West Virginia Department of Environmental Protection
Documentation of 2026 Proposed Updates to the WV Voluntary Remediation and Redevelopment De Minimis Standards (60CSR9)

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1.0 Background

The Voluntary Remediation and Redevelopment Act (W. Va. Code § 22-22-1, et seq.) established the WV Voluntary Remediation Program (VRP), which applies De Minimis Standards during voluntary remediation activities and brownfield revitalization. De Minimis Standards are contaminant levels that pose no substantial risk to human health based on the current or reasonably anticipated future land and groundwater use for either residential or industrial purposes. The Voluntary Remediation and Redevelopment Rule (60CSR3 §9.2.d) outlines the method for calculating De Minimis Standards, which are to be reviewed annually and updated as necessary to reflect current toxicity information, chemical-specific data, and exposure parameters.

2.0 Overview of De Minimis Standards Revisions

The De Minimis Standards are based on the product of *Exposure times Toxicity*. Exposure is calculated based on chemical-specific data and receptor-specific exposure parameters. As outlined in the Voluntary Remediation and Redevelopment Rule (60CSR3), the chemical-specific data for the contaminants in the De Minimis Standards Table were each compared to the current data in the Risk Assessment Information System (RAIS) Chemical Data Profiles (https://rais.ornl.gov/tools/profile.php) and the U.S. EPA Comptox database (https://comptox.epa.gov/dashboard). The exposure parameters used in De Minimis Standard calculations were taken from the most recent U.S. EPA Default Exposure Parameters, and the equations were compared to those defined in the U.S. EPA Regional Screening Level User's Guide (https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide).

Toxicity is based on values from various sources of toxicological research to determine carcinogenic responses to chemical exposures via ingestion (Cancer Slope Factor (CSF)) or inhalation (Inhalation Unit Risk (IUR)), and non-carcinogenic responses via ingestion (Reference Dose (RfD)) and inhalation (Reference Concentration (RfC)). The carcinogenic and non-carcinogenic effects due to dermal exposures have been developed for very few chemicals and are therefore assessed on a chemical-specific basis as a dermal absorption fraction of the ingestion toxic responses, with most chemicals having a dermal fraction value of one (1). The hierarchy of sources of toxicity values are determined in 60CSR3, with Tier 1 values being the Integrated Risk Information System (IRIS), Tier 2 being the Provisional Peer-Reviewed Toxicity Values (PPRTVs), and Tier 3 being all other sources. The toxicity updates were validated against the approved sources (Table 1).

Updates of parameters used to calculate exposure for the De Minimis Standards were cross-checked against the most current U.S. EPA Regional Screening Levels (RSLs) data as a last validation step. The RSLs are updated twice a year by U.S. EPA, and the WV De Minimis Standards updates represented here include all RSL updates through November 2024. (Note that the May 2025 update has been indefinitely

postponed by U.S. EPA.) The WV chemical-specific toxicity and exposure data were then updated in the De Minimis Standards calculation spreadsheet.

3.0 Updates of Toxicity Values

Toxicity values are mandated by 60CSR3 to be the most updated values from IRIS as the first preference (Tier 1) and the Provisionally Peer-Reviewed Toxicity Values (PPRTV) as the second preference (Tier 2). Other governmental (e.g., CalEPA and OPP) or relevant scientific sources (ATSDR) may also be used (Tier 3) when values are not available from IRIS or PPRTV.

Toxicity Value Sources	
Tier 1	IRIS – *Integrated Risk Information System*
Tier 2	PPRTV – *Peer-Reviewed Provisional Toxicity Values*
Tier 3	ATSDR – *Agency for Toxic Substances and Disease Registry, derived from Minimal Risk Levels* CalEPA – *California Environmental Protection Agency* OPP – *U.S. EPA Office of Pesticide Programs* PPRTV APP – *Peer-Reviewed Provisional Toxicity Values published in Appendix* RSL TEF – *U.S. EPA Regional Screening Levels Toxicity Equivalence Factors where the toxicity of several PAHs ae based on their toxicity relative to Benzo(a)pyrene in the absence of values in IRIS* RSL UG – *U.S. EPA Regional Screening Levels User's Guide providing modifications to toxicity values as deemed appropriate*

Since the last update of the De Minimis Standards Table (which became effective August 29, 2021), the toxicity values of numerous chemicals have changed (Table 1), requiring that the De Minimis Standards be updated to reflect these new values. Additionally, several RfC values were based on route-to-route extrapolation of inhalation exposures from ingestion exposure (RfD) values. Thus, as the RfD changes for a chemical using route-to-route extrapolation, the RfC also needs to change. Furthermore, the route-to-route extrapolation process in the past used a body mass of 70 kg; however, U.S. EPA and WVDEP have been using 80 kg as the default body mass for adults since 2014, and the older extrapolated values were not previously updated to account for this new body mass value.

3a. 1-Methylnaphthalene Reference Concentration (RfC)

1-Methylnaphthalene (1-MN) is one of three Naphthalenes (1-MN, 2-Methylnaphthalene and Naphthalene), which are recognized to be structurally similar compounds because they all have very similar chemical-specific parameters (Henry's Law Constant, Solubility, Vapor Pressure, etc.). In the May 2024 Regional Screening Level (RSL) updates from U.S. EPA, 1-MN had a new RfC that was developed by U.S. EPA as a PPRTV. This RfC for 1-MN was 3.0E-06 mg/m^3 and is 1,000 times more stringent than the RfC for Naphthalene developed by IRIS (3.0E-03 mg/m^3). WVDEP noticed that this new value would drop the Groundwater De Minimis Standard for 1-MN from 1.1 µg/L to 0.0063 µg/L, and the Industrial Groundwater Vapor Intrusion Screening Level for industrial sites would be 1.6 µg/L. These new values would have significant impacts on remedial actions within the VRP and UECA-LUST Program. Thus, WVDEP researched the development of the 1-MN RfC by PPRTV.

While there is precedent for increased toxicity via methylation (e.g., Methylmercury vs. elemental Mercury), there is little evidence that either of the Methylnaphthalenes are more toxic than Naphthalene. The oral RfD for all three chemicals are very similar (7.0E-02 mg/kg*d for 1-MN, 4.0E-03 mg/kg*d for 2-MN, and 2.0E-02 mg/kg*d for Naphthalene), and the Cancer Slope Factor (CSF) for 1-MN is similar to that of Naphthalene (5.1E-02 per mg/kg*d and 1.2E-01 per mg/kg*d, respectively). Importantly, the RfD values for Naphthalene and 1-MN are on the same order of magnitude (E-02), whereas the RfD for 2-MN is one order of magnitude more stringent (E-03). This same pattern also

holds for the subchronic RfD values (6.0E-01 for 1-MN, 4.0E-03 for 2-MN and 2.0E-01 for Naphthalene). Furthermore, the Intermediate RfC value for 1-MN (5.2E-01) is less stringent than that of 2-MN (1.74E-03). All of this toxicity information indicates that 1-MN toxicity more closely matches that of Naphthalene and not 2-MN.

Olfactory and respiratory epithelia are known targets for both 1-MN and Naphthalene because they affect the same organs and systems (USEPA 2024). Their structural and chemical similarities indicate that their toxicology should be similar as well, as indicated by the CSF and RfD values noted above. However, the RfC for 1-MN from PPRTV is three orders of magnitude (1000X) more stringent than that of Naphthalene, indicating a potential discrepancy in our collective understanding of Naphthalenes in general.

The toxicity study used by U.S. EPA for PPRTV (Kim et al. 2020) showed that 40% of the male rats inhaling 1-MN at a concentration of 3.0 mg/m^3 had hyperplasia of mucous cells in nasopharyngeal tissues, and 100% of the male rats had the same effect at a concentration of 23.7 mg/m^3. By comparison, female rats did not have any impacts until concentrations of 179.3 mg/m^3, but 100% of the females had the same hyperplasia as the males at this concentration, indicating universal impacts at higher concentrations. However, this study did not use one of the standardized toxicological protocols, although it was similar to OED Test Guideline 413, and PPRTV gave it a low confidence rating with an Uncertainty Factor (UF) of 3000. This subchronic study by Kim and others was also the only inhalation study of 1-MN available for consideration by U.S. EPA. PPRTV used the 3.0 mg/m^3 concentration as the Lowest Observed Adverse Effect Level (LOAEL) to develop a 10% BMD Point of Departure (POD) using Benchmark Dose software following standard toxicological practices.

By comparison, IRIS had three animal inhalation studies available to determine the RfC for Naphthalene when developing an RfC of 3.0E-03 mg/m^3, based on a National Toxicology Program (NTP) study (1992) of mice. In this chronic NTP study, the lowest concentration (52 mg/m^3) had 100% of both male and female mice impacted by hyperplasia of the respiratory epithelium and metaplasia of olfactory epithelium, indicating universal impacts at lower concentrations than those seen in 1-MN. However, these results are similar to the results for 1-MN at the 23.7 mg/m^3 concentration for male rats. With 100% impacts as the LOAEL, there was no way to calculate a 10% BMD POD, and IRIS chose to estimate a No Observed Adverse Effect Level (NOAEL) using the standard 10% of the LOAEL method. This NOAEL estimate resulted in the RfC for Naphthalene also using a UF of 3000. IRIS rated their RfC for Naphthalene as low to medium confidence, which is higher than the RfC for 1-MN from PPRTV that had low confidence.

Importantly, respiratory systems are known to produce both adverse and adaptive effects (Pandiri et al. 2017). Adaptive effects are those that produce a mild temporary response to environmental stressors, such as mucous cell hyperplasia, but recover once the stressor is gone, and are therefore considered unrelated to the toxicity of the stressor. Adverse effects are more permanent effects created by a stressor that are related to their toxicity from either acute, subchronic, or chronic exposures. Neither of the studies used to develop the RfCs for 1-MN or Naphthalene account for the potential adaptive effects as opposed to adverse effects of these chemicals. However, it is more likely that the 1-MN study exhibited adaptive effects at the lower concentrations used to establish the POD to develop the RfC. The Naphthalene study likely showed only adverse effects because it used more intermediate concentrations as the starting point for the study and 100% of the test mice were impacted, potentially shooting past the range of concentrations with adaptive effects. Comparatively, the 1-MN study showed partial (40%) impacts at the lowest concentration in male rats only, which may have been an adaptive response before the universal adverse effects became established at higher concentrations. Without clear knowledge of the adaptive versus adverse effects, there is more uncertainty in both of these values, but the adaptive effects were more likely evident in the 1-MN study. It is possible that the

lowest concentration of 1-MN exposure in the study by Kim and others may have a true adverse effect and the estimated 10% BMD POD is accurate, but such a determination cannot be made with the information available at this time.

An alternative method to determine a RfC value for 1-MN would be to use route-to-route extrapolation (RtR) of the RfD value. However, U.S. EPA generally does not support the use of RtR except on a case-by-case basis. Calculating a RtR RfC based on the accepted RfD for 1-MN using the standard RtR equation from U.S. EPA [RfC = RfD x (70/20)] yields a value of 2.5E-01 mg/m^3, which is 83,000 times less stringent than the PPRTV value. While this value supports the determination that the PPRTV RfC value is overly conservative, it is also developed from a process that has much uncertainty and questionable applicability when other options are available.

WVDEP concurs with both PPRTV and IRIS that there is a toxicological effect from 1-MN and Naphthalene due to inhalation but has reservations about the actual RfC value for 1-MN. Due to the admittedly low confidence in the RfC for 1-MN from PPRTV, WVDEP does not support the use of this value for 1-MN at this time. Accordingly, WVDEP has chosen to use the RfC value for Naphthalene from IRIS as a surrogate for 1-MN to account for the potential non-cancer inhalation risks from this chemical since the known toxicity values of 1-MN and Naphthalene closely align. The De Minimis Standards were developed using the Naphthalene RfC surrogate (3.0E-03 mg/m^3), and WVDEP recommends all site-specific risk assessments use this value for 1-MN as well. WVDEP will continue to monitor the RfC values available for 1-MN and, when appropriate, will update the value as more confident estimates become available.

3b. Determinations of Mutagenic Mode of Action

In addition to the changes in toxicity values listed below in Table 1, U.S. EPA has determined that several carcinogenic chemicals act by a mutagenic mode of action, which alters the impacts to children. This mutagenic designation has the effect of increasing the likelihood of getting cancer by a factor of approximately three (3) over the course of a lifetime, which impacts the protective screening levels in the De Minimis Standards. Four (4) chemicals in the table of De Minimis Standards have been updated to account for the newly designated mutagenic mode of action. Those chemicals are 3,3'-Dimethooxybenzidine, 3,3'-Dimethylbenzidine, 2-Chloro-1,3-butadiene (Chloroprene), and Formaldehyde. Because mutagenic chemicals alter the health effects during exposure to children, these mutagen designations only impact the Residential De Minimis Standards and Groundwater De Minimis Standards, not the Industrial De Minimis Standards.

Table 1:
Required Changes to Toxicity Data and Sources of Data for Chemicals Based on the Three Tiers of Toxicity Data

CHEMICAL	Oral Cancer Slope Factor (CSFo) $(mg/kd\text{-}d)^{-1}$	CSFo source	Oral Reference Dose (RfDo) (mg/kg-d)	RfDo source	Inhalation Unit Risk (IUR) $(ug/m3)^{-1}$	IUR source	Reference Concentration (RfC) (mg/m3)	RfC source
Acenaphthene							2.4E-01	RtR†
Acenaphthylene							2.4E-01	RtR†
Acetone							Deleted	ATSDR
Acrylonitrile			9.0E-05	ATSDR				
Arsenic, Inorganic	3.2E+01	IRIS	6.0E-05	IRIS				
Aldrin							1.2E-04	RtR†
Benzo(g,h,i)perylene							1.2E-01	RtR†
Bis(2-chloroisopropyl)ether							1.6E-01	RtR†
Bromodichloromethane							3.2E-02	RtR‡
Bromoform							8.0E-02	RtR†
Bromophos							2.0E-02	RtR†
1-Butanol							4.0E-01	RtR†
Butlyate							2.0E-01	RtR†
Tert-Butanol	5.0E-04	IRIS	4.0E-01	IRIS			5.0E+00	IRIS
Cadmium and compounds			1.0E-04	RSL*				
Chloroacetic acid			3.5E-03	CalEPA				
4-Chloroaniline			5.0E-04	RSL*				
Chloroethane							4.0E+00	RSL*
Chloroform							1.95E-03	ATSDR
Beta-Chloronaphthalene							3.2E-01	RtR†
2-Chlorophenol							2.0E-02	RtR†
o-Chlorotoluene							8.0E-02	RtR†
Chromium III (Soluble Compounds)							6.0E-05	CalEPA
Chromium VI	1.6E-01	IRIS	9.0E-04	IRIS	1.1E-02	IRIS	3.0E-05	IRIS
Crotonaldehyde					4.8E-04	RtR†		
Cyhalothrin/Karate (chemical deleted)			Deleted	OPP				
Cypermethrin			7.2E-02	OPP				
DDD			5.0E-04	ATSDR				

CHEMICAL	Oral Cancer Slope Factor (CSFo) $(mg/kd-d)^{-1}$	CSFo source	Oral Reference Dose (RfDo) (mg/kg-d)	RfDo source	Inhalation Unit Risk (IUR) $(ug/m3)^{-1}$	IUR source	Reference Concentration (RfC) (mg/m3)	RfC source
DDE			5.0E-04	ATSDR				
1,4-Dibromobenzene							4.0E-02	RtR†
Dibromochloromethane							8.0E-02	RtR†
1,1-Dichloroethylene							4.0E-03	ATSDR
1,2-Dichloroethylene (cis)							4.0E-02	PPRTV
Dieldrin							2.0E-04	RtR†
N,N-Dimethylaniline							8.0E-03	RtR†
1,4-Dithiane							4.0E-02	RtR†
Endosulfan							2.4E-02	RtR†
Endrin							1.2E-03	RtR†
2-Ethoxyethanol							4.0E-02	RSL*
Ethyl acetate			7.0E-01	RSL*				
Ethylbenzene			5.0E-02	RSL*				
Ethylene diamine							3.6E-01	RtR†
Ethylene glycol			8.0E-01	RSL*				
Ethyl ether							8.0E-01	RtR†
Fluorene							1.6E-01	RtR†
Fomesafen			1.0E-02	OPP				
Formaldehyde	2.1E-02	CalEPA			1.1E-05	IRIS	7.0E-03	IRIS
Furfural	3.5E-02	OPP						
Heptachlor			1.0E-04	RSL*			4.0E-04	RtR‡
Heptachlor epoxide							5.2E-05	RtR†
Hexabromobenzene							8.0E-03	RtR†
Hexachlorobenzene			1.0E-05	RSL*			4.0E-05	RtR‡
Hexachlorobutadiene							4.0E-03	RtR†
HCH (alpha)			9.0E-04	ATSDR				
HCH (gamma) Lindane			8.0E-07	ATSDR				
Isobutyl alcohol							4.0E-01	PPRTV
Isopropalin							6.0E-02	RtR†
Methyl acetate							4.0E+00	RtR†

CHEMICAL	Oral Cancer Slope Factor (CSFo) $(mg/kd-d)^{-1}$	CSFo source	Oral Reference Dose (RfDo) (mg/kg-d)	RfDo source	Inhalation Unit Risk (IUR) $(ug/m3)^{-1}$	IUR source	Reference Concentration (RfC) (mg/m3)	RfC source
MCPB			4.4E-02	Correct typo				
1-Methylnaphthalene	5.1E-02	PPRTV					3.0E-03	IRIS**
4-Methylphenol (p-Cresol)			2.0E-02	RSL*				
Mirex							8.0E-04	RtR†
Naled							8.0E-03	RtR†
Nickel and compounds							1.0E-05	ATSDR
2-Nitropropane					5.8E-04	PPRTV		
Oryzalin			1.9E-01	OPP				
Oxadiazon	7.1E-02	OPP						
Oxyfluorfen			4.0E-02	OPP				
Pyrene							1.2E-01	RtR†
Pyridine							4.0E-03	RtR†
RDX (Cyclonite)	8.0E-02	IRIS	4.0E-03	IRIS				
Ronnel							2.0E-01	RtR†
1,2,4,5-Tetrachlorobenzene			3.0E-05	RSL*			1.2E-03	RtR†
1,1,1,2-Tetrachloroethane							1.2E-01	RtR†
1,1,2,2-Tetrachloroethane							8.0E-02	RtR‡
p,a,a,a-Tetrachlorotoluene	1.6E+01	PPRTV	6.0E-05	PPRTV	4.0E-03	RtR‡		
Toxaphene			9.0E-05	PPRTV				
1,2,4-Tribromobenzene							2.0E-02	RtR†
1,1,2-Trichloropropane							2.0E-02	RtR†
Vinyl Chloride							5.1E-02	ATSDR

*U.S. EPA used several subchronic toxicity values in place of chronic toxicity values as part of the RSL process because the subchronic values were more recent and more protective than the chronic values. Original sources of the toxicity values can be found in the RSL documentation.

**PPRTV developed a provisional RfC value of 3.0E-06 mg/m^3 for 1-Methylnaphthalene; however, WVDEP has little confidence in this value (see Subsection 3a) and has opted to use the RfC value for Naphthalene from IRIS as a surrogate for 1-Methylnaphthalene.

†RtR is Route-to-Route extrapolation of RfC values based on RfD or CSF values that needed to be changed to account for the change in body mass from 70 kg to 80 kg.

‡Route-to-Route extrapolation that needed to be updated because the RfD or CSF value the extrapolation was based on changed, and the extrapolated RfC needed to change with it.

4.0 Updates of Exposure Values

4a. Exposure Assumptions

WVDEP has been concerned about the use of the U.S. EPA national default value of 26 years for Exposure Duration, which comes from the 90th percentile value in Table 16-87 of the U.S. EPA Default Exposure Factors Handbook: 2011 Edition that was derived using a Monte Carlo probabilistic method conducted by Johnson and Capel in 1992 to simulate the residential occupancy period of 500,000 individuals using U.S. Census Bureau data. The 2022 U.S. Census Bureau data for WV indicates that 16.0% of householders moved into their current home in 1989 or earlier. Thus, 84.0% of the population lived in their home for no more than 33 years, and 14% of the population lived in their home for at least 33 years, which equates to an 84th percentile value of 33 years. This analysis indicates that the 90th percentile for WV is greater than 33 years and likely more than 35 years, instead of the 26-year 90th percentile used nationwide.

Table 16-87 of the U.S. EPA Default Exposure Factors Handbook: 2011 Edition indicates that the 95th percentile residential occupancy period is 33 years. An additional estimate of residential occupancy period in Table 16-90 of the U.S. EPA Default Exposure Factors Handbook: 2011 Edition adapted from more recent U.S. Census Bureau data (2008) indicates that the 90th percentile residential occupancy period is 32 years. Furthermore, the original 1989 Risk Assessment Guidance for Superfund (RAGS) Volume I, Human Health Evaluation Manual (Part A) that is still the blueprint for all human health risk assessment in both U.S. EPA and WVDEP, utilized a value of 30 years for the Exposure Duration to assess human health risks based on the 90th percentile available at that time. In fact, WVDEP originally used the 30-year Exposure Duration value in all risk assessments until U.S. EPA changed their default value in 2011.

WVDEP requested access to the pertinent WV Census data to calculate a state-specific Exposure Duration value; however, the US Census Bureau was unable to share the data with WVDEP. Without access to the complete Census data for WV, there is no way to precisely calculate the 90th percentile residential occupancy period for a state-specific Exposure Duration value; however, it is clear with publicly available data that 26 years underestimates the 90th percentile length of time West Virginians spend living in one location. Based on this information, WVDEP proposes to update the WV Default Exposure Duration for residents from 26 years to 30 years to align with the original RAGS guidance. This update of the residential Exposure Duration to 30 years accounts for the readily apparent longer time periods spent living at one residence by WV citizens and the uncertainty in the actual value for the State. WVDEP considered using 32 years based on the alternate national 90th percentile in Table 16-90 of the 2011 Default Exposure Factors Handbook, or 33 years based on the known 84th percentile for WV, but, due to the uncertainty in the specific WV residential occupancy period, is proposing to only increase the residential Exposure Duration by four (4) years to match the original RAGS default Exposure Duration.

4b. Lead

On October 16, 2025, the U.S. EPA Office of Land and Emergency Management (OLEM) issued a directive providing updated guidance for lead contaminated soil on residential properties at CERCLA sites and RCRA hazardous waste cleanup facilities (https://www.epa.gov/superfund/residential-soil-lead-directive-cercla-sites-and-rcra-hazardous-waste-cleanup-facilities). This directive established an RSL value of 200 mg/kg and a Removal Management Level (RML) of 600 mg/kg, and the RSL is expected to be formally revised during the next scheduled RSL update.

The WVDEP Voluntary Remediation Program has historically followed U.S. EPA guidance for Lead risks by adopting the RSLs as the Residential (400 mg/kg) and Industrial (800 mg/kg) De Minimis

Standards. These old standards are based on biokinetic models that predict soil exposures resulting in a 5% chance of an individual's blood Lead levels matching the Center for Disease Control's (CDC) original Blood Lead Reference Value (BLRV) of 10 µg/dL. Note that the CDC BLRV is based on the actual Lead concentration of 97.5% of the population. The 97.5th percentile was chosen since there is no toxicological threshold for naturally occurring Lead, meaning there is no safe dose, and this level was presumed to protect sensitive populations based on natural background exposures. The CDC updated the BLRV to 5 µg/dL in 2012 and again to 3.5 µg/dL in 2021. Evidence has shown that Lead as low as 2 µg/dL causes decreased cognitive function in children (USEPA 2013), and possibly as low as 1 µg/dL (ATSDR 2020). In addition to the well-known cognitive impacts, Lead also causes hypertension and coronary heart disease, especially in adults, along with liver dysfunction and reproductive issues (USEPA 2013). Note that the new U.S. EPA Lead guidance also establishes that the target blood Lead level (BLL) threshold to be used in assessing Lead risks is 5.0 µg/dL in all cases, not the latest CDC value of 3.5 µg/dL.

Site-specific risks due to Lead exposure at residences have been assessed using the Integrated Exposure Uptake Biokinetic Model (IEUBK) since 1994, but risks for non-residential workers have been assessed using the Adult Lead Model (ALM) since 2001. Both of these models can estimate the probability of someone having a blood Lead level greater than a specified threshold (e.g., 5 µg/dL) and also calculate a site-specific Preliminary Remediation Goal (PRG) to remediate the risks associated with Lead by assessing the most sensitive receptors. IEUBK specifically models the blood Lead level of children ages 0-6 years old that have been exposed to Lead in soil and dust. ALM models the BLL of a fetus exposed via the pregnant mother that is living or working at a site with Lead-contaminated soil and dust. The methods to calculate a PRG in both models is to determine the soil concentration that creates no more than a 5% chance of a blood Lead level greater than an established threshold, which was historically 10 µg/dL but is being updated to 5 µg/dL, with important exposure parameters adjusted to the specific exposure scenario (e.g., soil ingestion rate, exposure duration, and soil absorption factor). Both of these models are relatively simple to use and have been utilized by the remediation industry for decades.

Based on the information presented, WVDEP is proposing to update both the Residential De Minimis Standard and the Industrial De Minimis Standard for Lead. WVDEP proposes to update the Residential De Minimis Standard to 200 mg/kg to match the new U.S. EPA guidance and RSL, which is now suitably protective for residential receptors. Additionally, WVDEP proposes to update the Industrial De Minimis Standard for Lead, which is not addressed in the updated U.S. EPA guidance, to 460 mg/kg. This proposed Industrial De Minimis Standard has been developed based on an Adult Lead Model scenario of a Composite Worker (i.e., indoor and outdoor) with a soil ingestion rate of 100 mg/day, an exposure frequency of 250 days/year, an averaging time of 365 days, and a 5% probability of the target BLL in a fetus exceeding 5 µg/dL. This scenario uses the same exposure parameters as those used to develop all Industrial De Minimis Standards.

Applicants may also assess the site-specific risks due to Lead in their soil using either IEUBK for risks to residential receptors or ALM for risks to industrial receptors following well established protocols outlined in the VRP Guidance Manual. Furthermore, the BLL threshold used to assess the risks will be 5.0 µg/dL, in accordance with the new U.S. EPA guidance. Note that both IEUBK and ALM models can be used to calculate both the risks to the individuals as well as calculate Preliminary Remediation Goals (PRGs) that can be used as thresholds during remedial activities.

The current Groundwater De Minimis Standard is 15 µg/L, based on the Maximum Contaminant Level (MCL) under the Safe Drinking Water Act (SDWA) and promulgated in the WV Groundwater Protection Act (GPA). In the case of Lead, the MCL is actually an Action Level defined in the Copper and Lead Rule. The rationale for this MCL is that Lead has an MCL Goal (MCLG) of zero (0) µg/L

because there are no safe levels of Lead exposure, but since a concentration of zero is impossible to measure and Lead is a naturally occurring element, the Copper and Lead Rule established an Action Level of 15 µg/L based on the balance of human health risks, treatment costs, and analytical detection limits. In October 2024, the Copper and Lead Improvements Rule was promulgated by U.S. EPA (https://www.epa.gov/ground-water-and-drinking-water/lead-and-copper-rule-improvements) and established a new Action Level of 10 µg/L for Lead in drinking water to better protect human health. Thus, the U.S. EPA Regional Screening Levels (RSLs) update on November 13, 2024, included an update to both the tap water RSL and MCL for Lead to 10 µg/L. WVDEP anticipates that this change to the Lead MCL will eventually be reflected in State 47CSR12 regulations as well.

In the meantime, because the Groundwater De Minimis Standard has programmatically been based on the Copper and Lead Rule Action Level, WVDEP proposes to update the Lead Groundwater De Minimis Standard to 10 µg/L to align with the current MCL from U.S. EPA and to be appropriately protective of human health.

5.0 New Chemicals Added to the De Minimis Standards (PFAS)

On April 26, 2024, U.S. EPA published the final rule establishing National Primary Drinking Water Regulations (NPDWRs) for six per- and polyfluoroalkyl substances (PFAS), which became effective on June 25, 2024. This final rule established the Maximum Contaminant Levels (MCLs) for the following PFAS:

- Hexafluoropropylene oxide dimer acid (HFPO-DA, commonly known as GenX Chemicals)
- Perfluorohexane sulfonic acid (PFHxS)
- Perfluorononanoic acid (PFNA)
- Perfluorooctanesulfonic acid (PFOS)
- Perfluorooctanoic acid (PFOA)

The rule also included a Hazard Index MCL to limit any mixture containing one or more of HFPO-DA, PFHxS, PFNA, and/or Perfluorobutane sulfonic acid (PFBS).

Later, on May 14, 2025, the U.S. EPA announced that the agency plans to rescind and reconsider the MCLs for GenX, PFNA, and PFHxS, as well as the hazard index for mixtures, which includes PFBS, and, on September 11, 2025, formally filed a motion for partial vacatur requesting the D.C. Circuit Court to vacate those four (4) standards.

Additionally, on May 8, 2024, U.S. EPA published the final rule designating two (2) per- and polyfluoroalkyl substances (PFAS)—perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), including their salts and structural isomers—as hazardous substances pursuant to CERCLA, and this rule became effective on July 8, 2024.

In accordance with the Voluntary Remediation and Redevelopment Rule §9.2.d, which states that "updates to the De Minimis Standards shall occur following significant regulatory changes such as a revised groundwater quality standard or listing of a new hazardous substance in 104(14) of CERCLA," these regulatory actions trigger the duty for WVDEP to update the De Minimis Standards to include such substances.

Thus, WVDEP proposes De Minimis Standards for the two (2) PFAS that are designated as CERCLA hazardous substances and for which U.S. EPA plans to implement MCLs:

- Perfluorooctanesulfonic acid (PFOS)

- Perfluorooctanoic acid (PFOA)

Following the established protocol to develop De Minimis Standards in 60CSR3, the toxicity data was based on the three-tiered approach, and chemical-specific data for these two PFAS were found in the Risk Assessment Information System (RAIS) Chemical Database. The exposure parameters were the same as those used to develop every other De Minimis Standard for relevant media and receptors (residential soil, industrial soil, and groundwater). The resulting De Minimis Standards for PFOA and PFOS are either equal to or slightly less stringent than the corresponding U.S. EPA Regional Screening Levels. It is important to remember that WVDEP is committed to protecting human health and once the MCLs or other regulatory statutes include other PFAS compounds, such as HFPO-DA, they will be added to the De Minimis Standards.

The Voluntary Remediation and Redevelopment Rule specifies that when a chemical has a WV Groundwater Standard based on MCLs established in 47CSR12, the De Minimis Standard will default to the values from 47CSR12. Although federal MCLs developed for PFOA and PFOS have not yet been reflected in the 47CSR12 regulations, WVDEP anticipates such regulations will occur in the future and proposes to use the federal MCLs as the default De Minimis Groundwater Standards for programmatic consistency.

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6.0 Proposed Changes to the De Minimis Table

Once the updated exposure and toxicity values were input into the De Minimis Standards calculation spreadsheet, the final screening values of the De Minimis Standards were updated accordingly. Table 2 shows the current values and the proposed new values together. If no change is being proposed, then only one value is presented as both current and new. However, for those standards which changed, the current standard is ~~struck through,~~ and the proposed new standard is in parentheses. Upon completion of the approval process, the final version of the De Minimis Standards Table will be published in the VRP Guidance Manual and on the WVDEP Office of Environmental Remediation Technical Guidance and Templates webpage (https://dep.wv.gov/dlr/oer/technicalguidanceandtemplates/Pages/default.aspx).

Table 2:
Proposed Changes to the De Minimis Standards Table (Table 60-9)

CONTAMINANT	CAS No.	Residential Soil[1,3] (mg/kg)	Value Basis4	Industrial Soil[1,3] (mg/kg)	Value Basis4	Ground Water[2,3] (ug/L)	Value Basis4
Acetaldehyde	75-07-0	~~1.2E+01~~(1.0E+01)	c	3.7E+02	nc	~~2.6E+00~~(2.2E+00)	c
Acetochlor	34256-82-1	1.3E+03	nc	1.6E+04	nc	3.5E+02	nc
Acetone	67-64-1	~~6.1E+04~~(7.0E+04)	nc	1.1E+05	Csat	~~1.4E+04~~(1.8E+04)	nc
Acetonitrile	75-05-8	8.7E+02	nc	3.7E+03	nc	1.3E+02	nc
Acetophenone	98-86-2	2.5E+03	Csat	2.5E+03	Csat	1.9E+03	nc
Acrolein	107-02-8	1.5E-01	nc	6.5E-01	nc	4.2E-02	nc
Acrylamide	79-06-1	2.4E-01	c	4.6E+01	c	~~5.0E-02~~(4.8E-02)	c
Acrylonitrile	107-13-1	~~2.7E-01~~(2.4E-01)	c	1.2E+01	c	~~5.2E-02~~(4.6E-02)	c
Alachlor	15972-60-8	~~9.7E+00~~(9.2E+00)	c	4.1E+02	c	2.0E+00	gws
Alar	1596-84-5	~~3.0E+01~~(2.9E+01)	c	1.3E+03	c	~~4.3E+00~~(3.8E+00)	c
Aldicarb	116-06-3	6.3E+01	nc	8.2E+02	nc	3.0E+00	gws
Aldicarb sulfone	1646-88-4	6.3E+01	nc	8.2E+02	nc	2.0E+00	gws
Aldrin	309-00-2	~~3.9E-02~~(3.7E-02)	c	1.8E+00	c	~~9.2E-04~~(8.0E-04)	c
Aluminum	7429-90-5	7.7E+04	nc	1.0E+06	max	2.0E+04	nc
Aniline	62-53-3	~~9.5E+01~~(9.0E+01)	c	4.0E+03	c	~~1.3E+01~~(1.2E+01)	c
Antimony and compounds	7440-36-0	3.1E+01	nc	4.7E+02	nc	6.0E+00	gws
Arsenic	7440-38-2	~~6.8E-01~~(3.0E-02)	c	~~3.0E+01~~(1.4E+00)	c	1.0E+01	gws
Assure	76578-14-8	5.7E+02	nc	7.4E+03	nc	1.2E+02	nc
Atrazine	1912-24-9	~~2.4E+00~~(2.2E+00)	c	1.0E+02	c	3.0E+00	gws
Azobenzene	103-33-3	~~5.6E+00~~(5.3E+00)	c	2.6E+02	c	~~1.2E-01~~(1.0E-01)	c
Barium and compounds	7440-39-3	1.5E+04	nc	2.2E+05	nc	2.0E+03	gws
Baygon	114-26-1	2.5E+02	nc	3.3E+03	nc	7.8E+01	nc
Baythroid	68359-37-5	1.6E+03	nc	2.1E+04	nc	1.2E+02	nc
Bentazon	25057-89-0	1.9E+03	nc	2.5E+04	nc	5.7E+02	nc
Benzaldehyde	100-52-7	1.7E+02	c	1.2E+03	Csat	~~1.9E+01~~(1.6E+01)	c
Benzene	71-43-2	~~1.2E+00~~(1.1E+00)	c	5.4E+01	c	5.0E+00	gws
Benzidine	92-87-5	~~5.3E-04~~(5.2E-04)	c	1.0E-01	c	1.0E-04	c
Benzoic acid	65-85-0	2.5E+05	nc	1.0E+06	max	7.5E+04	nc

CONTAMINANT	CAS No.	Residential Soil[1,3] (mg/kg)	Value Basis4	Industrial Soil[1,3] (mg/kg)	Value Basis4	Ground Water[2,3] (ug/L)	Value Basis4
Benzyl alcohol	100-51-6	6.3E+03	nc	8.2E+04	nc	2.0E+03	nc
Benzyl chloride	100-44-7	~~1.1E+00~~(1.0E+00)	c	5.1E+01	c	~~8.9E-02~~(7.8E-02)	c
Beryllium and compounds	7440-41-7	1.6E+02	nc	2.3E+03	nc	4.0E+00	gws
1,1'-Biphenyl	92-52-4	5.1E+01	nc	2.1E+02	nc	8.3E-01	nc
Bis(2-chloroethyl)ether	111-44-4	~~2.4E-01~~(2.2E-01)	c	1.1E+01	c	~~1.4E-02~~(1.2E-02)	c
Bis(2-chloroisopropyl)ether	108-60-1	~~5.1E+00~~(4.7E+00)	c	2.3E+02	c	~~3.6E-01~~(3.1E-01)	c
Bis(chloromethyl)ether	542-88-1	~~8.9E-05~~(7.7E-05)	c	3.9E-03	c	~~7.2E-05~~(6.3E-05)	c
Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7	~~3.9E+01~~(3.7E+01)	c	1.6E+03	c	6.0E+00	gws
Bromodichloromethane	75-27-4	~~3.1E-01~~(2.7E-01)	c	1.4E+01	c	~~1.3E-01~~(8.0E+01)	gws
Bromoform (tribromomethane)	75-25-2	~~2.0E+01~~(1.8E+01)	c	9.1E+02	c	~~3.3E+00~~(8.0E+01)	gws
Bromomethane	74-83-9	7.3E+00	nc	3.2E+01	nc	7.5E+00	nc
Bromophos	2104-96-3	3.4E+02	nc	~~3.8E+03~~(3.9E+03)	nc	~~1.8E+01~~(1.9E+01)	nc
1,3-Butadiene	106-99-0	~~8.1E-02~~(7.1E-02)	c	3.6E+00	c	~~7.1E-02~~(6.2E-02)	c
1-Butanol	71-36-3	~~4.7E+03~~(4.9E+03)	nc	7.6E+03	Csat	~~5.3E+02~~(5.9E+02)	nc
Butylate	2008-41-5	~~3.2E+03~~(3.3E+03)	nc	~~3.3E+04~~(3.4E+04)	nc	~~2.1E+02~~(2.2E+02)	nc
n-Butylbenzene	104-51-8	1.1E+02	Csat	1.1E+02	Csat	1.0E+03	nc
Butyl benzyl phthalate	85-68-7	~~2.9E+02~~(2.7E+02)	c	1.2E+04	c	~~1.6E+01~~(1.4E+01)	c
Cadmium and compounds	7440-43-9	~~3.7E+01~~(7.5E+00)	nc	~~5.3E+02~~(1.1E+02)	nc	5.0E+00	gws
Caprolactam	105-60-2	3.1E+04	nc	4.0E+05	nc	9.9E+03	nc
Carbaryl	63-25-2	6.3E+03	nc	8.2E+04	nc	1.8E+03	nc
Carbon disulfide	75-15-0	7.4E+02	Csat	7.4E+02	Csat	8.1E+02	nc
Carbon tetrachloride	56-23-5	~~7.0E-01~~(6.1E-01)	c	3.1E+01	c	5.0E+00	gws
Carbosulfan	55285-14-8	6.3E+02	nc	8.2E+03	nc	5.1E+01	nc
Chloranil	118-75-2	~~1.4E+00~~(1.3E+00)	c	5.7E+01	c	~~1.8E-01~~(1.6E-01)	c
Chlordane (Technical Mixture)	12789-03-6	~~1.9E+00~~(1.8E+00)	c	8.9E+01	c	2.0E+00	gws
Chloroacetic acid	79-11-8	~~1.3E+02~~(2.2E+02)	nc	~~1.6E+03~~(2.9E+03)	nc	~~4.0E+01~~(6.0E+01)	~~nc~~gws
4-Chloroaniline	106-47-8	~~2.7E+00~~(2.6E+00)	c	1.1E+02	c	~~3.7E-01~~(3.2E-01)	c
Chlorobenzene	108-90-7	2.9E+02	nc	7.6E+02	Csat	1.0E+02	gws
Chlorobenzilate	510-15-6	~~4.9E+00~~(4.7E+00)	c	2.1E+02	c	~~3.1E-01~~(2.8E-01)	c
p-Chlorobenzoic acid	74-11-3	1.9E+03	nc	2.5E+04	nc	5.1E+02	nc
2-Chloro-1,3-butadiene (chloroprene)	126-99-8	~~1.1E-02~~(3.7E-03)	c	4.7E-01	c	~~1.9E-02~~(6.4E-03)	c

CONTAMINANT	CAS No.	Residential Soil[1,3] (mg/kg)	Value Basis4	Industrial Soil[1,3] (mg/kg)	Value Basis4	Ground Water[2,3] (ug/L)	Value Basis4
1-Chlorobutane	109-69-3	2.5E+02	nc	7.3E+02	Csat	2.0E+02	nc
Chloroethane	75-00-3	2.1E+03	Csat	2.1E+03	Csat	2.1E+04(8.3E+03)	nc
Chloroform	67-66-3	3.4E-01(3.0E-01)	c	1.5E+01	c	8.0E+01	sgws
Chloromethane	74-87-3	1.2E+02	nc	5.0E+02	nc	1.9E+02	nc
4-Chloro-2-methylaniline	95-69-2	5.4E+00(5.2E+00)	c	2.3E+02	c	7.0E-01(6.2E-01)	c
beta-Chloronaphthalene	91-58-7	5.0E+03(5.1E+03)	nc	5.0E+04(5.3E+04)	nc	3.3E+02(3.5E+02)	nc
o-Chloronitrobenzene	88-73-3	1.8E+00(1.7E+00)	c	7.7E+01	c	2.4E-01(2.1E-01)	c
p-Chloronitrobenzene	100-00-5	9.0E+00(8.6E+00)	c	3.8E+02	c	1.2E+00(1.0E+00)	c
2-Chlorophenol	95-57-8	3.4E+02(3.5E+02)	nc	3.9E+03(4.0E+03)	nc	2.7E+01(2.9E+01)	nc
o-Chlorotoluene	95-49-8	4.5E+02(5.0E+02)	nc	9.1E+02	Csat	9.0E+01(9.8E+01)	nc
Chlorpyrifos-methyl	5598-13-0	6.3E+02	nc	8.2E+03	nc	1.2E+02	nc
Chromium III	16065-83-1	1.2E+05(4.9E+04)	nc	1.0E+06(3.0E+05)	maxnc	2.2E+04	nc
Chromium VI	18540-29-9	3.1E-01(9.4E-01)	c	6.3E+01(2.0E+02)	c	3.5E-02(1.0E-01)	c
Cobalt	7440-48-4	2.3E+01	nc	3.5E+02	nc	6.0E+00	nc
Copper and compounds	7440-50-8	3.1E+03	nc	4.7E+04	nc	8.0E+02(1.3E+03)	negws
Crotonaldehyde	123-73-9	8.2E-02(8.0E-02)	c	3.6E+00(4.0E+00)	c	8.2E-03(7.9E-03)	c
Cyanazine	21725-46-2	6.5E-01(6.1E-01)	c	2.7E+01	c	8.8E-02(7.7E-02)	c
Cyanide and compounds	74-90-8	2.3E+01	nc	1.5E+02	nc	2.0E+02	gws
Cyanogen	460-19-5	7.8E+01	nc	1.2E+03	nc	2.0E+01	nc
Cyanogen bromide	506-68-3	7.0E+03	nc	1.1E+05	nc	1.8E+03	nc
Cyclohexane	110-82-7	1.2E+02	Csat	1.2E+02	Csat	1.3E+04	nc
Cyclohexanone	108-94-1	5.1E+03	Csat	5.1E+03	Csat	1.4E+03	nc
Cyhalothrin/Karate	68085-85-8	6.3E+01	nc	8.2E+02	nc	2.0E+01	nc
Cypermethrin	52315-07-8	1.3E+03(4.6E+03)	nc	1.6E+04(5.9E+04)	nc	4.0E+02(1.4E+03)	nc
Dacthal	1861-32-1	6.3E+02	nc	8.3E+03(8.2E+03)	nc	1.2E+02	nc
Dalapon	75-99-0	1.9E+03	nc	2.5E+04	nc	2.0E+02	gws
DDD	72-54-8	1.9E+00(2.1E+00)	ncc	2.5E+01(9.6E+01)	ncc	3.2E-02(2.8E-02)	c
DDE	72-55-9	2.0E+00(1.9E+00)	c	9.3E+01	c	4.6E-02(4.0E-02)	c
DDT	50-29-3	1.9E+00(1.8E+00)	c	8.5E+01	c	2.3E-01(2.0E-01)	c
Diazinon	333-41-5	4.4E+01	nc	5.7E+02	nc	1.0E+01	nc
Dibenzofuran	132-64-9	7.8E+01	nc	1.2E+03	nc	7.9E+00	nc

CONTAMINANT	CAS No.	Residential Soil[1,3] (mg/kg)	Value Basis4	Industrial Soil[1,3] (mg/kg)	Value Basis4	Ground Water[2,3] (ug/L)	Value Basis4
1,4-Dibromobenzene	106-37-6	~~4.1E+02~~(4.4E+02)	nc	~~2.8E+03~~(3.1E+03)	nc	~~4.7E+01~~(5.1E+01)	nc
Dibromochloromethane	124-48-1	~~8.3E+00~~(7.9E+00)	c	3.9E+02	c	~~8.7E-01~~(8.0E+01)	~~c~~gws
1,2-Dibromo-3-chloropropane	96-12-8	~~5.7E-03~~(5.4E-03)	c	6.9E-01	c	2.0E-01	gws
1,2-Dibromoethane	106-93-4	~~3.9E-02~~(3.4E-02)	c	1.7E+00	c	5.0E-02	gws
Dibutyl phthalate	84-74-2	6.3E+03	nc	8.2E+04	nc	9.0E+02	nc
Dicamba	1918-00-9	1.9E+03	nc	2.5E+04	nc	5.7E+02	nc
1,2-Dichlorobenzene	95-50-1	3.8E+02	Csat	3.8E+02	Csat	6.0E+02	gws
1,4-Dichlorobenzene	106-46-7	~~2.8E+00~~(2.4E+00)	c	1.2E+02	c	7.5E+01	gws
3,3'-Dichlorobenzidine	91-94-1	~~1.2E+00~~(1.1E+00)	c	5.1E+01	c	~~1.3E-01~~(1.1E-01)	c
1,4-Dichloro-2-butene	764-41-0	~~2.3E-03~~(2.0E-03)	c	1.0E-01	c	~~1.3E-03~~(1.2E-03)	c
Dichlorodifluoromethane	75-71-8	9.4E+01	nc	4.0E+02	nc	2.0E+02	nc
1,1-Dichloroethane	75-34-3	~~3.8E+00~~(3.3E+00)	c	1.7E+02	c	~~2.8E+00~~(2.4E+00)	c
1,2-Dichloroethane	107-06-2	~~5.0E-01~~(4.3E-01)	c	2.2E+01	c	5.0E+00	gws
1,1-Dichloroethylene	75-35-4	~~2.4E+02~~(5.1E+00)	nc	~~1.1E+03~~(2.2E+01)	nc	7.0E+00	gws
1,2-Dichloroethylene (cis)	156-59-2	~~1.7E+01~~(6.5E+01)	nc	~~8.0E+01~~(3.9E+02)	nc	7.0E+01	gws
1,2-Dichloroethylene (trans)	156-60-5	7.5E+01	nc	3.2E+02	nc	1.0E+02	gws
2,4-Dichlorophenol	120-83-2	1.9E+02	nc	2.5E+03	nc	4.6E+01	nc
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	94-82-6	1.9E+03	nc	2.5E+04	nc	4.5E+02	nc
2,4-Dichlorophenoxyacetic Acid (2,4-D)	94-75-7	7.0E+02	nc	9.6E+03	nc	7.0E+01	gws
1,2-Dichloropropane	78-87-5	~~2.7E+00~~(2.3E+00)	c	7.1E+01	nc	5.0E+00	gws
1,3-Dichloropropene	542-75-6	~~1.9E+00~~(1.7E+00)	c	8.6E+01	c	~~4.7E-01~~(4.1E-01)	c
2,3-Dichloropropanol	616-23-9	1.9E+02	nc	2.5E+03	nc	5.9E+01	nc
Dichlorvos	62-73-7	~~1.9E+00~~(1.8E+00)	c	7.9E+01	c	~~2.6E-01~~(2.3E-01)	c
Dicyclopentadiene	77-73-6	1.4E+00	nc	5.8E+00	nc	6.3E-01	nc
Dieldrin	60-57-1	~~4.2E-02~~(4.0E-02)	c	2.0E+00	c	~~7.2E-04~~(6.3E-04)	c
Diethylene glycol, monobutyl ether	112-34-5	1.9E+03	nc	2.4E+04	nc	6.0E+02	nc
Diethylene glycol, monoethyl ether	111-90-0	3.8E+03	nc	4.8E+04	nc	1.2E+03	nc
Di(2-ethylhexyl)adipate	103-23-1	~~4.5E+02~~(4.3E+02)	c	1.9E+04	c	4.0E+02	gws
Diethyl phthalate	84-66-2	5.1E+04	nc	6.6E+05	nc	1.5E+04	nc
Diethylstilbestrol	56-53-1	~~1.6E-03~~(1.5E-03)	c	6.6E-02	c	~~5.1E-05~~(4.5E-05)	c
Difenzoquat (Avenge)	43222-48-6	5.2E+03	nc	6.8E+04	nc	1.7E+03	nc

CONTAMINANT	CAS No.	Residential Soil[1,3] (mg/kg)	Value Basis4	Industrial Soil[1,3] (mg/kg)	Value Basis4	Ground Water[2,3] (ug/L)	Value Basis4
1,1-Difluoroethane	75-37-6	1.4E+03	Csat	1.4E+03	Csat	8.3E+04	nc
Diisopropyl methylphosphonate	1445-75-6	5.3E+02	Csat	5.3E+02	Csat	1.6E+03	nc
3,3'-Dimethoxybenzidine	119-90-4	3.4E-01(7.5E-02)	c	1.4E+01	c	4.7E-02(1.5E-02)	c
N-N-Dimethylaniline	121-69-7	2.6E+01(2.5E+01)	c	7.2E+02(7.8E+02)	nc	2.5E+00(2.2E+00)	c
2,4-Dimethylaniline	95-68-1	2.7E+00(2.6E+00)	c	1.1E+02	c	3.7E-01(3.3E-01)	c
2,4-Dimethylaniline hydrochloride	21436-96-4	9.4E-01(8.9E-01)	c	4.0E+01	c	1.3E-01(1.2E-01)	c
3,3'-Dimethylbenzidine	119-93-7	4.9E-02(1.1E-02)	c	2.1E+00	c	6.5E-03(2.0E-03)	c
2,4-Dimethylphenol	105-67-9	1.3E+03	nc	1.6E+04	nc	3.6E+02	nc
2,6-Dimethylphenol	576-26-1	3.8E+01	nc	4.9E+02	nc	1.1E+01	nc
3,4-Dimethylphenol	95-65-8	6.3E+01	nc	8.2E+02	nc	1.8E+01	nc
4,6-Dinitro-o-cyclohexyl phenol	131-89-5	1.3E+02	nc	1.6E+03	nc	2.3E+01	nc
1,2-Dinitrobenzene	528-29-0	6.3E+00	nc	8.2E+01	nc	1.9E+00	nc
1,3-Dinitrobenzene	99-65-0	6.3E+00	nc	8.2E+01	nc	2.0E+00	nc
1,4-Dinitrobenzene	100-25-4	6.3E+00	nc	8.2E+01	nc	2.0E+00	nc
2,4-Dinitrophenol	51-28-5	1.3E+02	nc	1.6E+03	nc	3.9E+01	nc
Dinitrotoluene (Technical Grade)	25321-14-6	1.2E+00(1.1E+00)	c	5.1E+01	c	1.0E-01(9.2E-02)	c
2,4-Dinitrotoluene	121-14-2	1.7E+00	c	7.4E+01	c	2.4E-01(2.1E-01)	c
2,6-Dinitrotoluene	606-20-2	3.6E-01(3.4E-01)	c	1.5E+01	c	4.9E-02(4.3E-02)	c
Dinoseb	88-85-7	6.3E+01	nc	8.2E+02	nc	7.0E+00	gws
1,4-Dioxane	123-91-1	5.4E+00(5.0E+00)	c	2.5E+02	c	4.6E-01(4.0E-01)	c
Diphenylamine	122-39-4	6.3E+03	nc	8.2E+04	nc	1.3E+03	nc
1,2-Diphenylhydrazine	122-66-7	6.8E-01(6.4E-01)	c	2.9E+01	c	7.8E-02(6.9E-02)	c
Diquat	85-00-7	1.4E+02	nc	1.8E+03	nc	2.0E+01	gws
Disulfoton	298-04-4	2.5E+00	nc	3.3E+01	nc	5.0E-01	nc
1,4-Dithiane	505-29-3	5.4E+02(5.7E+02)	nc	4.6E+03(4.9E+03)	nc	5.3E+01(5.9E+01)	nc
Diuron	330-54-1	1.3E+02	nc	1.6E+03	nc	3.6E+01	nc
Endosulfan	115-29-7	4.5E+02	nc	6.0E+03(6.1E+03)	nc	3.1E+01(3.3E+01)	nc
Endothall	145-73-3	1.3E+03	nc	1.6E+04	nc	1.0E+02	gws
Endrin	72-20-8	1.9E+01	nc	2.5E+02	nc	2.0E+00	gws
Epichlorohydrin	106-89-8	2.0E+01	nc	8.8E+01	nc	2.0E+00	nc
Ethion	563-12-2	3.2E+01	nc	4.1E+02	nc	4.3E+00	nc

CONTAMINANT	CAS No.	Residential Soil[1,3] (mg/kg)	Value Basis4	Industrial Soil[1,3] (mg/kg)	Value Basis4	Ground Water[2,3] (ug/L)	Value Basis4
2-Ethoxyethanol	110-80-5	~~5.3E+03~~(2.7E+03)	nc	~~4.9E+04~~(1.6E+04)	nc	~~3.4E+02~~(8.0E+01)	nc
Ethyl acetate	141-78-6	6.7E+02	nc	2.8E+03	nc	1.4E+02	nc
Ethylbenzene	100-41-4	~~6.2E+00~~(5.4E+00)	c	2.7E+02	c	7.0E+02	gws
Ethylene diamine	107-15-3	~~6.3E+03~~(6.4E+03)	nc	~~7.6E+04~~(7.8E+04)	nc	~~4.9E+02~~(5.3E+02)	nc
Ethylene glycol	107-21-1	~~1.3E+05~~(5.1E+04)	nc	~~1.0E+06~~(6.6E+05)	~~max~~nc	~~4.0E+04~~(1.6E+04)	nc
Ethylene glycol, monobutyl ether	111-76-2	6.3E+03	nc	8.2E+04	nc	2.0E+03	nc
Ethylene thiourea (ETU)	96-45-7	5.1E+00	nc	6.6E+01	nc	~~1.6E+00~~(1.5E+00)	nc
Ethyl ether	60-29-7	~~2.1E+03~~(2.4E+03)	nc	~~9.9E+03~~(1.0E+04)	nc	~~1.1E+03~~(1.2E+03)	nc
Ethyl methacrylate	97-63-2	1.1E+03	Csat	1.1E+03	Csat	6.3E+02	nc
Fenamiphos	22224-92-6	1.6E+01	nc	2.1E+02	nc	4.4E+00	nc
Fluometuron	2164-17-2	8.2E+02	nc	1.1E+04	nc	2.4E+02	nc
Fluorine (Soluble Fluoride)	7782-41-4	4.7E+03	nc	7.0E+04	nc	4.0E+03	gws
Fomesafen	72178-02-0	~~1.6E+02~~(6.3E+02)	nc	~~2.1E+03~~(8.2E+03)	nc	~~3.9E-01~~(1.9E+02)	nc
Fonofos	944-22-9	1.3E+02	nc	1.6E+03	nc	~~1.9E+02~~(2.4E+01)	nc
Formaldehyde	50-00-0	~~1.8E+01~~(3.6E+00)	c	~~7.9E+02~~(5.8E+02)	c	~~4.3E-01~~(1.5E-01)	c
Formic Acid	64-18-6	3.1E+01	nc	1.3E+02	nc	6.3E-01	nc
Furan	110-00-9	9.1E+00	nc	4.2E+01	nc	5.3E+00	nc
Furazolidone	67-45-8	1.4E-01	c	6.0E+00	c	~~2.0E-02~~(1.8E-02)	c
Furfural	98-01-1	~~2.2E+02~~(1.9E+01)	~~ncc~~	~~2.7E+03~~(9.4E+02)	~~ncc~~	~~3.8E+01~~(2.0E+00)	~~ncc~~
Glycidaldehyde	765-34-4	2.4E+01	nc	2.1E+02	nc	1.7E+00	nc
Glyphosate	1071-83-6	6.3E+03	nc	8.2E+04	nc	7.0E+02	gws
Heptachlor	76-44-8	~~1.4E-01~~(1.3E-01)	c	6.3+00	c	4.0E-01	gws
Heptachlor epoxide	1024-57-3	~~7.1E-02~~(6.7E-02)	c	3.3E+00	c	2.0E-01	gws
Hexabromobenzene	87-82-1	1.5E+02	nc	2.0E+03	nc	~~1.1E+01~~(1.2E+01)	nc
Hexachlorobenzene	118-74-1	~~2.2E-01~~(2.0E-01)	c	~~1.0E+01~~(6.1E+00)	c	1.0E+00	gws
Hexachlorobutadiene	87-68-3	~~1.3E+00~~(1.1E+00)	c	1.7E+01	Csat	~~1.4E-01~~(1.2E-01)	c
HCH (alpha)	319-84-6	~~8.6E-02~~(8.2E-02)	c	3.6E+00	c	~~7.2E-03~~(6.4E-03)	c
HCH (beta)	319-85-7	~~3.0E-01~~(2.9E-01)	c	1.3E+01	c	~~2.5E-02~~(2.2E-02)	c
HCH (gamma) Lindane	58-89-9	~~5.7E-01~~(5.7E-02)	c	~~2.5E+01~~(8.0E-01)	c	2.0E-01	gws
HCH-technical	608-73-1	~~3.0E-01~~(2.9E-01)	c	1.3E+01	c	~~2.5E-02~~(2.2E-02)	c
Hexachlorocyclopentadiene	77-47-4	1.9E+00	nc	8.0E+00	nc	5.0E+01	gws

CONTAMINANT	CAS No.	Residential Soil[1,3] (mg/kg)	Value Basis4	Industrial Soil[1,3] (mg/kg)	Value Basis4	Ground Water[2,3] (ug/L)	Value Basis4
Hexachlorodibenzo-p-dioxin mixture (HxCDD)	Various	~~1.0E-04~~(9.9E-05)	c	4.7E-03	c	~~1.3E-05~~(1.1E-05)	c
Hexachloroethane	67-72-1	~~2.0E+00~~(1.7E+00)	c	8.6E+01	c	~~3.3E-01~~(2.9E-01)	c
Hexachlorophene	70-30-4	1.9E+01	nc	2.5E+02	nc	6.0E+00	nc
1,6-Hexamethylene diisocyanate	822-06-0	3.4E+00	nc	1.4E+01	nc	2.1E-02	nc
n-Hexane	110-54-3	1.4E+02	Csat	1.4E+02	Csat	1.5E+03	nc
Hexazinone	51235-04-2	2.1E+03	nc	2.7E+04	nc	6.4E+02	nc
HMX	2691-41-0	3.9E+03	nc	5.7E+04	nc	1.0E+03	nc
Hydrazine	302-01-2	~~3.4E-02~~(3.0E-02)	c	1.5E+00	c	~~1.1E-03~~(9.5E-04)	c
Hydrogen sulfide	7783-06-4	1.0E+06	max	1.0E+06	max	4.2E+00	nc
p-Hydroquinone	123-31-9	~~9.0E+00~~(8.6E+00)	c	3.8E+02	c	~~1.3E+00~~(1.1E+00)	c
Iron	7439-89-6	5.5E+04	nc	8.2E+05	nc	1.4E+04	nc
Isobutanol	78-83-1	~~1.0E+04~~(8.2E+03)	~~Csat~~nc	1.0E+04	Csat	~~1.7E+03~~(7.3E+02)	nc
Isophorone	78-59-1	~~5.7E+02~~(5.4E+02)	c	2.4E+04	c	~~7.8E+01~~(6.9E+01)	c
Isopropalin	33820-53-0	1.1E+03	nc	1.5E+04	nc	~~2.9E+01~~(3.0E+01)	nc
Isopropylbenzene (Cumene)	98-82-8	2.7E+02	Csat	2.7E+02	Csat	4.5E+02	nc
Isopropyl methyl phosphonic acid	1832-54-8	6.3E+03	nc	8.2E+04	nc	2.0E+03	nc
Lead	7439-92-1	~~4.0E+02~~(2.0E+02)	nc	~~8.0E+02~~(4.6E+02)	nc	~~1.5E+01~~(1.0E+01)	gws
Lead (tetraethyl)	78-00-2	7.8E-03	nc	1.2E-01	nc	1.3E-03	nc
Lithium	7439-93-2	1.6E+02	nc	2.3E+03	nc	4.0E+01	nc
Malathion	121-75-5	1.3E+03	nc	1.6E+04	nc	3.9E+02	nc
Maleic anhydride	108-31-6	6.3E+03	nc	8.0E+04	nc	1.9E+03	nc
Manganese (non-food)	7439-96-5	1.8E+03	nc	2.6E+04	nc	4.3E+02	nc
Mephosfolan	950-10-7	5.7E+00	nc	7.4E+01	nc	1.8E+00	nc
Mepiquat	24307-26-4	1.9E+03	nc	2.5E+04	nc	6.0E+02	nc
Mercury (elemental and inorganic)	7439-97-6	3.1E+00	Csat	3.1E+00	Csat	2.0E+00	gws
Mercury (methyl)	22967-92-6	7.8E+00	nc	1.2E+02	nc	2.0E+00	nc
Methacrylonitrile	126-98-7	7.6E+00	nc	1.0E+02	nc	1.9E+00	nc
Methanol	67-56-1	1.1E+05	Csat	1.1E+05	Csat	2.0E+04	nc
Methidathion	950-37-8	9.5E+01	nc	1.2E+03	nc	2.9E+01	nc
Methoxychlor	72-43-5	3.2E+02	nc	4.1E+03	nc	4.0E+01	gws
Methyl acetate	79-20-9	~~2.3E+04~~(2.5E+04)	nc	2.9E+04	Csat	~~5.3E+03~~(5.9E+03)	nc

CONTAMINANT	CAS No.	Residential Soil[1,3] (mg/kg)	Value Basis4	Industrial Soil[1,3] (mg/kg)	Value Basis4	Ground Water[2,3] (ug/L)	Value Basis4
Methyl acrylate	96-33-3	1.6E+02	nc	6.6E+02	nc	4.2E+01	nc
Methyl Tertiary Butyl Ether (MTBE)	1634-04-4	~~5.0E+01~~(4.4E+01)	c	2.2E+03	c	~~1.4E+01~~(1.2E+01)	c
2-Methylaniline (o-toluidine)	95-53-4	~~3.4E+01~~(3.2E+01)	c	1.4E+03	c	~~4.7E+00~~(4.2E+00)	c
2-Methyl-4-chlorophenoxyacetic acid	94-74-6	3.2E+01	nc	4.1E+02	nc	7.5E+00	nc
4-(2-Methyl-4-chlorophenoxy) butyric acid	94-81-5	~~2.8E+02~~(2.8E+03)	nc	~~3.6E+03~~(3.6E+04)	nc	~~6.5E+01~~(6.5E+02)	nc
2-(2-Methyl-4-chlorophenoxy) propionic acid	93-65-2	6.3E+01	nc	8.2E+02	nc	1.6E+01	nc
4,4'-Methylenebisbenzeneamine	101-77-9	~~3.4E-01~~(3.2E-01)	c	1.4E+01	c	~~4.7E-02~~(4.2E-02)	c
4,4'-Methylene bis(2-chloroaniline)	101-14-4	1.2E+00	c	2.3E+02	c	~~1.6E-01~~(1.5E-01)	c
4,4'-Methylene bis(N,N'-dimethyl)aniline	101-61-1	~~1.2E+01~~(1.1E+01)	c	5.0E+02	c	~~5.2E-01~~(6.6E-01)	c
Methylene bromide	74-95-3	2.5E+01	nc	1.1E+02	nc	8.0E+00	nc
Methylene chloride	75-09-2	~~5.8E+01~~(5.7E+01)	c	3.3E+03	~~Csat~~nc	5.0E+00	gws
Methylenediphenyl diisocyanate	101-68-8	8.5E+05	nc	1.0E+06	max		
Methyl ethyl ketone	78-93-3	2.8E+04	nc	2.8E+04	Csat	5.6E+03	nc
Methyl isobutyl ketone	108-10-1	3.4E+03	Csat	3.4E+03	Csat	1.2E+03	nc
Methyl methacrylate	80-62-6	2.4E+03	Csat	2.4E+03	Csat	1.4E+03	nc
2-Methyl-5-nitroaniline	99-55-8	~~6.0E+01~~(5.7E+01)	c	2.6E+03	c	~~8.2E+00~~(7.2E+00)	c
Methyl parathion	298-00-0	1.6E+01	nc	2.1E+02	nc	4.5E+00	nc
2-Methylphenol (o-Cresol)	95-48-7	3.2E+03	nc	4.1E+04	nc	9.3E+02	nc
3-Methylphenol (m-Cresol)	108-39-4	3.2E+03	nc	4.1E+04	nc	9.3E+02	nc
4-Methylphenol (p-Cresol)	106-44-5	~~6.3E+03~~(1.3E+03)	nc	~~8.2E+04~~(1.6E+04)	nc	~~1.9E+03~~(3.7E+02)	nc
Methyl styrene (mixture)	25013-15-4	3.3E+02	nc	3.9E+02	Csat	2.3E+01	nc
Methyl styrene (alpha)	98-83-9	5.0E+02	Csat	5.0E+02	Csat	7.8E+02	nc
Metolaclor (Dual)	51218-45-2	9.5E+03	nc	1.2E+05	nc	2.7E+03	nc
Metribuzin	21087-64-9	1.6E+03	nc	2.1E+04	nc	4.9E+02	nc
Mirex	2385-85-5	~~3.6E-02~~(3.4E-02)	c	1.7E+00	c	~~8.8E-04~~(7.6E-04)	c
Molybdenum	7439-98-7	3.9E+02	nc	5.8E+03	nc	1.0E+02	nc
Monochloramine	10599-90-3	7.8E+03	nc	1.2E+05	nc	~~2.0E+03~~(4.0E+03)	~~nc~~gws
Naled	300-76-5	1.2E+02	nc	~~1.0E+03~~(1.1E+03)	nc	~~1.1E+01~~(1.2E+01)	nc
Nickel and compounds	7440-02-0	~~1.5E+03~~(1.4E+03)	nc	~~2.2E+04~~(1.7E+04)	nc	1.0E+02	gws
Nitrate	14797-55-8	1.3E+05	nc	1.0E+06	max	1.0E+04	gws
Nitrite	14797-65-0	7.8E+03	nc	1.2E+05	nc	1.0E+03	gws

CONTAMINANT	CAS No.	Residential Soil[1,3] (mg/kg)	Value Basis4	Industrial Soil[1,3] (mg/kg)	Value Basis4	Ground Water[2,3] (ug/L)	Value Basis4
2-Nitroaniline	88-74-4	6.3E+02	nc	8.0E+03	nc	1.9E+02	nc
Nitrobenzene	98-95-3	~~5.5E+00~~(4.8E+00)	c	2.4E+02	c	~~1.4E-01~~(1.2E-01)	c
Nitrofurantoin	67-20-9	4.4E+03	nc	5.7E+04	nc	1.4E+03	nc
Nitrofurazone	59-87-0	~~4.2E-01~~(4.0E-01)	c	1.8E+01	c	~~6.0E-02~~(5.3E-02)	c
Nitroglycerin	55-63-0	6.3E+00	nc	8.2E+01	nc	2.0E+00	nc
2-Nitropropane	79-46-9	~~1.5E-02~~(5.9E-02)	c	~~6.4E-01~~(3.0E+00)	c	~~2.1E-03~~(8.4E-03)	c
N-Nitrosodi-n-butylamine	924-16-3	~~1.0E-01~~(9.4E-02)	c	4.7E+00	c	~~2.7E-03~~(2.4E-03)	c
N-Nitrosodiethanolamine	1116-54-7	~~1.9E-01~~(1.8E-01)	c	8.2E+00	c	~~2.8E-02~~(2.5E-02)	c
N-Nitrosodiethylamine	55-18-5	~~8.1E-04~~(8.0E-04)	c	1.5E-01	c	~~1.7E-04~~(1.6E-04)	c
N-Nitrosodimethylamine	62-75-9	2.0E-03	c	3.5E-01	c	1.1E-04	c
N-Nitrosodiphenylamine	86-30-6	1.1E+02	c	4.7E+03	c	~~1.2E+01~~(1.1E+01)	c
N-Nitroso di-n-propylamine	621-64-7	~~7.8E-02~~(7.4E-02)	c	3.3E+00	c	~~1.1E-02~~(9.5E-03)	c
N-Nitroso-N-methylethylamine	10595-95-6	~~2.0E-02~~(1.9E-02)	c	9.4E-01	c	~~7.1E-04~~(6.2E-04)	c
N-Nitrosopyrrolidine	930-55-2	~~2.6E-01~~(2.5E-01)	c	1.1E+01	c	~~3.7E-02~~(3.3E-02)	c
m-Nitrotoluene	99-08-1	6.3E+00	nc	8.2E+01	nc	1.7E+00	nc
o-Nitrotoluene	88-72-2	~~3.2E+00~~(3.0E+00)	c	1.5E+02	c	~~3.1E-01~~(2.8E-01)	c
p-Nitrotoluene	99-99-0	~~3.4E+01~~(3.2E+01)	c	1.4E+03	c	~~4.3E+00~~(3.8E+00)	c
NuStar	85509-19-9	1.3E+02	nc	1.6E+03	nc	3.1E+01	nc
Oryzalin	19044-88-3	~~7.0E+01~~(6.6E+01)	c	2.9E+03	c	~~7.9E+00~~(7.0E+00)	c
Oxadiazon	19666-30-9	~~3.2E+02~~(7.3E+00)	~~nc~~	~~4.1E+03~~(3.2E+02)	~~nc~~	~~4.7E+01~~(4.4E-01)	~~nc~~
Oxamyl	23135-22-0	1.6E+03	nc	2.1E+04	nc	2.0E+02	gws
Oxyfluorfen	42874-03-3	~~7.4E+00~~(7.1E+00)	c	3.1E+02	c	~~5.4E-01~~(4.8E-01)	c
Paraquat dichloride	1910-42-5	2.8E+02	nc	3.7E+03	nc	9.0E+01	nc
Parathion	56-38-2	3.8E+02	nc	4.9E+03	nc	8.6E+01	nc
Pentachlorobenzene	608-93-5	5.0E+01	nc	5.0E+02	nc	2.0E+00	nc
Pentachloronitrobenzene	82-68-8	~~2.7E+00~~(2.6E+00)	c	1.3E+02	c	~~1.2E-01~~(1.1E-01)	c
Pentachlorophenol	87-86-5	~~1.0E+00~~(9.6E-01)	c	4.0E+01	c	1.0E+00	gws
Per- and Polyfluoroalkyl Substances (PFAS)							
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	6.3E-03	nc	8.2E-02	nc	4.0E-03	gws
Perfluorooctanoic acid (PFOA)	335-67-1	1.8E-05	c	7.8E-04	c	4.0E-03	gws
Perchlorate and perchlorate salts	Various	5.5E+01	nc	8.2E+02	nc	1.4E+01	nc

CONTAMINANT	CAS No.	Residential Soil[1,3] (mg/kg)	Value Basis4	Industrial Soil[1,3] (mg/kg)	Value Basis4	Ground Water[2,3] (ug/L)	Value Basis4
Permethrin	52645-53-1	3.2E+03	nc	4.1E+04	nc	1.0E+03	nc
Phenol	108-95-2	1.9E+04	nc	2.5E+05	nc	5.8E+03	nc
m-Phenylenediamine	108-45-2	3.8E+02	nc	4.9E+03	nc	1.2E+02	nc
p-Phenylenediamine	106-50-3	6.3E+01	nc	8.2E+02	nc	2.0E+01	nc
2-Phenylphenol	90-43-7	~~2.9E+02~~(2.7E+02)	c	1.2E+04	c	~~3.1E+01~~(2.7E+01)	c
Phosphine	7803-51-2	2.3E+01	nc	3.5E+02	nc	5.7E-01	nc
Phosphorus (white)	7723-14-0	1.6E+00	nc	2.3E+01	nc	4.0E-01	nc
p-Phthalic acid	100-21-0	3.2E+04	nc	4.1E+05	nc	9.4E+03	nc
Phthalic anhydride	85-44-9	1.3E+05	nc	1.0E+06	max	3.9E+04	nc
Polybrominated biphenyls	36355-01-8	~~1.8E-02~~(1.7E-02)	c	7.7E-01	c	~~2.6E-03~~(2.3E-03)	c
Polychlorinated biphenyls (PCBs)	1336-36-3	~~3.1E-01~~(2.9E-01)	c	1.4E+01	c	5.0E-01	gws
Aroclor 1016	12674-11-2	5.5E+00	nc	8.2E+01	nc	~~2.2E-01~~(2.0E-01)	c
Aroclor 1221	11104-28-2	~~2.6E-01~~(2.4E-01)	c	1.2E+01	c	~~7.9E-03~~(6.8E-03)	c
Aroclor 1232	11141-16-5	~~2.2E-01~~(2.0E-01)	c	1.0E+01	c	~~7.9E-03~~(6.8E-03)	c
Aroclor 1242	53469-21-9	~~3.1E-01~~(3.0E-01)	c	1.5E+01	c	~~7.9E-03~~(6.8E-03)	c
Aroclor 1248	12672-29-6	~~3.1E-01~~(3.0E-01)	c	1.5E+01	c	~~7.9E-03~~(6.8E-03)	c
Aroclor 1254	11097-69-1	~~3.2E-01~~(3.1E-01)	c	1.5E+01	c	~~7.9E-03~~(6.8E-03)	c
Aroclor 1260	11096-82-5	~~3.3E-01~~(3.1E-01)	c	1.6E+01	c	~~7.9E-03~~(6.8E-03)	c
Polycyclic Aromatic Hydrocarbons (PAHs)							
Acenaphthene	83-32-9	~~4.1E+03~~(4.2E+03)	nc	~~4.7E+04~~(4.9E+04)	nc	~~2.4E+02~~(2.6E+02)	nc
Acenaphthylene	208-96-8	~~4.2E+03~~(4.3E+03)	nc	~~5.1E+04~~(5.3E+04)	nc	~~2.4E+02~~(2.6E+02)	nc
Anthracene	120-12-7	2.3E+04	nc	3.5E+05	nc	1.8E+03	nc
Benz[a]anthracene	56-55-3	1.5E+00	c	3.2E+02	c	~~3.0E-02~~(2.8E-02)	c
Benzo[b]fluoranthene	205-99-2	1.1E+00	c	2.1E+02	c	~~2.5E-01~~(2.4E-01)	c
Benzo[k]fluoranthene	207-08-9	1.1E+01	c	2.1E+03	c	~~2.5E+00~~(2.4E+00)	c
Benzo[g,h,i]perylene	191-24-2	1.8E+03	nc	2.3E+04	nc	6.0E+02	nc
Benzo[a]pyrene	50-32-8	1.1E-01	c	2.1E+01	c	2.0E-01	gws
Chrysene	218-01-9	1.1E+02	c	2.1E+04	c	~~2.5E+01~~(2.4E+01)	c
Dibenz[a,h]anthracene	53-70-3	1.1E-01	c	2.1E+01	c	~~2.5E-02~~(2.4E-02)	c
Fluoranthene	206-44-0	2.4E+03	nc	3.0E+04	nc	8.0E+02	nc
Fluorene	86-73-7	2.9E+03	nc	~~3.7E+04~~(3.8E+04)	nc	~~1.5E+02~~(1.6E+02)	nc

CONTAMINANT	CAS No.	Residential Soil[1,3] (mg/kg)	Value Basis4	Industrial Soil[1,3] (mg/kg)	Value Basis4	Ground Water[2,3] (ug/L)	Value Basis4
Indeno[1,2,3-cd]pyrene	193-39-5	1.1E+00	c	2.1E+02	c	~~2.5E-01~~(2.4E-01)	c
1-Methylnaphthalene	90-12-0	~~2.4E+01~~(1.3E+01)	c	3.9E+02	Csat	~~1.1E+00~~(5.7E-01)	c
2-Methylnaphthalene	91-57-6	3.1E+02	nc	4.7E+03	nc	3.6E+01	nc
Naphthalene	91-20-3	~~2.4E+00~~(2.2E+00)	c	1.1E+02	c	~~1.2E-01~~(1.0E-01)	c
Phenanthrene	85-01-8	2.3E+04	nc	3.5E+05	nc	1.7E+03	nc
Pyrene	129-00-0	2.3E+03	nc	3.4E+04	nc	~~7.9E+01~~(8.1E+01)	nc
Prometon	1610-18-0	9.5E+02	nc	1.2E+04	nc	2.5E+02	nc
Prometryn	7287-19-6	2.5E+03	nc	3.3E+04	nc	6.0E+02	nc
Propachlor	1918-16-7	8.2E+02	nc	1.1E+04	nc	2.5E+02	nc
Propanil	709-98-8	3.2E+02	nc	4.1E+03	nc	8.2E+01	nc
Propargite	2312-35-8	~~2.9E+00~~(2.7E+00)	c	1.2E+02	c	~~1.6E-01~~(1.4E-01)	c
n-Propylbenzene	103-65-1	2.6E+02	Csat	2.6E+02	Csat	6.6E+02	nc
Propylene glycol	57-55-6	1.0E+06	max	1.0E+06	max	4.0E+05	nc
Propylene glycol, monoethyl ether	1569-02-4	3.9E+04	Csat	3.9E+04	Csat	1.4E+04	nc
Propylene glycol, monomethyl ether	107-98-2	4.2E+04	nc	1.1E+05	Csat	3.2E+03	nc
Pursuit	81335-77-5	1.6E+05	nc	1.0E+06	max	4.7E+04	nc
Pyridine	110-86-1	~~5.8E+01~~(5.9E+01)	nc	~~5.1E+02~~(5.5E+02)	nc	~~5.3E+00~~(5.9E+00)	nc
Quinoline	91-22-5	~~1.8E-01~~(1.7E-01)	c	7.7E+00	c	~~2.4E-02~~(2.1E-02)	c
RDX (Cyclonite)	121-82-4	~~6.1E+00~~(8.0E+00)	c	~~2.8E+02~~(3.8E+02)	c	~~7.0E-01~~(8.5E-01)	c
Resmethrin	10453-86-8	1.9E+03	nc	2.5E+04	nc	6.7E+01	nc
Ronnel	299-84-3	3.8E+03	nc	~~5.1E+04~~(5.2E+04)	nc	~~2.0E+02~~(2.1E+02)	nc
Rotenone	83-79-4	2.5E+02	nc	3.3E+03	nc	6.1E+01	nc
Selenious Acid	7783-00-8	3.9E+02	nc	5.8E+03	nc	1.0E+02	nc
Selenium	7782-49-2	3.9E+02	nc	5.8E+03	nc	5.0E+01	gws
Silver and compounds	7440-22-4	3.9E+02	nc	5.8E+03	nc	9.4E+01	nc
Simazine	122-34-9	~~4.5E+00~~(4.3E+00)	c	1.9E+02	c	4.0E+00	gws
Sodium azide	26628-22-8	3.1E+02	nc	4.7E+03	nc	8.0E+01	nc
Sodium diethyldithiocarbamate	148-18-5	~~2.0E+00~~(1.9E+00)	c	8.5E+01	c	~~2.9E-01~~(2.5E-01)	c
Strontium, stable	7440-24-6	4.7E+04	nc	7.0E+05	nc	1.2E+04	nc
Strychnine	57-24-9	1.9E+01	nc	2.5E+02	nc	5.9E+00	nc
Styrene	100-42-5	8.7E+02	Csat	8.7E+02	Csat	1.0E+02	gws

CONTAMINANT	CAS No.	Residential Soil[1,3] (mg/kg)	Value Basis4	Industrial Soil[1,3] (mg/kg)	Value Basis4	Ground Water[2,3] (ug/L)	Value Basis4
tert-butanol	75-65-0	~~1.4E+03~~(1.3E+03)	~~nc~~	~~2.1E+04~~(6.5E+04)	~~nc~~	~~3.6E+02~~(1.4E+02)	~~nc~~
2,3,7,8-Tetrachlorodibenzodioxin (TCDD/dioxin)	1746-01-6	~~5.2E-06~~(4.9E-06)	c	2.4E-04	c	3.0E-05	gws
1,2,4,5-Tetrachlorobenzene	95-94-3	~~1.7E+01~~(2.3E+00)	nc	~~1.5E+02~~(3.1E+01)	nc	~~9.8E-01~~(1.6E-01)	nc
1,1,1,2-Tetrachloroethane	630-20-6	~~2.1E+00~~(1.9E+00)	c	9.4E+01	c	~~5.7E-01~~(5.0E-01)	c
1,1,2,2-Tetrachloroethane	79-34-5	~~6.4E-01~~(5.7E-01)	c	2.8E+01	c	~~7.6E-02~~(6.6E-02)	c
Tetrachloroethylene (PCE)	127-18-4	~~2.5E+01~~(2.2E+01)	c	1.7E+02	Csat	5.0E+00	gws
2,3,4,6-Tetrachlorophenol	58-90-2	1.9E+03	nc	2.5E+04	nc	2.4E+02	nc
p,a,a,a-Tetrachlorotoluene	5216-25-1	~~2.1E-02~~(2.6E-02)	c	~~9.8E-01~~(1.3E+00)	c	~~5.5E-04~~(6.4E-04)	c
Tetrahydrofuran	109-99-9	2.0E+04	nc	1.0E+05	nc	3.4E+03	nc
Thallium and compounds	7440-28-0	7.8E-01	nc	1.2E+01	nc	2.0E+00	gws
Thiobencarb	28249-77-6	6.3E+02	nc	8.2E+03	nc	1.6E+02	nc
Thiocyanates	Various	1.6E+01	nc	2.3E+02	nc	4.0E+00	nc
Tin and compounds	7440-31-5	4.7E+04	nc	7.0E+05	nc	1.2E+04	nc
Toluene	108-88-3	8.2E+02	Csat	8.2E+02	Csat	1.0E+03	gws
Toluene-2,4-diamine	95-80-7	~~1.4E-01~~(1.3E-01)	c	~~6.0E+00~~(5.7E+00)	c	~~2.0E-02~~(1.7E-02)	c
Toluene-2,5-diamine	95-70-5	~~3.0E+00~~(2.9E+00)	c	1.3E+02	c	~~4.3E-01~~(3.8E-01)	c
Toluene-2,6-diamine	823-40-5	1.9E+03	nc	2.5E+04	nc	6.0E+02	nc
p-Toluidine	106-49-0	~~1.8E+01~~(1.7E+01)	c	7.7E+02	c	~~2.5E+00~~(2.2E+00)	c
Toxaphene	8001-35-2	~~4.9E-01~~(4.7E-01)	c	2.1E+01	c	3.0E+00	gws
1,2,4-Tribromobenzene	615-54-3	~~2.8E+02~~(2.9E+02)	nc	~~2.4E+03~~(2.6E+03)	nc	~~2.0E+01~~(2.2E+01)	nc
Tributyltin oxide (TBTO)	56-35-9	1.9E+01	nc	2.5E+02	nc	5.7E+00	nc
2,4,6-Trichloroaniline	634-93-5	1.9E+00	nc	2.5E+01	nc	4.0E-01	nc
1,2,4-Trichlorobenzene	120-82-1	~~2.4E+01~~(2.3E+01)	c	2.8E+02	nc	7.0E+01	gws
1,1,1-Trichloroethane	71-55-6	6.4E+02	Csat	6.4E+02	Csat	2.0E+02	gws
1,1,2-Trichloroethane	79-00-5	~~1.2E+00~~(1.1E+00)	c	6.8E+00	nc	5.0E+00	gws
Trichloroethylene (TCE)	79-01-6	~~1.0E+00~~(9.2E-01)	c	2.0E+01	nc	5.0E+00	gws
Trichlorofluoromethane	75-69-4	7.9E+02	nc	1.2E+03	Csat	1.1E+03	nc
2,4,5-Trichlorophenol	95-95-4	6.3E+03	nc	8.2E+04	nc	1.2E+03	nc
2,4,6-Trichlorophenol	88-06-2	~~4.9E+01~~(4.7E+01)	c	8.2E+02	nc	~~4.1E+00~~(3.6E+00)	c
2,4,5-Trichlorophenoxyacetic Acid	93-76-5	6.3E+02	nc	8.2E+03	nc	1.6E+02	nc
2-(2,4,5-Trichlorophenoxy) propionic acid	93-72-1	5.1E+02	nc	6.6E+03	nc	5.0E+01	gws

CONTAMINANT	CAS No.	Residential Soil[1,3] (mg/kg)	Value Basis4	Industrial Soil[1,3] (mg/kg)	Value Basis4	Ground Water[2,3] (ug/L)	Value Basis4
1,1,2-Trichloropropane	598-77-6	~~1.7E+02~~(1.8E+02)	nc	~~1.0E+03~~(1.1E+03)	nc	~~2.6E+01~~(2.8E+01)	nc
1,2,3-Trichloropropane	96-18-4	~~5.1E-03~~(5.1E-03)	c	1.1E+00	c	~~7.5E-04~~(7.2E-04)	c
1,2,3-Trichloropropene	96-19-5	7.8E-01	nc	3.3E+00	nc	6.2E-01	nc
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	76-13-1	9.1E+02	Csat	9.1E+02	Csat	1.0E+04	nc
1,2,4-Trimethylbenzene	95-63-6	2.2E+02	Csat	2.2E+02	Csat	5.6E+01	nc
1,3,5-Trimethylbenzene	108-67-8	1.8E+02	Csat	1.8E+02	Csat	6.0E+01	nc
Trimethyl phosphate	512-56-1	~~2.7E+01~~(2.6E+01)	c	1.1E+03	c	~~3.9E+00~~(3.4E+00)	c
1,3,5-Trinitrobenzene	99-35-4	2.2E+03	nc	3.2E+04	nc	5.9E+02	nc
Trinitrophenylmethylnitramine (Tetryl)	479-45-8	1.6E+02	nc	2.3E+03	nc	3.9E+01	nc
2,4,6-Trinitrotoluene	118-96-7	~~2.1E+01~~(2.0E+01)	c	5.1E+02	nc	~~2.5E+00~~(2.2E+00)	c
Vanadium and compounds	7440-62-2	~~4.6E+02~~(4.0E+02)	c	8.4E+03	nc	1.5E+02	nc
Vinclozolin	50471-44-8	7.6E+01	nc	9.8E+02	nc	2.1E+01	nc
Vinyl acetate	108-05-4	9.7E+02	nc	2.7E+03	Csat	4.1E+02	nc
Vinyl bromide	593-60-2	~~2.8E-01~~(2.4E-01)	c	1.2E+01	c	~~3.7E-01~~(3.2E-01)	c
Vinyl chloride	75-01-4	~~6.1E-02~~(6.0E-02)	c	1.8E+01	c	2.0E+00	gws
Warfarin	81-81-2	1.9E+01	nc	2.5E+02	nc	5.6E+00	nc
Xylenes	1330-20-7	2.6E+02	Csat	2.6E+02	Csat	1.0E+04	gws
Zinc and Compounds	7440-66-6	2.3E+04	nc	3.5E+05	nc	6.0E+03	nc
Zinc phosphide	1314-84-7	2.3E+01	nc	3.5E+02	nc	6.0E+00	nc
Zineb	12122-67-7	3.2E+03	nc	4.1E+04	nc	9.9E+02	nc

Notes

[1]Where appropriate, the residential and industrial soil values consider ingestion and dermal exposure to soil and inhalation exposure to contaminants moving from soil to ambient air from volatilization or particulate emission.

[2]Groundwater standards promulgated under 47CSR12 are provided, where available. Standards that are unavailable under 47CSR12 are based on a risk-based methodology that considers ingestion, dermal, and inhalation exposure arising from the domestic use of groundwater.

[3]The concentrations in this table shall be applied where the exposure pathways described in footnotes 1 and 2 are the major contributors to risks identified in the site assessment. If other exposure pathways are identified, the acceptable contractions shall be determined only in consultation with the Secretary, considering all exposure pathways, and all other requirements of the regulations.

[4]Basis of standard: c – cancer effect; nc – noncancer effect; max – calculated risk-based concentration exceeds maximum possible contaminant level of $1x10^6$ mg/kg; Csat – calculated risk-based concentration exceeds residual saturation level; gws – West Virginia Groundwater Quality Standards from 47CSR12.

~~*Lead – Residential soil based on Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (July 1994), U.S. EPA OSWER Directive 9355.4-12. Industrial soil based on the U.S. EPA's *Blood Lead Concentrations of U.S. Adult Females: Summary Statistics from Phases 1 and 2 of the National Health and Nutrition Evaluation Survey (NHANES III)* (2002) and *Lead at Superfund Sites: Frequent Questions from Risk Assessors on the Adult Lead Methodology* (2018).~~