

The Texas Commission on Environmental Quality (TCEQ, agency, or commission) proposes amendments to §§350.2 - 350.4, 350.33, 350.34, 350.37, 350.51, 350.54, 350.71, 350.73 - 350.77, 350.79, 350.91 - 350.96, 350.111, and 350.134, and proposes a new §350.90.

BACKGROUND AND SUMMARY OF THE FACTUAL BASIS FOR THE PROPOSED RULES

The initial rulemaking of Chapter 350 was originally adopted on September 2, 1999, and became effective September 24, 1999. The purpose of the original rulemaking was to create a unified performance-based remediation program that is risk-based, consistent, streamlined, and that expedites site remediations. Subsequent to the initial adoption, the rulemaking has been readopted under the Quadrennial Review requirements. In August 2003, §350.1 was modified to include a provision to confirm that engineering, geoscience, and surveying information submitted to the agency must comply with the applicable professional licensing and registration Acts. Other than that, the rule has remained unchanged since its original adoption.

The agency has gained much experience over the last seven years through intensive implementation of the rule at thousands of contamination sites located throughout Texas. The agency has noticed errors (misspellings, typographical, mathematical) in the rule that need to be corrected, as well as provisions that either need clarification or modification to facilitate consistent and effective rule application.

Additionally, the agency has reevaluated some policy positions reflected in the current rules and desires to modify the rules in light of that, or has developed new positions and procedures in guidance that were previously unaddressed by the rules, but are now ripe for inclusion in the rules. Finally, the agency is proposing new rule provisions in support of a new electronic data management system initiative and expanded use of geographical information system technology to increase agency

effectiveness and institutional memory as well as to improve the public availability of technical information stored at the agency. For all of these reasons, these amendments are proposed.

SECTION BY SECTION DISCUSSION

Administrative and grammatical changes are proposed throughout the sections to bring the existing rule language into agreement with Texas Register requirements, agency guidelines, and guidance provided in the *Texas Legislative Council Drafting Manual*, November 2004.

The name of the agency has changed from Texas Natural Resource Conservation Commission (TNRCC) to Texas Commission on Environmental Quality (TCEQ) since the adoption of the current rule. Therefore, changes are proposed to §§350.4(a)(58) and (b), 350.73(a)(4) and (b), and 350.111(a)(7) and (8) and (c), as well as to Figures 30 TAC §§350.73(e), 350.74(a), and 350.77(b) to reflect this agency name change.

Proposed §350.2(g), Applicability, is amended to provide the agency the latitude to grant a variance that will foster regulatory consistency between neighboring leaking petroleum storage tank (LPST) sites that have comparable conditions. As explained in the March 26, 1999, issue of the *Texas Register* (24 TexReg 2208) preamble to the proposed rulemaking, one reason this chapter was adopted was to create greater uniformity between regulatory programs, and thus between remediation sites. However, because of the large number of LPST sites that have been remediated under the 30 TAC Chapter 334 regulations, the application of this chapter to an LPST site has sometimes had the opposite effect, resulting in regulatory inconsistency with comparable neighboring LPST sites that have been regulated under Chapter 334.

Therefore, these provisions are proposed in order to enable the executive director the discretion to grant a site-specific variance to use the Chapter 334 regulations in lieu of this chapter in certain instances.

These proposed amendments provide criteria that must be met to be eligible to request the variance.

Most importantly, there must be neighboring LPST sites that are regulated under the Chapter 334 risk-based corrective action regulations, and the regulatory requirements for those sites must be substantially different from what is required by this chapter, even though the site conditions, release conditions, and receptor conditions are comparable.

If the person can demonstrate that Chapter 334 requirements apply to neighboring and comparable LPST sites, and that to comply with this chapter unjustifiably imposes greater requirements, the person will be able to formally submit a request for a variance as set forth in these amendments. The person is responsible for initiating the variance request and for providing all information required under these amendments and for supplying any additionally requested information that is reasonable and appropriate. The requested variance will be granted if the executive director agrees with the person that the sites are neighboring and comparable, and an unjustifiable difference in requirements will result if this chapter is applied to the LPST site. With the variance, the person will then apply the Chapter 334 risk-based corrective regulations in lieu of this chapter.

However, the agency has chosen to allow this variance only for LPST sites that ceased aboveground or underground storage tank use before September 1, 2003, the effective date of this chapter for LPST sites. Further, the variance is only for those properties and future subdivisions of those properties where the landowner voluntarily commits to impose a permanent prohibition against any future aboveground or underground storage tank use at that property by means of a restrictive covenant

enforceable by the State of Texas. In the opinion of the agency, these criteria ensure any LPST releases that will qualify for this variance are constrained to those releases that occurred prior to the date Chapter 350 became effective for LPST sites. This ensures that the application of Chapter 334 will be allowed only for legacy situations that occurred prior to the effective date of this chapter. Any release occurring or potentially occurring after that date as a consequence of storage tank system operation after that date, should, in the opinion of the agency, be regulated under Chapter 350. Further, the agency believes if compliance with Chapter 350 does not create regulatory inconsistency with obligations under Chapter 334, then the variance is not warranted and compliance with Chapter 350 is fully appropriate.

If in the future the landowner of the property or subdivision of the property desires to resume storage tank use at the property or subdivision of the property, then the LPST release for which the variance was granted must be brought into full compliance with this chapter at that time.

Proposed §350.2(m), concerning the use of this chapter on or after May 1, 2000, would clarify provisions regarding switching rules once the person established grandfather status under the previous rules of 30 TAC Chapter 335, Subchapters A and S (Industrial Solid Wastes and Municipal Hazardous Wastes in General; Risk Reduction Standards, respectively). These provisions specify that, first, a person who desires to remain subject to Chapter 335 risk reduction standards may not use any provisions of Chapter 350 and that, second, a person who switches to Chapter 350 to complete a response action may not revert back to Chapter 335. As originally structured, the second provision would appear to apply only to risk reduction standard number 3. By deleting these two provisions from subsection (m)(1) and (2) and adding them to subsection (m), the provisions will apply uniformly to all three risk reduction standards of Chapter 335.

Proposed §350.3, Process, would modify flowcharts that describe the sequence and timing for reporting to the agency. The proposed changes to the flowcharts correct typographical errors and more accurately summarize the existing rule. The amendment would clarify that documentation of any required institutional controls related to Remedy Standard A must be submitted within 90 days of agency approval of a Response Action Completion Report, and clarify that proof of compliance with institutional control requirements must be submitted within 120 days of agency approval of a Response Action Plan, if a waste control unit, technical impracticability demonstration, and/or plume management zone is used. The proposed changes neither alter nor add requirements to the existing institutional control and reporting requirements.

Proposed §350.4, Definitions and Acronyms, would include proposed revisions to correct typographical errors, revisions to the definitions for “Background,” “Commercial/industrial land use,” “Implementation Procedures,” “Person,” and “Surface soil,” changing the term “Sample quantitation limit” to “Sample detection limit,” and adding the acronym “TPDES” (Texas Pollutant Discharge Elimination System).

Proposed §350.4(a)(6), concerning the definition of “Background,” would add diffuse non-point source pollution in surface water and sediment as an example of anthropogenic background. Anthropogenic background conditions arise as a result of human activities, as opposed to conditions that are naturally occurring. An example of an anthropogenic background condition is a large area of relatively low-level concentrations of lead in soils that resulted from past automobile emissions. People are not required to perform response actions to address anthropogenic background conditions. The reason for proposing

the addition is to make it clear that the agency will consider non-point source pollution as a possible anthropogenic background argument for surface water and sediment.

Non-point source pollution occurs when precipitation or irrigation water runs over land or through the ground, picks up pollutants, and carries them away into water bodies. Technically, the term “non-point source” means any source of water pollution that is not a point source, i.e., any discernible, confined and discrete conveyance including, but not limited, to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. Although diffuse runoff is generally treated as non-point source pollution, runoff that enters and is discharged from conveyances such as those described above is considered a point source discharge.

Typical examples of non-point source pollution include fertilizers/nutrients, herbicides, and insecticides in urban and rural storm runoff, oil, grease, and toxic chemicals in urban storm runoff, runoff from roads and highways, and atmospheric deposition of emissions (e.g., motor vehicle and machinery emissions). Anthropogenic background must be primarily associated with non-point source pollution from diffuse sources, cannot be related to specific activities conducted at an affected property, and cannot be related to other point sources or releases from the affected property or nearby industrial facilities. Chemical of concern (COC) characteristics typical of anthropogenic background should be present uniformly throughout a water body or throughout a larger section of the water body than the area potentially impacted by the facility in question. Persons should also attempt to demonstrate that the proposed anthropogenic background is not a result of point source discharges from Texas Pollution Discharge Elimination System (TPDES) permitted industrial or domestic wastewater treatment plants.

Discharges associated with municipal separate storm sewer systems that are governed by a TPDES (or National Pollution Discharge Elimination) storm water permit include runoff that contains COCs from a multitude of point and non-point sources. Undoubtedly, such urban runoff may contain point source releases of wastes or products or industrial activities, and/or the storm water is finally discharged from a point source. Both cases will not clearly meet the definition of anthropogenic background. However, the agency desires to avoid the situation where a person is tasked with disproving the potential for urban runoff to contain a discrete COC source before the agency will agree to an anthropogenic background definition for purposes of a particular project. Therefore, purely for the purposes of expediting these projects where COC concentrations are attributable to point source urban runoff, persons will not be asked to prove that the urban runoff strictly satisfies the anthropogenic background definition. It should be noted that the Texas Risk Reduction Program (TRRP) rule already states that anthropogenic background “is not the result of specific use or release of waste or products, or industrial activity.” Therefore, the agency may reject the anthropogenic background proposal where there is obvious contradiction to the intent of the rule, which is why the agency is proposing the addition of the word “might” as a qualifier to the examples of anthropogenic sources. Examples of unacceptable proposals include situations where the COC concentration is attributable to a known or suspected unauthorized discharge or from activities at the on-site affected property or adjacent properties, or there is a clear, significant waste or industrial contribution.

The proposed addition of this text as an example of anthropogenic background clarifies that persons opting to make a sediment background proposal will be expected to make a reasonable attempt to distinguish between affected property impacts and those attributable to widespread, diffuse anthropogenic pollutants in sediments and surface water. The agency will not entertain the presumption

that sediments (and surface water) in an industrial/urban area are already impacted by non-point source pollution, as a rationale to preclude sampling affected property sediments (and surface water) or attempting to establish natural or anthropogenic background (where this is desired).

Proposed §350.4(a)(13), concerning the definition of “Commercial/industrial land use,” would clarify that the hiring of domestic household help at a property does not result in the land use of that property being considered commercial/industrial under the TRRP rule. The current definition indicates that land use activities consistent with commercial/industrial land use include North American Industrial Classification System (NAICS) Code 814, which relates to the use of domestic help in a private household. The proposed change excludes NAICS Code 814.

Proposed §350.4(a)(45), concerning the definition of “Implementation Procedures,” would correct a reference to an agency document. The rule currently defines “Implementation Procedures” when used in the TRRP rule as referring to the agency document “Implementation of the Texas Natural Resource Conservation Commission Standards via Permitting.” While “Implementation of the Texas Natural Resource Conservation Commission Standards via Permitting” is an actual agency document referred to in the TRRP rule, it is not applicable to the situations being discussed in the rule when the term “Implementation Procedures” is referenced. The correct document to use when “Implementation Procedures” is referenced in the rule is entitled “Procedures to Implement the Texas Surface Water Quality Standards.”

Changes are proposed to §350.4(a)(62), relating to the definition of “Person.” The current definition excludes “a governmental entity that is not a responsible party performing a remedial action” from the

definition of “Person.” The agency has determined that the current definition is too broad with regard to governmental entities, in that it unintentionally implies that remediation projects conducted by a governmental entity are not regulated by the TRRP rule. The current definition of the existing rule was intended, in part, to provide relief for a governmental entity which is performing a remedial action but is not a responsible party, such as governmental entities remediating brownfields properties, or performing State Lead PST or Superfund remediation, from being required to obtain: a) a restrictive covenant in the situation where the landowner refuses to execute the covenant; or b) the written consent from a landowner prior to filing a deed notice or Voluntary Cleanup Program certificate of completion on that landowner’s property. Given the potential for overbroad application of the definition of “Person,” the definition is narrowed and the related proposed changes to §350.111(c) specifically address this requirement more suitably.

Proposed §350.4(a)(78), concerning the definition of “Sample quantitation limit,” would replace the word “quantitation” with “detection” in order to better fit the definition provided in the rule.

Conforming changes are also proposed for §§350.51(d)(1) and (n), 350.54(h)(2), 350.71(k)(1), and 350.79.

Proposed §350.4(a)(88), concerning the definition of “Surface soil,” would revise the current definition of surface soil with respect to human health considerations. The proposed changes would define surface soil for both residential and commercial/industrial land use, as the soils extending from ground surface to five feet in depth, or to the top of the uppermost groundwater-bearing unit or bedrock, whichever is less in depth for both residential and commercial/industrial land uses. For residential land use, surface soils are currently defined as the soils extending from ground surface to 15 feet in depth, or

to the top of the uppermost groundwater-bearing unit or bedrock, whichever is less in depth. For commercial/industrial land use, surface soils are currently defined as the soils extending from ground surface to five feet in depth, or to the top of the uppermost groundwater-bearing unit or bedrock, whichever is less in depth. The significance of the proposed change is that for residential land use, human exposure to soils containing COCs at depths greater than five feet below ground surface will no longer be considered in the same fashion. Under the current surface soil definition, the protective concentration level (PCL) for the combined human health exposure pathways of dermal contact with and ingestion of the soil COCs, ingestion of vegetables grown in the soil COCs, and inhalation of volatile and particulate COC emissions from the soils (i.e., $^{Tot}Soil_{Comb}$) applies from ground surface to 15 feet in depth. With this proposed change, only human exposure to volatile emission of COCs from the five feet to 15 feet depth interval will still be evaluated (i.e., $^{Air}Soil_{Inh-v}$). The $^{Tot}Soil_{Comb}$ PCL will only apply from ground surface to five feet in depth. The proposed changes to the definition of surface soils are intended to reduce the complexity of applying the TRRP rule.

At Tier 1, the critical PCLs, i.e., the lowest PCL applicable for a particular COC and environmental medium, for the vast majority of COCs is the soil-to-groundwater PCL that is set to safeguard for ingestion of groundwater (i.e., $^{GW}Soil_{Ing}$). This means that at Tier 1, soil response actions are driven by the need to protect the underlying groundwater rather than by human health exposure concerns. The $^{GW}Soil_{Ing}$ PCLs are applicable throughout both the surface and subsurface soils. At those affected properties, the proposed change to the definition of surface soil will have no effect on response actions to address COC impacts at Tier 1.

However, for some COCs the critical PCL at Tier 1 is the $^{Tot}Soil_{Comb}$ PCL. Also, when Tier 2 or 3 $^{GW}Soil_{Ing}$ PCLs are established, and the underlying groundwater is Class 3, a plume management zone is applied, or a certified municipal setting designation (MSD) is applied, the $^{Tot}Soil_{Comb}$ PCL frequently becomes the critical PCL for surface soil.

The agency believes that the existing practice of defining surface soil differently for residential and commercial/industrial land uses has led to a perhaps unnecessarily complicated application of the TRRP rule in some cases. This is due in part to the TRRP rule requirement that all COCs, including those being addressed at commercial/industrial facilities, are required to be horizontally delineated to residential assessment levels (surface soil is ground surface to 15 feet in depth). However, when subsequently setting surface soil PCLs, the commercial/industrial definition for surface soil can be used for commercial/industrial properties (ground surface to five feet in depth). It should be noted that the proposed changes will not remove the requirement to use assessment levels appropriate for residential land use for the delineation of COCs, but the proposed changes will allow the use of the same depth definition for surface soil at both residential and commercial/industrial properties. This proposed change is intended to make the implementation of the TRRP rule less complicated and more streamlined for both the regulated community and staff.

In addition to the considerations described in preceding paragraphs, when considering the proposed changes to the definition of surface soils agency staff gave weight to the fact that the current United States Environmental Protection Agency (EPA) definition of surface soils with respect to direct exposure by humans does not exceed the 0 to five feet below ground surface soil interval for

commercial/industrial or residential land use. Staff also considered the likelihood of exposure to soils deeper than five feet below ground surface (i.e., that soils excavated for the installation of things such as swimming pools and building piers will either be removed or covered with top soil that is suitable for landscaping purposes).

The commission is requesting comments on the proposal to revise the surface soils definition for residential land use, with regard to human health concerns, as the soils extending from ground surface to five feet in depth, or to the top of the uppermost groundwater-bearing unit or bedrock, whichever is less in depth.

Proposed §350.33(f)(4)(E), Remedy Standard B, is amended to clarify the current rule and by replacing clause (i), concerning recovery of readily recoverable nonaqueous phase liquids (NAPLs) within a plume management zone with a general requirement that the remaining NAPL will not result in unacceptable risk to human health and the environment. The original intent of the rule was to only require “readily recoverable NAPLs” to be removed when warranted by site conditions, not to require “readily recoverable NAPLs” to be removed at all sites. As stated in the adoption preamble as published in the September 17, 1999, issue of the *Texas Register* (see 24 TexReg 7546): *The agency does prefer that identified NAPLs be removed or treated. However, the agency also recognizes that controls may be appropriate, particularly if the NAPL cannot be sufficiently addressed such that there is a net environmental benefit. Therefore, in the implementation of these rule provisions, the initial premise is that the NAPLs must be removed to the extent practicable; however, flexibility is provided by which the person can make a demonstration that the remaining NAPLs do not represent a significant long term threat to human health and the environment.* The amendment modifies the rule to meet this

original intent and clarifies the minimum criteria by which persons can evaluate the appropriateness of leaving NAPLs in place.

Proposed §350.34(1) and (2), No Further Action, would specify other rule requirements that may trigger the need for an institutional control.

Proposed §350.37(i) and (k), Human Health Points of Exposure, is amended to correct and clarify the rule. The amendment factors in impacts to downgradient reaches of the surface water body, and establishes the point of exposure (POE) for intermittent streams.

Proposed §350.51(d), Affected Property Assessment, would correct and clarify the rule so that it is fully consistent with the intent behind the rule provision. The goal of the provision is to ensure that the key question of whether groundwater has been affected by a COC release is specifically answered. The existing rule requires that the vertical extent of the release be investigated to the greater of the method quantitation limit or to the background concentration, or until groundwater is encountered, in which case the groundwater will be sampled. When groundwater has already been investigated, the rule softens the vertical assessment required by allowing the vertical assessment to terminate at the ^{GW}Soil PCL. That reference to ^{GW}Soil in §350.51(d)(1) was incorrectly too specific, and should have instead more generally stated “the assessment level.”

Also, proposed §350.51(d)(1) is amended into additional paragraphs (2) and (3) to enhance readability, and the existing paragraph (2) would be renumbered to paragraph (4). In paragraph (2), an amendment is proposed to clarify that in the context of using §350.75(i)(7)(C) to limit the vertical assessment under

§350.51(d), groundwater assessment data must be available, except in the following extreme geologic situations: the depth to groundwater is great, the potential for the geology to prevent the COCs from reaching the groundwater is great, or the “soil” is actually rock (and thus there may not be a good or feasible way to collect and analyze a soil sample that will yield representative soil COC concentrations). For those situations, it is proposed to provide the agency authority to grant an exception to the need for groundwater data.

Proposed §350.51(i) is amended concerning the records survey required for the affected property assessment. The most recent affected property assessment report (APAR) form requests that the person research whether areas within 1/2 mile of the outer extent of affected groundwater are serviced by, or connected to, a public water supply. The TCEQ requests this information in order to comply with the requirements of Texas Water Code (TWC), §26.408, codified from House Bill 3030 and passed by the 78th Legislature, 2003. This legislation requires that the TCEQ, within 30 days of receiving a report of groundwater contamination, identify any private drinking water wells that may be threatened by the groundwater, and notify the well owners that their water supplies are or may be contaminated. The agency therefore requests this information in the APAR form.

Proposed §350.51(j), concerning the collection of representative samples of groundwater, would involve revising the text to reflect the fact that samples collected from any environmental medium (not just groundwater) should be collected and handled in a manner which will yield representative concentrations of COCs.

Proposed §350.51(k), concerning collecting representative samples of surface water, would revise the text to reflect the fact that samples collected from either surface water or sediment should be collected and handled in a manner which will yield representative concentrations of the COCs in those two media. Another proposed change is to refer to a different, more complete guidance document for surface water/sediment collection. For this change, *Implementation Procedures* is proposed to be deleted, and *Surface Water Quality Monitoring Procedures, Volume I* is proposed to be used in its place.

Proposed §350.51(m), concerning site-specific background soil concentrations, would add the word “soil” into the rule to clarify that the Texas-specific background concentrations are for soil. Proposed changes to Figure 30 TAC §350.51(m), entitled, “Texas-Specific Background Concentrations,” include amending the title to include the word “soil” as the table pertains exclusively to soils, not groundwater or other media; and also amending the title to include the units of milligrams per kilogram (mg/kg). In addition, it is proposed to amend the reference to fluorine to fluoride, since fluoride is the correct form of the element that should be listed in the table. Finally, the table has been corrected to reflect thorium instead of thallium, as it was mistakenly portrayed as thallium in the original rule, and had been previously corrected in guidance.

A footnote is proposed for additional clarification to the figure in §350.51(m). It references the document which is the source of the table data: *Background Geochemistry of Some Rocks, Soils, Plants, and Vegetables in the Conterminous United States*, by Jon J. Connor, Hansford T. Shacklette, *et al.*, Geological Survey Professional Paper 574-F, U.S. Geological Survey.

Proposed §350.54(d), Data Acquisition and Reporting Requirements, is amended to revise the laboratory accreditation requirements to be consistent with 30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification. The new requirements will be implemented on July 1, 2008. The proposed changes to the existing rule clarify the requirements for data generated prior to the implementation of the amended rule. Also proposed is an amendment to §350.54(e)(4) to clarify that method detection limits are not analyst dependent.

Proposed §350.71(k), General Requirements, is amended to simplify and clarify the existing rule. To facilitate this, proposed paragraph (4), is added and is referenced in subsection (k). Additional text is proposed to be added to paragraph (1) to add specific context that clarifies the intent of the rule to facilitate consistent rule application. Additional text is also proposed for paragraph (2) to clarify that the residential assessment level is the analytical performance criteria to screen COCs from PCL development under this paragraph. Furthermore, the additional text makes paragraph (2) self-contained, eliminating the prior need to also apply paragraph (3) when applying paragraph (2). The proposed amendment to paragraph (3) would greatly shorten and simplify the rule language by deleting subparagraphs (A) and (B)(vi). In short, now under paragraph (3) if a COC is not detected in excess of the residential assessment level, even though it is anticipated to be present at the facility, it can be dropped from PCL development. Proposed paragraph (4) would clarify that a COC that is not anticipated to be associated with a facility or site activities can be dropped from PCL development when it is not detected. Note that the residential assessment level is intentionally not included in paragraph (4) to address the frequent situation where a broad spectrum analytical method is used during the assessment, but some of the analytes reported from the analysis are not associated with the facility and the sample detection limits for those analytes exceed the residential assessment level. Under the

existing rule, those analytes need to be reanalyzed using a method with a reporting level at or below the residential assessment level. This rule amendment will allow those analytes to be dropped from PCL development when they are not detected at the detection limit for that broad spectrum method.

Proposed §350.73, Determination and Use of Human Toxicity Factors and Chemical Properties, would include revisions to §350.73(a) to add a new source to the list of acceptable sources for obtaining human toxicity factors, and a proposed change to require the use of the most recent chronic human toxicity factors, instead of the current approach of requiring that the sources in the list be used in a certain order. The proposed new source of toxicity factors is EPA Provisional Peer Reviewed Toxicity Values (i.e., Superfund Health Risk Technical Support Center). The changes are proposed because two of the sources in the list, the “EPA Health Effects Assessment Summary Table” and the “EPA National Center for Environmental Assessment,” will no longer have updates to toxicity factors, however, it will likely take a number of years for new toxicity factors to be developed to replace some of the values that are in those sources. The proposed changes will allow the continued use of any of the sources that are currently in the TRRP rule, so long as the source contains the most recent toxicity factor. A change is proposed to §350.73(b) to remove a sentence that will be unnecessary if the proposed changes to §350.73(a) are approved, because all toxicity factors will be required to be the most recent available factors.

Changes are proposed to Figure: §350.73(e) to reflect current available chemical and physical data for 2-ethoxy ethanol (Table Compound No. 172).

Proposed §350.73(e)(1) would remove incorrect references to leachate tests, including the Synthetic Precipitation Leaching Procedure (SPLP), as appropriate tests for determining the soil-water partition coefficient (K_d) of inorganic compounds or the organic carbon-water partition coefficient (K_{oc}) of ionizing organic compounds. The changes are proposed because leachate tests such as SPLP are not appropriate for determining the partitioning coefficients. The proposed changes would continue to allow the use of data from appropriately conducted tests to be used to determine a site-specific K_d or K_{oc} .

Changes are proposed to Figure §350.73(e)(1)(C) to add pH-dependent soil-water partition coefficients (K_d) for antimony and a revised single value for vanadium.

Figure: 30 TAC §350.74(a), entitled “Risk-Based Exposure Limit Equations and Default Exposure Factors for Residents,” is proposed to be amended to correct the reference concentration (RfC) citation for the relative bioavailability factor (RBAF) from §350.74(j)(1)(D) to §350.74(j)(1)(C). It is also proposed to delete the TNRCC Chronic Remediation-Specific Effects Screening Level values referenced in the figure, to conform with proposed revisions to §350.73.

Proposed §350.74(h), concerning the surface water risk-based exposure limit (SW RBEL), would include new language to make persons more aware that they may have to develop multiple RBELs or PCLs depending on the distance downstream COCs are expected to be present in the watershed, and that the RBELs and PCLs will vary with the different uses and exposure pathways within the watershed.

Proposed §350.74(h)(2) would add contact recreation as a water body use that the person must consider when applying human health criteria to establish ^{SW}RBELs. Adding contact recreation as a water body use acknowledges the fact that incidental ingestion of surface water and dermal contact with surface water sometimes occurs, and therefore, may be pathways of exposure to COCs, even when a water body is not a drinking water source.

Proposed §350.74(h)(3) would replace “limits” with “effluent limitations” to be more technically accurate. Also, the reference to 30 TAC Chapter 321, Subchapter H, is proposed to be changed to Texas Pollutant Discharge Elimination System (TPDES) General Permit Number TXG830000, because the existing reference is no longer valid.

Proposed §350.74(h)(4) is amended to spell out “United States” rather than use the abbreviation “U.S.”. In addition, language that clarifies the meaning of the term “federal guidance criteria” is proposed to be added.

Section 350.74(h)(5) is proposed to be added— elevated from the former §350.74(h)(6)(B). Elevation of this subsection emphasizes the fact that the specified analytes (chlorides, sulfates, et al.) should be treated as COCs.

Because of the additions previously discussed, §350.74(h)(6) becomes §350.74(h)(7), and §350.74(h)(7) becomes §350.74(h)(8). Also, proposed §350.74(h)(7) would clarify the fact that some parameters (nutrients, TDS, etc.) are sometimes COCs themselves.

Changes are proposed to the groundwater-to-surface water PCL equation contained in Figure: 30 TAC §350.75(b)(1) to clarify that ecological receptors must be considered when determining PCLs for groundwater discharges to surface water. The term currently in the numerator of the equation (^{SW}RBEL) is only related to aquatic life and human health exposure pathways that are addressed by the Texas Surface Water Quality Standards (TSWQS). The proposed new term for the numerator of the equation, the PCL for surface water (^{SW}SW), takes ecological receptors into consideration (including aquatic life) and other human pathways not addressed by the TSWQS, as described in later discussions of proposed changes to this section of the TRRP rule.

Changes are proposed to Figure: 30 TAC §350.75(b)(1) to correct the missing temperature term “K” for the units for the Universal Gas Constant in two places in the figure, and to update the amount of time that an individual is assumed to be exposed to a chemical or multiple COC (i.e., the exposure interval). The exposure interval value is used when performing certain calculations used to determine risk-based values. To reflect more recently published EPA information, it is proposed to change the exposure interval(s) value to 9.5×10^8 seconds (30 years). The value currently used in the rule is 1.0×10^9 (33 years). This change has already been addressed and implemented in guidance. Another proposed change to the figure is to replace incorrect cross-references to tables that are supposed to contain “Soil organic carbon-water coefficient” values (i.e., K_{oc} values) with the correct cross-reference. The cross-references proposed for deletion refer to tables containing K_d values, instead of K_{oc} values. An additional proposed change to the figure corrects the definition of the term “LDF,” changing it from “Lateral Dilution Factor” to “Leachate Dilution Factor,” to better represent the fact

that the dilution factor is used in calculations for predicting the concentrations of a COC contained in groundwater after it leaches through soils containing that COC and dilutes in the groundwater. It is also proposed to change the equation for calculating “The residential saturation limit where NAPL becomes mobile” to show the term “ θ_T ” as a multiplier, rather than as an exponent, and to correct the residential saturation value given in the figure, changing it from 0.0167 to the correct value of 0.04514. This too has already been corrected in guidance.

Proposed changes to Figure: §350.75(b)(1) also include revising the “Surface Water Exposure Pathway PCL Equation” section of the table to clarify that the PCL for surface water (^{SW}SW) is determined by comparing the value for the risk-based exposure limit for surface water for aquatic life and human health concerns ($^{SW}RBEL$), to the value for the PCL for surface water for ecological protection ($^{SW}SW_{Eco}$), and choosing the smaller of the two values. A change is proposed to the same section of the table to add a cross-reference to §350.77(a).

Proposed §350.75(i)(4) would clarify that PCLs for discharges from groundwater to surface water are equal to PCLs for surface water plus adjustments for dilution (when allowed). The previously mentioned proposed change also clarifies that adjustments for dilution apply to ecological exposure pathways, as well as human health exposure pathways, for discharges from groundwater to surface water. Additional proposed changes to §350.75(i)(4) would clarify that the PCLs for surface water for ecological protection ($^{SW}SW_{Eco}$) must be considered when developing PCLs for discharges from groundwater to surface water, provide a cross-reference to the appropriate section of the rule for

developing those PCLs, add a cross-reference to §350.75(i)(4)(A) for clarity, and remove unnecessary cross-references.

The cross-references proposed for deletion are unnecessary because they are contained in §350.75(i)(4)(B). A reference to determining whether a water body is fresh water or marine is proposed for deletion because it applies to the establishment of PCLs for surface water, rather than the development of PCLs for the discharge of groundwater to surface water.

Changes are proposed to §350.75(i)(4)(A) - (C) as a part of the previously mentioned clarification that adjustments for dilution apply to ecological exposure pathways (including aquatic life), as well as to human health exposure pathways.

Proposed §350.76(c), Approaches for Specific Chemicals of Concern to Determine Human Health Protective Concentration Levels, would provide flexibility to establish residential lead ^{Tot}Soil_{Comb} PCLs.

The revision to the rule allows for the use of property specific inputs and models. Proposed subsection (c)(2) would establish that any model is considered a Tier 3 evaluation. Input values and models used in Tier 3 evaluations require the approval of the agency. Subsequent paragraphs and figures are renumbered to accommodate proposed subsection (c)(2).

Proposed §350.76(e) would direct the use of the same approach currently being used to demonstrate attainment of the critical PCL for 2,3,7,8-TCDD in soil, for attainment of the critical PCL for 2,3,7,8-TCDD in other media (e.g., groundwater, sediment).

Changes are proposed to Figure: §350.76(g)(2), relating to Total Petroleum Hydrocarbons, to revise the surrogate chemicals. The current rule addresses total petroleum hydrocarbon (TPH) contamination using a surrogate-chemical toxicity/physical property approach for the various aliphatic and aromatic carbon range fractions resulting from analysis by TCEQ Method 1006. The surrogate chemicals used by TCEQ for the various aliphatic and aromatic fractions appear in Figure: §350.76(g)(2). The Massachusetts Department of Environmental Protection (MA DEP) was one of the first regulatory agencies to use the toxicity surrogate-chemical approach for addressing environmental TPH contamination (MA DEP, 1994). In 1997, the Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG) published *Development of Fraction Specific Reference Doses (RfDs) and Reference Concentrations (RfCs) for Total Petroleum Hydrocarbons* (TPHCWG, 1997). TCEQ review of the 1994 MA DEP and 1997 TPHCWG approaches was useful in developing the current TRRP toxicity surrogate approach for TPH, and TPHCWG surrogate chemicals and toxicity factors are currently used by TCEQ for several aliphatic and aromatic fractions. In November 2003, MA DEP published their *Final Updated Petroleum Hydrocarbon Fraction Toxicity Values for the VPH/EPH/APH Methodology*. TCEQ reviewed the 2003 MA DEP document and determined that several revisions to the surrogate chemicals found in Figure: §350.76(g)(2) are justified based on new scientific information and/or analyses conducted since the TPHCWG surrogate toxicity factors were published in 1997.

Additionally, the footnote to this figure is revised to correct the term to reflect “less than or equal to.”

Section 350.77, Ecological Risk Assessment and Development of Ecological Protective Concentration Levels, is proposed to be amended. An ecological risk assessment is conducted to determine the potential impacts posed to ecological receptors (i.e., aquatic life and wildlife) by COCs. The process is

a tiered approach, with increasingly complex criteria being evaluated as the process progresses from Tier 1 (using an exclusion criteria checklist to determine if significant exposure to COCs is likely), to Tier 2 (comparing concentrations of COCs at an affected property to literature-based PCLs), to Tier 3 (using site-specific measurements of exposure and the effects of exposure to COCs).

Proposed §350.77(a) would acknowledge existing agency guidance that was planned, but not in existence at the time the current rule was written. The specific guidance document is the agency's *Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas* (RG-263), as amended. The procedures contained in the guidance document have been in use since 2001.

Referencing the document in the rule will serve to make the person aware of the existence of the guidance document earlier in the ecological risk assessment process.

Proposed §350.77(a) would also provide the ability to end an ecological risk assessment evaluation even if the Tier 1 evaluation failed, provided the person can demonstrate that a response action (e.g., a cap that prevents exposure to impacted soils) will eliminate the potential for wildlife to be exposed to COCs, or if it can be demonstrated that concentrations of COCs that are protective for humans are also protective of ecological receptors. The rule currently indicates that a person may end the ecological risk assessment evaluation, based on the previously described factors, only if the response action is completed to address exposure to COCs by humans. The proposed changes will broaden the type of response actions that may be considered as justification for ending the ecological risk evaluation to include response actions completed for any reason, so long as the potential for ecological receptors to be exposed to a COC is eliminated or rendered insignificant. The agency has determined that the

proposed changes will reduce costs and effort with regard to ecological risk evaluations, without significantly impacting the protection of human health and the environment.

In addition, proposed §350.77(a) would acknowledge the possibility of ending an ecological risk assessment evaluation following a Tier 1 evaluation that is failed due to surface water and/or sediment exposure pathway issues, using the expedited stream evaluation process. The expedited stream evaluation process has been implemented via the previously mentioned *Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas* (RG-263), as amended. The expedited stream evaluation process allows a person to exit the ecological risk assessment process if the evaluation establishes that the completed surface water and sediment exposure pathways are insignificant.

Acknowledging the existence of the expedited stream evaluation process in the rule will serve to make the person aware of the existence of the guidance document earlier in the ecological risk assessment process.

Proposed §350.77(b) would include a revision to correct a typographical error and a clarification that a person is required to continue to Tier 2 or Tier 3 of the ecological risk assessment process unless a reasoned justification (described in §350.77(a) of the current rule) and/or an expedited stream evaluation demonstrates that the ecological risk involved is acceptable. The proposed changes would also inform the person that the reasoned justification approach and the expedited stream evaluation process are described in agency's guidance. That guidance document is the *Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas* (RG-263), as amended.

Proposed §350.77(c) is amended to provide a reference to the agency's ecological risk assessment guidance. The proposed revision informs the person of the location of guidance concerning the elimination of a COC that does not pose an ecological risk and the development of PCLs for a COC that does pose an unacceptable risk to selected ecological receptors.

Proposed §350.77(c) would also clarify the current procedure for conducting a Tier 2 screening-level ecological risk assessment. The proposed clarifications are intended to enable the person to avoid a recurring issue that has been observed by agency staff reviewing Tier 2 screening-level ecological risk assessments. The proposed changes do not modify the current procedures for conducting Tier 2 screening-level ecological risk assessments.

Proposed new §350.90, Spatial and Electronic Information, would require a person to provide accurate spatial coordinates for any site data (e.g., sampling locations), as required by the agency, in a format to be specified by the agency. The provision is proposed to facilitate agency management of the data and evaluation and use of the data. Also proposed are conforming rule changes that would delete §§350.91(c), 350.92(b), 350.93(b), 350.94(m), 350.95(f), and 350.96(b). Further conforming rule changes are proposed to §§350.92, 350.93, and 350.96, striking the "(a)" to make subsection (a) in each case implied.

Proposed §350.91(b)(7), Affected Property Assessment Report, would add language to indicate that if an expedited stream evaluation is conducted, it should be included in the APAR.

Additional language is proposed to be added as §350.91(b)(15) to further clarify that the person is to provide spatial data coordinates, as requested by the agency, for the affected property and any sampling or testing locations, in a format that is approved or required by the agency. Existing §350.91(b)(15) is proposed to be renumbered as §350.91(b)(16).

Proposed §350.95(b), Response Action Completion Report, would add institutional control rule citations to help indicate that institutional controls may be established for reasons other than commercial/industrial land use. The proposed language also includes the term “when applicable.”

Proposed §350.96(a), Post-Response Action Care Reports, would replace the word “reports” with “report.”

Proposed §350.111(c), Use of Institutional Controls, would reflect a clarification and resulting change in language that acknowledges that the subject at issue is more appropriately addressed in this section rather than in the definition of “Person” contained in existing §350.4(a)(62). Therefore, the definition of “Person” is changed in the proposed rule, and that language and concept is incorporated into this section. This clarification is consistent with current practice under the existing rule and reflects the intent that a governmental entity that is not a responsible party is excluded from the requirement of having to obtain written consent from the landowner prior to filing a deed notice or Voluntary Cleanup Program certificate of completion in the real property records. The language is also amended so that if subsection (b)(4) relating to change in circumstance, subsection (d) relating to technical impracticability, or subsection (f) relating to missing landowner, of this section apply, persons also aren’t required to obtain written landowner consent.

Proposed §350.111(c)(4) would also incorporate the language and concept that was removed from the definition of “Person” in proposed §350.4(a)(62). This change is consistent with current practice under the existing rule and will provide a governmental entity who is performing remediation activities under this title, but who is not a responsible party, the ability to impose a deed notice on property if the landowner refuses consent to file a restrictive covenant on the property in accordance with Remedy Standard B requirements. This rule provision is needed to extend the beneficial use of finite state and federal remediation funds so that more sites can be addressed, rather than expending excessive funds to complete an unwarranted removal/decontamination remedy, when a control-based remedy that is fully protective of human health and the environment is the lowest cost remedial alternative. Conforming rule changes are proposed to §350.111(c)(2) and (3) to move the “or” at the end of paragraph (2) to the end of paragraph (3).

Proposed §350.111(e) would replace the incorrect cross-reference of §350.33(f)(3)(E) to §350.111(f)(3)(F).

Proposed §350.134(b), Qualifying Criteria (for establishing a facility operations area), would reference 30 TAC Chapter 60, Compliance History, which was adopted post-Chapter 350. Chapter 60 rules establish additional criteria for evaluating the compliance history of a facility.

FISCAL NOTE: COSTS TO STATE AND LOCAL GOVERNMENT

Nina Chamness, Analyst, Strategic Planning and Assessment Section, has determined that, for the first five-year period the proposed rules are in effect, no fiscal implications are anticipated for the agency. However, for other units of state government, local governments, or federal entities that are responsible

for clean up of contaminated sites under the Voluntary Cleanup, Corrective Action, Petroleum Storage Tank (PST), and Superfund Programs, there may be some fiscal implications as a result of administration or enforcement of the proposed rules. These fiscal implications are not anticipated to be significant.

The proposed rules amend various portions of Chapter 350 to correct misspellings, typographical errors, mathematical errors, and other minor errors found in the current rule; to clarify and modify rule provisions to facilitate consistent and effective rule interpretation; to incorporate current guidance practices into rule language; to support the use of a new electronic data management system; and to expand the use of geographical information system technology to improve the use and availability of technical information used by the agency. The proposed rules would apply to regulated entities responsible for cleanup of contaminated sites under the Voluntary Cleanup, Corrective Action, PST, Dry Cleaners, and Superfund Programs throughout the state.

In general, cost increases are not anticipated under the proposed rules since they incorporate current guidance in many cases. However, the proposed rules would require the collection and reporting of spatial data coordinates. Any cost increases associated with this provision are expected to be minimal. Costs for spatial data coordinates are estimated to be less than \$100 per data location. Cost savings, which are not anticipated to be significant, may occur under the proposed rules that pertain to certain legacy LPST sites, to certain situations where groundwater samples do not have to be collected, and to certain circumstances where a full-scale ecological risk assessment is not required. In situations where groundwater samples do not have to be collected, cost savings can range from \$100 - \$200 per sample. If ten monitoring wells would be required under the current rules, the proposed rules could save

regulated entities as much as \$2,000 per site. Where detailed, complex ecological risk evaluations will not be required, cost savings could be as much as \$1,000 - \$10,000 per assessment. Staff estimates that there may be 300 - 400 governmental entities that could experience these cost increases and cost savings under the proposed rules.

PUBLIC BENEFITS AND COSTS

Ms. Chamness also determined that for each year of the first five years the proposed rules are in effect, the public benefit anticipated from the changes seen in the proposed rules will be fair, efficient, and continued protection of public health and safety through environmental cleanup of contaminated sites.

In general, cost increases are not anticipated for individuals and large businesses under the proposed rules since they incorporate current guidance in many cases. However, the proposed rules will require the collection and reporting of spatial data coordinates. Any cost increases associated with this provision are expected to be minimal. Costs for spatial data coordinates are estimated to be less than \$100 per data location. Cost savings, which are not anticipated to be significant, may occur under the proposed rules that pertain to certain legacy LPST sites, to certain situations where groundwater samples do not have to be collected, and to certain circumstances where a full-scale ecological risk assessment is not required. In situations where groundwater samples do not have to be collected, cost savings can range from \$100 - \$200 per sample. If ten monitoring wells would be required under the current rules, the proposed rules could save regulated entities as much as \$2,000 per site. Where detailed, complex ecological risk evaluations will not be required, cost savings could be as much as \$1,000 - \$10,000 per assessment. Staff estimates that there may be 900 - 1,200 large businesses that could experience these cost increases and savings.

SMALL BUSINESS AND MICRO-BUSINESS ASSESSMENT

No significant adverse fiscal implications are anticipated for small or micro-businesses as a result of the proposed rules. Small or micro-businesses responsible for clean up of contaminated sites may experience the same cost increases for data point collection and the same cost savings from reduced collection of water samples and ecological risk evaluations as those incurred by governmental entities and large businesses under the proposed rules. Staff estimates that there may be 1,800 – 2,400 small or micro-businesses that could experience these types of fiscal implications.

LOCAL EMPLOYMENT IMPACT STATEMENT

The commission has reviewed this proposed rulemaking and determined that a local employment impact statement is not required because the proposed rules do not adversely affect a local economy in a material way for the first five years that the proposed rules are in effect.

DRAFT REGULATORY IMPACT ANALYSIS DETERMINATION

The commission reviewed the proposed rulemaking in light of the regulatory analysis requirements of Texas Government Code, §2001.0225, and determined that the rulemaking is not subject to §2001.0225 because it does not meet the definition of a "major environmental rule" as defined in that statute. A "major environmental rule" means a rule, the specific intent of which, is to protect the environment or reduce risks to human health from exposure and that may adversely affect in a material way, the economy, a sector of the economy, productivity, competition, jobs, the environment, or the public health and safety of the state or a sector of the state. The commission has determined that the proposed rulemaking does not fall under the definition of a "major environmental rule" because the proposed

amendments and new rule are primarily designed to clarify the existing regulatory requirements and adjust methods and measures to ensure a consistent application of soil and water analysis and remediation standards. In furtherance of this effort at promoting consistency, certain policies and practices concerning sampling, remediating, and reporting are altered in a manner which ensures flexibility in the remediation process while maintaining appropriate protection of human health and the environment. The proposed amendments and new rule do not rise to the level of material, but rather are limited to incorporating modifications to the current regulatory framework based upon the implementation of the rules to date.

Furthermore, the proposed rulemaking does not meet any of the four applicability requirements listed in Texas Government Code, §2001.0225(a). Texas Government Code, §2001.0225(a), only applies to a major environmental rule, the result of which is to: 1) exceed a standard set by federal law, unless the rule is specifically required by state law; 2) exceed an express requirement of state law, unless the rule is specifically required by federal law; 3) exceed a requirement of a delegation agreement or contract between the state and an agency or representative of the federal government to implement a state and federal program; or 4) adopt a rule solely under the general powers of the agency instead of under a specific state law. This rulemaking does not meet any of these four applicability requirements because this rulemaking: 1) does not exceed any standard set by federal law; 2) does not exceed the requirements of state law; 3) does not exceed a requirement of a delegation agreement or contract between the state and an agency or representative of the federal government to implement any state and federal program; and 4) is not proposed solely under the general powers of the agency, but rather under specific authorizing statutes as referenced in the STATUTORY AUTHORITY section of this preamble.

TAKINGS IMPACT ASSESSMENT

The commission evaluated the proposed rules and performed an assessment of whether these proposed rules constitute a takings under Texas Government Code, Chapter 2007. The specific purpose of the rules is to clarify the existing regulatory requirements and adjust methods and measures to ensure a consistent application of soil and water analysis and remediation standards. Among other technical changes, the proposed rule contains a clarification of language regarding the filing of institutional controls by non-responsible party governmental entities performing remedial actions. The proposed change reflects the practice of the existing rule but inserts the clarifying language in §350.111 as opposed to the prior means of excluding the qualifying governmental entities from the defined subset of persons to whom TRRP is applicable in §350.4(a)(62). Inserting the language in §350.111, rather than §350.4(a)(62), is proposed to achieve the same result of the existing rule regarding institutional controls while avoiding the overbroad and unintended interpretation that governmental entities are excluded from all other requirements of TRRP.

Promulgation and enforcement of the proposed amendments and new rule would constitute neither a statutory nor a constitutional taking of private real property. Specifically, the proposed regulations do not affect a landowner's rights in real property because the clarification in the rulemaking does not burden (constitutionally) nor restrict or limit the owner's right to property and reduce its value by 25% or more beyond that which would exist in the absence of the proposed clarification of the regulations. In other words, there are no burdens imposed on private real property under this rulemaking because the proposed amendments and new rule do not materially change the substance of the rule but rather clarify the institutional control process as it relates to non-responsible party governmental entities conducting remedial actions. Therefore, the proposed rules do not have any impact on the use or

enjoyment of private real property, and there would be no reduction in value of property as a result of this rulemaking.

CONSISTENCY WITH THE COASTAL MANAGEMENT PROGRAM

The commission reviewed the proposed rulemaking and found the proposal is a rulemaking identified in the Coastal Coordination Act Implementation Rules, 31 TAC §505.11(b)(2) relating to rules subject to the Coastal Management Program, and will, therefore, require that goals and policies of the Texas Coastal Management Program (CMP) be considered during the rulemaking process.

The commission reviewed this rulemaking for consistency with the CMP goals and in accordance with the regulations of the Coastal Coordination Council and determined that the rulemaking is procedural in nature and will have no substantive effect on commission actions subject to the CMP and is, therefore, consistent with CMP goals and policies.

SUBMITTAL OF COMMENTS

Written comments may be submitted to Patricia Durón, MC 205, Office of Legal Services, Texas Commission on Environmental Quality, P.O. Box 13087, Austin, Texas 78711-3087, or faxed to (512) 239-4808. Electronic comments may be submitted at www5.tceq.state.tx.us/rules/ecomments/.

Comments must be received by October 9, 2006. All comments should reference Rule Project Number 2005-033-350-PR. The proposed rules may be viewed on the commission's web site at http://www.tceq.state.tx.us/nav/rules/prose_adopt.html. For further information or questions concerning this proposal, please contact Maria Lebron, Remediation Division, (512) 239-1898.

SUBCHAPTER A: GENERAL INFORMATION

§§350.2 - 350.4

STATUTORY AUTHORITY

The amended rules are proposed under the following statutory authority: TWC, §5.103 and §26.011, which provide the commission with authority to adopt any rules necessary to carry out its powers, duties, and policies and to protect water quality in the state; TWC, §5.103(c), which states the commission must adopt rules when adopting, repealing, or amending any agency statement of general applicability that interprets or prescribes law or policy or describes the practice and procedure requirements of the agency, and Texas Health and Safety Code (THSC), Texas Solid Waste Disposal Act, §361.017 and §361.024, which provide the commission the authority to regulate industrial solid waste and municipal hazardous wastes and all other powers necessary or convenient to carry out its responsibilities. In addition, the amended rules are proposed under TWC, §26.039, which states that activities which are inherently or potentially capable of causing or resulting in the spillage or accidental discharge of waste or other substances and which pose serious or significant threats of pollution are subject to reasonable rules establishing safety and preventive measures which the commission may adopt or issue; TWC, §26.121, which prohibits persons from discharging wastes into or adjacent to any water in the state unless authorized to do so and prohibits persons from committing any other act or engaging in any other activity which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state; TWC, §26.262, which states that it is the policy of this state to prevent the spill or discharge of hazardous substances into the waters in the state and to cause the removal of such spills and discharges without undue delay; and TWC, §26.264, which provides the commission with authority to issue rules necessary and

convenient to carry out the policy referenced in TWC, §26.262. Authority to adopt the amended rules is also provided by TWC, §26.341, which states that it is the policy of this state to maintain and protect the quality of groundwater and surface water resources in the state from certain substances in underground and aboveground storage tanks that may pollute groundwater and surface water resources, and requires the use of all reasonable methods, including risk-based corrective action to implement this policy; TWC, §26.345, which provides the commission with the authority to adopt rules necessary to carry out the policy referenced in TWC, §26.341; and TWC, §26.401, which states that it is the policy of this state that discharges of pollutants, disposal of wastes, or other activities subject to regulation by state agencies be conducted in a manner that will maintain present uses and not impair potential uses of groundwater or pose a public health hazard, and that the quality of groundwater be restored if feasible.

The proposed amendments implement TWC, §§5.103, 26.011, 26.039, 26.262, 26.264, 26.341, 26.345, and 26.401, and THSC, §§361.017, 361.024.

§350.2. Applicability.

(a) - (b) (No change.)

(c) Property regulated under Chapter 330 of this title (relating to Municipal Solid Waste).

Persons shall comply with the requirements of this chapter for those municipal solid waste properties except when subject to the requirements of 40 Code of Federal Regulations Parts 257 and/or 258, as amended. However, for those municipal solid waste properties subject to the requirements of 40 Code of Federal Regulations Parts 257 and/or 258, as amended, the executive director may establish an

alternative health-based groundwater protection standard for a COC in accordance with §330.409 [§330.235(i)] of this title (relating to Assessment Monitoring Program), as amended. Determination of such an alternative standard shall be made using the procedures of Subchapter D of this chapter (relating to Development of Protective Concentration Levels).

(d) - (e) (No change.)

(f) Property regulated under Chapter 333 of this title (relating to Brownfields [Brownfield] Initiatives). The person entering the Voluntary Cleanup Program (VCP) shall comply with all requirements found in the Texas Health and Safety Code, Chapter 361, Subchapter S, as amended, concerning the Voluntary Cleanup Program; Subchapter A of Chapter 333 of this title (relating to Voluntary Cleanup Program Section), as amended; and the requirements of this chapter. Where there is a conflict between the requirements of this chapter and the requirements in the Texas Health and Safety Code, Chapter 361, Subchapter S, as amended, and Chapter 333, Subchapter A of this title, as amended, the requirements of the Texas Health and Safety Code, Chapter 361, Subchapter S, as amended, and Chapter 333, Subchapter A of this title, as amended, shall apply.

(g) Property regulated under Chapter 334 of this title (relating to Underground and Aboveground Storage Tanks). The person shall comply with the requirements of this chapter for the assessment, response actions, and post-response action care for releases of regulated substances from underground storage tanks (USTs) as specified in Chapter 334, Subchapter A of this title (relating to General Provisions), as amended, and for releases of petroleum products from aboveground storage tanks (ASTs) as specified in Chapter 334, Subchapter F of this title (relating to Aboveground Storage

Tanks), as amended, which are reported to the executive director in accordance with Chapter 334, Subchapter D of this title (relating to Release Reporting and Corrective Action), as amended, on or after September 1, 2003, unless a variance is granted in accordance with requirements described in paragraphs (1) - (8) of this subsection. Additional corrective action requirements for these facilities are found in Chapter 334, Subchapters D, J, and K of this title (relating to Release Reporting and Corrective Action; Leaking Petroleum Storage Tank Corrective Action Specialist Registration and Project Manager Licensing [Registration of Corrective Action Specialists and Project Managers for Product Storage Tank Remediation Projects]; and Storage, Treatment, and Reuse Procedures for Petroleum-Substance Contaminated Soil, respectively), as amended. For releases discovered and reported to the executive director before September 1, 2003, the person shall continue to comply with Chapter 334 Subchapters D, G, H, J, K, and M of this title (relating to Release Reporting and Corrective Action; Target Concentration Criteria; [Interim] Reimbursement Program; Leaking Petroleum Storage Tank Corrective Action Specialist Registration and Project Manager Licensing [Registration of Corrective Action Specialists and Project Managers for Product Storage Tank Remediation Projects]; Storage, Treatment, and Reuse Procedures for Petroleum-Substance Contaminated Soil; and Reimbursable Cost Specifications [Guidelines] for the Petroleum Storage Tank Reimbursement Program, respectively), as amended, which were in effect prior to the effective date of this chapter, not to preclude compliance with a subsequent amendment of 30 TAC 334 of this title (Underground and Aboveground Storage Tanks).

(1) The executive director receives a written request from the person in a prescribed or allowed format for a variance from applicability of this chapter, as amended, that includes:

(A) documentation in accordance with the requirements of Chapter 334,

Subchapters A, C, D, and F of this title, as amended and as applicable, or as indicated by other credible and appropriate evidence acceptable to the executive director that before September 1, 2003, the UST system at the property for which the variance is sought was permanently removed from service and the AST at the property for which the variance is sought was removed from the property;

(B) a draft restrictive covenant that will be filed in the property records of the county where the property is located upon granting of the variance by the executive director that:

(i) prohibits use of ASTs or USTs at the property or at any subsequent subdivision of the property;

(ii) is written in favor of the TCEQ and the State of Texas;

(iii) runs with the land;

(C) identification of UST or AST release sites addressed under Chapter 334, Subchapters D and G of this title, as amended, that are in proximity to the property for which the variance is sought, with a justification as to why compliance with this chapter would result in a degree of regulatory inequity that is not justifiable after comparing the release, site, and receptor conditions and other relevant factors for those other release sites with the release for which the variance is sought.

(2) The executive director may request additional information reasonably necessary for appropriate consideration of the variance request. Should the executive director make such a request, the person shall provide any additionally requested information within 45 calendar days of the date the executive director makes the request, or within another time period directed or agreed upon by the executive director.

(3) The executive director agrees there would be an unjustifiable degree of regulatory inequity and specifically grants the requested variance after consideration of information provided in accordance with paragraphs (1) and (2) of this subsection and accordingly provides written notice to the person that the variance is granted. The executive director may direct changes to be made to the draft restrictive covenant as necessary to ensure the restrictive covenant performs with the intent of this subsection.

(4) After receiving the written notice described in paragraph (3) of this subsection, the person shall provide:

(A) proof in a form acceptable to the executive director within 45 calendar days of the date the written notice granting the variance was issued by the executive director that the restrictive covenant described in paragraph (1)(B) of this subsection was filed in the property records of the county where the property is located;

(B) a copy of the restrictive covenant filed in the property records.

(5) Failure to comply with paragraph (4) of this subsection will result in subsequent repeal of the variance by the executive director, unless the person can provide compelling evidence that it was reasonably outside their ability to comply (e.g., affected by natural disaster or tragedy).

(6) The executive director will notify the person seeking the variance in writing if the variance is denied or repealed and give the reason(s) if the variance is denied or repealed.

(7) Once the variance is in effect, then the person shall comply with Chapter 334, Subchapters D and G of this title, as amended, in lieu of this chapter.

(8) If the property or subdivision of the property is subsequently used for UST or AST purposes regulated under Chapter 334 of this title, as amended, then the variance is automatically repealed and this chapter will then become applicable to the release, regardless of whether the release has been fully addressed and closed under Chapter 334, Subchapters D and G of this title.

(h) Property regulated under Chapter 335 of this title (relating to Industrial Solid Waste and Municipal Hazardous Waste). The person shall comply with the requirements of this chapter when undertaking the remediation of affected property at facilities used for the storage, processing or disposal of industrial solid waste or municipal hazardous waste, or for the remediation of environmental media containing COCs resulting from releases from waste management facility components (e.g., tank, container storage area, surface impoundment, etc.), either as part of closure or at any time before or after closure. The person shall close a waste management facility component in a manner that minimizes or eliminates the need for further maintenance and controls. The manner of closure shall

also minimize or eliminate, to the extent necessary to protect human health and the environment, the post-closure escape of waste, contaminants, leachate, run-off, or decomposition products to the surrounding environmental media. Waste management facility components undergoing closure for which the person can demonstrate that no release of COCs to surrounding environmental media has occurred are subject to this chapter only with regard to this closure performance standard and the removal, decontamination or control requirements for waste as specified in Subchapter B of this chapter (relating to Remedy Standards). In the event a release of COCs to surrounding environmental media has occurred, then the person shall comply with this chapter for response to the release. The person shall comply with §335.118(b) of this title (relating to Closure Plan; Submission and Approval of Plan), as amended, or applicable permit provisions regarding requirements for public participation in the corrective action process for permitted hazardous waste facilities. The person shall also comply with the requirements of paragraphs (1) - (3) of this subsection, as applicable.

(1) (No change.)

(2) Any person who stores, processes, or disposes of hazardous waste is also subject to the applicable provisions relating to closure and post-closure in Chapter 335, Subchapters E and F of this title (relating to Interim Standards for Owners and Operators [owners and operators] of Hazardous Waste Storage, Processing, or Disposal Facilities; and Permitting Standards for Owners and Operators of Hazardous Waste Storage, Processing, or Disposal Facilities, respectively), as amended.

(3) - (4) (No change.)

(i) Affected property regulated under Chapter 335, Subchapter K of this title (relating to Hazardous Substance Facilities Assessment and Remediation). The person shall comply with all requirements found in the Texas Health and Safety Code, Chapter 361, Subchapter F, as amended; Chapter 335, Subchapter K of this title [(relating to Hazardous Substance Facilities Assessment and Remediation)], as amended; and the requirements of this chapter for any release or threatened release of hazardous substances into the environment that may constitute an imminent and substantial endangerment to public health and safety or the environment. Where there is a conflict between the requirements in this chapter and the requirements of Texas Health and Safety Code, Chapter 361, Subchapter F, as amended, and Chapter 335, Subchapter K of this title, as amended, the requirements of Texas Health and Safety Code, Chapter 361, Subchapter F and Chapter 335, Subchapter K of this title shall apply.

(j) (No change.)

(k) Property regulated under Chapter 312 of this title (relating to Sludge Use, Disposal, and Transportation). The executive director may reference this chapter in permits subject to Chapter 312 of this title, as amended, when specifying closure provisions to address releases of COCs from facility components at municipal wastewater treatment plants.

(l) (No change.)

(m) Use of this chapter on or after May 1, 2000. The person who started a response action under Chapter 335, Subchapters A and S of this title (relating to Industrial Solid Waste [Wastes] and

Municipal Hazardous Waste [Wastes] in General; Risk Reduction Standards, respectively), as amended, may qualify to continue under those previous commission rules subject to the limitations specified in paragraphs (1) – (4) of this subsection. Any person desiring to remain under Chapter 335 of this title may not use any of the provisions of this chapter. If a person elects to proceed under this chapter, then they shall not be allowed to return to Chapter 335 of this title. Also, the person shall respond as described in §350.35 of this title (relating to Substantial Change in Circumstances) in the event a substantial change in circumstance occurs which results in an unacceptable threat to human health or the environment.

(1) The person who has submitted an initial notification of intent to conduct a Risk Reduction Standard 1 or 2 response action (i.e., §335.8(c)(1) and (2) of this title (relating to Closure [Closures] and Remediation), as amended) prior to May 1, 2000, and has submitted a final report within five years after that date may request that the response action be reviewed according to the regulations in effect at the time of initial notification. Persons will automatically qualify for this grandfathering provision if they have previously received a letter from the agency acknowledging receipt of the initial notification, or submit other forms of documentation by May 1, 2001, that proper and timely notification had been made. [Any person desiring to remain under Chapter 335 of this title may not use any of the provisions of this chapter.]

(2) The person who has submitted a remedial investigation report that fully complies with §335.553(b)(1) of this title (relating to Required Information [Risk Reduction Standard No. 3]), as amended, prior to May 1, 2001, may elect to either continue under those rules or to proceed under this chapter. [Any person desiring to remain under Chapter 335 of this title may not use any of the

provisions of this chapter. If a person elects to proceed under this chapter, then they shall not be allowed to return to Chapter 335 of this title.]

(3) - (4) (No change.)

§350.3. Process.

Once a release of COCs as defined by various programs has been identified and reported pursuant to rules or procedures established by one of the program areas identified in §350.2 of this title (relating to Applicability), this chapter controls the assessment and any action taken in response to that release. Upon initial notification to the appropriate program, the person will follow the general process as stated in paragraphs (1) - (5) of this section to demonstrate compliance with this chapter.

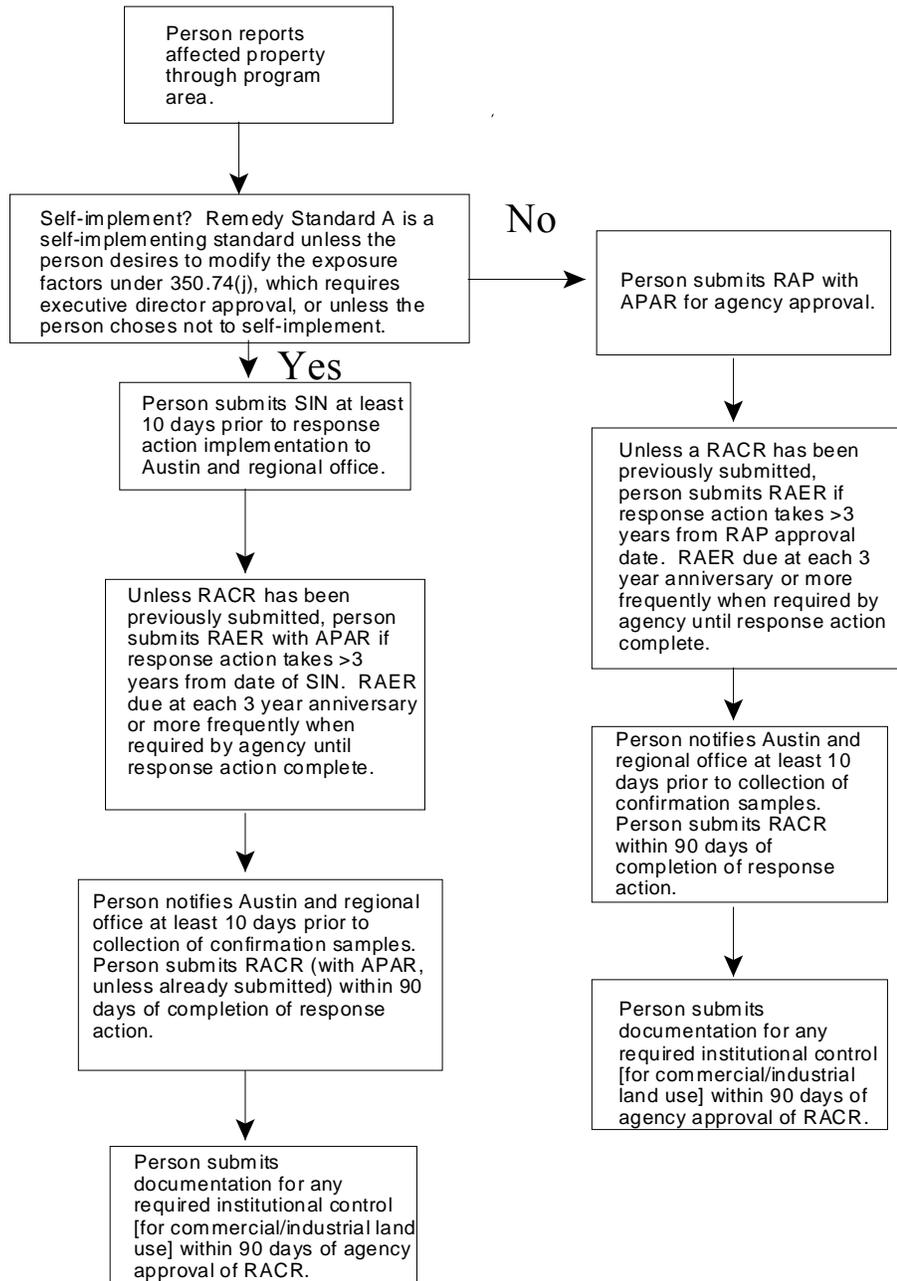
(1) - (3) (No change.)

(4) The person shall develop and submit the reports required in Subchapter B of this chapter (relating to Remedy Standards) which contain the information specified for each report in Subchapter E of this chapter (relating to Reports). The sequencing of report submission is illustrated in the following figure.

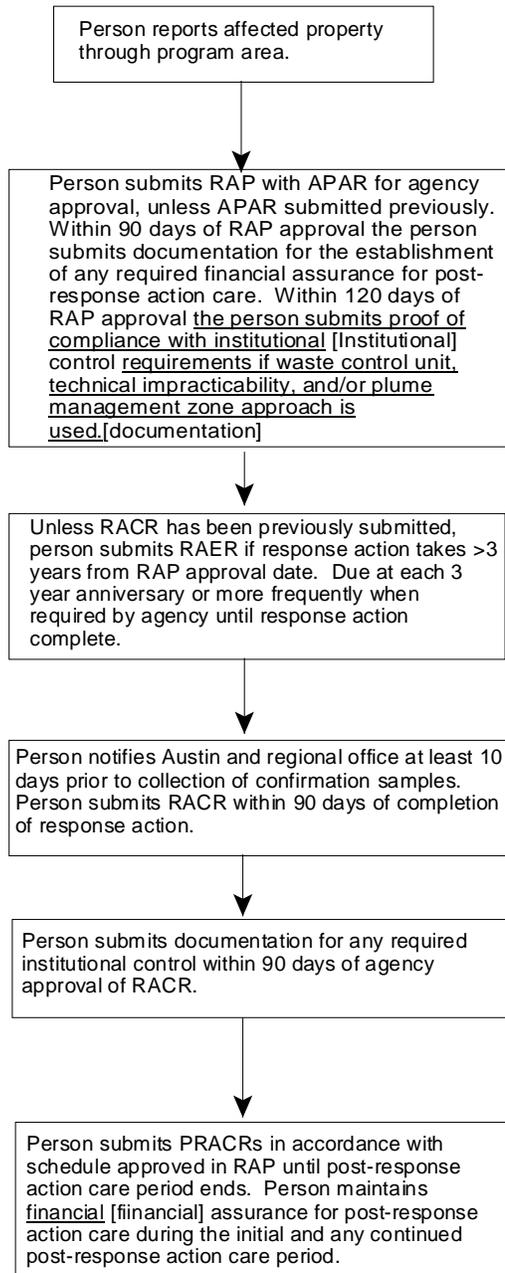
Figure: 30 TAC §350.3(4)

[Figure: 30 TAC §350.3(4)]

Remedy Standard A Reporting



Remedy Standard B Reporting



(5) (No change.)

§350.4. Definitions and Acronyms.

(a) Definitions.

(1) - (5) (No change.)

(6) **Background**--A population of concentrations characterized from samples in an environmental medium containing a chemical of concern that is naturally occurring (i.e., the concentration is not due to a release of chemicals of concern from human activities) or anthropogenic (i.e., the presence of a chemical of concern in the environment which is due to human activities, but is not the result of site-specific use or release of waste or products, or industrial activity). Examples of anthropogenic sources might include non-site specific sources such as lead from automobile emissions, arsenic from use of defoliants, [and] polynuclear aromatic hydrocarbons resulting from combustion of hydrocarbons, and diffuse non-point source pollution in surface water and sediment. There are some commonalities regardless of the activity; specifically, the chemicals of concern have resulted from the use of a product in its intended manner and may be present at generally low levels over large areas (tens of square miles up to hundreds of square miles). Background is required for use in a statistical model appropriate for testing the hypothesis that the background area characterized by these kinds of models has the same concentrations of the chemical of concern as the affected property. The background area characterized is as “close” as possible to the affected property, in either space or time, as required.

(7) **Bedrock**--The solid rock (i.e., consolidated, coherent, and relatively hard naturally formed material that [than] cannot normally be excavated by manual methods alone) that underlies gravel, soil or other surficial material.

(8) - (10) (No change.)

(11) **Chemical of concern**--Any chemical that has the potential to adversely affect ecological or human receptors due to its concentration, distribution, and mode of toxicity. Depending on the program area, chemicals of concern may include the following: solid waste, industrial solid waste, municipal solid waste, and hazardous waste as defined in the Texas Health and Safety Code, §361.003, as amended; hazardous constituents as listed in 40 Code of Federal Regulations Part 261, Appendix VIII, as amended; constituents on the groundwater monitoring list in 40 Code of Federal Regulations Part 264, Appendix IX, as amended; constituents as listed in 40 Code of Federal Regulations Part 258 Appendices I and II, as amended; pollutant as defined in Texas Water Code, §26.001, as amended; hazardous substance as defined in the Texas Health and Safety Code, §361.003, as amended, and [the] Texas Water Code, §26.263, as amended; regulated substance as defined in Texas Water Code, §26.342, as amended, and §334.2 of this title (relating to Definitions), as amended; petroleum product as defined in Texas Water Code, §26.342, as amended, and §334.122(b)(12) of this title (relating to Definitions for ASTs), as amended; other substances as defined in Texas Water Code, §26.039(a), as amended; and daughter products of the aforementioned constituents.

(12) (No change.)

(13) **Commercial/industrial land use**--Any real property or portions of a property not used for human habitation or for other purposes with a similar potential for human exposure as defined for residential land. Examples of commercial/industrial land use include manufacturing; industrial research and development; utilities; commercial warehouse operations; lumber yards; retail gas stations; auto service stations; auto dealerships; equipment repair and service stations; professional offices (lawyers, architects, engineers, real estate, insurance, etc.); medical/dental offices and clinics (not including hospitals); financial institutions; office buildings; any retail business whose principal activity is the sale of food or merchandise; personal service establishments (health clubs, barber/beauty salons, mortuaries, photographic studios, etc.); churches (not including churches providing day care or school services other than during normal worship services); motels/hotels (not including those which allow residence); agricultural lands; and portions of government-owned land (local, state, or federal) that have commercial/industrial activities occurring. Land use activities consistent with this classification have the North American Industrial Classification System code numbers 11 - 21 inclusive; 22 except 22131; 23 - 56 inclusive; 61 except 61111, 61121, and 61131; 62 except 62211, 62221, 62231, 62311, 62322, 623311, 623312, 62399, and 62441; 71 except 71219; 72 except 721211 and 72131; 81 except 814 [inclusive]; and 92 excluding 92214.

(14) - (44) (No change.)

(45) **Implementation Procedures**--The most current version of *Procedures to Implement the Texas Surface Water Quality Standards [Implementation of the Texas Natural Resource Conservation Commission Standards via Permitting]*, as amended.

(46) **Innocent Owner or Operator**--Those persons so designated in accordance with [the] Texas Health and Safety Code, Chapter 361, Subchapter V, Immunity From Liability of Innocent Owner or Operator, as amended.

(47) - (57) (No change.)

(58) **Natural Resource Trustees**--The federal agencies as designated by the President and the state agencies as designated by the Governor pursuant to the National Contingency Plan, Oil Pollution Act, and CERCLA §107(f)(2)(A) and (B) to act on behalf of the public as trustees of natural resources (e.g., water, air, land, wildlife). The Trustees include TCEQ [TNRCC], Texas Parks and Wildlife Department, Texas General Land Office, National Oceanic and Atmospheric Administration, and the Department of the Interior.

(59) - (61) (No change.)

(62) **Person**--An individual, corporation, organization, government or governmental subdivision or agency, business trust, partnership, association, or any other legal entity[, but excluding a governmental entity that is not a responsible party performing a remedial action].

(63) - (77) (No change.)

(78) **Sample detection [quantitation] limit**--The method detection limit, as defined in this section, adjusted to reflect sample-specific actions, such as dilution or use of smaller aliquot sizes

than prescribed in the analytical method, and to take [takes] into account sample characteristics, sample preparation, and analytical adjustments. The term, as used in this rule, is analogous to the sample-specific detection limit.

(79) - (87) (No change.)

(88) **Surface soil**--For human health exposure pathways, the soil zone extending from ground surface to 5 [15] feet in depth [for residential land use and from ground surface to 5 feet in depth for commercial/industrial land use]; or to the top of the uppermost groundwater-bearing unit or bedrock, whichever is less in depth. For ecological exposure pathways, the soil zone extending from ground surface to 0.5 feet in depth.

(89) - (91) (No change.)

(b) Acronyms.

(1) - (19) (No change.)

(20) TCEQ – Texas Commission on Environmental Quality [TNRCC - Texas Natural Resource Conservation Commission; and];

(21) TPDES - Texas Pollutant Discharge Elimination System; and

(22) [(21)] U.S. EPA - United States Environmental Protection Agency.

(c) - (d) (No change.)

SUBCHAPTER B: REMEDY STANDARDS

§§350.33, 350.34, 350.37

STATUTORY AUTHORITY

The amended rules are proposed under the following statutory authority: TWC, §5.103 and §26.011, which provide the commission with authority to adopt any rules necessary to carry out its powers, duties, and policies and to protect water quality in the state; TWC, §5.103(c), which states the commission must adopt rules when adopting, repealing, or amending any agency statement of general applicability that interprets or prescribes law or policy or describes the practice and procedure requirements of the agency, and THSC, Texas Solid Waste Disposal Act, §361.017 and §361.024, which provide the commission the authority to regulate industrial solid waste and municipal hazardous wastes and all other powers necessary or convenient to carry out its responsibilities. In addition, the amended rules are proposed under TWC, §26.039, which states that activities which are inherently or potentially capable of causing or resulting in the spillage or accidental discharge of waste or other substances and which pose serious or significant threats of pollution are subject to reasonable rules establishing safety and preventive measures which the commission may adopt or issue; TWC, §26.121, which prohibits persons from discharging wastes into or adjacent to any water in the state unless authorized to do so and prohibits persons from committing any other act or engaging in any other activity which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state; TWC, §26.262, which states that it is the policy of this state to prevent the spill or discharge of hazardous substances into the waters in the state and to cause the removal of such spills and discharges without undue delay; and TWC, §26.264, which provides the commission with authority to issue rules necessary and convenient to carry out the policy

referenced in TWC, §26.262. Authority to adopt the amended rules is also provided by TWC, §26.341, which states that it is the policy of this state to maintain and protect the quality of groundwater and surface water resources in the state from certain substances in underground and aboveground storage tanks that may pollute groundwater and surface water resources, and requires the use of all reasonable methods, including risk-based corrective action to implement this policy; TWC, §26.345, which provides the commission with the authority to adopt rules necessary to carry out the policy referenced in TWC, §26.341; and TWC, §26.401, which states that it is the policy of this state that discharges of pollutants, disposal of wastes, or other activities subject to regulation by state agencies be conducted in a manner that will maintain present uses and not impair potential uses of groundwater or pose a public health hazard, and that the quality of groundwater be restored if feasible.

The proposed amendments implement TWC, §§5.103, 26.011, 26.039, 26.262, 26.264, 26.341, 26.345, and 26.401, and THSC, §§361.017, 361.024.

§350.33. Remedy Standard B.

(a) - (e) (No change.)

(f) The following are the Remedy Standard B groundwater response objectives and associated requirements for response actions performed in accordance with subsections (a)(1) - (2), and (a)(3)(A) of this section to address human health or environmental risk at an affected property. The person shall achieve the Remedy Standard B groundwater PCLE zone response objectives stated in paragraph (1) of this subsection, unless the person demonstrates that an affected property meets the qualifying criteria

for one, or a combination, of the modified groundwater response approaches described in paragraphs (2) - (4) of this subsection. A person who satisfactorily demonstrates technical impracticability as described in paragraph (3) of this subsection, may use technical impracticability to establish a plume management zone as described in paragraph (4) of this subsection for instances when a plume management zone would not otherwise be authorized by the executive director, except that the person shall not allow the groundwater plume management zone to expand beyond the existing boundary of the groundwater PCLE zone. A person who uses one, or a combination, of the modified groundwater response approaches shall fulfill the post-response action care obligations described in the approved RAP. A person who uses one, or a combination, of the modified groundwater response approaches which utilizes a physical control(s) shall provide financial assurance as specified in subsections (l) and (m) of this section.

(1) - (2) (No change.)

(3) Technical impracticability. A technical impracticability demonstration can be used for all three classes of groundwater under Remedy Standard B. To use this approach, the person must:

(A) - (C) (No change.)

(D) achieve the performance criteria in subsection (f)(4)(E)[,] of this section for NAPLs;

(E) - (F) (No change.)

(4) Plume management zones. With the approval of the executive director, the person may use a plume management zone under Remedy Standard B for class 2 and 3 groundwater-bearing units which presently contain a groundwater PCLE zone.

(A) - (B) (No change.)

(C) In order to establish a plume management zone, the person must:

(i) comply with the institutional control requirements in §350.31(g) of this title [(relating to General Requirements for Remedy Standards)], with the exception that proof of compliance with the institutional control requirements shall be submitted to the executive director within 120 days of the approval of the RAP, which provides notice of the existence and location of the plume management zone and which prevents exposure to groundwater from this zone until such time as COCs may reduce to the critical groundwater PCLs;

(ii) - (iii) (No change.)

(D) (No change.)

(E) The person is required to reduce NAPLs which contain COCs in excess of PCLs within a plume management zone to the extent that all of the following are met [practicable. In

the determination of adequate NAPL reduction, the executive director may consider conformance with the following criteria and other relevant factors]:

(i) the presence of any remaining NAPLs will not result in an unacceptable risk to human health or the environment [readily recoverable NAPLs have been recovered];

(ii) - (v) (No change.)

(F) (No change.)

(g) - (k) (No change.)

(l) For properties using physical control measures in response to subsections (e)(2) and/or (f) of this section, financial assurance shall be established and maintained for the post-response action care period specified in subsection (h) of this section. The person shall prepare and include in the RAP a written cost estimate in current dollars of the total cost of the post-response action care activities for the post-response action care period specified in subsection (h) of this section. The cost estimate shall be based on the costs of hiring a third party to conduct the post-response action care activities. Within 90 days after the executive director's approval of the RAP and before commencing work indicated in the RAP, an acceptable financial assurance mechanism must be submitted to the commission for post-response action care in the amount specified in the approved RAP. If the total post-response action care cost estimate is \$100,000 or less, the executive director may choose to exempt the person from

providing a financial assurance demonstration. For persons meeting the requirements of subsection (n) of this section [subchapter], the amount of financial assurance demonstrated may be less than the total post-response action care cost estimate. Financial assurance for post-response action care shall be demonstrated in compliance with Chapter 37, Subchapter N of this title (relating to Financial Assurance Requirements for the Texas Risk Reduction Program Rules [Rule]). The executive director may perform the post-response action care activities at an affected property using the funds provided for this purpose when the executive director determines that a person has failed to provide the post-response action care described in an approved RAP.

(m) For properties using physical control measures in response to subsections (e)(2) and/or (f) of this section that require post-response action care beyond the initial post-response action care period, financial assurance shall continue to be demonstrated for the post-response action care period specified in subsection (j) of this section. At least 180 days before the end of the preceding post-response action care period, a written cost estimate in current dollars shall be prepared and submitted for the cost of continuing the post-response action care activities specified in the approved RAP for the additional post-response action care period specified in subsection (j) of this section. The cost estimate shall be based on the costs of hiring a third party to conduct the post-response action care activities. At least 90 days before the end of the preceding post-response action care period, an acceptable financial assurance mechanism shall be submitted for the continued post-response action care period in an amount approved by the executive director. If the total post-response action care cost estimate is \$100,000 or less, the executive director may choose to exempt the person from providing a financial assurance demonstration. For persons meeting the requirements of subsection (n) of this section, the amount of financial assurance demonstrated may be less than the total post-response action care estimate.

Financial assurance for post-response action care shall be demonstrated in compliance with Chapter 37, Subchapter N of this title (relating to Financial Assurance Requirements for the Texas Risk Reduction Program Rule). The executive director may perform the continued post-response action care activities at an affected property using the funds provided for this purpose when the executive director determines that a person has failed to provide the post-response action care described in an approved RAP.

(n) The owner or an authorized officer of a small business, as defined in this subsection, may seek to reduce the amount of financial assurance demonstrated under this subsection if the initial post-response action care period or subsequent post-response action care periods specified in subsections (h) - (j) of this section are greater than ten years. If the executive director determines a person meets the definition as specified in paragraph (2) of this subsection, the person shall submit the affidavit required by paragraph (1) of this subsection and establish and maintain financial assurance for the post-response action care period in an amount based on the following equation: $((\text{total cost estimate})/(\text{number of years in total response action care period})) \times 10$. The owner shall continue demonstrating subsequent post-response action care in ten year periods or as directed by the executive director. The owner or an authorized officer is required to notify the executive director when the definition specified in paragraph (2) of this subsection is no longer met. A small business must comply with subsections (l) and (m) of this section relating to financial assurance.

(1) - (2) (No change.)

§350.34. No Further Action.

Particular agency program areas covered by this rule will confirm that a person has completed all necessary response actions at an affected property and that no further action is required. The program areas may issue other letters acknowledging conditional or partial completion of response actions, as appropriate.

(1) For Remedy Standard A, such confirmation will be issued subsequent to approval of the RACR by the executive director and, when applicable, receipt by the agency of proof that an institutional control noting commercial/industrial land use is in effect for the affected property in accordance with §350.31(g) of this title (relating to General Requirements for Remedy Standards), §350.51(l), (3) or (4) of this title (relating to Affected Property Assessment), and §350.74(b)(1) or §350.74(j)(2) of this title (relating to Development of Risk-Based Exposure Limits).

(2) For Remedy Standard B, a conditional no further action letter will be issued subsequent to approval of the RACR by the executive director and, when applicable, receipt by the agency of proof that institutional controls are [an institutional control is] in effect for the affected property in accordance with §350.31(g) of this title (relating to General Requirements for Remedy Standards), §350.51(l), (3), or (4) of this title, and §350.74(b)(1) or (j)(2) of this title. The letter will indicate that the person has conditionally completed response actions at the affected property but must perform post-response action care obligations as described in the approved RAP throughout the initial and any continued post-response action care period in response to §350.33(h) - (j) of this title (relating to Remedy Standard B). The letter will also indicate whether the person must establish and maintain financial assurance in response to §350.33(l) and/or (m) of this title [(relating to Remedy Standard B)] for post-response action care for affected properties which use physical controls.

(3) For Remedy Standard B, a final no further action letter will be issued subsequent to termination of the post-response action care period by the executive director as described in §350.33(i) of this title [(relating to Remedy Standard B)].

§350.37. Human Health Points of Exposure.

(a) - (h) (No change.)

(i) POEs for surface water runoff or groundwater discharges to surface water. The prescribed POE to surface water will be at the point of surface water runoff or groundwater discharge (i.e., within the groundwater) into and throughout the extent of any on-site or off-site surface water body meeting the definition of surface water in the state as defined in §307.4 of this title (relating to General Criteria), as amended. This includes the surface water body at the initial point of entry and any water bodies that may be impacted by COCs.

(j) (No change.)

(k) POEs for sediment. The prescribed POE to sediment is within the upper one-foot of sediment beneath any surface water body meeting the definition of surface water in the state as defined in §307.4 of this title, as amended. For intermittent water bodies, both sediment and surface soil POEs may apply.

(l) - (m) (No change.)

SUBCHAPTER C: AFFECTED PROPERTY ASSESSMENT

§350.51, §350.54

STATUTORY AUTHORITY

The amended rules are proposed under the following statutory authority: TWC, §5.103 and §26.011, which provide the commission with authority to adopt any rules necessary to carry out its powers, duties, and policies and to protect water quality in the state; TWC, §5.103(c), which states the commission must adopt rules when adopting, repealing, or amending any agency statement of general applicability that interprets or prescribes law or policy or describes the practice and procedure requirements of the agency, and THSC, Texas Solid Waste Disposal Act, §361.017 and §361.024, which provide the commission the authority to regulate industrial solid waste and municipal hazardous wastes and all other powers necessary or convenient to carry out its responsibilities. In addition, the amended rules are proposed under TWC, §26.039, which states that activities which are inherently or potentially capable of causing or resulting in the spillage or accidental discharge of waste or other substances and which pose serious or significant threats of pollution are subject to reasonable rules establishing safety and preventive measures which the commission may adopt or issue; TWC, §26.121, which prohibits persons from discharging wastes into or adjacent to any water in the state unless authorized to do so and prohibits persons from committing any other act or engaging in any other activity which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state; TWC, §26.262, which states that it is the policy of this state to prevent the spill or discharge of hazardous substances into the waters in the state and to cause the removal of such spills and discharges without undue delay; and TWC, §26.264, which

provides the commission with authority to issue rules necessary and convenient to carry out the policy referenced in TWC, §26.262. Authority to adopt the amended rules is also provided by TWC, §26.341, which states that it is the policy of this state to maintain and protect the quality of groundwater and surface water resources in the state from certain substances in underground and aboveground storage tanks that may pollute groundwater and surface water resources, and requires the use of all reasonable methods, including risk-based corrective action to implement this policy; TWC, §26.345, which provides the commission with the authority to adopt rules necessary to carry out the policy referenced in TWC, §26.341; and TWC, §26.401, which states that it is the policy of this state that discharges of pollutants, disposal of wastes, or other activities subject to regulation by state agencies be conducted in a manner that will maintain present uses and not impair potential uses of groundwater or pose a public health hazard, and that the quality of groundwater be restored if feasible.

The proposed amendments implement TWC, §§5.103, 26.011, 26.039, 26.262, 26.264, 26.341, 26.345, and 26.401, and THSC, §§361.017, 361.024.

§350.51. Affected Property Assessment.

(a) - (c) (No change.)

(d) For the vertical soil assessment to adequately determine if groundwater has been or will be affected, the person shall complete the requirements of paragraph (1), (2), (3), or (4) [or (2)] of this subsection.

(1) The person shall demonstrate that the vertical limit of COCs in soil which exceed the higher of the method quantitation limit or background concentrations has been characterized.], unless an adequate groundwater assessment has been conducted (e.g., COC concentrations in groundwater have been measured from appropriate locations).] If the person satisfactorily demonstrates that all reasonably available analytical technology has been used to show that the COC cannot be measured to the method quantitation limit due to sample specific interferences, then the sample detection [quantitation] limit may be used in lieu of the method quantitation limit. [If a groundwater assessment has been conducted, then the person shall characterize the vertical limit of COCs in soil which exceeds the ^{GW}Soil PCL, unless the person can meet the requirements of §350.75(i)(7)(C) of this title (relating to Tiered Human Health Protective Concentration Level Evaluation.). If the uppermost groundwater-bearing unit is encountered before the vertical limit of COCs is determined, then representative groundwater samples (i.e., a groundwater sample does not have to be collected from each boring) must be collected to evaluate potential groundwater impacts. The vertical extent of the soil assessment shall continue beyond the uppermost groundwater-bearing unit as appropriate based on the likelihood that COCs have migrated deeper considering the chemical and physical properties of the COCs (e.g., dense non-aqueous phase liquids) and the hydrogeology of the affected property. The executive director may omit or modify this requirement on a site-specific basis if the vertical assessment would exacerbate the vertical migration of COCs.]

(2) If an adequate groundwater assessment has been conducted (i.e., COC concentrations in groundwater have been measured from appropriate locations), then the person shall characterize the vertical limits of COCs in soil which exceed the assessment level. The ^{GW}Soil PCL may not be applicable as an assessment level if the person has conducted an adequate groundwater

assessment and can meet the requirements of §350.75(i)(7)(C) of this title (relating to Tiered Human Health Protective Concentration Level Evaluation). The executive director may omit or modify the requirement for a groundwater assessment under this paragraph for use of §350.75(i)(7)(C) of this title on a site-specific determination based on probable depth to groundwater, presence of soils or bedrock that prohibit or impede vertical migration of COCs, and physical and chemical properties of the COCs.

(3) If the uppermost groundwater-bearing unit is encountered before the vertical limit of COCs is determined to the higher of the method quantitation limit or background concentrations, then representative groundwater samples (i.e., a groundwater sample does not have to be collected at each boring location) must be collected to evaluate potential groundwater impacts. The vertical extent of the soil assessment shall continue beyond the uppermost groundwater-bearing unit as appropriate based on the likelihood that COCs have migrated deeper considering the chemical and physical properties of the COCs (e.g., dense non-aqueous phase liquids) and the hydrogeology of the affected property. The executive director may omit or modify this requirement on a site-specific basis if the vertical assessment would exacerbate the vertical migration of COCs.

(4) [(2)] If a person has already determined that the groundwater is impacted, then they may satisfy the requirements of this subsection by declaring the entire soil column to the top of the lowest impacted groundwater bearing unit as a soil PCLE zone.

(e) - (h) (No change.)

(i) The person shall conduct a field survey to locate potential receptors, including water wells and surface waters to at least 500 feet beyond the boundary of the affected property; and conduct a records survey to identify properties that are not connected to a public water supply, and all water wells and surface water bodies within 1/2 mile of the limits of groundwater which contains COCs in excess of the residential assessment level. The person shall also attempt to identify any off-site properties within 1/4 mile of the affected property that have environmental information (e.g., soil boring logs, analytical results from samples of environmental media, etc.) collected for submission to the agency which may be useful in fulfilling the requirements of this section, although collection and submittal of this information by the person is not required.

(j) When determining concentrations of COCs in an environmental medium [groundwater], the person shall collect and handle [groundwater] samples in accordance with sampling methodologies which will yield representative concentrations of COCs present in the sampled medium [groundwater].

(k) When determining concentrations of COCs in surface water and sediment, the person shall collect and handle [surface water] samples in accordance with the requirements in the agency's Surface Water Quality Monitoring Procedures, Volume I [Implementation Procedures], as amended, or shall use an alternative methodology approved by the executive director.

(l) (No change.)

(m) If a person does not desire to determine a site-specific soil background concentration, then they may use the Texas-specific median background concentrations for metals provided in the following

figure. The Texas-specific background concentrations may be used to determine the critical PCL and then used in comparisons to individual measurements of COCs or representative concentrations of COCs in accordance with §350.79(1) or (2)(A) of this title (relating to Comparison of Chemical of Concern Concentrations to Protective Concentration Levels), respectively.

Figure: 30 TAC §350.51(m)

[Figure: 30 TAC §350.51(m)]

Texas-Specific <u>Soil</u> Background Concentrations milligrams per kilogram (mg/kg) ¹	
Metal	Median Background Concentration (mg/kg)
Aluminum	30,000
Antimony	1
Arsenic	5.9
Barium	300
Beryllium	1.5
Boron	30
Total Chromium	30
Cobalt	7
Copper	15
Flouride [Flourine]	190
Iron	15,000
Lead	15
Manganese	300
Mercury	0.04
Nickel	10
Selenium	0.3
Strontium	100

Tin	0.9
Titanium	2,000
<u>Thorium</u> [Thallium]	9.3
Vanadium	50
Zinc	30

¹ Source: “Background Geochemistry of Some Rocks, Soils, Plants, and Vegetables in the Conterminous United States”, by Jon J. Connor, Hansford T. Shacklette, et al., Geological Survey Professional Paper 574-F, US Geological Survey.

(n) Analytical results, including non-detected analytical results, should be considered whether doing direct comparisons of individual measurements or when using statistical or geostatistical approaches. In cases where there is reason to believe, based on available analytical data, that the COC could be present at that sampling location and that the concentration of the COC is suspected to be near but below the sample detection [quantitation] limit, the full value of the sample detection [quantitation] limit should be used as a proxy for the non-detected result. If there is reason to believe, based on available analytical data, that the COC could be present at that sampling location and that the concentration of the COC is suspected to be below, but not near to, the sample detection [quantitation] limit, then 1/2 the sample detection [quantitation] limit should be used as a proxy for the non-detected result. Other statistically-based approaches for handling non-detected results or assigning proxy values may be appropriate and approved if there is sufficient technical basis. If greater than 15 percent non-detected results are reported for a particular medium, and the exposure area cannot be definitively identified based on documented and verifiable site-specific information, the executive director may require persons to utilize alternative statistical methods for calculating the concentration term.

(o) (No change.)

§350.54. Data Acquisition and Reporting Requirements.

(a) - (c) (No change.)

(d) The person shall ensure that the laboratory selected to perform the analyses of samples has in place an adequate and documented quality assurance program and the capability to meet the project and measurement objectives. The laboratory's quality assurance program must be compliant with the requirements in Chapter 25 of this title (relating to Environmental Testing Laboratory Accreditation and Certification), as amended, by July 1, 2008. For data generated on or before July 1, 2008, the person shall ensure the laboratory's quality assurance program is [should be generally] consistent with:

(1) - (2) (No change.)

(e) The person shall ensure the data are generated by a laboratory performing the analytical methods that meet the intralaboratory performance standards for the method and that those performance standards are sufficient to meet the bias, precision, sensitivity, representativeness, comparability, and completeness, as specified in the project data quality objectives.

(1) - (3) (No change.)

(4) The method detection limit shall be verified after major instrument maintenance[, a change in analyst,] or major changes in instrumentation or instrument conditions. The person shall

ensure that the laboratory has performed and has documented an initial demonstration of proficiency for the analysis of each COC and each method used, and has also demonstrated, in a scientifically valid manner, and has documented the method detection limit the laboratory can achieve. This demonstration and documentation shall be preparatory and method specific and include any cleanup method used. The method detection limit should be routinely checked for reasonableness.

(5) (No change.)

(6) The standard available method may either be a documented method from the U. S. EPA, American Society for Testing and Materials, other organizations nationally recognized as having scientifically acceptable methods, or the executive director, or a laboratory method that is completely documented in an appropriate Standard Operating Procedure. All methods derived by a laboratory must meet the quality control criteria recommended in U.S. EPA Test Methods for Evaluation of Solid Waste, Update III, as amended, unless the project and/or samples require less stringent quality control requirements than those recommended in U.S. EPA Test Methods for Evaluation of Solid Waste, Update III, as amended. Such projects or samples which require less stringent quality control shall be clearly identified and the rationale for lower levels of quality control shall be documented.

(A) Application of the method shall include the use of instrument calibration that brackets the value reported or includes a low standard that is below the necessary level of required performance, unless the method quantitation limit has been determined to be the necessary level of required performance in accordance with §350.78(c) of this title (relating to Determination of Critical Protective Concentration Levels). The calibration range shall yield results which demonstrate that the

sample reporting level has not exceeded the necessary level of required performance after correction for sample weight or volume.

(B) (No change.)

(f) - (g) (No change.)

(h) The person shall:

(1) (No change.)

(2) report all non-detected results as less than the value of the sample detection
[quantitation] limit; or

(3) (No change.)

(i) (No change.)

SUBCHAPTER D: DEVELOPMENT OF PROTECTIVE CONCENTRATION LEVELS

§§350.71, 350.73 - 350.77, 350.79

STATUTORY AUTHORITY

The amended rules are proposed under the following statutory authority: TWC, §5.103 and §26.011, which provide the commission with authority to adopt any rules necessary to carry out its powers, duties, and policies and to protect water quality in the state; TWC, §5.103(c), which states the commission must adopt rules when adopting, repealing, or amending any agency statement of general applicability that interprets or prescribes law or policy or describes the practice and procedure requirements of the agency, and THSC, Texas Solid Waste Disposal Act, §361.017 and §361.024, which provide the commission the authority to regulate industrial solid waste and municipal hazardous wastes and all other powers necessary or convenient to carry out its responsibilities. In addition, the amended rules are proposed under TWC, §26.039, which states that activities which are inherently or potentially capable of causing or resulting in the spillage or accidental discharge of waste or other substances and which pose serious or significant threats of pollution are subject to reasonable rules establishing safety and preventive measures which the commission may adopt or issue; TWC, §26.121, which prohibits persons from discharging wastes into or adjacent to any water in the state unless authorized to do so and prohibits persons from committing any other act or engaging in any other activity which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state; TWC, §26.262, which states that it is the policy of this state to prevent the spill or discharge of hazardous substances into the waters in the state and to cause the removal of such spills and discharges without undue delay; and TWC, §26.264, which provides the commission with authority to issue rules necessary and convenient to carry out the policy

referenced in TWC, §26.262. Authority to adopt the amended rules is also provided by TWC, §26.341, which states that it is the policy of this state to maintain and protect the quality of groundwater and surface water resources in the state from certain substances in underground and aboveground storage tanks that may pollute groundwater and surface water resources, and requires the use of all reasonable methods, including risk-based corrective action to implement this policy; TWC, §26.345, which provides the commission with the authority to adopt rules necessary to carry out the policy referenced in TWC, §26.341; and TWC, §26.401, which states that it is the policy of this state that discharges of pollutants, disposal of wastes, or other activities subject to regulation by state agencies be conducted in a manner that will maintain present uses and not impair potential uses of groundwater or pose a public health hazard, and that the quality of groundwater be restored if feasible.

The proposed amendments implement TWC, §§5.103, 26.011, 26.039, 26.262, 26.264, 26.341, 26.345, and 26.401, and THSC, §§361.017, 361.024.

§350.71. General Requirements.

(a) - (j) (No change.)

(k) For Tiers 1, 2, and 3 as explained in §350.75 of this title (relating to Tiered Human Health Protective Concentration Level Evaluation) and §350.77 of this title (relating to Ecological Risk Assessment and Development of Ecological Protective Concentration Levels), the person shall establish PCLs for each individual COC within each environmental medium unless the conditions of paragraphs (1), (2), [or] (3), or (4) of this subsection are met or unless the use of paragraphs (1), (2), [or] (3), or

(4) of this subsection is prohibited by the individual program area listed in §350.2 of this title (relating to Applicability). For the purposes of determining whether a COC meets the conditions of paragraphs (1), (2), [or] (3), or (4) of this subsection, a COC should be considered detected in a particular environmental medium if the analytical measurement is greater than the method detection limit and the analytical response meets the qualitative identification criteria recommended in the analytical method.

(1) The COC is detected in at least one sample, but all detected COC concentrations and sample detection [quantitation] limits for the COC are less than the residential assessment level in the environmental medium being evaluated under this paragraph, as well as in all other environmental media from which samples were collected.

(2) The COC is detected in at least one sample in the environmental medium, but the conditions described in one of subparagraphs (A) - (E) of this paragraph are met and all [any] nondetected results for the COC are less than the residential assessment level in the environmental medium being evaluated under this paragraph [meet the conditions described in §350.71(k)(3)].

(A) - (E) (No change.)

(3) The COC is known or is reasonably anticipated to be associated with historical or current activities conducted at the on-site property, but the COC is not detected in any sample in the environmental medium, and all sample detection limits for the COC are less than the residential assessment level for the environmental medium [or the person is required to comply with the conditions

of this paragraph as a part of meeting the requirements of §350.71(k)(2), and the conditions in subparagraph (A) or (B) of this paragraph are met].

[(A) All sample limits are less than the residential assessment level for the environmental medium.]

[(B) The sample quantitation limits in some samples are greater than the residential assessment level for the environmental medium, but all of the conditions in clauses (i) - (vi) of this subparagraph are met:]

[(i) an appropriate analytical method was used;]

[(ii) the COC is not anticipated to be present in the environmental medium based on, but not limited to, source area information, knowledge of on-site historical operations, characteristics of the COC and affected property;]

[(iii) the sample quantitation limit(s) of the COC in critical samples are less than the method quantitation limit of the analytical method used;]

[(iv) the COC is not a companion or daughter product of a parent COC that cannot be eliminated under conditions in this section;]

[(v) no companion or daughter products to this parent COC are detected; and]

[(vi) without consideration of any physical or institutional controls, the exposure potential is low based on the nature of the source area, the nature of the COC, the use and conditions of the affected property, the nature of the groundwater, local water use, proximity to potential receptors, and any other appropriate site-specific factors affecting potential exposure to the COC should it be present.]

(4) The COC is not known or is not reasonably anticipated to be associated with historical or current activities conducted at the on-site property, and is not detected in any sample in the environmental medium.

§350.73. Determination and Use of Human Toxicity Factors and Chemical Properties.

(a) In all cases, the toxicity factors used must be protective of human health and the environment. The person shall use the most recent chronic human toxicity factors taken from the following [hierarchy of] sources (unless otherwise specified in §350.76 of this title (relating to Approaches for Specific Chemicals of Concern to Determine Human Health Protective Concentration Levels)). [The person shall use the source in paragraph (1) of this section and only if the relevant chronic human toxicity factor is not available in that source, proceed to the source in paragraph (2) of this section and, only if the toxicity factor is not available in that source, proceed in the same fashion through sources in paragraphs (3) - (6) of this subsection.] The most recent chronic human toxicity

factors from the sources listed[, in order of hierarchy of sources] in paragraphs (1) - (7) [(1) - (6)] of this subsection [, which are most current] as of the submittal date of the SIN or the RAP are presumed to be protective of human health and the environment, unless a person rebuts this presumption by published credible authority. In addition, the executive director may determine during review of the RACR that a change in a toxicity factor since the submittal of the SIN or RAP has been of such a magnitude that the PCLs previously developed for a COC would clearly not be protective of human health and the environment, then the adequacy of the response action must be reevaluated. Likewise, if the executive director determines at any time that a subsequent change in a toxicity factor is of such a magnitude such that the proposed response action is no longer warranted to protect human health and the environment, then a response action based on that previous chronic toxicity factor consideration shall no longer be required.

(1) United States Environmental Protection Agency (EPA) [EPA] Integrated Risk Information System (IRIS);

(2) EPA Provisional Peer Reviewed Toxicity Values (i.e., Superfund Health Risk Technical Support Center);

(3) [(2)] EPA Health Effects Assessment Summary Tables;

(4) [(3)] EPA National Center for Environmental Assessment (i.e., Superfund Technical Support Center);

(5) [(4)] the TCEQ [TNRCC] Chronic Remediation-Specific Effects Screening Levels;

(6) [(5)] Agency [agency] for Toxic Substances and Disease Registry; and

(7) [(6)] other scientifically valid sources as approved by the executive director.

(b) If the executive director determines that it is necessary to evaluate COCs which do not have any human chronic toxicity factors provided in the sources listed in subsection (a) of this section, then the executive director will provide chronic toxicity factors. The person may provide toxicological information to the executive director for consideration in the derivation of the chronic toxicity factors. The person shall provide all toxicological data from any toxicological studies conducted for the person when such information is requested by the executive director. [The person shall use the TNRCC Chronic Remediation-Specific Effects Screening Level value as the reference concentration in evaluating the inhalation pathway for both residential and commercial/industrial land use in accordance with §350.75(i)(3), (6) and (8) of this title (relating to Tiered Human Health Protective Concentration Level Evaluation), and all chronic inhalation exposure pathways for which PCLs are established in accordance with §350.75(i)(5) and (11) of this title, but only in cases where neither a EPA unit risk factor nor a EPA reference concentration is available for that COC from the hierarchy list provided in subsection (a) of this section.]

(c) - (d) (No change.)

(e) The person shall use the COC chemical/physical parameter values for COCs provided in the following figure to calculate PCLs, unless the executive director approves the use of a more representative alternative value in accordance with paragraphs (1) and (2) of this subsection. For those COCs not included in the figure in this subsection, the person may provide chemical/physical information to the executive director for consideration in developing appropriate chemical/physical parameters.

Figure: 30 TAC §350.73(e)

[Figure: 30 TAC §350.73(e)]

No	COMPOUND	Physical State	CAS number	Type	M.W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D.W.)	Br _{Bg} (g soil/g D.W.)
1	Acenaphthene	s	83-32-9	O	154.21	6.44E-03	3.60	-----	4.21E-02	7.69E-06	4.24E+00	3.75E-03	4.15		
2	Acenaphthylene	s	208-96-8	O	152.20	4.74E-03	3.84	-----	4.39E-02	7.07E-06	3.93E+00	2.90E-02	3.94		
3	Acetaldehyde	g	75-07-0	O	44.05	2.75E-03	0.42	-----	1.24E-01	1.23E-05	1.00E+06	9.00E+02	0.43		
4	Acetone	l	67-64-1	O	58.08	1.61E-03	-0.24	-----	1.24E-01	1.14E-05	6.00E+05	2.27E+02	-0.24		
5	Acetone cyanohydrin	l	75-86-5	O	85.11	1.34E-04	-0.22	-----	8.12E-02	9.09E-06	1.83E+06	8.00E-01	-0.03		
6	Acetonitrile	l	75-05-8	O	41.05	1.21E-03	-0.33	-----	1.28E-01	1.45E-05	2.05E+05	9.00E+01	-0.34		
7	Acetophenone	l	98-86-2	O	120.15	4.45E-04	1.56	-----	6.00E-02	8.73E-06	5.50E+03	3.95E-01	1.67		
8	Acifluorfen, sodium	s	62476-59-9	O	383.64	< 8.31E-13	2.05	-----	1.45E-02	4.40E-06	> 2.50E+05	< 9.75E-09	0.37		
9	Acrolein	l	107-02-8	O	56.06	1.83E-04	-0.28	-----	1.05E-01	1.12E-05	2.00E+05	2.65E+02	-0.10		
10	Acrylamide	s	79-06-1	O	71.08	1.33E-08	-0.66	-----	9.70E-02	1.28E-05	2.20E+06	7.00E-03	-0.81		
11	Acrylic acid	l	79-10-7	O	72.06	1.32E-05	0.05	-----	9.08E-02	1.06E-05	1.00E+06	3.72E+00	0.44		
12	Acrylonitrile	l	107-13-1	O	53.06	4.57E-03	0.04	-----	1.22E-01	1.34E-05	7.50E+04	1.10E+02	0.21		
13	Alachlor	s	15972-60-8	O	269.77	8.62E-07	2.28	-----	1.94E-02	5.83E-06	2.40E+02	2.20E-05	3.37		
14	Aldicarb	s	116-06-3	O	190.27	5.82E-08	1.20	-----	3.05E-02	7.20E-06	6.00E+03	2.90E-05	1.36		
15	Aldicarb sulfone	s	1646-88-4	O	222.27	1.10E-07	0.23	-----	5.55E-02	5.79E-06	8.00E+03	9.00E-05	-0.67		
16	Aldrin	s	309-00-2	O	364.91	7.07E-03	4.68	-----	1.32E-02	4.86E-06	7.84E-02	1.67E-05	6.75		
17	Allyl alcohol	l	107-18-6	O	58.08	2.08E-04	0.51	-----	1.14E-01	1.10E-05	3.20E+05	2.63E+01	0.17		
18	Allyl chloride	l	107-05-1	O	76.53	4.57E-01	1.43	-----	9.80E-02	1.08E-05	3.40E+03	3.60E+02	1.93		
19	Aluminum	s	7429-90-5	M	26.98	0.00E+00		2.55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.33	1.5E-03	6.50E-04
20	Aminopyridine, 4-	s	504-24-5	O	94.12	2.44E-07	-0.32	-----	8.02E-02	1.08E-05	7.66E+04	2.00E-03	-0.11		
21	Ammonia	g	7664-41-7	I	17.03	1.36E-02	0.49	-----	2.59E-01	6.93E-05	5.31E+05	7.47E+03	0.23		
22	Ammonium sulfamate	s	7773-06-0	I	114.13	0.00E+00	-----	CE	9.81E-02	1.04E-05	2.00E+06	0.00E+00	-4.34		
23	Aniline	l	62-53-3	O	93.13	5.82E-05	0.96	-----	7.00E-02	8.30E-06	3.60E+04	6.69E-01	1.08		
24	Anthracene	s	120-12-7	O	178.23	4.61E-03	4.37	-----	3.24E-02	7.74E-06	4.34E-02	2.55E-05	4.35		
25	Antimony		7440-36-0	M	121.75	0.00E+00	-----	1.65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	7.0E-02	3.00E-02
26	Aramite	l	140-57-8	O	334.86	CE	4.00	-----	4.23E-02	4.45E-06	CE	1.23E-04	4.82		

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{ABg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
27	Aroclor 1016	l	12674-11-2	O	257.55	2.27E-02	4.87	-----	2.05E-02	6.80E-06	4.20E-01	7.12E-04	5.69		
28	Aroclor 1254	L	11097-69-1	O	327.00	1.12E-01	5.72	-----	CE	5.60E-06	3.45E-02	8.82E-05	5.61		
29	Arsenic	s	7440-38-2	M	74.92	0.00E+00	-----	1.40	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.68	1.00E-02	8.00E-03
30	Arsine	g	7784-42-1	I	77.95	2.41E-01	-----	CE	CE	CE	2.00E+05	1.13E+04	CE		
31	Asbestos	s	1332-21-4	I	varies	0.00E+00	-----	5.00	CE	CE	0.00E+00	0.00E+00	CE		
32	Atrazine	s	1912-24-9	O	215.69	1.09E-07	2.20	-----	5.64E-02	5.58E-06	3.00E+01	3.00E-07	2.82		
33	Barium	s	7440-39-3	M	137.33	0.00E+00	-----	1.04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	4.9E-02	1.50E-02
34	Barium cyanide	s	542-62-1	I	189.37	CE	-----	1.78	CE	CE	8.00E+05	CE	CE	4.9E-02	1.50E-02
35	Benzene	l	71-43-2	O	78.11	2.27E-01	1.82	-----	8.80E-02	9.80E-06	1.77E+03	9.50E+01	1.99		
36	Benzenethiol	l	108-98-5	O	110.18	1.83E-02	1.32	-----	7.60E-02	8.68E-06	7.60E+02	2.40E+00	2.69		
37	Benzidine	s	92-87-5	O	184.24	1.62E-09	1.32	-----	3.40E-02	1.50E-05	5.20E+02	8.36E-08	1.34		
38	Benzo-a-anthracene	s	56-55-3	O	228.29	1.39E-04	5.55	-----	5.10E-02	9.00E-06	1.00E-02	1.54E-07	5.52		
39	Benzo-a-pyrene	s	50-32-8	O	252.32	4.70E-05	5.98	-----	4.30E-02	9.00E-06	1.62E-03	4.89E-09	6.11		
40	Benzo-b-fluoranthene	s	205-99-2	O	252.32	4.99E-04	6.08	-----	2.26E-02	5.56E-06	1.50E-03	8.06E-08	6.11		
41	Benzo-j-fluoranthene	s	205-82-3	O	252.32	4.63E-04	5.72	-----	4.15E-02	5.48E-06	2.50E-03	8.39E-08	6.11		
42	Benzo-k-fluoranthene	s	207-08-9	O	252.32	4.45E-07	6.09	-----	2.26E-02	5.56E-06	5.50E-04	9.59E-11	6.11		
43	Benzo-(g,h,i)-perylene	s	191-24-2	O	276.34	5.82E-06	6.20	-----	4.90E-02	5.65E-05	2.60E-04	1.00E-10	6.70		
44	Benzoic acid	s	65-85-0	OA	122.12	1.39E-05	-0.30	-----	5.36E-02	7.97E-06	3.50E+03	6.51E-03	1.87		
45	Benzotrichloride	l	98-07-7	O	195.48	2.03E-02	3.16	-----	5.91E-02	7.02E-06	1.00E+02	1.90E-01	3.90		
46	Benzyl alcohol	l	100-51-6	O	108.14	1.62E-05	1.08	-----	8.00E-02	8.00E-06	4.00E+04	1.06E-01	1.08		
47	Benzyl chloride	l	100-44-7	O	126.59	1.66E-02	2.26	-----	7.50E-02	7.80E-06	4.93E+02	1.20E+00	2.79		
48	Beryllium	s	7440-41-7	M	9.01	0.00E+00	-----	1.36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.57	3.60E-03	1.50E-03
49	Biphenyl, 1,1-	s	92-52-4	O	154.21	1.25E-02	3.71	-----	5.73E-02	6.71E-06	7.50E+00	2.94E-02	3.76		
50	Bis (2-chloro-ethyl) ether	l	111-44-4	O	143.01	8.90E-04	1.19	-----	6.92E-02	7.53E-06	1.02E+04	1.34E+00	1.56		
51	Bis (2-	l	108-60-1	O	171.07	4.16E-03	2.50	-----	6.00E-02	6.40E-06	1.70E+03	8.50E-01	2.58		

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
	chloroisopropyl ether														
52	Bis (2-chloromethyl) ether	l	542-88-1	O	114.96	4.99E-03	0.08	-----	8.32E-02	9.59E-06	3.80E+04	3.00E+01	0.58		
53	Bis (2-ethyl-hexyl) phthalate	l	117-81-7	O	390.56	4.57E-04	5.83	-----	3.51E-02	3.66E-06	3.00E-01	6.45E-06	8.39		
54	Bis (tri-n-butyltin) oxide	l	56-35-9	O	596.11	2.08E-03	CE	-----	CE	CE	1.80E+01	6.91E-05	5.80		
55	Bromodichloromet hane	l	75-27-4	O	163.83	1.32E-01	1.74	-----	2.98E-02	1.06E-05	4.50E+03	5.84E+01	1.61		
56	Bromoform	l	75-25-2	O	252.73	2.56E-02	1.94	-----	1.49E-02	1.03E-05	3.20E+03	5.60E+00	1.79		
57	Bromomethane	g	74-83-9	O	94.94	5.90E-01	1.02	-----	7.28E-02	1.21E-05	1.52E+04	1.64E+03	1.18		
58	Butadiene, 1,3-	g	106-99-0	O	54.09	2.61E+00	2.11	-----	1.79E-01	1.02E-05	7.35E+02	2.11E+03	2.03		
59	Butanol, n-	l	71-36-3	O	74.12	3.55E-04	0.77	-----	8.00E-02	9.30E-06	7.47E+04	6.54E+00	0.84		
60	Butylate	l	2008-41-5	O	217.38	3.50E-03	2.10	-----	4.89E-02	5.14E-06	4.60E+01	1.30E-02	3.85		
61	Butyl benzyl phthalate	l	85-68-7	O	312.37	7.94E-05	4.14	-----	1.74E-02	4.83E-06	2.90E+00	1.20E-05	4.84		
62	Cacodylic acid	s	75-60-5	O	138.00	0.00E+00	0.38	-----	CE	CE	2.00E+06	0.00E+00	0.00		
63	Cadmium	s	7440-43-9	M	112.41	0.00E+00	-----	1.18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-0.07	1.40E-01	6.40E-02
64	Calcium cyanide	s	592-01-8	I	92.11	CE	-----	CE	CE	CE	CE	CE	-2.41		
65	Captan	s	133-06-2	O	300.59	2.99E-04	3.81	-----	1.83E-02	4.90E-06	5.00E-01	7.50E-06	1.84		
66	Carbaryl	s	63-25-2	O	201.22	5.32E-07	2.37	-----	2.78E-02	5.60E-06	3.00E+01	1.36E-06	2.35		
67	Carbazole	s	86-74-8	O	167.21	3.38E-03	3.39	-----	3.90E-02	7.03E-06	7.21E-01	2.66E-04	3.23		
68	Carbofuran	s	1563-66-2	O	221.26	1.62E-07	1.46	-----	5.35E-02	5.40E-06	7.00E+02	8.30E-06	2.30		
69	Carbosulfan	l	55285-14-8	O	380.55	2.15E-05	4.41	-----	3.76E-02	3.88E-06	3.00E-01	3.10E-07	5.57		
70	Carbon disulfide	l	75-15-0	O	76.14	6.13E-01	1.72	-----	1.04E-01	1.00E-05	2.30E+03	3.40E+02	1.94		
71	Carbon tetrachloride	l	56-23-5	O	153.82	1.20E+00	2.27	-----	7.80E-02	8.80E-06	8.05E+02	1.12E+02	2.44		
72	Chloral	l	75-87-6	O	147.39	2.66E-05	0.80	-----	3.85E-02	9.70E-06	8.30E+06	3.50E+01	1.19		
73	Chlordane	s	57-74-9	O	409.78	2.02E-03	5.08	-----	1.18E-02	4.37E-06	5.60E-02	1.00E-05	6.60		
74	Chlorfenvinphos	l	470-90-6	O	359.57	2.31E-08	3.11	-----	CE	CE	1.45E+02	1.70E-07	4.15		

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
75	Chlorine	g	7782-50-5	I	70.91	2.86E+00	-----	CE	1.20E-01	1.48E-05	7.00E+03	5.17E+03	0.85		
76	Chlorine cyanide	g	506-77-4	O	61.47	1.12E-01	-----	CE	1.20E-01	1.39E-05	3.00E+04	1.00E+03	-0.38		
77	Chloroaniline, p-	s	106-47-8	O	127.57	4.86E-05	1.82	-----	4.83E-02	1.01E-05	3.90E+03	2.35E-02	1.72		
78	Chlorobenzene	l	108-90-7	O	112.56	1.82E-01	2.33	-----	7.30E-02	8.70E-06	5.02E+02	1.21E+01	2.64		
79	Chlorobenzilate	s	510-15-6	O	325.19	3.78E-06	2.90	-----	8.00E-02	8.00E-06	1.30E+01	2.20E-06	3.99		
80	Chloro-1,3-butadiene, 2-	l	126-99-8	O	88.54	1.33E+00	2.00	-----	1.00E-01	1.00E-05	6.30E+02	2.12E+02	2.53		
81	Chlorodifluoromethane	g	75-45-6	O	86.47	1.22E+00	0.79	-----	1.13E-01	1.32E-05	2.90E+03	7.83E+03	0.89		
82	Chloroethane	l	75-00-3	O	64.51	2.12E-01	1.25	-----	1.50E-01	1.18E-05	2.00E+04	1.20E+03	1.58		
83	Chloroform	l	67-66-3	O	119.38	1.53E-01	1.67	-----	1.04E-01	1.00E-05	7.92E+03	1.98E+02	1.52		
84	Chloromethane	g	74-87-3	O	50.49	1.44E+00	0.78	-----	1.26E-01	6.50E-06	7.25E+03	3.77E+03	1.09		
85	Chloronaphthalene, 2-	s	91-58-7	O	162.62	2.54E-02	3.93	-----	6.18E-02	6.98E-06	6.74E+00	1.70E-02	3.81		
86	Chlorophenol, 2-	l	95-57-8	OA	128.56	7.40E-04	2.46	-----	5.01E-02	9.46E-06	2.80E+04	1.42E+00	2.16		
87	Chlorotoluene, 2-	l	95-49-8	O	126.59	1.35E-01	2.61	-----	7.01E-02	-----	1.54E+02	3.9E-03	3.20		
88	Chlorpyrifos	s	2921-88-2	O	350.59	1.73E-04	3.70	-----	4.85E-02	5.11E-06	9.00E-01	1.87E-05	4.66		
89	Chromium (III)/Chromium (total)	s	7440-47-3	M	52.00	0.00E+00	-----	3.08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	5.20E-03	4.50E-03
90	Chromium (VI)	s	18540-29-9	M	52.00	0.00E+00	-----	1.15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	5.20E-03	4.50E-03
91	Chrysene	s	218-01-9	O	228.29	5.03E-05	5.49	-----	2.48E-02	6.21E-06	2.00E-03	7.80E-09	5.52		
92	Cobalt	s	7440-48-4	M	58.93	0.00E+00	-----	1.65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	1.00E-02	7.00E-03
93	Copper	s	7440-50-8	M	63.55	0.00E+00	-----	1.60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-0.57	2.90E-01	2.50E-01
94	Copper cyanide	s	544-92-3	I	115.58	CE	-----	1.54	CE	CE	0.00E+00	0.00E+00	-1.49	2.90E-01	2.50E-01
95	Cresol, m-	l	108-39-4	O	108.14	3.62E-05	1.94	-----	7.40E-02	1.00E-05	2.30E+04	1.40E-01	2.06		
96	Cresol, o-	s	95-48-7	O	108.14	6.65E-05	1.99	-----	7.40E-02	8.30E-06	2.04E+04	3.20E-01	2.06		
97	Cresol, p-	s	106-44-5	O	108.14	3.99E-05	1.91	-----	7.40E-02	1.00E-05	2.30E+04	1.30E-01	2.06		
98	Crotonaldehyde	l	123-73-9	O	70.09	8.15E-04	0.21	-----	9.37E-02	1.02E-05	1.60E+05	1.90E+01	0.60		
99	Cumene	l	98-82-8	O	120.19	6.07E-01	3.54	-----	6.50E-02	7.10E-06	5.00E+01	4.60E+00	3.45		
100	Cyanide	CE	57-12-5	I	26.02	CE	-----	1.00	5.21E-01	2.28E-05	1.00E+05	1.38E+01	-0.69		

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
101	Cyanogen	g	460-19-5	O	52.04	2.06E-01	0.13	-----	2.04E-01	1.37E-05	1.00E+04	3.88E+03	0.07		
102	Cyanogen bromide	s	506-68-3	O	105.92	4.41E+02	-0.49	-----	6.24E-02	1.13E-05	1.31E+00	1.00E+02	-0.29		
103	Cyclohexanone	l	108-94-1	O	98.14	4.99E-04	0.74	-----	7.72E-02	8.73E-06	2.30E+04	4.00E+00	1.13		
104	Cyclotrimethylenet rinitramine	s	121-82-4	O	222.12	4.99E-04	1.80	-----	6.65E-02	6.39E-06	3.87E+01	1.00E-09	0.87		
105	DDD	s	72-54-8	O	320.05	1.66E-04	4.93	-----	1.69E-02	4.76E-06	9.00E-02	8.66E-07	5.87		
106	DDE	s	72-55-9	O	241.93	8.73E-04	5.04	-----	1.44E-02	5.87E-06	6.50E-02	5.66E-06	6.00		
107	DDT	s	50-29-3	O	354.49	2.23E-03	5.14	-----	1.37E-02	4.95E-06	3.10E-03	3.93E-07	6.79		
108	Di-n-butyl phthalate	l	84-74-2	O	278.35	5.94E-05	4.53	-----	4.38E-02	7.86E-06	1.12E+01	4.25E-05	4.61		
109	Di-n-octyl phthalate	l	117-84-0	O	390.56	2.78E-03	7.92	-----	1.51E-02	3.90E-06	2.00E-02	4.47E-06	8.54		
110	Diallate	s	2303-16-4	O	270.22	1.58E-04	3.28	-----	8.00E-02	8.00E-06	1.40E+01	1.50E-04	4.08		
111	Diazinon	l	333-41-5	O	304.35	4.70E-06	2.12	-----	1.80E-02	4.90E-06	4.00E+01	8.40E-05	3.86		
112	Dibenz-a,h-anthracene	s	53-70-3	O	278.35	4.66E-07	6.28	-----	2.00E-02	5.18E-06	5.00E-04	2.10E-11	6.70		
113	Dibromo-3-chloropropane, 1,2-	l	96-12-8	O	236.33	8.31E-03	2.23	-----	8.00E-02	8.00E-06	1.00E+03	7.60E-01	2.68		
114	Dibromochloromet hane	l	124-48-1	O	208.28	3.25E-02	1.80	-----	1.96E-02	1.05E-05	5.25E+03	1.50E+01	1.70		
115	Dicamba	s	1918-00-9	O	209.03	3.28E-07	0.34	-----	6.02E-02	6.69E-06	5.60E+03	9.70E-05	2.14		
116	Dichlorobenzene, 1,2-	l	95-50-1	O	147.00	8.73E-02	2.84	-----	6.90E-02	7.90E-06	1.50E+02	1.36E+00	3.28		
117	Dichlorobenzene, 1,3-	l	541-73-1	O	147.00	1.95E-01	2.23	-----	6.80E-02	8.13E-06	1.10E+02	2.30E+00	3.28		
118	Dichlorobenzene, 1,4-	s	106-46-7	O	147.00	1.17E-01	2.81	-----	6.90E-02	7.90E-06	7.38E+01	1.06E+00	3.28		
119	Dichlorobenzidine, 3,3-	s	91-94-1	O	253.13	8.65E-07	2.86	-----	1.94E-02	6.74E-06	3.11E+00	2.20E-07	3.21		
120	Dichloro-2-butene, 1,4	l	764-41-0	O	125.00	1.24E-02	2.26	-----	7.43E-02	8.62E-06	6.91E+03	1.26E+01	2.60		
121	Dichlorodifluorom ethane	l	75-71-8	O	120.91	1.67E+01	2.11	-----	5.20E-02	1.05E-05	2.80E+02	4.80E+03	1.82		

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
122	Dichloroethane, 1,1-	l	75-34-3	O	98.96	2.39E-01	1.50	-----	7.42E-02	1.05E-05	5.50E+03	2.28E+02	1.76		
123	Dichloroethane, 1,2-	l	107-06-2	O	98.96	5.32E-02	1.24	-----	1.04E-01	9.90E-06	8.70E+03	8.13E+01	1.83		
124	Dichloroethylene, 1,1-	l	75-35-4	O	96.94	1.06E+00	1.81	-----	9.00E-02	1.04E-05	2.40E+03	5.91E+02	2.12		
125	Dichloroethylene, cis-1,2-	l	156-59-2	O	96.94	1.87E-01	1.46	-----	7.35E-02	1.13E-05	4.93E+03	1.75E+02	1.86		
126	Dichloroethylene, trans-1,2	l	156-60-5	O	96.94	3.90E-01	1.70	-----	7.07E-02	1.19E-05	6.30E+03	3.52E+02	2.07		
127	Dichlorophenol, 2,4-	s	120-83-2	OA	163.00	1.31E-04	1.86	-----	3.46E-02	8.77E-06	4.50E+03	7.15E-02	2.80		
128	Dichlorophenoxyacetic acid, 2,4-	s	94-75-7	O	221.04	5.82E-09	2.95	-----	5.90E-02	6.50E-06	8.90E+02	2.40E-05	2.62		
129	Dichloropropane, 1,2	l	78-87-5	O	112.99	1.17E-01	1.77	-----	7.82E-02	8.73E-06	2.80E+03	5.00E+01	2.25		
130	Dichloro-1-propanol, 2,3-	l	616-23-9	O	128.99	3.97E-05	1.53	-----	4.84E-02	9.84E-06	2.95E+05	5.82E-01	0.78		
131	Dichloropropene, 1,3-	l	542-75-6	O	110.97	1.23E-01	1.72	-----	6.26E-02	1.00E-05	1.55E+03	3.12E+01	1.75		
132	Dichloropropene, 1,3-cis	l	10061-01-5	O	110.97	9.15E-02	1.65	-----	7.94E-02	8.00E-06	2.70E+03	3.70E+01	1.53		
133	Dichloropropene, 1,3-trans	l	10061-02-6	O	110.97	9.15E-02	1.65	-----	7.94E-02	9.20E-06	2.80E+03	3.00E+01	1.53		
134	Dichlorvos	l	62-73-7	O	220.98	3.98E-05	9.59	-----	2.32E-02	7.80E-06	1.60E+04	5.27E-02	1.40		
135	Dieldrin	s	60-57-1	O	380.91	1.11E-04	4.33	-----	1.25E-02	4.74E-06	1.95E-01	9.96E-07	5.45		
136	Diethylhexyl adipate	l	103-23-1	O	370.57	9.78E-01	5.58	-----	3.56E-02	3.72E-06	1.71E-03	8.25E-05	8.12		
137	Diethyl phthalate	l	84-66-2	O	222.24	1.87E-05	2.18	-----	2.56E-02	6.35E-06	1.08E+03	1.65E-03	2.65		
138	Diethylstilbestrol	s	56-53-1	O	268.36	2.62E-13	4.88	-----	4.43E-02	8.00E-06	1.30E+04	1.06E-09	5.64		
139	Dimethoate	s	60-51-5	O	229.26	2.58E-09	0.63	-----	8.00E-02	8.00E-06	2.50E+04	5.09E-06	0.28		
140	Dimethoxybenzidine, 3,3'-	s	119-90-4	O	244.29	1.66E-08	1.78	-----	2.42E-02	5.50E-06	2.40E+02	2.50E-07	2.08		

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
141	Dimethylbenzidine, 3,3'-	s	119-93-7	O	212.29	5.40E-09	2.30	-----	5.10E-02	8.00E-06	2.40E+02	3.70E-07	3.02		
142	Dimethylhydrazine, 1,1-	l	57-14-7	O	60.10	4.16E-06	-0.70	-----	1.06E-01	1.04E-05	1.24E+08	1.57E+02	-1.19		
143	Dimethylhydrazine, 1,2-	l	540-73-8	O	60.10	1.72E-04	0.59	-----	1.04E-01	1.10E-05	1.18E+07	6.63E+01	-0.54		
144	Dimethyl phenol, 2,4-	s	105-67-9	O	122.17	8.31E-05	2.07	-----	5.84E-02	8.69E-06	6.20E+03	1.26E-01	2.61		
145	Dimethyl phthalate	l	131-11-3	O	194.19	2.40E-05	1.50	-----	5.68E-02	6.30E-06	4.19E+03	9.12E-03	1.66		
146	Dinitrobenzene, 1,3-	s	99-65-0	O	168.11	4.57E-06	1.48	-----	2.80E-01	7.60E-06	5.40E+02	2.49E-04	1.63		
147	Dinitrobenzene, 1,4-	s	100-25-4	O	168.11	4.44E-06	1.42	-----	6.15E-02	7.18E-06	1.00E+02	4.83E-05	1.63		
148	Dinitrophenol, 2,4-	s	51-28-5	OA	184.11	2.01E-07	-2.00	-----	2.73E-02	9.06E-06	5.80E+03	1.14E-04	1.73		
149	Dinitrotoluene, 2,4-	s	121-14-2	O	182.14	3.60E-05	1.71	-----	2.03E-01	7.06E-06	2.85E+02	1.74E-04	2.18		
150	Dinitrotoluene, 2,6-	s	606-20-2	O	182.14	3.11E-05	1.62	-----	3.27E-02	7.26E-06	1.82E+02	5.70E-04	2.18		
151	Dinoseb	s	88-85-7	O	240.22	2.08E-02	3.08	-----	2.25E-02	6.25E-06	5.20E+01	7.52E-02	3.67		
152	Dioxane, 1,4-	l	123-91-1	O	88.11	2.04E-04	-0.27	-----	2.30E-01	1.00E-05	9.00E+05	3.80E+01	-0.32		
153	TCDDioxins, 2,3,7,8-	s	1746-01-6	O	321.97	1.47E-03	7.15	-----	4.70E-02	8.00E-06	1.93E-05	7.40E-10	7.02		
154	TCDDioxins, 1,2,3,7-	s	67028-18-6	O	321.97	3.16E-04	5.98	-----	4.80E-02	5.28E-06	4.20E-05	5.25E-08	6.91		
155	TCDDioxins, 1,3,6,8-	s	33423-92-6	O	321.97	2.91E-04	4.36	-----	4.80E-02	5.28E-06	3.20E-04	5.25E-09	7.20		
156	TCDDioxins, 1,2,3,4-	s	30746-58-8	O	321.97	1.55E-03	CE	-----	4.80E-02	5.28E-06	4.70E-04	4.73E-08	7.18		
157	PeCDDioxins, 1,2,3,7,8-	s	40321-76-4	O	356.42	1.08E-04	5.70	-----	4.64E-02	5.07E-06	1.20E-04	9.48E-10	7.56		
158	PeCDDioxins, 1,2,3,4,7-	s	39227-61-7	O	356.42	1.08E-04	5.80	-----	4.64E-02	5.07E-06	1.20E-04	7.50E-10	7.56		
159	HxCDDioxins, 1,2,3,4,7,8-	s	39227-28-6	O	390.86	1.85E-03	6.02	-----	4.49E-02	4.87E-06	4.42E-06	8.80E-11	8.21		

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
160	HpCDDioxins, 1,2,3,4,6,7,8-	s	35822-46-9	O	425.31	3.12E-04	7.00	-----	4.35E-02	4.70E-06	2.40E-06	3.21E-11	8.85		
161	OCDDioxins	s	3268-87-9	O	459.75	2.80E-04	7.08	-----	4.30E-02	4.54E-06	4.00E-07	8.25E-13	9.50		
162	Diphenylamine	s	122-39-4	O	169.23	1.83E-04	2.54	-----	6.80E-02	6.30E-06	3.00E+02	4.26E-03	3.29		
163	Diphenylhydrazine, 1,2-	s	122-66-7	O	184.24	1.42E-07	2.82	-----	5.62E-02	5.70E-06	1.84E+03	2.60E-05	3.06		
164	Diquat dibromide	s	85-00-7	O	344.05	2.69E-12	2.31	-----	5.52E-02	5.52E-06	7.00E+05	1.00E-07	-2.82		
165	Disulfoton	s	298-04-4	O	274.41	2.58E-04	3.95	-----	8.00E-02	8.00E-06	1.60E+01	2.30E-04	3.86		
166	Diuron	s	330-54-1	O	233.10	3.04E-08	2.63	-----	5.40E-02	5.30E-06	4.20E+01	1.00E-07	2.67		
167	Endosulfan	s	115-29-7	O	406.93	4.66E-04	2.87	-----	1.15E-02	4.55E-06	5.10E-01	9.96E-06	3.84		
168	Endothall	s	145-73-3	O	230.13	1.08E-08	1.93	-----	CE	CE	1.00E+05	1.80E-04	1.89		
169	Endrin	s	72-20-8	O	380.91	4.95E-05	3.97	-----	1.25E-02	4.74E-06	2.50E-01	5.84E-07	5.45		
170	Epichlorohydrin	l	106-89-8	O	92.53	1.37E-03	0.30	-----	8.60E-02	9.80E-06	6.60E+04	1.67E+01	0.63		
171	Ethion	l	563-12-2	O	384.48	2.87E-05	4.19	-----	CE	CE	1.20E+00	1.50E-06	4.75		
172	Ethoxy ethanol, 2-	l	110-80-5	O	90.12	1.04E-05 [2.13E+00]	2.10E-01 [-0.10]	-----	7.77E-02 [9.47E-02]	8.30E-06 [9.75E-06]	5.29E+05 [1.20E+01]	1.12E+00 [4.56E+00]	1.66E-01 [-0.42]		
173	Ethoxyethanol acetate, 2-	l	111-15-9	O	132.16	3.77E-05	0.20	-----	6.10E-02	7.29E-06	2.30E+05	2.00E+00	0.59		
174	Ethyl acetate	l	141-78-6	O	88.11	5.57E-03	0.72	-----	7.30E-02	9.70E-06	7.90E+04	9.41E+01	0.86		
175	Ethyl acrylate	l	140-88-5	O	100.12	1.06E-02	2.03	-----	7.40E-02	8.68E-06	2.00E+04	2.95E+01	1.22		
176	Ethyl benzene	l	100-41-4	O	106.17	3.28E-01	2.31	-----	7.50E-02	7.80E-06	1.69E+02	9.60E+00	3.03		
177	S-Ethyl dipropylthiocarbamate	l	759-94-4	O	189.32	4.57E-03	2.38	-----	5.35E-02	5.65E-06	3.70E+02	1.60E-01	3.02		
178	Ethyl ether	l	60-29-7	O	74.12	2.70E-02	0.88	-----	7.40E-02	9.30E-06	6.10E+04	5.40E+02	1.05		
179	Ethyl methacrylate	l	97-63-2	O	114.14	6.65E-03	1.57	-----	8.00E-02	8.00E-06	1.90E+04	1.75E+01	1.77		
180	Ethyl-2-methylbenzene, 1-	l	611-14-3	O	120.19	2.19E-01	3.03	---	6.76E-02	7.29E-06	7.46E+01	2.48E+00	3.53		
181	Ethyl-4-methylbenzene, 1-	l	622-96-8	O	120.19	3.27E-01	3.07	---	6.70E-02	7.18E-06	9.49E+01	2.95E+00	3.58		
182	Ethylenediamine	l	107-15-3	O	60.10	7.19E-08	0.67	-----	1.53E-01	1.12E-05	7.95E+06	1.10E+01	-1.62		
183	Ethylene dibromide	l	106-93-4	O	187.86	2.93E-02	1.73	-----	2.17E-02	1.90E-05	4.32E+03	1.10E+01	2.01		

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
184	Ethylene glycol	l	107-21-1	O	62.07	2.49E-06	-0.90	-----	1.08E-01	1.22E-05	1.00E+06	7.00E-02	-1.20		
185	Ethylene oxide	g	75-21-8	O	44.05	4.92E-03	0.34	-----	1.04E-01	1.45E-05	3.83E+05	1.32E+03	-0.05		
186	Ethylene thiourea	s	96-45-7	O	102.16	4.99E-05	-0.66	-----	7.15E-02	1.02E-05	1.20E+04	8.36E-02	-0.49		
187	Fluoranthene	s	206-44-0	O	202.26	3.88E-04	4.69	-----	3.02E-02	6.35E-06	2.60E-01	8.13E-06	4.93		
188	Fluorene	s	86-73-7	O	166.22	2.64E-03	3.88	-----	3.63E-02	7.88E-06	1.98E+00	3.24E-03	4.02		
189	Fluorine (soluble Fluoride)	g	7782-41-4	I	38.00	CE	-----	2.18	CE	CE	NA/reacts	7.60E+02	0.22		
190	Formaldehyde	g	50-00-0	O	30.03	1.37E-05	0.34	-----	1.80E-01	2.00E-05	5.50E+05	3.88E+03	0.35		
191	Formic acid	l	64-18-6	O	46.03	1.79E-04	-0.54	-----	7.90E-02	1.40E-06	1.00E+06	4.10E+01	-0.46		
192	TCDFurans, 2,3,7,8-	s	51207-31-9	O	305.98	6.16E-04	5.20	-----	4.86E-02	5.41E-06	4.19E-04	1.50E-08	6.29		
193	PeCDFuran, 1,2,3,7,8-	s	57117-41-6	O	340.42	2.11E-04	6.73	-----	4.69E-02	5.18E-06	2.40E-04	2.72E-09	6.94		
194	PeCDFuran, 2,3,4,7,8-	s	57117-31-4	O	340.42	2.44E-04	7.40	-----	4.69E-02	5.18E-06	2.36E-04	2.63E-09	6.94		
195	HxCDFurans, 1,2,3,4,7,8-	s	70648-26-9	O	374.87	5.97E-04	7.40	-----	4.50E-02	4.97E-06	8.25E-06	2.40E-10	7.92		
196	HxCDFurans, 1,2,3,6,7,8-	s	57117-44-9	O	374.87	2.54E-04	7.55	-----	4.50E-02	4.97E-06	1.77E-05	2.20E-10	7.92		
197	HxCDFurans, 2,3,4,6,7,8-	s	60851-34-5	O	374.87	1.70E-03	7.54	-----	4.50E-02	4.97E-06	1.30E-05	2.00E-10	7.92		
198	HpCDFurans, 1,2,3,4,6,7,8-	s	67562-39-4	O	409.31	1.54E-03	6.37	-----	4.30E-02	4.79E-06	1.35E-06	3.82E-10	8.23		
199	HpCDFurans, 1,2,3,4,7,8,9-	s	55673-89-7	O	409.31	1.58E-03	5.00	-----	4.30E-02	4.79E-06	1.40E-06	1.07E-10	6.90		
200	OCDFurans	s	39001-02-0	O	443.76	7.90E-05	6.75	-----	4.27E-02	4.62E-06	1.20E-06	3.75E-12	8.87		
201	Furan	l	110-00-9	O	68.08	2.24E-01	1.32	-----	1.04E-01	1.20E-05	1.00E+04	6.00E+02	1.36		
202	Fufural	l	98-01-1	O	96.09	1.25E-04	0.44	-----	8.72E-02	1.12E-05	8.60E+04	2.00E+00	0.83		
203	Glycidylaldehyde	l	765-34-4	O	72.06	1.08E-05	0.96	-----	9.64E-02	1.16E-05	8.55E+07	2.70E+01	-0.12		
204	Heptachlor	s	76-44-8	O	373.32	2.44E-02	4.07	-----	1.12E-02	5.69E-06	1.80E-01	3.26E-04	6.21		
205	Heptachlor epoxide	s	1024-57-3	O	389.32	3.45E-04	3.86	-----	1.32E-02	4.23E-06	2.75E-01	4.34E-06	4.91		
206	Hexachlorobenzene	s	118-74-1	O	284.78	2.22E-02	4.45	-----	5.42E-02	5.91E-06	6.00E-03	1.23E-05	5.86		

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
207	Hexachloro-1,3-butadiene	l	87-68-3	O	260.76	9.94E-01	3.84	-----	5.61E-02	6.16E-06	2.55E+00	1.77E-01	4.72		
208	Hexachlorocyclohexane, techn	CE	608-73-1	O	290.83	5.99E-05	3.38	-----	1.42E-02	7.34E-06	4.35E+01	1.64E-04	4.26		
209	Hexachlorocyclohexane, alpha	s	319-84-6	O	290.83	2.82E-04	3.12	-----	1.42E-02	7.34E-06	2.00E+00	4.26E-05	4.26		
210	Hexachlorocyclohexane, beta	s	319-85-7	O	290.83	1.44E-05	3.14	-----	1.42E-02	7.34E-06	5.42E-01	4.90E-07	4.26		
211	Hexachlorocyclohexane, gamma	s	58-89-9	O	290.83	1.41E-04	3.04	-----	1.42E-02	7.34E-06	5.75E+00	3.72E-05	4.26		
212	Hexachlorocyclohexantadiene	l	77-47-4	O	273.78	7.15E-01	3.98	-----	1.61E-02	7.21E-06	1.80E+00	7.32E-02	4.63		
213	Hexachloroethane	s	67-72-1	O	236.74	1.62E-01	3.26	-----	2.50E-03	6.80E-06	5.00E+01	4.72E-01	4.03		
214	Hexachlorophene	s	70-30-4	O	406.91	2.54E-09	7.30	-----	8.00E-02	8.00E-06	3.00E-03	2.74E-12	6.92		
215	Hexane, n-	l	110-54-3	O	86.18	4.66E+01	2.68	-----	2.00E-01	7.77E-06	1.30E+01	1.52E+02	3.29		
216	Hexazinone	s	51235-04-2	O	252.32	8.62E-11	1.57	-----	5.08E-02	5.11E-06	3.30E+04	2.03E-07	2.15		
217	Hydrazine	l	302-01-2	O	32.05	7.20E-08	-1.00	-----	4.16E-01	1.90E-05	3.41E+08	1.40E+01	-1.47		
218	Hydrogen chloride	g	7647-01-0	I	36.46	9.30E-02	-----	CE	1.67E-01	2.05E-05	6.60E+05	3.08E+04	0.54		
219	Hydrogen cyanide	g	74-90-8	I	27.03	5.40E-03	-----	CE	1.73E-01	1.96E-05	1.00E+06	6.20E+02	-0.69		
220	Hydrogen sulfide	g	7783-06-4	I	34.08	9.56E-01	-----	CE	1.76E-01	1.61E-05	4.13E+03	1.52E+04	0.23		
221	Indene	l	95-13-6	O	116.16	2.08E-02	2.50	-----	6.82E-02	7.97E-06	3.90E+02	1.30E+00	2.80		
222	Indeno-(1,2,3-cd)-pyrene	s	193-39-5	O	276.34	2.85E-06	6.54	-----	1.90E-02	5.66E-06	3.75E-03	1.40E-10	6.70		
223	Isobutyl alcohol	l	78-83-1	O	74.12	4.99E-04	0.75	-----	8.60E-02	8.00E-06	9.49E+04	1.00E+01	0.77		
224	Isophorone	l	78-59-1	O	138.21	2.57E-04	1.48	-----	6.23E-02	6.76E-06	1.20E+04	4.10E-01	2.62		
225	Kepon	s	143-50-0	O	490.64	1.04E-06	4.43	-----	4.22E-02	4.30E-06	7.60E+00	2.25E-07	4.91		
226	Lead	s	7439-92-1	M	207.20	0.00E+00	-----	1.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.73		
227	Malathion	l	121-75-5	O	330.36	9.98E-07	2.46	-----	1.50E-02	4.40E-06	1.45E+02	7.90E-06	2.29		
228	Maleic anhydride	s	108-31-6	O	98.06	8.31E-06	1.41	-----	9.50E-02	1.11E-05	8.65E+02	1.34E-03	1.62		
229	Maleic hydrazide	s	123-33-1	O	112.09	< 1.03E-10	1.40	-----	8.75E-02	8.75E-06	6.00E+03	< 7.50E-08	-0.89		
230	Malononitrile	s	109-77-3	O	66.06	1.97E-07	0.69	-----	9.97E-02	1.09E-05	6.96E+06	3.79E-01	-0.18		
231	Manganese	s	7439-96-5	M	54.94	0.00E+00	-----	1.70	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	1.00E-01	5.00E-02
232	Mercury	l	7439-97-6	M	200.59	4.74E-01	-----	-1.40	3.07E-02	6.30E-06	3.00E-02	1.30E-03	-0.47	5.50E-03	1.40E-02

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
233	Methacrylonitrile	l	126-98-7	O	67.09	3.03E-03	0.53	-----	8.00E-02	8.00E-06	2.50E+04	6.80E+01	0.76		
234	Methanol	l	67-56-1	O	32.04	1.94E-04	-0.74	-----	1.50E-01	1.64E-05	1.00E+06	1.22E+02	-0.63		
235	Methomyl	s	16752-77-5	O	162.21	7.48E-09	2.20	-----	4.07E-02	7.20E-06	5.80E+04	5.00E-05	0.61		
236	Methoxychlor	s	72-43-5	O	345.65	6.57E-04	4.89	-----	1.56E-02	4.46E-06	4.50E-02	1.23E-06	5.67		
237	Methoxyethanol	l	109-86-4	O	76.10	1.28E+00	0.93	-----	9.15E-02	1.02E-05	2.01E+01	6.20E+00	-0.91		
238	Methoxyethanol acetate	l	110-49-6	O	118.13	1.28E+00	1.40	-----	7.22E-02	8.10E-06	3.52E+01	7.00E+00	0.10		
239	Methyl ethyl ketone	l	78-93-3	O	72.11	1.94E-03	0.28	-----	8.08E-02	9.80E-06	2.40E+05	9.10E+01	0.26		
240	Methyl isobutyl ketone	l	108-10-1	O	100.16	5.82E-03	1.18	-----	7.50E-02	7.80E-06	1.90E+04	1.45E+01	1.16		
241	Methyl mercury	CE	22967-92-6	I	215.62	CE	-----	CE	CE	CE	CE	CE	0.08		
242	Methyl methacrylate	l	80-62-6	O	100.12	1.33E-02	1.36	-----	7.70E-02	8.60E-06	1.60E+04	3.80E+01	1.28		
243	Methyl naphthalene, 1-	s	90-12-0	O	142.20	1.64E-02	3.36	-----	6.31E-02	7.13E-06	2.80E+01	6.62E-02	3.72		
244	Methyl naphthalene, 2-	s	91-57-6	O	142.20	1.85E-02	3.64	-----	6.29E-02	7.20E-06	2.54E+01	6.75E-02	3.72		
245	Methyl parathion	s	298-00-0	O	263.21	5.82E-06	2.81	-----	8.00E-02	8.00E-06	5.00E+01	1.52E-05	2.75		
246	Methylene-bis (2-chloroaniline), 4,4'-	s	101-14-4	O	267.16	1.40E-05	3.90	-----	1.99E-02	5.80E-06	7.24E+01	6.94E-05	3.47		
247	Methylene bromide	l	74-95-3	O	173.83	3.49E-02	2.26	-----	8.00E-02	8.00E-06	1.10E+04	4.56E+01	1.52		
248	Methylene chloride	l	75-09-2	O	84.93	9.10E-02	1.07	-----	1.01E-01	1.17E-05	1.54E+04	4.55E+02	1.34		
249	Molinate	l	2212-67-1	O	187.31	5.25E-05	1.70	-----	5.65E-02	6.00E-06	9.00E+02	5.60E-03	2.91		
250	Molybdenum	s	7439-98-7	M	95.94	0.00E+00	-----	1.30	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	1.00E-01	6.00E-02
251	MTBE	l	1634-04-4	O	88.15	2.44E-02	1.15	-----	7.92E-02	9.41E-05	4.80E+04	2.49E+02	1.43		
252	Naled	l	300-76-5	O	380.78	2.71E-03	2.12	-----	CE	6.80E-06	1.50E+00	2.00E-04	1.60		
253	Naphthalene	s	91-20-3	O	128.17	2.00E-02	3.19	-----	5.90E-02	7.50E-06	3.14E+01	8.89E-02	3.17		
254	Nickel and compounds (soluble salts)	s	7440-02-0	M	58.69	0.00E+00	-----	1.20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-0.57	2.50E-02	8.00E-03
255	Nickel, refinery	CE	No	I	CE	CE	-----	CE	CE	CE	CE	CE	CE	2.50E-02	8.00E-03

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
	dust		CASNUM												
256	Nitrate	CE	14797-55-8	I	62.00	CE	-----	CE	CE	CE	CE	CE	0.21		
257	Nitrite	CE	14797-65-0	I	46.01	CE	-----	CE	CE	CE	CE	CE	0.06		
258	Nitroaniline 2-	s	88-74-4	O	138.13	2.08E-05	1.43	-----	5.99E-02	7.18E-06	1.26E+03	4.75E-03	2.02		
259	Nitrobenzene	l	98-95-3	O	123.11	8.56E-04	2.12	-----	7.60E-02	8.60E-06	1.90E+03	2.44E-01	1.81		
260	Nitropropane, 2-	l	79-46-9	O	89.09	5.15E-03	0.54	-----	9.23E-02	1.01E-05	1.70E+04	1.82E+01	0.87		
261	Nitroso-n-ethylurea, n-	s	759-73-9	O	117.11	1.05E-04	1.51	-----	8.08E-02	8.25E-06	4.85E+04	7.97E-01	-0.02		
262	Nitroso-n-methylurea, n-	CE	684-93-5	O	103.08	1.08E-06	1.23	-----	7.06E-02	1.02E-05	4.21E+06	8.04E-01	-0.52		
263	Nitroso-methyl-ethyl-amine, n-	CE	10595-95-6	O	88.11	3.70E-05	1.32	-----	8.00E-02	8.00E-06	3.00E+05	2.28E+00	-0.15		
264	Nitrosodi-n-butylamine, n-	CE	924-16-3	O	158.24	3.58E-03	2.36	-----	8.00E-02	8.00E-06	1.20E+03	2.89E-01	2.31		
265	Nitrosodi-n-propylamine, n-	s	621-64-7	O	130.19	9.35E-05	1.30	-----	5.45E-02	8.17E-06	9.89E+03	4.00E-01	1.35		
266	Nitrosodiethanolamine	l	1116-54-7	O	134.14	2.05E-09	0.48	-----	7.27E-02	7.70E-06	7.33E+07	5.00E-04	-1.28		
267	Nitrosodiethylamine, N-	l	55-18-5	O	102.14	3.60E-05	0.48	-----	8.00E-02	8.00E-06	1.47E+05	1.42E+00	0.34		
268	Nitrosodimethylamine, N-	l	62-75-9	O	74.08	2.16E-05	0.56	-----	1.34E-01	9.72E-06	1.00E+06	5.37E+00	-0.64		
269	Nitrosodiphenylamine	s	86-30-6	O	198.22	2.08E-04	2.52	-----	3.12E-02	6.35E-06	3.51E+01	9.88E-02	3.16		
270	Nitrosopyrrolidine, n-	l	930-55-2	O	100.12	7.48E-07	-0.19	-----	8.00E-02	8.00E-06	7.80E+05	1.75E-01	0.23		
271	Nitrotoluene, m	l	99-08-1	O	137.14	2.24E-03	2.15	-----	6.42E-02	7.69E-06	4.98E+02	1.50E-01	2.36		
272	Nitrotoluene, o	l	88-72-2	O	137.14	1.87E-03	2.15	-----	6.47E-02	7.73E-06	6.00E+02	1.50E-01	2.36		
273	Nitrotoluene, p	s	99-99-0	O	137.14	2.29E-03	2.15	-----	6.40E-02	7.70E-06	4.00E+02	1.20E-01	2.36		
274	Octamethylphosphoramide	l	152-16-9	O	286.25	1.16E-08	-0.51	-----	8.00E-02	8.00E-06	1.00E+06	9.88E-04	-1.01		
275	Oxamyl	s	23135-22-0	O	219.26	1.60E-11	0.70	-----	5.57E-02	5.75E-06	2.80E+05	3.83E-07	-1.20		
276	Parathion	s	56-38-2	O	291.26	2.37E-05	3.75	-----	1.70E-02	5.80E-06	1.18E+01	1.73E-05	3.73		

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
277	Pebulate	l	1114-71-2	O	203.35	9.85E-04	2.63	-----	5.10E-02	5.38E-06	9.20E+01	8.85E-03	3.51		
278	Pentachlorobenzene	s	608-93-5	O	250.34	3.16E-02	4.50	-----	6.70E-02	6.30E-06	6.50E-01	1.67E-03	5.22		
279	Pentachloronitrobenzene	s	82-68-8	O	295.34	2.57E-02	4.11	-----	1.59E-02	6.10E-06	7.11E-02	1.13E-04	5.03		
280	Pentachlorophenol	s	87-86-5	OA	266.34	1.16E-05	2.61	-----	5.60E-02	6.10E-06	1.40E+01	1.70E-05	4.74		
281	Phenanthrene	s	85-01-8	O	178.23	5.40E-03	4.15	-----	3.33E-02	7.47E-06	9.94E-01	6.80E-04	4.35		
282	Phenol	s	108-95-2	O	94.11	2.47E-05	1.24	-----	8.20E-02	9.10E-06	8.70E+04	4.63E-01	1.51		
283	Phenyl mercuric acetate	s	62-38-4	O	336.74	3.41E-09	2.20	-----	8.00E-02	8.00E-06	4.37E+03	3.04E-06	0.89		
284	Phenylene diamine, m-	s	108-45-2	O	108.14	9.56E-07	0.04	-----	6.63E-02	9.90E-06	3.51E+05	2.28E-02	-0.39		
285	Phenylene diamine, p-	s	106-50-3	O	108.14	5.24E-08	0.04	-----	7.15E-02	8.92E-06	3.80E+04	4.60E-03	-0.39		
286	Phorate	l	298-02-2	O	260.38	4.99E-04	3.74	-----	8.00E-02	8.00E-06	4.40E+01	1.30E-03	3.37		
287	Phosphine	g	7803-51-2	I	34.00	1.46E+02	-----	CE	3.81E-01	1.82E-05	4.00E+02	3.14E+04	-0.27		
288	Phosphoric acid	s	7664-38-2	I	98.00	CE	-----	CE	CE	CE	CE	3.00E-02	-0.77		
289	Phosphorus, white	s	7723-14-0	I	123.90	5.65E-02	3.05	-----	CE	CE	3.00E+00	2.50E-02	3.08		
290	Phthalic anhydride	s	85-44-9	O	148.12	2.54E-07	1.90	-----	6.36E-02	7.90E-06	6.20E+03	2.00E-04	2.07		
291	Polybrominated biphenyls	s	67774-32-7	O	627.59	1.62E-04	3.33	-----	CE	4.63E-06	1.10E-02	5.20E-08	6.39		
292	Polychlorinated biphenyls	l	1336-36-3	O	290.00	1.75E-02	5.72	-----	1.04E-01	1.00E-05	5.55E-02	7.60E-05	6.30		
293	Potassium cyanide	s	151-50-8	I	65.12	0.00E+00	-----	CE	CE	CE	7.20E+05	0.00E+00	-1.69		
294	Pronamide	s	23950-58-5	O	256.13	3.74E-04	2.30	-----	8.00E-02	8.00E-06	1.50E+01	4.00E-04	3.57		
295	Propargite	l	2312-35-8	O	350.48	1.44E-06	3.75	-----	3.94E-02	4.20E-06	5.00E-01	4.48E-08	3.73		
296	Propargyl alcohol	l	107-19-7	O	56.06	1.34E-05	0.73	-----	1.04E-01	1.24E-05	5.57E+06	1.20E+01	-0.42		
297	Propham	s	122-42-9	O	179.22	5.30E-06	1.71	-----	5.71E-02	6.28E-06	2.50E+02	1.35E-04	2.66		
298	Propylene oxide	l	75-56-9	O	58.08	3.47E-03	0.10	-----	1.04E-01	1.16E-05	4.76E+05	5.32E+02	0.03		
299	Pyrene	s	129-00-0	O	202.26	4.57E-04	4.58	-----	2.72E-02	7.24E-06	1.35E-01	4.25E-06	4.93		
300	Pyridine	l	110-86-1	O	79.10	2.91E-01	0.64	-----	9.10E-02	7.60E-06	3.00E+02	2.00E+01	0.80		
301	Quinoline	l	91-22-5	O	129.16	1.15E-04	2.76	-----	5.46E-02	8.31E-06	6.78E+03	9.60E-02	2.14		

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
302	Selenious acid	s	7783-00-8	I	128.97	1.27E-05	-----	CE	CE	CE	1.67E+06	3.00E+00	-3.18	1.50E-02	2.20E-02
303	Selenium	s	7782-49-2	M	78.96	0.00E+00	-----	0.34	CE	CE	0.00E+00	0.00E+00	0.24	1.50E-02	2.20E-02
304	Selenourea	CE	630-10-4	O	118.98	CE	CE	-----	CE	CE	CE	CE	-2.63		
305	Silver	s	7440-22-4	M	107.87	0.00E+00	-----	-1.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	1.70E-01	1.00E-01
306	Sodium azide	s	26628-22-8	I	65.01	CE	-----	CE	CE	CE	4.20E+05	CE	0.86		
307	Sodium cyanide	s	143-33-9	I	49.01	0.00E+00	-----	CE	CE	CE	5.80E+05	0.00E+00	-1.69		
308	Sodium diethyldithiocarbamate	s	148-18-5	O	171.26	CE	CE	-----	CE	CE	CE	CE	0.27		
309	Sodium fluoride	s	7681-49-4	I	41.99	0.00E+00	-----	CE	CE	CE	4.00E+04	0.00E+00	-0.77		
310	Strychnine	s	57-24-9	O	334.42	6.65E-12	1.90	-----	8.00E-02	8.00E-06	1.43E+02	1.67E-10	1.85		
311	Styrene	l	100-42-5	O	104.15	1.14E-01	2.88	-----	7.10E-02	8.00E-06	3.10E+02	6.24E+00	2.90		
312	Tetrachlorobenzene, 1,2,4,5-	s	95-94-3	O	215.89	4.99E-02	3.20	-----	2.11E-02	8.80E-06	3.00E-01	5.40E-03	4.57		
313	Tetrachloroethane, 1,1,1,2-	s	630-20-6	O	167.85	9.98E-02	2.98	-----	7.10E-02	7.90E-06	1.10E+03	1.22E+01	2.93		
314	Tetrachloroethane, 1,1,2,2-	l	79-34-5	O	167.85	1.55E-02	1.89	-----	7.10E-02	7.90E-06	2.97E+03	5.17E+00	2.19		
315	Tetrachloroethylene	l	127-18-4	O	165.83	7.65E-01	2.19	-----	7.20E-02	8.20E-06	2.00E+02	1.84E+01	2.97		
316	Tetrachlorophenol, 2,3,4,6-	s	58-90-2	OA	231.89	2.54E-04	2.02	-----	2.17E-02	7.10E-06	1.00E+02	5.02E-03	4.09		
317	Tetraethyl dithiopyrophosphate	l	3689-24-5	O	322.32	1.75E-04	2.87	-----	1.50E-02	5.50E-06	2.50E+01	1.70E-04	3.98		
318	Tetraethyl lead	l	78-00-2	O	323.45	3.31E+00	3.69	-----	1.32E-02	6.40E-06	8.00E-01	1.50E-01	4.88		
319	Thallium chloride	s	7791-12-0	I	239.84	0.00E+00	-----	CE	CE	CE	2.90E+03	0.00E+00	CE	1.00E-03	4.00E-04
320	Thallium nitrate	s	10102-45-1	I	266.39	7.19E-11	-----	CE	CE	CE	9.55E+04	4.71E-07	CE		
321	Thallium sulfate	s	7446-18-6	I	504.83	0.00E+00	-----	CE	CE	CE	4.87E+04	0.00E+00	CE		
322	Thiofanox	s	39196-18-4	O	218.32	3.90E-07	1.77	-----	2.55E-02	6.62E-06	5.20E+03	3.10E-04	2.16		
323	Thiophanatemethyl	s	23564-05-8	O	342.40	< 3.82E-07	0.95	-----	4.55E-02	4.68E-06	3.50E+00	< 7.50E-08	1.50		
324	Thiram	s	137-26-8	O	240.44	< 3.28E-06	2.83	-----	2.25E-02	6.24E-06	3.00E+01	< 7.50E-06	1.70		
325	Tin	s	7440-31-5	M	118.71	0.00E+00	-----	CE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29	1.00E-02	6.00E-03

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
326	Toluene	l	108-88-3	O	92.14	2.76E-01	2.15	-----	8.70E-02	8.60E-06	5.30E+02	2.82E+01	2.54		
327	Toluenediamine, 2,4-	s	95-80-7	O	122.17	7.48E-08	3.11	-----	8.00E-02	8.00E-06	7.47E+03	8.36E-05	0.16		
328	Toluenediamine, 2,6-	s	823-40-5	O	122.17	5.15E-10	CE	-----	6.87E-02	7.97E-06	4.80E+04	1.98E-05	0.16		
329	Toluene diisocyanate, 2,4/2,6-	l	26471-62-5	O	174.16	6.86E-06	3.35	-----	6.09E-02	6.80E-06	1.11E+05	8.00E-02	3.74		
330	Toluidine, p-	s	106-49-0	O	107.16	3.82E-04	1.40	-----	8.00E-02	8.00E-06	7.20E+03	3.30E-01	1.62		
331	Toxaphene	s	8001-35-2	O	413.81	1.40E-04	4.98	-----	1.16E-02	4.34E-06	7.40E-01	4.19E-06	6.79		
332	TP Silvex, 2,4,5-	s	93-72-1	O	269.51	5.45E-07	3.41	-----	1.94E-02	5.80E-06	1.40E+02	5.20E-06	3.68		
333	Triallate	s	2303-17-5	O	304.67	4.53E-04	3.16	-----	4.58E-02	4.84E-06	4.00E+00	1.20E-04	4.57		
334	Trichloro-1,2,2-trifluoroethane, 1,1,2	l	76-13-1	O	187.38	2.20E+01	3.11	-----	7.80E-02	8.20E-06	2.00E+02	3.60E+02	3.09		
335	Trichlorobenzene, 1,2,4-	l	120-82-1	O	181.45	5.90E-02	3.22	-----	3.00E-02	8.23E-06	4.88E+01	3.36E-01	3.93		
336	Trichloroethane, 1,1,1-	l	71-55-6	O	133.40	7.15E-01	2.04	-----	7.80E-02	8.80E-06	1.33E+03	1.24E+02	2.68		
337	Trichloroethane, 1,1,2-	l	79-00-5	O	133.40	3.80E-02	1.70	-----	7.92E-02	8.80E-06	4.42E+03	2.52E+01	2.01		
338	Trichloroethylene	l	79-01-6	O	131.39	4.28E-01	1.97	-----	7.90E-02	9.10E-06	1.10E+03	7.20E+01	2.47		
339	Trichlorofluoromethane	l	75-69-4	O	137.37	4.03E+00	2.13	-----	8.70E-02	9.70E-06	1.10E+03	6.87E+02	2.13		
340	Trichlorophenol, 2,4,5-	s	95-95-4	OA	197.45	1.78E-04	2.47	-----	2.91E-02	7.03E-06	1.20E+03	1.63E-02	3.45		
341	Trichlorophenol, 2,4,6-	s	88-06-2	OA	197.45	3.19E-04	2.12	-----	3.18E-02	6.25E-06	9.82E+02	1.18E-02	3.45		
342	Trichlorophenoxyacetic acid, 2,4,5-	s	93-76-5	O	255.48	3.62E-07	1.72	-----	8.00E-02	8.00E-06	2.78E+02	3.61E-06	3.26		
343	Trichloropropane, 1,1,2-	l	598-77-6	O	147.43	1.21E+00	2.24	-----	3.96E-02	9.30E-06	4.44E+01	6.64E+00	2.43		
344	Trichloropropane, 1,2,3-	l	96-18-4	O	147.43	1.58E-02	2.59	-----	7.10E-02	7.90E-06	1.90E+03	3.70E+00	2.50		

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345	Triethylamine	l	121-44-8	O	101.19	1.99E-02	1.12	-----	7.54E-02	7.51E-06	1.50E+04	5.00E+01	1.51		
346	Trifluralin	s	1582-09-8	O	335.28	2.01E-03	4.14	-----	1.49E-02	4.70E-06	6.00E-01	1.10E-04	5.31		
347	Trimethylbenzene, 1,2,3-	l	526-73-8	O	120.19	1.33E-01	2.77	-----	6.77E-02	7.41E-06	7.52E+01	1.49E+00	3.55		
348	Trinitrobenzene, 1,3,5-	s	99-35-4	O	213.11	2.87E-06	1.15	-----	8.00E-02	8.00E-06	3.53E+02	9.90E-05	1.45		
349	Trinitrophenylmethylnitramine, 2,4,6-	s	479-45-8	O	287.15	8.31E-11	2.37	-----	5.69E-02	6.40E-06	7.50E+01	4.00E-10	2.04		
350	Trinitrotoluene, 2,4,6-	s	118-96-7	O	227.13	1.90E-05	2.48	-----	5.41E-02	6.57E-06	1.30E+02	1.24E-04	1.99		
351	Uranium	s	7440-61-1	M	238.03	0.00E+00	-----	3.47	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	5.00E-03	4.00E-03
352	Vanadium	s	7440-62-2	M	50.94	0.00E+00	-----	3.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	3.60E-03	3.00E-03
353	Vanadium pentoxide	s	1314-62-1	I	181.88	0.00E+00	-----	CE	CE	CE	8.00E+03	0.00E+00	CE	3.60E-03	3.00E-03
354	Vernam	l	1929-77-7	O	203.35	7.36E-04	3.44	-----	5.10E-02	5.39E-06	9.85E+01	1.04E-02	3.51		
355	Vinyl acetate	l	108-05-4	O	86.09	2.29E-02	0.72	-----	8.50E-02	9.20E-06	2.00E+04	1.09E+02	0.73		
356	Vinyl chloride	g	75-01-4	O	62.50	3.49E+00	1.04	-----	1.06E-01	1.23E-05	2.76E+03	2.80E+03	1.62		
357	Warfarin	s	81-81-2	O	308.33	1.15E-07	2.96	-----	1.63E-02	4.40E-06	1.70E+01	1.16E-07	3.20		
358	Xylenes	l	1330-20-7	O	106.17	2.93E-01	2.38	-----	7.40E-02	8.50E-06	1.98E+02	8.06E+00	3.09		
359	Xylene, m-	l	108-38-3	O	106.17	3.05E-01	2.29	-----	7.00E-02	7.80E-06	1.60E+02	8.00E+00	3.20		
360	Xylene, o-	l	95-47-6	O	106.17	7.36E-04	2.11	-----	8.70E-02	1.00E-05	1.78E+02	6.75E+00	3.13		
361	Xylene, p-	l	106-42-3	O	106.17	3.18E-01	2.49	-----	7.69E-02	8.44E-06	1.85E+02	8.76E+00	3.17		
362	Zinc	s	7440-66-6	M	65.39	0.00E+00	-----	1.20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-0.47	9.00E-02	4.40E-02
363	Zinc cyanide	s	557-21-1	I	117.43	CE	-----	1.60	CE	CE	0.00E+00	CE	-2.31		
364	Zinc phosphide	s	1314-84-7	I	258.12	0.00E+00	-----	1.60	CE	CE	0.00E+00	0.00E+00	CE		
365	6 C aliphatics (TPH)	l	---	O	81	3.3E+01	2.9	-----	1.0E-01	1.0E-05	3.6E+01	2.7E+02	---		
366	> 6-8 C aliphatics (TPH)	l	---	O	100	5.0E+01	3.6	-----	1.0E-01	1.0E-05	5.4E+00	4.8E+01	---		
367	> 8-10 C aliphatics (TPH)	l	---	O	130	8.0E+01	4.5	-----	1.0E-01	1.0E-05	4.3E-01	4.8E+00	---		
368	> 10-12 C aliphatics (TPH)	l	---	O	160	1.2E+02	5.4	-----	1.0E-01	1.0E-05	3.4E-02	4.8E-01	---		

No	COMPOUND	Physical State	CAS number	Type	M. W. (g/mole)	H' (cm ³ -H ₂ O/cm ³ -air)	LogK _{oc}	Log K _d	D _{air} (cm ² /s)	D _{wat} (cm ² /s)	Solubility (mg/l)	Vapor Pressure (mm Hg)	Log K _{ow}	Br _{Abg} (g soil/g D. W.)	Br _{Bg} (g soil/g D. W.)
369	>12-16 C aliphatics (TPH)	l	---	O	200	5.2E+02	6.7	-----	1.0E-01	1.0E-05	7.6E-04	3.6E-02	---		
370	>16-35 C aliphatics (TPH)	l	---	O	270	4.9E+03	8.8	-----	1.0E-01	1.0E-05	2.5E-06	8.4E-04	---		
371	5-7 C aromatics (TPH) - Benzene	l		O	78	2.27E-01	1.82	-----	8.8E-02	9.8E-06	1.77E+03	9.50E+01	---		
372	>7-8 C aromatics (TPH) - Toluene	l	---	O	92	2.76E-01	2.15	-----	8.7E-02	8.6E-06	5.30E+02	2.82E+01	---		
370	>8-10 C aromatics (TPH)	l	---	O	120	4.8E-01	3.2	-----	1.0E-01	1.0E-05	6.5E+01	4.8E+00	---		
371	>10-12 C aromatics (TPH)	l	---	O	130	1.4E-01	3.4	-----	1.0E-01	1.0E-05	2.5E+01	4.8E-01	---		
375	>12-16 C aromatics (TPH)	l	---	O	150	5.3E-02	3.7	-----	1.0E-01	1.0E-05	5.8E+00	3.6E-02	---		
376	>16-21 C aromatics (TPH)	l	---	O	190	1.3E-02	4.2	-----	1.0E-01	1.0E-05	6.5E-01	8.4E-04	---		
377	>21-35 C aromatics (TPH)	s	---	O	240	6.7E-04	5.1	-----	1.0E-01	1.0E-05	6.6E-03	3.3E-07	---		

Legend

<i>s</i>	<i>compound solid at @ 20 °C</i>	<i>D_{air}</i>	<i>Diffusion coefficient in air (cm²/s)</i>
<i>l</i>	<i>compound liquid at @ 20 °C</i>	<i>D_{wat}</i>	<i>Diffusion coefficient in water (cm²/s)</i>
<i>g</i>	<i>compound gaseous at @ 20 °C</i>	<i>K_{ow}</i>	<i>Octanol-water partition coefficient (cm³-H₂O/cm³-Octanol)</i>
<i>H'</i>	<i>Dimensionless Henry's Law Constant H' = H x 41.57 @ 20 °C (cm³-H₂O/cm³-air)</i>	<i>Br_{Abg}</i>	<i>Soil-to-above ground plant biotransfer factor (g soil/g plant tissue dry weight)</i>
<i>H</i>	<i>Henry's Law Constant (atm-m³/mole)</i>	<i>Br_{Bg}</i>	<i>Soil-to-below ground plant biotransfer factor (g soil/g plant tissue dry weight)</i>
<i>MW</i>	<i>Molecular Weight (g/mole)</i>	<i>Type</i>	<i>O: Organic, I: Inorganic, M: Metal, OA: Organic Acids</i>
<i>K_{oc}</i>	<i>Soil organic carbon-water partition coefficient (cm³-H₂O/g-Carbon)</i>	<i>CE</i>	<i>Not found, Can not estimate</i>
<i>K_d</i>	<i>Soil-water partition coefficient (cm³-H₂O/g-Soil)</i>	<i>NA/reacts</i>	<i>Not applicable because reacts with water</i>
		<i>Values in italic</i>	<i>Estimated by TCEQ/TNRCCJ</i>

(1) For Tiers 2 and 3, the person may determine property-specific soil pH in order to account for the high pH dependence of the soil-water partition coefficient (K_d) of inorganic compounds and the organic carbon-water partition coefficient (K_{oc}) of ionizing organic compounds. Once the property-specific pH is determined, the person shall apply subparagraphs (A) - (C) of this paragraph as applicable to determine pH-dependent K_d and K_{oc} values unless another appropriate method is approved by the executive director. The executive director may also approve the use of data from appropriately-conducted [leachate] tests [(e.g., SPLP)] in determining a site-specific K_d or K_{oc} .

(A) - (B) (No change.)

(C) The person shall use the following figure to determine the pH-dependent K_d value for the inorganic COCs listed.

Figure: 30 TAC §350.73(e)(1)(C)

[Figure: 30 TAC §350.73(e)(1)(C)]

K_d Values (L/kg) for Inorganic COCs as a Function of pH^a													
pH	Sb	As	Ba	Be	Cd	Cr (3)	Cr(6)	Hg	Ni	Ag	Se	Tl	Zn
4.9	9.6E+01	2.5E+01	1.1E+01	2.3E+01	1.5E+01	1.2E+03	3.1E+01	4.0E-02	1.6E+01	1.0E-01	1.8E+01	4.4E+01	1.6E+01
5.0	9.1E+01	2.5E+01	1.2E+01	2.6E+01	1.7E+01	1.9E+03	3.1E+01	6.0E-02	1.8E+01	1.3E-01	1.7E+01	4.5E+01	1.8E+01
5.1	8.7E+01	2.5E+01	1.4E+01	2.8E+01	1.9E+01	3.0E+03	3.0E+01	9.0E-02	2.0E+01	1.6E-01	1.6E+01	4.6E+01	1.9E+01
5.2	8.3E+01	2.6E+01	1.5E+01	3.1E+01	2.1E+01	4.9E+03	2.9E+01	1.4E-01	2.2E+01	2.1E-01	1.5E+01	4.7E+01	2.1E+01
5.3	7.9E+01	2.6E+01	1.7E+01	3.5E+01	2.3E+01	8.1E+03	2.8E+01	2.0E-01	2.4E+01	2.6E-01	1.4E+01	4.8E+01	2.3E+01
5.4	7.6E+01	2.6E+01	1.9E+01	3.8E+01	2.5E+01	1.3E+04	2.7E+01	3.0E-01	2.6E+01	3.3E-01	1.3E+01	5.0E+01	2.5E+01
5.5	7.2E+01	2.6E+01	2.1E+01	4.2E+01	2.7E+01	2.1E+04	2.7E+01	4.6E-01	2.8E+01	4.2E-01	1.2E+01	5.1E+01	2.6E+01
5.6	6.9E+01	2.6E+01	2.2E+01	4.7E+01	2.9E+01	3.5E+04	2.6E+01	6.9E-01	3.0E+01	5.3E-01	1.1E+01	5.2E+01	2.8E+01
5.7	6.5E+01	2.7E+01	2.4E+01	5.3E+01	3.1E+01	5.5E+04	2.5E+01	1.0E+00	3.2E+01	6.7E-01	1.1E+01	5.4E+01	3.0E+01
5.8	6.2E+01	2.7E+01	2.6E+01	6.0E+01	3.3E+01	8.7E+04	2.5E+01	1.6E+00	3.4E+01	8.4E-01	9.8E+00	5.5E+01	3.2E+01
5.9	6.0E+01	2.7E+01	2.8E+01	6.9E+01	3.5E+01	1.3E+05	2.4E+01	2.3E+00	3.6E+01	1.1E+00	9.2E+00	5.6E+01	3.4E+01
6.0	5.7E+01	2.7E+01	3.0E+01	8.2E+01	3.7E+01	2.0E+05	2.3E+01	3.5E+00	3.8E+01	1.3E+00	8.6E+00	5.8E+01	3.6E+01
6.1	5.4E+01	2.7E+01	3.1E+01	9.9E+01	4.0E+01	3.0E+05	2.3E+01	5.1E+00	4.0E+01	1.7E+00	8.0E+00	5.9E+01	3.9E+01
6.2	5.2E+01	2.8E+01	3.3E+01	1.2E+02	4.2E+01	4.2E+05	2.2E+01	7.5E+00	4.2E+01	2.1E+00	7.5E+00	6.1E+01	4.2E+01
6.3	4.9E+01	2.8E+01	3.5E+01	1.6E+02	4.4E+01	5.8E+05	2.2E+01	1.1E+01	4.5E+01	2.7E+00	7.0E+00	6.2E+01	4.4E+01
6.4	4.7E+01	2.8E+01	3.6E+01	2.1E+02	4.8E+01	7.7E+05	2.1E+01	1.6E+01	4.7E+01	3.4E+00	6.5E+00	6.4E+01	4.7E+01
6.5	4.5E+01	2.8E+01	3.7E+01	2.8E+02	5.2E+01	9.9E+05	2.0E+01	2.2E+01	5.0E+01	4.2E+00	6.1E+00	6.6E+01	5.1E+01
6.6	4.3E+01	2.8E+01	3.9E+01	3.9E+02	5.7E+01	1.2E+06	2.0E+01	3.0E+01	5.4E+01	5.3E+00	5.7E+00	6.7E+01	5.4E+01
6.7	4.1E+01	2.9E+01	4.0E+01	5.5E+02	6.4E+01	1.5E+06	1.9E+01	4.0E+01	5.8E+01	6.6E+00	5.3E+00	6.9E+01	5.8E+01
6.8	3.9E+01	2.9E+01	4.1E+01	7.9E+02	7.5E+01	1.8E+06	1.9E+01	5.2E+01	6.5E+01	8.3E+00	5.0E+00	7.1E+01	6.2E+01
6.9	3.7E+01	2.9E+01	4.2E+01	1.1E+03	9.1E+01	2.1E+06	1.8E+01	6.6E+01	7.4E+01	1.0E+01	4.7E+00	7.3E+01	6.8E+01
7.0	3.5E+01	2.9E+01	4.2E+01	1.7E+03	1.1E+02	2.5E+06	1.8E+01	8.2E+01	8.8E+01	1.3E+01	4.3E+00	7.4E+01	7.5E+01
7.1	3.4E+01	2.9E+01	4.3E+01	2.5E+03	1.5E+02	2.8E+06	1.7E+01	9.9E+01	1.1E+02	1.6E+01	4.1E+00	7.6E+01	8.3E+01
7.2	3.2E+01	3.0E+01	4.4E+01	3.8E+03	2.0E+02	3.1E+06	1.7E+01	1.2E+02	1.4E+02	2.0E+01	3.8E+00	7.8E+01	9.5E+01
7.3	3.1E+01	3.0E+01	4.4E+01	5.7E+03	2.8E+02	3.4E+06	1.6E+01	1.3E+02	1.8E+02	2.5E+01	3.5E+00	8.0E+01	1.1E+02
7.4	2.9E+01	3.0E+01	4.5E+01	8.6E+03	4.0E+02	3.7E+06	1.6E+01	1.5E+02	2.5E+02	3.1E+01	3.3E+00	8.2E+01	1.3E+02
7.5	2.8E+01	3.0E+01	4.6E+01	1.3E+04	5.9E+02	3.9E+06	1.6E+01	1.6E+02	3.5E+02	3.9E+01	3.1E+00	8.5E+01	1.6E+02
7.6	2.6E+01	3.1E+01	4.6E+01	2.0E+04	8.7E+02	4.1E+06	1.5E+01	1.7E+02	4.9E+02	4.8E+01	2.9E+00	8.7E+01	1.9E+02
7.7	2.5E+01	3.1E+01	4.7E+01	3.0E+04	1.3E+03	4.2E+06	1.5E+01	1.8E+02	7.0E+02	5.9E+01	2.7E+00	8.9E+01	2.4E+02

7.8	2.4E+01	3.1E+01	4.9E+01	4.6E+04	1.9E+03	4.3E+06	1.4E+01	1.9E+02	9.9E+02	7.3E+01	2.5E+00	9.1E+01	3.1E+02
7.9	2.3E+01	3.1E+01	5.0E+01	6.9E+04	2.9E+03	4.3E+06	1.4E+01	1.9E+02	1.4E+03	8.9E+01	2.4E+00	9.4E+01	4.0E+02
8.0	2.2E+01	3.1E+01	5.2E+01	1.0E+05	4.3E+03	4.3E+06	1.4E+01	2.0E+02	1.9E+03	1.1E+02	2.2E+00	9.6E+01	5.3E+02
^a non pH-dependent inorganic K _a values for [antimony,] cyanide, and vanadium are [45,] 9.9, and <u>50</u> [1,000] respectively.													

(2) (No change.)

§350.74. Development of Risk-Based Exposure Limits.

(a) General requirement. The person shall use the criteria provided in subsections (b) - (j) of this section and the RBEL equations provided in the following figures, as applicable, to establish RBELs appropriate for the type of COC, the complete and reasonably anticipated to be completed exposure pathways, receptors, and land uses. The person shall establish RBELs for carcinogenic COCs and noncarcinogenic COCs using the default exposure factors provided in the following figure for residents and commercial/industrial workers, unless the executive director approves the use of alternate exposure factors in accordance with subsection (j) of this section.

Figure: 30 TAC §350.74(a)

[Figure: 30 TAC §350.74(a)]

Risk-Based Exposure Limit Equations and Default Exposure Factors for Residents

RBEL-1:
 Inhalation of carcinogenic COCs - RBEL (mg/m³)

$$^{Air}RBEL_{Inh-c} = \frac{RL \times ATc \times 365 \text{ days/yr}}{URF \times 1000 \mu\text{g/mg} \times EF.res \times ED.A.res}$$

Inhalation of noncarcinogenic COCs - RBEL (mg/m³)

$$^{Air}RBEL_{Inh-nc} = \frac{RfC \times HQ \times AT.A.res \times 365 \text{ days/yr}}{EF.res \times ED.A.res}$$

RBEL-5:
 Class 3 Groundwater RBEL

$$^{GW}RBEL_{Class\ 3} = 100 \times RBEL-4$$

RBEL-2:
 Dermal contact with carcinogenic COCs in soil - RBEL (mg/kg)

$$^{Soil}RBEL_{Derm-c} = \frac{RL \times ATc \times 365 \text{ days/yr}}{SF_d \times MF \times 10^{-6} \text{ kg/mg} \times EF.res \times DF.adj \times ABS.d}$$

where: $SF_d = \frac{SF_o}{ABS_{GI}}$ when $ABS_{GI} < 50\%$, otherwise $SF_d = SF_o$; and

$$DF.adj = \frac{(SA_{0<6})(AF_{0<6})(ED_{0<6})}{(BW_{0<6})} + \frac{(SA_{6<18})(AF_{6<18})(ED_{6<18})}{(BW_{6<18})} + \frac{(SA_{18<30})(AF_{18<30})(ED_{18<30})}{(BW_{18<30})}$$

Dermal contact with noncarcinogenic COCs in soil - RBEL (mg/kg)

$$^{Soil}RBEL_{Derm-nc} = \frac{HQ \times RfD_d \times BW.C \times AT.C.res \times 365 \text{ days/yr}}{10^{-6} \text{ kg/mg} \times ED.C.res \times EF.res \times SA.C.res \times AF.C.res \times ABS.d}$$

where $RfD_d = (RfD_o) (ABS_{GI})$ when $ABS_{GI} < 50\%$, otherwise $RfD_d = RfD_o$

RBEL-7:
 Ingestion of carcinogenic COCs in above-ground vegetables - RBEL (mg/kg)

$$^{AbgVeg}RBEL_{Ing-c} = \frac{RL \times ATc \times 365 \text{ day/yr}}{EF.res \times SF_o \times MF \times IRabg.AgeAdj.res}$$

Ingestion of noncarcinogenic COCs in above-ground vegetables - RBEL (mg/kg)

$$^{AbgVeg}RBEL_{Ing-nc} = \frac{HQ \times RfD_o \times BW.C \times AT.C.res \times 365 \text{ day/yr}}{EF.res \times ED.C.res \times IRabg.C.res}$$

Ingestion of carcinogenic COCs in below-ground vegetables - RBEL (mg/kg)

$$^{BgVeg}RBEL_{Ing-c} = \frac{RL \times ATc \times 365 \text{ day/yr}}{EF.res \times SF_o \times MF \times IRbg.AgeAdj.res}$$

Ingestion of noncarcinogenic COCs in below-ground vegetables - RBEL (mg/kg)

$$^{BgVeg}RBEL_{Ing-nc} = \frac{HQ \times RfD_o \times BW.C \times AT.C.res \times 365 \text{ day/yr}}{EF.res \times ED.C.res \times IRbg.C.res}$$

RBEL-3:
 Ingestion of carcinogenic COCs in soil - RBEL (mg/kg)

$$^{Soil}RBEL_{Ing-c} = \frac{RL \times ATc \times 365 \text{ days/yr}}{SF_o \times MF \times 10^{-6} \text{ kg/mg} \times EF.res \times IRsoil.AgeAdj.res \times RBAF}$$

Ingestion of noncarcinogenic COCs in soil - RBEL (mg/kg)

$$^{Soil}RBEL_{Ing-nc} = \frac{HQ \times BW.C \times RfD_o \times AT.C.res \times 365 \text{ days/yr}}{10^{-6} \text{ kg/mg} \times EF.res \times ED.C.res \times IRsoil.C.res \times RBAF}$$

Risk-Based Exposure Limit Equations and Default Exposure Factors for Residents

RBEL-4:

Ingestion of carcinogenic COCs in water - RBEL (mg/L)
 $^{GW}RBEL_{ing-c}$ = primary MCL when available, or a secondary MCL under the conditions described in §350.74(f)(3), otherwise

$$\frac{RL \times AT_c \times 365 \text{ days/yr}}{SF_o \times MF \times IRw.AgeAdj.res \times EF.res}$$

Ingestion of noncarcinogenic COCs in water - RBEL (mg/L)
 $^{GW}RBEL_{ing-nc}$ = primary MCL when available, or a secondary MCL under the conditions described in §350.74(f)(3), otherwise

$$\frac{RfD_o \times HQ \times BW.C \times AT.C.res \times 365 \text{ days/yr}}{IRw.C.res \times EF.res \times ED.C.res}$$

RBEL-6: Surface Water RBEL

$^{SW}RBEL$ = the lowest value of each COC established under §350.74(h)(1) - (4), unless the person has sufficient property-specific surface water quality information specific to the particular surface water body at the affected property to support an adjustment to the RBEL in accordance with §350.74(h)(5). $^{SW}RBEL$ determined pursuant to §350.74(h)(1)-(5) may require modification in response to §350.74(h)(6)-(7).

Risk-Based Exposure Limit Equations and Default Exposure Factors for Residents				
<u>Term</u>	<u>Exposure Factor</u>	<u>Default Exposure Factor</u>	<u>Change to Default Exposure Factor Allowed?</u>	<u>Citation for Change</u>
ABS.d**	Dermal Absorption Fraction (unitless)	(Figure: 30 TAC §350.74(c))	Tier 2/3	§350.74(j)(1)(B)
ABS _{GI}	Gastrointestinal Absorption Fraction (unitless)	(Figure: 30 TAC §350.74(c))	Tier 2/3	§350.74(j)(1)(A)
AF.C.res	Soil-to-Skin Adherence Factor (mg/cm ² -event) - Child	0.2	No	NA
AF _(0<6)	Age-Specific Adherence Factor (mg/cm ² -event)	0.2	No	NA
AF _(6<18)	Age-Specific Adherence Factor (mg/cm ² -event)	0.1	No	NA
AF _(18<30)	Age-Specific Adherence Factor (mg/cm ² -event)	0.1	No	NA
AT.A.res	Averaging Time - noncarcinogens (yr)-Adult	30	No	NA
ATc	Averaging Time - carcinogens (yr)	70	No	NA
AT.C.res	Averaging Time - noncarcinogens (yr) -Child	6	No	NA
BW.C	Body Weight (kg) - Child	15	No	NA
BW _(0<6)	Age-Specific Body Weight (kg)	15	No	NA
BW _(6<18)	Age-Specific Body Weight (kg)	45	No	NA
BW _(18<30)	Age-Specific Body Weight (kg)	70	No	NA
DF.adj	Dermal Adjustment Factor (mg-yr/kg-event)	352	No	NA
ED.A.res	Exposure Duration (yr) - Adult	30	No	NA
ED.C.res	Exposure Duration (yr) - Child	6	No	NA
ED _(0<6)	Age-Specific Exposure Duration (yr)	6	No	NA
ED _(6<18)	Age-Specific Exposure Duration (yr)	12	No	NA
ED _(18<30)	Age-Specific Exposure Duration (yr)	12	No	NA
EF.res	Exposure Frequency (days/yr) (event/yr for dermal soil)	350	No	NA
HQ	Hazard Quotient (unitless)	1	No	NA
IRsoil.AgeAdj.res	Age-Adjusted Soil Ingestion Rate (mg-yr/kg-day)	120	No	NA
IRsoil.C.res	Soil Ingestion Rate (mg/day) - Child	191	No	NA
IRw.AgeAdj.res	Age-Adjusted Water Ingestion Rate (L-yr/kg-day)	0.80	No	NA
IRw.C.res	Water Ingestion Rate (L/Day) - Child	0.64	No	NA
MF	Modifying Factor for SFO (unitless)	1	No	NA
	for Arsenic	0.1	No	

RBAF	Relative Bioavailability Factor (unitless)	1	Tier 2/3	<u>§350.74(j)(1)(C)</u> [§350.74(j)(1)(D)]
	for Arsenic	0.78	Tier 2/3	<u>§350.74(j)(1)(C)</u> [§350.74(j)(1)(D)]

Figure: 30 TAC §350.74(a)

Risk-Based Exposure Limit Equations and Default Exposure Factors for Residents				
<u>Term</u>	<u>Exposure Factor</u>	<u>Default Exposure Factor</u>	<u>Change to Default Exposure Factor Allowed?</u>	<u>Citation for Change</u>
RL	Risk Level (unitless)	10 ⁻⁵	No	NA
SA.C.res	Skin Surface Area (cm ²)- Child	2200	No	NA
SA _(0<6)	Age-specific Skin Surface Area (cm ²)	2200	No	NA
SA _(6<18)	Age-specific Skin Surface Area (cm ²)	3500	No	NA
SA _(18<30)	Age-specific Skin Surface Area (cm ²)	4800	No	NA
SF _d	Dermal Slope Factor (mg/kg-day) ⁻¹	Chemical Specific	NA	§350.73(a)
SF _o	Oral Slope Factor (mg/kg-day) ⁻¹	Chemical Specific	NA	§350.73(a)
URF	Inhalation Unit Risk Factor (μg/m ³) ⁻¹	Chemical Specific	NA	§350.53(a)-(b)
Vegetable Ingestion Rate - Age-Adjusted (kg-yr/kg-day)				
	IRabg.AgeAdj.res Aboveground Vegetables	0.0028	No	NA
	IRbg.AgeAdj.res Below-Ground Vegetables	0.0012	No	NA
Vegetable Ingestion Rate - Child (kg/day)				
	IRabg.C.res Aboveground Vegetables	0.0024	No	NA
	IRbg.C.res Below-Ground Vegetables	0.0010	No	NA
Footnote:				
** It is not necessary to calculate a soil dermal contact RBEL for COCs with a vapor pressure in mm HG ≥ 1.				
NA means not applicable.				

Figure: 30 TAC §350.74(a)

Risk Based Exposure Limit Equations and Default Exposure Factors for Commercial/Industrial Worker	
<p>RBEL-1: Inhalation of carcinogenic COCs - RBEL (mg/m³)</p> ${}^{\text{Air}}\text{RBEL}_{\text{Inh-c}} = \frac{\text{RL} \times \text{ATc} \times 365 \text{ days/yr}}{\text{URF} \times 1000 \mu\text{g/mg} \times \text{EF.w} \times \text{ED.w}}$ <p>Inhalation of noncarcinogenic COCs - RBEL (mg/m³)</p> ${}^{\text{Air}}\text{RBEL}_{\text{Inh-nc}} = \frac{\text{RfC} \times \text{HQ} \times \text{AT.w} \times 365 \text{ days/yr}}{\text{EF.w} \times \text{ED.w}}$	<p>RBEL-4: Ingestion of carcinogenic COCs in water - RBEL (mg/L)</p> <p>${}^{\text{GW}}\text{RBEL}_{\text{Ing-c}}$ = primary MCL when available, or a secondary MCL under the conditions described in §350.74(f)(3), otherwise</p> $\frac{\text{RL} \times \text{BW.A} \times \text{ATc} \times 365 \text{ days/yr}}{\text{SF}_o \times \text{MF} \times \text{IRw.w} \times \text{EF.w} \times \text{ED.w}}$ <p>Ingestion of noncarcinogenic COCs in water - RBEL (mg/L)</p> <p>${}^{\text{GW}}\text{RBEL}_{\text{Ing-nc}}$ = primary MCL when available, or a secondary MCL under the conditions described in §350.74(f)(3), otherwise</p> $\frac{\text{RfD}_o \times \text{HQ} \times \text{BW.A} \times \text{AT.w} \times 365 \text{ days/yr}}{\text{IRw.w} \times \text{EF.w} \times \text{ED.w}}$

Figure: 30 TAC §350.74(a)

Risk-Based Exposure Limit Equations and Default Exposure Factors for Commercial/Industrial Worker	
<p>RBEL-3: Ingestion of carcinogenic COCs in soil - RBEL (mg/kg) $\text{Soil RBEL}_{\text{Ing-c}} = \frac{\text{RL} \times \text{BW.A} \times \text{AT}_c \times 365 \text{ days/yr}}{\text{SF}_o \times \text{MF} \times 10^{-6} \text{ kg/mg} \times \text{EF.w} \times \text{ED.w} \times \text{IRsoil.w} \times \text{RBAF}}$</p> <p>Ingestion of noncarcinogenic COCs in soil - RBEL (mg/kg) $\text{Soil RBEL}_{\text{Ing-nc}} = \frac{\text{HQ} \times \text{BW.A} \times \text{RfD}_o \times \text{AT.w} \times 365 \text{ days/yr}}{10^{-6} \text{ kg/mg} \times \text{EF.w} \times \text{ED.w} \times \text{IRsoil.w} \times \text{RBAF}}$</p>	<p>RBEL-6: Surface Water RBEL</p> <p>^{SW}RBEL = the lowest value of each COC established under §350.74(h)(1) - (4), unless the person has sufficient property-specific surface water quality information specific to the particular surface water body at the affected property to support an adjustment to the RBEL in accordance with §350.74(h)(5). ^{SW}RBEL determined pursuant to §350.74(h)(1)-(5) may require modification in response to §350.74(h)(6)-(7).</p>

<u>Term</u>	<u>Exposure Factor</u>	<u>Default Exposure Factor</u>	<u>Change to Default Exposure Factor Allowed?</u>	<u>Citation for Change</u>
ABS.d**	Dermal Absorption Fraction (unitless)	(Figure: 30 TAC §350.74(c))	Tier 2/3	§350.74(j)(1)(B)
ABS _{GI}	Gastrointestinal Absorption Fraction (unitless)	(Figure: 30 TAC §350.74(c))	Tier 2/3	§350.74(j)(1)(A)
AF.w	Soil-to-Skin Adherence Factor (mg/cm ² -event)	0.2	No	NA
ATc	Averaging Time - carcinogens (yr)	70	No	NA
AT.w	Averaging Time - noncarcinogens (yr)	25	Tier 2/3	§350.74(j)(2)
BW.A	Body Weight, adult (kg)	70	No	NA
ED.w	Exposure Duration (yr)	25	Tier 2/3	§350.74(j)(2)
EF.w	Exposure Frequency (days/yr) (event/yr for dermal soil)	250	Tier 2/3	§350.74(j)(2)
HQ	Hazard Quotient (unitless)	1	No	NA
IR _{soil.w}	Soil Ingestion Rate (mg/day)	100	No	NA
IR _{w.w}	Water Ingestion Rate (L/day)	1.4	No	NA
MF	Modifying Factor for SF _o (unitless)	1	No	NA
	for Arsenic	0.1	No	NA
RBAF	Relative Bioavailability Factor (unitless)	1	Tier 2/3	§350.74(j)(1)(D)
	for Arsenic	0.78	Tier 2/3	§350.74(j)(1)(D)
RfC*	Reference Concentration (mg/m ³)	Chemical-Specific	NA	§350.73(a)-(b)
RfD _o	Oral Reference Dose (mg/kg-day)	Chemical-Specific	NA	§350.73(a)
RfD _d	Dermal Reference Dose (mg/kg-day)	Chemical-Specific	NA	§350.73(a)
RL	Risk Level (unitless)	10 ⁻⁵	No	NA
SA.w	Skin Surface Area (cm ²)	2500	No	NA
SF _d	Dermal Slope Factor (mg/kg-day) ⁻¹	Chemical-Specific	NA	§350.73(a)
SF _o	Oral Slope Factor (mg/kg-day) ⁻¹	Chemical-Specific	NA	§350.73(a)
URF	Inhalation Unit Risk Factor (µg/m ³) ⁻¹	Chemical-Specific	NA	§350.73(a)-(b)

Footnote:
 ** It is not necessary to calculate a soil dermal contact RBEL for COCs with a vapor pressure in mm HG \geq 1.
 NA means not applicable.

(b) - (d) (No change.)

(e) Vegetable ingestion RBELs. The vegetable RBELs ($^{AbgVeg}RBEL_{Ing}$ and $^{BgVeg}RBEL_{Ing}$) are the protective concentration of a COC in aboveground vegetables and below-ground vegetables, respectively, for ingestion by residents. The person shall establish RBELs for ingestion of aboveground vegetables for all carcinogenic and noncarcinogenic COCs which are metals. In addition, the person shall establish RBELs for ingestion of below-ground vegetables for all carcinogenic and noncarcinogenic COCs with a dimensionless Henry's Law Constant less than 0.03, as shown in the figure in §350.73(e) of this title (relating to Determination and Use of Human Toxicity Factors and Chemical Properties), when either of the following criteria are met:

(1) - (2) (No change.)

(f) - (g) (No change.)

(h) Surface water RBEL. The surface water RBEL ($^{SW}RBEL$) is the protective concentration of a COC at the POE in surface water. To establish $^{SW}RBEL$ for a COC, the person shall determine the lowest value from paragraphs (1) - (5) [(4)] of this subsection for each COC, unless the person has sufficient surface water quality information specific to the particular surface water body to support an adjustment to the RBEL in accordance with paragraph (6) [(5)] of this subsection. The $^{SW}RBEL$ value determined pursuant to paragraphs (1) - (6) [(5)] of this subsection may require modification in response to the requirements of paragraphs (7) and (8) [(6) and (7)] of this subsection. The $^{SW}RBEL$ value for a

given COC shall be protective of relevant downgradient water bodies in consideration of the water body use (e.g., designated drinking water supply or sustainable fishery), the water body type (e.g., estuary or perennial freshwater stream), the standards applicable to the type of water body/use, and the fate and transport characteristics of the COC in question at the particular affected property.

(1) (No change.)

(2) The person shall apply the human health criteria to protect drinking water and fisheries as provided in Table 3 of §307.6 of this title [(relating to Toxic Materials)], as amended. When applicable, the person shall convert total metal concentrations in surface water or groundwater to dissolved concentrations as described in the agency's *Implementation Procedures*, as amended. The person shall determine the applicability of human health criteria according to the water body uses (e.g., public water supply, sustainable fishery, incidental fishery, and contact recreation) in accordance with the procedures contained in §307.3 and §307.6 of this title [(relating to Definitions and Abbreviations, and Toxic Materials, respectively)], as amended, and the *Implementation Procedures*, as amended. When a water body is not being evaluated as a drinking water source, the person must determine the necessity to evaluate exposure pathways associated with contact recreation such as incidental ingestion of surface water and dermal contact with surface water. The person shall use the total suspended solids concentration for the nearest classified segment, as listed in the agency's *Implementation Procedures*, as amended.

(3) The person shall apply the effluent limitations [limits] specified in Texas Pollutant Discharge Elimination System (TPDES) General Permit Number TXG830000, as amended, [for discharges to surface waters of petroleum fuel contaminated waters as specified in Chapter 321, Subchapter H of this title (relating to Discharge to Surface Waters from Treatment of Petroleum Fuel Substance Contaminated Waters), as amended] for any release of groundwater or storm water that has been impacted by petroleum fuel (as defined in the general permit).

(4) The person shall apply United States [U.S.] EPA guidelines or alternate provisions in accordance with §307.6 (c)(7) of this title [(relating to Toxic Materials)], as amended, when criteria for aquatic life protection are not provided for a COC in §307.6 of this title, Table 1, as amended. In addition, the person shall apply federal guidance criteria (i.e., lower of a federal numerical criterion, MCL, or equivalent state drinking water guideline) or alternate provisions [for surface waters] in accordance with §307.6(d)(8) of this title [(relating to Toxic Materials)], as amended, when human health criteria for a COC are not provided in Table 3 of §307.6 of this title, as amended.

(5) The person shall apply the numerical criteria for chlorides, sulfates, total dissolved solids, and pH for classified segments as specified in §307.10, Appendix A of this title (relating to Appendices A - E), as amended.

(6) [(5)] The person may apply additional provisions where data on surface water quality for a specific surface water body at the affected property is available or can be reasonably obtained.

(A) The person may determine property-specific hardness, based on sampling data, for calculating metals criteria in accordance with the procedures contained in the agency's

Implementation Procedures, as amended.

(B) The person may determine property-specific total suspended solids, based on sampling data, for estimating “dissolved” metals in accordance with the *Implementation Procedures*, as amended.

(C) The person may determine the actual pH of the particular surface water body at the affected property.

(7) [(6)] The additional numeric and narrative criteria listed in subparagraphs (A) and (B) [- (C)] of this paragraph may require development of a surface water RBEL (e.g., where a nutrient is a COC) or modification to the surface water RBEL (e.g., lower a RBEL value to minimize foaming on the water's surface) determined pursuant to paragraphs (1) - (5) of this subsection.

(A) General criteria related to aesthetic parameters, nutrient parameters, and salinity in accordance with §307.4(b), (e), and (g) of this title (relating to General Criteria), as amended.

(B) Numerical criteria for chlorides, sulfates, total dissolved solids, and pH for classified segments as specified in §307.10, Appendix A of this title (relating to Appendices A - E), as amended.]

(B) [(C)] General provisions related to the preclusion of adverse toxic effects on aquatic and terrestrial life, livestock, or domestic animals in accordance with §307.6(b) of this title, as amended.

(8) [(7)] If the executive director determines that the release has the potential to lower the surface water dissolved oxygen, then the executive director may require the person to apply the dissolved oxygen criteria for classified segments specified in §307.10, Appendix A of this title (relating to Appendices A - E), as amended, or the dissolved oxygen criteria for unclassified waters specified in §307.10, Appendix D of this title, as amended, §307.4(h) of this title (relating to General Criteria), as amended, and §307.7(b)(3)(A) of this title (relating to Site Specific Uses and Criteria), as amended.

(i) Aesthetics. For COCs for which a RBEL cannot be calculated by the procedures of this section, or the RBEL concentration for the COC otherwise adversely impacts environmental quality or public welfare and safety, presents objectionable characteristics (e.g., taste, odor), or makes a natural resource unfit for use, the person shall comply with paragraphs (1) - (3) of this subsection as appropriate. For response actions which are triggered for an area solely for purposes of this subsection (i.e., there is no other human health or ecological hazard remaining), the executive director will evaluate the seriousness, probable longevity of the matter, and suitability of the proposed remedy with the landowner in order to site-specifically determine whether or not institutional controls and financial

assurance are warranted. The person shall provide all information reasonably necessary to support such a determination to the executive director. The default presumption is that financial assurance and institutional controls are required for exposure prevention remedies. If the executive director determines that institutional controls and financial assurance are not warranted, then persons shall not be required to comply with the provisions of §350.31(g), §350.33(e)(2)(C) and §350.111(b)(3) or (6) of this title (relating to General Requirements for Remedy Standards, Remedy Standard B, and Use of Institutional Controls), specifically relating to the physical control matters for the portion of affected property with the aesthetics issue.

(1) - (3) (No change.)

(j) Requirements for variance to default RBEL exposure factors.

(1) (No change.)

(2) Under Tiers 2 or 3 as provided in §350.75 of this title (relating to Tiered Human Health Protective Concentration Level Evaluation), a person may request that the executive director allow a variance to the following default commercial/industrial exposure factors for the affected property as shown in the figure in subsection (a) of this section: averaging time for noncarcinogens (AT.w), exposure duration (ED.w), and exposure frequency (EF.w). This shall only be allowed for facilities that have or will have, as a condition of the approval of this variance, restricted property access. The executive director shall not delegate this decision to agency staff.

(A) (No change.)

(B) The person requesting such variance shall provide public notification as described in subparagraphs (D) and (E) of this paragraph for any request to vary the default exposure factors at the same time that variance-based PCLs are submitted to the executive director for approval. If the natural physical condition of the on-site commercial/industrial area for which the variance is sought essentially prohibits full commercial/industrial use (e.g., marshes and cliffs), and the variance would not necessitate a lesser commercial/industrial use of that area, then the executive director will determine the need for public notice on a site-specific basis for the prohibited use area. The person may request the executive director or his staff to review the variance-based PCLs or the variance request for completeness (e.g., administratively complete, mathematical accuracy, compliance with other PCL development procedures) in advance of initiating the public notification process. The required public notice shall be completed prior to consideration of the variance request for approval by the executive director. The public notice provisions may be performed in conjunction with or as part of another public participation/notification process required for permitting or other applicable state or federal statute or regulation provided the requirements of subparagraph (E) of this paragraph are also met. Additionally, an alternative mechanism that may exist under the other public participation/notification process which effectively provides broad public notice of the variance request, such as notification to an existing citizens' advisory board for the affected property/facility, may substitute for the requirements of subparagraph (D) of this paragraph, provided the completion of the notification is sufficiently documented.

(C) - (K) (No change.)

(L) A person who receives a variance from the default exposure factors shall comply with the institutional control requirements in §350.111(b), (b)(12)₂ or (13) of this title (relating to Use of Institutional Controls), as applicable, and provide proof of compliance with the institutional control requirements within 90 days of the approval by the executive director of the RACR.

(3) (No change.)

§350.75. Tiered Human Health Protective Concentration Level Evaluation.

(a) (No change.)

(b) Tier 1 PCLs.

(1) Tier 1 is a risk-based analysis to derive non-site-specific PCLs for complete or reasonably anticipated to be completed exposure pathways. Tier 1 is based on default exposure factors and affected property parameters in the applicable PCL equations provided in the following figure and assumes exposure occurs at, above or below the source area (i.e., no lateral transport).

Figure: 30 TAC §350.75(b)(1)

[Figure: 30 TAC §350.75(b)(1)]

Tier 1 PCL Equations

Groundwater Ingestion PCL Equation: $^{GW}GW_{Ing}$
Exposure Pathway Description: Ingestion of groundwater Source Medium: Groundwater Exposure Medium: Groundwater $^{GW}GW_{Ing} = ^{GW}RBEL_{Ing}$ (See Eq. RBEL-4, Figure: 30 TAC §350.74(a))
Class 3 Groundwater PCL Equation: $^{GW}GW_{Class\ 3}$
Exposure Pathway Description: Class 3 groundwater Source Medium: Class 3 groundwater Exposure Medium: Class 3 groundwater $^{GW}GW_{Class\ 3} = ^{GW}RBEL_{Class\ 3}$ (See Eq. RBEL-5, Figure: 30 TAC §350.74(a))
Groundwater Volatilization PCL Equation: $^{Air}GW_{Inh-v}$
Exposure Pathway Description: Inhalation of volatiles from class 1, 2, or 3 groundwater Source Medium: Class 1, 2, or 3 groundwater Exposure Medium: Outdoor air $^{Air}GW_{Inh-v} = \frac{^{Air}RBEL_{Inh-v}}{VF_{Wamb}}$ (See Eq. RBEL-1, Figure: 30 TAC §350.74(a))

$$VF_{wamb} \left[\frac{mg / m^3 - air}{mg / L - H_2O} \right] = \frac{H'}{1 + \left[\frac{U_{air} \delta_{air} L_{gw}}{W_g D_{ws}^{eff}} \right]} \cdot \left[10^3 \frac{L}{m^3} \right]$$

$$D_{ws}^{eff} \left[\frac{cm^2}{s} \right] = (h_{cap} + h_v) \left[\frac{h_{cap}}{D_{cap}^{eff}} + \frac{h_v}{D_s^{eff}} \right]^{-1}$$

$$D_{cap}^{eff} \left[\frac{cm^2}{s} \right] = D^{air} \frac{\theta_{acap}^{3.33}}{\theta_T^2} + \left[\frac{D^{wat}}{H'} \right] \left[\frac{\theta_{wcap}^{3.33}}{\theta_T^2} \right]$$

$$D_s^{eff} \left[\frac{cm^2}{s} \right] = D^{air} \frac{\theta_{as}^{3.33}}{\theta_T^2} + \left[\frac{D^{wat}}{H'} \right] \left[\frac{\theta_{ws}^{3.33}}{\theta_T^2} \right]$$

Groundwater-to-Surface Water PCL Equation: ^{SW}GW

Exposure Pathway Description: Discharge of class 1, 2, or 3 groundwater to surface water
 Source Medium: Class 1, 2, or 3 groundwater
 Exposure Medium: Surface water

$$\frac{{}^{SW}GW}{DF} = \frac{{}^{SW}SW}{DF} \qquad \left[{}^{SW}GW = \frac{(swRBEL)}{DF} \right]$$

(See Eq. RBEL-6, Figures: 30 TAC §350.74(a); and 30 TAC §350.75(i)(4))

<i>Term</i>	<i>COC Chemical/Physical and Affected Property Parameters Definition</i>	<i>Tier 1 Defaults</i>	<i>Change to Tier 1 Default Allowed?</i>	<i>Rule Citation Regarding Change</i>
ρ_b	Soil bulk density (g/cm ³)	1.67	Tier 2, 3	§350.75(c) and (d)
θ_{ws}	Volumetric water content of vadose zone soils (cm ³ -water/cm ³ -soil)	0.16	Tier 2, 3	§350.75(c) and (d)
θ_{as}	Volumetric air content of vadose zone soils (cm ³ -air/cm ³ -soil) = $\theta_T - \theta_{ws}$	0.21	Tier 2, 3	§350.75(c) and (d)

<i>Term</i>	<i>COC Chemical/Physical and Affected Property Parameters Definition</i>	<i>Tier 1 Defaults</i>	<i>Change to Tier 1 Default Allowed?</i>	<i>Rule Citation Regarding Change</i>
θ_T	Total soil porosity = $1 - (\rho_b/\rho_s)$ (cm ³ -pore space/cm ³ -soil)	0.37	Tier 2, 3	§350.75(c) and (d)
ρ_s	Particle density (g/cm ³)	2.65	Tier 2, 3	§350.75(c) and (d)
H'	Dimensionless Henry's Law Constant	(Figure: 30 TAC §350.73(e))	No	NA
H	Henry's Law Constant (atm-m ³ /mole) (H=H'RT)	(Figure: 30 TAC §350.73(e))	No	NA
R	Universal Gas Constant (atm m ³ mol ⁻¹ °K ⁻¹) [(atm-m ³ /g-mol)]	8.206 x 10 ⁻⁵	No	NA
T	Temperature (°K) = 273 + °C	293	No	NA
U _{air}	Windspeed above ground surface in ambient mixing zone (cm/s)	240	Tier 2, 3	§350.75(c) and (d)

<i>Term</i>	<i>COC Chemical/Physical and Affected Property Parameters Definition</i>	<i>Tier 1 Defaults</i>	<i>Change to Tier 1 Default Allowed?</i>	<i>Rule Citation Regarding Change</i>
δ_{air}	Ambient air mixing zone height (cm)	200	No	NA
L _{gw}	Depth to groundwater = h _{cap} + h _v (cm)	305	Tier 2, 3	§350.75(c) and (d)
D _{ws} ^{eff}	Effective diffusivity above water table (cm ² /s)	COC and affected property specific	Tier 2, 3	§350.73(e) and §350.75(c) and (d)
D _{cap} ^{eff}	Effective diffusivity in the capillary fringe (cm ² /s)	COC and affected property specific	Tier 2, 3	§350.73(e) and §350.75(c) and (d)
D _s ^{eff}	Effective diffusivity in vadose zone soils (cm ² /s)	COC and affected property specific	Tier 2,3	§350.73(e) and §350.75(c) and (d)
h _{cap}	Thickness of capillary fringe (cm)	5	Tier 2, 3	§350.75(c) and (d)
h _v	Thickness of vadose zone (cm)	300	Tier 2, 3	§350.75(c) and (d)

W_{eg}	Width of groundwater source in the direction to the closest off-site property line from the groundwater source (cm) • 0.5 acre source • 30 acre source	4,500 34,800	Tier 2, 3 Tier 2, 3	§350.75(c) and (d)
θ_{acap}	Volumetric air content of capillary fringe soils (cm ³ -air/cm ³ -soil)	0.037	Tier 2, 3	§350.75(c) and (d)
θ_{wcap}	Volumetric water content of capillary fringe soils (cm ³ -water/cm ³ -soil)	0.333	Tier 2, 3	§350.75(c) and (d)
D^{air}	Diffusion coefficient in air (cm ² /s)	(Figure: 30 TAC §350.73(e))	No	NA
D^{wat}	Diffusion coefficient in water (cm ² /s)	(Figure: 30 TAC §350.73(e))	No	NA
DF	Surface Water Dilution Factor	NA	Tier 2, 3	§350.75(i)(4)

Soil PCL Equation: $^{Tot}Soil_{Comb}$

Exposure Pathway Description: Combined equation for ingestion of surface soil + dermal contact with surface soil + inhalation of surface soil volatiles and particulates + consumption of garden vegetables grown in contaminated surface soil

Source Medium: Surface soils

Exposure Medium: Surface soil and air (and vegetables for residential land use only).

Residential

$$^{Tot}Soil_{Comb} = \frac{1}{\left[\frac{1}{Air\ Soil_{Inh-VP}} \right] + \left[\frac{1}{Soil\ Soil_{Derm}} \right] + \left[\frac{1}{Soil\ Soil_{Ing}} \right] + \left[\left(\frac{1}{Veg\ Soil_{Ing-Inorg}} \right) \text{ or } \left(\frac{1}{Veg\ Soil_{Ing-Org}} \right) \right]}$$

Commercial/Industrial Worker

$$^{Tot}Soil_{Comb} = \frac{1}{\left(\frac{1}{Air\ Soil_{Inh-VP}} \right) + \left(\frac{1}{Soil\ Soil_{Derm}} \right) + \left(\frac{1}{Soil\ Soil_{Ing}} \right)}$$

Soil PCL Equation: $^{Air}Soil_{Inh-VP}$

Exposure Pathway Description: Inhalation of surface soil volatiles and particulates

Source Medium: Surface soils

Exposure Medium: Air

$$^{Air}Soil_{Inh-VP} = \frac{^{Air}RBEL_{Inh}}{VF_{ss} + PEF} \quad (See Eq. RBEL-1, Figure: 30 TAC §350.74(a))$$

Soil PCL Equation: $^{Soil}Soil_{Derm}$

Exposure Pathway Description: Dermal contact with surface soil
 Source Medium: Surface soil
 Exposure Medium: Surface soil

$$^{Soil}Soil_{Derm} = ^{Soil}RBEL_{Derm} \quad (See Eq. RBEL-2, Figure: 30 TAC §350.74(a))$$

Exposure Pathway Description: Ingestion of surface soil
 Source Medium: Surface soil
 Exposure Medium: Surface soil

$$^{Soil}Soil_{Ing} = ^{Soil}RBEL_{Ing} \quad (See Eq. RBEL - 3, Figure: 30 TAC §350.74(a))$$

**Soil PCL Equation: $^{Veg}Soil_{Ing-Inorg}$ & $^{Veg}Soil_{Ing-Org}$
 (for residential land use only).**

Exposure Pathway Description: Consumption of garden vegetables grown in contaminated surface soil
 Source Medium: Surface soil
 Exposure Medium: Vegetables

$$^{Veg}Soil_{Ing-Inorg} = \frac{1}{\frac{Br_{abg}}{AbgVeg RBEL_{Ing}} + \frac{Br_{bg}}{bgVeg RBEL_{Ing}}} \quad (See Eq. RBEL - 7, Figure: 30 TAC §350.74(a))$$

$$^{Veg}Soil_{Ing-Org} = \frac{(^{BgVeg}RBEL_{Ing})(K_{S_{Veg}})}{(RCF)(VG_{bg})} \quad (See Eq. RBEL - 7, Figure: 30 TAC §350.74(a))$$

Soil PCL Equation: $^{Air}Soil_{Inh-V}$

Exposure Pathway Description: Inhalation of subsurface soil volatiles
 Source Medium: Subsurface soils
 Exposure Medium: Air

$$^{Air}Soil_{Inh-V} = \frac{^{Air}RBEL_{Inh}}{VF_{ss}} \quad (See Eq. RBEL - 1, Figure: 30 TAC §350.74(a))$$

Volatilization Factor: VF_{ss}

Where VF_{ss} is the smaller of the two following VF_{ss} values

$$VF_{ss} \left[\frac{mg / m^3 - air}{mg / kg - Soil} \right] = \frac{2\rho_b D_A}{(Q/C) [3.14 D_A \tau]^{\frac{1}{2}}} \cdot \left(\frac{10^4 cm^2}{m^2} \right)$$

$$D_A = \left[\frac{\theta_{as}^{3.33} D^{air} H' + \theta_{ws}^{3.33} D^{wat}}{[\theta_{ws} + K_d P_b + \theta_{as} H'] \theta_T^2} \right]$$

or

$$VF_{ss} \left[\frac{mg / m^3 - air}{mg / kg - soil} \right] = \frac{P_b d_s}{(Q/C) \tau} \cdot \left(\frac{10^4 cm^2}{m^2} \right)$$

Particulate Emission Factor: PEF

$$PEF \left[\frac{mg / m^3 - air}{mg / kg - soil} \right] = \frac{(0.036)(1-V) \left(\frac{U_m}{U_1} \right)^3 F(x)}{(Q/C)(3600s/hr)}$$

Soil-to-Groundwater PCL Equation: ^{GW}Soil
Exposure Pathway Description: Soil leachate to groundwater Source Medium: Surface and subsurface soils Exposure Medium: Groundwater
${}^{GW}Soil = \frac{(GroundwaterPCL^*) \cdot LDF}{K_{sw}}$
$K_{sw} \left[\frac{(mg / L - H_2O)}{(mg / kg - soil)} \right] = \frac{\rho_b}{\theta_{ws} + K_d \rho_b + H' \theta_{as}}$
*Critical groundwater PCL as determined in accordance with §350.78 of this title (relating to Determination of Critical PCLs) or attenuation action level as determined in accordance with §350.33(f)(4)(D) of this title (relating to Remedy Standard B).
Theoretical Residual Soil Saturation Limit PCL (Soil_{Res})
$Soil_{Res} (mg / kg) = \left(\frac{Res.sat \times \theta_r \times p}{\rho_b} \right) \times 1,000,000 \text{ mg/kg}$

Term	COC Chemical/Physical and Affected Property Parameters Definition	Tier 1 Defaults	Change to Tier 1 Default Allowed?	Rule Citation Regarding Change
Br _{Abg}	Soil-to-above ground plant biotransfer factor (g soil/g dry weight plant tissue)	(Figure: 30 TAC §350.73(e))	Tier 2, 3	§350.73(e)(2)
Br _{Bg}	Soil-to-below ground plant biotransfer factor (g soil/g dry weight plant tissue)	(Figure: 30 TAC §350.73(e))	Tier 2, 3	§350.73(e)(2)
RCF	Ratio of concentration in roots to concentration in soil pore water (mg/kg) (lg/ml)	$(10^{((0.77 \times \log K_{ow}) - 1.52)}) + \frac{0.82}{0.222}$	Special Consideration	§350.73(e)
log K _{ow}	Octanol-water partition coefficient	(Figure: 30 TAC §350.73(e))	Special Consideration	§350.73(e)
K _{Sveg}	Soil-water partition coefficient (mL/g) = K _{oc} x f _{oc}	chemical specific	Tier 2, 3	§350.73(e) and §350.75(c) and (d)
VG _{bg}	Below ground vegetable correction factor (unitless)	0.01	No	NA
D _A	Apparent diffusivity (cm ² /sec)	chemical specific	Tier 2, 3	§350.73(e) and §350.75(c) and (d)

<i>Term</i>	<i>COC Chemical/Physical and Affected Property Parameters Definition</i>	<i>Tier 1 Defaults</i>	<i>Change to Tier 1 Default Allowed?</i>	<i>Rule Citation Regarding Change</i>
ρ_b	Soil bulk density (g/cm ³)	1.67	Tier 2, 3	§350.75(c) and (d)
Q/C	Inverse of mean concentration in air at center of affected soil area ([g/m ² -s]/[kg/m ³]) Default location assumed: • 0.5 acre source • 30 acre source Tier 2, 3 may estimate Q/C from the following equation for Houston: Q/C = -9.3087 ln(x) + 69.989, (where x = source area acreage), or other equation representative of Q/C for other city more representative of the affected property conditions and acceptable to the executive director (see USEPA Soil Screening Level Guidance: Technical Background Document, May 1996, EPA/540/R-95/128)	Houston 79.25 40.76	Tier 2, 3 Tier 2, 3 Tier 2, 3	§350.75(c) and (d)
τ	Exposure interval (s)	<u>9.5 x 10⁸</u> [1.0x10 ⁹]	Tier 2, 3	§350.74(j)(2)
θ_{ws}	Volumetric water content of vadose zone soils (cm ³ -water/cm ³ -soil)	0.16	Tier 2, 3	§350.75(c) and (d)
θ_{as}	Volumetric air content of vadose zone soils (cm ³ -air/cm ³ -soil) = $\theta_T - \theta_{ws}$	0.21	Tier 2, 3	§350.75(c) and (d)
D ^{air}	Diffusion coefficient in air (cm ² /s)	(Figure: 30 TAC §350.73(e))	No	NA
D ^{wat}	Diffusion coefficient in water (cm ² /s)	(Figure: 30 TAC §350.73(e))	No	NA
H'	Dimensionless Henry's Law Constant	(Figure: 30 TAC §350.73(e))	No	NA
H	Henry's Law Constant (atm-m ³ /mole) (H = H'RT)	(Figure: 30 TAC §350.73(e))	No	NA
K _d	Soil-water partition coefficient (cm ³ -water/g-soil) • for organics • for inorganic	(Figure: 30 TAC §350.73(e)) $k_d = K_{oc} \cdot f_{oc}$ $k_d = \text{pH dependent value}$	Tier 2, 3	§350.73(e) and (Figures: 30 TAC §350.73(e)(1)(A), (B), (C))

K_{oc}	Soil organic carbon-water partition coefficient (cm ³ -water/g-carbon)	(Figure: 30 TAC §350.73(e))	Tier 2, 3	§350.73(e) and (Figure: 30 TAC §350.73(e)(1)(B)) [(Figures: 30 TAC 350.73(e)(1)(A),(B), (C))]
f_{oc}	Fraction of organic carbon in soil (g-carbon/g-soil)			
	• VF_{ss}	0.008		
	• $K_{s_{veg}}$	0.008	Tier 2, 3	§350.75(c) and (d)
	• K_{sw}	0.002	Tier 2, 3	§350.75(c) and (d)
θ_T	Total soil porosity = $1 - (\rho_b/\rho_s)$ (cm ³ -pore space/cm ³ -soil)	0.37	Tier 2, 3	§350.75(c) and (d)
ρ_s	Particle density (g/cm ³)	2.65	Tier 2, 3	§350.75(c) and (d)
d_s	Thickness of affected surficial soil (cm)	305	Tier 2, 3	§350.75(c) and (d)
V	Fraction vegetative cover (unitless)	0.5	Tier 2, 3	§350.75(c) and (d)
U_m	Mean annual windspeed at 7 m height (m/s)	4.8	Tier 2, 3	§350.75(c) and (d)
U_t	Equivalent threshold value of windspeed at 7 m height (m/s)	11.32	Tier 2, 3	§350.75(c) and (d)

Figure: 30 TAC §350.75(b)(1) - Tier 1 PCL Equations

<i>Term</i>	<i>COC Chemical/Physical and Affected Property Parameters Definition</i>	<i>Tier 1 Defaults</i>	<i>Change to Tier 1 Default Allowed?</i>	<i>Rule Citation Regarding Change</i>
F(x)	Function dependent on (U_t/U_m) derived using Cowherd et. al. (1985) (unitless)	0.224	Tier 2, 3	§350.75(c) and (d)
R	Universal Gas Constant ($\text{atm m}^3 \text{mol}^{-1} \text{K}^{-1}$) [(atm-m ³ /g-mol)]	8.206×10^{-5}	No	NA
T	Temperature (°K) = 273 + °C	293	No	NA
K_{sw}	Soil-leachate partition factor for COC (mg/L-water/mg/kg-soil)	property-specific	Tier 2, 3	§350.73(e) and §350.75(c) and (d)
LDF	<u>Leachate</u> [Lateral] Dilution Factor			
	0.5 acre source area	20	Tier 2, 3	§350.75(c) and (d)
	30 acre source area	10	Tier 2, 3	§350.75(c) and (d)
Res.sat	The residual saturation limit where the NAPL becomes mobile (cm ³ /cm ³)			
	$\text{Res. sat} = \frac{10,000 \text{ mg/kg} \times \rho_b}{1,000,000 \text{ mg/kg} \times p \times \theta_T^{[0T]}}$	<u>0.04514</u> [0.0167]	Tier 2, 3	§350.75(c) and (d)
p	The density of the NAPL (g/cm ³)	1	Tier 2, 3	§350.75(c) and (d)

Air Source Medium Exposure Pathway PCL Equation

<p>PCL Eq.:^{Air}Air_{Inh} Exposure Pathway Description: Inhalation of air Source Medium: Air Exposure Medium: Air</p> <p>$^{Air}Air_{Inh} = ^{Air}RBEL_{Inh}$ (See Eq. RBEL-1, Figure: 30 TAC §350.74(a))</p>
Surface Water Exposure Pathway PCL Equation
<p>PCL Eq.:^{SW}SW Exposure Pathway Description: Aquatic life and human health protection (^{SW}RBEL) and ecological protection (^{SW}SW_{Eco}) Source Medium: Surface water Exposure Medium: Surface water</p> <p style="text-align: center;"><i>$^{SW}SW = \text{the lessor of } ^{SW}RBEL \text{ and } ^{SW}SW_{ECO} \quad [^{SW}RBEL]$</i></p> <hr/> <p style="text-align: center;">(see RBEL-6, Figure 30 TAC §350.74(a), §350.74(h), and §350.77(a)) [(see RBEL-6, Figures: 30 TAC §350.74(a) and §350.74(h))]</p>

(2) - (4) (No change.)

(c) - (h) (No change.)

(i) Pathway specific PCL Considerations.

(1) - (3) (No change.)

(4) PCLs for COCs in groundwater discharge to surface water (^{SW}GW). The person shall set ^{SW}GW equal to $^{SW}SW [^{SW}RBEL]$ divided by the surface water dilution factor. The ^{SW}SW is the lesser of the ^{SW}RBEL established in accordance with §350.74(h) of this title (relating to Development of

Risk-Based Exposure Limits) and the SW_{Eco} established in accordance with §350.77 of this title (relating to Ecological Risk Assessment and Development of Ecological Protective Concentration Levels). The surface water dilution factor shall be determined [, or as modified] in accordance with subparagraph (A) or (B) [, (C), (D), or (E)] of this paragraph. The person shall use the PCL equation as shown in the figure in subsection (b)(1) of this section to establish ^{SW}GW . [The person shall determine if the affected water body is freshwater or marine in order to apply applicable aquatic life and/or human health criteria listed in Tables 1 and 3 of §307.6 of this title (relating to Toxic Materials), as amended.]

(A) The person shall assume a surface water dilution factor of one when the concentration of all COCs in groundwater at the zone of discharge to surface water is less than or equal to the ^{SW}SW [$^{SW}RBEL$] for those COCs at the time the affected property assessment required in §350.51 of this title (relating to Affected Property Assessment) is conducted. The person shall also assume a surface water dilution factor of one for those specific COCs which are listed as impairing the nearest classified segment at or downstream of the affected property. Impaired water bodies are provided in the current Clean Water Act, §303(d) list, as amended.

(B) When the concentration of a COC in groundwater at the zone of discharge to surface water exceeds the ^{SW}SW [$^{SW}RBEL$] for that COC at the time the affected property assessment required in §350.51 of this title (relating to Affected Property Assessment) is conducted, the person may establish a surface water dilution factor in accordance with subparagraph [subparagraphs] (C), (D), or (E) of this paragraph.

(C) The person may use [divide the ^{SW}RBEL by] a surface water dilution factor of 0.15 for non-flowing surface waters such as lakes, estuaries, tidal rivers; and fresh water streams and rivers (where the groundwater discharge is clearly less than 15% of the 7Q2 stream flow as defined in §307.3(a)(34) of this title (relating to Definitions and Abbreviations)), as amended. The person shall use the 7Q2 flows as listed in Appendix B of §307.10 of this title (relating to Appendices A - E), as amended, for groundwater discharges directly to a classified segment as listed in Appendix C of §307.10 of this title, as amended. For groundwater discharges which are not directly to a classified segment, site-specific 7Q2 values must be determined for the water body directly receiving the groundwater discharge.

(D) For freshwater streams and rivers where the groundwater discharge is clearly greater than 15% of the 7Q2 flow, the person shall estimate property-specific surface water dilution factors based on 7Q2 flows for chronic aquatic-life criteria, 25% of 7Q2 flows for acute aquatic-life criteria, and harmonic mean flows as defined in §307.3(a)(19) of this title (relating to Definitions and Abbreviations), as amended, for human health criteria in accordance with the procedures contained in the *Implementation Procedures*, as amended. The person shall divide the ^{SW}SW [RBEL] by the estimated property-specific dilution factor. The person shall use the 7Q2 flows listed in Appendix B of §307.10 of this title (relating to Appendices A - E), as amended, for groundwater discharges directly to a classified segment as listed in Appendix C of §307.10 of this title, as amended. For groundwater discharges which are not directly to a classified segment, site-specific 7Q2 values must be determined for the water body directly receiving the groundwater discharge.

(E) - (F) (No change.)

(5) - (15) (No change.)

(j) (No change.)

§350.76. Approaches for Specific Chemicals of Concern to Determine Human Health Protective Concentration Levels.

(a) - (b) (No change.)

(c) Lead.

(1) The Tier 1 residential soil PCL ($^{Tot}Soil_{Comb}$) for lead [for all three tiers] is 500 mg/kg.

(2) Subject to prior approval by the executive director, the person may use property-specific data in conjunction with a lead model approved by the executive director (e.g., EPA Integrated Exposure Uptake Biokinetic model for lead in children) to calculate a Tier 3 residential soil PCL ($^{Tot}Soil_{Comb}$) for lead. The person shall submit information to the executive director which demonstrates that variance from default model inputs is supported by property-specific information (e.g., data from a

scientifically valid bioavailability study using property-specific soils). Property-specific model input values must be approved by the executive director.

(3) [(2)] The commercial/industrial soil PCL ($^{Tot}Soil_{Comb}$) is based only on the soil ingestion pathway ($^{Soil}Soil_{Ing}$). The person shall use the exposure algorithm and default exposure factors in the following figure for calculating the Tier 1 commercial/industrial $^{Soil}RBEL_{Ing}$ value.

Figure: 30 TAC §350.76(c)(3)

[Figure: 30 TAC §350.76(c)(2)]

Equation for Adult Lead Exposure Commercial/Industrial Land Use (Tier 1)		
$^{Soil}Soil_{Ing} = ^{Soil}RBEL_{Ing}$		
$^{Soil}RBEL_{Ing} (\mu g / g) = \frac{(PbB_{95\text{ fetal}} / (R \times (GSD_i)^{1.645})) - PbB_0}{BKSF \times (IR_{sd} \times AF_{sd} \times EF_{sd} / 365)}$		
Parameter	Definition (units)	Default
PbB _{95 fetal}	95th Percentile PbB in Fetus ($\mu\text{g/dL}$)	10
R	Mean Ratio of Fetal to Maternal PbB	0.9
GSD _i	Individual Geometric Standard Deviation	1.91
PbB ₀	Baseline Blood Lead Value ($\mu\text{g/dL}$)	1.64
BKSF	Biokinetic Slope Factor ($\mu\text{g/dL per } \mu\text{g/day}$)	0.4
IR _{sd}	Soil/Dust Ingestion Rate (g/day)	0.05
EF _{sd}	Soil/Dust Exposure Frequency (days/yr)	250
AF _{sd}	Absolute Absorption Fraction of Lead in Soil/Dust	0.10

(4) [(3)] The person may use a different exposure algorithm as presented in the following figure that considers soil and dust separately for calculating the Tier 2 and 3 commercial/industrial $^{Soil}RBEL_{Ing}$ value in cases where the person has adequate direct measurement data on the concentrations of lead in both soil and dust at the affected property. In addition, in calculating Tier 2 or 3 $^{Soil}RBEL_{Ing}$ values, the person may deviate from the default exposure factors as shown in the figure in paragraph (3) [(2)] of this subsection and the following figure if property-specific or defensible alternative data (e.g., from open literature or privately funded studies) adequately support such an approach. The specific exposure factors for which the person may use property-specific or scientifically defensible alternative values are the following:

Figure: 30 TAC§350.76(c)(4)

[Figure: 30 TAC§350.76(c)(3)]

Equation for Adult Lead Exposure Commercial/Industrial Land Use (Tiers 2 & 3 only)		
$^{Soil}Soil_{Ing} = ^{Soil}RBEL_{Ing}$		
$^{Soil}RBEL_{Ing} (\mu g / g) = \frac{(PbB_{95} fetal / (R \times (GSD_i)^{1.645})) - PbB0}{BKSF \times ((IR_{sf} \times AF_s \times EF_{s/365}) + (K_{sd} \times IR_d \times AF_d \times EF_d / 365))}$		
Parameter	Definition (units)	Defaults
PbB ₉₅ fetal	95th Percentile PbB in Fetus ($\mu g/dL$)	10
R	Mean Ratio of Fetal to Maternal PbB	0.9
GSD _i	Individual Geometric Standard Deviation	1.91
Parameter	Definition (units)	Defaults
PbB0	Baseline Blood Lead Value ($\mu g/dL$)	1.64
BKSF	Biokinetic Slope Factor ($\mu g/dL$ per $\mu g/day$)	0.4

IR_s	Soil Ingestion Rate (g/day)	0.025
IR_d	Dust Ingestion Rate (g/day)	0.025
K_{sd}	Ratio of Concentration in Dust to that in Soil	***
EF_s	Soil Exposure Frequency (days/yr)	250
EF_d	Dust Exposure Frequency (days/yr)	250
AF_s	Absolute Absorption Fraction of Lead in Soil	0.10
AF_d	Absolute Absorption Fraction of Lead in Dust	0.10
***Based on direct measurement data on the concentrations of lead in both soil and dust at the affected property.		

(A) individual geometric standard deviation (GSD_i);

(B) baseline blood lead (PbBO);

(C) absolute absorption fraction of lead in soil/dust (A_{fsd});

(D) absolute absorption fraction of lead in soil (AFs); and

(E) absolute absorption fraction of lead in dust (A_{fd}).

(d) Polychlorinated Biphenyls.

(1) (No change.)

(2) For Tiers 2 and 3, the person may use alternative slope factors when the following conditions are met:

(A) (No change.)

(B) The person may conduct congener or isomer analyses. The person may use the lowest reference point of the upper-bound slope factors ($0.07 \text{ (mg/kg-day)}^{-1}$) for the soil ingestion, dermal contact with soil, and inhalation exposure pathways if congener or isomer analyses verify that congeners with more than four chlorines comprise less than one-half percent of total polychlorinated biphenyls in a given exposure medium. The upper reference point of the upper-bound slope factors ($2 \text{ (mg/kg-day)}^{-1}$) shall be used for all other exposure pathways regardless of the results of the congener- or isomer-specific analyses. If congener or isomer analyses indicate that congeners with more than four chlorines comprise greater than one-half percent of total polychlorinated biphenyls in a given exposure medium, then the person shall use the upper-reference point of the upper-bound slope factors ($2 \text{ (mg/kg-day)}^{-1}$) for all pathways for that specific exposure medium. Further, when congener concentrations are available, the contribution of dioxin-like polychlorinated biphenyls to total dioxin equivalents shall be considered. The person shall apply the toxicity equivalency factors specified in the following figure to the measured [soil] concentrations for each of the dioxin-like polychlorinated biphenyls. These values shall then be summed to obtain a 2,3,7,8-TCDD toxicity equivalency quotient. Toxicity equivalency quotients for dioxin-like polychlorinated biphenyls shall then be added to those for other dioxin-like compounds as specified in subsection (e) of this section to yield a total toxicity equivalency quotient concentration. This total toxicity equivalency quotients concentration shall then be

compared with the critical [soil] PCL for TCDD, 2,3,7,8- (dioxin). When addressing dioxin-like polychlorinated biphenyls in this manner, the person shall subtract the concentration of dioxin-like polychlorinated biphenyls from the total polychlorinated biphenyls concentration to avoid overestimating dioxin-like polychlorinated biphenyls by evaluating them twice.

Figure: 30 TAC §350.76(d)(2)(B)

Toxicity Equivalency Factors (TEFs) for Dioxin-Like Compounds	
Congener/Class	TEF Value
2,3,7,8-Substituted Dibenzodioxins	
2,3,7,8-Tetrachlorodibenzodioxin	1
2,3,7,8-Pentachlorodibenzodioxins	1
2,3,7,8-Hexachlorodibenzodioxins	0.1
2,3,7,8-Heptachlorodibenzodioxins	0.01
Octachlorodibenzodioxins	0.0001
2,3,7,8-Substituted Dibenzofurans	
2,3,7,8-Tetrachlorodibenzofuran	0.1
1,2,3,7,8-Pentachlorodibenzofuran	0.05
2,3,4,7,8-Pentachlorodibenzofuran	0.5
2,3,7,8-Hexachlorodibenzofurans	0.1
2,3,7,8-Heptachlorodibenzofurans	0.01
Octachlorodibenzofurans	0.0001
Dioxin-Like PCBs	
3,4,4',5-TCB (81)	0.0001
3,3',4,4'-TCB (77)	0.0001
3,3',4,4',5-PeCB (126)	0.1

Toxicity Equivalency Factors (TEFs) for Dioxin-Like Compounds	
Congener/Class	TEF Value
3,3',4,4',5,5'-HxCB (169)	0.01
2,3,3',4,4'-PeCB (105)	0.0001
2,3,4,4',5-PeCB (114)	0.0005
2,3',4,4',5-PeCB (118)	0.0001
2',3,4,4',5-PeCB (123)	0.0001
2,3,3',4,4',5-HxCB (156)	0.0005

Toxicity Equivalency Factors (TEFs) for Dioxin-Like Compounds	
Congener/Class	TEF Value
2,3,3',4,4',5'-HxCB (157)	0.0005
2,3',4,4',5,5'-HxCB (167)	0.00001
2,3,3',4,4',5,5'-HpCB (189)	0.0001

(3) - (4) (No change.)

(e) Polychlorinated Dibenzo-p-Dioxins and Dibenzofurans.

(1) In demonstrating attainment of the critical [soil] PCL for TCDD, 2,3,7,8- (dioxin), the person shall apply the toxicity equivalency factor as shown in the figure in subsection (d)(2)(B) of this section to the measured [soil] concentrations in accordance with the following procedures.

(A) When analytical data are only available for total dioxins/furans, the person shall assume that the mixture consists solely of 2,3,7,8-TCDD, and a toxicity equivalency factor value

of 1.0 shall be applied to the measured [soil] concentration to yield the 2,3,7,8-TCDD toxicity equivalency quotient concentration for the [soil] sample.

(B) When homologue-specific analytical data are available (e.g., tetrachlorodibenzodioxins), the person shall assume that each homologue class is comprised solely of 2,3,7,8-substituted congeners, and the toxicity equivalency factor specified for the 2, 3, 7, 8-substituted congeners in the homologue class shall be applied to the measured [soil] concentrations for that homologue class. A toxicity equivalency factor value of 0.5 should be used for the pentachlorodibenzofuran homologue class. The toxicity equivalency quotient concentrations for each homologue class shall be summed to obtain a total toxicity equivalency quotient concentration for the [soil] sample.

(C) When congener-specific analytical data are available (e.g., 1, 2, 3, 4, 7, 8-hexachlorodibenzofuran), the person shall apply the toxicity equivalency factor for the 2, 3, 7, 8-substituted congeners to the measured [soil] concentrations. The toxicity equivalency quotient concentrations for each 2, 3, 7, 8-substituted congener shall then be summed to obtain a total toxicity equivalency quotient concentration for the [soil] sample.

(2) The person shall then compare the total toxicity equivalency quotient [soil] concentration established in paragraph (1) of this subsection to the critical [soil] PCL for TCDD, 2, 3, 7, 8- (dioxins).

(3) (No change.)

(f) Polycyclic Aromatic Hydrocarbons.

(1) - (2) (No change.)

(3) The cancer slope factors and inhalation unit risk factors for the seven carcinogenic polycyclic aromatic hydrocarbons, shall be calculated according to the equations set forth in the following figure:

Figure: 30 TAC §350.76(f)(3)]

[Figure: 30 TAC §350.76(f)(3)]

Equations for Calculating Cancer Slope Factors and Unit Risk Factors for Carcinogenic PAHs	
$SF_{PAH} = (SF_{B(a)P}) (RPF_{PAH})$	
where:	SF_{PAH} = adjusted cancer slope factor for a PAH (mg/kg-day) ⁻¹ $SF_{B(a)P}$ = cancer slope factor for benzo{a}pyrene (mg/kg-day) ⁻¹ RPF_{PAH} = relative potency factor for a PAH in Figure [5:] 30 TAC §350.76(f)(2) (unitless)
$URF_{PAH} = (URF_{B(a)P}) (RPF_{PAH})$	
where:	URF_{PAH} = adjusted inhalation unit risk factor for a PAH (μg/m ³) ⁻¹ $URF_{B(a)P}$ = inhalation unit risk factor for benzo{a}pyrene (μg/m ³) ⁻¹ RPF_{PAH} = relative potency factor for a PAH in (Figure [5:] 30 TAC §350.76(f)(2)) (unitless)

(4) - (5) (No change.)

(g) Total Petroleum Hydrocarbons.

(1) (No change.)

(2) In order to establish PCLs for total petroleum hydrocarbons, the person shall establish PCLs for each of the aliphatic and aromatic hydrocarbon fractions listed in the following figure (e.g., aliphatic >C₆-C₈) for the mandatory and complete or reasonably anticipated to be completed exposure pathways as required in §350.71(c) of this title (relating to General Requirements):

Figure: 30 TAC §350.76(g)(2)

[Figure: 30 TAC §350.76(g)(2)]

Hydrocarbon Fractions and Toxicity Factors		
Aliphatic Hydrocarbon Fraction	Surrogate for Oral RfD	Surrogate for Inhalation RfC
C ₆	n-hexane	n-hexane ¹ commercial hexane ²
>C ₆ -C ₈	n-hexane	n-hexane ¹ commercial hexane ²
>C ₈ -C ₁₀	<u>C9-C17 aliphatics</u> [JP-8 and other petroleum streams]	<u>dearomatized white spirits</u> [JP-8 and other petroleum streams]
>C ₁₀ -C ₁₂	<u>C9-C17 aliphatics</u> [JP-8 and other petroleum streams]	<u>dearomatized white spirits</u> [JP-8 and other petroleum streams]
>C ₁₂ -C ₁₆	<u>C9-C17 aliphatics</u> [JP-8 and other petroleum streams]	<u>dearomatized white spirits</u> [JP-8 and other petroleum streams]
>C ₁₆ -C ₂₁	white mineral oils	----
>C ₁₆ -C ₂₁ (for transformer mineral oil releases only)	transformer mineral oil	----
>C ₂₁₋₃₅ ³	white mineral oil	----

>C ₂₁ -C ₃₅ (for transformer mineral oil releases only)	transformer mineral oil	----
Aromatic Hydrocarbon Fraction	Surrogate for Oral RfD	Surrogate for Inhalation RfC
>C ₇₋₈	ethylbenzene	ethylbenzene
>C _{8-C₁₀}	multiple aromatic compounds	high flash aromatic naphtha
>C _{10-C₁₂}	multiple aromatic compounds	high flash aromatic naphtha
>C _{12-C₁₆}	multiple aromatic compounds	multiple aromatic compounds
>C _{16-C₂₁}	pyrene	----
>C _{21-C₃₅} ³	pyrene	----
Footnotes:		
1. For mixtures with greater than 53% n-hexane content. 2. For mixtures with less than <u>or equal to</u> 53% n-hexane content. 3. The person may truncate the analysis at C ₂₈ when there does not appear to be significant mass of >C ₂₈ based on the gas chromatogram and the product is anticipated to be a lighter hydrocarbon (e.g., gasoline, diesel, not transformer mineral oil, or used motor oil).		

(3) - (8) (No change.)

§350.77. Ecological Risk Assessment and Development of Ecological Protective Concentration Levels.

(a) General. The person shall evaluate the affected property by conducting an ecological risk assessment in a manner appropriate and consistent with subsections (b), (c), or (d) of this section. The process is discussed in the agency’s ecological risk assessment guidance. The purpose of the ecological risk assessment will be to characterize the ecological setting of the affected property, identify complete or reasonably anticipated to be completed exposure pathways and representative ecological receptors, scientifically eliminate COCs that pose no unacceptable risk, and develop PCLs for selected ecological

receptors where warranted. The POEs for the selected ecological receptors shall be established on a property-specific basis. However, if the person can show that no unacceptable ecological risk exists due to incomplete or insignificant exposure pathways as specified in subsection (b) of this section, or if all COCs can be eliminated as specified in subsection (c)(1), (6), (7), or (8) of this section, or if, after incorporation of site-specific information, it can be shown that there is either no ecological risk or that it is not apparent as specified in subsection (d) of this section, then the ecological risk assessment process will terminate at that point. Also, if after the ecological risk assessment process specified in subsection (b) of this section, or if at anytime during the ecological risk assessment process specified in subsections (c) or (d) of this section, the person can demonstrate to the satisfaction of the executive director that the [either] implementation of a [physical control (e.g., a cap) planned as part of a] response action [to address the exceedence of human health-based PCLs] will eliminate the ecological exposure pathway or render it insignificant, or that human health PCLs will be protective of ecological receptors, then no further ecological risk assessment evaluation will be required. In addition, if after the ecological risk assessment process specified in subsection (b) of this section, the person can demonstrate to the satisfaction of the executive director that an expedited stream evaluation can determine that the completed surface water and sediment pathways are insignificant, then no further ecological risk assessment evaluation will be required. If no further ecological risk assessment evaluation is required, then the person shall provide, as appropriate, a reasoned justification and/or an expedited stream evaluation for terminating the ecological risk assessment and place this information in the affected property assessment report as described in §350.91 of this title (relating to Affected Property Assessment Report). Furthermore, after ecological PCLs have been established, the person shall have the option, where determined appropriate, of conducting an ecological services analysis as a

means of managing ecological risk at the affected property, in accordance with subsection (f) of this section and §350.33(a)(3)(B) of this title (relating to Remedy Standard B). Subsections (b), (c), and (d) of this section describe a three-tiered approach to conducting an ecological risk assessment, and although there is a logical progression from one tier to the next, the person may begin the ecological evaluation of the affected property at any tier.

(b) Tier 1: exclusion criteria checklist. The person shall conduct a Tier 1 assessment at all affected properties to which this rule is applicable as presented in §350.2 [§350.(2)] of this title (relating to Applicability), unless the person elects to begin the ecological evaluation at Tier 2 or Tier 3. The person shall use the Tier 1 Exclusion Criteria Checklist provided in the following figure. The person will have fulfilled the ecological risk assessment requirements if the affected property meets the exclusion criteria. However, the person shall re-enter the ecological risk assessment process if changing circumstances result in the affected property not meeting the Tier 1 exclusion criteria. The person is required to continue the ecological risk assessment process as described in subsection (c) or (d) of this section if the affected property fails the exclusion criteria, unless the reasoned justification and/or expedited stream evaluation processes described in subsection (a) of this section are used to demonstrate that no unacceptable ecological risk exists.

Figure: 30 TAC §350.77(b)

[Figure: 30 TAC §350.77(b)]

TIER 1: EXCLUSION CRITERIA CHECKLIST

This exclusion criteria checklist is intended to aid the person and the TCEQ [TNRCC] in determining whether or not further ecological evaluation is necessary at an affected property where a response action is being pursued under the Texas Risk Reduction Program (TRRP). Exclusion criteria refer to those conditions at an affected property which preclude the need for a formal ecological risk assessment (ERA) because there are **incomplete or insignificant ecological exposure pathways** due to the nature of the affected property setting and/or the condition of the affected property media. This checklist (and/or a Tier 2 or 3 ERA or the equivalent) must be completed by the person for all affected property subject to the TRRP. The person should be familiar with the affected property but need not be a professional scientist in order to respond, although some questions will likely require contacting a wildlife management agency (i.e., Texas Parks and Wildlife Department or U.S. Fish and Wildlife Service). The checklist is designed for general applicability to all affected property; however, there may be unusual circumstances which require professional judgement in order to determine the need for further ecological evaluation (e.g., cave-dwelling receptors). In these cases, the person is strongly encouraged to contact TCEQ [TNRCC] before proceeding.

Besides some preliminary information, the checklist consists of three major parts, **each of which must be completed unless otherwise instructed**. PART I requests affected property identification and background information. PART II contains the actual exclusion criteria and supportive information. PART III is a qualitative summary statement and a certification of the information provided by the person. **Answers should reflect existing conditions and should not consider future remedial actions at the affected property**. Completion of the checklist should lead to a logical conclusion as to whether further evaluation is warranted. Definitions of terms used in the checklist have been provided and users are strongly encouraged to familiarize themselves with these definitions before beginning the checklist.

Name of Facility:

Affected Property Location:

Mailing Address:

TCEQ [TNRCC] Case Tracking #s:

Solid Waste Registration #s:

Voluntary Cleanup Program #:

EPA I.D. #s:

Definitions¹

¹ These definitions were taken from 30 TAC §350.4 and may have both ecological and human health applications. For the purpose of this checklist, it is understood that only the ecological applications are of concern.

Affected property - The entire area (i.e., on-site and off-site; including all environmental media) which contains releases of chemicals of concern at concentrations equal to or greater than the assessment level applicable for residential land use and groundwater classification.

Assessment level - A critical protective concentration level for a chemical of concern used for affected property assessments where the human health protective concentration level is established under a Tier 1 evaluation as described in §350.75(b) of this title (relating to Tiered Human Health Protective Concentration Level Evaluation), except for the protective concentration level for the soil-to-groundwater exposure pathway which may be established under Tier 1, 2, or 3 as described in §350.75(i)(7) of this title, and ecological protective concentration levels which are developed, when necessary, under Tier 2 and/or 3 in accordance with §350.77(c) and/or (d), respectively, of this title (relating to Ecological Risk Assessment and Development of Ecological Protective Concentration Levels).

Bedrock - The solid rock (i.e., consolidated, coherent, and relatively hard naturally formed material that cannot normally be excavated by manual methods alone) that underlies gravel, soil or other surficial material.

Chemical of concern - Any chemical that has the potential to adversely affect ecological or human receptors due to its concentration, distribution, and mode of toxicity. Depending on the program area, chemicals of concern may include the following: solid waste, industrial solid waste, municipal solid waste, and hazardous waste as defined in Texas Health and Safety Code, §361.003, as amended; hazardous constituents as listed in 40 Code of Federal Regulations Part 261, Appendix VIII, as amended; constituents on the groundwater monitoring list in 40 Code of Federal Regulations Part 264, Appendix IX, as amended; constituents as listed in 40 CFR Part 258 Appendices I and II, as amended; pollutant as defined in Texas Water Code, §26.001, as amended; hazardous substance as defined in Texas Health and Safety Code, §361.003, as amended, and the Texas Water Code §26.263, as amended; regulated substance as defined in Texas Water Code §26.342, as amended and §334.2 of this title (relating to Definitions), as amended; petroleum product as defined in Texas Water Code §26.342, as amended and §334.122(b)(12) of this title (relating to Definitions for ASTs), as amended; other substances as defined in Texas Water Code §26.039(a), as amended; and daughter products of the aforementioned constituents.

Community - An assemblage of plant and animal populations occupying the same habitat in which the various species interact via spatial and trophic relationships (e.g., a desert community or a pond community).

Complete exposure pathway - An exposure pathway where a human or ecological receptor is exposed to a chemical of concern via an exposure route (e.g., incidental soil ingestion, inhalation of volatiles and particulates, consumption of prey, etc).

De minimus - The description of an area of affected property comprised of one acre or less where the ecological risk is considered to be insignificant because of the small extent of contamination, the absence of protected species, the availability of similar unimpacted habitat nearby, and the lack of adjacent sensitive environmental areas.

Ecological protective concentration level - The concentration of a chemical of concern at the point of exposure within an exposure medium (e.g., soil, sediment, groundwater, or surface water) which is determined in accordance with §350.77(c) or (d) of this title (relating to Ecological Risk Assessment and Development of Ecological Protective Concentration Levels) to be protective for ecological receptors. These concentration levels are primarily intended to be protective for more mobile or wide-ranging ecological receptors and, where appropriate, benthic invertebrate communities within the waters in the state. These concentration levels are not intended to be directly protective of receptors with limited mobility or range (e.g., plants, soil invertebrates, and small rodents), particularly those residing within active areas of a facility, unless these receptors are threatened/endangered species or unless impacts to these receptors result in disruption of the ecosystem or other unacceptable consequences for the more mobile or wide-ranging receptors (e.g., impacts to an off-site grassland habitat eliminate rodents which causes a desirable owl population to leave the area).

Ecological risk assessment - The process that evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors; however, as used in this context, only chemical stressors (i.e., COCs) are evaluated.

Environmental medium - A material found in the natural environment such as soil (including non-waste fill materials), groundwater, air, surface water, and sediments, or a mixture of such materials with liquids, sludges, gases, or solids, including hazardous waste which is inseparable by simple mechanical removal processes, and is made up primarily of natural environmental material.

Exclusion criteria - Those conditions at an affected property which preclude the need to establish a protective concentration level for an ecological exposure pathway because the exposure pathway between the chemical of concern and the ecological receptors is not complete or is insignificant.

Exposure medium - The environmental medium or biologic tissue in which or by which exposure to chemicals of concern by ecological or human receptors occurs.

Facility - The installation associated with the affected property where the release of chemicals of concern occurred.

Functioning cap - A low permeability layer or other approved cover meeting its design specifications to minimize water infiltration and chemical of concern migration, and prevent ecological or human receptor exposure to chemicals of concern, and whose design requirements are routinely maintained.

Landscaped area - An area of ornamental, or introduced, or commercially installed, or manicured vegetation which is routinely maintained.

Off-site property (off-site) - All environmental media which is outside of the legal boundaries of the on-site property.

On-site property (on-site) - All environmental media within the legal boundaries of a property owned or leased by a person who has filed a self-implementation notice or a response action plan for that property or who has become subject to such action through one of the agency's program areas for that property.

Physical barrier - Any structure or system, natural or manmade, that prevents exposure or prevents migration of chemicals of concern to the points of exposure.

Point of exposure - The location within an environmental medium where a receptor will be assumed to have a reasonable potential to come into contact with chemicals of concern. The point of exposure may be a discrete point, plane, or an area within or beyond some location.

Protective concentration level - The concentration of a chemical of concern which can remain within the source medium and not result in levels which exceed the applicable human health risk-based exposure limit or ecological protective concentration level at the point of exposure for that exposure pathway.

Release - Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment, with the exception of:

(A) A release that results in an exposure to a person solely within a workplace, concerning a claim that the person may assert against the person's employer;

(B) An emission from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine;

(C) A release of source, by-product, or special nuclear material from a nuclear incident, as those terms are defined by the Atomic Energy Act of 1954, as amended (42 U.S.C. §2011 *et seq.*), if the release is subject to requirements concerning financial protection established by the Nuclear Regulatory Commission under §170 of that Act;

(D) For the purposes of the environmental response law §104, as amended, or other response action, a release of source, by-product, or special nuclear material from a processing site designated under §102(a)(1) or §302(a) of the Uranium Mill Tailings Radiation Control Act of 1978 (42 U.S.C. §7912 and §7942), as amended; and

(E) The normal application of fertilizer.

Sediment - Non-suspended particulate material lying below surface waters such as bays, the ocean, rivers, streams, lakes, ponds, or other similar surface water body (including intermittent streams). Dredged sediments which have been removed from below surface water bodies and placed on land shall be considered soils.

Sensitive environmental areas - Areas that provide unique and often protected habitat for wildlife species. These areas are typically used during critical life stages such as breeding, hatching, rearing of young, and

overwintering. Examples include critical habitat for threatened and endangered species, wilderness areas, parks, and wildlife refuges.

Source medium - An environmental medium containing chemicals of concern which must be removed, decontaminated and/or controlled in order to protect human health and the environment. The source medium may be the exposure medium for some exposure pathways.

Stressor - Any physical, chemical, or biological entity that can induce an adverse response; however, as used in this context, only chemical entities apply.

Subsurface soil - For human health exposure pathways, the portion of the soil zone between the base of surface soil and the top of the groundwater-bearing unit(s). For ecological exposure pathways, the portion of the soil zone between 0.5 feet and 5 feet in depth.

Surface cover - A layer of artificially placed utility material (e.g., shell, gravel).

Surface soil - For human health exposure pathways, the soil zone extending from ground surface to 5 [15] feet in depth [for residential land use and from ground surface to 5 feet in depth for commercial/industrial land use]; or to the top of the uppermost groundwater-bearing unit or bedrock, whichever is less in depth. For ecological exposure pathways, the soil zone extending from ground surface to 0.5 feet in depth.

Surface water - Any water meeting the definition of surface water in the state as defined in §307.3 of this title (relating to Abbreviations and Definitions), as amended.

PART I. Affected Property Identification and Background Information

1) Provide a description of the specific area of the response action and the nature of the release. Include estimated acreage of the affected property and the facility property, and a description of the type of facility and/or operation associated with the affected property. Also describe the location of the affected property with respect to the facility property boundaries and public roadways.

Attach available USGS topographic maps and/or aerial or other affected property photographs to this form to depict the affected property and surrounding area. Indicate attachments:

- Topo map Aerial photo Other

2) Identify environmental media known or suspected to contain chemicals of concern (COCs) at the present time. Check all that apply:

- | Known/Suspected COC Location | Based on sampling data? | |
|--|------------------------------|-----------------------------|
| <input type="checkbox"/> Soil \leq 5 ft below ground surface | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| <input type="checkbox"/> Soil $>$ 5 ft below ground surface | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| <input type="checkbox"/> Groundwater | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| <input type="checkbox"/> Surface Water/Sediments | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

Subpart A. Surface Water/Sediment Exposure

1) Regarding the affected property where a response action is being pursued under the TRRP, have COCs migrated and resulted in a release or imminent threat of release to either surface waters or to their associated sediments via surface water runoff, air deposition, groundwater seepage, etc.? Exclude wastewater treatment facilities and stormwater conveyances/impoundments authorized by permit. Also exclude conveyances, decorative ponds, and those portions of process facilities which are:

a. Not in contact with surface waters in the State or other surface waters which are ultimately in contact with surface waters in the State; and

b. Not consistently or routinely utilized as valuable habitat for natural communities including birds, mammals, reptiles, etc.

Yes

No

Explain:

If the answer is Yes to Subpart A above, the affected property does not meet the exclusion criteria. However, complete the remainder of Part II to determine if there is a complete and/or significant soil exposure pathway, then complete PART III - Qualitative Summary and Certification. If the answer is No, go to Subpart B.

Subpart B. Affected Property Setting

In answering “Yes” to the following question, it is understood that the affected property is not attractive to wildlife or livestock, including threatened or endangered species (i.e., the affected property does not serve as valuable habitat, foraging area, or refuge for ecological communities). (May require consultation with wildlife management agencies.)

1) Is the affected property wholly contained within contiguous land characterized by: pavement, buildings, landscaped area, functioning cap, roadways, equipment storage area, manufacturing or process area, other surface cover or structure, or otherwise disturbed ground?

Yes

No

Explain:

If the answer to Subpart B above is Yes, the affected property meets the exclusion criteria, assuming the answer to Subpart A was No. Skip Subparts C and D and complete PART III - Qualitative Summary and Certification. If the answer to Subpart B above is No, go to Subpart C.

Subpart C. Soil Exposure

1) Are COCs which are in the soil of the affected property solely below the first 5 feet beneath ground surface **or** does the affected property have a physical barrier present to prevent exposure of receptors to COCs in surface soil?

Yes

No

Explain:

If the answer to Subpart C above is Yes, the affected property meets the exclusion criteria, assuming the answer to Subpart A was No. Skip Subpart D and complete PART III - Qualitative Summary and Certification. If the answer to Subpart C above is No, proceed to Subpart D.

Subpart D. *De Minimus* Land Area

In answering “Yes” to the question below, it is understood that all of the following conditions apply:

❖ The affected property is not known to serve as habitat, foraging area, or refuge to threatened/endangered or otherwise protected species. (Will likely require consultation with wildlife management agencies.)

❖ Similar but unimpacted habitat exists within a half-mile radius.

❖ The affected property is not known to be located within one-quarter mile of sensitive environmental areas (e.g., rookeries, wildlife management areas, preserves). (Will likely require consultation with wildlife management agencies.)

❖ There is no reason to suspect that the COCs associated with the affected property will migrate such that the affected property will become larger than one acre.

1) Using human health protective concentration levels as a basis to determine the extent of the COCs, does the affected property consist of one acre or less and does it meet all of the conditions above?

Yes

No

Explain how conditions are met/not met:

If the answer to Subpart D above is Yes, then no further ecological evaluation is needed at this affected property, assuming the answer to Subpart A was No. Complete PART III - Qualitative Summary and Certification. If the answer to Subpart D above is No, proceed to Tier 2 or 3 or comparable ERA.

PART III. Qualitative Summary and Certification (Complete in all cases.)

Attach a brief statement (not to exceed 1 page) summarizing the information you have provided in this form. This summary should include sufficient information to verify that the affected property meets or does

not meet the exclusion criteria. The person should make the initial decision regarding the need for further ecological evaluation (i.e., Tier 2 or 3) based upon the results of this checklist. After review, TCEQ [TNRCC] will make a final determination on the need for further assessment. **Note that the person has the continuing obligation to re-enter the ERA process if changing circumstances result in the affected property not meeting the Tier 1 exclusion criteria.**

Completed by: _____ (*Typed/Printed Name*)
_____ (*Title*)
_____ (*Date*)

I believe that the information submitted is true, accurate, and complete, to the best of my knowledge.

_____ (*Typed/Printed Name of Person*)
_____ (*Title of Person*)
_____ (*Signature of Person*)
_____ (*Date Signed*)

(c) Tier 2: screening-level ecological risk assessment. The person shall conduct a screening-level ecological risk assessment to scientifically eliminate COCs that do not pose an ecological risk and to develop PCLs for those COCs that do pose an unacceptable risk to selected ecological receptors. Effect levels and exposure factors from the literature are used as early input, but Tier 2 PCLs are not developed without consideration of realistic assumptions and available site-specific information. The screening-level ecological risk assessment should contain the three following widely-acknowledged phases of an ecological risk assessment: problem formulation, which establishes the goals, breadth, and focus of the assessment; analysis, which consists of the technical evaluation of data on both the exposure of the ecological receptor to a chemical stressor and the potential adverse effects; and risk characterization, where the likelihood of adverse effects occurring as a result of exposure to a chemical stressor is evaluated. In order to develop a screening-level ecological risk assessment which

appropriately evaluates ecological risk, the person shall meet the minimum requirements listed in paragraphs (1) - (10) of this subsection. Additional information on these requirements, as well as case examples, are [may be] provided in the agency's ecological assessment guidance [a guidance document developed by the executive director]. The person shall:

(1) - (6) (No change.)

(7) justify the use of less conservative assumptions (e.g., a larger home range) to adjust the exposure and repeat the hazard quotient exercise in paragraph (6) of this subsection, once again eliminating COCs that pose no unacceptable risk based on comparisons to the NOAELs and adding another set of comparisons, this time to the LOAELs, for those COCs indicating a potential risk (i.e., NOAEL hazard quotient > 1); however, when multiple members of a class of COCs are present which exert additive effects, it is also appropriate to utilize an ecological hazard index methodology (if all COCs are eliminated at this point, the ecological risk assessment process ends and the items listed in paragraphs (8) and (9) [(8) - (9)] of this subsection are not required);

(8) (No change.)

(9) calculate medium-specific PCLs bounded by the NOAEL and the LOAEL used in paragraph (7) of this subsection for those COCs that [which] are not eliminated as a result of the hazard quotient exercises or the uncertainty analysis; and

(10) (No change.)

(d) - (g) (No change.)

§350.79. Comparison of Chemical of Concern Concentrations to Protective Concentration Levels.

The person shall follow the procedures of this subsection to determine if a response action under this chapter is necessary to protect human health and the environment, and if a response action is necessary, then to determine if the remedy standard is attained. If the person satisfactorily demonstrates that all reasonably available analytical technology (e.g., selected ion monitoring) has been used to show that the COC cannot be measured to the method quantitation limit due to sample specific interferences, then the person shall be allowed to determine attainment based on the sample detection [quantitation] limit. The person shall make these determinations using the procedures described in either paragraph (1) or (2) of this subsection.

(1) - (2) (No change.)

SUBCHAPTER E: REPORTS

§§350.90 - 350.96

STATUTORY AUTHORITY

The amended rules and new section are proposed under the following statutory authority: TWC, §5.103 and §26.011, which provide the commission with authority to adopt any rules necessary to carry out its powers, duties, and policies and to protect water quality in the state, TWC, §5.103(c), which states the commission must adopt rules when adopting, repealing, or amending any agency statement of general applicability that interprets or prescribes law or policy or describes the practice and procedure requirements of the agency, and THSC, Texas Solid Waste Disposal Act, §361.017 and §361.024, which provide the commission the authority to regulate industrial solid waste and municipal hazardous wastes and all other powers necessary or convenient to carry out its responsibilities. In addition, the amended rules and new section are proposed under TWC, §26.039, which states that activities which are inherently or potentially capable of causing or resulting in the spillage or accidental discharge of waste or other substances and which pose serious or significant threats of pollution are subject to reasonable rules establishing safety and preventive measures which the commission may adopt or issue; TWC, §26.121, which prohibits persons from discharging wastes into or adjacent to any water in the state unless authorized to do so and prohibits persons from committing any other act or engaging in any other activity which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state; TWC, §26.262, which states that it is the policy of this state to prevent the spill or discharge of hazardous substances into the waters in the state and to cause the removal of such spills and discharges without undue delay; and TWC, §26.264, which provides the commission with authority to issue rules necessary and convenient to carry out the policy

referenced in TWC, §26.262. Authority to adopt the amended rules is also provided by TWC, §26.341, which states that it is the policy of this state to maintain and protect the quality of groundwater and surface water resources in the state from certain substances in underground and aboveground storage tanks that may pollute groundwater and surface water resources, and requires the use of all reasonable methods, including risk-based corrective action to implement this policy; TWC, §26.345, which provides the commission with the authority to adopt rules necessary to carry out the policy referenced in TWC, §26.341; and TWC, §26.401, which states that it is the policy of this state that discharges of pollutants, disposal of wastes, or other activities subject to regulation by state agencies be conducted in a manner that will maintain present uses and not impair potential uses of groundwater or pose a public health hazard, and that the quality of groundwater be restored if feasible.

The proposed amendments and new section implement TWC, §§5.103, 26.011, 26.039, 26.262, 26.264, 26.341, 26.345, and 26.401, and THSC, §§361.017, 361.024.

§350.90. Spatial and Electronic Information.

(a) When required, the person shall provide accurate spatial coordinates and associated data attributes that are reported in a format approved or required by the executive director.

(b) Reports shall be submitted in a format, including an electronic format, and according to a schedule established by the executive director.

§350.91. Affected Property Assessment Report.

(a) The person shall include the contact and identifications as described in paragraphs (1) - (3) of this subsection in an affected property assessment report (APAR):

(1) - (2) (No change.)

(3) the physical address or location of the affected property, including [an] accurate latitude and longitude and associated spatial data attributes in a format approved or required by the executive director.

(b) An APAR shall document descriptions of procedures and conclusions of the assessment and shall include all information required to meet the requirements of §350.51 of this title (relating to Affected Property Assessment), §350.52 of this title (relating to Groundwater Resource Classification) and §350.53 of this title (relating to Land Use Classification). This includes, but is not limited to:

(1) - (5) (No change.)

(6) an identification of all complete or reasonably anticipated to be completed exposure pathways, and an identification of other exposure pathways evaluated in accordance with §350.71(c)(8) of this title (relating to General Requirements) and an explanation of why those pathways were not considered to be complete or reasonably [reasonably] anticipated to be completed;

(7) as required, a completed Tier 1 Exclusion Criteria Checklist and, if appropriate, a reasoned justification and/or an expedited stream evaluation for terminating the ecological risk assessment, or as required a Tier 2 screening-level ecological risk assessment, and/or a Tier 3 site-specific ecological risk assessment as specified in §350.77 of this title (relating to Ecological Risk Assessment and Development of Ecological Protective Concentration Levels);

(8) - (13) (No change.)

(14) a description of any exposure conditions which require notice under §350.55(e) of this title (relating to Notification Requirements) and any certification required under §350.55(d) and (e) of this title; [and]

(15) accurate spatial coordinates and associated data attributes, in a format approved or required by the executive director, for all locations where samples of environmental media were collected or where other testing was conducted (e.g., water wells and monitor wells which were sampled or which were used for aquifer testing, soil sampling locations, surface water and sediment sampling locations, and air sampling locations); and

(16) [(15)] any other reasonable information required by the executive director.

[(c) The APAR shall be submitted in a format and according to a schedule established by the executive director.]

§350.92. Self-Implementation Notice.

[(a)] The person shall include the following information in a self-implementation notice (SIN):

(1) the person shall include the following contact and identifications:

(A) the name, mailing address, and telephone number of the contact person or office for the on-site affected property;

(B) the program and identification numbers for the project, if any (e.g., Solid Waste Registration number, Leaking Petroleum Storage Tank identification number, Voluntary Cleanup Program number, etc.); and

(C) the physical address or location of the affected property;

(2) a list of the COCs which require a response action;

(3) a description of the qualitative and quantitative response action objectives to be achieved by the response action;

(4) a description of any exposure conditions which require notice under §350.55(e) of this title (relating to Notification Requirements) and any certification required under §350.55(d) and (e) of this title;

(5) a description of the response action chosen to achieve Remedy Standard A;

(6) acknowledgment that any permits needed to implement the remedy will be obtained prior to implementation;

(7) a schedule for implementation and completion of the response action;

(8) if applicable, a copy of the proposed institutional control for §350.31(h)(1) of this title (relating to General Requirements for Remedy Standards); and

(9) any other reasonable information required by the executive director.

[(b) The SIN shall be submitted in a format established by the executive director.]

§350.93. Response Action Effectiveness Report.

[(a)] The person shall include the following information in a response action effectiveness report (RAER):

- (1) a summary of the response actions taken since the last reporting period;
- (2) for each environmental medium, a comparison among the critical PCL; the initial concentration of COCs; and the current (i.e., at the time of RAER submittal) concentrations of COCs;
- (3) an estimate of the percentage of the response action which has been completed;
- (4) an estimate in years of the additional time necessary to complete the response actions;
- (5) a determination whether sufficient progress is being made to achieve the selected remedy standard within a reasonable time frame given the particular circumstances of an affected property;
- (6) if applicable, a copy of the proposed institutional control for §350.31(h) of this title (relating to General Requirements for Remedy Standards); and
- (7) any other reasonable information required by the executive director.

[(b) The RAER shall be submitted in a format established by the executive director.]

§350.94. Response Action Plan.

(a) - (l) (No change.)

[(m) The person shall submit the RAP in a format specified by the executive director.]

§350.95. Response Action Completion Report.

(a) (No change.)

(b) When the person selects Remedy Standard A, the RACR shall include information which documents that the requirements for response actions stated in §350.31 and §350.32 of this title (relating to General Requirements for Remedy Standards and Remedy Standard A, respectively) have been fulfilled. When applicable, the [The] report shall also include a copy of the document that the person proposes to use to fulfill the institutional control requirements of §350.31(g) of this title (relating to General Requirements for Remedy Standards), §350.51(1), (3), or (4) of this title (relating to Affected Property Assessment), and §350.74(b)(1) or (j)(2) of this title (related to Development of Risk-Based Exposure Limits) when the affected property has been restored for commercial/industrial use.

(c) (No change.)

(d) In situations where soils which contain COCs are relocated for reuse in accordance with §350.36 of this title (relating to Relocation of Soils Containing Chemicals of Concern for Reuse Purposes), the person shall also provide:

(1) documentation of the prior written landowner consent required in §350.36(d) of this title (relating to Relocation of Soils Containing Chemicals of Concern [COCs] for Reuse Purposes) for soil reuse on property not owned by the person; and

(2) (No change.)

(e) (No change.)

[(f) The person shall submit the RACR in a format established by the executive director.]

§350.96. Post-Response Action Care Reports.

[(a)] The person shall include the following information in a post-response action care report [reports] (PRACR):

(1) the results of any monitoring program with all analytical data prepared and presented in accordance with §350.54 of this title (relating to Data Acquisition and Reporting Requirements);

(2) a summary of activities related to the inspection, operation, and maintenance of physical controls;

(3) a discussion of any corrective actions taken in response to failure of institutional and/or physical controls; and

(4) any other reasonable information required by the executive director.

[(b) The person shall submit PRACRs in a format established by the executive director.]

SUBCHAPTER F: INSTITUTIONAL CONTROLS

§350.111

STATUTORY AUTHORITY

The amended rule is proposed under the following statutory authority: TWC, §5.103 and §26.011, which provide the commission with authority to adopt any rules necessary to carry out its powers, duties, and policies and to protect water quality in the state; TWC, §5.103(c), which states the commission must adopt rules when adopting, repealing, or amending any agency statement of general applicability that interprets or prescribes law or policy or describes the practice and procedure requirements of the agency, and THSC, Texas Solid Waste Disposal Act, §361.017 and §361.024, which provide the commission the authority to regulate industrial solid waste and municipal hazardous wastes and all other powers necessary or convenient to carry out its responsibilities. In addition, the amended rule is proposed under TWC, §26.039, which states that activities which are inherently or potentially capable of causing or resulting in the spillage or accidental discharge of waste or other substances and which pose serious or significant threats of pollution are subject to reasonable rules establishing safety and preventive measures which the commission may adopt or issue; TWC, §26.121, which prohibits persons from discharging wastes into or adjacent to any water in the state unless authorized to do so and prohibits persons from committing any other act or engaging in any other activity which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state; TWC, §26.262, which states that it is the policy of this state to prevent the spill or discharge of hazardous substances into the waters in the state and to cause the removal of such spills and discharges without undue delay; and TWC, §26.264, which

provides the commission with authority to issue rules necessary and convenient to carry out the policy referenced in TWC, §26.262. Authority to adopt the amended rule is also provided by TWC, §26.341, which states that it is the policy of this state to maintain and protect the quality of groundwater and surface water resources in the state from certain substances in underground and aboveground storage tanks that may pollute groundwater and surface water resources, and requires the use of all reasonable methods, including risk-based corrective action to implement this policy; TWC, §26.345, which provides the commission with the authority to adopt rules necessary to carry out the policy referenced in TWC, §26.341; and TWC, §26.401, which states that it is the policy of this state that discharges of pollutants, disposal of wastes, or other activities subject to regulation by state agencies be conducted in a manner that will maintain present uses and not impair potential uses of groundwater or pose a public health hazard, and that the quality of groundwater be restored if feasible.

The proposed amendment implements TWC, §§5.103, 26.011, 26.039, 26.262, 26.264, 26.341, 26.345, and 26.401, and THSC, §§361.017, 361.024.

§350.111. Use of Institutional Controls.

(a) Whenever required by this chapter, the person or landowner shall file a copy of the appropriate deed notice, VCP certificate of completion or restrictive covenant in the real property records of the county in which the property is located to notify future owners of any limitations on the use of the property. Deed notices, VCP certificates of completion and restrictive covenants shall include the following information:

(1) - (6) (No change.)

(7) the TCEQ [TNRCC] Program and identifier number, and the availability of more detailed information at or through the TCEQ [TNRCC] Central Records Office or Web Site; and

(8) the physical address and mailing address for the TCEQ [TNRCC] Central Records Office.

(b) (No change.)

(c) The person shall submit a written request to the landowner to obtain permission to file the deed notice or VCP certificate of completion or to solicit agreement to have an innocent landowner execute a restrictive covenant. This written request must contain a copy of the proposed deed notice, VCP certificate of completion or restrictive covenant, the address and phone number of the commission's Public Interest Counsel as someone the landowner may contact, and a clear explanation as to the content and purpose of the institutional control. [Except for subsections (b)(4), (d), and (f) of this section, the] The person shall obtain written consent from the landowner for the filing of the deed notice or VCP certificate of completion prior to filing of a deed notice or VCP certificate of completion required to be filed under this chapter in the real property records unless the person is a governmental entity that is not a responsible party or subsections (b)(4), (d), or (f) of this section apply. Restrictive covenants shall be executed only by the landowner. A restrictive covenant in favor of TCEQ [TNRCC] and the State of Texas which runs with the land shall be the required institutional control with the

exception of institutional controls required under §350.31(h) and §350.74(b)(1) of this title (relating to General Requirements for Remedy Standards and Development of Risk-Based Exposure Limits, respectively) unless information is presented which demonstrates that:

(1) (No change.)

(2) it is technically impracticable to obtain a residential-based Remedy Standard A response action and an innocent landowner refuses to execute a restrictive covenant, or a non-innocent landowner refuses to consent to the filing of a deed notice or VCP certificate of completion; a court of competent jurisdiction has determined the amount of compensation due the landowner as compensation for filing a deed notice or VCP certificate of completion in the real property records for that property; and the person has paid into the court registry compensation, if any, determined by the court, in which case the person shall file a deed notice or VCP certificate of completion; [or]

(3) after extensive and diligent inquiry by the person, the executive director concludes that the landowner cannot be found, in which case the person shall file a deed notice or VCP certificate of completion, or [.]

(4) the person is a governmental entity that is not a responsible party, and the innocent landowner refuses to execute a restrictive covenant.

(d) (No change.)

(e) The person shall provide a copy of the request for landowner consent for filing of a deed notice or VCP certificate of completion or copy of the request for the innocent landowner to execute a restrictive covenant, and proof of the date of receipt by the landowner of the request, with the RACR, unless required earlier in accordance with §§350.33(f)(2), ~~(f)(3)(F)~~ [(f)(3)(E)], or (f)(4)(C) of this title (relating to Remedy Standard B). Proof of written landowner consent for the filing of deed notice or a VCP certificate of completion or the written agreement of the innocent landowner to execute a restrictive covenant shall be provided to the executive director before the executive director will approve the RACR, unless the provisions in subsections (b)(4), (d) or (f) of this section are met.

(f) (No change.)

SUBCHAPTER G: ESTABLISHING A FACILITY OPERATIONS AREA

§350.134

STATUTORY AUTHORITY

The amended rule is proposed under the following statutory authority: TWC, §5.103 and §26.011, which provide the commission with authority to adopt any rules necessary to carry out its powers, duties, and policies and to protect water quality in the state; TWC, §5.103(c), which states the commission must adopt rules when adopting, repealing, or amending any agency statement of general applicability that interprets or prescribes law or policy or describes the practice and procedure requirements of the agency, and THSC, Texas Solid Waste Disposal Act, §361.017 and §361.024, which provide the commission the authority to regulate industrial solid waste and municipal hazardous wastes and all other powers necessary or convenient to carry out its responsibilities. In addition, the amended rule is proposed under TWC, §26.039, which states that activities which are inherently or potentially capable of causing or resulting in the spillage or accidental discharge of waste or other substances and which pose serious or significant threats of pollution are subject to reasonable rules establishing safety and preventive measures which the commission may adopt or issue; TWC, §26.121, which prohibits persons from discharging wastes into or adjacent to any water in the state unless authorized to do so and prohibits persons from committing any other act or engaging in any other activity which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the state; TWC, §26.262, which states that it is the policy of this state to prevent the spill or discharge of hazardous substances into the waters in the state and to cause the removal of such spills and discharges without undue delay; and TWC, §26.264, which

provides the commission with authority to issue rules necessary and convenient to carry out the policy referenced in TWC, §26.262. Authority to adopt the amended rule is also provided by TWC, §26.341, which states that it is the policy of this state to maintain and protect the quality of groundwater and surface water resources in the state from certain substances in underground and aboveground storage tanks that may pollute groundwater and surface water resources, and requires the use of all reasonable methods, including risk-based corrective action to implement this policy; TWC, §26.345, which provides the commission with the authority to adopt rules necessary to carry out the policy referenced in TWC, §26.341; and TWC, §26.401, which states that it is the policy of this state that discharges of pollutants, disposal of wastes, or other activities subject to regulation by state agencies be conducted in a manner that will maintain present uses and not impair potential uses of groundwater or pose a public health hazard, and that the quality of groundwater be restored if feasible.

The proposed amendment implements TWC, §§5.103, 26.011, 26.039, 26.262, 26.264, 26.341, 26.345, and 26.401, and THSC, §§361.017, 361.024.

§350.134. Qualifying Criteria.

(a) (No change.)

(b) Other criteria that may be considered include, but are not limited to, the risk to human health and the environment that would be presented by the granting of a FOA₂ [. In addition, such factors as] the compliance history of the facility determined in accordance with Chapter 60 of this title

(relating to Compliance History), as amended, and any other pertinent information [shall also be considered].