOROPROPIONIC ACID (DALAPON), 2,2-	75990	20	5.3	E	20	5.3	E	2,000	530	E	2,000	530	E	2,000	530	E	2,000	530	E	NA
DICHLORVOS	62737	0.052	0.012	E	0.22	0.052	E	5.2	1.2	E	22	5.2	E	0.052	0.012	E	0.22	0.052	E	NA
DIELDRIN	60571	0.0041	0.11	E	0.016	0.44	E	0.41	11	E	1.6	44	E	4.1	110	E	16	440	E	15
DIETHYL PHTHALATE	84662	500	160	E	500	160	E	10,000	10,000	C	10,000	10,000	C	10,000	10,000	C	10,000	10,000	C	NA
DIMETHOATE	60515	0.73	0.28	E	2	0.77	E	73	28	E	200	77	E	730	280	E	2000	770	E	NA
DIMETHYLAMINOAZO-BENZENE, P-	60117	0.014	0.037	E	0.057	0.15	E	1.4	3.7	E	5.7	15	E	14	37	E	23	60	E	20
DIMETHYLHYDRAZINE, 1,1-	57147	0.0087	0.00097	E	0.037	0.0041	E	0.87	0.097	E	3.7	0.41	E	0.087	0.0097	E	0.37	0.041	E	NA
DIMETHYLPHENOL, 2,4-	105679	73	31	E	200	85	E	7,300	3,100	E	10,000	8,500	E	10,000	10,000	C	10,000	10,000	C	NA
DINITROBENZENE, 1,3-	99650	0.1	0.049	E	0.1	0.049	E	10	4.9	E	10	4.9	E	100	49	E	100	49	E	NA
DINITROPHENOL, 2,4-	51285	1.9	0.21	E	4.1	0.46	E	190	21	E	410	46	E	19	2.1	E	41	4.6		NA
DINITROTOLUENE, 2,4-	121142	0.21	0.05	E	0.84	0.2	E	21	5	E	84	20	E	210	50	E	840	200	E	NA
DINITROTOLUENE, 2,6- (2,6-DNT)	606202	3.7	1.1	E	10	3	E	370	110	E	1,000	300	E	3700	1,100	E	10,000	3,000	E	NA
DINOSEB	88857	0.7	0.29	E	0.7	0.29	E	70	29	E	70	29	E	70	29	E	70	29	E	NA
DIOXANE, 1,4-	123911	0.56	0.073	E	2.4	0.31	E	56	7.3	E	240	31	E	5.6	0.73	E	24	3.1	E	NA

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		TDS ≤ 2500						*TDS > 2500*												
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		100 X GW MSC	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		
DIPHENYLAMINE	122394	20	12	E	20	12	E	2,000	1,200	E	2,000	1,200	E	20,000	12,000	E	20,000	12,000	E	NA
DIPHENYLHYDRAZINE, 1,2-	122667	0.083	0.15	E	0.33	0.58	E	8.3	15	E	33	58	E	83	150	E	330	580	E	30
DIQUAT	85007	2	0.24	E	2	0.24	E	200	24	E	200	24	E	2	0.24	E	2	0.24	E	NA
DISULFOTON	298044	0.03	0.08	E	0.03	0.08	E	3	8	E	3	8	E	3	8	E	3	8	E	20
DIURON	330541	1	0.87	E	1	0.87	E	100	87	E	100	87	E	1	0.87	E	1	0.87	E	NA
ENDOSULFAN I (ALPHA)	959988	22	110	E	53	280	E	53	280	E	53	280	E	22	110	E	53	280	E	15
ENDOSULFAN II (BETA)	33213659	22	130	E	28	170	E	28	170	E	28	170	E	22	130	E	28	170	E	15
ENDOSULFAN SULFATE	1031078	12	72	E	12	72	E	12	72	E	12	72	E	12	72	E	12	72	E	15
ENDOTHALL	145733	10	4.2	E	10	4.2	E	1,000	420	E	1,000	420	E	10	4.2	E	10	4.2	E	NA
ENDRIN	72208	0.2	5.4	E	0.2	5.4	E	20	540	E	20	540	E	0.2	5.4	E	0.2	5.4	E	15
EPICHLOROHYDRIN	106898	0.28	0.056	E	0.58	0.12	E	28	5.6	E	58	12	E	28	5.6	E	58	12	E	NA
ETHION	563122	1.8	39	E	5.1	110	E	60	1300	E	60	1300	E	1.8	39	E	5.1	110	E	15
ETHOXYETHANOL, 2- (EGEE)	110805	390	55	E	820	120	E	10,000	5,500	E	10,000	10000	C	10,000	5,500	E	10,000	10,000	C	NA
ETHYL ACETATE	141786	870	220	E	1,800	460	E	10,000	10,000	C	10,000	10000	C	10,000	10,000	C	10,000	10,000	C	NA
ETHYL ACRYLATE	140885	0.31	0.12	E	1.3	0.49	E	31	12	E	130	49	E	31	12	E	130	49	E	NA
ETHYL BENZENE	100414	70	46	E	70	46	E	7,000	4,600	E	7,000	4,600	E	7,000	4,600	E	7,000	4,600	E	NA
ETHYL ETHER	60297	190	53	E	410	110	E	10,000	5,300	E	10,000	10,000	C	190	53	E	410	110	E	NA
ETHYLENE GLYCOL	107211	700	85	E	700	85	E	10,000	8,500	E	10,000	8,500	E	10,000	8,500	E	10,000	8,500	E	NA

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		100 X GW MSC	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		
FENAMIPHOS	22224926	0.2	0.17	E	0.2	0.17	E	20	17	E	20	17	E	0.2	0.17	E	0.2	0.17	E	NA
FLUORANTHENE	206440	27	3,300	E	27	3,300	E	27	3,300	E	27	3,300	E	27	3,300	E	27	3,300	E	10
FLUORENE	86737	19	380	E	19	380	E	19	380	E	19	380	E	19	380	E	19	380	E	15
FLUOROTRICHLORO-METHANE (FREON 11)	75694	200	90	E	200	90	E	10,000	9,000	E	10,000	9,000	E	10,000	9,000	E	10,000	9,000	E	NA
FONOFOS	944229	1	2.8	E	1	2.8	E	100	280	E	100	280	E	1	2.8	E	1	2.8	E	20
FORMALDEHYDE	50000	100	12	E	100	12	E	10,000	1,200	E	10,000	1,200	E	10,000	1,200	E	10,000	1,200	E	NA
FORMIC ACID	64186	1,900	210	E	4,100	460	E	10,000	10,000	C	10,000	10,000	C	10,000	2,100	E	10,000	4,600	E	NA
FURFURAL	98011	11	1.4	E	29	3.7	E	1,100	140	E	2,900	370	E	11	1.4	E	29	3.7	E	NA
GLYPHOSATE	1071836	70	630	E	70	630	E	7,000	63,000	E	7,000	63,000	E	70	630	E	70	630	E	15
HEPTACHLOR	76448	0.04	0.68	E	0.04	0.68	E	4	68	E	4	68	E	18	310	E	18	310	E	15
HEPTACHLOR EPOXIDE	1024573	0.02	1	E	0.02	1	E	2	100	E	2	100	E	20	1,000	E	20	1,000	E	10
HEXACHLOROBENZENE	118741	0.1	0.96	E	0.1	0.96	E	0.62	6	E	0.62	6	E	0.62	6	E	0.62	6	E	15
HEXACHLOROBUTADIENE	87683	0.1	1.2	E	0.1	1.2	E	10	120	E	10	120	E	100	1,200	E	100	1,200	E	15
HEXACHLOROCYCLO-PENTADIENE	77474	5	91	E	5	91	E	340	6,200	E	340	6,200	E	340	6,200	E	340	6,200	E	15
HEXACHLOROETHANE	67721	0.1	0.56	E	0.1	0.56	E	10	56	E	10	56	E	10	56	E	10	56	E	15
HEXANE	110543	55	510	E	120	1,100	E	950	8,700	E	950	8,700	E	55	510	E	120	1,100	E	15
INDENO[1,2,3-CD]PYRENE	193395	0.09	7,000	E	0.36	28,000	E	6.2	190,000	C	6.2	190,000	C	6	190,000	C	6	190,000	C	5
ISOBUTYL ALCOHOL	78831	290	76	E	610	160	E	10,000	7,600	E	10,000	10,000	C	10,000	7,600	E	10,000	10,000	C	NA

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		TDS ≤ 2500						*TDS > 2500*												
		Residential			*Non-Residential*			*Residential*			*Non-Residential*			*Residential*			*Non-Residential*			
		100 X GW MSC	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		
ISOPHORONE	78591	10	1.9	E	10	1.9	E	1,000	190	E	1,000	190	E	10,000	1,900	E	10,000	1,900	E	NA
KEPONE	143500	0.0041	0.56	E	0.016	2.2	E	0.41	56	E	1.6	220	E	4.1	560	E	16	2,200	E	10
MALATHION	121755	20	67	E	20	67	E	2,000	6,700	E	2,000	6,700	E	2,000	6,700	E	2,000	6,700	E	20
MALEIC HYDRAZIDE	123331	400	47	E	400	47	E	40,000	4,700	E	40,000	4,700	E	400	47	E	400	47	E	NA
METHACRYLONITRILE	126987	0.19	0.031	E	0.41	0.067	E	19	3.1	E	41	6.7	E	0.19	0.031	E	0.41	0.067	E	NA
METHANOL	67561	490	58	E	1,000	120	E	10,000	5,800	E	10,000	10,000	C	10,000	5,800	E	10,000	10,000	C	NA
METHOMYL	16752775	20	3.2	E	20	3.2	E	2,000	320	E	2,000	320	E	20	3.2	E	20	3.2	E	NA
METHOXYCHLOR	72435	4	630	E	4	630	E	10	1,600	E	10	1,600	E	10	1,600	E	10	1,600	E	10
METHYL CHLORIDE	74873	0.3	0.038	E	0.3	0.038	E	30	3.8	E	30	3.8	E	30	3.8	E	30	3.8	E	NA
METHYL ETHYL KETONE	78933	280	53	E	580	110	E	10,000	5,300	E	10,000	10,000	C	10,000	5,300	E	10,000	10,000	C	NA
METHYL ISOBUTYL KETONE	108101	22	3.4	E	47	7.3	E	2,200	340	E	4,700	730	E	2,200	340	E	4,700	730	E	NA
METHYL METHACRYLATE	80626	78	11	E	160	22	E	7,800	1,100	E	10,000	2,200	E	7,800	1,100	E	10,000	2,200	E	NA
METHYL METHANESULFONATE	66273	0.67	0.083	E	2.6	0.32	E	67	8.3	E	260	32	E	0.67	0.083	E	2.6	0.32	E	NA
METHYL PARATHION	298000	0.2	0.42	E	0.2	0.42	E	20	42	E	20	42	E	20	42	E	20	42	E	30
METHYL TERT-BUTYL ETHER (MTBE)	1634044	2	0.28	E	2	0.28	E	200	28	E	200	28	E	20	2.8	E	20	2.8	E	NA
METHYLNAPHTHALENE, 2-	91576	150	6,000	E	410	10,000	C	2500	10,000	C	2,500	10,000	C	150	6,000	E	410	10,000	C	15
NAPHTHALENE	91203	2	5	E	2	5	E	200	500	E	200	500	E	2,000	5,000	E	2,000	5,000	E	30
NAPHTHYLAMINE, 1-	134327	0.037	0.3	E	0.14	1.1	E	3.7	30	E	14	110	E	37	300	E	140	1,100	E	15

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		Residential			Non-Residential			Residential			Non-Residential			Residential			Non-Residential			
		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		100 X GW MSC	Generic Value		
NAPHTHYLAMINE, 2-	91598	0.037	0.012	E	0.14	0.046	E	3.7	1.2	E	14	4.6	E	37	12	E	140	46	E	NA
NITROANILINE, M-	99092	0.21	0.033	E	0.58	0.091	E	21	3.3	E	58	9.1	E	0.21	0.033	E	0.58	0.091	E	NA
NITROANILINE, O-	88744	0.21	0.037	E	0.58	0.1	E	21	3.7	E	58	10	E	0.21	0.037	E	0.58	0.1	E	NA
NITROANILINE, P-	100016	0.21	0.031	E	0.58	0.086	E	21	3.1	E	58	8.6	E	0.21	0.031	E	0.58	0.086	E	NA
NITROBENZENE	98953	1.8	0.79	E	5.1	2.2	E	180	79	E	510	220	E	1,800	790	E	5,100	2,200	E	NA
NITROPHENOL, 2-	88755	230	47	E	630	130	E	23,000	4,700	E	63,000	13,000	E	190,000	43,000	E	190,000	43,000	E	NA
NITROPHENOL, 4-	100027	6	4.2	E	6	4.2	E	600	420	E	600	420	E	6,000	4,200	E	6,000	4,200	E	NA
NITROPROPANE, 2-	79469	0.0016	0.00026	E	0.0068	0.0011	E	0.16	0.026	E	0.68	0.11	E	0.016	0.0026	E	0.068	0.011	E	NA
NITROSODI-N-PROPYL-AMINE, N-	621647	0.0094	0.0013	E	0.037	0.0051	E	0.94	0.13	E	3.7	0.51	E	9.4	1.3	E	37	5.1	E	NA
NITROSODIETHYLAMINE, N-	55185	0.0001	0.000018	E	0.00043	0.000075	E	0.01	0.0018	E	0.043	0.0075	E	0.001	0.00018	E	0.0043	0.00075	E	NA
NITROSODIMETHYLAMINE, N-	62759	0.00031	0.000041	E	0.0013	0.00017	E	0.031	0.0041	E	0.13	0.017	E	0.0031	0.00041	E	0.013	0.0017	E	NA
NITROSODIPHENYLAMINE, N-	86306	13	20	E	53	82	E	1,300	2,000	E	3,500	5,400	E	3,500	5,400	E	3,500	5,400	E	30
OCTYL PHTHALATE, DI-N-	117840	73	10,000	C	200	10,000	C	300	10,000	C	300	10,000	C	300	10,000	C	300	10,000	C	5
OXAMYL (VYDATE)	23135220	20	2.6	E	20	2.6	E	2000	260	E	2,000	260	E	20	2.6	E	20	2.6	E	NA
PARATHION	56382	22	130	E	61	360	E	650	3,900	E	650	3,900	E	22	130	E	61	360	E	15
PCB-1016 (AROCLOR)	12674112	0.26	70	E	0.72	190	E	4.9	1,300	E	4.9	1,300	E	0.26	70	E	0.72	190	E	10
PCB-1221 (AROCLOR)	11104282	0.13	0.62	E	0.52	2.5	E	13	62	E	20	95	E	0.13	0.62	E	0.52	2.5	E	20

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B. Soil to Groundwater Numeric Values[1]

REGULATED SUBSTANCE	*CASRN*	*Used Aquifers*												*Non-Use Aquifers*						*Soil Buffer Distance (feet)*
		TDS ≤ 2500						*TDS > 2500*												
		Residential			*Non-Residential*			*Residential*			*Non-Residential*			*Residential*			*Non-Residential*			
		100 X GW MSC	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		
PCB-1232 (AROCLOR)	11141165	0.13	0.52	E	0.52	2.1	E	13	52	E	52	210	E	0.13	0.52	E	0.52	2.1	E	20
PCB-1242 (AROCLOR)	53469219	0.13	16	E	0.52	62	E	13	1,600	E	24	2,900	E	0.13	16	E	0.52	62	E	10
PCB-1248 (AROCLOR)	12672296	0.037	18	E	0.14	67	E	0.6	290	E	0.6	290	E	0.037	18	E	0.14	67	E	10
PCB-1254 (AROCLOR)	11097691	0.037	75	E	0.14	280	E	1.2	2,400	E	1.2	2,400	E	0.037	75	E	0.14	280	E	5
PCB-1260 (AROCLOR)	11096825	0.025	110	E	0.11	500	E	2.5	11,000	E	8	36,000	E	0.025	110	E	0.11	500	E	5
PENTACHLOROBENZENE	608935	2.9	230	E	8.2	660	E	24	1,900	E	24	1,900	E	24	1,900	E	24	1,900	E	10
PENTACHLORONITRO-BENZENE	82688	0.25	5	E	1	20	E	25	500	E	59	1,200	E	59	1,200	E	59	1,200	E	15
PENTACHLOROPHENOL	87865	0.1	5	E	0.1	5	E	10	500	E	10	500	E	100	5,000	E	100	5,000	E	10
PHENACETIN	62442	30	12	E	120	47	E	3000	1,200	E	12,000	4,700	E	30,000	12,000	E	76,000	30,000	E	NA
PHENANTHRENE	85018	120	11,000	E	120	11,000	E	120	11,000	E	120	11,000	E	120	11,000	E	120	11,000	E	10
PHENOL	108952	400	66	E	400	66	E	40,000	6,600	E	40,000	6,600	E	40,000	6,600	E	40,000	6,600	E	NA
PHENYLENEDIAMINE, M-	108452	22	3.1	E	61	8.6	E	2200	310	E	6100	860	E	22,000	3,100	E	61,000	8,600	E	NA
PHORATE	298022	0.19	0.41	E	0.41	0.88	E	19	41	E	41	88	E	0.19	0.41	E	0.41	0.88	E	30
PHTHALIC ANHYDRIDE	85449	7,300	2,300	E	20,000	6,200	E	190,000	190,000	C	190,000	190,000	C	190,000	190,000	C	190,000	190,000	C	NA
PRONAMIDE	23950585	5	3	E	5	3	E	500	300	E	500	300	E	5	3	E	5	3	E	NA
PROPYLENE OXIDE	75569	0.28	0.048	E	1.1	0.19	E	28	4.8	E	110	19	E	0.28	0.048	E	1.1	0.19	E	NA
PYRENE	129000	1.3	220	E	1.3	220	E	1.3	220	E	1.3	220	E	1.3	220	E	1.3	220	E	10
PYRIDINE	110861	0.97	0.11	E	2	0.22	E	97	11	E	200	22	E	9.7	1.1	E	20	2.2	E	NA
SIMAZINE	122349	0.4	0.16	E	0.4	0.16	E	40	16	E	40	16	E	0.4	0.16	E	0.4	0.16	E	NA

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APPENDIX A
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B. Soil to Groundwater Numeric Values[1]

REGULATED SUBSTANCE	*CASRN*	*Used Aquifers*												*Non-Use Aquifers*						*Soil Buffer Distance (feet)*
		TDS ≤ 2500						*TDS > 2500*												
		Residential			*Non-Residential*			*Residential*			*Non-Residential*			*Residential*			*Non-Residential*			
		100 X GW MSC	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		
STRYCHNINE	57249	1.1	0.9	E	3.1	2.5	E	110	90	E	310	250	E	1,100	900	E	3,100	2,500	E	NA
STYRENE	100425	10	24	E	10	24	E	1,000	2,400	E	1,000	2,400	E	1,000	2,400	E	1,000	2,400	E	30
TERBUFOS	13071799	0.09	0.13	E	0.09	0.13	E	9	13	E	9	13	E	0.09	0.13	E	0.09	0.13	E	30
TETRACHLORODIBENZO-P-DIOXIN, 2,3,7,8- (TCDD)	1746016	0.000003	0.032	E	0.000003	0.032	E	0.0003	3.2	E	0.0003	3.2	E	0.0019	20	E	0.0019	20	E	5
TETRACHLOROETHANE, 1,1,2,2-	79345	0.074	0.023	E	0.32	0.099	E	7.4	2.3	E	32	9.9	E	7.4	2.3	E	32	9.9	E	NA
TETRACHLOROETHYLENE (PCE)	127184	0.5	0.43	E	0.5	0.43	E	50	43	E	50	43	E	5	4.3	E	5	4.3	E	NA
TETRACHLOROPHENOL, 2,3,4,6-	58902	29	450	E	61	950	E	2,900	45,000	E	6,100	95,000	E	2,900	45,000	E	6,100	95,000	E	15
TETRAETHYL LEAD	78002	0.00037	0.0046	E	0.001	0.012	E	0.037	0.46	E	0.1	1.2	E	0.37	4.6	E	1	12	E	15
THIRAM	137268	18	47	E	51	130	E	1,800	4,700	E	3,000	7800	E	18	47	E	51	130	E	20
TOLUENE	108883	100	44	E	100	44	E	10,000	4,400	E	10,000	4,400	E	10,000	4,400	E	10,000	4,400	E	NA
TOLUIDINE, M-	108441	0.28	0.13	E	1.1	0.5	E	28	13	E	110	50	E	0.28	0.13	E	1.1	0.5	E	NA
TOLUIDINE, O-	95534	0.37	0.42	E	1.4	1.6	E	37	42	E	140	160	E	370	420	E	1400	1600	E	NA
TOLUIDINE, P-	106490	0.35	0.32	E	1.4	1.3	E	35	32	E	140	130	E	0.35	0.32	E	1.4	1.3	E	NA
TOXAPHENE	8001352	0.3	1.2	E	0.3	1.2	E	30	120	E	30	120	E	0.3	1.2	E	0.3	1.2	E	20
TRIBROMOMETHANE (BROMOFORM)	75252	10	4.3	E	10	4.3	E	1,000	430	E	1,000	430	E	1000	430	E	1000	430	E	NA
TRICHLOROBENZENE, 1,2,4-	120821	7	28	E	7	28	E	700	2,800	E	700	2,800	E	4,900	10,000	C	4,900	10,000	C	20

[1] For other options see Section 250.308
All concentrations in mg/kg
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B. Soil to Groundwater Numeric Values[1]

REGULATED SUBSTANCE	*CASRN*	*Used Aquifers*												*Non-Use Aquifers*						*Soil Buffer Distance (feet)*
		TDS ≤ 2500						*TDS > 2500*												
		Residential			*Non-Residential*			*Residential*			*Non-Residential*			*Residential*			*Non-Residential*			
		100 X GW MSC	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		*100 X GW MSC*	*Generic Value*		
TRICHLOROBENZENE, 1,3,5-	108703	4	31	E	4	31	E	400	3,100	E	400	3100	E	4	31	E	4	31	E	15
TRICHLOROETHANE, 1,1,1-	71556	20	7.2	E	20	7.2	E	2,000	720	E	2,000	720	E	200	72	E	200	72	E	NA
TRICHLOROETHANE, 1,1,2-	79005	0.5	0.15	E	0.5	0.15	E	50	15	E	50	15	E	5	1.5	E	5	1.5	E	NA
TRICHLOROETHYLENE (TCE)	79016	0.5	0.17	E	0.5	0.17	E	50	17	E	50	17	E	5	1.7	E	5	1.7	E	NA
TRICHLOROPHENOL, 2,4,5-	95954	370	2,300	E	1,000	6,100	E	37,000	190,000	C	100,000	190,000	C	120,000	190,000	C	120,000	190,000	C	15
TRICHLOROPHENOL, 2,4,6-	88062	6	17	E	24	67	E	600	1,700	E	2,400	6,700	E	6,000	17,000	E	24,000	67,000	E	20
TRICHLOROPHENOXYA-CETIC ACID, 2,4,5- (2,4,5-T)	93765	7	1.5	E	7	1.5	E	700	150	E	700	150	E	7,000	1,500	E	7,000	1,500	E	NA
TRICHLOROPHENOXYPRO-PIONIC ACID, 2,4,5- (2,4,5-TP)(SILVEX)	93721	5	22	E	5	22	E	500	2,200	E	500	2,200	E	5	22	E	5	22	E	20
TRICHLOROPROPANE, 1,2,3-	96184	4	3.3	E	4	3.3	E	400	330	E	400	330	E	400	330	E	400	330	E	NA
VINYL ACETATE	108054	55	6.5	E	120	14	E	5500	650	E	10,000	1,400	E	55	6.5	E	120	14	E	NA
VINYL CHLORIDE	75014	0.2	0.027	E	0.2	0.027	E	20	2.7	E	20	2.7	E	2	0.27	E	2	0.27	E	NA
WARFARIN	81812	9.2E-08	2.2E-07	E	9.2E-08	2.2E-07	E	9.2E-08	2.2E-07	E	9.2E-08	2.2E-07	E	9.2E-08	2.2E-07	E	9.2E-08	2.2E-07	E	30
XYLENES (TOTAL)	1330207	1,000	850	E	1,000	850	E	10,000	10,000	C	10,000	10,000	C	10,000	10,000	C	10,000	10,000	C	NA

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APPENDIX A
Table 4—Medium-Specific Concentrations (MSCs) for Inorganic Regulated Substances in Soil
A. Direct Contact Numeric Values

REGULATED SUBSTANCE	*CASRN*	*Residential MSC*		*Non-Residential MSCs*			
		0-15 feet		*Surface Soil 0-2 feet*		*Subsurface Soil 2-15 feet*	
ALUMINUM	7429905	190,000	C	190,000	C	190,000	C
ANTIMONY	7440360	88	G	1,100	G	190,000	C
ARSENIC	7440382	12	G	53	G	190,000	C
ASBESTOS	12001295	1,100	N	5,500	N	190,000	C
BARIUM AND COMPOUNDS	7440393	15,000	G	190,000	C	190,000	C
BERYLLIUM	7440417	4.2	G	18	G	190,000	C
BORON AND COMPOUNDS	7440428	20,000	G	190,000	C	190,000	C
CADMIUM	7440439	110	G	1,400	G	190,000	C
CHROMIUM III	16065831	190,000	C	190,000	C	190,000	C
CHROMIUM VI	18540299	1,100	G	14,000	G	190,000	C
COBALT	7440484	13,000	G	170,000	G	190,000	C
COPPER	7440508	190,000	C	190,000	C	190,000	C
CYANIDE, FREE	57125	4,400	G	56,000	G	190,000	C
IRON	7439896	66,000	G	190,000	C	190,000	C
LEAD	7439921	500	U	1,000	S	190,000	C
MANGANESE	7439965	10,000	G	130,000	G	190,000	C
MERCURY	7439976	19	G	240	G	190,000	C
NICKEL	7440020	4,400	G	56,000	G	190,000	C
SELENIUM	7782492	1,100	G	14,000	G	190,000	C
SILVER	7440224	1,100	G	14,000	G	190,000	C
THALLIUM	7440280	18	G	220	G	190,000	C
TIN	7440315	130,000	G	190,000	C	190,000	C
VANADIUM	7440622	13	G	160	G	190,000	C
ZINC	7440666	66,000	G	190,000	C	190,000	C

All concentrations in mg/kg
R—Residential
NR—Non-Residential
G—Ingestion
N—Inhalation
C—Cap
U—UBK Model
S—SEGH Model
NA—Not Applicable

APPENDIX A
Table 4—Medium-Specific Concentrations (MSCs) for Inorganic Regulated Substances in Soil
B. Soil to Groundwater Numeric Values[1]

		Used Aquifers								*Non-use Aquifers*				*Soil*
		TDS ≤ 2500				*TDS > 2500*								*Buffer*
RELATED SUBSTANCE	*CASRN*	*R*		*NR*		*R*		*NR*		*R*		*NR*		*Distance*
		100 X GW MSC	*Generic Value*	*100 X GW MSC*	*Generic Value*	*100 X GW MSC*	*Generic Value*	*100 X GW MSC*	*Generic Value*	*100 X GW MSC*	*Generic Value*	*100 X GW MSC*	*Generic Value*	*(feet)*
ALUMINUM	7429905	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ANTIMONY	7440360	0.6	27	0.6	27	60	2,700	60	2,700	600	27,000	600	27,000	15
ARSENIC	7440382	5	150	5	150	500	15,000	500	15,000	5,000	150,000	5,000	150,000	15
ASBESTOS	1.2E+07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BARIUM AND COMPOUNDS	7440393	200	8,200	200	8,200	20,000	190,000	20,000	190,0000	190,000	190,000	190,000	190,000	15
BERYLLIUM	7440417	0.4	320	0.4	320	40	32,000	40	32,000	400	190,000	400	190,000	10
BORON AND COMPOUNDS	7440428	6.0	6.7	60	6.7	6,000	670	6,000	670	60,000	6,700	60,000	6,700	NA
CADMIUM	7440439	0.5	38	0.5	38	50	3,800	50	3,800	500	38,000	500	38,000	15
CHROMIUM III	1.6E+07	10	190,000	10	190,000	1,000	190,000	1,000	190,000	10,000	190,000	10,000	190,000	5
CHROMIUM VI	1.9E+07	18	340	51	970	1,800	34,000	5,100	97,000	18,000	190,000	51,000	190,000	15
COBALT	7440484	220	24	610	68	22,000	2,400	61,000	6,800	190,000	24,000	190,000	68,000	NA
COPPER	7440508	100	36,000	100	36,000	10,000	190,000	10,000	190,000	100,000	190,000	100,000	190,000	10
CYANIDE, FREE	57125	20	200	20	200	2,000	20,000	2,000	20,000	20,000	190,000	20,000	190,000	20
IRON	7439896	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LEAD	7439921	0.5	450	0.5	450	50	45,000	50	45,000	500	190,000	500	190,000	10
MANGANESE	7439965	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MERCURY	7439976	0.2	10	0.2	10	20	1,000	20	1,000	200	10,000	200	10,000	15
NICKEL	7440020	10	650	10	650	1,000	65,000	1,000	65,000	10,000	190,000	10,000	190,000	15

[1] For other options see Section 250.308
All concentrations in mg/kg
R=Residential
NR=Non-Residential
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N=Inhalation
E=Soil to groundwater equation
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Table 4—Medium-Specific Concentrations (MSCs) for Inorganic Regulated Substances in Soil
B. Soil to Groundwater Numeric Values[1]

		Used Aquifers								*Non-use Aquifers*				*Soil*
		TDS ≤ 2500				*TDS > 2500*								*Buffer*
RELATED SUBSTANCE	*CASRN*	*R*		*NR*		*R*		*NR*		*R*		*NR*		*Distance*
		100 X GW MSC	*Generic Value*	*100 X GW MSC*	*Generic Value*	*100 X GW MSC*	*Generic Value*	*100 X GW MSC*	*Generic Value*	*100 X GW MSC*	*Generic Value*	*100 X GW MSC*	*Generic Value*	*(feet)*
SELENIUM	7782492	5	26	5	26	500	2,600	500	2,600	5,000	26,000	5,000	26,000	20
SILVER	7440224	10	84	10	84	1,000	8,400	1,000	8,400	10,000	84,000	10,000	84,000	20
THALLIUM	7440280	0.2	14	0.2	14	20	1,400	20	1,400	200	14,000	200	14,000	15
TIN	7440315	2,200	240	6,100	680	190,000	24,000	190,000	68,000	190,000	190,000	190,000	190,000	NA
VANADIUM	7440622	0.21	210	0.58	580	21	21,000	58	58,000	210	190,000	580	190,000	5
ZINC	7440666	200	12,000	200	12,000	20,000	190,000	20,000	190,000	190,000	190,000	190,000	190,000	15

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APPENDIX A
Table 5—Physical and Toxicological Properties
A. Organic Regulated Substances

Regulated Substance	*CAS*	*RfDo (mg/kg-d)*	*CSFo (mg/kg-d)$^{-1}$*	*RfDi (mg/m3)*	*CSFi*	*Koc*	*VOC*	*Aqueous Sol (mg/L)*	*Aqueous Sol Reference*	*TF Vol from Surface Soil*	*TF Vol from Sub-Surface Soil*	*Organic Liquid*	*Boiling Point (degrees*	*Attenuation lambda*
ACENAPHTHENE	83329	0.06		0.06		4900		3.47	5				279	1.24
ACENAPHTHYLENE	208968	0.06		0.06		4500		3.93	5				280	2.11
ACETALDEHYDE	75070	0.0022	0.0077	0.0028	0.0077	4.1	X	1000000	11	13100	15100	X	20.4	
ACETONE	67641	0.1		8.8571428		0.31	X	1000000	11	13100	15000	X	56.07	18.07
ACETONITRILE	75058	0.006		0.006		0.5	X	74000	11	13100	15000	X	81.6	4.50
ACETOPHENONE	98862	0.1		0.1		170		5500	12			X	202.6	
ACETYLAMINOFLUORENE, 2- (2AAF)	53963		3.8		4.55	1600		5.29	11				303	0.69
ACROLEIN	107028	0.02		5.71429E-06		0.56	X	212500	11	13100	15100	X	52.69	4.50
ACRYLAMIDE	79061	0.0002	4.5	0.0002	4.55	25		640000	11				125	
ACRYLIC ACID	79107	0.5		0.0002857		29	X	1000000	11	13000	14900	X	141.2	1.39
ACRYLONITRILE	107131	0.001	0.54	0.0005714	0.238	11	X	74500	11	13100	15100	X	77.3	5.50
ALACHLOR	15972608	0.01	0.08	0.01	0.08	110		140	4				100	
ALDICARB	116063	0.001		0.001		22		6000	9				287	0.40
ALDRIN	309002	0.00003	17	0.00003	17.15	48000		0.18	11				145	0.22
ALLYL ALCOHOL	107186	0.005		0.005		3.2	X	320000	15	13100	15000	X	97	18.07
AMINOBIPHENYL, 4-	92671		21		21	110		311	11				302	18.07
AMITROLE	61825		0.94		0.945	120		280000	7				200	0.69
ANILINE	62533	0.0016	0.0057	0.0002857	0.0056	190	X	36000	11	13000	14900	X	184.4	
ANTHRACENE	120127	0.3		0.3		21000		0.0434	11				340	0.28
ATRAZINE	1912249	0.035	0.222	0.035	0.222	130		70	8				200	
BENZENE	71432		0.029		0.02905	58	X	1790	11	13100	15000	X	80.9	0.35
BENZO[A]ANTHRACENE	56553		0.73		0.385	350000		0.014	5				437.6	0.19
BENZO[A]PYRENE	50328		7.3		3.85	910000		0.0038	5				495	0.24
BENZO[B]FLUORANTHENE	205992		0.73		0.385	550000		0.0012	5				357	0.21

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A. Organic Regulated Substances

Regulated Substance	*CAS*	*RfDo (mg/kg-d)*	*CSFo (mg/kg-d)$^{-1}$*	*RfDi (mg/m3)*	*CSFi*	*Koc*	*VOC*	*Aqueous Sol (mg/L)*	*Aqueous Sol Reference*	*TF Vol from Surface Soil*	*TF Vol from Sub-Surface Soil*	*Organic Liquid*	*Boiling Point (degrees*	*Attenuation lambda*
BENZO[GHI]PERYLENE	191242	0.06		0.06		2800000		0.00026	5				500	0.19
BENZO[K]FLUORANTHENE	207089		0.073		0.0385	4400000		0.00055	5				480	0.06
BENZOIC ACID	65850	4		4		32		3400	5				249.2	
BENZYL ALCOHOL	100516	0.3		0.3		100		42900	5			X	205.3	
BENZYL CHLORIDE	100447		0.17		0.1715	190	X	525	11	13000	15000	X	179.4	20.90
BHC, ALPHA	319846	0.0003	6.3	0.0003	6.3	1800		2	5				288	0.94
BHC, BETA-	319857	0.0003	1.8	0.0003	1.855	2300		5	5				60	1.02
BHC, DELTA-	319868	0.0003		0.0003		1900		21.3	12				60	1.26
BHC, GAMMA (LINDANE)	58899	0.0003	1.1	0.0003	1.085	1400		7.3	11				323.4	1.05
BIS(2-CHLORO-ISOPROPYL)ETHER	108601	0.04		0.04		62	X	1700	12	13000	14900	X	189	0.69
BIS(2-CHLOROETHYL)ETHER	111444		1.1		1.155	76	X	17200	11	13000	14900	X	178.75	0.69
BIS(CHLOROMETHYL)ETHER	542881		220		217	16	X	22000	2	13100	15100	X	105	57270.57
BIS[2-ETHYLHEXYL] PHTHALATE	117817	0.02	0.014	0.02	0.0084	87000		0.34	11			X	384	0.65
BROMODICHLOROMETHANE	75274	0.02	0.062	0.02	0.1295	93	X	6735	11	13100	15000	X	87	
BROMOMETHANE	74839	0.0014		0.0014285		170	X	15220	11	13100	15000	X	3.55	6.66
BUTYL ALCOHOL, N-	71363	0.1		0.1		3.2	X	63200	11	13000	14900	X	117.73	4.68
BUTYL PHTHALATE, DI-N-	84742	0.1		0.1		1600		13	11			X	340	11.00
BUTYLBENZYL PHTHALATE	85687	0.2		0.2		34000		2.69	11			X	370	1.39
CAPTAN	133062	0.13	0.0035	0.13	0.00231	200		3.3	11				259	589.39
CARBARYL	63252	0.1		0.1		190		82.6	11				315	4.22
CARBOFURAN	1563662	0.005		0.005		43		700	13				200	
CARBON DISULFIDE	75150	0.1		0.19999		300	X	1185	11	13100	15100	X	46.2	
CARBON TETRACHLORIDE	56235	0.0007	0.13	0.00057	0.0525	160	X	804.8	11	13100	15000	X	76.7	0.07
CHLORDANE	57749	0.00006	1.3	0.00006	1.3	98000		0.056	11				175	0.09

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CHLORO-1-PROPENE, 3- (ALLYL CHLORIDE)	107051	0.000286		0.0002857		48	X	3370	11	13100	15000	X	45.1	18.07
CHLOROANILINE, P-	106478	0.004		0.004		460		3.9	2				232	
CHLOROBENZENE	108907	0.02		0.005714		200	X	497	11			X	131.69	0.84
CHLOROBENZILATE	510156	0.02	0.27	0.02	0.273	2600		13	11			X	415	3.60
CHLORODIBROMOMETHANE	124481	0.02	0.084	0.02	0.0945	83	X	4000	2	13100	15100	X	116	1.39
CHLOROETHANE	75003	2.86		2.857		42	X	5678	11	13100	15000	X	12.27	4.50
CHLOROETHYL VINYL ETHER, 2-	110758	0.025		0.025		6.6	X	15000	2	13100	15100	X	108	
CHLOROFORM	67663	0.01	0.0061	0.01	0.0805	56	X	7950	11	13100	15000	X	61.18	0.01
CHLORONAPHTHALENE, 2-	91587	0.08		0.08		8500		6.74	5				256	
CHLOROPHENOL, 2-	95578	0.005		0.005		400	X	28500	5	12900	14900	X	174.9	
CHLOROPRENE	126998	0.02		0.0019999		50	X	2115	11	13100	15000	X	59.4	0.69
CHLORPYRIFOS	2921882	0.003		0.003		4600		1.3	3				200	
CHRYSENE	218019		0.0073		0.00385	490000		0.0018	5				448	0.13
CRESOL(S)	1319773	0.005		0.005		25	X	19320	14	13000	14900	X	138.5	5.16
CRESOL, P-CHLORO-M-	59507	0.005		0.005		780		3850	5				235	
CROTONALDEHYDE	4170303		1.9		1.9	5.6	X	181000	18			X	104	18.07
CUMENE	98828	0.04		0.0025713		2800	X	49.9	11	13100	15100	X	152.4	15.81
CYCLOHEXANONE	108941	5		5		66	X	5000	15	13000	14900	X	157	
DDD, 4,4'-	72548		0.24		0.2415	44000		0.16	5				193	0.02
DDE, 4,4'-	72559		0.34		0.34	87000		0.0013	5				348.1	0.02
DDT, 4,4'-	50293	0.0005	0.34	0.0005	0.34	240000		0.0017	5				260	0.02
DIALLATE	2303164		0.061		0.061	190	X	14	11	12900	14900	X	150	1.39
DIAZINON	333415	0.0009		0.0009		500		40	15				306.1	

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DIBENZO[A,H]ANTHRACENE	53703		7.3		4.2	1800000		0.0005	5				524	0.13
DIBROMO-3-CHLOROPROPANE, 1,2-	96128	0.0000571	1.4	0.0000571	0.00242	140	X	1230	11	13000	15000	X	196	0.69
DIBROMOETHANE, 1,2- (ETHYLENE DIBROMIDE)	106934	0.0000571	85	0.0000571	0.77	54	X	4152	11	13100	15100	X	131.36	2.11
DIBROMOMETHANE	74953	0.01		0.01		110	X	11930	11	13100	15100	X	96.25	4.50
DICHLOROBENZENE, 1,2-	95501	0.09		0.0571		350	X	83.96	11	13100	15100	X	180.48	0.69
DICHLOROBENZENE, 1,3-	541731	0.089		0.089		360	X	125	11	13100	15100	X	173	0.69
DICHLOROBENZENE, P-	106467	0.229	0.024	0.229	0.0385	510		81.3	11				174.12	0.69
DICHLOROBENZIDINE, 3,3'-	91941		0.45		1.19	22000		12.3	11				368	0.69
DICHLORODIFLUOROMETHANE (FREON 12)	75718	0.2		0.0571		360	X	280	5	13200	15000	X	-29.8	0.69
DICHLOROETHANE, 1,1-	75343	0.1	0.0057	0.143	0.0056	52	X	5060	5	13100	15000	X	57.3	0.16
DICHLOROETHANE, 1,2-	107062		0.091		0.091	38	X	8608	11	13100	15000	X	83.48	0.07
DICHLOROETHYLENE, 1,1-	75354	0.009	0.6	0.009	0.175	65	X	2250	11	13100	15000	X	31.56	0.19
DICHLOROETHYLENE, CIS-1,2-	156592	0.01		0.01		49	X	800	17	13100	15000	X	60	0.01
DICHLOROETHYLENE, TRANS-1,2-	156605	0.02		0.02		47	X	6300	5	13100	15000	X	47.5	0.01
DICHLOROMETHANE (METHYLENE CHLORIDE)	75092	0.06	0.0075	0.857	0.00165	16	X	13030	11	13100	15000	X	39.64	4.50
DICHLOROPHENOL, 2,4-	120832	0.003		0.003		160		4500	11				209.5	5.88
DICHLOROPHENOXYACETIC ACID, 2,4- (2,4-D)	94757	0.01		0.01		59		677	11				160	1.39
DICHLOROPROPANE, 1,2-	78875	0.00123	0.068	0.00123	0.068	47	X	2700	11	13100	15000	X	96	0.10
DICHLOROPROPIONIC ACID (DALAPON), 2,2-	75990	0.03		0.03		62	X	502000	16	13000	14900	X	190	2.11
DICHLORVOS	62737	0.0005	0.29	0.0001429	0.291	50		10000	11				140	
DIELDRIN	60571	0.00005	16	0.00005	16.1	11000		0.2	5			X	385	0.12

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DIETHYL PHTHALATE	84662	0.8		0.8		81		896	11			X	298	2.25
DIMETHOATE	60515	0.0002		0.0002		110		25000	13				200	2.26
DIMETHYLAMINOAZOBENZENE, P-	60117		4.6		4.55	1000		0.23	11				200	4.50
DIMETHYLHYDRAZINE, 1,1-	57147		1.72		1.72	0.2	X	1000000	11	13000	15000	X	63	5.75
DIMETHYLPHENOL, 2,4-	105679	0.02		0.02		130		7870	11			X	210.9	18.07
DINITROBENZENE, 1,3-	99650	0.0001		0.0001		150		469	3				300	0.69
DINITROPHENOL, 2,4-	51285	0.002		0.002		0.79		2787	11				113	0.48
DINITROTOLUENE, 2,4-	121142	0.002	0.31	0.002	0.31	51		270	11				300	0.69
DINITROTOLUENE, 2,6- (2,6-DNT)	606202	0.001		0.001		74		182	11				300	0.69
DINOSEB	88857	0.001		0.001		120		52	1				42	1.03
DIOXANE, 1,4-	123911		0.011		0.027	7.8	X	1000000	11	13000	14900	X	101.32	0.69
DIPHENYLAMINE	122394	0.025		0.025		190		300	12				302	4.50
DIPHENYLHYDRAZINE, 1,2-	122667		0.8		0.77	660		68	11				309	0.69
DIQUAT	85007	0.0022		0.0022		2.6		700000	7				355	
DISULFOTON	298044	0.00004		0.00004		1000	X	25	9	13400	15400	X	133	6.02
DIURON	330541	0.002		0.002		300		42	3				155	
ENDOSULFAN I (ALPHA)	959988	0.006		0.006		2000		0.53	5				200	
ENDOSULFAN II (BETA)	33213659	0.006		0.006		2300		0.28	5				390	
ENDOSULFAN SULFATE	1031078	0.006		0.006		2300		0.117	5				200	
ENDOTHALL	145733	0.02		0.02		120		100000	1				200	
ENDRIN	72208	0.0003		0.0003		11000		0.26	5				245	
EPICHLOROHYDRIN	106898	0.002	0.0099	0.0002857	0.0042	35	X	65900	11	13000	14900	X	116.11	4.50
ETHION	563122	0.0005		0.0005		8700		0.6	15			X	200	

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ETHOXYETHANOL, 2- (EGEE)	110805	0.4		0.4		12	X	1000000	15	13200	15000	X	135.5	4.50
ETHYL ACETATE	141786	0.9		0.9		59	X	80000	3	13100	15000	X	77.06	18.07
ETHYL ACRYLATE	140885		0.048		0.048	110	X	15000	11	13100	15100	X	100	18.07
ETHYL BENZENE	100414	0.1		0.286		220	X	206	11	13100	15000	X	136.19	1.11
ETHYL ETHER	60297	0.2		0.2		68	X	69000	3	13100	15100	X	34.5	
ETHYLENE GLYCOL	107211	2		2		4.4	X	1000000	11	13100	15100	X	197.5	10.54
FENAMIPHOS	22224926	0.00025		0.00025		300		700	9				200	
FLUORANTHENE	206440	0.04		0.04		49000		0.265	5				375	0.29
FLUORENE	86737	0.04		0.04		7900		0.19	5				298	2.11
FLUOROTRICHLOROMETHANE (FREON 11)	75694	0.3		0.2		130	X	1240	5	13100	15000	X	23.63	0.35
FONOFOS	944229	0.002		0.002		1100	X	13	9	13400	15500	X	130	
FORMALDEHYDE	50000	0.2	0.0455	0.2	0.0455	3.6	X	50000	11	13100	15100	X	-21	18.07
FORMIC ACID	64186	2		2		0.54	X	1000000	15	13000	14900	X	100.7	18.07
FURFURAL	98011	0.003		0.0143		6.3	X	83000	3	13000	14900	X	161.7	
GLYPHOSATE	1071836	0.1		0.1		3500		12000	4				186	
HEPTACHLOR	76448	0.0005	4.5	0.0005	4.55	6800		0.18	11				310	46.84
HEPTACHLOR EPOXIDE	1024573	0.000013	9.1	0.000013	9.1	21000		0.275	5				200	0.23
HEXACHLOROBENZENE	118741	0.0008	1.6	0.0008	1.61	3800		0.0062	11				319.3	0.06
HEXACHLOROBUTADIENE	87683	0.0002	0.078	0.0002	0.077	4700		3.2	11			X	215	0.69
HEXACHLOROCYCLOPENTADIENE	77474	0.007		0.00002		7200		3.4	11			X	239	4.50
HEXACHLOROETHANE	67721	0.001	0.014	0.001	0.014	2200		50	11				186.8	0.69
HEXANE	110543	0.06		0.0571		3600	X	9.47	3	13100	15000	X	69	
INDENO[1,2,3-CD]PYRENE	193395		0.73		0.385	31000000		0.062	5				536	0.17

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ISOBUTYL ALCOHOL	78831	0.3		0.3		60	X	95000	3	13000	14900	X	108.1	17.57
ISOPHORONE	78591	0.2	0.00095	0.2	0.00095	31		12000	5			X	215.2	4.50
KEPONE	143500		16		16.1	55000		7.6	3				350	0.17
MALATHION	121755	0.02	0.00095	0.02	0.00095	1300	X	145	3	14000	16300	X	156.5	2.46
MALEIC HYDRAZIDE	123331	0.5		0.5		2.8		6000	15				260	
METHACRYLONITRILE	126987	0.0001		0.0002		21	X	25000	12	13100	15100	X	90.3	
METHANOL	67561	0.5		0.5		2.8	X	1000000	11	13100	15100	X	64.55	36.14
METHOMYL	16752775	0.025		0.025		20		58000	9				144	
METHOXYCHLOR	72435	0.005	0.00095	0.005	0.00095	63000		0.1	11				346	0.69
METHYL CHLORIDE	74873		0.013		0.0063	6	X	5325	11	13200	15000	X	-24.2	4.50
METHYL ETHYL KETONE	78933	0.6		0.286		32	X	223000	11	13100	15100	X	79.6	2.57
METHYL ISOBUTYL KETONE	108101	0.08		0.0229		17	X	19000	11	13100	15100	X	117.4	18.07
METHYL METHACRYLATE	80626	0.08		0.08		10	X	15000	11	13100	15100	X	100.3	4.50
METHYL METHANESULFONATE	66273		0.099		0.098	5.2		200000	12				203	
METHYL PARATHION	298000	0.00025		0.00025		790	X	50	9	13500	15600	X	133	3.61
METHYL TERT-BUTYL ETHER (MTBE)	1634044	0.857		0.857		12	X	51000	11	13100	15100	X	55.2	
METHYLNAPHTHALENE, 2-	91576	0.04		0.00286		16000		24.6	5			X	241.05	
NAPHTHALENE	91203	0.04		0.00286		950		31	11				217.9	0.98
NAPHTHYLAMINE, 1-	134327		1.8		1.8	3200		1698	11				301	0.69
NAPHTHYLAMINE, 2-	91598		1.8		1.8	87		263	11				306	0.69
NITROANILINE, M-	99092	0.0000571		5.714E-05		18		890	5				306.4	
NITROANILINE, O-	88744	0.0000571		5.714E-05		27		1260	5				284.1	
NITROANILINE, P-	100016	0.0000571		5.714E-05		15		800	5				331.7	

[1] Aqueous solubility references are keyed to the numbered list found at 250.304(f)

APPENDIX A
Table 5—Physical and Toxicological Properties
A. Organic Regulated Substances

Regulated Substance	*CAS*	*RfDo (mg/kg-d)*	*CSFo (mg/kg-d)$^{-1}$*	*RfDi (mg/m3)*	*CSFi*	*Koc*	*VOC*	*Aqueous Sol (mg/L)*	*Aqueous Sol Reference*	*TF Vol from Surface Soil*	*TF Vol from Sub-Surface Soil*	*Organic Liquid*	*Boiling Point (degrees*	*Attenuation lambda*
NITROBENZENE	98953	0.0005		0.0005714		130		1900	11			X	210.8	0.64
NITROPHENOL, 2-	88755	0.062		0.062		37		2100	13				215	9.01
NITROPHENOL, 4-	100027	0.062		0.062		230		16000	11				279	25.81
NITROPROPANE, 2-	79469	0.00571	9.45	0.00571	9.45	20	X	17000	11	13000	14900	X	120.25	0.69
NITROSODI-N-PROPYLAMINE, N-	621647	0.095	7	0.095	7	11		9894	11			X	206	0.69
NITROSODIETHYLAMINE, N-	55185		150		151	26	X	93000	11	13000	14900	X	176	0.69
NITROSODIMETHYLAMINE, N-	62759		51		49	8.5	X	1000000	11	13000	14900	X	154	0.69
NITROSODIPHENYLAMINE, N-	86306		0.0049		0.0091	580		35	11				268.7	3.72
OCTYL PHTHALATE, DI-N-	117840	0.02		0.02		980000000		3	11			X	234	0.69
OXAMYL (VYDATE)	23135220	0.025		0.025		7.1		280000	9				101	
PARATHION	56382	0.006		0.006		2300		6.54	11			X	375	
PCB-1016 (AROCLOR)	12674112	0.00007	0.09	0.00007	0.09	110000		0.049	5			X	340	
PCB-1221 (AROCLOR)	11104282		0.5		0.5	1900		0.2	5			X	340	
PCB-1232 (AROCLOR)	11141165		0.5		0.5	1500		1.45	5			X	340	
PCB-1242 (AROCLOR)	53469219		0.5		0.5	48000		0.24	5			X	340	
PCB-1248 (AROCLOR)	12672296		1.8		1.8	190000		0.006	5			X	340	
PCB-1254 (AROCLOR)	11097691	0.00002	1.8	0.00002	1.8	810000		0.012	5			X	340	
PCB-1260 (AROCLOR)	11096825		0.6		0.6	1800000		0.08	5				31	
PENTACHLOROBENZENE	608935	0.0008		0.0008		32000		0.24	3				277	0.37
PENTACHLORONITROBENZENE	82688	0.003	0.26	0.003	0.26	7900		0.59	11				328	0.36
PENTACHLOROPHENOL	87865	0.03	0.12	0.03	0.12	20000		14	11				309.5	0.17
PHENACETIN	62442		0.0022		0.0022	110		760	12				200	4.50
PHENANTHRENE	85018	0.3		0.3		38000		1.18	5				341.2	0.63
PHENOL	108952	0.6		0.6		22		82800	11				181.84	36.14

[1] Aqueous solubility references are keyed to the numbered list found at 250.304(f)

APPENDIX A
Table 5—Physical and Toxicological Properties
A. Organic Regulated Substances

Regulated Substance	*CAS*	*RfDo (mg/kg-d)*	*CSFo (mg/kg-d)$^{-1}$*	*RfDi (mg/m3)*	*CSFi*	*Koc*	*VOC*	*Aqueous Sol (mg/L)*	*Aqueous Sol Reference*	*TF Vol from Surface Soil*	*TF Vol from Sub-Surface Soil*	*Organic Liquid*	*Boiling Point (degrees*	*Attenuation lambda*
PHENYLENEDIAMINE, M-	108452	0.006		0.006		12		447974					286	4.50
PHORATE	298022	0.0002		0.0002		810	X	50	12	13100	15100	X	118	
PHTHALIC ANHYDRIDE	85449	2		0.0343		79		6200	11				284.5	13490.40
PRONAMIDE	23950585	0.075		0.075		200		15	12				321	
PROPYLENE OXIDE	75569	0.00857	0.24	0.008571	0.0132	25	X	590000	11	13100	15000	X	34.23	
PYRENE	129000	0.03		0.03		68000		0.013	5				393	0.07
PYRIDINE	110861	0.001		0.001		0.0066	X	1000000	11	13100	15000	X	115.25	18.07
SIMAZINE	122349	0.005	0.12	0.005	0.12	110		5	4				225	
STRYCHNINE	57249	0.0003		0.0003		280		300	13				270	4.50
STYRENE	100425	0.2		0.286		910	X	320	11	13100	15100	X	145.14	1.20
TERBUFOS	13071799	0.000025		0.000025		510	X	4.5	7	13000	15000	X	69	
TETRACHLORODIBENZO-P-DIOXIN, 2,3,7,8- (TCDD)	1746016		150000		116000	4300000		0.0000193	12				412.2	0.21
TETRACHLOROETHANE, 1,1,2,2-	79345		0.27		0.203	79	X	2962	11	13100	15100	X	146.5	0.56
TETRACHLOROETHYLENE (PCE)	127184	0.01	0.052	0.0857	0.00203	300	X	200	11	13100	15000	X	121.07	0.03
TETRACHLOROPHENOL, 2,3,4,6-	58902	0.03		0.03		6200		1000	15	‘			150	0.69
TETRAETHYL LEAD	78002	0.0000001		0.0000001		4900		0.21	15			X	200	4.50
THIRAM	137268	0.005		0.005		1000		30	3				200	
TOLUENE	108883	0.2		0.114		130	X	526	11	13100	15000	X	110.63	9.01
TOLUIDINE, M-	108441		0.24		0.24	140		15114	18			X	203.3	
TOLUIDINE, O-	95534		0.18		0.1785	410		16600	11			X	200.4	18.07
TOLUIDINE, P-	106490		0.19		0.19	320		6640	6				200.4	
TOXAPHENE	8001352	0.001	1.1	0.001	1.12	1500		0.55	11				431.8	
TRIBROMOMETHANE (BROMOFORM)	75252	0.02	0.0079	0.02	0.00385	130	X	3010	11	13100	15100	X	149.2	0.69

[1] Aqueous solubility references are keyed to the numbered list found at 250.304(f)

APPENDIX A
Table 5—Physical and Toxicological Properties
A. Organic Regulated Substances

Regulated Substance	*CAS*	*RfDo (mg/kg-d)*	*CSFo (mg/kg-d)$^{-1}$*	*RfDi (mg/m3)*	*CSFi*	*Koc*	*VOC*	*Aqueous Sol (mg/L)*	*Aqueous Sol Reference*	*TF Vol from Surface Soil*	*TF Vol from Sub-Surface Soil*	*Organic Liquid*	*Boiling Point (degrees*	*Attenuation lambda*
TRICHLOROBENZENE, 1,2,4-	120821	0.01		0.0571		1500		49	11			X	213	0.69
TRICHLOROBENZENE, 1,3,5-	108703	0.01		0.0571		3100		6.01	3				208	
TRICHLOROETHANE, 1,1,1-	71556	0.571		0.571		100	X	1495	11	13100	15000	X	74.08	0.05
TRICHLOROETHANE, 1,1,2-	79005	0.004	0.057	0.004	0.056	76	X	4420	11	13100	15100	X	113.5	0.03
TRICHLOROETHYLENE (TCE)	79016	0.002	0.011	0.143	0.00595	93	X	1100	11	13100	15000	X	86.7	0.02
TRICHLOROPHENOL, 2,4,5-	95954	0.1		0.1		2400		1200	11				245.5	0.14
TRICHLOROPHENOL, 2,4,6-	88062	0.042	0.011	0.042	0.01085	1100		800	11				246	0.14
TRICHLOROPHENOXYACETIC ACID, 2,4,5- (2,4,5-T)	93765	0.01		0.01		43		240	3				278.8	1.39
TRICHLOROPHENOXYPROPIONIC ACID, 2,4,5- (2,4,5-TP)(SILVEX)	93721	0.008		0.008		1700		140	1				200	
TRICHLOROPROPANE, 1,2,3-	96184	0.006	7	0.0005714	7	280	X	1800	15	13100	15100	X	156.8	0.35
VINYL ACETATE	108054	1		0.0571		2.8	X	20000	11	13200	15000	X	72.5	
VINYL CHLORIDE	75014		1.9		0.294	10	X	8800	11	13200	15000	X	-13.37	0.09
WARFARIN	81812	0.0003		0.0003		910		9.17E-09	9				356	4.50
XYLENES (TOTAL)	1330207	2		2		350	X	175	10	13100	15000	X	140	0.69

[1] Aqueous solubility references are keyed to the numbered list found at 250.304(f)

APPENDIX A
Table 5—Physical and Toxicological Properties
B. Inorganic Regulated Substances

Regulated Substance	*CAS*	*RfDo (mg/kg-d)*	*CSFo $(mg/kg\text{-}d)^{-1}$*	*RfDi (mg/m3)*	*CSFi*	*Kd*
ANTIMONY	7440360	0.0004		0.0004		45
ARSENIC	7440382	0.0003	1.5	0.0003	15.05	29
ASBESTOS	12001295				805	
BARIUM AND COMPOUNDS	7440393	0.07		0.000143		41
BERYLLIUM	7440417	0.005	4.3	0.005	8.4	790
BORON AND COMPOUNDS	7440428	0.09		0.005714		
CADMIUM	7440439	0.0005		0.0005	6.3	75
CHROMIUM III	16065831	1		5.71E-06		1,800,000
CHROMIUM VI	18540299	0.005		0.005	42	19
COBALT	7440484	0.06		8.57E-06		
COPPER	7440508	2,600				360
CYANIDE, TOTAL	57125	0.02		0.02		9.9
LEAD	7439921					890
MERCURY	7439976	8.57E-05		8.57E-05		52
NICKEL	7440020	0.02		0.02		65
SELENIUM	7782492	0.005		0.005		5
SILVER	7440224	0.005		0.005		8.3
THALLIUM	7440280	0.00008		0.00008		71
TIN	7440315	0.6		0.6		
VANADIUM	7440622	5.71E-05		5.71E-05		1000
ZINC	7440666	0.3		0.3		62

APPENDIX A
Table 6—Threshold of Regulation Compounds

REGULATED SUBSTANCE	*CASRN*	*ALL AQUIFER GROUNDWATER MSC (ug/L)*	*Residential Soil MSC (mg/kg) 0-15 feet*	*Non-Residential Soil MSCs*		*Soil to Groundwater*[1] *(mg/kg)*
				Surface Soil (mg/kg) 0-2 feet	*Subsurface Soil (mg/kg) 2-15 feet*	
ACETIC ACID	64197	5	100	100	100	0.5
ACETIC ANHYDRIDE	108247	5	100	100	100	0.5
AMYL ACETATE, N-	628637	5	100	100	100	0.5
AMYL ACETATE, SEC-	626380	5	100	100	100	0.5
ANTU (ALPHA-NAPHTHYLTHIOUREA)	86884	5	100	100	100	0.5
AZINPHOS-METHYL (GUTHION)	86500	5	100	100	100	0.5
BETA PROPIOLACTONE	57578	5	100	100	100	0.5
BIS(2-CHLORO-1-METHYL-ETHYL)ETHER	108601	5	100	100	100	0.5
BIS(2-CHLOROETHOXY)METHANE	111911	5	100	100	100	0.5
BROMOPHENYL PHENYL ETHER, 4-	101553	5	100	100	100	0.5
BUTYL ACETATE, N-	123864	5	100	100	100	0.5
BUTYL ACETATE, SEC-	105464	5	100	100	100	0.5
BUTYL ACETATE, TERT-	540885	5	100	100	100	0.5
BUTYLAMINE, N-	109739	5	100	100	100	0.5
CALCIUM CHROMATE	13765190	5	100	100	100	0.5
CALCIUM CYANAMIDE	156627	5	100	100	100	0.5
CARBONYL FLUORIDE	353504	5	100	100	100	0.5
CATECHOL	120809	5	100	100	100	0.5
CHLOROACETALDEHYDE	107200	5	100	100	100	0.5
CHLOROPHENYL PHENYL ETHER, 4-	7005723	5	100	100	100	0.5
CYCLOHEXANE	110827	5	100	100	100	0.5

[1] The value in the table is 100 times the groundwater MSC.
The option to use the SPLP is also available to calculate the soil to groundwater numeric value.
(See Section 250.308)

APPENDIX A
Table 6—Threshold of Regulation Compounds

REGULATED SUBSTANCE	*CASRN*	*ALL AQUIFER GROUNDWATER MSC (ug/L)*	*Residential Soil MSC (mg/kg) 0-15 feet*	*Non-Residential Soil MSCs*		*Soil to Groundwater*[1] *(mg/kg)*
				Surface Soil (mg/kg) 0-2 feet	*Subsurface Soil (mg/kg) 2-15 feet*	
DECABORANE	17702419	5	100	100	100	0.5
DIBENZOFURAN	132649	5	100	100	100	0.5
DICHLORO-2-BUTENE, TRANS-1,3-	110576	5	100	100	100	0.5
DIETHANOLAMINE	111422	5	100	100	100	0.5
DIETHYLAMINE	109897	5	100	100	100	0.5
DIGLYCIDYL ETHER (DGE)	2238075	5	100	100	100	0.5
DIMETHYL PHTHALATE	131113	5	100	100	100	0.5
DIMETHYL SULFATE	77781	5	100	100	100	0.5
DIMETHYLPHENETHYLAMINE, ALPHA, ALPHA-	122098	5	100	100	100	0.5
DINITRO-O-CRESOL, 4,6-	534521	5	100	100	100	0.5
DIOXATHION	78342	5	100	100	100	0.5
ETHYL METHANESULFONATE	62500	5	100	100	100	0.5
ETHYLAMINE	75047	5	100	100	100	0.5
ETHYLENE CHLORHYDRIN	107073	5	100	100	100	0.5
FAMPHUR	52857	5	100	100	100	0.5
FENSULFOTHION	115902	5	100	100	100	0.5
HEXACHLOROPROPENE	1888717	5	100	100	100	0.5
HEXANONE, 2- (METHYL N-BUTYL KETONE)	591786	5	100	100	100	0.5
IODOMETHANE	74884	5	100	100	100	0.5
ISOAMYL ACETATE	123922	5	100	100	100	0.5
ISOBUTYL ACETATE	110190	5	100	100	100	0.5
ISODRIN	465736	5	100	100	100	0.5

[1] The value in the table is 100 times the groundwater MSC.
The option to use the SPLP is also available to calculate the soil to groundwater numeric value.
(See Section 250.308)

APPENDIX A
Table 6—Threshold of Regulation Compounds

REGULATED SUBSTANCE	*CASRN*	*ALL AQUIFER GROUNDWATER MSC (ug/L)*	*Residential Soil MSC (mg/kg) 0-15 feet*	*Non-Residential Soil MSCs*		*Soil to Groundwater*[1] *(mg/kg)*
				Surface Soil (mg/kg) 0-2 feet	*Subsurface Soil (mg/kg) 2-15 feet*	
ISOPHORONE DIISOCYANATE	4098719	5	100	100	100	0.5
ISOSAFROLE	120581	5	100	100	100	0.5
LITHIUM	7439932	5	100	100	100	0.5
LITHIUM HYDRIDE	7580678	5	100	100	100	0.5
MANGANESE CYCLOPENTADIENYL TRICARBONYL	12079651	5	100	100	100	0.5
METHYL HYDRAZINE	60344	5	100	100	100	0.5
METHYL ISOAMYL KETONE	110123	5	100	100	100	0.5
METHYL ISOCYANATE	624839	5	100	100	100	0.5
METHYL MERCAPTAN	74931	5	100	100	100	0.5
METHYLAMINE	74895	5	100	100	100	0.5
METHYLCHLOROPHENOXYACETIC ACID (MCPA)	94749	5	100	100	100	0.5
MEVINPHOS	7786347	5	100	100	100	0.5
MONOCROTOPHOS	6923224	5	100	100	100	0.5
NAPHTHOQUINONE, 1,4-	130154	5	100	100	100	0.5
NITRIC ACID	7697372	5	100	100	100	0.5
NITROQUINOLINE-1-OXIDE, 4-	56575	5	100	100	100	0.5
OSMIUM TETROXIDE	20816120	5	100	100	100	0.5
PENTABORANE	19624227	5	100	100	100	0.5
PENTACHLOROETHANE	76017	5	100	100	100	0.5
PERCHLOROMETHYL MERCAPTAN	594423	5	100	100	100	0.5
PHENYL MERCAPTAN	108985	5	100	100	100	0.5

[1] The value in the table is 100 times the groundwater MSC.
The option to use the SPLP is also available to calculate the soil to groundwater numeric value.
(See Section 250.308)

APPENDIX A
Table 6—Threshold of Regulation Compounds

REGULATED SUBSTANCE	*CASRN*	*ALL AQUIFER GROUNDWATER MSC (ug/L)*	*Residential Soil MSC (mg/kg) 0-15 feet*	*Non-Residential Soil MSCs*		*Soil to Groundwater*[1] *(mg/kg)*
				Surface Soil (mg/kg) 0-2 feet	*Subsurface Soil (mg/kg) 2-15 feet*	
PICOLINE, 2-	109068	5	100	100	100	0.5
PROPANOL, 1-	71238	5	100	100	100	0.5
PROPANOL, 2- (ISOPROPYL ALCOHOL)	67630	5	100	100	100	0.5
PROPIONIC ACID	79094	5	100	100	100	0.5
PROPIONITRILE (ETHYL CYANIDE)	107120	5	100	100	100	0.5
PROPYLENE IMINE	75558	5	100	100	100	0.5
PYRETHRUM	8003347	5	100	100	100	0.5
QUINONE (p-BENZOQUINONE)	106514	5	100	100	100	0.5
RESORCINOL	108463	5	100	100	100	0.5
SELENIUM HEXAFLUORIDE	7783791	5	100	100	100	0.5
SODIUM BISULFITE	7631905	5	100	100	100	0.5
SULFIDE	18496258	5	100	100	100	0.5
SULFUR MONOCHLORIDE	10025679	5	100	100	100	0.5
SULFURIC ACID	7664939	5	100	100	100	0.5
TELLURIUM	13494809	5	100	100	100	0.5
TELLURIUM HEXAFLUORIDE	7783804	5	100	100	100	0.5
TEPP (TETRAETHYL PYROPHOSPHATE)	107493	5	100	100	100	0.5
TETRAHYDROFURAN	109999	5	100	100	100	0.5
TETRANITROMETHANE	509148	5	100	100	100	0.5
THIONAZIN	297972	5	100	100	100	0.5
TRIETHYLAMINE	121448	5	100	100	100	0.5

[1] The value in the table is 100 times the groundwater MSC.
The option to use the SPLP is also available to calculate the soil to groundwater numeric value.
(See Section 250.308)

APPENDIX A
Table 6—Threshold of Regulation Compounds

REGULATED SUBSTANCE	*CASRN*	*ALL AQUIFER GROUNDWATER MSC (ug/L)*	*Residential Soil MSC (mg/kg) 0-15 feet*	*Non-Residential Soil MSCs*		*Soil to Groundwater*[1] *(mg/kg)*
				Surface Soil (mg/kg) 0-2 feet	*Subsurface Soil (mg/kg) 2-15 feet*	
TRIETHYLPHOSPHOROTHIOATE, O,O,O-	126681	5	100	100	100	0.5
TRINITROGLYCEROL (NITROGLYCERIN)	55630	5	100	100	100	0.5

[1] The value in the table is 100 times the groundwater MSC.
The option to use the SPLP is also available to calculate the soil to groundwater numeric value.
(See Section 250.308)

APPENDIX A
Table 7
DEFAULT VALUES FOR CALCULATING MEDIUM-SPECIFIC CONCENTRATIONS FOR LEAD

Input Values Used in UBK Model for Lead (for residential exposure scenario)			
Geometric Standard Deviation (GSD)	1.42 (default)	Drinking water intake	Model default
Outdoor air lead concentration	0.2 µg/m3 (default)	Soil lead level	495 µg/g
Indoor air lead concentration (% of outdoor)	30	Indoor dust lead level	495 µg/g
Time spent outdoors	Model default	Soil/dust ingestion weighting factor (%)	45
Ventilation rate	Model default	Paint lead intake	Model default
Lung absorption	Model default	Maternal contribution method	Infant model
Dietary lead intake	Model default	Mother's blood lead at birth	7.5 µg/dL blood (model default)
GI method/bioavailability	Non-linear	Target blood lead level	10 µg/dL blood
Lead concentration in drinking water	4.00 µg/L (default)		

Input Values Used in SEGH Equation (for nonresidential exposure scenario)	
Concentration of lead in soil (S)	987 µg/g
Target blood lead level in adults (T)	20 µg/dL blood
Geometric standard deviation of blood lead distribution (G)	1.4
Baseline blood lead level in target population (B)	4 µg/dL blood
Number of standard deviations corresponding to degree of protection required for the target population (n)	1.645 (for 95% of population)
Slope of blood lead to soil lead relationship (δ)	7.5 µg/dL blood per µg/g soil

REFERENCE

WIXSON, B.G. (1991). The Society for Environmental Geochemistry and Health (SEGH) Task Force Approach to the Assessment of Lead in Soil. *Trace Substances in Environmental Health*. 11-20.

APPENDIX A

TABLE 8
CONSTITUENTS OF POTENTIAL ECOLOGICAL CONCERN

METALS

Arsenic III
Arsenic V
Barium
Beryllium
Cadmium
Chromium III
Chromium VI
Cobalt
Copper
Iron
Lead
Manganese
Mercury, inorganic
Mercury, methyl
Molybdenum
Nickel
Selenium
Vanadium
Zinc
Cyanide

ORGANICS

Acenaphthene
Aldrin *
Benzene
Benzo(a)pyrene
Biphenyl
Bis(2-ethylhexyl)phthalate
Bromophenyl phenyl ether,4-
Butylbenzyl phthalate
Chlordane *
Chlorobenzene
DDT (and metabolites)
Diazinon
Dibenzofuran
Dichlorobenzene,1,2-

ORGANICS cont'd

Dichlorobenzene,1,3-
Dichlorobenzene,1,4-
Dichloroethane,1,1-
Dieldrin
Diethyl phthalate
Di-n-butyl phthalate
Endosulfan (mixed isomers)
Endosulfan, alpha
Endosulfan, beta
Endrin
Ethylbenzene
Fluoranthene
Fluorene
Heptachlor
Hexachloroethane
Hexachlorocyclohexane (Lindane)
Kepone *
Malathion
Methoxychlor
Mirex *
Naphthalene
Pentachlorobenzene
Pentachlorophenol
Polynuclear aromatic hydrocarbons
Polychlorinated biphenyls (PCB)
Phenanthrene
Pyrene
Tetrachloroethane,1,1,2,2-
Tetrachloroethylene
Tetrachloromethane
Toluene
Toxaphene
Tribromomethane
Trichlorobenzene,1,2,4-
Trichloroethane,1,1,1-
Trichloroethylene
Xylene, m-

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