N50092.AR.000231
JEB FORT STORY, VA
5090.3a

DRAFT CONFIRMATORY STUDIES REPORT FOR SITE 2 -LANDFILL 2 FORT STORY VA
8/1/1995
MONTGOMERY WATSON

DRAFT CONFIRMATORY STUDIES REPORT FOR SITE 2 - LANDFILL 2 FORT STORY, VIRGINIA

Addendum to the Final Fort Story Preliminary Assessment/ Site Investigation Report

Confirmatory Studies
Fort Story, Virginia
Contract No. DACW45-92-D-0007
Delivery Order 0030

Volume 1 of 1

Prepared for:

U.S. Army Corps of Engineers
Missouri River Division
Omaha District
Omaha, Nebraska

Prepared by:

Montgomery Watson
560 Herndon Parkway, Suite 300
Herndon, Virginia 22070

August 1995

PROJECT STAFF

Program Manager
Bruce McMaster, Ph.D.

Assistant Program Manager
Christopher B. Cain, P.E.

Principal-in-Charge
Donald A. Kane, Ph.D., P.E.

Project Manager
Thomas L. Haynos

Report Preparation Staff

Technical
Thomas L. Haynos
Paige S. Igoe
Alexander O. Zay
Shirley M. Murphy

Production
Julie Lawrence

Technical Advisory Committee
Mimi Boxwell, P.G.

TABLE OF CONTENTS

		Page No.
	EXECUTIVE SUMMARY	ES-1
1.0	INTRODUCTION	1-1
1.1	CONFIRMATORY STUDIES OBJECTIVES	1-1
1.2	REPORT ORGANIZATION	1-1
1.3	BACKGROUND INFORMATION AND SITE DESCRIPTION AND HISTORY	1-2
2.0	FIELD PROCEDURES	2-1
2.1	DESCRIPTION OF FIELD PROCEDURES	2-1
	2.1.1 Groundwater Sampling Procedures	2-1
	2.1.2 Surface Water Sampling Procedures	2-2
	2.1.3 Sediment Sampling Procedures	2-3
	2.1.4 Equipment Decontamination Procedures	2-3
	2.1.5 Investigation-Derived Waste Management	2-4
2.2	SUMMARY AND CONCLUSIONS OF CONFIRMATORY STUDIES FIELD INVESTIGATION PROGRAMS	2-4
3.0	PHYSICAL CHARACTERISTICS	3-1
4.0	ASSESSMENT OF SITE CONTAMINATION	4-1
4.1	FIELD WATER SAMPLING RESULTS	4-1
4.2	IDENTIFICATION OF TRIGGER LEVELS	4-1
	4.2.1 Groundwater Trigger Levels	4-2
	4.2.2 Surface Water Trigger Levels	4-2
	4.2.3 Sediment Trigger Levels	4-2
4.3	CONFIRMATORY STUDIES INVESTIGATION RESULTS	4-2
	4.3.1 Groundwater Contamination Assessment	4-3
	4.3.2 Surface Water Contamination Assessment	4-3
	4.3.3 Sediment Contamination Assessment	4-3
	4.3.4 Summary and Conclusion	4-4
5.0	RECOMMENDATIONS	5-1

APPENDIX A	References
APPENDIX B	Site 2 - Landfill 2 - Field Records of Groundwater Sampling
APPENDIX C	Summary of EPA and Virginia Groundwater and Surface Water Standards
APPENDIX D	EPA Region III Risk-Based Concentrations (January - June 1995)
APPENDIX E	National Oceanic and Atmospheric Administration ER-L and ER-M Values

LIST OF TABLES

Table No.		Follows Page No.
3-1	Groundwater Elevation Data	3-1
4-1	Field Water Analytical Results, January 1995	4-1
4-2	Groundwater and Surface Water Data Summary, January 1995	4-2
4-3	Groundwater and Surface Water Data Summary, June 1990	4-2
4-4	Sediment Sample Results, January 1995	4-2

LIST OF FIGURES

Figure No.		Follows Page No.
1-1	Vicinity Map	1-2
1-2	Site Location Map	1-2
1-3	Site Map	1-2
3-1	Interpreted Potentiometric Surface Map, January 1995	3-1
4-1	Groundwater/Surface Water Contaminant Concentrations	4-2
4-2	Sediment Contaminant Concentrations	4-2

ACRONYMS AND ABBREVIATIONS

ARR	Analytical Results Report
CDAP	Chemical Data Acquisition Plan
CS	Confirmatory Studies
DO	Delivery Order
DOT	U.S. Department of Transportation
DPW	Directorate of Public Works
DQOs	data quality objectives
ENRD	Fort Eustis Environmental and Natural Resources Division
EPA	Environmental Protection Agency
ER-L	effects range-low
ER-M	effects range-medium
ft	feet
gpm	gallons per minute
ID	inside diameter
IDW	investigation-derived waste
JMM	James M. Montgomery, Inc.
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
MRD	Missouri River Division USACE Laboratory
msl	mean sea level
NGVD	National Geodetic Vertical Datum of 1929
NOAA	National Oceanic and Atmospheric Administration
PA/SI	Preliminary Assessment/Site Investigation
pH	negative logarithm of H^+ concentration
PID	photoionization detector
QA	quality assurance
QC	quality control
QCSR/ARR	Quality Control Summary Report/Analytical Results Report
RBC	Risk-Based Concentrations
RI	Remedial Investigation
SMCL	Secondary Maximum Contaminant Level
SSHP	Site Safety and Health Plan
USACE	U.S. Army Corps of Engineers
USAEHA	U.S. Army Environmental Hygiene Agency
µg/kg	micrograms per kilogram
µg/l	micrograms per liter
VGPL	Virginia Groundwater Protection Levels
WQP	water quality parameters

CHEMICAL COMPOUNDS

DDE	dichloro-diphenyl-ethane
DDT	dichloro-diphenyl-trichloroethane
PCBs	polychlorinated biphenyls
BNAs	base-neutral and acid extractable compounds
pest/PCBs	pesticides/polychlorinated biphenyls
TAL	target analyte list (for metals)
TFH-H	total fuel hydrocarbons - heavy fraction
TFH-L	total fuel hydrocarbon - light fraction
VOCs	volatile organic compounds

EXECUTIVE SUMMARY

Montgomery Watson, formerly James M. Montgomery Consulting Engineers, Inc., is the prime Architect-Engineer contracted by the U.S. Army Corps of Engineers, Omaha District, to conduct Confirmatory Studies (CS) at Fort Story, Virginia. The work was conducted for the Fort Eustis Environmental and Natural Resources Division. This report, an addendum to the *Final Site Investigation Report for the Fort Story Preliminary Assessment/Site Investigation (Final PA/SI)* (JMM, 1992), presents the results of the 1995 CS project field investigation.

The objective of the CS is to complete the PA/SI for Site 2 - Landfill 2 and to assess whether further investigations would be required. During the PA/SI, cadmium was detected in a groundwater sample at 87 µg/l, which exceeds federal maximum contaminant levels (MCLs) of 5 µg/l, and EPA Risk Based Concentrations (RBCs) of 18 µg/l. Copper was also detected in soil samples collected from one of the monitoring well borings. The *Final PA/SI Report* recommended additional sampling be conducted at the site to ascertain whether the cadmium was associated with the landfill. Specifically, the objective of the CS at Site 2 - Landfill 2 is to determine whether cadmium is present in the groundwater at the site, and if so, determine whether the source of the cadmium is Landfill 2.

Five groundwater samples, two surface water samples, and five sediment samples were collected at Site 2 - Landfill 2 during the 1995 CS project field investigation. Groundwater, surface water and sediment samples were analyzed for volatile organic compounds (VOCs), base-neutral and acid extractable compounds (BNAs), pesticides and polychlorinated biphenyls (pest/PCBs), total fuel hydrocarbons, total metals and dissolved metals. Three of the five groundwater samples and the two surface water samples were analyzed for selected water quality parameters.

Based on the results of the groundwater, surface water, and sediment sample analytical results collected during the CS at Site 2 - Landfill 2, there is no groundwater or sediment contamination concern at this site. With the exception of total lead, groundwater concentrations during the 1995 CS were well below the respective regulatory standards. Total lead was detected in two of the five monitoring wells at 16 µg/l and 18 µg/l respectively, which exceeds the MCL for lead of 15 µg/l. Dissolved lead was not detected from any of the groundwater samples collected at the site during the 1995 CS. Additionally, shallow groundwater underlying the site is not considered a potable drinking water source.

Cadmium was not detected in any of the groundwater samples collected from the site during the 1995 CS.

Surface water analytical results were well below the respective Virginia Water Quality Standards for fresh water and saline water at the site.

In the sediment samples, 4,4'-DDE was detected at concentrations which exceeded National Oceanic and Atmospheric Administration ER-L and ER-M values. Because 4,4'-DDE is a breakdown component of DDT, which was widely used in the past at Fort Story, it is not considered to be associated with Landfill 2.

The results of the January 27-28, 1995 groundwater, surface water, and sediment sampling show that Landfill 2 is not a threat to the environment or human health. Therefore it is recommended that No Further Action be considered at this site.

1.0 INTRODUCTION

Montgomery Watson, formerly James M. Montgomery Consulting Engineers, Inc., is the prime Architect-Engineer contracted by the U.S. Army Corps of Engineers (USACE), Omaha District, to conduct Confirmatory Studies (CS) at Site 2 - Landfill 2 at Fort Story, Virginia. The CS was performed for USACE under Contract Number DACW45-92-D-0007 and Delivery Order (DO) 0030. The work is being conducted for the Fort Eustis Environmental and Natural Resources Division (ENRD).

The results of the investigation are presented in this *Draft Confirmatory Studies Report*, which is an addendum to the *Final Site Investigation Report for the Fort Story Preliminary Assessment/Site Investigation and Fort Story NIKE Preliminary Assessment/Site Investigation (Final PA/SI)* (JMM, 1992). Because this report is an addendum to the *Final PA/SI*, the primary focus will be on the results of the analytical data generated for the additional confirmatory samples collected. The appropriate support documentation are referenced in this report to provide detailed discussions of field investigation procedures and protocol.

1.1 CONFIRMATORY STUDIES OBJECTIVES

The purpose of DO 0030 was to perform CS at three sites:

- Site 2 - Landfill 2, Fort Story
- Site 11A - Waste Oil Storage Tanks, Fort Eustis
- Site 20 - Past Pesticide Storage Area, Fort Eustis

This report addresses only the Fort Story CS site, Site 2 - Landfill 2, which was recommended for further study in the *Final PA/SI*. The goals of the Fort Story CS, as stated in the Scope of Services, dated December 1, 1992, were to complete the ongoing PA/SI for Site 2 - Landfill 2 and to assess whether further investigations will be required after this phase of work. Development of all related planning documents and execution of field investigations for the two Fort Eustis sites were conducted in 1993. The results of Site 11A - Waste Oil Storage Tanks, and Site 20 - Pesticide Storage Area at Fort Eustis were presented to USACE in a separate document, the *Fort Eustis, Virginia, Final Confirmatory Studies Report for Two Sites* (Montgomery Watson, 1995a).

1.2 REPORT ORGANIZATION

Section 1.0 of this report presents background information and a site description for the Fort Story Site 2 - Landfill 2 CS project site. Section 2.0 summarizes the field investigation programs conducted at the CS project site and addresses procedures for groundwater, surface water, and sediment sampling. Section 3.0 describes additional physical characteristics obtained during the CS at the project site. Because no additional site subsurface information was obtained during the CS field investigation, the geological and hydrogeological features presented in the *Final PA/SI* report are discussed. Section 4.0 presents the results of the CS investigation, including an assessment of any contamination detected in site media. Section 5.0 provides recommendations for Site 2 - Landfill 2 at Fort Story.

1.3 BACKGROUND INFORMATION, SITE DESCRIPTION AND HISTORY

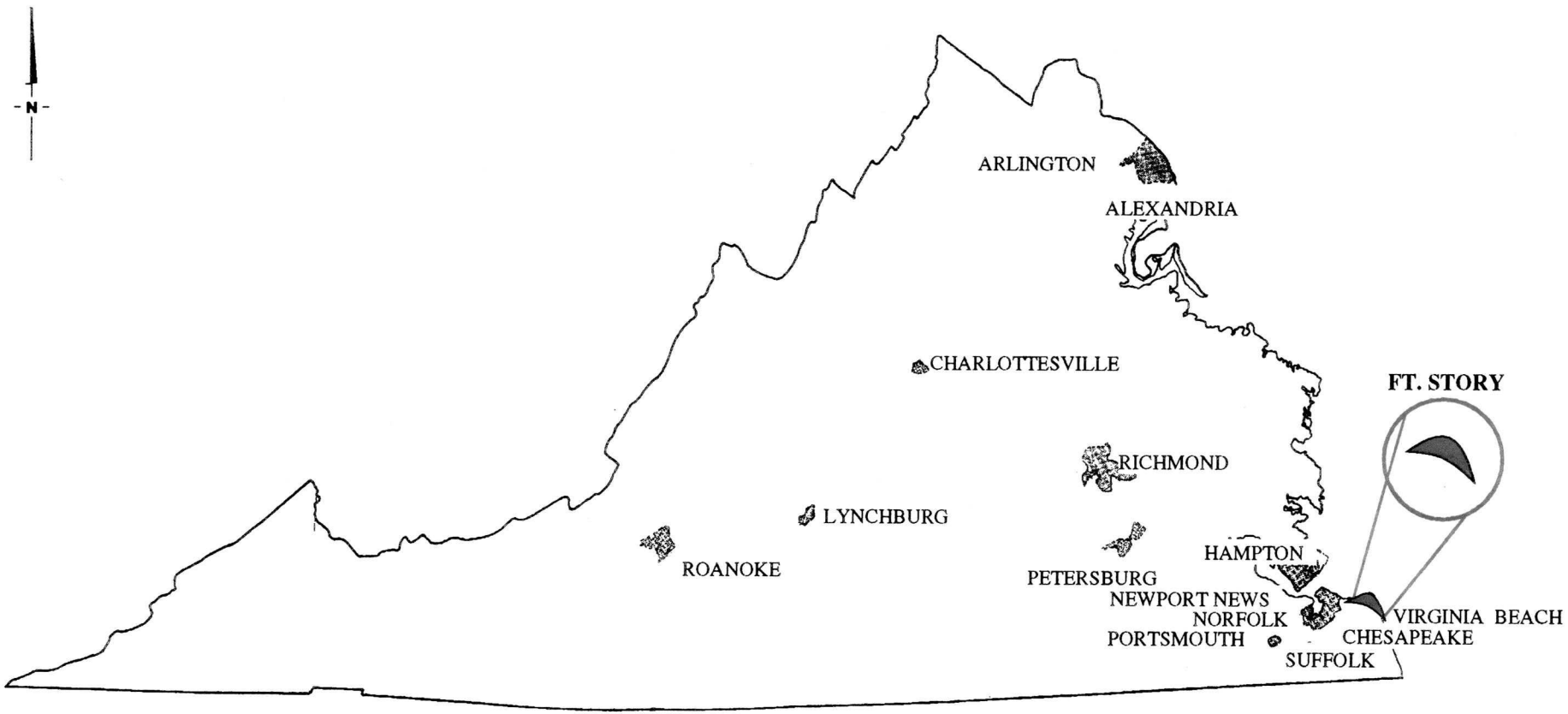
Fort Story is located within the Hampton Roads region of southeastern Virginia. Figure 1-1 presents a vicinity map of Fort Story in relation to the Hampton Roads region. Figure 1-2 presents a map of Fort Story.

Site 2 - Landfill 2 is located within the wetland area along the southern margin of Fort Story, and is immediately adjacent to the southern flank of a central sand ridge area near the junction of Coast Artillery Road and U.S. Route 60. Figure 1-3 presents a site map of Site 2 - Landfill 2.

The landfill was in operation from 1956 to 1962 (ESE, 1988). During the 1960s, a group of wooden buildings were reported possibly to have been demolished and buried at this site, but no documentation is available to confirm this action (Fort Story Personnel, 1990). Surface debris or evidence of buried debris was not evident during field observations when the PA/SI was conducted in 1990. The geographical surveying and electromagnetic surveying were performed during the 1990 PA/SI investigation to determine the extent of the landfill. Based on these surveying results, the size of the landfill is approximately 3 acres. Five monitoring wells were installed and groundwater samples were collected and submitted for chemical analysis to assess whether the landfill may have released contaminants to the environment. Additionally, 10 soil samples were collected from the monitor well borings and submitted for chemical analysis. The soil samples were collected at the surface and at the water table.

During the PA/SI, cadmium was detected in groundwater collected from MW109 at a concentration of 87 µg/L. Although MW109 is cross-gradient to the landfill, it is downgradient of a marshy area that may have been affected by contaminants from the landfill. Additionally, elevated concentrations of copper were detected in the soil samples collected from the boring for monitoring well MW107, located downgradient of the landfill.

Montgomery Watson recommended in the *Final PA/SI* that additional CS be conducted at Site 2 - Landfill 2 to ascertain whether the elevated concentrations of cadmium detected in the groundwater during the PA/SI were associated with Landfill 2.

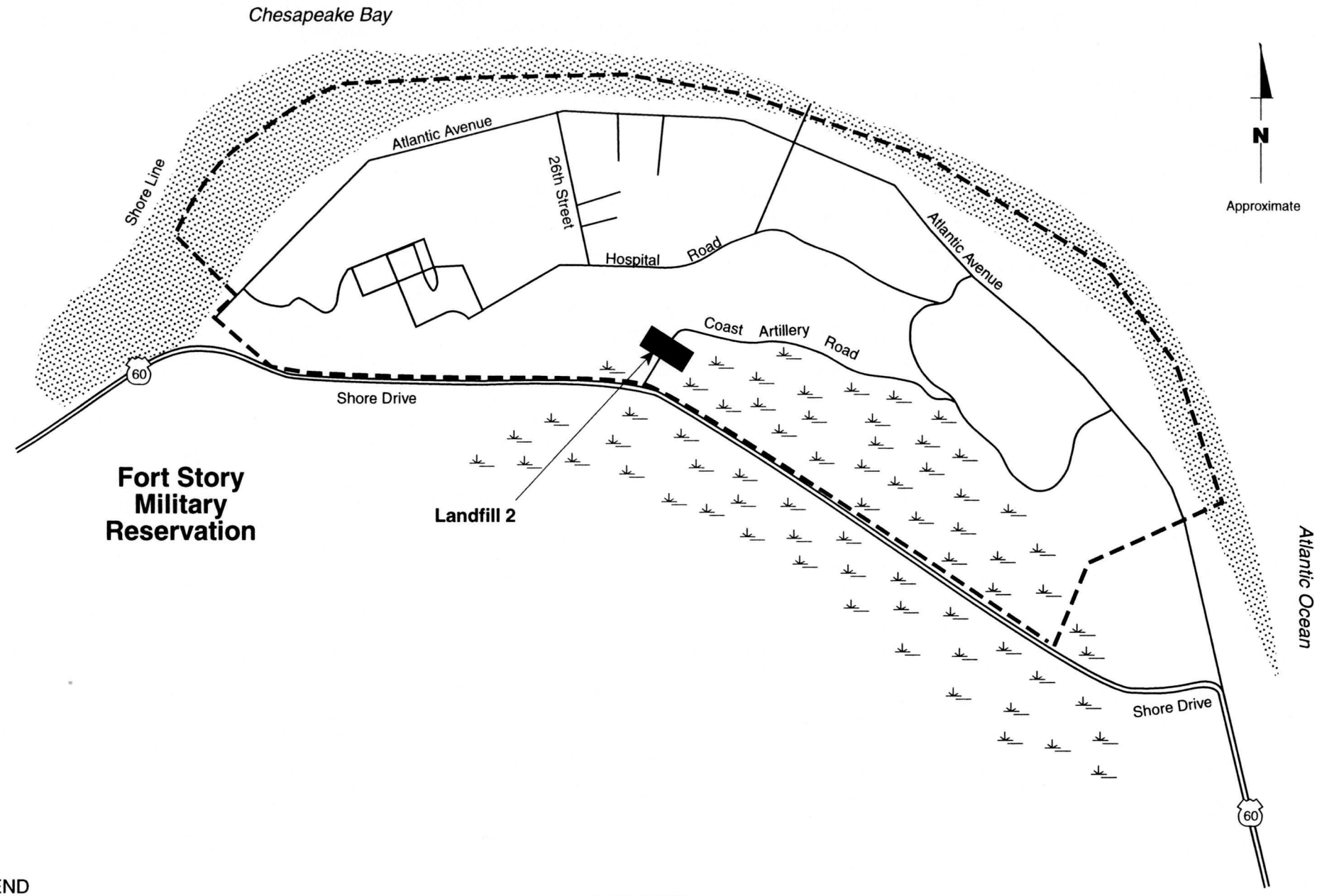


Site 2 - Landfill 2
Confirmatory Studies
Fort Story, Virginia

Vicinity Map

MONTGOMERY WATSON

Figure 1-1



LEGEND

- Swamp land
- Shore line
- Fort Story Military Reservation Boundary

SCALE IN FEET

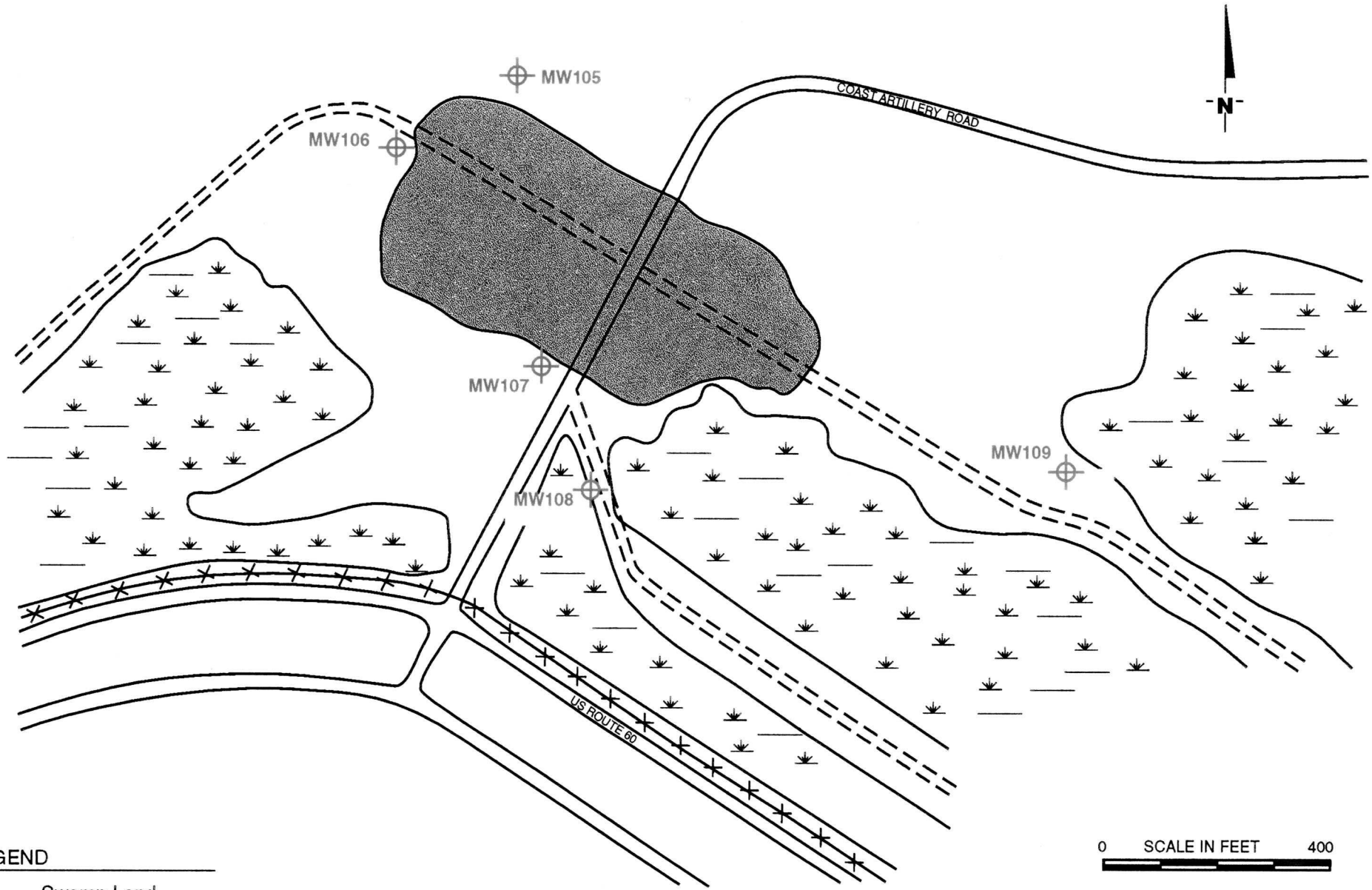
0 1000 2000 3000

Confirmatory Studies
Fort Story, Virginia

Installation Map

MONTGOMERY WATSON

Figure 1-2



LEGEND

- Swamp Land
- Existing Monitoring Well
- Approximate Location Landfill
- Fence

Site 2 - Landfill 2
Confirmatory Studies
Fort Story, Virginia

Site Map

MONTGOMERY WATSON

Figure 1-3

2.0 FIELD PROCEDURES

This section documents Montgomery Watson's Fort Story Confirmatory Studies (CS) field investigation programs. Proposed field investigation procedures, sampling locations, analytical requirements, numbers of samples to be collected and field documentation requirements for the CS fieldwork are presented in the *Final Chemical Data Acquisition Plan, Confirmatory Studies, Fort Story, Virginia (CDAP)* (Montgomery Watson, 1995b). Health and safety procedures followed during the CS field investigation program were presented in the *Final Site Safety and Health Plan, Confirmatory Studies, Fort Story, Virginia (SSHP)* (Montgomery Watson, 1995c).

The *Quality Control Summary Report/Analytical Results Report, Confirmatory Studies, Fort Story, Virginia (QCSR/ARR)* (Montgomery Watson, 1995d) was prepared to evaluate the conformance of the 1995 CS field investigation program, including health and safety procedures, to those proposed in the project work plans, and to assess the impact of any field changes.

To ensure the integrity of the samples collected during the CS field investigation programs, several aspects were documented in the *QCSR/ARR*:

- equipment and procedures used during all sampling events;
- procedures for decontaminating sampling equipment;
- sample handling, documentation and shipping procedures;
- calibration and measurement records;
- identification of USACE-approved field changes, USACE-approved interpretations of the *CDAP*, field nonconformances, corrective actions and the resulting effect on the data generated; and
- an evaluation of whether the CS field data quality objectives (DQOs) were met.

The following sections summarize the CS field investigation programs conducted at the Fort Story Site 2 - Landfill 2 CS project site. Where possible, the appropriate support documentation listed previously and the *Final PA/SI* are referenced in order to provide a more complete discussion of technical procedures used during the field investigation. Lastly, a summary and conclusions of the field investigation programs are presented.

2.1 DESCRIPTION OF FIELD PROCEDURES

The following sections discuss the technical procedures used during the 1995 Fort Story CS field investigation programs.

2.1.1 Groundwater Sampling Procedures

On January 27-28, 1995, Montgomery Watson collected five groundwater samples, one field duplicate groundwater sample, and one split groundwater sample from the existing wells located at the project site. Existing monitoring wells were sampled by determining the volume of water contained in the well, purging the required number of well volumes, measuring the variation of field parameters during purging, and collecting the groundwater sample.

Measurements of the static water level and total depth of each monitoring well were required for the calculation of the respective well volumes. Water level and total depth measurements were obtained using a Solinst™ water level indicator. This device was decontaminated between monitoring wells using the procedures described in the *CDAP* and *QCSR/ARR*. Depth-to-water and total well depth, and respective purge volume were recorded on the Groundwater Sampling Log. Appendix B presents the Groundwater Sampling Logs completed for each well sampled for this project.

The purge volume is the number of well volumes required to be evacuated from a well prior to collecting the groundwater sample. The *CDAP* specifies that the purge volume from all monitoring wells sampled in 1995 be equivalent to at least three well volumes, unless the well purges dry. If the well purged dry, it was sampled after being allowed to recover. Purging of the monitoring wells was performed either through bailing or by use of a centrifugal or inertial lift pump, depending on the elevation head. A disposable Teflon™ bailer, 1 inch in diameter and 3 feet in length, was used to purge through bailing. Sterile nylon cord was used for lowering and withdrawing the bailer from the wells. The nylon cord was discarded following the sampling of each well.

During purging operations, field measurements of purge water temperature, pH and conductivity were obtained. Each measurement was recorded on the Groundwater Sampling Log (Appendix B) for the given well and sampling event.

After purging, groundwater samples were obtained using a dedicated disposable Teflon bailer and submitted for chemical analysis. All groundwater samples were analyzed using SW-846 protocol for Target Compound List (TCL) volatile organic compounds (VOCs), TCL base-neutral and acid extractable compounds (BNAs), a library search for VOCs and BNAs to identify tentatively identified compounds (TICs), TCL pesticides and polychlorinated biphenyls (pest/PCBs), total and dissolved Target Analyte List (TAL) metals, cyanide, total fuel hydrocarbons-heavy fraction (TFH-H) as fuel, and TFH-H as oil. Groundwater samples collected from monitoring wells MW105 and MW109 were also analyzed for water quality parameters (WQP). The groundwater sample collected from MW105 was also analyzed for total fuel hydrocarbons-light fraction (TFH-L). Each groundwater sample was immediately placed in appropriate laboratory containers, labeled, placed in coolers (maintained at 4°C), and shipped via overnight courier to the laboratory for chemical analysis using the protocols outlined in the *CDAP* and *QCSR/ARR*. The analyzed WQPs included alkalinity, ammonia-N, chloride, nitrate-N, orthophosphate-P, sulfate, total dissolved solids, and total phosphorous.

Samples collected for dissolved metals analysis were filtered in the field using a 0.45-micron filter. The sample was transferred through the filter and into the appropriate preserved sample containers using a peristaltic pump and new polyethylene tubing. The polyethylene tubing and filter were discarded after each sample was collected.

2.1.2 Surface Water Sampling Procedures

On January 27-28, 1995, two surface water samples and one duplicate surface water sample were collected by Montgomery Watson from the project site. All surface water samples were analyzed for TCL VOCs, TCL BNAs, a library search for VOCs and BNAs to identify TICs, TCL pest/PCBs, total and dissolved TAL metals, TFH-H as fuel, TFH-H as oil, and WQP.

Sample aliquots collected for VOC analysis were obtained by lowering an unpreserved glass laboratory sample bottle into the water and carefully transferring the sample into 40-

ml VOC vials. This procedure was used to ensure that no air bubbles remained in the vial and no preservative was lost.

Sample aliquots collected for parameters other than VOCs were obtained by lowering an open, preserved sample bottle horizontally into the water at the designated sample collection point, taking care not to spill preservative into the water. As water entered the bottle, the bottle was gradually turned upright, keeping the lip just under the surface so that only the uppermost surface water was collected. The sample bottles were filled to just below the lip to avoid any loss of preservative. If the water was not deep enough to turn the bottle upright, the bottle was held at an angle as steep as possible with the lip remaining just under the surface. Sample bottles were filled with the opening of the bottle oriented upstream.

Each surface water sample collected for chemical analysis was immediately labeled, placed in coolers (maintained at 4°C), and shipped via overnight courier to the laboratory for chemical analysis using the protocols outlined in the *CDAP* and *QCSR/ARR*.

Surface water samples collected for dissolved metals analysis were filtered in the field using a 0.45-micron filter using the procedures previously described for groundwater sampling in Section 2.1.1.

2.1.3 Sediment Sampling Procedures

On January 27-29, 1995, Montgomery Watson collected five sediment samples, one duplicate sediment sample, and one split sample for chemical analysis. All sediment samples were analyzed for TCL VOCs, TCL BNAs, a library search for VOCs and BNAs to identify TICs, TCL pest/PCBs, TAL metals, TFH-H as fuel, and TFH-H as oil. The sediment sample collected from location SD3001 was also analyzed for TFH-L.

The sediment samples were collected with a decontaminated stainless steel trowel or hand auger. Grab samples were collected at a 1 - 1.5 foot depth. VOC and TFH-L samples were collected as a grab sample. Samples collected for the remaining parameters were homogenized in a decontaminated stainless steel bowl using a decontaminated stainless steel spoon.

Each sediment sample was immediately placed in appropriate laboratory containers, labeled, placed in coolers (maintained at 4°C), and shipped via overnight courier to the laboratory for chemical analysis using the protocols outlined in the *CDAP* and *QCSR/ARR*.

2.1.4 Equipment Decontamination Procedures

Strict decontamination procedures were followed during the CS project field investigation sampling activities to prevent cross-contamination. Before use, all sampling equipment (except disposable bailers) was decontaminated by an Alconox™ wash, a tap water rinse, a normal alcohol (n-propanol) rinse and a double distilled or de-ionized water rinse. Disposable bailers were used to collect aqueous samples. Because the disposable bailers were new and a single bailer was used at each sampling location, field decontamination of the bailers was not necessary. The decontamination activities were conducted on site.

In order to evaluate the water used during decontamination for the CS project, a deionized water sample was collected and submitted for laboratory analysis. Results from the analysis of this sample were used to evaluate whether the field water used during decontamination activities had any influence on the analytical data. Section 4.3 presents an evaluation of

these analytical results.

2.1.5 Investigation-Derived Waste Management

Investigation-derived waste (IDW) was handled in accordance with guidance provided by Fort Eustis ENRD. Purge water from groundwater sampling (including decontamination fluids) was contained in appropriately labeled, DOT-approved, 55-gallon drums. Upon completion of sampling activities at each site, the purge water drums were transported to a temporary storage area at the Fort Story Hazardous Waste Accumulation Facility at Building 1013 and pumped into a polyethylene 350-gallon storage tank.

2.2 SUMMARY AND CONCLUSIONS OF CONFIRMATORY STUDIES FIELD INVESTIGATION PROGRAMS

The CS field investigation programs are fully evaluated in the *QCSR*. The objectives of the *QCSR/ARR* are to ensure that the sample protocol outlined in the project work plans were adhered to and all field changes and problems were documented and addressed prior to and during the evaluation of the analytical data. This was achieved by evaluating the effectiveness of the soil and groundwater sampling programs with respect to the CS field DQOs. The following summary is based upon the conclusions presented in the *QCSR/ARR*.

The CS project field DQOs are quantitative and qualitative statements used to assess the quality of the data required for use in future project phases. The evaluation of field DQOs with respect to precision, accuracy, representatives, completeness and comparability criteria were presented in the *QCSR/ARR*.

The overall field DQOs were attained for the Fort Story CS project. The CS field investigation programs were in substantial conformance with those proposed in the *CDAP*. All field changes and problems were fully documented in the field. These actions result in a high level of confidence associated with the CS data set. By meeting the CS project field DQOs, the field investigation programs and associated QA/QC program implemented were successful in confirming that the data collected in the field are of known quality and are useful for the purposes of evaluating the CS project site.

3.0 PHYSICAL CHARACTERISTICS

Descriptions of the physical characteristics of Fort Story (e.g., climate, topography, surface water hydrology) were presented in the *Final PA/SI.* This section provides additional information on the hydrogeology specific to Site 2 - Landfill 2, which was assessed from the data collected during the 1995 CS field investigation.

Water level measurements were collected within a 2-hour period on January 26, 1995, from all five groundwater monitoring wells at the site. Table 3-1 presents the groundwater elevation data derived from these measurements. Also included in Table 3-1 for comparison purposes are water level measurements collected at the site on June 11, 1990, during the PA/SI field investigation.

Figure 3-1 shows the potentiometric surface map for Site 2 - Landfill 2 based on measurements collected on January 26, 1995. The water level obtained at monitoring well MW-107 did not correlate well when compared with the measurements obtained during the 1990 PA/SI investigation. The cause of this anomaly is not known; therefore, the water level obtained from monitoring well MW-107 was not used in the construction of the potentiometric surface map for the site. Figure 3-1 shows that the hydraulic gradient at the site is minimal, with a change in hydraulic head of less than 0.1 feet across the site. Groundwater flows in a southerly direction towards the wetland area.

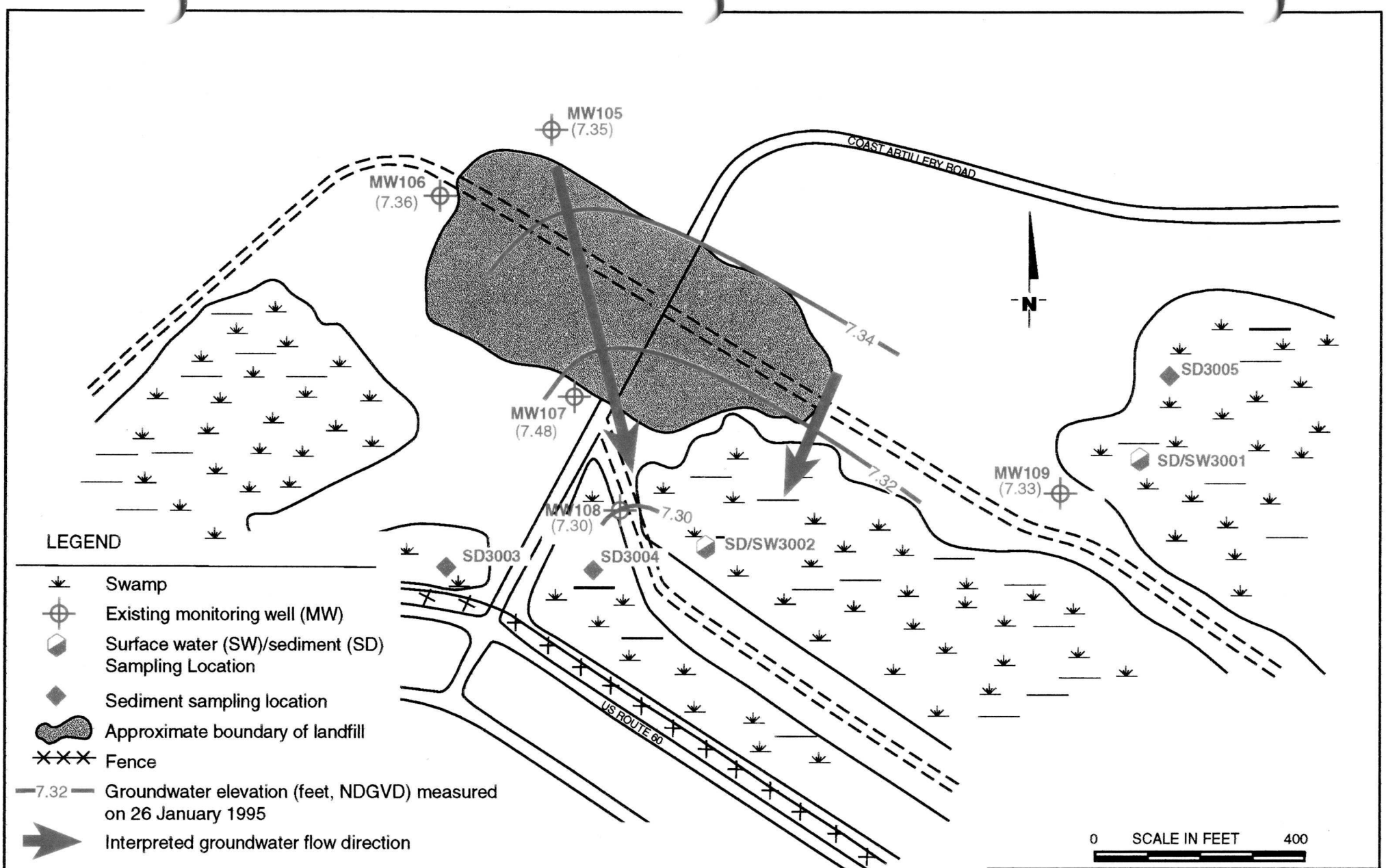
Table 3-1

Groundwater Elevation Data
Site 2 - Landfill 2
Confirmatory Studies
Fort Story, Virginia
Page 1 of 1

	Elevation[a]		Date Measured: 6/11/90		Date Measured: 1/26/95	
Well ID	GS	TOC	Depth to Water[b]	Elevation of Water[c]	Depth to Water[d]	Elevation of Water[e]
MW105	16.89	16.56	8.73	8.16	9.21	7.35
MW106	9.75	9.52	1.73	8.02	2.16	7.36
MW107	10.84	10.60	2.84	8.00	3.12	7.48
MW108	9.29	8.98	1.51	7.78	1.68	7.30
MW109	10.07	9.68	1.99	8.08	2.35	7.33

a Elevations are in feet and are surveyed with reference to the National Geodetic Vertical Datum (NGVD) of 1929.
b Depth measured in feet below ground surface.
c Elevations are calculated in feet with reference to surveyed elevation at ground surface.
d Depth measured in feet below top of casing.
e Elevations are calculated in feet with reference to surveyed elevation for top of casing.

ID = Identification
GS = Ground Surface
TOC = Top of Casing



Note: SD/SW3001 was originally designated SD/SW3002 in the *CDAP* but was labelled as SD/SW3001 in the field. As a result of this field change, samples from the location labelled SD/SW3001 in the *CDAP* were labelled as SD/SW3002 in the field. This map reflects the field change.

Groundwater elevation of MW107 was not considered to be representative of potentiometric surface and therefore was not used to interpret groundwater contours.

Site 2 - Landfill 2
Confirmatory Studies
Fort Story, VA

Potentiometric Surface
Map on 26 January, 1995

MONTGOMERY WATSON

Figure 3-1

4.0 ASSESSMENT OF SITE CONTAMINATION

This section presents an assessment of the contaminants detected in site media (groundwater, surface water, and sediment) at Site 2 - Landfill 2 CS project site. Note that the analytical results reported in the *Final PA/SI* are not discussed in the text of this CS report except where appropriate to compare to 1995 analytical results. For comparison purposes, results from the analysis of groundwater samples collected in 1990 during the PA/SI site investigation are posted on the site figures and summarized in tables.

The quality of the analytical data presented in this section has been reported separately. Data validation results for the 1995 analytical data were presented in the *Quality Control Summary Report/Analytical Results Report, Confirmatory Studies, Fort Story, Virginia (QCSR/ARR)* (Montgomery Watson, 1995). Montgomery Watson reviewed the analytical data results according to the following: guidelines specified in the USACE-approved project work plans; *Test Methods for Evaluating Solid Waste, EPA SW-846* (EPA, 1986); the EPA guidance documents *National Functional Guidelines for Organic Data Review* (EPA, 1991); *Laboratory Data Validation Functional Guidelines for Evaluation of Inorganic Analyses* (EPA, 1988); and the project laboratories' quality assurance (QA) plans. Data quality was evaluated in terms of the data quality criteria: precision, accuracy, representativeness, completeness and comparability.

As part of the data validation process, QA split samples were collected and submitted to the USACE Missouri Division (MRD) Laboratory for chemical analyses. QA sample results for the split samples were not submitted by MRD to Montgomery Watson for review, but were submitted directly to the USACE Project Chemist.

Based on the data validation results presented in the *QCSR/ARR*, the analytical data were considered acceptable and can be used with a high degree of confidence to evaluate environmental conditions at the Fort Story CS project site. For the limited number of analytical data in which quality control criteria were deficient, these sample results were qualified as estimated, and are presented with the appropriate qualifiers in this section.

4.1 FIELD WATER SAMPLING RESULTS

Field water consists of bottled distilled or deionized water purchased for the project and potable water available for use during the Fort Story CS investigation. The results of field water analyses are used generally to determine whether contamination present in samples was introduced as a result of field water quality. A full evaluation of the quality of the field water used during the Fort Story CS field investigations is presented in the *QCSR/ARR*.

Samples of deionized water obtained from the laboratory were collected directly from the container used to store the water and analyzed for volatile organic compounds (VOCs), base-neutral and acid extractable compounds (BNAs), pesticides/polychlorinated biphenyls (pest/PCBs), total fuel hydrocarbons-light fraction (TFH-L), total fuel hydrocarbons-heavy fraction (TFH-H), and target analyte list (TAL) metals. No VOCs, BNAs, Pest/PCBs, TFH-L, TFH-H, or metals were detected in the deionized water sample. (Table 4-1)

4.2 IDENTIFICATION OF TRIGGER LEVELS

Media-specific trigger levels were developed for each of the analytes detected to provide a basis for evaluating the analytical data generated from the 1995 CS investigation. The trigger levels were based on the criteria described below.

Table 4-1

Field Water Analytical Results, January 1995
Site 2- Landfill 2
Confimatory Studies
Fort Story, Virginia
Page 1 of 1

Parameter/Analyte	**S2DI1**
Volatile Organic Compounds (µg/L)	ND
Base-Neutral/Acid Extractable Compounds (µg/L)	ND
Pesticides/PCBs (µg/L)	ND
Total Fuel Hydrocarbons (µg/L)	ND
Total Metals (µg/L)	ND

ND = Not detected above method reporting limit

4.2.1 Groundwater Trigger Levels

Federal EPA maximum contaminant levels (MCLs), Secondary MCLs and the Virginia Groundwater Protection Levels (VGPLs) were used as trigger levels to evaluate chemicals detected in groundwater samples. For metals, total and dissolved concentrations were compared to MCLs and VGPLs. This approach for determining trigger levels is consistent with the methodology for determining trigger levels described in the *CDAP*. A summary of EPA and Virginia groundwater and surface water standards is provided in Appendix C.

Groundwater trigger levels were also evaluated with respect to risk based concentrations (RBCs). RBCs are provided quarterly by EPA Region III (EPA, 1995), and are typically used in a human health risk assessment as the basis of comparison for the initial screening of compounds of potential concern. However, for this report, the RBCs were used as additional criteria to evaluate the contaminants detected in CS project site samples collected and analyzed in 1995. Appendix D presents the January - June 1995 RBCs. It should be noted that the RBCs for water are derived based on the risk from exposure through tap water and typically are more conservative than MCLs.

4.2.2 Surface Water Trigger Levels

For surface water trigger levels, Virginia State Water Control Board Regulations Water Quality Standards (VR 680-21-00) were used to identify trigger levels.

4.2.3 Sediment Trigger Levels

For sediment trigger levels, the Effects-Range - Low (ER-L) and Effects-Range - High (ER-H) values established by the National Oceanic and Atmospheric Administration (NOAA) were used to establish trigger levels for the project site. NOAA uses ER-L and ER-M values to rank sediment contamination data measured at National Status and Trends sites with regard to potential for adverse biological effects. NOAA values are provided in Appendix E.

4.3 CONFIRMATORY STUDIES INVESTIGATION RESULTS

Tables 4-2 and 4-4, and Figures 4-1 and 4-2 present a summary of detected compounds in the groundwater and surface water samples collected at Site 2 - Landfill 2 during the 1995 CS project field investigation. Table 4-3 and Figures 4-1 and 4-2 provide the 1990 groundwater analytical results as well.

4.3.1 Groundwater Contamination Assessment

The results of the January 27-28, 1995, groundwater sampling show low concentrations of VOCs, and metals detected in the samples collected from the on-site monitoring wells. BNAs, pest/PCBs, and TFH were not detected in the samples.

Concentrations of 2-butanone (MEK) (MW106 at 23 µg/l), 4-methyl-2-pentanone (MIBK) (MW109 at 12 µg/l), toluene (2.9 and 1.1 µg/l at SW3001 and SW3002) and acetone (12 µg/l at MW107) were each detected in separate monitoring wells on site. Acetone and MIBK are common laboratory contaminants, and their presence may be the result of laboratory contamination. The detected concentrations of VOCs were well below applicable Federal MCLs, VGPLs, and RBCs.

Total and dissolved metals results were compared to the MCLs and VGPLs (Appendix C) and RBCs (Appendix D). Total lead was detected in the groundwater samples collected from monitoring wells MW107 and MW108 at concentrations of 16 and 18 µg/l. Both samples exceed the MCL of 15 µg/l, but are below the VGPL of 50 µg/l. However, dissolved lead was not detected in these samples. With the exception of arsenic and manganese, all other total and

Table 4-2

Groundwater and Surface Water Data Summary, January 1995
Site 2 - Landfill 2
Confirmatory Studies
Fort Story, Virginia

Parameter/Analyte	SW3001	SW3001D	SW3002	MW105	MW106	MW107	MW108	MW109	MW109D
Volatile Organic Compounds (µg/L)									
2-Butanone (MEK)	<10	<10	<10	<10	**23**	<10	<10	<10	<10
4-Methyl-2-pentanone (MIBK)	<10	<10	<10	<10	<10	<10	<10	**12**	<10
Acetone	<10	<10	<10	<10	<10	**12**	<10	<10	<10
Toluene	**2.9**	**2.2**	**1.1**	<1	<1	<1	<1	<1	<1
Tentatively Identified VOCs									
Acetic acid, methyl ester	ND	ND	ND	ND	ND	**2.6**[JT]	ND	ND	ND
Pentane	ND	ND	ND	ND	ND	**1.1**[JT]	ND	ND	ND
Sulfur dioxide	ND	ND	ND	ND	ND	ND	ND	**1.3**[JT]	ND
Unknown	**4.1**[JT]	ND	ND	ND	**7 (3)**[JT]	**145(2)**[JT]	**6**[JT]	ND	ND
Unknown alkane	ND	**1.2**[JT]	ND	ND	ND	ND	ND	ND	ND
Unknown methyl ethyl	ND	ND	**1.3**[JT]	ND	ND	ND	ND	ND	ND
Base-Neutral Acid Extractable Compounds (µg/l)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pesticides and Polychlorinated Biphenyls (mg/l)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Fuel Hydrocarbons (µg/l)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Metals (µg/L)									
Aluminum	**600**	**560**	<340	**1,100**	**1,100**	**3,400**	**2,300**	**8,600**	**9,400**
Arsenic	<10	<10	<100	<100	<10	**27**	**22**	**16**	**16**
Barium	**22**	**19**	**64**	<10	**24**	**73**	**27**	**47**	**53**
Beryllium	<4	<4	<4	<4	**4**	**4**	**4**	<4	<4
Calcium	**5,800**	**6,100**	**21,000**	**16,000**	**3,100**	**69,000**	**15,000**	**8,500**	**9,200**
Chromium	<10	<10	<10	<10	<10[UJ,b]	<10[UJ,b]	<10[UJ,b]	**14**	**15**
Copper	<25	<25	<25	<25	<25	**200**	<25	<25	<25
Iron	**12,000**	**11,000**	**33,000**	**4,100**	**1,500**	**31,000**	**31,000**	**14,000**	**15,000**
Lead	**8.7**	**6.1**	<5	<5	<5	**16**	**18**	**15**	**16**

Table 4-2

Groundwater and Surface Water Data Summary, January 1995
Site 2 - Landfill 2
Confirmatory Studies
Fort Story, Virginia

Parameter/Analyte	SW3001	SW3001D	SW3002	MW105	MW106	MW107	MW108	MW109	MW109D
Total Metals (µg/L) (cont)									
Magnesium	**4,100**	**4,300**	**6,900**	**1,300**	**560**	**3,400**	**6,400**	**3,900**	**4,100**
Manganese	**170**	**170**	**550**	**40**	**51**	**560**	**440**	**280**	**290**
Potassium	<1,000	<1,000	**3,200**	<1,000	<1,000	**1,600**	**4,200**	**3,200**	**3,300**
Sodium	**14,000**	**15,000**	**22,000**	**8,300**	**3,100**	**6,300**	**15,000**	**11,000**	**12,000**
Vanadium	<10	<10	<10	<10	<10	**12**	<10	**20**	**22**
Zinc	**49**	**53**	**23**	<20	**38**	**280**	**460**	**60**	**84**
Dissolved Metals (µg/L)									
Aluminum	**380**	**380**	<200	<200	**250**	<200	**1,200**	**1,500**	**1,500**
Arsenic	<10	<10	<10	<100	<27	**27**	**22**	<10	<10
Barium	**16**	**16**	**41**	<10	**24**	**55**	**21**	**22**	**21**
Calcium	**4,900**	**5,000**	**19,000**	**12,000**	**1,700**	**69,000**	**15,000**	**7,200**	**7,200**
Iron	**8,500**	**8,700**	**11,000**	**1,600**	**700**	**21,000**	**28,000**	**9,800**	**9,900**
Magnesium	**3,900**	**3,900**	**6,700**	**1,100**	**530**	**3,400**	**6,300**	**3,100**	**3,200**
Manganese	**150**	**160**	**480**	**25**	**44**	**560**	**430**	**230**	**220**
Potassium	<1,000	<1,000	**3,000**	<1,000	<1,000	**1,600**	**4,300**	**2,600**	**2,800**
Sodium	**15,000**	**15,000**	**6,700**	**9,900**	**3,100**	**7,000**	**16,000**	**11,000**	**12,000**
Zinc	**39**	**60**	**130**	<20	**37**	**49**	**25**	**21**	<20

Table 4-2

Groundwater and Surface Water Data Summary, January 1995
Site 2 - Landfill 2
Confirmatory Studies
Fort Story, Virginia

Parameter/Analyte	SW3001	SW3001D	SW3002	MW105	MW106	MW107	MW108	MW109	MW109D
Miscellaneous (µg/L)									
Alkalinity (to pH 4.5) as $CaCO_3$	<1,000	**2,200**	**27,000**	**15,000**	NA	NA	NA	**33,000**	**37,000**
Ammonia-N	**130**	**120**	**210**	**74**	NA	NA	NA	**3,000**	**3,500**
Chloride	**32,000**	**34,000**	**50,000**	**14,000**	NA	NA	NA	**20,000**	**25,000**
Nitrate-N	<50	**130**	**170**	<50	NA	NA	NA	<50	<50
Orthophosphate-P	<50	<500	<50	**<80**	NA	NA	NA	**96**	**80**
Sulfate as SO4	<5,000	**7,200**	<5,000	**13,000**	NA	NA	NA	**8,900**	**8,900**
Total Dissolved Solids	**180,000**	**170,000**	**150,000**	**44,000**	NA	NA	NA	**200,000**	**160,000**
Total Phosphorus (365.4)	**450**	**320**	**490**	**130**	NA	NA	NA	**820**	**760**

b = Concentration qualified due to low MS/MSD recovery.
JT = Associated value is tentatively identified and estimated.
NA = Not analyzed
ND = Not detected above method reporting limit.
UJ = Associated non-detection is estimated. Results are qualitatively acceptable.

= Exceeded Federal MCL Standard

Table 4-3

Groundwater Data Summary, June 1990
Site 2- Landfill 2
Confimatory Studies
Fort Story, Virginia

Parameters	MW105	MW105D	MW106	MW107	MW108	MW109
Volatile Organic Compounds (µg/L)						
Toluene	ND	NA	ND	ND	ND	1.3
Carbon Disulfide	2.8	NA	2.0	0.8	18	25
Base-Neutral Acid Extractable Compounds (µg/L)						
Benzoic Acid	ND[J,D]	ND[D]	ND[D]	ND	120	ND[D]
Pesticides/PCBs (µg/L)	ND	ND	ND	ND	ND	ND
Total Metals (µg/L)						
Arsenic	ND	ND	ND	30	ND	30
Cadmium	ND	ND	170	ND	ND	140
Chromium	19	20	22	26	22	51
Copper	10[C]	11[C]	29[C]	97[C]	21[C]	36[C]
Mercury	ND	ND	ND	ND	ND	0.2
Lead	10	ND	25	40	20	60
Zinc	ND	ND	130	160	97	100
Dissolved Metals (µg/L)						
Arsenic	ND	ND	ND	11	ND	8
Cadmium	ND	ND	ND	ND	ND	87
Lead	ND	ND	3	ND	ND	5
Zinc	65	66	ND	29	66	66
Cyanide (µg/L)	ND	ND	ND	ND	ND	ND
Inorganics (µg/L)						
Barium	ND	ND	100	170	ND	140
Fluoride	ND	ND	ND	1,100	ND	ND
Chloride	13.7	13,600	3,400	7,800	31,900	17,400
Sulfate	15.0	15,000	5,400	3,200	ND	ND
Field Parameters[a]						
Temperature(°C)	12.8	12.8	12.3	11.8	6.4	7.8
pH	6.7	6.7	6.1	6.6	6.1	6.1
Conductivity (µmho)	200	200	40	260	300	190
Turbidity (NTU)	58.4	58.4	200.2	144.8	707.2	457.2

a = Field parameters measured after purging and prior to sample collection in the field
C = Compound found in associated blank sample
D = Sample dilution increased reported detection limits
J = Analytical results considered estimated, but below the quantitation limit
NA = Not analyzed
ND = Not detected above method reporting limit
= Exceeded Federal MCL Standard

Table 4-4

Sediment Sample Results, January 1995
Site 2 - Landfill 2
Confirmatory Studies
Fort Story, Virginia

Parameter/Analyte	SD3001	SD3002	SD3003	SD3004	SD3005	SD3005D
Volatile Organic Compounds (mg/kg)						
Acetone	**1.30**	**0.960**[J,a]	**1.20**[J,a]	**0.630**	**0.750**	**0.700**
Toluene	<0.029	<0.045[UJ,a]	<0.046[UJ,a]	<0.045	**0.090**	<0.042
Tentatively Identified VOCs						
Unknown	**0.041**[J]	**0.053**[J]	**0.119(2)**[J]	ND	ND	**0.058**[J]
Base Neutral/Acid Extractable Compounds (mg/kg)						
Tentatively Identified BNAs						
Cynnamyl cinnamate	ND	ND	**14.0**[JT]	ND	ND	ND
D-Friedoolean-14-en-3-one	**1.80**[JT]	**3.60**[JT]	ND	**4.70**[JT]	**4.40**[JT]	**4.00**[JT]
Docasonic acid	**7.20**[JT]	ND	**7.40**[JT]	**13.00**[JT]	ND	ND
Eicosane, 7-hexyl	ND	ND	**1.20**[JT]	ND	ND	ND
3-Eicosene, (E) -	ND	**9.0**[JT]	ND	ND	ND	ND
Ethane, 1,1,2,2,-tetrachloroeth	ND	ND	ND	**11.0**[JT]	ND	ND
Heneicosanoic acid	ND	ND	**2.60**[JT]	**2.0**[JT]	ND	ND
Hexacosane	**1.70**[JT]	ND	ND	ND	ND	ND
Hexadecane -1, 2-diol	ND	**2.20**[JT]	ND	ND	ND	ND
1-Nonadecanol	ND	**31.0**[JT]	ND	ND	ND	ND
Pentatriacontane	ND	ND	**3.30**[JT]	**13.0**[JT]	**2.60**[JT]	ND
17-Pentatriacontene	ND	**7.40**[JT]	ND	ND	ND	ND
2-Phenanthernol, 4b, 5, 6, 7, 8, 8a, 9, 10-octahydro-4b	ND	ND	ND	**6.20**[JT]	**6.20**[JT]	ND
2 (1H) - phenenthrenone, 3,4,4a,4b,5,6,7,8,10,10a - decabydro-1	ND	ND	ND	ND	ND	**14.00**[JT]
Phytol	ND	ND	ND	ND	ND	**6.10**[JT]
Propanoic acid, 2 hydroxyl-2-meth	ND	ND	ND	**12.0**[JT]	ND	ND
Taraxerol	**1.90**[JT]	ND	ND	**2.80**[JT]	**2.80**[JT]	**1.40**[JT]
Tetratetracontane	**0.980**[JT]	ND	ND	**1.40**[JT]	**100**[JT]	ND

Table 4-4

Sediment Sample Results, January 1995
Site 2 - Landfill 2
Confirmatory Studies
Fort Story, Virginia

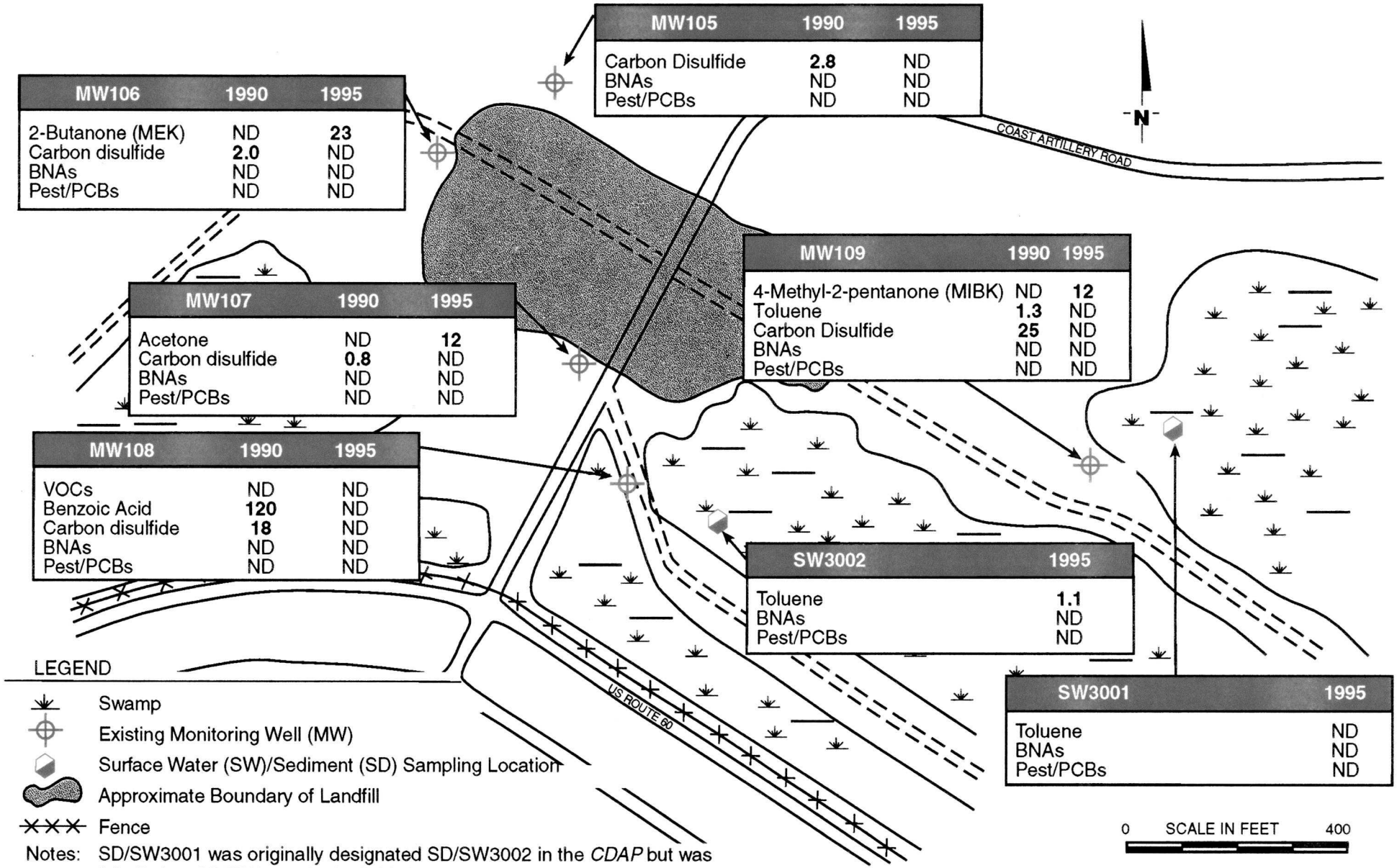
Parameter/Analyte	SD3001	SD3002	SD3003	SD3004	SD3005	SD3005D
Base Neutral/Acid Extractable Compounds (mg/kg)						
Tentatively Identified Compounds (Cont.)						
9-Tricosene, (z)	ND	12.0^{JT}	ND	ND	ND	ND
(Z) 14-Tricosenyl formate	ND	ND	ND	ND	120^{JT}	ND
Unknown	41.5(7)^{JT}	32.1(4)^{JT}	23.4(5)^{JT}	16.0(3)^{JT}	21.1(5)^{JT}	31.8(7)^{JT}
Unknown alkane	1.10^{JT}	6.20^{JT}	26.0(2)^{JT}	23.5(4)^{JT}	10.3(2)^{JT}	14.6(4)^{JT}
Unknown alkene	2.70^{JT}	ND	ND	ND	ND	ND
Unknown alkylated polynuclear aromatic hydrocarbon	5.80^{JT}	8.80^{JT}	ND	ND	660^{JT}	8.10^{JT}
Unknown carboxylic acid	ND	33.6(2)^{JT}	ND	ND	ND	ND
Unknown dimethyl alkane isomer	ND	ND	71.0^{JT}	ND	ND	ND
Unknown hydrocarbon	ND	5.01^{JT}	4.70(4)^{JT}	ND	ND	ND
Unknown methylated pentadecane isomer	ND	ND	ND	6.90^{JT}	ND	ND
Unknown trimethul dodecane isomer	ND	ND	41.0^{JT}	ND	ND	ND
Pesticides and Polychlorinated Biphenyls (mg/kg)						
4,4'-DDD	0.079	0.063	0.390	0.170	0.390	0.110
4,4'-DDE	<0.030	<0.021	<0.036	0.045	0.069	0.032
Total Fuel Hydrocarbons (mg/kg)						
Total fuel hydrocarbons - heavy fraction as Fuel	<62	<91	460	850	<77	<67
Metals (mg/kg)						
Aluminum	230	3,000	3,900	3,800	1,700	1,800
Arsenic	5.0	4.6	9.9	7.3	3.4	4.3
Barium	36	84	72	55	28	26
Cadmium	<0.50	0.78	0.68	0.57	<0.50	<0.50
Calcium	4,100	7,700	4,900	6,500	2,300	2,100
Chromium	4.9	3.8	7.5	6.5	3.9	4.1
Cobalt	1.6	2.3	3.1	2.3	1.5	1.4
Copper	7.9	6.7	14	16	4.3	3.8

Table 4-4

Sediment Sample Results, January 1995
Site 2 - Landfill 2
Confirmatory Studies
Fort Story, Virginia

Parameter/Analyte	SD3001	SD3002	SD3003	SD3004	SD3005	SD3005D
Metals (mg/kg) (Cont.)						
Iron	6,500	25,000	16,000	14,000	6,400	5,800
Lead	30	22	69	58	30	24
Magnesium	820	890	1300	1300	910	860
Manganese	59	190	140	130	68	64
Mercury	0.17	<0.2	0.28	0.28	0.14	0.10
Nickel	<4	<4	5.4	4.3	<4	<4
Potassium	180	190	320	270	230	240
Sodium	260	260	530	390	250	210
Vanadium	14	16	23	24	12	11
Zinc	49	65	380	90	30	30

a = Concentration qualified due to low surrogate spike recovery.
J = Associated value is an estimated quantity. Results are qualitatively acceptable.
JT = Associated value is tentatively detected and estimated.
ND = Not detected at method reporting limit.
UJ = Associated non-detect is estimated. Results are qualitatively acceptable.
( ) = Number of compounds in total, if more than one.



LEGEND

- Swamp
- Existing Monitoring Well (MW)
- Surface Water (SW)/Sediment (SD) Sampling Location
- Approximate Boundary of Landfill
- Fence

Notes: SD/SW3001 was originally designated SD/SW3002 in the *CDAP* but was labelled as SD/SW3001 in the field. As a result of this field change, samples from the location labelled SD/SW3001 in the *CDAP* were labelled as SD/SW3002 in the field. This map reflects the field change.

All concentrations are in µg/l.

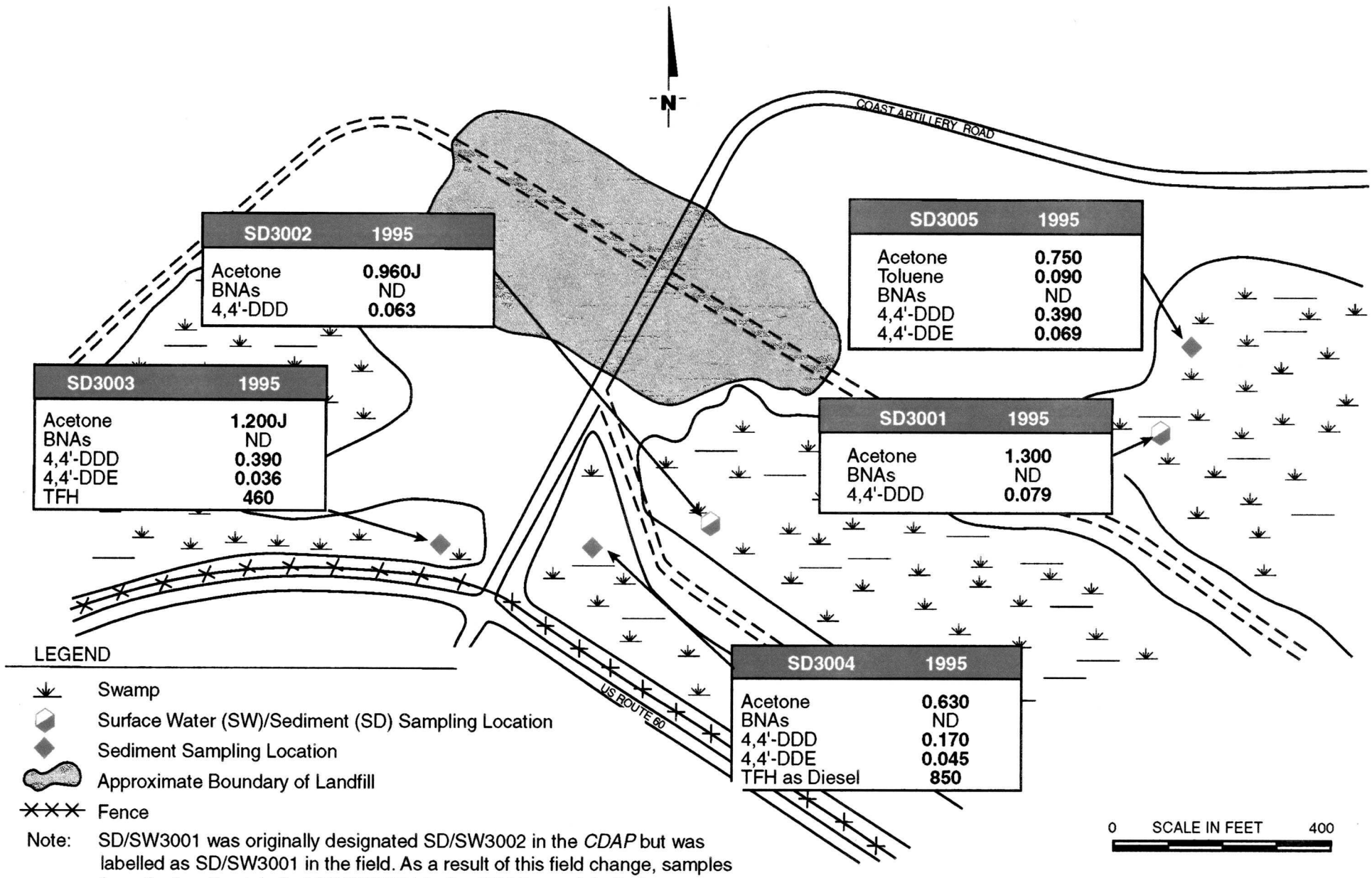
ND = Not detected

Site 2 - Landfill 2
Confirmatory Studies
Fort Story, VA

Groundwater/Surface Water Contaminant Concentrations

MONTGOMERY WATSON

Figure 4-1



LEGEND

- Swamp
- Surface Water (SW)/Sediment (SD) Sampling Location
- Sediment Sampling Location
- Approximate Boundary of Landfill
- Fence

Note: SD/SW3001 was originally designated SD/SW3002 in the *CDAP* but was labelled as SD/SW3001 in the field. As a result of this field change, samples from the location labelled SD/SW3001 in the *CDAP* were labelled as SD/SW3002 in the field. This map reflects the field change.

All concentrations are in mg/kg

J = Associated value is an estimated quantity
ND = Not detected

Site 2 - Landfill 2
Confirmatory Studies
Fort Story, VA

Sediment Contaminant Concentrations

MONTGOMERY WATSON

Figure 4-2

dissolved metals concentrations detected in groundwater samples collected at the site were below MCLs, VGPLs, and RBCs for tap water. Total and dissolved arsenic exceeded the RBC for tap water of 11 µg/l in groundwater samples collected from monitoring wells MW108 and MW109, but was below the MCL and VGPL of 50 µg/l. Total manganese exceeded the RBC for tap water of 180 µg/l, and the EPA Secondary Maximum Contaminant Levels (SMCLs) of 50 µg/l, in groundwater samples collected from four of the five monitoring wells sampled (MW106, MW107, MW108, MW109). However, dissolved manganese only exceeded the above criteria in three of the five groundwater samples collected (MW107, MW108, MW109). Total beryllium exceeded the RBC of 16 µg/l in groundwater samples collected from three of the five monitoring wells sampled (MW106, MW107, MW108), however, dissolved beryllium was not detected in any of the groundwater samples. No MCL, SMCL or VGPL exists for beryllium.

No water quality parameters (WQPs) in groundwater exceeded any trigger levels. Chloride in the groundwater was detected at 14 and 20 mg/l in monitoring wells MW105 and MW109, respectively, which suggests that the groundwater at the site is saline. Relatively low concentrations of orthophosphate-P were detected in the groundwater at the site. Sulfate was detected in MW109 at a concentration of 8,900 µg/l. With the exception of ammonia-N, concentrations of WQPs in upgradient monitoring well MW105 are similar to WQPs detected in downgradient monitoring well MW109. Ammonia-N was higher in MW109 (3,000 µg/l). The higher concentrations of ammonia in MW109 are likely a result of the proximity of MW109 to a wetland area.

4.3.2 Surface Water Contamination Assessment

The results of the January 27-28, 1995, surface water sampling show low concentrations of toluene and metals present in the surface water at the site. Toluene was detected in SW3001 and SW3002 at concentrations of 2.9 and 1.1 mg/l, respectively (Table 4-2). BNAs, pest/PCBs, and TFH were not detected in the surface water samples collected from the site.

Total lead was detected in surface water sample SW3001 at a concentration of 8.7 µg/l. Total zinc was detected in both surface water samples at concentrations of 49 and 23 µg/l, respectively. Dissolved zinc was detected in both surface water samples at concentrations of 39 and 130 µg/l respectively. Similar, but slightly lower concentrations of the above metals were also detected in the dissolved metals surface water sample analyses.

No WQPs in surface water exceeded any trigger levels. A relatively low concentration, 210 µg/l, of nitrate-N was detected in the surface water samples from SW3002. Chloride was detected in both surface water samples SW3001 and SW3002 at 32,000 and 50,000 µg/l, respectively. Sulfate was detected in the duplicate of sample SW3002 at a concentration of 7,200 µg/l.

None of the VOCs or metals detected in the surface water samples exceeded any of the Virginia Water Quality Standards for fresh water, or saline water surface waters.

4.3.3 Sediment Contamination Assessment

The results of the January 27-28, 1995, sediment sampling show acetone was detected in all of the sediment samples at concentrations ranging from 0.630 mg/kg to 1.30 mg/kg. Acetone is a common laboratory contaminant and its presence may be the result of laboratory contamination, however, acetone was not detected in laboratory method blank samples. The only other VOC found in the sediment samples was toluene, which was detected in the sample collected from sediment location SD3005 at a concentration of 0.090 mg/kg. Neither VOC exceeded the established trigger levels.

Several TICs were detected in the sediment samples, however no trigger levels have been established for any of the compounds tentatively detected in the samples. No BNAs other than TICs were detected in any of the sediment samples collected from the site. The pesticide 4,4'-DDD was detected in all five sediment samples collected, at concentrations ranging from 0.063 mg/kg, to 0.390 mg/kg. The pesticide 4,4'-DDE was detected in three of the five collected sediment samples, at concentrations ranging from 0.036 to 0.069 mg/kg. The pesticide 4,4'-DDE exceeded the NOAA ER-L value of 0.0022 mg/kg and NOAA ER-M value of 0.027 mg/kg in SD3003, SD3004 and SD3005. No metals exceeding trigger levels were detected in the sediment samples collected on the site.

TFH-H as fuel was detected in two of the sediment samples (SD3003 and SD3004) collected from the site at concentrations of 460 and 850 mg/kg, respectively. However, there is no established trigger level for TFH-H as fuel that can be applied to this site.

4.3.4 Summary and Conclusion

The purpose of additional sampling and analysis performed during the 1995 CS investigation at Site 2 - Landfill 2 was to confirm the presence of elevated concentrations of cadmium in site groundwater, and to determine whether the presence of cadmium, copper, or possibly other contaminants are associated with Landfill 2.

With the exception of lead, no VOCs, BNAs, pest/PCBs, or metals were detected above any applicable regulatory levels. Total lead slightly exceeded the EPA MCL in samples collected from two of the five monitoring wells; however, dissolved lead was not detected in any of the samples. Cadmium was not detected in any of the groundwater, surface water or sediment samples collected on site during this study. Copper was not detected above trigger levels. Arsenic was detected above the RBC guidance values for tap water in two of the groundwater samples, but below the EPA MCL and VGPL groundwater standards. Manganese was detected above the RBC and EPA SMCL guidelines values in the groundwater samples collected on site; however, no EPA MCL or VGPL standard exists for manganese.

The pesticide 4,4'-DDE was detected at concentrations exceeding the trigger level for the site. Because 4,4'-DDE is a breakdown component of DDT, which was used widely throughout Fort Story in the past, the source of 4,4'-DDE is not considered to be from Landfill 2.

The analytes detected in site media at Landfill 2 exceeding trigger levels appear to be isolated and do not indicate a VOC or metals contamination problem at the site. Groundwater, surface water and sediment quality, therefore, is not considered to be a concern at the site.

5.0 RECOMMENDATIONS

The following recommendations are derived from the 1995 Confirmatory Studies (CS) and the 1990 Preliminary Assessment/Site Investigation (PA/SI) conducted by Montgomery Watson for Site 2 - Landfill 2 of the Fort Story Installation Restoration Program (IRP) Site.

With the exception of lead, detectable groundwater concentrations of all analytes were well below the MCL and VGPL regulatory standards for the site. Total lead was detected in two of the five monitoring wells at concentrations ranging from 16 to 18 µg/l, which exceeds the MCL for lead of 15 µg/l, however lead concentrations were detected below the VGPL of 50 µg/l in all monitoring wells. Dissolved lead was not detected in any of the samples collected from any of the monitoring wells. This suggests that a majority of the total lead detected in the unfiltered samples is associated with suspended solids. The groundwater at the site is not used as a source of drinking water for the site or for surrounding areas.

Total and dissolved cadmium were detected in groundwater collected in 1990 from monitoring well MW109. Cadmium was not detected in groundwater samples collected from Site 2 - Landfill 2 in 1995.

Surface water concentrations of all analytes were well below the respective Virginia Water Quality Standards for surface waters. With the exception of 4,4'-DDE, sediment concentrations were well below NOAA's ER-L and ER-M sediment values.

The results of the January 27-28 groundwater, surface water, and sediment sampling show that Landfill 2 has not released contaminants into the subsurface at concentrations that are a threat to the environment. Therefore, Montgomery Watson recommends that No Further Action be considered for this site.

APPENDIX A - REFERENCES

Environmental Protection Agency (EPA), 1986. *Test Methods for Evaluating Solid Waste, Third Edition with Revisions and Updates*. EPA SW-846. Washington, D.C. November 1986.

EPA, 1988. *Laboratory Data Validation Functional Guidelines for Evaluation of Inorganic Analyses.*

EPA, 1991. *National Functional Guidelines for Organic Data Review.*

EPA, 1995. *Risk-Based Concentration Table, January to June, 1995.* Technical Support Section, Region III (3HW13), November 1994.

Environmental Science and Engineering, 1988. *Update of the Initial Installation Assessment of Ft. Story, Final Report.*

Fort Story Personnel, 1990. Miscellaneous interviews and group discussions with various members of environmental and maintenance staff.

James M. Montgomery Consulting Engineers (JMM), 1992. *Final Site Investigation Report for the Fort Story Preliminary Assessment/Site Investigation and Fort Story NIKE Preliminary Assessment/Site Investigation (Final PA/SI).*

Montgomery Watson, 1995a. *Final Confirmatory Studies Report for 2 Sites, Fort Eustis, Virginia (CS).*

Montgomery Watson, 1995b. *Final Chemical Data Acquisition Plan, Confirmatory Studies, Fort Story, Virginia (CDAP).*

Montgomery Watson, 1995c. *Final Site Safety and Health Plan Addendum for Remedial Investigations at Eight Sites and Confirmatory Studies at Two Sites, Fort Eustis, Virginia (SSHP Addendum).*

Montgomery Watson, 1995d. *Quality Control Summary Report/Analytical Results Report (QCSR/ARR) for Remedial Investigations and Confirmatory Sites, Fort Eustis, Virginia.*

GROUNDWATER SAMPLING LOG

CLIENT USACE Omaha
SITE Fort Story
WELL NUMBER MW105
JOB NUMBER 18168.1122

TOTAL WELL DEPTH 13.0' meas., 14.9' as constructed
WELL DIAMETER
BOREHOLE DIAMETER

MIN NUMBER WELL VOL TO BE PURGED 3
VOL PER VERTICAL FT CASING (GAL) .95
VOL PER FT BOREHOLE (LESS CASING)(GAL)

STATIC WATER LEVEL (FT) 9.25'
STANDING WATER COLUMN (FT) 5.65*

AMT ONE WELL VOL (GAL)
TOTAL GAL TO BE PURGED 16.1

PURGING SYSTEM electric stage pump
SAMPLING SYSTEM ded. teflon bail.

DATE	TIME	AMOUNT PURGED (GAL)	FIELD PARAMETERS MEASURED						COMMENTS	SAMPLER
			EC(µmhos)	pH	TEMP(C°)	TURBIDITY(NTU)	PID(ppm)			
1/27/15	10:56	initial	105	6.56	8.0	447	0.8			AT
"	11:50		45	6.36	7.5	78.0	Ø			AT
"	12:15		55	6.32	8.0	31.6	Ø			AT

NOTES: * Construction volume (after development) was used because well had >1 ft sand/silt.

TURBIDITY:

GROUNDWATER SAMPLING LOG

CLIENT: USACE Omaha
SITE: Fort Story
WELL NUMBER: MW106
JOB NUMBER: 1868.1122

TOTAL WELL DEPTH: 11.86'
WELL DIAMETER:
BOREHOLE DIAMETER:

MIN NUMBER WELL VOL TO BE PURGED: 3
VOL PER VERTICAL FT CASING (GAL): .95 gal/ft
VOL PER FT BOREHOLE (LESS CASING)(GAL):

STATIC WATER LEVEL (FT): 2.16'
STANDING WATER COLUMN (FT): 9.70'

AMT ONE WELL VOL (GAL):
TOTAL GAL TO BE PURGED: 27.6

PURGING SYSTEM: hand bail
SAMPLING SYSTEM: dedicated bailer

DATE	TIME	AMOUNT PURGED (GAL)	FIELD PARAMETERS MEASURED						COMMENTS	SAMPLER
			EC(µmhos)	pH	TEMP(C°)	TURBIDITY(NTU)	PID(ppm)			
1/27/95	6 gal =	25 liters	30	5.66	NA	15.4	NA			AT
1/27/95	13.2 gal =	50 liters	29	5.58	NA	13.3	NA			AT
1/27/95	19.8 gal =	75 liters	29	NA	5.55	19.8	NA			AT
1/27/95	26.5 gal	100 liters	29	5.46	8.0	19.8	NA			AT

NOTES:

TURBIDITY:

GROUNDWATER SAMPLING LOG

CLIENT USACE Omaha
SITE Fort Story
WELL NUMBER MW107
JOB NUMBER 1868.11.22

TOTAL WELL DEPTH 10.95*
WELL DIAMETER
BOREHOLE DIAMETER

MIN NUMBER WELL VOL TO BE PURGED 3
VOL PER VERTICAL FT CASING (GAL) .95
VOL PER FT BOREHOLE (LESS CASING)(GAL)

STATIC WATER LEVEL (FT) 3.12
STANDING WATER COLUMN (FT) 7.83

AMT ONE WELL VOL (GAL)
TOTAL GAL TO BE PURGED 22.3

PURGING SYSTEM electric stage pump
SAMPLING SYSTEM dedicated bail

DATE	TIME	AMOUNT PURGED (GAL)	FIELD PARAMETERS MEASURED						COMMENTS	SAMPLER
			EC(µmhos)	pH	TEMP(C°)	TURBIDITY(NTU)	PID(ppm)			
1/28/95		5	289	6.26	10.0	32.8	NA			PSQ
1/28/95		10	300	6.35	11.0	~~67.9~~ 6.79	NA			PSQ
1/28/95		15	305	6.35	11.0	3.72	NA			PSQ
1/28/95		20	310	6.41	11.0	2.36	NA			PSQ

NOTES: * Total depth as constructed. Well had > 1 ft of sand/silt.

TURBIDITY:

GROUNDWATER MPLING LOG

CLIENT USACE Omaha
SITE Forstory
WELL NUMBER mw108
JOB NUMBER 1568.1122

TOTAL WELL DEPTH 11.14'
WELL DIAMETER
BOREHOLE DIAMETER

MIN NUMBER WELL VOL TO BE PURGED 3
VOL PER VERTICAL FT CASING (GAL) .95
VOL PER FT BOREHOLE (LESS CASING)(GAL)

STATIC WATER LEVEL (FT) 1.68
STANDING WATER COLUMN (FT) 9.46

AMT ONE WELL VOL (GAL)
TOTAL GAL TO BE PURGED 26.96

PURGING SYSTEM electric stage pump
SAMPLING SYSTEM ~~[illegible]~~ dedicated bail

DATE	TIME	AMOUNT PURGED (GAL)	FIELD PARAMETERS MEASURED						COMMENTS	SAMPLER
			EC(µmhos)	pH	TEMP(C°)	TURBIDITY(NTU)	PID(ppm)			
1/28/95		2.7	200	6.04	10.0	33.6	NA			PSQ
1/28/95		9.0	100	6.04	9.0	12.4	NA			PSQ
1/28/95		15.0	100	6.06	9.0	6.38	NA			PSQ
1/28/95		20.0	185	6.04	10.0	5.36	NA			PSQ
1/28/95		25.0	187	6.08	10.0	20.7	NA			PSQ
1/28/95		29.0	190	6.02	10.0	6.12	NA			PSQ

NOTES:

TURBIDITY:

GROUNDWATER SAMPLING LOG

CLIENT USACE Omaha
SITE Fort Story
WELL NUMBER MW109
JOB NUMBER 1808.1122

TOTAL WELL DEPTH 10.9'
WELL DIAMETER
BOREHOLE DIAMETER

MIN NUMBER WELL VOL TO BE PURGED 3
VOL PER VERTICAL FT CASING (GAL) .95
VOL PER FT BOREHOLE (LESS CASING)(GAL)

STATIC WATER LEVEL (FT) 2.35'
STANDING WATER COLUMN (FT) 7.55

AMT ONE WELL VOL (GAL)
TOTAL GAL TO BE PURGED 21.5

PURGING SYSTEM electric stage pump
SAMPLING SYSTEM dedicated bail.

DATE	TIME	AMOUNT PURGED (GAL)	FIELD PARAMETERS MEASURED						COMMENTS	SAMPLER
			EC(µmhos)	pH	TEMP(C°)	TURBIDITY(NTU)	PID(ppm)			
~~1/27/95~~		~~2~~	~~out of range~~	~~5.66~~	~~8.0~~					
1/27/95		2	95	5.66	8.0	out of range	41.6		samples are lt. brown	PSQ/AT
1/27/95		5	95	581	7.0	out of range	12.5		"	PSQ/AT
1/27/95		10	100	5.85	7.5	801	41.6		"	PSQ/AT
1/27/95		15	100	5.98	7.0	NA	15.9		"	PSQ/AT
1/27/95		20	110	6.12	7.0	223	29.1		"	

NOTES:

TURBIDITY:

Maximum contaminant levels for inorganic chemicals.

(a) The MCL for nitrate is applicable to both community water systems and non-community water systems except as provided by in paragraph (d) of this section. The levels for the other inorganic chemicals apply only to community water systems. Compliance with MCLs for inorganic chemicals is calculated pursuant to 141.23.
(b) The following maximum contaminant levels for cadmium, chromium, mercury, nitrate, and selenium shall remain effective until July 30, 1992. The following maximum contaminant level for lead shall remain effective until December 7, 1992.

Contaminant	Level, milligrams per liter
Arsenic.....	0.05
Barium.....	1
Cadmium.....	0.010
Chromium.....	0.05
Lead.....	0.05
Mercury.....	0.002
Nitrate (as N).....	10
Selenium.....	0.01

(c) The maximum contaminant level for fluoride is 4.0 mg/l. See 40 CFR 143.3, which establishes a secondary maximum contaminant level at 2.0 mg/l.
(d) At the discretion of the State, nitrate levels not to exceed 20 mg/l may be allowed in a non-community water system if the supplier of water demonstrates to the satisfaction of the State that:
(d)(1) Such water will not be available to children under 6 months of age; and
(d)(2) There will be continuous posting of the fact that nitrate levels exceed 10 mg/l and the potential health effects of exposure; and
(d)(3) Local and State public health authorities will be notified annually of nitrate levels that exceed 10 mg/l; and
(d)(4) No adverse health effects shall result.
[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57342, Aug. 27, 1980; 47 FR 10998, Mar. 12, 1982; 51 FR 11410, Apr. 2, 1986; 56 FR 3578, Jan. 30, 1991; 56 FR 26548, June 7, 1991; 56 FR 32113, July 15, 1991]

Maximum contaminant levels for organic chemicals.

The following are the maximum contaminant levels for organic chemicals. The maximum contaminant levels for organic chemicals in paragraph (a) of this section apply to all community water systems. Compliance with the maximum contaminant level in paragraph (a) of this section is calculated pursuant to 141.24. The maximum contaminant level for total trihalomethanes in paragraph (c) of this section applies only to community water systems which serve a population of 10,000 or more individuals and which add a disinfectant (oxidant) to the water in any part of the drinking water treatment process. Compliance with the maximum contaminant level for total trihalomethanes is calculated pursuant to 141.30.

	Level, milligrams per liter
(a) [Reserved]	
(b) [Reserved].....	.....
(c) Total trihalomethanes (the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform)).....	0.1

[40 FR 59570, Dec. 24, 1975, as amended at 44 FR 68641, Nov. 29, 1979; 56 FR 3579, Jan. 30, 1991; 57 FR 31838, July 17, 1992]

Maximum contaminant levels for turbidity.

The requirements in this section apply to unfiltered systems until December 30, 1991, unless the State has determined prior to that date, in writing pursuant to 1412(b)(7)(C)(iii), that filtration is required. The requirements in this section

apply to filtered systems until June 29, 1993. The requirements in this section apply to unfiltered systems that the State has determined, in writing pursuant to 1412(b)(7)(c)(iii), must install filtration, until June 29, 1993, or until filtration is installed, whichever is later.
(a) One turbidity unit (TU), as determined by a monthly average pursuant to 141.22 except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the State that the higher turbidity does not do any of the following:
(a)(1) Interfere with disinfection;
(a)(2) Prevent maintenance of an effective disinfectant agent throughout the distribution system; or
(a)(3) Interfere with microbiological determinations.
(b) Five turbidity units based on an average for two consecutive days pursuant to 141.22.
[40 FR 59570, Dec. 24, 1975]

Maximum microbiological contaminant levels.

The maximum contaminant levels for coliform bacteria, applicable to community water systems and non-community water systems, are as follows:
(a) When the membrane filter technique pursuant to 141.21(a) is used, the number of coliform bacteria shall not exceed any of the following:
(a)(1) One per 100 milliliters as the arithmetic mean of all samples examined per compliance period pursuant to 141.21(b) or (c), except that, at the primacy Agency's discretion systems required to take 10 or fewer samples per month may be authorized to exclude one positive routine sample per month from the monthly calculation if:
(a)(1)(i) As approved on a case-by-case basis the State determines and indicates in writing to the public water system that no unreasonable risk to health existed under the conditions of this modification. This determination should be based upon a number of factors not limited to the following:
(a)(1)(i)(A) The system provided and had maintained an active disinfectant residual in the distribution system, (B) the potential for contamination as indicated by a sanitary survey, and (C) the history of the water quality at the public water system (e.g. MCL or monitoring violations); (ii) the supplier initiates a check sample on each of two consecutive days from the same sampling point within 24 hours after notification that the routine sample is positive, and each of these check samples is negative; and (iii) the original positive routine sample is reported and recorded by the supplier pursuant to 141.31(a) and 141.33(a). The supplier shall report to the State its compliance with the conditions specified in this paragraph and a summary of the corrective action taken to resolve the prior positive sample result. If a positive routine sample is not used for the monthly calculation, another routine sample must be analyzed for compliance purposes. This provision may be used only once during two consecutive compliance periods.
(a)(2) Four per 100 milliliters in more than one sample when less than 20 are examined per month; or
(a)(3) Four per 100 milliliters in more than five percent of the samples when 20 or more are examined per month.
(b)(1) When the fermentation tube method and 10 milliliter standard portions pursuant to 141.21(a) are used, coliform bacteria shall not be present in any of the following:
(b)(1)(i) More than 10 percent of the portions (tubes) in any one month pursuant to 141.21 (b) or (c) except that, at the State's discretion, systems required to take 10 or fewer samples per month may be authorized to exclude one positive routine sample resulting in one or more positive tubes per month from the monthly calculation if:
(b)(1)(i)(A) As approved on a case-by-case basis the State determines and indicates in writing to the public water system that no unreasonable risk to health existed under the conditions of this modification. This determination should be based upon a number of factors not limited to the following: (1) The system provided and had maintained an active disinfectant residual in the distribution system, (2) the potential for contamination as indicated by a sanitary survey, and (3) the history of the water quality at the public water system (e.g. MCL or monitoring violations);
(b)(1)(i)(B) The supplier initiates a check sample on each of two consecutive days from the sampling point within 24 hours after notification that the routine sample is positive, and each of these check samples is negative; and
(b)(1)(i)(C) The original positive routine sample is reported and recorded by the supplier pursuant to 141.31(a) and 141.33(a). The supplier shall report to the State its compliance with the conditions specified in this paragraph and report the action taken to resolve the prior positive sample result. If a positive routine sample is not used for the monthly calculation, another routine sample must be analyzed for compliance purposes. This provision may be used only once during two consecutive compliance periods.
(b)(1)(ii) Three or more portions in more than one sample when less than 20 samples are examined per month; or

(b)(1)(iii) Three or more portions in more than five percent of the samples when 20 or more samples are examined per month.
(b)(2) When the fermentation tube method and 100 milliliter standard portions pursuant to 141.21(a) are used, coliform bacteria shall not be present in any of the following:
(b)(2)(i) More than 60 percent of the portions (tubes) in any month pursuant to 141.21 (b) or (c), except that, State discretion, systems required to take 10 or fewer samples per month may be authorized to exclude one positive routine sample resulting in one or more positive tubes per month from the monthly calculation if:
(b)(2)(i)(A) As approved on a case-by-case basis the State determines and indicates in writing to the public water system that no unreasonable risk to health existed under the conditions of this modification. This determination should be based upon a number of factors not limited to the following: (1) The system provided and had maintained an active disinfectant residual in the distribution system, (2) the potential for contamination as indicated by a sanitary survey, and (3) the history of the water quality at the public water system (e.g. MCL or monitoring violations);
(b)(2)(i)(B) The supplier initiates two consecutive daily check samples from the same sampling point within 24 hours after notification that the routine sample is positive, and each of these check samples is negative; and
(b)(2)(i)(C) The original positive routine sample is reported and recorded by the supplier pursuant to 141.31(a) and 141.33(a). The supplier shall report to the State its compliance with the conditions specified in this paragraph and a summary of the corrective action taken to resolve the prior positive sample result. If a positive routine sample is not used for the monthly calculation, another routine sample must be analyzed for compliance purposes. This provision may be used only once during two consecutive compliance periods.
(b)(2)(ii) Five portions in more than one sample when less than five samples are examined per month; or
(b)(2)(iii) Five portions in more than 20 percent of the samples when five or more samples are examined per month.
(b)(3) When the Minimal Medium ONPG-MUG test described in 141.21(a) of this part is used, coliform bacteria shall not be present at levels exceeding those specified in paragraph (b)(1) (i)-(iii) of this section.
(c) For community or non-community systems that are required to sample at a rate of less than 4 per month, compliance with paragraph (a), (b)(1), or (b)(2) of this section shall be based upon sampling during a 3 month period, except that, at the discretion of the State, compliance may be based upon sampling during a one-month period.
(d) If an average MCL violation is caused by a single sample MCL violation, then the case shall be treated as one violation with respect to the public notification requirements of 141.32.
[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57343, Aug. 27, 1980; 54 FR 30001, July 17, 1989]

Maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity in community water systems.

The following are the maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity:
(a) Combined radium-226 and radium-228--5 pCi/1.
(b) Gross alpha particle activity (including radium-226 but excluding radon and uranium)--15 pCi/1.
[41 FR 28404, July 9, 1976]

Maximum contaminant levels for beta particle and photon radioactivity from man-made radionuclides in community water systems.

(a) The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year.
(b) Except for the radionuclides listed in Table A, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents shall be calculated on the basis of a 2 liter per day drinking water intake using the 168 hour data listed in "Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure," NBS Handbook 69 as amended August 1963, U.S. Department of Commerce. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 millirem/year.

TABLE A--AVERAGE ANNUAL CONCENTRATIONS ASSUMED TO PRODUCE A TOTAL BODY OR ORGAN DOSE OF 4 MREM/YR

Radionuclide	Critical organ	pCi per liter
Tritium.....	Total body.....	20,000
Strontium-90.....	Bone marrow.....	8

[41 FR 28404, July 9, 1976]
Subpart C--Monitoring and Analytical Requirements

Maximum contaminant levels for organic contaminants.

(a) The following maximum contaminant levels for organic contaminants apply to community and non-transient, non-community water systems.

CAS No.	Contaminant	MCL (mg/l)
(1) 75-01-4	Vinyl chloride.....	0.002
(2) 71-43-2	Benzene.....	0.005
(3) 56-23-5	Carbon tetrachloride.....	0.005
(4) 107-06-2	1,2-Dichloroethane.....	0.005
(5) 79-01-6	Trichloroethylene.....	0.005
(6) 106-46-7	para-Dichlorobenzene.....	0.075
(7) 75-35-4	1,1-Dichloroethylene.....	0.007
(8) 71-55-6	1,1,1-Trichloroethane.....	0.2
(9) 156-59-2	cis-1,2-Dichloroethylene...	0.07
(10) 78-87-5	1,2-Dichloropropane.....	0.005
(11) 100-41-4	Ethylbenzene.....	0.7
(12) 108-90-7	Monochlorobenzene.....	0.1
(13) 95-50-1	o-Dichlorobenzene.....	0.6
(14) 100-42-5	Styrene.....	0.1
(15) 127-18-4	Tetrachloroethylene.....	0.005
(16) 108-88-3	Toluene.....	1
(17) 156-60-5	trans-1,2-Dichloroethylene.	0.1
(18) 1330-20-7	Xylenes (total).....	10
(19) 75-09-2	Dichloromethane	0.005
(20) 120-82-1	1,2,4-Trichlorobenzene	.07
(21) 79-00-5	1,1,2-Trichloroethane	.005

(b) The Administrator, pursuant to section 1412 of the Act, hereby identifies as indicated in the Table below granular activated carbon (GAC), packed tower aeration (PTA), or oxidation (OX) as the best technology treatment technique, or other means available for achieving compliance with the maximum contaminant level for organic contaminants identified in paragraphs (a) and (c) of this section:

BAT for Organic Contaminants Listed in 141.61(a) and (c)

CAS No.	Contaminant	GAC	PTA	OX
15972-60-8.....	Alachlor.....	X	.....	....
116-06-3.....	Aldicarb.....	X	.....	....
1646-88-4.....	Aldicarb sulfone.....	X	.....	....
1646-87-3.....	Aldicarb sulfoxide.....	X	.....	....
1912-24-9.....	Atrazine.....	X	.....	....
71-43-2.....	Benzene.....	X	X	....
50-32-8.....	Benzo[a]pyrene.....	X	.....	....
1563-66-2.....	Carbofuran.....	X	.....	....
56-23-5.....	Carbon tetrachloride.....	X	X	....
57-74-9.....	Chlordane.....	X	.....	....
75-99-0.....	Dalapon.....	X	.....	....
94-75-7.....	2,4-D.....	X	.....	....
103-23-1.....	Di (2-ethylhexyl) adipate.....	X	X	....
117-81-7.....	Di (2-ethylhexyl) phthalate.....	X	.....	....
96-12-8.....	Dibromochloropropane (DBCP).....	X	X	....
95-50-1.....	o-Dichlorobenzene.....	X	X	....
106-46-7.....	para-Dichlorobenzene.....	X	X	....

107-06-2	1,2-Dichloroethane	X	X	....
75-35-4	1,1-Dichloroethylene	X	X	....
156-59-2	cis-1,2-Dichloroethylene	X	X	....
156-60-5	trans-1,2-Dichloroethylene	X	X	....
75-09-2	Dichloromethane	.....	X	....
78-87-5	1,2-Dichloropropane	X	X	....
88-85-7	Dinoseb	X	.....	....
85-00-7	Diquat	X	.....	....
145-73-3	Endothall	X	.....	....
72-20-8	Endrin	X	.....	....
100-41-4	Ethylbenzene	X	X	....
106-93-4	Ethylene Dibromide (EDB)	X	X	....
1071-83-6	Gylphosate	.....	.....	X
76-44-8	Heptachlor	X	.....	....
1024-57-3	Heptachlor epoxide	X	.....	....
118-74-1	Hexachlorobenzene	X	.....	....
77-47-3	Hexachlorocyclopentadiene	X	X	....
58-89-9	Lindane	X	.....	....
72-43-5	Methoxychlor	X	.....	....
108-90-7	Monochlorobenzene	X	X	....
23135-22-0	Oxamyl (Vydate)	X	.....	....
87-86-5	Pentachlorophenol	X	.....	....
1918-02-1	Picloram	X	.....	....
1336-36-3	Polychlorinated biphenyls (PCB)	X	.....	....
122-34-9	Simazine	X	.....	....
100-42-5	Styrene	X	X	....
1746-01-6	2,3,7,8-TCDD (Dioxin)	X	.....	....
127-18-4	Tetrachloroethylene	X	X	....
108-88-3	Toluene	X	X	....
8001-35-2	Toxaphene	X	.....	....
93-72-1	2,4,5-TP (Silvex)	X	.....	....
120-82-1	1,2,4-Trichlorobenzene	X	X	....
71-55-6	1,1,1-Trichloroethane	X	X	....
79-00-5	1,1,2-Trichloroethane	X	X	....
79-01-6	Trichloroethylene	X	X	....
75-01-4	Vinyl chloride	.....	X	....
1330-20-7	Xylene	X	X	....

(c) The following maximum contaminant levels for synthetic organic contaminants apply to community water systems and non-transient, non-community water systems:

	CAS No.	Contaminant	MCL (mg/l)
(1)	15972-60-8	Alachlor	0.002
(2)	116-06-3	Aldicarb	0.003
(3)	1646-87-3	Aldicarb sulfoxide	0.004
(4)	1646-87-4	Aldicarb sulfone	0.002
(5)	1912-24-9	Atrazine	0.003
(6)	1563-66-2	Carbofuran	0.04
(7)	57-74-9	Chlordane	0.002
(8)	96-12-8	Dibromochloropropane	0.0002
(9)	94-75-7	2,4-D	0.07
(10)	106-93-4	Ethylene dibromide	0.00005
(11)	76-44-8	Heptachlor	0.0004
(12)	1024-57-3	Heptachlor epoxide	0.0002
(13)	58-89-9	Lindane	0.0002
(14)	72-43-5	Methoxychlor	0.04
(15)	1336-36-3	Polychlorinated biphenyls	0.0005
(16)	87-86-5	Pentachlorophenol	0.001
(17)	8001-35-2	Toxaphene	0.003
(18)	93-72-1	2,4,5-TP	0.05
(19)	50-32-8	Benzo[a]pyrene	0.0002
(20)	75-99-0	Dalapon	0.2
(21)	103-23-1	Di(2-ethylhexyl) adipate	0.4
(22)	117-81-7	Di(2-ethylhexyl) phthalate	0.006
(23)	88-85-7	Dinoseb	0.007
(24)	85-00-7	Diquat	0.02
(25)	145-73-3	Endothall	0.1
(26)	72-20-8	Endrin	0.002
(27)	1071-53-6	Glyphosate	0.7

(28) 118-74-1	Hexacholorbenzene.....	0.001
(29) 77-47-4	Hexachloroyclopentadiene.....	0.05
(30) 23135-22-0	Oxamyl (Vydate).....	0.2
(31) 1918-02-1	Picloram.....	0.5
(32) 122-34-9	Simazine.....	0.004
(33) 1746-01-6	2,3,7,8-TCDD (Dioxin).....	3 X 10 -8

[52 FR 25716, July 8, 1987; 53 FR 25111, July 1, 1988; 56 FR 3593, Jan. 30, 1992; 56 FR 30280, July 1, 1991; 57 FR 31846, July 17, 1992; 59 FR 34320, July 1, 1994]

Secondary maximum contaminant levels.

The secondary maximum contaminant levels for public water systems are as follows:

Contaminant	Level
Aluminum	0.05 to 0.2 mg/1.
Chloride	250 mg/1.
Color	15 color units.
Copper	1.0 mg/1.
Corrosivity	Non-corrosive.
Fluoride	2.0 mg/1.
Foaming agents	0.5 mg/1.
Iron	0.3 mg/1.
Manganese	0.05 mg/1.
Odor	3 threshold odor number.
pH	6.5-8.5.
Silver	0.1 mg/1.
Sulfate	250 mg/1.
Total dissolved solids (TDS)	500 mg/1.
Zinc	5 mg/1.

These levels represent reasonable goals for drinking water quality. The States may establish higher or lower levels which may be appropriate dependent upon local conditions such as unavailability of alternate source waters or other compelling factors, provided that public health and welfare are not adversely affected.
[44 FR 42198, July 19, 1979, as amended at 51 FR 11412, Apr. 2, 1986; 56 FR 3597, Jan. 30, 1991]

VIRGINIA GROUNDWATER PROTECTION LEVELS LIST OF HAZARDOUS CONSTITUENTS

COMMON NAME1	CAS NR2	Chemical abstracts service index Name3	Protection Level (µg/lit)
Acrylonitrile	107-13-1	2-Propenenitrile	2.
Aldrin	309-00-2	1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-(1a,4a,4a,4aB,5a,8a,8aB)-	0.003
Arsenic	(Total)	Arsenic	50.
Barium	(Total)	Barium	1000.
Benzene	71-43-2	Benzene	5.
Bis(2-chloroethyl) ether	111-44-4	Ethane,1,1'-oxybis2 chloro-	0.3
Cadmium	(Total)	Cadmium	0.4
Carbon disulfide	5-15-0	Carbon disulfide	1000.
Carbon tetrachloride	56-23-5	Methane, tetrachloro-	5.
Chlordane	57-74-9	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-	0.01
Chlorobenzene	108-90-7	Benzene, chloro-	100.
Chloroform	67-66-3	Methane, trichloro-	5.
Chromium	(Total)	Chromium	50.
Copper	(Total)	Copper	1000.
m-Cresol	108-39-4	Phenol, 3-methyl-	700.
o-Cresol	95-48-7	Phenol, 2-methyl-	700.
p-Cresol	106-44-5	Phenol, 4-methyl-	700.
Cyanide	57-12-5	Cyanide	5.
2,4-D; 2,4-Dichlorophenoxyacetic acid	94-75-7	Acetic acid, (2,4-dichlorophenoxy)-	100.
4,4'DDT	50-29-3	Benzene 1,1'-(2,2,2-trichloroethylidene) bis(4-chloro-	0.001
o-Dichlorobenzene	95-50-1	Benzene, 1,2-dichloro-	300.
p-Dichlorobenzene	106-46-7	Benzene, 1,4-dichloro-	75.
1,2-Dichloroethane; Ethylene dichloride	107-06-2	Ethane, 1,2-dichloro-	5.
1,1-Dichloroethylene; Vinylidene chloride	75-35-4	Ethene, 1,1-dichloro-	7.
Dieldrin	60-57-1	2,7:3,6-Dimethanonaphth [2,3]-oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-1aa,2B,2aa,3B,-6B,6aa,7B,7aa)-	0.003
2,4-Dinitrotoluene	121-14-2	Benzene, 1-methyl-2,4-dinitro-	1.
Endrin	72-20-8	5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-	

		1,7-ep-oxy-1,4,4a,5, 6,7,8,8a-octahydro-1	0.004
Foaming Agents (MBAS)	(Total)		0.05
Heptachlor	76-44-8	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	0.001
Heptachlor expoxide	1024-57-3	2,5-Methano-2H-indeno [1,2-b]oxirene, 2,3,4,5,6,7,7-heptachloro-1a,1b, 5,5a,6,6a-hexahydro-(1aa,1bB,2a, 5a,5aB,6B,6aa)	0.001
Hexachlorobenzene	118-74-1	Benzene, hexachloro-	0.2
Hexachlorobutadiene	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	50.
Hexachloroethane	67-72-1	Ethane, hexachloro-	300.
Isobutyl alcohol	78-63-1	1-Propanol, 2-methyl-	2500.
Kepone	143-50-0	1,3,4-Metheno-2H-cyclobuta- [cd] pentalen-2-one, 1,1a,3,3a,4,5,5,5a, 5b,6-decachloro-octahydro-	None
Lead	(Total)	Lead	50.
Lindane	58-89-9	Cyclohexane, 1,2,3,4,5,6-hexachloro-	0.01
Mercury	(Total)	Mercury	0.05
Methoxychlor	72-43-5	Benzene, 1,1' -(2,2,2,-trichloro-ethylidene) bis4-methoxy-	0.03
Methylene chloride; Dichloromethane	75-09-2	Methane, dichloro-	600.
Methyl ethyl ketone; MEK	78-93-3	2-Butanone	500.
Mirex	2385-85-5	Cyclobutacdpentalene, 1,1a,2,2,3,3a,4,5,5, 5a,5b,6-dodecachloro-octahydro-1, 3,4-metheno-1H-	None
Nitrobenzene	98-95-3	Benzene, nitro-	4.
Pentachlorophenol	87-86-5	Phenol, pentachloro-	250.
Petroleum hydrocarbons	(Total)		1000.
Phenol	108-95-2	Phenol	1.
Pyridine	110-86-1	Pyridine	30.
Selenium	(Total)	Selenium	10.
Silver	(Total)	Silver	None
Silvex; 2,4,5-TP	93-72-1	Propanoic acid, 2-(2,4,5-trichloro-phenoxy)-	10.
Sodium	(Total)	Sodium	270 mg/lit
1,1,1,2-Tetrachloroethane	630-20-6	Ethane, 1,1,1,2-tetrachloro-	700.
1,1,2,2-Tetrachloroethane	79-34-5	Ethane, 1,1,2,2-	20.

		tetrachloro-	
Tetrachloroethylene; Perchloroethylene; Tetrachloroethene	127-18-4	Ethene, tetrachloro-	7.
2,3,4,6-Tetrachlorophenol	58-90-2	Phenol, 2,3,4,6-tetrachloro-	100.
Toluene	108-88-3	Benzene, methyl-	1000.
Toxaphene	8001-35-2	Toxaphene	None
1,1,1-Trichloroethane; Methyl-chloroform	71-55-6	Ethane, 1,1,1-trichloro-	200.
1,1,2-Trichloroethane	79-00-5	Ethane, 1,1,2-trichloro-	60.
Trichloroethylene; Trichloroethene	79-01-6	Ethene, trichloro-	5.
2,4,5-Trichlorophenol	95-95-4	Phenol, 2,4,5-trichloro-	400.
2,4,6-Trichlorophenol	88-06-2	Phenol, 2,4,6-trichloro-	20.
Vinyl chloride	75-01-4	Ethene, chloro-	2.
Zinc	(Total)	Zinc	50.

NOTES: 1Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.
2Chemical Abstracts Service registry number. Where "Total" is entered, all species in the groundwater that contain this element are included.
3 CAS index names are those used in the 9th Cumulative Index.

COMMONWEALTH OF VIRGINIA

STATE WATER CONTROL BOARD

REGULATIONS

Water Quality Standards

Water Quality Standards (VR 680-21-00)

Effective May 20, 1992

VR680-21-01.14 Standards for Surface Water

A. Instream water quality conditions shall not be acutely or chronically toxic except for toxicity as allowed for in VR680-21-01.2.C (mixing zones). The following are definitions of acute and chronic toxicity conditions.

Acute Toxicity means an adverse effect that usually occurs shortly after the introduction of a pollutant. Lethality to an organism is the usual measure of acute toxicity. Where death is not easily detected immobilization is considered equivalent to death.

Chronic Toxicity means an adverse effect that is irreversible or progressive or occurs because the rate of injury is greater than the rate of repair during prolonged exposure to a pollutant. This includes low level, long-term effects such as reduction in growth or reproduction.

B. The following table is a list of numerical water quality standards for specific parameters.

1. For those waters with multiple designated beneficial uses, the most stringent standards in the following table shall apply.

2. When information has become available from the Environmental Protection Agency to calculate additional aquatic life or human health standards not contained in the table the Board may employ these values in establishing effluent limitations or other limitations pursuant to the General Standard in VR680-21-01.2 necessary to protect the beneficial uses until the Board has completed the regulatory standards adoption process.

Table of Parameters

	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER			
SUBSTANCE[1]	ACUTE[2] ug/l	CHRONIC[3] ug/l	ACUTE[2] ug/l	CHRONIC[3] ug/l	PUBLIC WATER SUPPLIES[4] ug/l	ALL OTHER SURFACE WATERS[5] ug/l
Aldrin c	3.0	0.3	1.3	0.13	0.0013	0.0014
Ammonia	See Table 1	See Table 2	See Tables 3 and 4			
Anthracene					9,600	110,000
Arsenic					50	
Arsenic III	360	190	69	36		
Barium					2,000	
Benzene c					12	710

VR680-21-01.14.B continued...

SUBSTANCE[1]	AQUATIC LIFE: FRESHWATER ACUTE[2] ug/l	FRESHWATER CHRONIC[3] ug/l	SALTWATER ACUTE[2] ug/l	SALTWATER CHRONIC[3] ug/l	HUMAN HEALTH: PUBLIC WATER SUPPLIES[4] ug/l	ALL OTHER SURFACE WATERS[5] ug/l
Benzo(a)anthracene c					0.028	0.311
Benzo(b)fluoranthene c					0.028	0.311
Benzo(k)fluoranthene c					0.028	0.311
Benzo(a)pyrene c					0.028	0.311
Bromoform c					44	3,600
Cadmium	$e^{(1.128[\ln(hardness^*)]-3.828)}$	$e^{(0.7852[\ln(hardness^*)]-3.490)}$	43	9.3	16	170
Carbon Tetrachloride c					2.5	45
Chlordane c	2.4	0.0043	.09	0.0040	0.0058	0.0059
Chloride	860,000	230,000			250,000**	
Chlorine	See VR680-21-01.1.1					
Chlorodibromomethane					690	57,000
Chloroform c					57	4,700
Chloromethane c					57	4,700
Chlorpyrifos	0.083	0.041	0.011	0.0056		
Chromium III	$e^{(0.8190[\ln(hardness^*)]+3.688)}$	$e^{(0.8190[\ln(hardness^*)]+1.561)}$			33,000	670,000
Chromium VI	16	11	1,100	50	170	3,400

SUBSTANCE[1]	AQUATIC LIFE: FRESHWATER ACUTE[2] ug/l	FRESHWATER CHRONIC[3] ug/l	SALTWATER ACUTE[2] ug/l	SALTWATER CHRONIC[3] ug/l	HUMAN HEALTH: PUBLIC WATER SUPPLIES[4] ug/l	ALL OTHER SURFACE WATERS[5] ug/l
Chrysene c					0.028	0.311
Copper	$e^{(0.9422[\ln(hardness^*)]-1.464)}$	$e^{(0.8545[\ln(hardness^*)]-1.465)}$	2.9	2.9	1,300	
Cyanide	22	5.2	1.0	1.0	700	215,000
DDT c	1.1	0.0010	0.13	0.0010	0.0059	0.0059
Demeton		0.1		0.1		
Dibenz(a,h)anthracene c					0.028	0.311
Dichloromethane c					47	16,000
1,2-Dichlorobenzene					2,700	17,000
1,3-Dichlorobenzene					400	2,600
1,4-Dichlorobenzene					400	2,600
Dichlorobromomethane c					3.0	220
1,2-Dichloroethane c					3.8	990
(2,4-dichlorophenoxy) acetic acid (2,4-D)					71	
Dieldrin c	2.5	0.0019	0.71	0.0019	0.0014	0.0014
Di-2-Ethylhexyl Phthalate c					18	59
2,4-Dinitrotoluene c					1.1	91

SUBSTANCE[1]	AQUATIC LIFE: FRESHWATER ACUTE[2] ug/l	FRESHWATER CHRONIC[3] ug/l	SALTWATER ACUTE[2] ug/l	SALTWATER CHRONIC[3] ug/l	HUMAN HEALTH: PUBLIC WATER SUPPLIES[4] ug/l	ALL OTHER SURFACE WATERS[5] ug/l
Dioxin	See VR680-21-01.15					
Dissolved Oxygen	See VR680-21-01.5					
Endosulfan	0.22	0.056	0.034	0.0087	0.93	2.0
Endrin	0.18	0.0023	0.037	0.0023	0.76	0.81
Ethylbenzene					3,100	29,000
Fluoranthene					300	370
Fluorene					1,300	14,000
Foaming agents (measured as methylene blue active substances)					500**	
Guthion		0.01		0.01		
Heptachlor c	0.52	0.0038	0.053	0.0036	0.0021	0.0021
Hexachlorocyclohexane (Lindane)	2.0	0.080	0.16	0.01	7	25
Hydrogen Sulfide		2.0		2.0		
Indeno(1,2,3-cd)pyrene c					0.028	0.311
Iron (soluble)					300**	
Isophorone					6,900	490,000
Kepone		zero		zero		

SUBSTANCE[1]	AQUATIC LIFE FRESHWATER ACUTE[2] ug/l	FRESHWATER CHRONIC[3] ug/l	SALTWATER ACUTE[2] ug/l	SALTWATER CHRONIC[3] ug/l	HUMAN HEALTH PUBLIC WATER SUPPLIES[4] ug/l	HUMAN HEALTH ALL OTHER SURFACE WATERS[5] ug/l
Lead	$e^{(1.273[\ln(hardness^*)]-1.460)}$	$e^{(1.273[\ln(hardness^*)]-4.705)}$	220	8.5	15	
Malathion		0.1		0.1		
Manganese (soluble)					50**	
Mercury[6][7]	2.4	0.012	2.1	0.025	0.144	0.146
Methoxyclor		0.03		0.03	40	
Mirex		zero		zero		
Monochlorobenzene					680	21,000
Nickel	$e^{(0.8460[\ln(hardness^*)]+3.3612)}$	$e^{(0.8460[\ln(hardness^*)]+1.1645)}$	75	8.3	607	4,583
Nitrate (as N)					10,000	
Parathion	0,065	0.013				
PCB-1242 c		0.014		0.030	0.00044	0.00045
PCB-1254 c		0.014		0.030	0.00044	0.00045
PCB-1221 c		0.014		0.030	0.00044	0.00045
PCB-1232 c		0.014		0.030	0.00044	0.00045
PCB-1248 c		0.014		0.030	0.00044	0.00045
PCB-1260 c		0.014		0.030	0.00044	0.00045

VR680-21-01.14.B continued...

SUBSTANCE[1]	AQUATIC LIFE FRESHWATER ACUTE[2] ug/l	AQUATIC LIFE FRESHWATER CHRONIC[3] ug/l	AQUATIC LIFE SALTWATER ACUTE[2] ug/l	AQUATIC LIFE SALTWATER CHRONIC[3] ug/l	HUMAN HEALTH PUBLIC WATER SUPPLIES[4] ug/l	HUMAN HEALTH ALL OTHER SURFACE WATERS[5] ug/l
PCB-1016 c		0.014		0.030	0.00044	0.00045
Pentachlorophenol c	e(1.005(pH)-4.830)	e(1.005(pH)-5.290)	13	7.9	2.8	82
pH	See VR680-21-01.5					
Phenol					21,000	4,600,000
Phosphorus (Elemental)				0.10		
Pyrene					960	11,000
Radioactivity	See VR680-21-01.12					
Selenium	20	5.0	300	71	172	11,200
Silver	e(1.72[ln(hardness)]-6.52)		2.3			
Sulfate					250,000**	
Temperature	See VR680-21-01.5					
Tetrachloroethylene					318	3,519
Toluene					6,800	200,000
Total dissolved solids					500,000**	
Toxaphene[6] c	0.73	0.0002	0.21	0.0002	0.0073	0.0075
Trichloroethylene c					27	807

VR680-21-01.14.B continued...

SUBSTANCE[1]		AQUATIC LIFE FRESHWATER ACUTE[2] ug/l	AQUATIC LIFE FRESHWATER CHRONIC[3] ug/l	AQUATIC LIFE SALTWATER ACUTE[2] ug/l	AQUATIC LIFE SALTWATER CHRONIC[3] ug/l	HUMAN HEALTH PUBLIC WATER SUPPLIES[4] ug/l	HUMAN HEALTH ALL OTHER SURFACE WATERS[5] ug/l
2,4,6-Trichlorophenol	c					21	65
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)						50	
Tributyltin		See VR680-21-01.13					
Vinyl Chloride	c					20	5,250
Zinc		$e^{(0.8473[\ln(hardness^*)]+0.8604)}$	$e^{(0.8473[\ln(hardness^*)]+0.7614)}$	95	86	5,000**	

[1] = Unless specifically listed above, all metals shall be measured as dissolved.
[2] = One hour average concentration not to be exceeded more than once every three years.
[3] = Four day average concentration not to be exceeded more than once every three years.
[4] = Unless otherwise noted, these standards have been calculated to protect human health from toxic effects through drinking water and fish consumption.
[5] = Unless otherwise noted, these standards have been calculated to protect human health from toxic effects through fish consumption.
[6] = Chronic aquatic life values have been calculated to protect wildlife from harmful effects through ingestion of contaminated tissue. However, the standard will also protect aquatic life from toxic effects.
[7] = Chronic aquatic life standard applies to methyl mercury.
* = Hardness as calcium carbonate mg/L $CaCO_3$ The minimum hardness allowed for use in this equation shall not be less than 25 mg/L, as calcium carbonate, even if the actual ambient hardness is less than 25 mg/L as calcium carbonate. The maximum hardness value for use in this equation shall not exceed 400 mg/L as calcium carbonate, even if the actual ambient hardness is greater than 400 mg/L as calcium carbonate.
** = To maintain acceptable taste, odor or aesthetic quality of drinking water.
c = Known or suspected carcinogen, human health standards are for a risk level of 10^{-5}.

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST
E=EPA ECAO Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects
E=EPA draft Soil Screening Level S=soil saturation concentration.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Soil Screening Levels-Transfers from Soil to: Groundwater mg/kg
Acephate	30560191	4.00E-03 I		8.70E-03 I			7.7 C	0.72 C	0.36 C	660 C	73 C		
Acetaldehyde	75070		2.57E-03 I		7.70E-03 I		94 N	0.81 C					
Acetochlor	34256821	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Acetone	67641	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N	62000 E	8 E
Acetone cyanohydrin	75865	7.00E-02 H	4.00E-02 A				2600 N	150 N	95 N	140000 N	5500 N		
Acetonitrile	75078	6.00E-03 I	1.43E-02 A				220 N	52 N	8.1 N	12000 N	470 N		
Acetophenone	98862	1.00E-01 I	5.71E-06 W			X	0.042 N	0.021 N	140 N	200000 N	7800 N		
Acifluorfen	62476599	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Acrolein	107028	2.00E-02 H	5.71E-06 I				730 N	0.021 N	27 N	41000 N	1600 N		
Acrylamide	79061	2.00E-04 I		4.50E+00 I	4.55E+00 I		0.015 C	0.0014 C	0.0007 C	1.3 C	0.14 C		
Acrylic acid	79107	5.00E-01 I	1.00E-03 I				18000 N	3.7 N	680 N	1E+06 N	39000 N		
Acrylonitrile	107131	1.00E-03 H	5.71E-04 I	5.40E-01 I	2.38E-01 I		0.12 C	0.026 C	0.0058 C	11 C	1.2 C		
Alachlor	15972608	1.00E-02 I		8.00E-02 H			0.84 C	0.078 C	0.039 C	72 C	8 C		
Alar	1596845	1.50E-01 I					5500 N	550 N	200 N	310000 N	12000 N		
Aldicarb	116063	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N	570 S	0.036 N
Aldicarb sulfone	1646884	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Aldrin	309002	3.00E-05 I		1.70E+01 I	1.71E+01 I		0.004 C	0.00037 C	0.00019 C	0.34 C	0.038 C	0.5 E	0.005 E
Ally	74223646	2.50E-01 I					9100 N	910 N	340 N	510000 N	20000 N		
Allyl alcohol	107186	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Allyl chloride	107051	5.00E-02 W	2.86E-04 I				1800 N	1 N	68 N	100000 N	3900 N		
Aluminum	7429905	1.00E+00 E					37000 N	3700 N	1400 N	1E+06 N	78000 N		
Aluminum phosphide	20859738	4.00E-04 I					15 N	1.5 N	0.54 N	820 N	31 N		
Amdro	67485294	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N		
Ametryn	834128	9.00E-03 I					330 N	33 N	12 N	18000 N	700 N		
m-Aminophenol	591275	7.00E-02 H					2600 N	260 N	95 N	140000 N	5500 N		
4-Aminopyridine	504245	2.00E-05 H					0.73 N	0.073 N	0.027 N	41 N	1.6 N		
Amitraz	33089611	2.50E-03 I					91 N	9.1 N	3.4 N	5100 N	200 N		
Ammonia	7664417		2.86E-02 I				1000 N	100 N					
Ammonium sulfamate	7773060	2.00E-01 I					7300 N	730 N	270 N	410000 N	16000 N		
Aniline	62533		2.86E-04 I	5.70E-03 I			10 N	1 N	0.55 C	1000 C	110 C	45 N	0.031 N
Antimony and compounds	7440360	4.00E-04 I					15 N	1.5 N	0.54 N	820 N	31 N		
Antimony pentoxide	1314609	5.00E-04 H					18 N	1.8 N	0.68 N	1000 N	39 N		
Antimony potassium tartrate	304610	9.00E-04 H					33 N	3.3 N	1.2 N	1800 N	70 N		
Antimony tetroxide	1332316	4.00E-04 H					15 N	1.5 N	0.54 N	820 N	31 N		
Antimony trioxide	1309644	4.00E-04 H					15 N	1.5 N	0.54 N	820 N	31 N		
Apollo	74115245	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Aramite	140578	5.00E-02 H		2.50E-02 I	2.49E-02 I		2.7 C	0.25 C	0.13 C	230 C	26 C		
Arsenic	7440382	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N	380 E	15 E
Arsenic (as carcinogen)	7440382			1.75E+00 I	1.51E+01 I		0.038 C	0.00041 C	0.0018 C	3.3 C	0.37 C	380 E	15 E
Arsine	7784421		1.43E-05 I				0.52 N	0.052 N					
Assure	76578148	9.00E-03 I					330 N	33 N	12 N	18000 N	700 N		
Asulam	3337711	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST
E=EPA ECAO Regional Support provisional value O=Other EPA documents

Basis: C=carcinogenic effects N=noncarcinogenic effects
E=EPA draft Soil Screening Level S=soil saturation concentration

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Atrazine	1912249	3.50E-02 I		2.22E-01 H			0.3 C	0.028 C	0.014 C	26 C	2.9 C		
Avermectin B1	65195553	4.00E-04 I					15 N	1.5 N	0.54 N	820 N	31 N		
Azobenzene	103333			1.10E-01 I	1.08E-01 I		0.61 C	0.058 C	0.029 C	52 C	5.8 C		
Barium and compounds	7440393	7.00E-02 I	1.43E-04 A				2600 N	0.52 N	95 N	140000 N	5500 N	350000 E	32 E
Baygon	114261	4.00E-03 I					150 N	15 N	5.4 N	8200 N	310 N		
Bayleton	43121433	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
Baythroid	68359375	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Benefin	1861401	3.00E-01 I					11000 N	1100 N	410 N	610000 N	23000 N		
Benomyl	17804352	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Bentazon	25057890	2.50E-03 I					91 N	9.1 N	3.4 N	5100 N	200 N		
Benzaldehyde	100527	1.00E-01 I				☒	610 N	370 N	140 N	200000 N	7800 N		
Benzene	71432		1.71E-03 E	2.90E-02 I	2.90E-02 I	☒	0.36 C	0.22 C	0.11 C	200 C	22 C	0.5 E	0.02 E
Benzenethiol	108985	1.00E-05 H					0.37 N	0.037 N	0.014 N	20 N	0.78 N		
Benzidine	92875	3.00E-03 I		2.30E+02 I	2.35E+02 I		0.00029 C	0.00003 C	0.00001 C	0.025 C	0.0028 C	1.3 C	1.100E-06 C
Benzoic acid	65850	4.00E+00 I					150000 N	15000 N	5400 N	1E+06 N	310000 N	320 S	280 E
Benzotrichloride	98077			1.30E+01 I			0.0052 C	0.00048 C	0.00024 C	0.44 C	0.049 C	0.012 C	0.000073 C
Benzyl alcohol	100516	3.00E-01 H					11000 N	1100 N	410 N	610000 N	23000 N		
Benzyl chloride	100447			1.70E-01 I		☒	0.062 C	0.037 C	0.019 C	34 C	3.8 C	0.5 C	0.00036 C
Beryllium and compounds	7440417	5.00E-03 I		4.30E+00 I	8.40E+00 I		0.016 C	0.00075 C	0.00073 C	1.3 C	0.15 C	690 E	180 E
Bidrin	141662	1.00E-04 I					3.7 N	0.37 N	0.14 N	200 N	7.8 N		
Biphenthrin (Talstar)	82657043	1.50E-02 I					550 N	55 N	20 N	31000 N	1200 N		
1,1-Biphenyl	92524	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N	9000 S	110 N
Bis(2-chloroethyl)ether	111444			1.10E+00 I	1.16E+00 I	☒	0.0092 C	0.0054 C	0.0029 C	5.2 C	0.58 C	0.3 E	0.0003 E
Bis(2-chloroisopropyl)ether	39638329	4.00E-02 I		7.00E-02 H	3.50E-02 H	☒	0.26 C	0.18 C	0.045 C	82 C	9.1 C		
Bis(chloromethyl)ether	542881			2.20E+02 I	2.17E+02 I	☒	0.00005 C	0.00003 C	0.00001 C	0.026 C	0.0029 C	0.00004 C	1.000E-07 C
Bis(2-chloro-1-methylethyl)ether				7.00E-02 W	7.00E-02 W		0.96 C	0.089 C	0.045 C	82 C	9.1 C		
Bis(2-ethylhexyl)phthalate (DEHP)	117817	2.00E-02 I		1.40E-02 I			4.8 C	0.45 C	0.23 C	410 C	46 C	210 E	11 E
Bisphenol A	80057	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Boron (and borates)	7440428	9.00E-02 I	5.71E-03 H				3300 N	21 N	120 N	180000 N	7000 N		
Boron trifluoride	7637072		2.00E-04 H				7.3 N	0.73 N					
Bromodichloromethane	75274	2.00E-02 I		6.20E-02 I		☒	0.17 C	0.1 C	0.051 C	92 C	10 C	1800 E	0.3 E
Bromoethene	593602				1.10E-01 H	☒	0.096 C	0.057 C					
Bromoform (tribromomethane)	75252	2.00E-02 I		7.90E-03 I	3.85E-03 I	☒	2.4 C	1.6 C	0.4 C	720 C	81 C	46 E	0.5 E
Bromomethane	74839	1.40E-03 I	1.43E-03 I			☒	8.7 N	5.2 N	1.9 N	2900 N	110 N	2 E	0.1 E
4-Bromophenyl phenyl ether	101553	5.80E-02 O					2100 N	210 N	78 N	120000 N	4500 N		
Bromophos	2104963	5.00E-03 H					180 N	18 N	6.8 N	10000 N	390 N		
Bromoxynil	1689845	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Bromoxynil octanoate	1689992	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
1,3-Butadiene	106990				9.80E-01 I	☒	0.011 C	0.0064 C				0.0013 C	0.000072 C
1-Butanol	71363	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N	9700 E	8 E
Butyl benzyl phthalate	85687	2.00E-01 I					7300 N	730 N	270 N	410000 N	16000 N	530 E	68 E
Butylate	2008415	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		

Sources: I = IRIS; H = HEAST; A = HEAST alternate; W = Withdrawn from IRIS or HEAST; E = EPA ECAO Regional Support provisional value; O = Other EPA documents

Basis: C = carcinogenic effects; N = noncarcinogenic effects; E = EPA draft Soil Screening Level; S = soil saturation concentration.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
sec-Butylbenzene	135988	1.00E-02 E				☒	61 N	37 N	14 N	20000 N	780 N	80 S	0.27 N
tert-Butylbenzene	104518	1.00E-02 E				☒	61 N	37 N	14 N	20000 N	780 N		
Butylphthalyl butylglycolate	85701	1.00E+00 I					37000 N	3700 N	1400 N	1E+06 N	78000 N		
Cacodylic acid	75605	3.00E-03 H					110 N	11 N	4.1 N	6100 N	230 N		
Cadmium and compounds	7440439	5.00E-04 I			6.30E+00 I		18 N	0.00099 C	0.68 N	1000 N	39 N	920 E	6 E
Caprolactam	105602	5.00E-01 I					18000 N	1800 N	680 N	1E+06 N	39000 N		
Captafol	2425061	2.00E-03 I		8.60E-03 H			7.8 C	0.73 C	0.37 C	670 C	74 C		
Captan	133062	1.30E-01 I		3.50E-03 H			19 C	1.8 C	0.9 C	1600 C	180 C		
Carbaryl	63252	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N	0.34 S	23 N
Carbofuran	1563662	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Carbon disulfide	75150	1.00E-01 I	2.86E-03 H			☒	21 N	10 N	140 N	200000 N	7800 N	11 E	14 E
Carbon tetrachloride	56235	7.00E-04 I	5.71E-04 E	1.30E-01 I	5.25E-02 I	☒	0.16 C	0.12 C	0.024 C	44 C	4.9 C	0.2 E	0.03 E
Carbosulfan	55285148	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
Carboxin	5234684	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Chloral	75876	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Chloramben	133904	1.50E-02 I					550 N	55 N	20 N	31000 N	1200 N		
Chloranil	118752			4.03E-01 H			0.17 C	0.016 C	0.0078 C	14 C	1.6 C		
Chlordane	57749	6.00E-05 I		1.30E+00 I	1.29E+00 I		0.052 C	0.0049 C	0.0024 C	4.4 C	0.49 C	10 E	2 E
Chlorimuron-ethyl	90982324	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Chlorine	7782505	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Chlorine dioxide	10049044		5.71E-05 I				2.1 N	0.21 N					
Chloroacetaldehyde	107200	6.90E-03 O					250 N	25 N	9.3 N	14000 N	540 N		
Chloroacetic acid	79118	2.00E-03 H					73 N	7.3 N	2.7 N	4100 N	160 N		
2-Chloroacetophenone	532274		8.57E-06 I				0.31 N	0.031 N					
4-Chloroaniline	106478	4.00E-03 I					150 N	15 N	5.4 N	8200 N	310 N	1200 S	0.3 E
Chlorobenzene	108907	2.00E-02 I	5.71E-03 A			☒	39 N	21 N	27 N	41000 N	1600 N	94 E	0.6 E
Chlorobenzilate	510156	2.00E-02 I		2.70E-01 H	2.70E-01 H		0.25 C	0.023 C	0.012 C	21 C	2.4 C		
p-Chlorobenzoic acid	74113	2.00E-01 H					7300 N	730 N	270 N	410000 N	16000 N		
4-Chlorobenzotrifluoride	98566	2.00E-02 H					730 N	73 N	27 N	41000 N	1600 N	86 N	7.5 N
2-Chloro-1,3-butadiene	126998	2.00E-02 A	2.00E-03 H			☒	14 N	7.3 N	27 N	41000 N	1600 N		
1-Chlorobutane	109693	4.00E-01 H				☒	2400 N	1500 N	540 N	820000 N	31000 N		
Chlorodibromomethane	124481	2.00E-02 I		8.40E-02 I		☒	0.13 C	0.075 C	0.038 C	68 C	7.6 C	1900 E	0.2 E
Chlorodifluoromethane	75456		1.43e+01 I			☒	87000 N	52000 N					
Chloroethane	75003	4.00E-01 E	2.86E+00 I			☒	8600 N	10000 N	540 N	820000 N	31000 N	2600 S	33 N
2-Chloroethyl vinyl ether	110758	2.50E-02 O				☒	150 N	91 N	34 N	51000 N	2000 N		
Chloroform	67663	1.00E-02 I		6.10E-03 I	8.05E-02 I	☒	0.15 C	0.078 C	0.52 C	940 C	100 C	0.2 E	0.3 E
Chloromethane	74873			1.30E-02 H	6.30E-03 H	☒	1.4 C	0.99 C	0.24 C	440 C	49 C	0.063 C	0.0066 C
4-Chloro-2,2-methylaniline hydrochloride	3165933			4.60E-01 H			0.15 C	0.014 C	0.0069 C	12 C	1.4 C		
4-Chloro-2-methylaniline	95692			5.80E-01 H			0.12 C	0.011 C	0.0054 C	9.9 C	1.1 C		
beta-Chloronaphthalene	91587	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N	2.8 S	140 N
o-Chloronitrobenzene	88733			2.50E-02 H		☒	0.42 C	0.25 C	0.13 C	230 C	26 C		
p-Chloronitrobenzene	100005			1.80E-02 H		☒	0.59 C	0.35 C	0.18 C	320 C	35 C		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA ECAO Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
2-Chlorophenol	95578	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N	53000 E	2 E
2-Chloropropane	75296		2.86E-02 H			☒	170 N	100 N				22 N	0.64 N
Chlorothalonil	1897456	1.50E-02 I		1.10E-02 H			6.1 C	0.57 C	0.29 C	520 C	58 C		
o-Chlorotoluene	95498	2.00E-02 I				☒	120 N	73 N	27 N	41000 N	1600 N	1200 N	5.6 N
Chlorpropham	101213	2.00E-01 I					7300 N	730 N	270 N	410000 N	16000 N		
Chlorpyrifos	2921882	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
Chlorpyrifos-methyl	5598130	1.00E-02 H					370 N	37 N	14 N	20000 N	780 N		
Chlorsulfuron	64902723	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Chlorthiophos	60238564	8.00E-04 H					29 N	2.9 N	1.1 N	1600 N	63 N		
Chromium III and compounds	16065831	1.00E+00 I	5.71E-07 W				37000 N	0.0021 N	1400 N	1E+06 N	78000 N		
Chromium VI and compounds	7440473	5.00E-03 I			4.20E+01 I		180 N	0.00015 C	6.8 N	10000 N	390 N	140 E	19 E
Coal tar	8001589				2.20E+00 W			0.0028 C					
Cobalt	7440484	6.00E-02 E					2200 N	220 N	81 N	120000 N	4700 N		
Coke Oven Emissions	8007452				2.17E+00 I			0.0029 C					
Copper and compounds	7440508	3.71E-02 H					1400 N	140 N	50 N	76000 N	2900 N		
Crotonaldehyde	123739	1.00E-02 W		1.90E+00 H	1.90E+00 W		0.035 C	0.0033 C	0.0017 C	3 C	0.34 C		
Cumene	98828	4.00E-02 I	2.57E-03 H				1500 N	9.4 N	54 N	82000 N	3100 N	81 N	65 N
Cyanides:													
Barium cyanide	542621	1.00E-01 W					3700 N	370 N	140 N	200000 N	7800 N		
Calcium cyanide	592018	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		
Copper cyanide	544923	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Cyanazine	21725462	2.00E-03 H		8.40E-01 H			0.08 C	0.0075 C	0.0038 C	6.8 C	0.76 C		
Cyanogen	460195	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		
Cyanogen bromide	506683	9.00E-02 I					3300 N	330 N	120 N	180000 N	7000 N		
Cyanogen chloride	506774	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Free cyanide	57125	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Hydrogen cyanide	74908	2.00E-02 I	8.57E-04 I				730 N	3.1 N	27 N	41000 N	1600 N		
Potassium cyanide	151508	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Potassium silver cyanide	506616	2.00E-01 I					7300 N	730 N	270 N	410000 N	16000 N		
Silver cyanide	506649	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Sodium cyanide	143339	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		
Zinc cyanide	557211	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Cyclohexanone	108941	5.00E+00 I				☒	30000 N	18000 N	6800 N	1E+06 N	390000 N		
Cyclohexlamine	108918	2.00E-01 I					7300 N	730 N	270 N	410000 N	16000 N		
Cyhalothrin/Karate	68085858	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Cypermethrin	52315078	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
Cyromazine	66215278	7.50E-03 I					270 N	27 N	10 N	15000 N	590 N		
Dacthal	1861321	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
Dalapon	75990	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
Danitol	39515418	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
DDD	72548			2.40E-01 I			0.28 C	0.026 C	0.013 C	24 C	2.7 C	37 S	0.7 E
DDE	72559			3.40E-01 I			0.2 C	0.018 C	0.0093 C	17 C	1.9 C	10 S	0.5 E

Sources: I = IRIS H = HEAST A = HEAST alternate W = Withdrawn from IRIS or HEAST
E = EPA ECAO Regional Support provisional value O = Other EPA documents

Basis: C = carcinogenic effects N = noncarcinogenic effects
E = EPA draft Soil Screening Level S = soil saturation concentration.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
DDT	50293	5.00E-04 I		3.40E-01 I	3.40E-01 I		0.2 C	0.018 C	0.0093 C	17 C	1.9 C	80 E	1 E
Decabromodiphenyl ether	1163195	1.00E-02 I				☒	61 N	37 N	14 N	20000 N	780 N		
Demeton	8065483	4.00E-05 I					1.5 N	0.15 N	0.054 N	82 N	3.1 N		
Diallate	2303164			6.10E-02 H		☒	0.17 C	0.1 C	0.052 C	94 C	10 C		
Diazinon	333415	9.00E-04 H					33 N	3.3 N	1.2 N	1800 N	70 N	5400 S	2.8 N
Dibenzofuran	132649	4.00E-03 E					150 N	15 N	5.4 N	8200 N	310 N	120 S	120 N
1,4-Dibromobenzene	106376	1.00E-02 I				☒	61 N	37 N	14 N	20000 N	780 N		
1,2-Dibromo-3-chloropropane	96128		5.71E-05 I	1.40E+00 H	2.42E-03 H	☒	0.048 C	0.21 N	0.0023 C	4.1 C	0.46 C	1.9 N	0.00061 M
1,2-Dibromoethane	106934		5.71E-05 H	8.50E+01 I	7.70E-01 I	☒	0.00075 C	0.0081 C	0.00004 C	0.067 C	0.0075 C	0.0058 C	0.00018 M
Dibutyl phthalate	84742	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N	100 E	120 E
Dicamba	1918009	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
1,2-Dichlorobenzene	95501	9.00E-02 I	4.00E-02 A			☒	270 N	150 N	120 N	180000 N	7000 N	300 E	6 E
1,3-Dichlorobenzene	541731	8.90E-02 O				☒	540 N	320 N	120 N	180000 N	7000 N		
1,4-Dichlorobenzene	106467		2.29E-01 I	2.40E-02 H		☒	0.44 C	0.26 C	0.13 C	240 C	27 C	7700 E	1 E
3,3'-Dichlorobenzidine	91941			4.50E-01 I			0.15 C	0.014 C	0.007 C	13 C	1.4 C	52 S	0.01 E
1,4-Dichloro-2-butene	764410				9.30E+00 H	☒	0.0011 C	0.00067 C					
Dichlorodifluoromethane	75718	2.00E-01 I	5.71E-02 A			☒	390 N	210 N	270 N	410000 N	16000 N	37 N	7.5 N
1,1-Dichloroethane	75343	1.00E-01 H	1.43E-01 A			☒	810 N	520 N	140 N	200000 N	7800 N	980 E	11 E
1,2-Dichloroethane (EDC)	107062		2.86E-03 E	9.10E-02 I	9.10E-02 I	☒	0.12 C	0.069 C	0.035 C	63 C	7 C	0.3 E	0.01 E
1,1-Dichloroethylene	75354	9.00E-03 I		6.00E-01 I	1.75E-01 I	☒	0.044 C	0.036 C	0.0053 C	9.5 C	1.1 C	0.04 E	0.03 E
1,2-Dichloroethylene (cis)	156592	1.00E-02 H				☒	61 N	37 N	14 N	20000 N	780 N	1500 E	0.2 E
1,2-Dichloroethylene (trans)	156605	2.00E-02 I				☒	120 N	73 N	27 N	41000 N	1600 N	3600 E	0.3 E
1,2-Dichloroethylene (mixture)	540590	9.00E-03 H				☒	55 N	33 N	12 N	18000 N	700 N		
2,4-Dichlorophenol	120832	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N	4800 S	0.5 E
2,4-Dichlorophenoxyacetic Acid (2,4-D)	94757	1.00E-02 I				☒	61 N	37 N	14 N	20000 N	780 N	7000 S	1.7 M
4-(2,4-Dichlorophenoxy)butyric Acid	94826	8.00E-03 I					290 N	29 N	11 N	16000 N	630 N		
1,2-Dichloropropane	78875		1.14E-03 I	6.80E-02 H		☒	0.16 C	0.092 C	0.046 C	84 C	9.4 C	11 E	0.02 E
2,3-Dichloropropanol	616239	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
1,3-Dichloropropene	542756	3.00E-04 I	5.71E-03 I	1.75E-01 H	1.30E-01 H	☒	0.077 C	0.048 C	0.018 C	33 C	3.7 C	0.1 E	0.001 E
Dichlorvos	62737	5.00e-04 I	1.43E-04 I	2.90E-01 I			0.23 C	0.022 C	0.011 C	20 C	2.2 C	3.5 C	0.00072 C
Dicofol	115322			4.40E-01 W			0.15 C	0.014 C	0.0072 C	13 C	1.5 C		
Dicyclopentadiene	77736	3.00E-02 H	5.71E-05 A			☒	0.42 N	0.21 N	41 N	61000 N	2300 N		
Dieldrin	60571	5.00E-05 I		1.60E+01 I	1.61E+01 I		0.0042 C	0.00039 C	0.0002 C	0.36 C	0.04 C	2 E	0.001 E
Diesel emissions			1.43E-03 I				52 N	5.2 N					
Diethyl phthalate	84662	8.00E-01 I					29000 N	2900 N	1100 N	1E+06 N	63000 N	520 E	110 E
Diethylene glycol, monobutyl ether	112345		5.71E-03 H				210 N	21 N					
Diethylene glycol, monoethyl ether	111900	2.00E+00 H					73000 N	7300 N	2700 N	1E+06 N	160000 N		
Diethylformamide	617845	1.10E-02 H					400 N	40 N	15 N	22000 N	860 N		
Di(2-ethylhexyl)adipate	103231	6.00E-01 I		1.20E-03 I			56 C	5.2 C	2.6 C	4800 C	530 C		
Diethylstilbestrol	56531			4.70E+03 H			0.00001 C	1E-06 C	7E-07 C	0.0012 C	0.00014 C		
Difenzoquat (Avenge)	43222486	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N		
Diflubenzuron	35367385	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA ECAO Regional Support provisional value O=Other EPA documents

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
1,1-Difluoroethane	75376		1.14E+01 I			☒	69000 N	42000 N					
Diisopropyl methylphosphonate (DIMP)	1445756	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N		
Dimethipin	55290647	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Dimethoate	60515	2.00E-04 I					7.3 N	0.73 N	0.27 N	410 N	16 N		
3,3'-Dimethoxybenzidine	119904			1.40E-02 H			4.8 C	0.45 C	0.23 C	410 C	46 C		
Dimethylamine	124403		5.71E-06 W				0.21 N	0.021 N					
2,4-Dimethylaniline hydrochloride	21436964			5.80E-01 H			0.12 C	0.011 C	0.0054 C	9.9 C	1.1 C		
2,4-Dimethylaniline	95681			7.50E-01 H			0.09 C	0.0083 C	0.0042 C	7.6 C	0.85 C		
N-N-Dimethylaniline	121697	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
3,3'-Dimethylbenzidine	119937			9.20E+00 H			0.0073 C	0.00068 C	0.00034 C	0.62 C	0.069 C	29 C	0.00039 C
N,N-Dimethylformamide	68122	1.00E-01 H	8.57E-03 I				3700 N	31 N	140 N	200000 N	7800 N		
1,1-Dimethylhydrazine	57147			2.60E+00 W	3.50E+00 W		0.026 C	0.0018 C	0.0012 C	2.2 C	0.25 C		
1,2-Dimethylhydrazine	540738			3.70E+01 W	3.70E+01 W		0.0018 C	0.00017 C	0.00009 C	0.15 C	0.017 C		
2,4-Dimethylphenol	105679	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N	5400 S	3 E
2,6-Dimethylphenol	576261	6.00E-04 I					22 N	2.2 N	0.81 N	1200 N	47 N		
3,4-Dimethylphenol	95658	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Dimethyl phthalate	131113	1.00E+01 H					370000 N	37000 N	14000 N	1E+06 N	780000 N	1600 E	1200 I
Dimethyl terephthalate	120616	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
1,2-Dinitrobenzene	528290	4.00E-04 H					15 N	1.5 N	0.54 N	820 N	31 N		
1,3-Dinitrobenzene	99650	1.00E-04 I					3.7 N	0.37 N	0.14 N	200 N	7.8 N		
1,4-Dinitrobenzene	100254	4.00E-04 H					15 N	1.5 N	0.54 N	820 N	31 N		
4,6-Dinitro-o-cyclohexyl phenol	131895	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
2,4-Dinitrophenol	51285	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N	360 N	0.1 E
Dinitrotoluene mixture				6.80E-01 I			0.099 C	0.0092 C	0.0046 C	8.4 C	0.94 C		
2,4-Dinitrotoluene	121142	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N	120 S	0.2 E
2,6-Dinitrotoluene	606202	1.00E-03 H					37 N	3.7 N	1.4 N	2000 N	78 N	370 S	0.1 E
Dinoseb	88857	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
di-n-Octyl phthalate	117840	2.00E-02 H					730 N	73 N	27 N	41000 N	1600 N	1000000 S	1000000 E
1,4-Dioxane	123911			1.10E-02 I			6.1 C	0.57 C	0.29 C	520 C	58 C		
Diphenamid	957517	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
Diphenylamine	122394	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
1,2-Diphenylhydrazine	122667			8.00E-01 I	7.70E-01 I		0.084 C	0.0081 C	0.0039 C	7.2 C	0.8 C		
Diquat	85007	2.20E-03 I					80 N	8 N	3 N	4500 N	170 N		
Direct black 38	1937377			8.60E+00 H			0.0078 C	0.00073 C	0.00037 C	0.67 C	0.074 C		
Direct blue 6	2602462			8.10E+00 H			0.0083 C	0.00077 C	0.00039 C	0.71 C	0.079 C		
Direct brown 95	16071866			9.30E+00 H			0.0072 C	0.00067 C	0.00034 C	0.62 C	0.069 C		
Disulfoton	298044	4.00E-05 I					1.5 N	0.15 N	0.054 N	82 N	3.1 N		
1,4-Dithiane	505293	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
Diuron	330541	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Dodine	2439103	4.00E-03 I					150 N	15 N	5.4 N	8200 N	310 N		
Endosulfan	115297	6.00E-03 I					220 N	22 N	8.1 N	12000 N	470 N	1 S	3 E
Endothall	145733	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST
E=EPA ECAO Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects
E=EPA draft Soil Screening Level S=soil saturation concentration.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion Industrial mg/kg	Soil Ingestion Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Endrin	72208	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N	16 S	0.4 E
Epichlorohydrin	106898	2.00E-03 H	2.86E-04 I	9.90E-03 I	4.20E-03 I		6.8 C	1 N	0.32 C	580 C	65 C		
1,2-Epoxybutane	106887		5.71E-03 I				210 N	21 N					
Ethephon (2-chloroethyl phosphonic acid)	16672870	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Ethion	563122	5.00E-04 I					18 N	1.8 N	0.68 N	1000 N	39 N		
2-Ethoxyethanol acetate	111159	3.00E-01 A					11000 N	1100 N	410 N	610000 N	23000 N		
2-Ethoxyethanol	110805	4.00E-01 H	5.71E-02 I				15000 N	210 N	540 N	820000 N	31000 N		
Ethyl acrylate	140885			4.80E-02 H			1.4 C	0.13 C	0.066 C	120 C	13 C		
EPTC (S-Ethyl dipropylthiocarbamate)	759944	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Ethyl ether	60297	2.00E-01 I				☒	1200 N	730 N	270 N	410000 N	16000 N		
Ethyl methacrylate	97632	9.00E-02 H					3300 N	330 N	120 N	180000 N	7000 N		
Ethyl acetate	141786	9.00E-01 I					33000 N	3300 N	1200 N	1E+06 N	70000 N		
Ethylbenzene	100414	1.00E-01 I	2.86E-01 I			☒	1300 N	1000 N	140 N	200000 N	7800 N	260 E	5 E
Ethylene cyanohydrin	109784	3.00E-01 H					11000 N	1100 N	410 N	610000 N	23000 N		
Ethylene diamine	107153	2.00E-02 H					730 N	73 N	27 N	41000 N	1600 N		
Ethylene glycol	107211	2.00E+00 I					73000 N	7300 N	2700 N	1E+06 N	160000 N		
Ethylene glycol, monobutyl ether	111762		5.71E-03 H				210 N	21 N					
Ethylene oxide	75218			1.02E+00 H	3.50E-01 H		0.066 C	0.018 C	0.0031 C	5.6 C	0.63 C		
Ethylene thiourea (ETU)	96457	8.00E-05 I		1.19E-01 H			0.57 C	0.053 C	0.027 C	48 C	5.4 C		
Ethyl p-nitrophenyl phenylphosphorothioate	2104645	1.00E-05 I					0.37 N	0.037 N	0.014 N	20 N	0.78 N		
Ethylnitrosourea	759739			1.40E+02 W			0.00048 C	0.00005 C	0.00002 C	0.041 C	0.0046 C		
Ethylphthalyl ethyl glycolate	84720	3.00E+00 I					110000 N	11000 N	4100 N	1E+06 N	230000 N		
Express	10120	8.00E-03 I					290 N	29 N	11 N	16000 N	630 N		
Fenamiphos	22224926	2.50E-04 I					9.1 N	0.91 N	0.34 N	510 N	20 N		
Fluometuron	2164172	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Fluoride	7782414	6.00E-02 I					2200 N	220 N	81 N	120000 N	4700 N		
Fluoridone	59756604	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N		
Flurprimidol	56425913	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Flutolanil	66332965	6.00E-02 I					2200 N	220 N	81 N	120000 N	4700 N		
Fluvalinate	69409945	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
Folpet	133073	1.00E-01 I		3.50E-03 I			19 C	1.8 C	0.9 C	1600 C	180 C		
Fomesafen	72178020			1.90E-01 I			0.35 C	0.033 C	0.017 C	30 C	3.4 C		
Fonofos	944229	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Formaldehyde	50000	2.00E-01 I			4.55E-02 I		7300 N	0.14 C	270 N	410000 N	16000 N		
Formic Acid	64186	2.00E+00 H					73000 N	7300 N	2700 N	1E+06 N	160000 N		
Fosetyl-al	39148248	3.00E+00 I					110000 N	11000 N	4100 N	1E+06 N	230000 N		
Furan	110009	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Furazolidone	67458			3.80E+00 H			0.018 C	0.0016 C	0.00083 C	1.5 C	0.17 C		
Furfural	98011	3.00E-03 I	1.43E-02 A				110 N	52 N	4.1 N	6100 N	230 N		
Furium	531828			5.00E+01 H			0.0013 C	0.00013 C	0.00006 C	0.11 C	0.013 C		
Furmecyclox	60568050			3.00E-02 I			2.2 C	0.21 C	0.11 C	190 C	21 C		
Glufosinate-ammonium	77182822	4.00E-04 I					15 N	1.5 N	0.54 N	820 N	31 N		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA ECAO Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Glycidaldehyde	765344	4.00E-04 I	2.86E-04 H				15 N	1 N	0.54 N	820 N	31 N		
Glyphosate	1071836	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Haloxyfop-methyl	69806402	5.00E-05 I					1.8 N	0.18 N	0.068 N	100 N	3.9 N		
Harmony	79277273	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
HCH (alpha)	319846			6.30E+00 I	6.30E+00 I		0.011 C	0.00099 C	0.0005 C	0.91 C	0.1 C	0.9 E	0.0004 E
HCH (beta)	319857			1.80E+00 I	1.80E+00 I		0.037 C	0.0035 C	0.0018 C	3.2 C	0.35 C	16 E	0.002 E
HCH (gamma) Lindane	58899	3.00E-04 I		1.30E+00 H			0.052 C	0.0048 C	0.0024 C	4.4 C	0.49 C	4.2 C	0.006 E
HCH-technical	608731			1.80E+00 I	1.79E+00 I		0.037 C	0.0035 C	0.0018 C	3.2 C	0.35 C		
Heptachlor	76448	5.00E-04 I		4.50E+00 I	4.55E+00 I	☒	0.0023 C	0.0014 C	0.0007 C	1.3 C	0.14 C	0.3 E	0.06 E
Heptachlor epoxide	1024573	1.30E-05 I		9.10E+00 I	9.10E+00 I	☒	0.0012 C	0.00069 C	0.00035 C	0.63 C	0.07 C	1 E	0.03 E
Hexabromobenzene	87821	2.00E-03 I				☒	12 N	7.3 N	2.7 N	4100 N	160 N		
Hexachlorobenzene	118741	8.00E-04 I		1.60E+00 I	1.61E+00 I	☒	0.0066 C	0.0039 C	0.002 C	3.6 C	0.4 C	1 E	0.8 E
Hexachlorobutadiene	87683	2.00E-04 H		7.80E-02 I	7.70E-02 I	☒	0.14 C	0.081 C	0.04 C	73 C	8.2 C	1 E	0.1 E
Hexachlorocyclopentadiene	77474	7.00E-03 I	2.00E-05 H			☒	0.15 N	0.073 N	9.5 N	14000 N	550 N	2 E	10 E
Hexachlorodibenzo-p-dioxin mixture	19408743			6.20E+03 I	4.55E+03 I		0.00001 C	1E-06 C	5E-07 C	0.0009 C	0.0001 C		
Hexachloroethane	67721	1.00E-03 I		1.40E-02 I	1.40E-02 I	☒	0.75 C	0.45 C	0.23 C	410 C	46 C	49 E	0.2 E
Hexachlorophene	70304	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N		
Hexahydro-1,3,5-trinitro-1,3,5-triazine	121824	3.00E-03 I		1.10E-01 I			0.61 C	0.057 C	0.029 C	52 C	5.8 C		
1,6-Hexamethylene diisocyanate	822060		2.86E-06 I				0.1 N	0.01 N					
n-Hexane	110543	6.00E-02 H	5.71E-02 I			☒	350 N	210 N	81 N	120000 N	4700 N	32 N	13 N
Hexazinone	51235042	3.30E-02 I					1200 N	120 N	45 N	67000 N	2600 N		
Hydrazine, hydrazine sulfate	302012			3.00E+00 I	1.71E+01 I		0.022 C	0.00037 C	0.0011 C	1.9 C	0.21 C		
Hydrogen chloride	7647010		2.00E-03 I				73 N	7.3 N					
Hydrogen sulfide	7783064	3.00E-03 I	2.57E-04 I				110 N	0.94 N	4.1 N	6100 N	230 N		
Hydroquinone	123319	4.00E-02 H					1500 N	150 N	54 N	82000 N	3100 N		
Imazalil	35554440	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Imazaquin	81335377	2.50E-01 I					9100 N	910 N	340 N	510000 N	20000 N		
Iprodione	36734197	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		
Isobutanol	78831	3.00E-01 I				☒	1800 N	1100 N	410 N	610000 N	23000 N		
Isophorone	78591	2.00E-01 I		9.50E-04 I			71 C	6.6 C	3.3 C	6000 C	670 C	3400 E	0.2 E
Isopropalin	33820530	1.50E-02 I					550 N	55 N	20 N	31000 N	1200 N		
Isopropyl methyl phosphonic acid	1832548	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Isoxaben	82558507	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Kepone	143500			1.80E+01 E			0.0037 C	0.00035 C	0.00018 C	0.32 C	0.035 C		
Lactofen	77501634	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Linuron	330552	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Lithium	7439932	2.00E-02 E					730 N	73 N	27 N	41000 N	1600 N		
Londax	83056996	2.00E-01 I					7300 N	730 N	270 N	410000 N	16000 N		
Malathion	121755	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Maleic anhydride	108316	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Maleic hydrazide	123331	5.00E-01 I					18000 N	1800 N	680 N	1E+06 N	39000 N		
Malononitrile	109773	2.00E-05 H					0.73 N	0.073 N	0.027 N	41 N	1.6 N		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA ECAO Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Mancozeb	8018017	3.00E-02 H					1100 N	110 N	41 N	61000 N	2300 N		
Maneb	12427382	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Manganese and compounds	7439965	5.00E-03 I	1.43e-05 I				180 N	0.052 N	6.8 N	10000 N	390 N		
Mephosfolan	950107	9.00E-05 H					3.3 N	0.33 N	0.12 N	180 N	7 N		
Mepiquat chloride	24307264	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
Mercury (inorganic)	7439976	3.00E-04 H	8.57E-05 H				11 N	0.31 N	0.41 N	610 N	23 N	7 E	3 E
Mercury (methyl)	22967926	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N		
Merphos	150505	3.00E-05 I					1.1 N	0.11 N	0.041 N	61 N	2.3 N		
Merphos oxide	78488	3.00E-05 I					1.1 N	0.11 N	0.041 N	61 N	2.3 N		
Metalaxyl	57837191	6.00E-02 I					2200 N	220 N	81 N	120000 N	4700 N		
Methacrylonitrile	126987	1.00E-04 I	2.00E-04 A				3.7 N	0.73 N	0.14 N	200 N	7.8 N		
Methamidophos	10265926	5.00E-05 I					1.8 N	0.18 N	0.068 N	100 N	3.9 N		
Methanol	67561	5.00E-01 I					18000 N	1800 N	680 N	1E+06 N	39000 N		
Methidathion	950378	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Methomyl	16752775	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Methoxychlor	72435	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N	41 S	62 E
2-Methoxyethanol acetate	110496	2.00E-03 A					73 N	7.3 N	2.7 N	4100 N	160 N		
2-Methoxyethanol	109864	1.00E-03 H	5.71E-03 I				37 N	21 N	1.4 N	2000 N	78 N		
2-Methoxy-5-nitroaniline	99592			4.60E-02 H			1.5 C	0.14 C	0.069 C	120 C	14 C		
Methyl acetate	79209	1.00E+00 H					37000 N	3700 N	1400 N	1E+06 N	78000 N		
Methyl acrylate	96333	3.00E-02 A					1100 N	110 N	41 N	61000 N	2300 N		
2-Methylaniline hydrochloride	636215			1.80E-01 H			0.37 C	0.035 C	0.018 C	32 C	3.5 C		
2-Methylaniline	95534			2.40E-01 H			0.28 C	0.026 C	0.013 C	24 C	2.7 C		
Methyl chlorocarbonate	79221	1.00E+00 W					37000 N	3700 N	1400 N	1E+06 N	78000 N		
4-(2-Methyl-4-chlorophenoxy) butyric acid	94815	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
2-Methyl-4-chlorophenoxyacetic acid	94746	5.00E-04 I					18 N	1.8 N	0.68 N	1000 N	39 N		
2-(2-Methyl-14-chlorophenoxy)propionic aci	93652	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Methylcyclohexane	108872		8.57E-01 H				31000 N	3100 N				60 S	1500 N
Methylene bromide	74953	1.00E-02 A				☒	61 N	37 N	14 N	20000 N	780 N		
Methylene chloride	75092	6.00E-02 I	8.57E-01 H	7.50E-03 I	1.64E-03 I	☒	4.1 C	3.8 C	0.42 C	760 C	85 C	7 E	0.01 E
4,4'-Methylene bis(2-chloroaniline)	101144	7.00E-04 H		1.30E-01 H	1.30E-01 H		0.52 C	0.048 C	0.024 C	44 C	4.9 C		
4,4'-Methylenebisbenzeneamine	101779			2.50E-01 W			0.27 C	0.025 C	0.013 C	23 C	2.6 C		
4,4'-Methylene bis(N,N'-dimethyl)aniline	101611			4.60E-02 I			1.5 C	0.14 C	0.069 C	120 C	14 C		
4,4'-Methylenediphenyl isocyanate	101688		5.71E-06 I			☒	0.035 N	0.021 N					
Methyl ethyl ketone	78933	6.00E-01 I	2.86E-01 I			☒	1900 N	1000 N	810 N	1E+06 N	47000 N		
Methyl hydrazine	60344			1.10E+00 W			0.061 C	0.0057 C	0.0029 C	5.2 C	0.58 C		
Methyl isobutyl ketone	108101	8.00E-02 H	2.29E-02 A				2900 N	84 N	110 N	160000 N	6300 N		
Methyl methacrylate	80626	8.00E-02 H					2900 N	290 N	110 N	160000 N	6300 N		
2-Methyl-5-nitroaniline	99558			3.30E-02 H			2 C	0.19 C	0.096 C	170 C	19 C		
Methyl parathion	298000	2.50E-04 I					9.1 N	0.91 N	0.34 N	510 N	20 N	28 S	0.041 N
2-Methylphenol (o-cresol)	95487	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N	12000 S	6 E
3-Methylphenol (m-cresol)	103394	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST
E=EPA ECAO Regional Support provisional value O=Other EPA documents

Basis: C=carcinogenic effects N=noncarcinogenic effects
E=EPA draft Soil Screening Level S=soil saturation concentration

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
4-Methylphenol (p-cresol)	106445	5.00E-03 H					180 N	18 N	6.8 N	10000 N	390 N		
Methyl styrene (mixture)	25013154	6.00E-03 A	1.14E-02 A			☒	60 N	42 N	8.1 N	12000 N	470 N		
Methyl styrene (alpha)	98839	7.00E-02 A				☒	430 N	260 N	95 N	140000 N	5500 N	8.8 S	7.5 N
Methyl tertbutyl ether (MTBE)	1634044	5.00E-03 E	8.57E-01 I			☒	180 N	3100 N	6.8 N	10000 N	390 N		
Metolaclor (Dual)	51218452	1.50E-01 H					5500 N	550 N	200 N	310000 N	12000 N		
Metribuzin	21807649	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Mirex	2385855	2.00E-04 I		1.80E+00 W			0.037 C	0.0035 C	0.0018 C	3.2 C	0.35 C		
Molinate	2212671	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Molybdenum	7439987	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Monochloramine	10599903	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Naled	300765	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
2-Naphthylamine	91598			1.30e+02 E			0.00052 C	0.00005 C	0.00002 C	0.044 C	0.0049 C		
Napropamide	15299997	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Nickel refinery dust					8.40E-01 I			0.0075 C					
Nickel and compounds	7440020	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N	6900 E	21 E
Nickel subsulfide	12035722				1.70E+00 I			0.0037 C					
Nitrapyrin	1929824	1.50E-03 W					55 N	5.5 N	2 N	3100 N	120 N		
Nitrate	14797558	1.60E+00 I					58000 N	5800 N	2200 N	1E+06 N	130000 N		
Nitric Oxide	10102439	1.00E-01 W					3700 N	370 N	140 N	200000 N	7800 N		
Nitrite	14797650	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
2-Nitroaniline	88744	6.00E-05 W	5.71E-05 H				2.2 N	0.21 N	0.081 N	120 N	4.7 N		
3-Nitroaniline	99092	3.00E-03 O					110 N	11 N	4.1 N	6100 N	230 N		
4-Nitroaniline	100016	3.00E-03 O					110 N	11 N	4.1 N	6100 N	230 N		
Nitrobenzene	98953	5.00E-04 I	5.71E-04 A			☒	3.4 N	2.1 N	0.68 N	1000 N	39 N	110 E	0.09 E
Nitrofurantoin	67209	7.00E-02 H					2600 N	260 N	95 N	140000 N	5500 N		
Nitrofurazone	59870			1.50E+00 H	9.40E+00 H		0.045 C	0.00067 C	0.0021 C	3.8 C	0.43 C		
Nitrogen dioxide	10102440	1.00E+00 W					37000 N	3700 N	1400 N	1E+06 N	78000 N		
Nitroguanidine	556887	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
4-Nitrophenol	100027	6.20E-02 O					2300 N	230 N	84 N	130000 N	4800 N		
2-Nitropropane	79469		5.71E-03 I		9.40E+00 H		210 N	0.00067 C					
N-Nitrosodi-n-butylamine	924163			5.40E+00 I	5.60E+00 I		0.012 C	0.0011 C	0.00058 C	1.1 C	0.12 C		
N-Nitrosodiethanolamine	1116547			2.80E+00 I			0.024 C	0.0022 C	0.0011 C	2 C	0.23 C		
N-Nitrosodiethylamine	55185			1.50E+02 I	1.51E+02 I		0.00045 C	0.00004 C	0.00002 C	0.038 C	0.0043 C		
N-Nitrosodimethylamine	62759			5.10E+01 I	4.90E+01 I		0.0013 C	0.00013 C	0.00006 C	0.11 C	0.013 C		
N-Nitrosodiphenylamine	86306			4.90E-03 I			14 C	1.3 C	0.64 C	1200 C	130 C	29 C	0.2 E
N-Nitroso di-n-propylamine	621647			7.00E+00 I			0.0096 C	0.00089 C	0.00045 C	0.82 C	0.091 C	0.014 C	0.00002 E
N-Nitroso-N-methylethylamine	10595956			2.20E+01 I			0.0031 C	0.00028 C	0.00014 C	0.26 C	0.029 C		
N-Nitrosopyrrolidine	930552			2.10E+00 I	2.13E+00 I		0.032 C	0.0029 C	0.0015 C	2.7 C	0.3 C		
m-Nitrotoluene	99081	1.00E-02 H				☒	61 N	37 N	14 N	20000 N	780 N	460 S	0.42 N
o-Nitrotoluene	88722	1.00E-02 H				☒	61 N	37 N	14 N	20000 N	780 N	460 S	0.42 N
p-Nitrotoluene	99990	1.00E-02 H				☒	61 N	37 N	14 N	20000 N	780 N	460 S	0.42 N
Norflurazon	27314132	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA ECAO Regional Support provisional value O=Other EPA documents

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
NuStar	85509199	7.00E-04 I					26 N	2.6 N	0.95 N	1400 N	55 N		
Octabromodiphenyl ether	32536520	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
Octahydro-1357-tetranitro-1357-tetrazocine	2691410	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Octamethylpyrophosphoramide	152169	2.00E-03 H					73 N	7.3 N	2.7 N	4100 N	160 N		
Oryzalin	19044883	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Oxadiazon	19666309	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Oxamyl	23135220	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Oxyfluorfen	42874033	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
Paclobutrazol	76738620	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Paraquat	1910425	4.50E-03 I					160 N	16 N	6.1 N	9200 N	350 N		
Parathion	56382	6.00E-03 H					220 N	22 N	8.1 N	12000 N	470 N	110 S	3.9 N
Pebulate	1114712	5.00E-02 H					1800 N	180 N	68 N	100000 N	3900 N		
Pendimethalin	40487421	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		
Pentabromo-6-chloro cyclohexane	87843			2.30E-02 H			2.9 C	0.27 C	0.14 C	250 C	28 C		
Pentabromodiphenyl ether	32534819	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Pentachlorobenzene	608935	8.00E-04 I				☒	4.9 N	2.9 N	1.1 N	1600 N	63 N	570 N	48 N
Pentachloronitrobenzene	82688	3.00E-03 I		2.60E-01 H		☒	0.041 C	0.024 C	0.012 C	22 C	2.5 C		
Pentachlorophenol	87865	3.00E-02 I		1.20E-01 I			0.56 C	0.052 C	0.026 C	48 C	5.3 C	7.9 C	0.2 E
Permethrin	52645531	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Phenmedipham	13684634	2.50E-01 I					9100 N	910 N	340 N	510000 N	20000 N		
Phenol	108952	6.00E-01 I					22000 N	2200 N	810 N	1E+06 N	47000 N	21000 S	49 E
m-Phenylenediamine	108452	6.00E-03 I					220 N	22 N	8.1 N	12000 N	470 N		
p-Phenylenediamine	106503	1.90E-01 H					6900 N	690 N	260 N	390000 N	15000 N		
Phenylmercuric acetate	62384	8.00E-05 I					2.9 N	0.29 N	0.11 N	160 N	6.3 N		
2-Phenylphenol	90437			1.94E-03 H			35 C	3.2 C	1.6 C	3000 C	330 C		
Phorate	298022	2.00E-04 H					7.3 N	0.73 N	0.27 N	410 N	16 N		
Phosmet	732116	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Phosphine	7803512	3.00E-04 I	8.57E-06 H				11 N	0.031 N	0.41 N	610 N	23 N		
Phosphorus (white)	7723140	2.00E-05 I					0.73 N	0.073 N	0.027 N	41 N	1.6 N		
p-Phthalic acid	100210	1.00E+00 H					37000 N	3700 N	1400 N	1E+06 N	78000 N		
Phthalic anhydride	85449	2.00E+00 I	3.43E-02 H				73000 N	130 N	2700 N	1E+06 N	160000 N		
Picloram	1918021	7.00E-02 I					2600 N	260 N	95 N	140000 N	5500 N		
Pirimiphos-methyl	29232937	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
Polybrominated biphenyls		7.00E-06 H		8.90E+00 H			0.0076 C	0.0007 C	0.00035 C	0.64 C	0.072 C		
Polychlorinated biphenyls (PCBs)	1336363			7.70E+00 I			0.0087 C	0.00081 C	0.00041 C	0.74 C	0.083 C		8.2 E
Aroclor 1016	12674112	7.00E-05 I					2.6 N	0.26 N	0.095 N	140 N	5.5 N		
Aroclor 1254	11097691	2.00E-05 I					0.73 N	0.073 N	0.027 N	41 N	1.6 N		
Polychlorinated terphenyls (PCTs)				4.50E+00 E			0.015 C	0.0014 C	0.0007 C	1.3 C	0.14 C		
Polynuclear aromatic hydrocarbons													
Acenaphthene	83329	6.00E-02 I					2200 N	220 N	81 N	120000 N	4700 N	120 S	200 E
Anthracene	120127	3.00E-01 I					11000 N	1100 N	410 N	610000 N	23000 N	6.8 S	4300 E
Benz[a]anthracene	56553			7.30E-01 E	6.10E-01 E		0.092 C	0.01 C	0.0043 C	7.8 C	0.88 C	27 S	0.7 E

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA ECAO Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Benzo[b]fluoranthene	205992			7.30E-01 E	6.10E-01 E		0.092 C	0.01 C	0.0043 C	7.8 C	0.88 C	23 S	4 E
Benzo[k]fluoranthene	207089			7.30E-02 E	6.10E-02 E		0.92 C	0.1 C	0.043 C	78 C	8.8 C		4 E
Benzo[a]pyrene	50328			7.30E+00 I	6.10E+00 W		0.0092 C	0.001 C	0.00043 C	0.78 C	0.088 C	11 S	4 E
Carbazole	86748			2.00E-02 H			3.4 C	0.31 C	0.16 C	290 C	32 C	11 S	0.5 E
Chrysene	218019			7.30E-03 E	6.10E-03 E		9.2 C	1 C	0.43 C	780 C	88 C	3.6 S	1 E
Dibenz[ah]anthracene	53703			7.30E+00 E	6.10E+00 E		0.0092 C	0.001 C	0.00043 C	0.78 C	0.088 C	7.2 S	11 E
Fluoranthene	206440	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N	68 S	980 E
Fluorene	86737	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N	89 S	160 E
Indeno[1,2,3-cd]pyrene	193395			7.30E-01 E	6.10E-01 E		0.092 C	0.01 C	0.0043 C	7.8 C	0.88 C	280 S	35 E
Naphthalene	91203	4.00E-02 W					1500 N	150 N	54 N	82000 N	3100 N	180 S	30 E
Pyrene	129000	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N	56 S	1400 E
Prochloraz	67747095	9.00E-03 I		1.50E-01 I			0.45 C	0.042 C	0.021 C	38 C	4.3 C		
Profluralin	26399360	6.00E-03 H					220 N	22 N	8.1 N	12000 N	470 N		
Prometon	1610180	1.50E-02 I					550 N	55 N	20 N	31000 N	1200 N		
Prometryn	7287196	4.00E-03 I					150 N	15 N	5.4 N	8200 N	310 N		
Pronamide	23950585	7.50E-02 I					2700 N	270 N	100 N	150000 N	5900 N		
Propachlor	1918167	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Propanil	709988	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Propargite	2312358	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Propargyl alcohol	107197	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Propazine	139402	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Propham	122429	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Propiconazole	60207901	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Propylene glycol	57556	2.00E+01 H					730000 N	73000 N	27000 N	1E+06 N	1000000 N		
Propylene glycol, monoethyl ether	52125538	7.00E-01 H					26000 N	2600 N	950 N	1E+06 N	55000 N		
Propylene glycol, monomethyl ether	107982	7.00E-01 H	5.71E-01 I				26000 N	2100 N	950 N	1E+06 N	55000 N		
Propylene oxide	75569		8.57E-03 I	2.40E-01 I	1.29E-02 I		0.28 C	0.49 C	0.013 C	24 C	2.7 C		
Pursuit	81335775	2.50E-01 I					9100 N	910 N	340 N	510000 N	20000 N		
Pydrin	51630581	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Pyridine	110861	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Quinalphos	13593038	5.00E-04 I					18 N	1.8 N	0.68 N	1000 N	39 N		
Quinoline	91225			1.20E+01 H			0.0056 C	0.00052 C	0.00026 C	0.48 C	0.053 C		
Resmethrin	10463868	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
Ronnel	299843	5.00E-02 H					1800 N	180 N	68 N	100000 N	3900 N		
Rotenone	83794	4.00E-03 I					150 N	15 N	5.4 N	8200 N	310 N		
Savey	78587050	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Selenious Acid	7783008	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Selenium	7782492	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Selenourea	630104	5.00E-03 H					180 N	18 N	6.8 N	10000 N	390 N		3 E
Sethoxydim	74051802	9.00E-02 I					3300 N	330 N	120 N	180000 N	7000 N		
Silver and compounds	7440224	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Simazine	122349	5.00E-03 I		1.20E-01 H			0.56 C	0.052 C	0.026 C	48 C	5.3 C		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA-ECAO Regional Support provisional value O=Other EPA documents

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Sodium azide	26628228	4.00E-03 I					150 N	15 N	5.4 N	8200 N	310 N		
Sodium diethyldithiocarbamate	148185	3.00E-02 I		2.70E-01 H			0.25 C	0.023 C	0.012 C	21 C	2.4 C		
Sodium fluoroacetate	62748	2.00E-05 I					0.73 N	0.073 N	0.027 N	41 N	1.6 N		
Sodium metavanadate	13718268	1.00E-03 H					37 N	3.7 N	1.4 N	2000 N	78 N		
Strontium, stable	7440246	6.00E-01 I					22000 N	2200 N	810 N	1E+06 N	47000 N		
Strychnine	57249	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N		
Styrene	100425	2.00E-01 I	2.86E-01 I			☒	1600 N	1000 N	270 N	410000 N	16000 N	1400 E	2 E
Systhane	88671890	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
2,3,7,8-TCDD (dioxin)	1746016			1.56E+05 H	1.16E+05 H		4E-07 C	5E-08 C	C	4E-05 C	4E-06 C		
Tebuthiuron	34014181	7.00E-02 I					2600 N	260 N	95 N	140000 N	5500 N		
Temephos	3383968	2.00E-02 H					730 N	73 N	27 N	41000 N	1600 N		
Terbacil	5902512	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Terbufos	13071799	2.50E-05 H					0.91 N	0.091 N	0.034 N	51 N	2 N		
Terbutryn	886500	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
1,2,4,5-Tetrachlorobenzene	95943	3.00E-04 I				☒	1.8 N	1.1 N	0.41 N	610 N	23 N	91 N	0.69 N
1,1,1,2-Tetrachloroethane	630206	3.00E-02 I		2.60E-02 I	2.59E-02 I	☒	0.41 C	0.24 C	0.12 C	220 C	25 C		
1,1,2,2-Tetrachloroethane	79345			2.00E-01 I	2.03E-01 I	☒	0.052 C	0.031 C	0.016 C	29 C	3.2 C	0.4 E	0.001 E
Tetrachloroethylene (PCE)	127184	1.00E-02 I		5.20E-02 E	2.03E-03 E	☒	1.1 C	3.1 C	0.061 C	110 C	12 C	11 E	0.04 E
2,3,4,6-Tetrachlorophenol	58902	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
p,a,a,a-Tetrachlorotoluene	5216251			2.00E+01 H		☒	0.00053 C	0.00031 C	0.00016 C	0.29 C	0.032 C		
Tetrachlorovinphos	961115	3.00E-02 I		2.40E-02 H			2.8 C	0.26 C	0.13 C	240 C	27 C		
Tetraethyldithiopyrophosphate	3689245	5.00E-04 I					18 N	1.8 N	0.68 N	1000 N	39 N		
Lead (tetraethyl)	78002	1.00E-07 I					0.0037 N	0.00037 N	0.00014 N	0.2 N	0.0078 N	0.00068 N	0.000034 N
Thallic oxide	1314325	7.00E-05 W					2.6 N	0.26 N	0.095 N	140 N	5.5 N		
Thallium													0.4 E
Thallium acetate	563688	9.00E-05 I					3.3 N	0.33 N	0.12 N	180 N	7 N		
Thallium carbonate	6533739	8.00E-05 I					2.9 N	0.29 N	0.11 N	160 N	6.3 N		
Thallium chloride	7791120	8.00E-05 I					2.9 N	0.29 N	0.11 N	160 N	6.3 N		
Thallium nitrate	10102451	9.00E-05 I					3.3 N	0.33 N	0.12 N	180 N	7 N		
Thallium selenite	12039520	9.00E-05 W					3.3 N	0.33 N	0.12 N	180 N	7 N		
Thallium sulfate	7446186	8.00E-05 I					2.9 N	0.29 N	0.11 N	160 N	6.3 N		
Thiobencarb	28249776	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
2-(Thiocyanomethylthio)-benzothiazole	21564170	3.00E-02 H					1100 N	110 N	41 N	61000 N	2300 N		
Thiofanox	39196184	3.00E-04 H					11 N	1.1 N	0.41 N	610 N	23 N		
Thiophanate-methyl	23564058	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N		
Thiram	137268	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Tin and compounds		6.00E-01 H					22000 N	2200 N	810 N	1E+06 N	47000 N		
Toluene	108883	2.00E-01 I	1.14E-01 I			☒	750 N	420 N	270 N	410000 N	16000 N	520 E	5 E
Toluene-2,4-diamine	95807			3.20E+00 H			0.021 C	0.002 C	0.00099 C	1.8 C	0.2 C		
Toluene-2,5-diamine	95705	6.00E-01 H					22000 N	2200 N	810 N	1E+06 N	47000 N		
Toluene-2,6-diamine	823405	2.00E-01 H					7300 N	730 N	270 N	410000 N	16000 N		
p-Toluidine	106490			1.90E-01 H			0.35 C	0.033 C	0.017 C	30 C	3.4 C		

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST
E=EPA ECAO Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects
E=EPA draft Soil Screening Level S=soil saturation concentration.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Toxaphene	8001352			1.10E+00 I	1.12E+00 I		0.061 C	0.0056 C	0.0029 C	5.2 C	0.58 C	5 E	0.04 E
Tralomethrin	66841256	7.50E-03 I					270 N	27 N	10 N	15000 N	590 N		
Triallate	2303175	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Triasulfuron	82097505	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
1,2,4-Tribromobenzene	615543	5.00E-03 I				X	30 N	18 N	6.8 N	10000 N	390 N		
Tributyltin oxide (TBTO)	56359	3.00E-05 I					1.1 N	0.11 N	0.041 N	61 N	2.3 N		
2,4,6-Trichloroaniline hydrochloride	33663502			2.90E-02 H			2.3 C	0.22 C	0.11 C	200 C	22 C		
2,4,6-Trichloroaniline	634935			3.40E-02 H			2 C	0.18 C	0.093 C	170 C	19 C		
1,2,4-Trichlorobenzene	120821	1.00E-02 I	5.71e-02 H			X	190 N	210 N	14 N	20000 N	780 N	240 E	2 E
1,1,1-Trichloroethane	71556	9.00E-02 W	2.86E-01 W			X	1300 N	1000 N	120 N	180000 N	7000 N	980 E	0.9 E
1,1,2-Trichloroethane	79005	4.00E-03 I		5.70E-02 I	5.60E-02 I	X	0.19 C	0.11 C	0.055 C	100 C	11 C	0.8 E	0.01 E
Trichloroethylene (TCE)	79016	6.00E-03 E		1.10E-02 W	6.00E-03 E	X	1.6 C	1 C	0.29 C	520 C	58 C	3 E	0.02 E
Trichlorofluoromethane	75694	3.00E-01 I	2.00E-01 A			X	1300 N	730 N	410 N	610000 N	23000 N	790 N	13 N
2,4,5-Trichlorophenol	95954	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N	8200 S	120 E
2,4,6-Trichlorophenol	88062			1.10E-02 I	1.09E-02 I		6.1 C	0.57 C	0.29 C	520 C	58 C	150 C	0.05 E
2,4,5-Trichlorophenoxyacetic acid	93765	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
2-(2,4,5-Trichlorophenoxy)propionic acid	93721	8.00E-03 I					290 N	29 N	11 N	16000 N	630 N		
1,1,2-Trichloropropane	598776	5.00E-03 I				X	30 N	18 N	6.8 N	10000 N	390 N	13 N	0.14 N
1,2,3-Trichloropropane	96184	6.00E-03 I		7.00e+00 I		X	0.0015 C	0.00089 C	0.00045 C	0.82 C	0.091 C	0.00003 C	6.000E-06 C
1,2,3-Trichloropropene	96195	5.00E-03 H				X	30 N	18 N	6.8 N	10000 N	390 N		
1,1,2-Trichloro-1,2,2- trifluoroethane	76131	3.00E+01 I	8.57E+00 H			X	59000 N	31000 N	41000 N	1E+06 N	1000000 N	2400 S	3100 N
Tridiphane	58138082	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
Triethylamine	121448		2.00E-03 I				73 N	7.3 N					
Trifluralin	1582098	7.50E-03 I		7.70E-03 I			8.7 C	0.81 C	0.41 C	740 C	83 C		
1,2,4-Trimethylbenzene	95636	5.00e-04 E				X	3 N	1.8 N	0.68 N	1000 N	39 N		
1,3,5-Trimethylbenzene	108678	4.00e-04 E				X	2.4 N	1.5 N	0.54 N	820 N	31 N	6.8 N	0.26 N
Trimethyl phosphate	512561			3.70E-02 H			1.8 C	0.17 C	0.085 C	150 C	17 C		
1,3,5-Trinitrobenzene	99354	5.00E-05 I					1.8 N	0.18 N	0.068 N	100 N	3.9 N		
Trinitrophenylmethylnitramine	479458	1.00E-02 H					370 N	37 N	14 N	20000 N	780 N		
2,4,6-Trinitrotoluene	118967	5.00E-04 I		3.00E-02 I			2.2 C	0.21 C	0.11 C	190 C	21 C		
Uranium (soluble salts)	7440611	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
Vanadium	7440622	7.00E-03 H					260 N	26 N	9.5 N	14000 N	550 N		
Vanadium pentoxide	1314621	9.00E-03 I					330 N	33 N	12 N	18000 N	700 N		
Vanadium sulfate	36907423	2.00E-02 H					730 N	73 N	27 N	41000 N	1600 N		
Vernam	1929777	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Vinclozolin	50471448	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Vinyl acetate	108054	1.00E+00 H	5.71E-02 I				37000 N	210 N	1400 N	1E+06 N	78000 N	370 E	84 E
Vinyl bromide	593602		8.57E-04 I			X	5.2 N	3.1 N				2 N	0.018 N
Vinyl chloride	75014			1.90E+00 H	3.00E-01 H	X	0.019 C	0.021 C	0.0017 C	3 C	0.34 C	0.002 E	0.01 E
Warfarin	81812	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N		
m-Xylene	108323	2.00E+00 H	2.00E-01 W			X	1400 N	730 N	2700 N	1E+06 N	160000 N	950 S	240 N
o-Xylene	95476	2.00E+00 H	2.00E-01 W			X	1400 N	730 N	2700 N	1E+06 N	160000 N	730 S	150 N

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST
E=EPA ECAO Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects
E=EPA draft Soil Screening Level S=soil saturation concentration.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
p-Xylene	106423		8.57E-02 w			☒	520 N	310 N				1000 S	220 N
Xylene (mixed)	1330207	2.00E+00 I				☒	12000 N	7300 N	2700 N	1E+06 N	160000 N	320 E	74 E
Zinc	7440666	3.00E-01 I					11000 N	1100 N	410 N	610000 N	23000 N		42000 E
Zinc phosphide	1314847	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N		
Zineb	12122677	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		

NOAA

Quick Reference Cards

NOAA Screening Guidelines for Inorganics

(all values in ppb)

These tables are for screening purposes for internal use only; they do not represent official NOAA policy and do not constitute criteria or clean-up levels. All attempts have been made to ensure accuracy, however, NOAA is not liable for errors. Numbers are subject to change as new data become available.

TRACE ELEMENT	WATER					SEDIMENT							SOIL			
	Maximum Contaminant Levels (MCL)	Ambient Water Quality Criteria [1] Freshwater acute	Freshwater chronic	Marine acute	Marine chronic	Effects Range-Low (ER-L)	Effects Range-Median (ER-M)	Overall Apparent Effects Threshold (OAET)	Threshold Effects Level (TEL)	Probable Effects Level (PEL)	Apparent Effects Threshold (AET) [2]	Status & Trends "High"	U.S.G.S. Mean Background	U.S.G.S. Range	Canadian Criteria Background	Canadian Criteria Recreational Agricultural Residential Target [3]
ALUMINUM	20												4.7 %	0.5% - > 10		
ANTIMONY	6	p88	p30	p1500	p500			25000			B 150000	21000	480	bd - 8800		
ARSENIC +3		360	190	69	36										≤ 5000	≤ 30000
ARSENIC +5		* 850		* 2319											< 5000	< 30000
ARSENIC, total	50					8200	70000	50000	7240	41600	B 57000	13000	5200	bd - 97000	5000	30000
BARIUM	2000												440000	10 - 500000	200000	500000
BERYLLIUM	4	*130	*5.3										630	bd - 15000		
CADMIUM	5	3.9+	1.1+	43	9.3	1200	9600	5000	676	4210	B 5100	540			1000	5000
CHROMIUM +3	100	+1700	+210	*10300		≤ 81000	≤ 370000		≤ 52800	<160400					≤ 20000	≤ 250000
CHROMIUM +6	100	16	11	1100	50	< 81000	< 370000		< 52800	<160400					< 20000	< 250000
CHROMIUM, total	100					81000	370000		52300	160400	B 280000	120000	37000	1000 - 200000	20000	250000
COBALT													6700	bd - 70000	15000	50000
COPPER	p1300	18+	12+	2.9		34000	270000	300000	18700	108200	O 390000	42000	17000	bd - 700000	30000	100000
IRON	300		1000										1.8 %	0.01% - > 10		
LEAD	p15	83+	8.5+	220	8.5	46700	218000	200000	30240	112180	B 480000	46000	16000	bd - 700000	50000	500000
MAGNESIUM													0.44 %	bd - > 10 %		
MANGANESE	50												330000	bd - 7000		
MERCURY	2	2.4	0.012	2.1	0.025	150	710	1000	130	696	M 410	220	58	bd - 4600	100	2000
MOLYBDENUM													590	bd - 15000	4000	10000
NICKEL	100	1400+	160+	75	8.3	20900	51600		15900	42800	B > 140000	42000	13000	bd - 700000	20000	100000
PHOSPHORUS					0.1								250000	bd - 6800000		
SELENIUM	50	20	5	300	71							920	280	bd - 4300	2000	3000

1 p - proposed; * - Lowest Observable Effect Level; + - value is dependent on hardness; pH - value is dependent on pH

2 Entry is lowest value among four AET tests; A - Amphipod bioassay, B - Benthic community impacts, M - Microtox bioassay, O - Oyster larvae bioassay

3 Soil with residues greater than target, require remediation for recreational, agricultural, or residential use in British Columbia, Canada

NOAA

Quick Reference Cards

NOAA Screening Guidelines for Inorganics

These tables are for screening purposes for internal use only: they do not represent official NOAA policy and do not constitute criteria or clean-up levels. All attempts have been made to ensure accuracy, however, NOAA is not liable for errors. Numbers are subject to change as new data become available.

TRACE ELEMENT	WATER					SEDIMENT							SOIL			
	Maximum Contaminant Levels (MCL)	Ambient Water Quality Criteria [1] Freshwater acute	Freshwater chronic	Marine acute	Marine chronic	Effects Range-Low (ER-L)	Effects Range-Median (ER-M)	Overall Apparent Effects Threshold (OAET)	Threshold Effects Level (TEL)	Probable Effects Level (PEL)	Apparent Effects Threshold (AET) [2]	Status & Trends "high"	U.S.G.S. Mean Back-ground	U.S.G.S. Range	Canadian Criteria Back-ground	Canadian Criteria Recreational Agricultural Residential Target [3]
SILVER	100	4.1+/ p0.92	0.12	2.3/ p7.2	p.92	1000	3700	1700	733	1770	A 6100	520			2000	20000
STRONTIUM													120000	bd - 3000000		
THALLIUM	2	*1400	*40	*2130												
THORIUM													8600	2200 - 31000		
TIN												4000	890	bd - 10000	5000	50000
URANIUM													2300	290 - 11000		
VANADIUM													58000	bd - 500000		
ZINC	5000	120+	110+	95	86	150000	410000	260000	124000	271000	B 410000	135000	48000	bd - 2900000	80000	500000
CYANIDE	200	22	5.2	1											5000	50000

Sources:

Water: US EPA, Quality Criteria for Water 1992

Sediment: Long and Morgan, 1990; Tech Memo NOS OMA 52
Sediment Classification Methods Compendium; September 1992; EPA 823-R-92-006
The Apparent Effects Threshold Approach; Briefing Report to the EPA Science Advisory Board; September 1988
Daskalakis O'Connor, 1994; Tech Memo NOS ORCA 76

Soil: Shacklette and Boerngen, 1984; USGS Professional Paper 1270
Ministry of Environment, 1989; Criteria for Managing Contaminated Sites in British columbia

For More Information contact:

Michael Buchman
NOAA/Hazmat
7600 Sand Point Way N.E.
Seattle, Washington 98115 - 0070
Tel: 206-526-6340 Fax: 206-526-6941
Internet: BUCHMAN@HAZMAT.NOAA.GOV

1 p - proposed; * - Lowest Observable Effect Level; + - value is dependent on hardness; pH - value is dependent on pH
2 Entry is lowest value among four AET tests; A - Amphipod bioassay, B - Benthic community impacts, M - Microtox bioassay, O - Oyster larvae bioassay
3 Soil with residues greater than target, require remediation for recreational, agricultural, or residential use in British Columbia, Canada

NOAA

Quick Reference Cards

NOAA Screening Guidelines for Organics

(all values in ppb)

These tables are for screening purposes for internal use only; they do not represent official NOAA policy and do not constitute criteria or clean-up levels. All attempts have been made to ensure accuracy, however, NOAA is not liable for errors. Numbers are subject to changes as new data become available.

CHEMICAL	CAS No.	WATER: Maximum Contaminant Levels (MCL)	WATER: Ambient Water Quality Criteria 1 — Freshwater acute	WATER: Freshwater chronic	WATER: Marine acute	WATER: Marine chronic	SEDIMENT: Effects Range-Low (ER-L)	SEDIMENT: Effects Range-Median (ER-M)	SEDIMENT: Overall Apparent Effects Threshold (OAET)	SEDIMENT: Threshold Effects Level (TEL)	SEDIMENT: Probable Effects Level (PEL)	SEDIMENT: Apparent Effects Threshold (AET) 2	SOIL: Canadian Criteria — Background	SOIL: Canadian Criteria — Recreational Agricultural Residential Target 3
CHLORINATED DIOXINS & PCBS														
TCDD 2,3,7,8-	1746016	3 E-09	*< 0.01	*< 0.00001										
POLYCHLORINATED BIPHENYLS	1336363	0.5	2	0.014	10	0.03	22.7	180	370	21.55	188.79	M 130	100	5000
SEMI-VOLATILES														
BENZIDINE	92875		* 2500											
BENZOIC ACID	65850											OBM 650		
BENZYL ALCOHOL	100516											M 57		
CHLOROANILINE 4-	106478				* 29700									
DIBENZOFURAN	132649											OM 540		
DIPHENYLHYDRAZINE 1,2-	122667		* 270											
ISOPHORONE	78591		* 117000		* 12900									
SEMI-VOLATILE, NITROAROMATICS														
DINITROTOLUENE 2,4-	121142		* 330	* 230	* 590 S	* 370 S								
NITROBENZENE	98953		* 27000		* 6680									
N-NITROSODIPHENYLAMINE	86306		* 5850 C		* 3300000 C							B 28		
SEMI-VOLATILE, ORGANOCHLORINES														
ALDRIN	309002		3		1.3								< 100	< 2000
CHLORDANE	57749	2	2.4	0.0043	0.09	0.004			2	2.26	4.79		< 100	< 2000
CHLORONAPHTHALENE 2-	91587		* 1600 C		* 7.5 C									
DDD	72548		* 0.6		* 3.6					< 1.22	<7.81	B < 16	< 100	< 2000
DDE	72559		* 1050		* 14		2.2	27		< 2.07	<374.17	B < 9	< 100	< 2000
DDT	50293		1.1	0.001	0.13	0.001			6	< 1.19	<4.77	B < 34	< 100	< 2000
DDT, total							1.58	46.1		3.89	51.7			
DIELDRIN	60571		2.5	0.0019	0.71	0.0019				0.715	4.3		< 100	< 2000
ENDOSULFAN	115297		0.22	0.056	0.034	0.0087								
ENDOSULFAN ALPHA -	959988		0.22	0.056	0.034	0.0087								
ENDOSULFAN BETA -	33213659		0.22	0.056	0.034	0.0087								

1 p - proposed; * - Lowest Observable Effect Level; + - value is dependant on hardness; pH - value is dependant on pH; C - value for chemical class; S - value for the summation of all isomers

2 Entry is lowest value among four AET tests; A - Amphipod bioassay, B - Benthic community impacts, M - Microtox bioassay, O - Oyster larvae bioassay

3 Soil with residues greater than target, require remediation for recreational, agricultural, or residential use in British Columbia, Canada

NOAA

Quick Reference Cards

NOAA Screening Guidelines for Organics

These tables are for screening purposes for internal use only; they do not represent official NOAA policy and do not constitute criteria or clean-up levels. All attempts have been made to ensure accuracy, however, NOAA is not liable for errors. Numbers are subject to changes as new data become available.

CHEMICAL	CAS NO.	WATER: Maximum Contaminant Levels (MCL)	WATER: Ambient Water Quality Criteria[1] Freshwater acute	Freshwater chronic	Marine acute	Marine chronic	SEDIMENT: Effects Range-Low (ER-L)	Effects Range-Median (ER-M)	Overall Apparent Effects Threshold (OAET)	Threshold Effects Level (TEL)	Probable Effects Level (PEL)	Apparent Effects Threshold (AET)[2]	SOIL: Canadian Criteria Back-ground	Recreational Agricultural Residential Target[3]
ENDRIN	72208	2	0.18	0.0023	0.037	0.0023							< 100	< 2000
HEPTACHLOR	76448	0.4	0.52	0.0038	0.053	0.0038								
HEPTACHLOR EPOXIDE	1024573	0.2	0.52	0.0038	0.053	0.0038							< 100	< 2000
HEXACHLOROBENZENE	118741	1	p6	p3.68	* 160 C	* 129 C						B 22	100	2000
HEXACHLOROBUTADIENE	87683		* 90	* 9.3	* 32							B 11		
HEXACHLOROCYCLOHEXANE	608731		* 100		* 0.34									
HEXACHLOROCYCLOPENTADIENE	77474	p 8	* 7	* 5.2	* 7									
HEXACHLOROETHANE	67721		* 980	* 540	* 940									
LINDANE	58899	0.2	2	0.08	0.16					0.32	.99		< 100	< 2000
METHOXYCHLOR	72435	40		0.03		0.03							< 100	< 2000
MIREX	2385855			0.001		0.001								
PENTACHLOROBENZENE	608935		* 250 C	* 50 C	* 160 C	* 129 C							100	2000
TETRACHLOROBENZENE 1,2,4,5-	95943		* 250 C	* 50 C	* 160 C	* 129 C							100	2000
TOXAPHENE	8001352	3	0.073	0.0002	0.21	0.0002								
SEMI-VOLATILE, ORGANOPHOSPHATES														
CHLORPYRIFOS	2921882		0.083	0.041	0.011	0.0056								
MALATHION	121755			0.1		0.1								
PARATHION MIXTURE	56382		0.065	0.013								M 31		
SEMI-VOLATILE, PHENOLICS														
CHLOROPHENOL 2-	95578		* 4380										100	500
DICHLOROPHENOL 2,4-	120832		* 2020	* 365									100	500
DICHLOROPHENOL 2,6-	87650												100	500
DIMETHYLPHENOL 2,4-	105679		* 2120									OM 29	100	500
DINITROPHENOL	51285		* 230 C	* 150 C	* 4850 C								100	1000
METHYL PHENOL 2- [O-CRESOL]	95487											OA 63	100	1000
METHYL PHENOL 4- [p-CRESOL]	106445											OM 670	100	1000
NITROPHENOL 4-	100027		* 230 C	* 150 C	* 4850 C								100	1000

1 p - proposed; * - Lowest Observable Effect Level; + - value is dependent on hardness; pH - value is dependent on pH; C - value for chemical class; S - value for the summation of all isomers

2 Entry is lowest value among four AET tests; A - Amphipod bioassay, B - Benthic community impacts, M - Microtox bioassay, O - Oyster larvae bioassay

3 Soil with residues greater than target, require remediation for recreational, agricultural, or residential use in British Columbia, Canada

NOAA

Quick Reference Cards

NOAA Screening Guidelines for Organics

These tables are for screening purposes for internal use only; they do not represent official NOAA policy and do not constitute criteria or clean-up levels. All attempts have been made to ensure accuracy, however, NOAA is not liable for errors. Numbers are subject to changes as new data become available.

CHEMICAL	CAS NO.	WATER: Maximum Contaminant Levels (MCL)	WATER: Ambient Water Quality Criteria[1] Freshwater acute	WATER: Freshwater chronic	WATER: Marine acute	WATER: Marine chronic	SEDIMENT: Effects Range-Low (ER-L)	SEDIMENT: Effects Range-Median (ER-M)	SEDIMENT: Overall Apparent Effects Threshold (OAET)	SEDIMENT: Threshold Effects Level (TEL)	SEDIMENT: Probable Effects Level (PEL)	SEDIMENT: Apparent Effects Threshold (AET)[2]	SOIL: Canadian Criteria Background	SOIL: Canadian Criteria Recreational Agricultural Residential Target[3]
PENTACHLOROPHENOL	87865	p 1.0	20 pH	13 pH	13	7.9						A 360	100	500
PHENOL	108952		* 10200	* 2560	* 5800							O 420	100	1000
TETRACHLOROPHENOL 2,3,4,6-	58902												100	500
TRICHLOROPHENOL 2,4,5-	95954		p100	p63	p240	p11							100	500
TRICHLOROPHENOL 2,4,6-	88062			* 970									100	500
SEMI-VOLATILE, PHTHALATES														
BUTYL BENZYL PHTHALATE	85687	100	* 940 C	* 3 C	* 2944 C	* 3.4 C						M 63		
DI(2-ETHYLHEXYL) PHTHALATE	117817	6	p400	p360	p400	p360				182.16	2846.51	B 1300		
DIETHYL PHTHALATE	84662		* 940 C	* 3 C	* 2944 C	* 3.4 C						B 200		
DIMETHYL PHTHALATE	131113		* 940 C	* 3 C	* 2944 C	* 3.4 C						M 71		
DIOCTYL PHTHALATE	117840		* 940 C	* 3 C	* 2944 C	* 3.4 C						B 6200		
N-BUTYL PHTHALATE	84742		* 940 C	* 3 C	* 2944 C	* 3.4 C						AOM 1400		
SEMI-VOLATILE, PAHS														
ACENAPHTHENE	83329		* 1700	* 520	* 970	* 710	16	500	150	6.71	88.9	OM 500	100	10000
ACENAPHTHYLENE	208968				* 300 C		44	640		5.87	127.87	AB 1300	100	10000
ANTHRACENE	120127				* 300 C		85.3	1100	300	46.85	245	OM 960	100	10000
BENZO(K)FLUORANTHENE	207089	0.2			* 300 C							M 3200	100	1000
BENZO-A-PYRENE	50328	0.2			* 300 C		430	1600	700	88.81	763.22	OM 1600	100	1000
BENZO[B]FLUORANTHENE	205992	0.2			* 300 C							M 3200	100	1000
BENZO[GHI]PERYLENE	191242				* 300 C							M 670	100	1000
BENZ[A]ANTHRACENE	56553	0.1			* 300 C		261	1600	550	74.83	692.53	M 1300	100	1000
CHRYSENE	218019	0.2			* 300 C		384	2800	900	107.77	845.98	M 1400	100	1000
DIBENZ[A,H]ANTHRACENE	53703	0.3			* 300 C		63.4	260	100	6.22	134.61	OM 230	100	1000
FLUORANTHENE	206440		* 3980		* 40	* 16	600	5100	1000	112.82	1493.54	M 1700	100	10000
FLUORENE	86737				* 300 C		19	540	350	21.17	144.35	OM 540	100	10000
INDENO(1,2,3-CD)PYRENE	193395	0.4			* 300 C							M 600	100	1000
METHYLNAPHTHALENE, 2-	91576				* 300 C		70	670	300	20.21	201.28	OM 670		

1 p - proposed; * - Lowest Observable Effect Level; + - value is dependent on hardness; pH - value is dependent on pH; C - value for chemical class; S - value for the summation of all isomers

2 Entry is lowest value among four AET tests; A - Amphipod bioassay, B - Benthic community impacts, M - Microtox bioassay, O - Oyster larvae bioassay

3 Soil with residues greater than target, require remediation for recreational, agricultural, or residential use in British Columbia, Canada

NOAA

Quick Reference Cards

NOAA Screening Guidelines for Organics

These tables are for screening purposes for internal use only; they do not represent official NOAA policy and do not constitute criteria or clean-up levels. All attempts have been made to ensure accuracy, however, NOAA is not liable for errors. Numbers are subject to changes as new data become available.

CHEMICAL	CAS NO.	WATER: Maximum Contaminant Levels (MCL)	WATER: Ambient Water Quality Criteria[1] Freshwater acute	WATER: Freshwater chronic	WATER: Marine acute	WATER: Marine chronic	SEDIMENT: Effects Range-Low (ER-L)	SEDIMENT: Effects Range-Median (ER-M)	SEDIMENT: Overall Apparent Effects Threshold (OAET)	SEDIMENT: Threshold Effects Level (TEL)	SEDIMENT: Probable Effects Level (PEL)	SEDIMENT: Apparent Effects Threshold (AET)[2]	SOIL: Canadian Criteria Back-ground	SOIL: Canadian Criteria Recreational Agricultural Residential Target[3]
NAPHTHALENE	91203		* 2300	* 620	* 2350		160	2100	500	34.57	390.84	OM 2100	100	5000
PHENANTHRENE	85018		p30	p6.3	p7.7	p4.6	240	1500	280	86.68	543.53	OM 130	100	5000
PYRENE	129000				* 300 C		665	2600	1000	152.66	1397.6	M 2600	100	10000
LMW PAHs					* 300 C					311.7	1442.00	OM 5200		
HMW PAHs					* 300 C					655.34	6676.14	M 12000		
Total PAHs					* 300 C		4022	44792		1684.06	16770.54		1000	20000
VOLATILE, AROMATIC & HALOGENATED														
BENZENE	71432	5	* 5300		* 5100	* 700							100	500
BIS(2-CHLOROETHOXY)METHANE	111911		*11000 C		* 12000 C	* 6400 C								
CARBON TETRACHLORIDE	56235	5	* 35200		* 50000								< 300	< 5000
CHLOROBENZENE	108907	100	* 250 C	* 50 C	* 160 C	* 129 C							100	1000
CHLORODIBROMOMETHANE	124481		*11000 C		* 12000 C	* 6400 C								
CHLOROFORM	67663	100	* 28900	* 1240									< 300	< 5000
DIBROMOMETHANE	74953		*11000 C		* 12000 C	* 6400 C								
DICHLOROBENZENE 1,2-	95501	600	* 1120 S	* 763 S	* 1970 S	* 129 C						M 35	< 100	< 2000
DICHLOROBENZENE 1,4-	106467	75	* 1120 S	* 763 S	* 1970 S	* 129 C						BM 110	< 100	< 2000
DICHLOROBENZENES	25321226	75-600	* 1120	* 763	* 1970	* 129 C						M 35&110	< 100	< 2000
DICHLOROBROMOMETHANE	75274	100	*11000 C		* 12000 C	* 6400 C								
DICHLORODIFLUOROMETHANE	75718		*11000 C		* 12000 C	* 6400 C								
DICHLOROETHANE 1,1-	75343												< 300	< 5000
DICHLOROETHYLENE 1,2-cis	540590	70	* 11600 S		* 224000 S								< 300	< 5000
DICHLOROETHYLENE 1,2-trans	156605	100	* 11600 S		* 224000 S								< 300	< 5000
DICHLOROPROPENE	542756		* 6060 S	* 244 S	* 790 S								< 300	< 5000
ETHYL BENZENE	100414	700	* 32000		* 430							B 10	100	5000
ETHYLENE DICHLORIDE	107062	5	* 118000	* 20000	* 113000									
METHYLENE CHLORIDE	75092	5											< 300	< 5000
PENTACHLOROETHANE	76017		* 7240	* 1100	* 390	* 281								
PROPYLENE DICHLORIDE	78875	5	* 23000 S	* 5700 S	* 10300 S	* 3040 S							< 300	< 5000

1 p - proposed; * - Lowest Observable Effect Level; + - value is dependent on hardness; pH - value is dependent on pH; C - value for chemical class; S - value for the summation of all isomers

2 Entry is lowest value among four AET tests; A - Amphipod bioassay, B - Benthic community impacts, M - Microtox bioassay, O - Oyster larvae bioassay

3 Soil with residues greater than target, require remediation for recreational, agricultural, or residential use in British Columbia, Canada

NOAA

Quick Reference Cards

NOAA Screening Guidelines for Organics

(all values in ppb)

These tables are for screening purposes for internal use only; they do not represent official NOAA policy and do not constitute criteria or clean-up levels. All attempts have been made to ensure accuracy, however, NOAA is not liable for errors. Numbers are subject to changes as new data become available.

CHEMICAL	CAS NO.	WATER: Maximum Contaminant Levels (MCL)	WATER: Ambient Water Quality Criteria[1] Freshwater acute	WATER: Freshwater chronic	WATER: Marine acute	WATER: Marine chronic	SEDIMENT: Effects Range-Low (ER-L)	SEDIMENT: Effects Range-Median (ER-M)	SEDIMENT: Overall Apparent Effects Threshold (OAET)	SEDIMENT: Threshold Effects Level (TEL)	SEDIMENT: Probable Effects Level (PEL)	SEDIMENT: Apparent Effects Threshold (AET)[2]	SOIL: Canadian Criteria Back-ground	SOIL: Canadian Criteria Recreational Agricultural Residential Target[3]
STYRENE	100425	100											100	5000
TETRACHLOROETHANE	79345		* 9320										< 300	< 5000
TETRACHLOROETHANE 1,1,1,2-	630206		* 9320 S	* 2400	* 9020								< 300	< 5000
TETRACHLOROETHYLENE	127184	5	* 5280	* 840	* 10200	* 450						B 57	< 300	< 5000
TOLUENE	108883	1000	* 17500		* 6300	* 5000							100	3000
TRICHLOROBENZENE 1,2,4-	120821	70	* 250 C	* 50 C	* 160 C	* 129 C						M 31	< 100	< 2000
TRICHLOROETHANE 1,1,1-	71556	200	* 18000 S		* 31200								< 300	< 5000
TRICHLOROETHANE 1,1,2-	79005	5	* 18000 S	* 9400									< 300	< 5000
TRICHLOROETHYLENE	79016	5	* 45000	* 21900	* 2000								< 300	< 5000
TRICHLOROFLUOROMETHANE	75694		* 11000 C		* 12000 C	* 6400 C								
VINYLIDENE CHLORIDE	75354	7	* 11600 S		* 224000 S								300	5000
XYLENE	1330207	10000										B 40	100	5000
XYLENE 1,2-	95476	10000										B < 40	< 100	< 5000
XYLENE 1,3-	108383	10000										B < 40	< 100	< 5000
XYLENE 1,4-	106423	10000										B < 40	< 100	< 5000
VOLATILES, NITRILES														
ACROLEIN	107028		* 68	* 21	* 55									
ACRYLONITRILE	107131		* 7550	* 2600										

Sources:

Water: US EPA, Quality Criteria for Water 1992

Sediment: Long and Morgan, 1990; Tech Memo NOS OMA 52
Sediment Classification Methods Compendium; September 1992; EPA 823-R-92-006
The Apparent Effects Threshold Approach; Briefing Report to the EPA Science Advisory Board; September 1988
Daskalakis O'Connor, 1994; Tech Memo NOS ORCA 76

Soil: Ministry of Environment, 1989; Criteria for Managing Contaminated Sites in British columbia

For More Information contact:

Michael Buchman
NOAA/Hazmat

7600 Sand Point Way N.E.
Seattle, Washington 98115 - 0070
Tel: 206-526-6340
Fax: 206-526-6941
Internet: buchman@hazmat.noaa.gov

1 p - proposed; * - Lowest Observable Effect Level; + - value is dependent on hardness; pH - value is dependent on pH; C - value for chemical class; S - value for the summation of all isomers

2 Entry is lowest value among four AET tests; A - Amphipod bioassay, B - Benthic community impacts, M - Microtox bioassay, O - Oyster larvae bioassay

3 Soil with residues greater than target, require remediation for recreational, agricultural, or residential use in British Columbia, Canada

NOAA

Quick Reference Cards

Guidelines for Sample Collection & Storage

These table are for screening purposes for internal use only; they do not represent official NOAA policy and do not constitute criteria.
All attempts have been made to ensure accuracy, however, NOAA is not liable for errors. Numbers are subject to change as new data become available.

MATERIAL	CONTAINER [1]	PRESERVATION	MAXIMUM HOLDING TIME	SAMPLE VOLUME
INORGANICS				
CHROMIUM^{+6}	P,G	Cool, 4°C	24 hours	400 ml / 200 g
MERCURY	P,G	HNO_3, to pH < 2	28 days	400 ml / 200 g
METALS, except CHROMIUM $^{+6}$ and MERCURY	P,G	HNO_3, to pH < 2	6 months	600 ml / 200 g
CYANIDE by method no. 9010	P,G	Cool 4°C, pH >12 See method 9010	14 days	1000 ml
ALPHA, BETA, AND RADIUM RADIATION	P,G	HNO_3 to pH < 2	6 months	1000 ml
ORGANICS				
BENZIDINES	G, TLC	Cool, 4°C, pH 6-9 store in dark	7 days until extraction, 40 days after extraction	1000 ml
CHLORINATED HYDROCARBONS	G, TLC	Cool, 4°C[3]	7 days until extraction, 40 days after extraction	1000 ml
DIOXINS AND FURANS	G, TLC	Cool, 4°C[3]	7 days until extraction, 40 days after extraction	1000 ml
HALOETHERS	G, TLC	Cool, 4°C[3]	7 days until extraction, 40 days after extraction	1000 ml
NITRITES	G, TLC	Cool, 4°C[3] adjust pH to 4-5	14 days	
NITROSAMINES	G, TLC	Cool, 4°C[3] store in dark	7 days until extraction, 40 days after extraction	1000 ml
NITROAROMATICS AND CYCLIC KETONES	G, TLC	Cool, 4°C[3] store in dark	7 days until extraction, 40 days after extraction	1000 ml
OIL and GREASE	G	Cool, 4°C[2]	28 days	1000 ml
Total ORGANIC CARBON, by method no. 9060	P,G	Cool, 4°C[2], HCl or H_2SO_4 to pH < 2	28 days	100 ml
Total ORGANIC HALIDES, (TOX) by method no. 9020 / 9021	G, TLC	Cool, 4°C[2]	8 days	500 ml
PCBS	G, TLC	Cool, 4°C	7 days until extraction, 40 days after extraction	1000 ml / 250 ml
PESTICIDES	G, TLC	Cool 4°C, pH 5-9	7 days until extraction, 40 days after extraction	1000 ml / 250 ml
PHENOLS	G, TLC	Cool, 4°C[3]	7 days until extraction, 40 days after extraction	1000 ml
PHTHALATE ESTHERS	G, TLC	Cool, 4°C	7 days until extraction, 40 days after extraction	1000 ml
POLYNUCLEAR AROMATIC HYDROCARBONS	G, TLC	Cool, 4°C[3] store in dark	7 days until extraction, 40 days after extraction	1000 ml / 250 ml
PURGEABLE AROMATIC HYDROCARBONS	VOA	Cool, 4°C[2,3]	14 days	40 ml
PURGEABLE HALOCARBONS	VOA	Cool, 4°C[3]	14 days	40 ml

Source:

EPA SW846

For More Information contact:

Michael Buchman
NOAA/Hazmat
7600 Sand Point Way N.E.
Seattle, Washington 98115
Tel: 206-526-6340 Fax: 206-526-6941
Internet: BUCHMAN@HAZMAT.NOAA.GOV

1 P - Polyethylene; G - Amber glass containers; TLC - Teflon lined cap; VOA - Volatile organic analyte vial of amber glass with teflon lined septum
2 Adjust to pH < 2 with H2SO4, HCl, or solid NaHSO4
3 Free chlorine must be removed prior to addition of HCl by exact addition of $Na_2S_2O_3$

NOAA

Quick Reference Cards

Options For Selection of Analytical Methods: Inorganics

These tables are for screening puposes for internal use only; they do not represent official NOAA policy and do not constitute criteria.
All attempts have been made to ensure accuracy, however, NOAA is not liable for errors. Numbers are subject to change as new data become available.

TRACE ELEMENT	FLAME AA	FURNACE AA	ICP	EXTRACTION METHODS	
				Water	Soil / Sediment
ALUMINUM	7020		6010 6020	3005 3010 3015	3050 3051
ANTIMONY	7040	7041 [2] 7062 [2]	6010 6020	3005 3015	3050 3051
ARSENIC	7061 [1]	7060 7062 [2]	6010 6020	3005 3010 3015	3050 3051
BARIUM	7080	7081 [2]	6010 6020	3005 3010 3015	3050 3051
BERYLLIUM	7090	7091	6010 6020	3005 3010 3015 3020	3050 3051
CADMIUM	7130	7131	6010 6020	3005 3010 3015 3020	3050 3051
CALCIUM	7140		6010	3005 3010 3015	3050 3051
CHROMIUM, total	7190	7191	6010 6020	3005 3010 3015 3020	3050 3051
CHROMIUM [6]	7195 - 7196 [3]			7195 - 7196	
COBALT	7200	7201	6010 6020	3005 3010 3015 3020	3050 3051
COPPER	7210	7211 [3]	6010 6020	3005 3010 3015	3050 3051
IRON	7380	7381 [2]	6010	3005 3010 3015	3050 3051
LEAD	7420	7421	6010 6020	3005 3010 3015 3020	3051
MAGNESIUM	7450		6010	3005 3010 3015	3050 3051
MANGANESE	7460	7461	6010 6020	3005 3010 3015	3050 3051
MERCURY (COLD VAPOR)	7470 / 7471			7470	3051 7471
MOLYBDENUM	7480	7481	6010 6020	3005 3010 3015 3020	3050 3051
NICKEL	7520		6010 6020	3005 3010 3015	3050 3051
POTASSIUM	7610		6010	3005 3010 3015	3050 3051
SELENIUM	7741 7742	7740	6010	3005 3010 3015	3050 3051
SILVER	7760	7761 [2]	6010 6020	3005 3015	3051 7760 7761
SODIUM	7770		6010	3005 3010 3015	3050 3051
STRONTIUM	7780		6010		3050 3051
THALLIUM	7840	7841	6010 6020	3005 3010 3015 3020	3050 3051
TIN	7870		6010		
VANADIUM	7910	7911	6010	3005 3010 3015 3020	3050 3051
ZINC	7950	7951 [3]	6010 6020	3005 3010 3015	3050 3051
CYANIDE				9010 9012	9011 9013

Source:

All method numbers refer to EPA SW-846

For More Information, contact:

Michael Buchman
NOAA/Hazmat

7600 Sand Point Way N.E.
Seattle, Washington 98115 - 0070
Tel: 206.526.6340 Fax: 206.526.6941
Internet: BUCHMAN@HAZMAT.NOAA.GOV

1 Hydride method
2 Follow the extraction procedure detailed in the individual determinative method
3 Includes colorimetric methods

NOAA

Quick Reference Cards

Options For Selection of Analytical Methods: Organics

These tables are for screening purposes for internal use only; they do not represent official NOAA policy and do not constitute criteria.
All attempts have been made to ensure accuracy, however, NOAA is not liable for errors. Numbers are subject to change as new data become available.

MATERIAL	GC / MS METHOD	SPECIFIC DETECTION METHOD	HPLC METHOD	EXTRACTION METHODS		CLEANUP METHODS
				Water	Soil / Sediment	
AROMATIC AND HALOGENATED VOLATILES	8240 8260	8010 8011 8021 8030		5030	5100	
CARBAMATES			8318	8318	8318	8318
CHLORINATED DIOXINS AND FURANS		8280 8290		8290 8290	8280 8290	8280 8290
CHLORINATED HERBICIDES	8270 [1]	8150 8151		8150	8150 3580	3620
CHLORINATED HYDROCARBONS	8270 8260	8120 8121		3510 3520	3540 3550	3620 3640
HALOETHERS	8270 8250	8110		3510 3520 8110	3540 3550 8110	8110
NITRILES	8240	8020 8021	8316	5030	5100	
NITROAROMATICS AND KETONES	8270 8250	8090		3510 3520	3540 3550	3620 3640
NITROAROMATICS AND NITRAMINES			8330 8331	8330 8331	8330 8331	8330 8331
NITROSAMINES	8270 8250	9070		3510 3520 8070	3540 3550 8070	3610 3620 3640 8070
NON-HALOGENATED VOLATILES	8240	8015		5030	5100	
ORGANOPHOSPHATES	8270 [1]	8140 8141	8321	3510 3520	3540 3550	3620
PAHS	8270 8250	8100	8310	3510 3520	3540 3550	3611 3630 3640
PCBS AND ORGANO CHLORINES	8270 [1]	8080 8081		3510 3520 3665	3540 3550 3665	3620 3640 3660 3665
PHENOLICS	8270 8250	8040		3510 3520	3540 3550	3630 3640 3650 8040
PHTHALATES	8270 8250	8060 8061		3510 3520	3540 3550	3610 3620 3640
SEMI-VOLATILE ORGANICS	8270 8250			3510 3520	3540 3550	3640 3650 3660
TOTAL ORGANIC HALIDES (TOX)		9020 9022		9020 9022		
VOLATILE ORGANICS	8240 8260	8021		5030	5100	

Source:

All method numbers refer to EPA SW-846

For more information, contact:

Michael Buchman
NOAA/Hazmat
7600 Sand Point Way N.E.
Seattle, Washington 98115 - 0070
Tel: 206-526-6340 Fax: 206-526-6941
Internet: BUCHMAN@HAZMAT.NOAA.GOV

1 This is not a method of choice, but rather a confirmatory method.