Raritan Plaza 1, Raritan Center
Edison, New Jersey 08818-3142
tel: 732 225-7000
Fax: 732 225-7851

June 30, 2008

Mr. Lorenzo Thantu
Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 20th Floor
New York, NY 10007-1866

PROJECT:	RAC II Contract No.: 68-W-98-210
WORK ASSIGNMENT:	164-RICO-02TK
DOC. CONTROL NO.:	3223-164-RA-ECRA-07392
SUBJECT:	Final Screening Level Ecological Risk Assessment Hopewell Precision Site Remedial Investigation/Feasibility Study Hopewell Junction, New York

Dear Mr. Thantu:

CDM Federal Programs Corporation (CDM) is pleased to submit this Final Screening Level Ecological Risk Assessment for the Hopewell Precision Site in Hopewell Junction, New York in fulfillment of Subtask No. 7.2 of the statement of work.

If you have any questions regarding this submittal, please contact me at (212) 785-9123 or Ms. Susan Schofield at (203) 262-6633.

Very truly yours,

CDM Federal Programs Corporation

Robert Goltz for

Jeanne Litwin, REM
RAC II Program Manager

cc: F. Rosado, EPA Region 2 (letter only)
R. D. Goltz/PSO File, CDM
S. Schofield, CDM
N. Luke, CDM
RAC II Document Control, CDM

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FINAL
SCREENING LEVEL ECOLOGICAL
RISK ASSESSMENT
HOPEWELL PRECISION SITE
HOPEWELL JUNCTION, NEW YORK
Work Assignment No. 164-RICO-02TK

June 30, 2008

Prepared for
U.S. Environmental Protection Agency
290 Broadway
New York, New York 10007-1866

Prepared by
CDM Federal Programs Corporation
125 Maiden Lane, 5th Floor
New York, New York 10038

EPA Work Assignment No.	: 164-RICO-02TK
EPA Region	: 2
Contract No.	: 68-W-98-210
CDM Federal Programs Corporation Document No.	: 3223-164-RA-ECRA-07392
Prepared by	: CDM FEDERAL PROGRAMS CORPORATION
Site Manager	: Susan Schofield, P.G.
Telephone Number	: (203) 262-6633
EPA Remedial Project Manager	: Lorenzo Thantu
Telephone Number	: (212) 637-4240
Date Prepared	: June 30, 2008

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Acronyms and Abbreviations

BERA	baseline ecological risk assessment
bgs	below ground surface
BTAG	Biological Technical Assistance Group
CDM	CDM Federal Programs Corporation
cis-1,2-DCE	*cis*-1,2-dichloroethene
COPC	chemical of potential concern
CSM	conceptual site model
DDE	dichlorodiphenyldichloroethylene
1,1-DCE	1,1-dichloroethene
EC	exposure concentration
EPA	United States Environmental Protection Agency
ERAGS	Ecological Risk Assessment Guidance for Superfund
ESL	ecological screening level
HQ	hazard quotient
HRS	Hazard Ranking System
BHC	hexachlorocyclohexane
k_{ow}	octanol/water partition coefficient
LOAEL	lowest-observed-adverse-effect level
MCL	maximum contaminant level
MEK	methyl ethyl ketone (2-butanone)
mg/kg	milligram per kilogram
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no-observed-adverse-effect level
NY	New York
NYSDEC	New York State Department of Environmental Conservation
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
POET	point of entry treatment
QAPP	quality assurance project plan
RAC	Response Action Contract
RI/FS	remedial investigation/feasability study
SLERA	screening level ecological risk assessment
SQuiRT	Screening Quick Reference Table
SMDP	scientific management decision point
SVOC	semi-volatile organic compound
TAL	Target Analyte List
TCL	Target Compound List
1,1,1-TCA	1,1,1-trichloroethane
TCE	trichloroethene
TDS	total dissolved solids
the site	the Hopewell Precision site
TKN	total Kjeldahl nitrogen

TOC	total organic carbon
TSS	total suspended solids
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	volatile organic compound
µg/kg	microgram per kilogram
µg/L	microgram per liter

Section 1
Introduction

CDM Federal Programs Corporation (CDM) received Work Assignment Number 164-RICO-02TK under the Option Period Response Action Contract (RAC) II program to perform a Remedial Investigation/Feasibility Study (RI/FS) including a screening level ecological risk assessment (SLERA) for the United States Environmental Protection Agency (EPA) Region 2 at the Hopewell Precision site (the site) located in Hopewell Junction, New York (NY). The overall purpose of the work assignment is to evaluate the nature and extent of contamination at the site and to develop and evaluate remedial alternatives, as appropriate. This SLERA, as part of the RI/FS, evaluates the ecological risks at the site, more specifically, those associated with aquatic environments of the study area.

1.1 Objectives

The objective of this SLERA is to evaluate the potential ecological impact of contaminants at the site. Conservative assumptions were used to identify exposure pathways and, where possible, quantify potential ecological risks. This report was prepared in accordance with the following documents:

- EPA's *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments*, Interim Final (ERAGS) (EPA 1997)
- EPA's *Guidelines for Ecological Risk Assessment* (EPA 1998)

The SLERA consists of Steps 1 and 2 of the eight step process presented in the EPA Guidance (EPA 1997). In Step 1 of the ERAGS, the screening level problem formulation and ecological effects evaluation, descriptions are developed of:

- The environmental setting
- Contaminants known or suspected to exist at the site and the maximum concentrations present in each medium
- Contaminant fate and transport mechanisms that might exist
- Mechanisms of ecotoxicity associated with contaminants and categories of receptors that may be affected
- Potentially complete exposure pathways

In Step 2 of the ERAGS, the screening level preliminary exposure estimate and risk calculations, risk is estimated by comparing maximum documented exposure concentrations with the ecotoxicity screening values identified in Step 1. The process concludes with a Scientific Management Decision Point (SMDP), which determines that:

- Ecological threats are negligible
- The ecological risk assessment should continue to determine whether a risk exists, or

- There is a potential for adverse ecological effects, and a more detailed baseline ecological risk assessment (BERA), incorporating more site-specific information, is needed.

Per EPA's ERAGS (1997), a SMDP will be made by risk managers.

1.2 Report Organization

This SLERA is composed of eight sections and three appendices as presented below.

Section 1 Introduction – provides an overview of the objectives and organization of the report.

Section 2 Problem Formulation – presents the environmental setting, nature and extent of contamination, risk questions, conceptual site model (CSM), and the process for selecting chemicals of potential concern (COPCs).

Section 3 Exposure Assessment – presents the pathways and media through which receptors may be exposed to site contaminants.

Section 4 Effects Assessment – presents the literature based- and chemical-specific ecological screening levels (ESLs) for detected chemicals.

Section 5 Risk Characterization – integrates information from the exposure and effects assessments and expands upon discussion of chemical properties of identified COPCs to evaluate risk to representative ecological receptors.

Section 6 Uncertainty Assessment – discusses the uncertainties associated with assumptions utilized in this SLERA.

Section 7 Summary and Conclusions – summarizes the significant findings of the SLERA.

Section 8 References – provides a list of the references cited in this SLERA.

Tables and figures are presented at the end of the text. In addition, Appendix A presents the letter received from the United States Fish and Wildlife Service (USFWS) regarding any Federally-listed threatened and endangered species at or in the vicinity of the site. Appendix B provides analytical results of sediment and surface water samples used to develop this SLERA. Fate, transport and toxicity information for COPCs are found in Appendix C.

Section 2
Problem Formulation

The problem formulation for this SLERA contains overviews of the environmental setting, nature and extent of contamination, potential sources of contamination, the initial tier of assessment endpoints selected for the SLERA, the potential exposure pathways, and the process for identifying COPCs.

2.1 Environmental Setting

This subsection describes the site location and description, site history, site geology and hydrogeology, ecological habitat and biota observed, and threatened and endangered species that may occur at or in the vicinity of the site.

2.1.1 Site Location and Description

The Hopewell Precision site is located in Hopewell Junction, Dutchess County, New York (Figure 2-1). The site consists of the Hopewell Precision facility and the downgradient area affected by the groundwater and vapor plume. The Hopewell Precision facility was located at 15 Ryan Drive from 1977 to 1980. The facility moved to the adjacent property at 19 Ryan Drive in 1980 and continues to operate at that location. The combined size of the adjacent properties is 5.7 acres. The rest of the site consists mostly of residential neighborhoods, all of which are served by private wells and septic systems. Almost 27,000 people live within 4 miles of the Hopewell Precision facility. Commercial development (e.g., strip malls, businesses, gas stations) in the area is primarily along New York State Route 82, which traverses the area in a northeast-southwest direction. An area of farmland borders the eastern side of a section of Route 82. Whortlekill Creek flows in a southerly direction across the residential area and along the western border of the site. Several ponds are present within the area, including two large former quarries (Redwing Lake and the gravel pit) that are filled with groundwater.

2.1.2 Site History

The history of the Hopewell Precision site is summarized in the Hazard Ranking System (HRS) package prepared by Roy F. Weston (2004).

Hopewell Precision is an active manufacturer of telecommunications equipment cabinetry. The company operated at its original location at 15 Ryan Drive from 1977 to 1980. It moved to its current location at the adjacent property at 19 Ryan Drive in 1980. The property at 19 Ryan Drive was vacant land prior to 1980 and Hopewell Precision has been the sole occupant of the building. The former facility at 15 Ryan Drive has been used since 1981 by Nicholas Brothers Moving Company for equipment storage and office space.

Processes at Hopewell Precision include shearing, punching, bending, welding, and painting. The painting process includes degreasing prior to the wet spray paint application. Hopewell Precision currently uses a water-based degreaser, but the company used trichloroethene (TCE) and 1,1,1-trichloroethane (1,1,1,-TCA) in a vapor

degreasing machine until 1998. Hopewell Precision purchased 12 drums (7,020 pounds) of 1,1,1-TCA in 1980 and 15 drums (9,000 pounds) in 1994. The company generated 1,675 gallons (32 drums) of 1,1,1-TCA waste for off-site disposal from 1986 through 1998. The company purchased 48 drums (31,680 pounds) of TCE in 1996 and 1997, but does not have any hazardous waste manifests for off-site disposal of TCE. Hopewell Precision no longer uses TCE or 1,1,1-TCA for degreasing.

EPA was made aware of Hopewell Precision in October 1979 through a letter from a former Hopewell Precision employee. During an on-site inspection at the former facility (15 Ryan Drive) in November 1979, EPA made note of solvent odors coming from an open disposal area. At the time of the inspection, Hopewell Precision was dumping one to five gallons per day of waste solvents, paint pigments, and sodium nitrate directly onto the ground. In August 2003, a former employee stated that the common practice for disposal of waste solvents at the former facility was to pour the material on the ground outside the building. Waste paints and thinners were dumped on a daily basis and waste solvents from the degreaser were dumped on a biweekly basis while he worked at Hopewell Precision in 1979 and 1980.

NYSDEC performed a Hazardous Waste Compliance Inspection of Hopewell Precision in May 1987. The inspector observed eleven 55-gallon drums of waste paint and thinners; six 55-gallon drums of waste 1,1,1-TCA; and one 55-gallon drum of unknown material at the facility. NYSDEC determined that Hopewell Precision was in violation of hazardous waste regulations because it was operating as a hazardous waste storage facility without a permit or interim status authorization. Hopewell Precision subsequently identified the drum of unknown material as paint thinner and performed corrective measures, including waste disposal, that NYSDEC found to be satisfactory. During another inspection in October 2002, NYSDEC observed four full or partially full 55-gallon drums of waste paint and solvent at the facility. The NYSDEC inspector reported that a spray booth/paint finishing operation generated waste paint and paint thinner. As a result of the inspection, NYSDEC cited the facility for 10 violations of hazardous waste regulations. Hopewell Precision subsequently corrected the violations to NYSDEC's satisfaction.

TCE and 1,1,1-TCA have been detected in soil samples collected at the Hopewell Precision site. In July 2003, EPA collected on-site and off-site soil samples. TCE was detected in two on-site soil samples and 1,1,1-TCA was detected in one on-site sample, but neither contaminant was detected in any off-site samples. EPA completed test holes and collected additional soil samples in December 2003, concentrating the investigation between the current and former Hopewell Precision facilities. Background samples were collected from test holes near the northern property boundaries. TCE was detected in 5 soil samples, at depths ranging from 0 to 12 feet. The maximum detected concentration was 3.7 micrograms per kilogram (µg/kg); TCE was not detected in background samples from the same depth range.

The site also includes a groundwater contamination plume beneath and downgradient of the current and former Hopewell Precision facilities. The former facility was served by a 25-foot deep well that was sampled in March 1980 (sample

collection point was a rest room faucet). The analytical results indicated the presence of 1,1,1-TCA at 3.6 micrograms per liter (µg/L) and TCE at 0.6 µg/L. NYSDEC installed three monitoring wells, each 39 to 40 feet deep, at the former facility in May 1985 and sampled the wells in March 1986. The analytical results for monitoring well B-3, located between the current and former buildings, indicated the presence of 1,1,1-TCA at 23 µg/L and TCE at an estimated 4 µg/L. Samples collected from the on-site monitoring wells by Hopewell Precision in April 1993 showed the continuing presence of 1,1,1-TCA and TCE. In October and December 2003, EPA installed and sampled temporary shallow monitoring wells on both properties. The analytical results indicated TCE concentrations up to 144 µg/L in groundwater at depths ranging from 10 to 30 feet below the ground surface (bgs).

From February to November 2003, EPA collected groundwater samples from hundreds of private drinking water wells in the vicinity of Hopewell Precision. TCE and 1,1,1-TCA were both detected in numerous private well samples, at individual concentrations up to 250 µg/L for TCE and 11.7 µg/L for 1,1,1-TCA. In addition, 1,1-dichloroethene (1,1-DCE), a breakdown product of TCE, was detected in two samples. Several instances of TCE detection exceeded the Maximum Contaminant Level (MCL) of 5 µg/L. EPA has installed point of entry treatment (POET) systems to remove volatile organic compounds (VOCs) at 37 homes where TCE exceeded or approached the MCL. In addition, NYSDEC has installed POET systems on 14 residential wells that exceeded the NYSDEC MCL for 1,1,1-TCA.

The site is also believed to have an impact on ponds located downgradient of the current/former Hopewell Precision facility. In April 2003, EPA collected water and sediment samples from small ponds located about 300 feet south-southwest (downgradient) of the Hopewell Precision facilities. TCE was detected at concentrations of 4 µg/L and 3.4 µg/L in the water samples and 88 µg/kg in one of the two sediment samples. EPA collected additional samples from two ponds located approximately 900 and 4,500 feet southwest of Hopewell Precision in May 2003. TCE was detected at an estimated concentration of 3.6 µg/kg in a sediment sample from the closer pond, but was not detected in a water sample from the same location or in sediment and water samples collected from the farther pond on Creamery Road.

2.1.3 Site Geology and Hydrogeology

2.1.3.1 Site Geology

Dutchess County is underlain by four distinct types of consolidated rocks and four types of unconsolidated deposits. Consolidated rocks include: (1) Precambrian undifferentiated granite and gneiss, (2) Early Cambrian Cheshire quartzite, (3) Ordovician and Cambrian Stockbridge limestone, and (4) Late to Middle Ordovician Hudson River Formation. The Hudson River Formation, described below, is the most extensive bedrock unit in the county and underlies the site.

Hudson River Formation: The Hudson River Formation is generally comprised of black, gray, red, or green shale or slate. The formation also includes beds of sandstone, limestone, and conglomerate. Metamorphism of the Hudson River Formation within the county increases from the northwest to the southeast; therefore,

phyllite is reportedly present in the vicinity of Hopewell Junction. The structure of the formation includes subparallel joints with spacing ranging from a fraction of an inch to several inches, depending upon the sand present in the formation. The thickness of the Hudson River Formation cannot be determined because beds cannot be traced over long distances; however, the apparent thickness ranges from a few feet to several thousand feet.

Unconsolidated Deposits: Pleistocene and Recent unconsolidated deposits in Dutchess County result primarily from glacial activities, with minor unconsolidated deposits laid down by streams. The thickness of unconsolidated deposits ranges from a few feet to several hundred feet, with the greatest thickness occurring in lowland areas. Unconsolidated deposits overlying consolidated rock in Dutchess County, from oldest to youngest, include (1) unstratified till, (2) stratified lacustrine deposits, (3) stratified sand and gravel, and (4) recent alluvium.

Unstratified till is the principle unit overlying bedrock in the region of the Hopewell Precision site. An isolated pocket of stratified sand and gravel overlies bedrock in the south-central portion of the site. Unconsolidated deposits in the central portion of the site include alluvial silt and sand, lacustrine silt and clay, and outwash sand and gravel.

2.1.3.2 Site Hydrogeology

The Hopewell Precision site is situated in a valley and is underlain by glacial outwash consisting predominantly of sand and gravel. Glacial outwash is the most important source of groundwater supply in Dutchess County, especially in valleys. Sand and gravel deposits underlie the glacial outwash and overlie fractured bedrock. Bedrock consists of shale or slate of the Hudson River Formation.

Glacial Outwash: The surface geology at the site consists of highly permeable glacial outwash sand and gravel that was deposited by glacial melt-water streams. The thickness of the glacial outwash unit ranges from 0 to 100 feet. Hydraulic conductivity of the glacial outwash ranges from 2.39×10^{-3} centimeters per second (cm/s) to 6.81×10^{-5} cm/s (Weston 2004).

Hudson River Formation: The Hudson River Formation consists of shale and slate with interbeds of sandstone, limestone, limestone conglomerate, and chert. The Hudson River Formation underlying the site is slightly metamorphosed and is characterized by numerous, small, closely-spaced, subparallel joints and bedding-plane type openings. Groundwater occurs in these areas and bedrock wells yield small to moderate water supplies. The most productive bedrock wells are located in valley areas, such as the site location, where joints and other openings are abundant and recharge to bedrock is facilitated by favorable topographic position and overlying permeable deposits. There has been no actual measure of hydraulic conductivity of the bedrock; however, typical hydraulic conductivity for moderately permeable fracture rock is approximately 10^{-4} cm/s (Weston 2004).

Glacial Outwash/Bedrock Hydrologic Unit: The aquifer of concern at the site has been designated as the Glacial Outwash/Bedrock Hydrologic Unit (Weston 2004). Interconnection between the glacial outwash and bedrock occurs at the site; therefore, the aquifer of concern is considered as a single unit. Residential wells within the site boundary are completed in both the glacial sediments and bedrock of the Hudson River Formation. Wells drilled in recent years are predominantly completed in the bedrock. Wells completed in the glacial materials are cased and screened. Wells tapping the bedrock portion of the aquifer are generally cased through the unconsolidated sediments, with the bedrock portion of the well uncased. Driller's logs of residential wells indicate that glacial sand and gravel units overlie fractured bedrock. Aquifer testing of residential wells completed in the glacial outwash unit revealed that pumping causes minimal drawdown, thereby suggesting a productive aquifer with high transmissivity. The sand and gravel unit transmits water to the underlying bedrock.

Within the residential neighborhood southwest of the Hopewell Precision facility, well completion reports noted the depth to bedrock ranges from 4 feet to 135 feet bgs. The depth to bedrock is shallower along the western ridge and deeper in the southern portion of the valley.

2.1.4 Habitat and Biota

An ecological reconnaissance was performed for the site on September 11 and 12, 2006 in accordance with the CDM Final Work Plan (CDM 2006a). For this field characterization, U.S. Geological Survey (USGS) topographic maps and aerial photos of the site were reviewed and examined.

The ecological reconnaissance was conducted in the following five areas: Redwing Lake; gravel pit; Unnamed Pond 2; a wetland area immediately south of Ryan Drive; and Whortlekill Creek along the western groundwater plume boundary. An ecological characterization of the Unnamed Pond 1 location was to be included in the field effort; however; it was located on private property and CDM was unable to gain access. In addition, access to the Clove Branch Road pond was limited as this was also located on private property. Observations made at both locations indicated that upland habitats associated with these areas are similar to other habitats observed. Information regarding the habitats and biota observed during the field effort is discussed in this section. Plant and wildlife species observed during the ecological reconnaissance are presented in Tables 2-1 and 2-2, respectively.

2.1.4.1 Redwing Lake

Redwing Lake is an eight-acre recreational swimming lake located in Redwing Park. Approximately one half of the lake's shoreline consists of beach areas composed of non-native recreational sand found along the eastern and southern portions of the lake. The sand material extends into the lake to an unknown depth. It is assumed that native substrate is exposed in the deeper portion of the lake. At the time of the ecological reconnaissance, aquatic vegetation near beach areas was sparse. Where present, it consisted of unidentified macrophytes which gradually formed denser colonies toward the northern shore. The lake is bounded on all sides by small wooded

parcels of land followed by residential properties and roads. Forested wetlands are present on the western side of the lake which are connected via tributary and wetlands to Whortlekill Creek less than one half mile to the west.

Terrestrial habitat within the beach area exhibited characteristics of a disturbed ecosystem mainly due to beach construction and the placement of sand. Native and urban invasive plant species observed included aspen (*Populus* spp.), common reed (*Phragmites australis*), grey birch (*Betula populifolia*), purple loosestrife (*Lythrum salicaria*), and touch-me-not (*Impatiens pallida*). Forested wetlands located on the western side of the lake are dominated by black gum (*Nyssa sylvatica*) and red maple (*Acer rubrum*). Other areas around the lake are dominated by the above mentioned tree species intermixed with black locust (*Robinia pseudoacacia*), boxelder (*Acer negundo*), cherry (*Prunus* spp.), sycamore (*Platanus occidentalis*), and willow (*Salix* spp.). The understory is comprised mostly of saplings of the above species along with multiflora rose (*Rosa mulitflora*). Herbaceous cover varied on habitat type consisting of species such as aster (*Aster* spp.), bladder campion (*Silene vulgaris*), chicory (*Cichorium intybus*), coltsfoot (*Tussilago farfara*), milkweed (*Asclepias* spp.), Japanese stiltgrass (*Microstegium viminieum*), Jack-in-the-pulpit (*Arisaeme triphyllum*), and poison ivy (*Toxicodendron radicans*).

Various wildlife species were observed in and around the lake. Within the lake, largemouth bass (*Micropterus salmoides*), sunfish (*Lepomis* spp.), and several unidentified forage fish were seen along with eastern painted turtle (*Chrysemys picta*) and snapping turtle (*Chelydra serpentina*). Other wildlife observed in the surrounding area were the terrestrial amphibians wood frog (*Rana sylvatica)* and red-back salamander (*Plethodon cinereus*), and birds including American crow (*Corvus brachyrhynchos*), blue jay (*Cyanocitta cristata*), Canada goose (*Branta canadensis*), killdeer (*Charadrius vociferus*), northern cardinal (*Cardinalis cardinalis*), northern flicker (*Colaptes auratus*), and pileated woodpecker (*Dryocopus pileatus*). Mammals observed included chipmunk (*Tamias striatus*) and grey squirrel (*Sciurus carolinensis*) with tracks of raccoon (*Procyon lotor*) and white tailed deer (*Odocoileus virginianus*) seen along beach areas.

2.1.4.2 Gravel Pit

The gravel pit is a former sand and gravel quarry that is currently used for recreational swimming and fishing located at the Whortlekill Rod and Gun Club. Areas immediately surrounding the lake are heavily disturbed due to past mining activities and the creation of berms and dirt roads encompassing the lake. In addition, the western shore appeared to be utilized as a disposal site for dredge materials from the lake as evidenced by spoils and an inactive dredge. A large wetland area is situated east of the lake, and Whortlekill Creek is located to the west. Other outlying areas consist of residential properties, roads and undeveloped land intermixed with various recreational gun/bow ranges located in forested areas west of the lake before reaching Whortlekill Creek. At the time of the ecological reconnaissance some ranges were active resulting in field team members being unable to fully characterize the forested area between the lake and Whortlekill Creek.

The lake is comprised of a sand-gravel bottom with little overhanging vegetation present. Aquatic vegetation was sparse within the southern portion of the lake and larger, denser colonies of an unidentified macrophyte was observed in other areas. Similar to Redwing Lake, areas immediately surrounding the gravel pit are characterized by the presence of invasive and native pioneer plant species along with ornamentals and turf grass. Tree species noted included aspen, black locust, tree-of-heaven (*Ailanthus altissima*) and willow. Understory was limited in these areas. Ground cover was sparse with the exception of mowed turf areas. Other vegetation included cattail (*Typha latifolia*), goldenrod (*Solidago* spp), purple loosestrife, and ragweed (*Ambrosia artemisiifolia*). Vegetation present in the wetland area included black gum, red maple, sensitive fern (*Onoclea sensibilis*), and skunk cabbage (*Symplocarpus foetidus*). Forested areas near the club entrance and to the west consisted of a mixed deciduous community composed of grey birch, red maple, and white oak (*Quercus alba*). Also present in these areas was maple leaf viburnum (*Viburnum acerifolium*), spotted wintergreen (*Chimaphila maculata*) and Virginia creeper (*Parthenocissus quinquefolia*).

Fish species identified consisted of sunfish and largemouth bass along with unidentified forage fish. Other wildlife observed or noted through calls included grey tree frog (*Hyla versicolor*), pickerel frog (*Rana palustris*), painted turtle, and wood frog. Great blue heron (*Ardea herodias*) and tracks of raccoon and white tail deer were also were observed.

2.1.4.3 Unnamed Pond 2

The Unnamed Pond 2 is located on Creamery Road and is a man-made feature created by an impoundment/culvert located in Whortlekill Creek immediately north of the road. The ponded portion of the creek is composed of sand-gravel substrate, is approximately 100 feet wide and extends upstream for approximately 300 feet. Stream flow within the impoundment is negligible prior to passing through the culvert located under Creamery Road at the downstream portion of the pond. After exiting the culvert, the creek once again forms a distinct channel and eventually returns to a more naturalized state.

Vegetation surrounding Unnamed Pond 2 consists of red maple, poison ivy, shagbark hickory (*Carya ovata*), touch-me-not, white oak, white pine (*Pinus strobus*), and grass/weed species typically associated with lawns which encompassed a large portion of the pond. Wildlife observed included several song bird species and pickerel frog.

2.1.4.4 Ryan Drive Wetland Area

An undeveloped forested/wetland area is located immediately south of Ryan Drive across from the former Hopewell Precision facility. The area is heavily disturbed and is approximately three acres in size. Habitat present follows a continuum, changing from upland habitat near Ryan Drive to a swamp. Private residences are found along the eastern, western and southern boundaries. Evidence of disturbance activities including the placement/disposal of fill material, excavating, and dumping of miscellaneous debris and refuse was observed in the northern and western third of

the area. Ditches running north to south are present which ultimately lead into a large open area which at the time of the field effort was flooded. Buttressed tree trunks, drift lines and water-stained leaves indicated the area is periodically inundated or saturated.

Vegetative communities associated with open areas near Ryan Drive consisted mostly of goldenrod and ragweed intermixed with Asiatic bittersweet (*Celastrus orbiculatus*), buckthorn (*Rhamnus* spp.), clearweed (*Pilea pumila*), false nettle (*Boehmeria cylindrica*), honeysuckle (*Lonicera* spp.), lady's thumb (*Polygonum persicaria*), and wild grape (*Vitis* spp.). Trees were limited in this area and consisted of species such as aspen, dogwood (*Cornus* spp.) and white pine. Approaching the ponded portion, tree species observed consisted of green ash (*Fraxinus pennsylvanica*), red maple, red oak (*Quercus rubra*), and shagbark hickory. Understory and ground cover species included garlic mustard, Japanese stiltgrass, poison ivy sensitive fern, touch-me-not, Virginia creeper, and winterberry holly (*Illex verticillata*). A large stand of button bush (*Cephalanthus occidentalis*) was found within the inundated portion of the area.

Wildlife observed or noted through calls included frogs and various birds. One eastern cottontail (*Sylvilagus floridanus*) was seen and tracks of raccoon and white tail deer were observed.

2.1.4.5 Whortlekill Creek

Whortlekill Creek is a variable, low gradient stream that drains a landscape composed of upland and lowland forests, wetlands, low to high density residential and commercial areas, road crossings, utility right-of-ways and other man-made structures. Stream width and depth vary, but generally range from 6 to 20 feet wide, and 2 inches to 1 foot deep; flow in some reaches is restricted *via* man-made impoundments resulting in a ponding effect. Stream morphology ranges from a well defined channel to poorly defined meandering or braided channels. Substrate varies from silt/sand to cobble-sized particles; however, the majority of the stream is characterized by a sand/gravel bottom. Although variable, riparian vegetation is mostly forested; where intact, canopy cover ranges from 60 to 100 percent. In areas subjected to residential development, right-of-ways and roads, riparian vegetation is limited or non-existent as the stream corridor is typically bordered by mowed turf, ornamental species, or disturbed forests. In low lying areas, riparian wetlands are present and consist mostly of emergent and scrub/shrub or forested wetland communities.

Vegetative communities situated in upland areas associated with Whortlekill Creek consist primarily of mixed deciduous forest. Canopy and understory species observed included American beech (*Fagus grandifolia*), hickory (*Carya* spp.), Japanese barberry (*Berberis thunbergii*), partridge berry (*Mitchella repens*), poison ivy, red maple, red oak, shagbark hickory, and spice bush (*Lindera benzoin*). Several wetlands were identified during the ecological reconnaissance and were characterized as forested or forested/emergent, and scrub/shrub wetlands. Species encountered in these wetlands included black gum, green ash, iron wood (*Ostrya virginiana*), Jack-in-the-pulpit, red maple, sensitive fern, skunk cabbage, and winterberry holly.

Fish observed in Whortlekill Creek included sunfish, white sucker (*Catostomus commersoni*) and unidentified forage fish species. In addition, aquatic invertebrates such as crayfish (Decapoda), freshwater clams (Bivalva), and various insects were observed throughout the survey area. Throughout the stream corridor, numerous songs birds, wild turkey (*Meleagris gallopavo*), broad-winged hawk (*Buteo platypterus*) and other unidentified hawk species were observed. Other wildlife such as northern two-lined salamander (*Eurycea bislineata*) and green frog (*Rana clamitans*) were also observed at Whortlekill Creek.

2.1.5 Threatened, Endangered Species/Sensitive Environments

Information regarding threatened and endangered species and ecologically sensitive environments that may exist at or in the vicinity of the site was requested from the USFWS and the NYSDEC. The letter received from the USFWS is presented in Appendix A.

2.1.5.1 Federally-Listed Species

The USFWS reported that a review of their records for the site and surrounding areas indicated the following federally listed threatened and endangered species were observed at locations noted below:

- Threatened Species: Bog turtle (*Clemmys muhlenbergii*) documented occurrence within five miles of the site
- Endangered Species: Indiana bat (*Myotis sodalis*) documented roosts approximately one mile from the site; approximately 23 miles from a known hibernacula located in Ulster County, NY
- Species of Concern: Blanding's turtle (*Emyartramia longicauda*) documented occurrence within two miles of the site
- Candidate Species: New England cottontail (*Sylvilagus transitionalis*) documented occurrence in Dutchess County, NY

2.1.5.2 State-Listed Species

The NYSDEC reported that a review of their records for the site and surrounding areas indicated the following State-listed threatened and endangered species were observed at locations noted below:

- Threatened Species: Blanding's turtle documented occurrence in East Fishkill, NY
- Endangered Species: Indiana bat documented occurrence in Poughkeepsie, NY, La Grange, NY, East Fishkill, NY, Beekman, NY, Wappinger, NY, and Union Vale, NY

The NYSDEC listed the floodplain forest associated with the Fishkill Creek stream corridor as significant habitat. The floodplain forest is located in the towns of East

Fishkill, and Fishkill, NY. The northern boundary of the floodplain forest is situated less than 1.5 miles south of the site.

During the ecological reconnaissance in September 2006, no federal- or state-listed threatened or endangered species were observed on or near the Hopewell Precision site; however, suitable habitat was observed for the Indiana bat and the Blanding's turtle within portions of the study area. Forested riparian areas associated with Whortlekill Creek and to a lesser extent Redwing Lake and the gravel pit may provide roosting and foraging habitat for the Indianan bat. In addition, Redwing Lake, the gravel pit and wetlands associated with Whortlekill Creek may provide potential habitat for the Blanding's turtle.

2.2 Nature and Extent of Contamination

Site-related contaminants were selected based on the history of chemical usage and the remedial investigation conducted by CDM at the Hopewell Precision facility. The site-related contaminants are TCE, 1,1,1-TCA, 1,1-dichloroethene (1,1-DCE), chloromethane, *cis*-1,2-dichloroethene (*cis*-1,2-DCE), methyl ethyl ketone (MEK or 2-butanone), and tetrachloroethene (PCE) (CDM 2008). For this SLERA, groundwater represents the source of site-related contaminants which may eventually discharge into surrounding surface water bodies. Thus, potential ecological risks due to the contamination of surface water and sediments are evaluated in this SLERA. Risks from exposure to contaminants in soil are not evaluated as surface soil was not collected as the majority of soil boring locations were situated underneath paved or impervious surfaces, limiting exposure to terrestrial receptors. As a result, the SLERA focuses on potential risks to ecological receptors associated with the aquatic portions of the study area, more specifically, those present/utilizing areas discussed in Section 2.1.4.

Sediment and surface water samples were collected from locations downgradient of the Hopewell Precision facility. Samples were collected from areas where groundwater may likely discharge to surface water bodies. Samples were collected from Whortlekill Creek, a wetland area south of Ryan Drive, three ponds and Redwing Lake and the gravel pit. A total of 39 surface water and sediment samples were collected in locations specified below. All surface water and sediment samples were co-located; locations are shown on Figure 2-2.

- Whortlekill Creek
  - 10 samples (SW/SD-028 to SW/SD-037) - between Creamery Road and Timothy Lane
  - 2 samples (SW/SD-038 and SW/SD-039) - upstream area/background
- Wetland Area - south of Ryan Drive
  - 1 sample (SW/SD-001)
- Unnamed Pond 1 - south of Ryan Drive and west of Route 82
  - 2 samples (SW/SD-002 and SW/SD-003)
- Unnamed Pond 2 - north of Creamery Road
  - 3 samples (SW/SD-004 to SW/SD-006)
- Redwing Lake

- 10 samples (SW/SD-007 to SW/SD-016)

- Gravel Pit
  - 10 samples (SW/SD-017 to SW/SD-026)
- Pond on Clove Branch Road
  - 1 sample (SW/SD-027)

2.2.1 Sediment

Thirty-seven sediment samples were collected from locations downgradient of the Hopewell Precision facility. Two background samples were collected from Whortlekill Creek (identified as SD-038 and SD-039). All sampling was conducted in accordance with procedures outlined in the Final Quality Assurance Project Plan (QAPP) (CDM 2006b). Samples were analyzed for Target Compound List (TCL) VOCs, semi-volatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), and Target Analyte List (TAL) inorganics (including metals and cyanide). Additional analyses included pH, grain size, and total organic carbon (TOC). Results of organic and inorganic chemicals detected in sediment are presented in Table 2-3 and Table 2-4, respectively.

2.2.1.1 Volatile Organic Compounds

No VOCs were detected in samples collected from the Ryan Drive wetland, Unnamed Pond 1, Unnamed Pond 2, and the Clove Branch Road pond. With the exception of dichlorodifluoromethane detected in one sample, no other VOCs were detected in Whortlekill Creek sediments. Of the remaining two sample areas, the gravel pit had the most VOCs detected, with dichlorodifluoromethane the most common. Other compounds included acetone and carbon disulfide. MEK (2-butanone) was detected at a concentration of 7 J µg/kg in one sample from Redwing Lake. No VOCs were detected in either background sample.

2.2.1.2 Semi-Volatile Organic Compounds

No SVOCs were detected in samples collected from the Ryan Drive wetland, Unnamed Pond 1 and the Clove Branch Road pond. Acetophenone was detected in one sample from Unnamed Pond 2 and two samples from the gravel pit; bis(2-ethylhexyl)phthalate was detected in one sample from Redwing Lake. No other SVOCs were detected in these areas. Several SVOCs were detected in Whortlekill Creek; however, these were limited mainly to locations SD-030, SD-036, and SD-037. Location SD-030 had the most and highest concentrations of SVOCs detected. No SVOCs were detected in either background sample.

2.2.1.3 Pesticides and PCBs

No PCBs were detected in any sample. No pesticides were detected in the Clove Branch Road Pond sediment. A total of eight pesticides were detected within the other sample areas with 4,4'-DDE the most common compound. No PCBs were detected in either background sample; the only pesticide detected in these samples was 4,4'-DDE.

2.2.1.4 Target Analyte List Metals and Cyanide

In general, concentrations of the majority of metals detected were consistent between

locations or individual water bodies. Almost one third of the highest metal concentrations (aluminum, barium, beryllium, chromium, cobalt, copper, iron, nickel, and potassium) detected at all locations were found in the Ryan Drive wetland sample. Concentrations of lead in two samples (SD-023 and SD-024) collected from the gravel pit were three orders of magnitude higher than at any other location. The high levels of lead are most likely associated with fishing lures/sinkers, lead-based paint or shot as the area is used for recreational fishing and shooting. Cyanide was not detected in samples collected from the Ryan Drive wetland, Unnamed Pond 1, gravel pit, and the Clove Branch Road pond. Cyanide was detected in all samples from Unnamed Pond 2, one sample from Redwing Lake and four from Whortlekill Creek.

Concentrations of metals detected in background samples, in general, reflected those found at other locations. Although not considerably higher than levels found at other locations, the highest concentrations of cadmium and manganese were found in background sediments. Cyanide was not detected in either background sample.

2.2.1.5 Sediment Summary

When evaluating all water bodies sampled, the majority of VOCs were detected in sediment collected from the gravel pit, followed by Redwing Lake. With the exception of MEK (2-butanone) detected at a concentration of 7 J µg/kg at SD-014, no site-related compounds (e.g., TCE, PCE, cis-1,2-DCE, 1,1-DCE, chloromethane and 1,1,1-TCA) were detected in any sample. Dichlorodifluoromethane was the most common VOC detected. Whortlekill Creek sample locations SD-030, SD-036, and SD-037 had the highest concentrations and most SVOCs detected; SD-030 had the highest concentrations of the three locations. In general, SVOCs were not detected at other locations, or when detected, consisted mainly of the compounds acetophenone or bis(2-ethylhexyl)phthalate. Pesticides were detected in sediment from all sample areas, with 4,4'-DDE the most frequently-detected compound. Given the number of samples collected from Redwing Lake and the gravel pit, these water bodies had the fewest detections of pesticide compounds. In general, concentrations of the majority of metals were consistent between locations or individual water bodies. However, almost one third of the highest metal concentrations detected at all locations were found in the Ryan Drive wetland sample.

2.2.2 Surface Water

Thirty-seven surface water samples were collected from locations downgradient of the Hopewell Precision facility. Two background samples were collected from Whortlekill Creek (identified as SW-038 and SW-039). Samples were co-located with sediment samples and collected from areas identified in Section 2-2. All sampling was conducted in accordance with procedures outlined in the Final QAPP (CDM 2006b). Samples were analyzed for TCL VOCs, SVOCs, pesticides/PCBs, and TAL inorganics (including metals and cyanide). Additional analyses included alkalinity, ammonia, chloride, hardness, nitrate/nitrite, sulfide, sulfate, pH, total Kjeldahl nitrogen (TKN), TOC, total suspended solids (TSS), and total dissolved solids (TDS). General water quality parameters measured in the field included pH, specific conductivity, dissolved oxygen, temperature, oxidation reduction potential, and

turbidity. Results of organic and inorganic chemicals detected in surface water are presented in Table 2-5 and Table 2-6, respectively.

2.2.2.1 Volatile Organic Compounds

No VOCs were detected in Unnamed Pond 1. When detected, only trace levels of VOCs were found in surface water samples. All detected results except three were estimated with J qualifiers. The three definitive results were for acetone in two samples from the gravel pit (10 µg/L and 12 µg/L) and one sample from Whortlekill Creek (6.7 µg/L). Most detected VOCs were found in samples from the gravel pit including 1,1,1-TCA from locations SW-017 and SW-018 at concentrations of 0.14 J µg/L and 0.13 J µg/L, respectively. In addition, chloromethane was detected in four samples at concentrations ranging from 0.11 J µg/L to 0.16 J µg/L . With the exception of TCE at a concentration of 0.28 J µg/L, no other compounds were found in surface water from the Clove Branch Road pond. At Whortlekill Creek, trace levels of 1,1,1-TCA was detected in four samples collected from locations between Clove Branch Road and Timothy Lane (SW-028 through SW-031). Similarly, trace levels of TCE (0.11 J to 0.21 J ug/L) were detected in three samples (SW-030, SW-031 and SW-033) in Whortlekill Creek. No VOCs were detected in either background sample.

2.2.2.2 Semi-Volatile Organic Compounds

No SVOCs were detected in samples from Unnamed Pond 1, Unnamed Pond 2, and the Clove Branch Road pond. Similar to VOCs, only trace levels of SVOCs were detected in surface water. All detected SVOCs, except bis(2-ethylhexyl)phthlate in some samples and fluorene had estimated (J qualifier) results. bis(2-Ethylhexyl)phthlate was detected in five samples (two in the gravel pit, two in Whortlekill Creek and one in Redwing Lake) with concentrations ranging from 6.8 to 9.5 µg/L. In addition, this compound was the only SVOC detected with definitive results in Redwing Lake and the gravel pit. Fluorene was detected once at a concentration of 0.12 µg/L in the Ryan Drive wetland sample. No other SVOCs were detected in the Ryan Drive wetland sample. Four SVOCs were detected within Whortlekill Creek. Estimated trace levels of anthracene, benzo(a) pyrene, and fluoranthene were found at location SW-029. The fourth SVOC, bis(2-ethylhexyl)phthlate, was detected in samples collected from other locations in Whortlekill Creek. No SVOCs were detected in either background sample.

2.2.2.3 Pesticides and PCBs

No PCBs were detected in any sample. No pesticides were detected in samples from Unnamed Pond 2. Similar to VOCs and SVOCs, only trace levels of pesticides were detected in surface water. Heptachlor was detected in one sample from Unnamed Pond 1 and three other compounds were detected in the Ryan Drive wetland sample. All data collected from the Clove Branch Road pond was rejected. The most common compounds detected in samples from Redwing Lake and the gravel pit were BHC and its associated isomers. These compounds were also detected in two samples from Whortlekill Creek. No pesticides or PCBs were detected in either background sample.

2.2.2.4 Target Analyte List Metals and Cyanide

In general, the highest concentrations of metals were found in the sample collected

from the Ryan Drive wetland. In addition, this was the only location where arsenic, barium, chromium, copper, nickel, and vanadium were detected. Lead was also detected in this sample and at one other location (SW-024). The remaining metals detected at other locations were relatively consistent; however, this sometimes varied between water bodies. For example, with the exception of one sample collected from Whortlekill Creek, detections of sodium were limited to Redwing Lake and the gravel pit. Cyanide was detected at a concentration of 5 µg/L at location SW-011 and was not detected at any other location. In general, concentrations of metals detected in both background samples reflected those found at other locations. Cyanide was not detected in either background sample.

2.2.2.5 Surface Water Summary

When evaluating all water bodies sampled, detections of site-related compounds 1,1,1-TCA, TCE, and chloromethane were limited to locations in the gravel pit, the Clove Branch Road pond and/or Whortlekill Creek. Additional VOCs detected were mostly found in the gravel pit and Whortlekill Creek and, to a lesser extent, other surface water bodies. Similar to sediment, most SVOCs were found in Whortlekill Creek, coincidently at location SW-029 which was situated downstream of where the highest and most detections of SVOCS were found in sediment. With the exception of Unnamed Pond 2 and the Clove Branch Road pond, pesticides were detected at all locations. A total of six pesticides were detected in the gravel pit; more than at any other location. When detected, concentrations of pesticides were relatively consistent between locations. In general, the highest concentrations of metals were found in the sample collected from the Ryan Drive wetland. In addition, this was the only location where arsenic, barium, chromium, copper, nickel, and vanadium were detected. The remaining metals detected at other locations were relatively consistent; however, this sometimes varied between water bodies.

2.3 Risk Questions

Risk questions summarize important components of the problem formulation phase of the SLERA. Risk questions are directly related to testable hypotheses that can be accepted or rejected using the results of the SLERA. Selected risk questions to be answered in this SLERA are as follow:

- *May ecological receptors be exposed to site-related contaminants present in sediment and surface water?*

  This question is addressed in the Exposure Assessment phase of the SLERA (Section 3).

- *Where present, are the concentrations of site-related contaminants sufficiently elevated to impair the survival, growth, or reproduction of sensitive ecological receptors?*

  This question is addressed in the Effects Assessment and Risk Characterization phases of the SLERA (Sections 4 and 5).

- *Are known or potential ecological receptors sufficiently exposed to site-related contaminants to cause adverse population-level or community-level effects?*

  This question is addressed in the Risk Characterization phase of the SLERA (Section 5).

2.4 Conceptual Site Model

The CSM integrates information on contaminant and habitat characteristics and is used to identify critical exposure pathways linking contaminants to receptors. Thus, the CSM is essentially a contaminant fate-and-transport diagram that illustrates the likely pathways along which COPCs might move from the sources of contamination through potentially-affected habitats to important ecological receptors.

This section presents a discussion of the sources of contamination, modes of transport of contaminants, and potential exposure pathways used to develop the CSM (Figure 2-3). The selection of assessment endpoints and specific risk questions are discussed. These are used to evaluate the potential for harmful effects to the selected assessment endpoints.

2.4.1 Sources of Contamination

As part of the RI, CDM installed 25 soil borings around the two buildings previously and currently occupied by Hopewell Precision. A total of 75 subsurface soil samples were collected and analyzed for full TCL compounds and TAL analytes, including cyanide and mercury. No detected compounds or analytes exceeded the site-specific soil screening criteria established for the RI, indicating no residual sources remain in the soils around the facility.

2.4.2 Exposure Pathways

An exposure pathway is the means by which contaminants are transported from a source to ecological receptors. For this SLERA, sediment and surface water are contaminated by groundwater discharge, which represents the source of potential contaminants in surface water bodies associated with the site. In addition, the study area is moderately urbanized and is comprised of both residential, light industrial and commercial dwellings; agricultural land use is limited but present. These areas convey overland flow and road runoff into Whortlekill Creek and, to a lesser extent, other surface water bodies.

Sediment and surface water present in areas evaluated in this SLERA are contaminated with a number of contaminants. Some of these contaminants, such as pesticides, are characterized by having a very low water solubility and high octanol/water partition coefficient (k_{ow}), implying that they are likely to be strongly associated with sediment. Thus, the strong adsorption to sediment may result in the retention of certain contaminants. Subsequently, any sediment transport that may occur may also result in the transport of contaminants; however, this would be limited only to Whortlekill Creek and, to a lesser extent, other areas that may be subject to flooding.

In undeveloped portions of the study area, habitats present support a number of aquatic/semi-aquatic species including benthic macroinvertebrates, fish, amphibians, birds, and mammals. Ecological receptors at the site may be exposed to contaminated sediment and surface water via direct contact or incidental ingestion. Contaminants present in sediments and surface water of Whortlekill Creek may also migrate via erosion (e.g., following a storm event), and subsequently be re-deposited on downstream surficial sediments or vegetation. Exposure of higher trophic-level receptors can also occur through food chain exposure (through the ingestion of prey that have become contaminated through site-related exposure). The complete pathways are illustrated on the CSM (Figure 2-3).

2.4.3 Assessment Endpoints

Assessment endpoints are explicit expressions of an environmental resource that is considered of value, operationally defined by an ecological entity and its attributes (EPA 1997). In SLERAs, assessment endpoints are usually considered to be any adverse effects from site contaminants to any ecological receptors at the site. It is not practical or possible to directly evaluate risks to all the individual components of the ecosystem on site, so assessment endpoints are used to focus on particular components that could be adversely affected by the contaminants associated with the site. In general, the assessment endpoints selected for the site are aimed at the viability of aquatic populations and organism survivability. The criteria for selection of assessment endpoints include ecological relevance, susceptibility (exposure plus sensitivity), and relevance to management goals.

A review of the CSM provided information for the selection of assessment endpoints. A variety of invertebrates, fish, reptiles, and amphibians inhabit the area. In addition, many birds and mammals inhabiting this and adjacent areas may forage within these areas and could feed on organisms inhabiting the site. Therefore, the assessment endpoints focused on these groups.

2.4.4 Measurement Endpoints

Measurement endpoints are chosen to link the existing site conditions to the goals established by the assessment endpoints and are useful for assessment endpoint evaluation. Measurement endpoints are quantitative expressions of observed or measured biological responses to contamination relevant to selected assessment endpoints. For a SLERA, ESLs are commonly used as measurement endpoints. For this SLERA, measurement endpoints are based on conservative ESLs from sources discussed in Section 4.1.

For this SLERA, the following assessment endpoints and measurement endpoints were selected to evaluate whether site-related contaminants pose a risk to ecological receptors:

- Assessment Endpoint 1: Viability (survival, growth, and reproduction) of benthic macroinvertebrate communities present in site surface water bodies.

Measurement Endpoint: Evaluate the toxicity of sediment and surface water by comparing maximum detected concentrations to media-specific ESLs.

- Assessment Endpoint 2: Viability (survival, growth, and reproduction) of fish communities present in site surface water bodies.

  Measurement Endpoint: Evaluate the toxicity of sediment and surface water by comparing maximum-detected concentrations to media-specific ESLs.

- Assessment Endpoint 3: Viability (survival, growth, and reproduction) of reptile and amphibian communities present in site surface water bodies.

  Measurement Endpoint: Evaluate the toxicity of sediment and surface water by comparing maximum-detected concentrations to media-specific ESLs.

- Assessment Endpoint 4: Viability (survival, growth, and reproduction) of mammalian communities utilizing site surface water bodies.

  Measurement Endpoint: Evaluate the toxicity of sediment and surface water by comparing maximum-detected concentrations to media-specific ESLs.

- Assessment Endpoint 5: Viability (survival, growth, and reproduction) of avian communities utilizing site surface water bodies.

  Measurement Endpoint: Evaluate the toxicity of sediment and surface water by comparing maximum-detected concentrations to media-specific ESLs.

2.5 Risk Characterization Methods

Potential risks to ecological receptors are evaluated using the Hazard Quotient (HQ) approach. This process involves comparing the maximum contaminant concentrations measured at the site to ESLs. The ESLs are intended to be conservative screening values independent of pathways, and in this way avoid the potential for underestimating risk. The HQ method was used to estimate risk of exposure to each COPC. This method compares the maximum exposure concentration (EC) for a specific chemical to their screening benchmark counterpart and is expressed as a ratio per the following formula:

$$Hazard\ Quotient = \frac{Maximum\ Detected\ Concentration\ of\ COPC}{ESL}$$

Where the ESL represents the "no effect" level for that analyte and assessment endpoint.

For this SLERA, if HQs are greater than unity (1.0), risk will be implied. A HQ less than one suggests there is a high degree of confidence that minimal risk exists for the given COPC, particularly since the benchmarks represent the lowest measurable

concentration considered to be protective of the most sensitive organisms. Therefore, contaminants for which the HQ is above one are retained as COPCs for potential further evaluation, such as a BERA. Higher HQs are not necessarily indicative of more severe effects because of varying degrees of uncertainty in the screening level benchmarks used to calculate HQs.

Chemicals for which ESLs are not available are also retained as COPCs even though they are not associated with the site. Calcium, magnesium, potassium, and sodium were eliminated from further consideration as COPCs because they are ubiquitous, occur naturally in high concentrations, are essential nutrients, and are unlikely to pose risk. The COPC selection process for this SLERA is further discussed in Sections 3, 4, and 5.

Section 3
Exposure Assessment

The objective of the exposure assessment is to determine the pathways and media through which receptors may be exposed to site contaminants. Exposure scenarios are simplified descriptions of how potential receptors may come in contact with contaminants. Potential exposure pathways are dependent on habitats and receptors present on-site, the extent and magnitude of contamination, and environmental fate and transport of COPCs.

Exposure-related information for representative groups of organisms previously identified as potential receptors for this SLERA are described in this section. These descriptions are based on likely exposure scenarios identified in the CSM (Figure 2-3), developed in the Problem Formulation phase. The receptor groups represent organisms who, with reasonable potential, may be exposed to site-related contaminants. Exposure scenarios are simplified descriptions of how potential receptors or representative receptor groups may come in contact with contaminants

Observations made during the ecological reconnaissance found the study area provides habitat for a number of aquatic/semi-aquatic species, including benthic macroinvertebrates, fish, reptiles, amphibians, birds, and mammals. The site is located in a mixed use area (light industrial, commercial, residential, and agricultural) which can be characterized as moderately developed. The majority of undeveloped land is mostly associated with riparian areas of Whortlekill Creek, and to a lesser extent other surface water bodies included in this evaluation.

Organisms or representative groups of organisms can be exposed to contaminants by direct contact and/or ingestion of contaminated media and/or prey. Although several potential exposure scenarios can be identified for ecological receptors, it is most appropriate to focus the assessment on critical exposure scenarios or those most likely to contribute to risk. This SLERA focuses on the most critical exposure scenarios identified in the CSM. For example, ingestion of pore water or inhalation exposure pathways may exist, but are either insignificant, cannot be quantified, or are sufficiently represented by other pathways (e.g., ingestion of sediments may also include ingestion of pore water).

Risks from exposure to contaminants in surface soil are not evaluated as this medium was not collected. Subsurface soil samples were collected in support of the RI, with the majority situated underneath paved or impervious surfaces, limiting exposure to terrestrial receptors. As a result, the SLERA focuses on potentials risks to ecological receptors associated with the aquatic portion of the study area, more specifically, those present in areas discussed in Section 2.1.4.

Section 4
Effects Assessment

An effects assessment includes an evaluation of the available types and sources of effects data and presents media- and chemical-specific screening levels that serve as conservative effects concentrations for the SLERA. For this SLERA, effects data were limited to screening level or benchmark concentrations.

4.1 Literature-Based Effects Data

This section of the SLERA describes and provides support for the sources and types of effects data selected for use in this evaluation. As appropriate for a SLERA, effects data are limited to ESLs. Screening values from the following references were applied in a hierarchical fashion to the maximum site-specific COPC concentrations as follows:

- Sediment
  - Primary Source
    - NYSDEC Technical Guidance for Benthic Aquatic Life Chronic Toxicity and for Wildlife Bioaccumulation (1999)
  - Secondary Source
    - National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables (SQuiRT) Freshwater Sediment Values (2006)
    - Washington State Department of Ecology Freshwater Sediment Quality Values (1997)
    - Smith, S.L., D.D. MacDonald, K.A. Keenleyside, C.G. Ingersoll and L.J. Field. A Preliminary Evaluation of Sediment Quality Assessment Values for Freshwater Ecosystems (1996)
    - Jones, D.S., G.W. Suter,II, and R.N. Hull. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment-Associated Biota: (1997 Revision)
    - EPA Region 3 Biological Technical Assistance Group (BTAG) Freshwater Sediment Screening Benchmarks (on-line 2007)

Sediment criteria for organic compounds are adjusted for a site-specific TOC value. For conservative purposes, these criteria were adjusted using the lowest site-specific TOC of 2,300 milligrams per kilogram (mg/kg).

- Surface Water
  - Primary Source
    - NYSDEC Technical Operational Guidance, Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations (1998)
  - Secondary Source
    - National Recommended Water Quality Criteria (EPA 2006)
    - NOAA SQuiRT Freshwater Values (2006)
    - EPA Region 3 BTAG Freshwater Screening Benchmarks (on-line 2007)

In this SLERA, the NYSDEC benchmarks were examined first to determine if a screening value was available for a particular compound. If a value was available, it was utilized. If no NYSDEC benchmark was available, other sources listed were examined and the lowest value located was used in the screening. If a selected screening level was exceeded, or no screening level was located, contaminants were retained as COPCs.

Section 5
Risk Characterization

The risk characterization integrates information from the exposure and effects assessments and estimates risk to representative ecological receptors. This SLERA relies on the HQ approach, supplemented by site observations to assess ecological risks at the site.

5.1 Hazard Quotient Approach

The HQ approach for estimating risk is based on the ratio of a selected exposure concentration to a selected ESL or effects concentration. The equation is as follow:

$$Hazard\ Quotient = \frac{Maximum\ Detected\ Concentration\ of\ COPC}{ESL}$$

In general, the information derived through this approach contributes to the risk characterization for the assessment endpoints listed in Section 2.4.4.

Following EPA guidance for conducting SLERAs, the maximum detected COPC concentration in sediment and surface water serves as the exposure concentration. The chemical-specific and media-specific screening levels serve as the effects concentration. The comparison of these two values allows calculation of the HQ, which in turn is used to quantify risk estimation. HQs greater than 1.0 indicate a potential for adverse effects. HQs less than 1.0 are considered insignificant and therefore risks are not expected.

It should be noted that higher HQs between COPCs are not necessarily indicative of more severe effects because of varying degrees of uncertainty in the ESLs used to calculate HQs. There are also differences in toxicity endpoints (e.g., body weight reduction vs. reproduction effects) and measurement endpoints (e.g., no-observed-adverse-effect level [NOAEL] vs. lowest-observed-adverse-effect level [LOAEL]). Resultant HQs should not be compared unless the confidence, toxicity endpoints, and measurement endpoints are equal. Where the confidence in ESLs is equal, a higher HQ will suggest a greater likelihood of adverse effects.

5.2 HQ-based Risk Estimates

The reliability of HQs to predict actual risks is dependent on the quality of the exposure and effects concentrations used to calculate HQs. There is greater confidence in HQ-based risk estimates when exposure and effects data are based on large databases reflecting extensive sample collection (exposure data) and toxicological information (effects data). The data collected provide adequate confidence that detected COPC concentrations represent actual conditions relative to chemical contamination.

Similarly, screening levels based on a large toxicity database comprised of a wide variety of organisms are preferred over concentrations from a limited database or those not directly linked to adverse effects. As discussed previously, all screening levels are biased towards over-protection, and it is, therefore, unlikely that risks are underestimated using these conservative screening levels.

5.3 Evaluation of Site-Specific Data

Data collected in August 2006 were used to describe the magnitude and distribution of contaminants in sediment and surface water at the site. Following EPA Guidance (EPA 1997), the maximum detected concentration for each chemical was used to evaluate potential risk for this SLERA. Maximum concentrations of detected chemicals, the sample location where the maximum contaminant concentration was measured, the frequency for detected chemicals, and maximum HQs calculated are presented in Tables 5-1 and 5-2 for sediment and surface water, respectively. If the maximum contaminant concentration exceeds the screening level for that contaminant (i.e, HQ > 1.0), then the potential for adverse ecological effects may exist.

5.4 Evaluation Approach

The following approach was used to identify and evaluate COPCs for this SLERA:

- An HQ > 1.0 (i.e., where the maximum concentration exceeds the ESL) indicates the potential for adverse effects. An HQ $\leq$ 1.0 is considered insignificant as risks are not expected because ESLs are the lowest measurable concentration that is protective of the most sensitive organism.

- The exposure value for each contaminant is assumed to be present throughout the site at the measured concentration all of the time.

- Maximum concentrations of contaminants are used for the risk calculations. The bioavailability of each contaminant is assumed to be 100 percent. No assumptions are considered regarding partitioning or, in the case of metals, ionic species present.

- Background concentrations are not considered.

5.5 Identification of Chemicals of Potential Concern

Chemicals with maximum detected values above their selected ESLs (i.e., HQ > 1.0) were identified as COPCs, as were detected contaminants for which screening-level benchmarks could not be identified. The HQs and identified COPCs, and the reason for their selection, are as follows (see also Tables 5-1 and 5-2).

Contaminants with maximum concentrations exceeding ESLs (HQs >1.0):

- Sediment
    - VOCs: acetone and carbon disulfide

- SVOCs: acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i,)perylene, benzo(k)fluoranthene, dibenzofuran, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene

- Pesticides: 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-BHC, beta-BHC, alpha-chlordane, and gamma-chlordane

- Inorganics: antimony, arsenic, cadmium, chromium, copper, cyanide, iron, lead, manganese, nickel, selenium, and silver

- Surface Water

  - SVOCs: benzo(a)pyrene and fluoranthene

  - Pesticides: 4,4'-DDT, gamma-chlordane, and heptachlor

  - Inorganics: barium, copper, iron, manganese, and vanadium

Contaminants retained as COPCs because no ESLs could be identified:

- Sediment

  - Inorganics: barium, beryllium, thallium, and vanadium

  - VOCs: dichlorodifluoromethane

  - SVOCs: acetophenone

- Surface Water

  - VOCs: chloromethane

The above contaminants were retained as COPCs for this SLERA; however, with the exception of chloromethane, it is unlikely that any are site-related contaminants. Given the nature of the study area, the non-site related COPCs identified are ubiquitous to such a suburban/agricultural landscape (e.g., 4,4'-DDT; benzo(a) pyrene). In addition, over land flow and several storm water culverts convey surface and road runoff into Whortlekill Creek; other surface water bodies are subject to over land flow but to a lesser extent. In both instances this may also be a potential source of COPCs. Finally, some organic COPCs such as acetone, carbon disulfide, and bis(2-ethylexyl)phthalate are considered common laboratory contaminants, and are most likely not site-related.

The primary contaminants at the site are TCE and 1,1,1-TCA in groundwater (see Section 2.1.2); chloromethane, 1,1-DCE, *cis*-1,2-DCE, MEK (2-butanone) and PCE were also identified as site-related contaminants. With the exception of MEK (2-butanone)

(detected in one sample below its screening value) none of these compounds were detected in sediment. 1,1,1-TCA and TCE were detected in some surface water samples; however, levels detected were orders of magnitude below their respective screening criteria. Chloromethane was also detected and retained as a COPC because no ESL was located. Although concentrations of the majority of contaminants are unlikely to be site-related, detected concentrations exceeded ecological screening values, and therefore, they were retained as COPCs. The fate and transport, and toxicity of these COPCs are discussed in Appendix C.

An evaluation of the concentration trends for TCE and 1,1,1-TCA indicates that the higher levels of the groundwater plume are not migrating south of Creamery Road. TCE concentrations have shown a downward trend in all sampled wells along Creamery Road. Wells with 1,1,1-TCA have also shown a decreasing trend. However, low levels of TCE are migrating to the south, primarily in the western lobe of the plume. Based on the decrease in the levels in the groundwater plume, contamination that may discharge into surface water bodies in the future is not expected to be higher than observed during the RI sampling.

5.6 Risk Summary

This section of the SLERA discusses the potential ecological significance of the estimated risks and provides conclusions. Ecological significance considers the limitations and uncertainties (see Section 6) with the quantitative HQ risk estimates. An important first step in understanding the results of this SLERA is to answer the risk questions initially presented in Section 2, Problem Formulation.

The following risk questions were identified as important to the SLERA. The results of the SLERA are used to respond to these questions and to help form conclusions. The risk questions and associated responses are presented below.

- *May ecological receptors be exposed to site-related contaminants present in sediment and surface water?*

  Response: Yes. Available data show that some compounds detected are site-related; more specifically, TCE, 1,1,1-TCA, chloromethane, and MEK (2-butanone). However, with the exception of chloromethane, these compounds were not retained as COPCs as levels detected were orders of magnitude below their respective screening criteria. Chloromethane was retained as a COPC because no ESL was located. COPCs such as polycyclic aromatic hydrocarbons (PAHs) and pesticides are typically associated with suburban/agricultural areas such as those within the study area, and are unlikely to be site related.

- *Where present, are the concentrations of site-related contaminants sufficiently elevated to impair the survival, growth, or reproduction of sensitive ecological receptors?*

  Response: No. With the exception of chloromethane, concentrations of site-related contaminants detected were orders of magnitude below their

respective screening criteria. No ESL for chloromethane was located; however, only trace levels were detected in surface water. It is unlikely any risks exist to ecological receptors from exposure to chloromethane.

- *Are known or potential ecological receptors sufficiently exposed to site-related contaminants to cause adverse population-level or community-level effects?*

  Response: No. With the exception of chloromethane for which no ESL was located, concentrations of site-related contaminants detected were orders of magnitude below their respective screening criteria.

Section 6
Uncertainty Assessment

The potential risks from contaminants in sediment and surface water to communities or populations at the Hopewell Precision site were evaluated by comparing the maximum exposure concentrations to ecological screening values representing the lowest level at which harmful effects would be predicted to occur. Some degree of uncertainty inherent in these comparisons are introduced during various steps in the evaluation. The sources of uncertainty are discussed below, as well as whether the assumptions used are likely to over- or under-represent ecological risks from contaminants at the site. In general, because this SLERA used conservative assumptions, risks are likely overestimated.

The main sources of uncertainty include natural variability, error, and insufficient knowledge. Natural variability is an inherent characteristic of ecological systems, their stressors, and their combined behavior in the environment. Biotic and abiotic parameters in these systems may vary to such a degree that the exposure and response of similar assessment endpoints in the same system may differ temporally and spatially. Factors that contribute to temporal and spatial variability include differences in individual organism behavior (within and between species), changes in the weather or ambient temperature, unanticipated interference from other stressors, interactions with other species in the community, differences between microenvironments, and numerous other factors.

6.1 Problem Formulation

Sources of uncertainty within the problem formulation phase of the SLERA relate to the selection of assessment endpoints and assumptions within the CSM.

The selection of appropriate assessment endpoints to characterize risk is a critical step within the problem formulation of an ecological risk assessment. If an assessment endpoint is overlooked or not identified, environmental risk at the site will be underestimated. Within this SLERA, the selection of assessment endpoints was performed with the intent of being inclusive for this site. However, given the complexity of the environment and the state of knowledge of organism interactions, it is possible that unique exposure pathways or assessment endpoints exist that were not acknowledged within the problem formulation. If additional pathways or assessment endpoints exist, risk may be underestimated.

The CSM presents the pathways by which contaminants are released from source areas to expose receptors. However, some exposure pathways are difficult to evaluate or cannot be quantitatively evaluated based on available information. Within this SLERA the inhalation exposure pathway was not addressed. It was assumed this exposure pathway is not significant when compared to COPC exposure via direct contact and incidental ingestion. This may result in underestimating potential risk.

Target receptors were selected to represent a variety of organisms with similar feeding and behavioral strategies and to assist in the evaluation of measurement

endpoints. However, species-specific exposure within similar feeding groups may vary and result in differing risk potential. Target receptors were selected with the intent of optimizing exposure and assuming that a significant portion of their life cycles was restricted to the area of contamination. The assumption that avian and mammalian target receptors spend a significant portion of their life cycles at the site or a particular area may be conservative.

6.2 Exposure Assessment

All exposure assessments have a degree of uncertainty due to necessary simplifications and assumptions, which must be made as part of the evaluation. Major sources of uncertainty in the exposure assessment are discussed below.

Concentrations used to represent exposure point concentrations and characterizations of the distributions of COPCs can be a source of uncertainty. These issues relate to the adequate characterization of the nature and extent of chemical contamination. It is assumed that sufficient samples have been collected from site media and appropriately analyzed to adequately describe the nature and extent of chemical contamination resulting from the release of site-related chemicals.

When potential levels of uncertainty could adversely affect the results of the assessment, conservative approaches are taken that may result in over-protection of sensitive receptors. Such an approach is prudent where uncertainties are high and is in line with regulatory guidance for conducting SLERAs. For example, maximum detected concentrations of COPCs are used to assess potential risk at the SLERA stage, and this approach likely overestimated the average concentrations to which receptors may be exposed.

In this risk assessment, it was assumed that COPCs in environmental media were 100 percent bioavailable. This is a conservative assumption that will overestimate risk. Bioavailability can be affected by factors including chemical speciation, sorption onto soils or sediment, complexation, aging, competition with environmental ligands, or precipitation in anoxic environments in the presence of sulphides (Chapman *et al.* 2003). Sediment particle size can also influence exposure concentrations and bioavailability; sediments comprised of fine particles will tend to have higher COPC concentrations than coarser textured sediments due to the larger surface area and increased number of potential adsorption sites.

6.3 Effects Assessment

Uncertainties associated with the effects assessment relate to estimations of ESLs, the use of conservative assumptions, and the degree of interaction between site contaminants.

Not all ESLs have the same degree of confidence. For some COPCs, information on toxicity is limited or not available. Additionally, many ESLs were derived from laboratory animal studies that evaluated exposure to a single chemical under controlled conditions. Wildlife species using the Hopewell Precision site may be

exposed to a mixture of COPCs under sometimes stressful environmental conditions, which may affect the toxic impact of a contaminant. Additionally, extrapolation of an ESL derived from populations or species different from those at the site may introduce error because of differences in pharmacokinetics or population and species variability. Further, where ESLs were statistically determined, they do not represent absolute thresholds; they are reflective of the experimental design. Finally, ESLs incorporate error contributed by the use of results from many studies incorporating different methods of sample collection, preparation, and analysis. These factors may result in over- or underestimating ecological risk.

Uncertainties can be introduced by use of unrealistic assumptions in the CSM. In SLERAs, conservative assumptions are generally made in light of the uncertainty associated with the risk assessment process. This minimizes the possibility of concluding that no risk is present when a threat actually does exist (e.g., minimizes false negatives). However, the accuracy with which risk was predicted is not known. The use of conservative assumptions likely overestimates potential risk.

There is also the potential of cumulative stress from exposure to additional stressors (e.g., habitat degradation); however, this was not evaluated in this SLERA. If other stressors exist at the site, and if the effects of those stressors and the effects of exposure to site-related contaminants are cumulative, ecological risks at the site may be underestimated.

6.4 Risk Characterization

By definition, uncertainties in risk characterization are influenced by uncertainties in exposure assessment and effects assessment. The adequate sampling and analysis of sediment and surface water minimize the uncertainties in the exposure assessment of these media. Descriptions of the magnitude and distribution of COPCs at the site are considered to be generally representative of current conditions. Since only the maximum-detected concentrations are used at this stage of the ecological risk assessment, the range of exposure concentrations is less critical to the results of the SLERA.

The frequency of a specific chemical in exceedance of its criteria was not taken into consideration as part of the COPC identification process. In several instances chemicals were retained as a COPCs; however, they were often detected in a fraction of the samples and in several cases were found in only one. This was most prevalent in surface water samples where six of the nine chemicals retained as COPCs exceeded the criteria in the one sample where that chemical was detected.

Effects data can also contribute to overall uncertainty in risk characterization. Science and scientific investigations cannot prove any hypothesis beyond doubt. The scientific method is instead based on stating the hypotheses, testing the hypotheses, and either accepting or rejecting the hypotheses based on the weight-of-evidence provided by test data. Confidence in the ability of selected ESLs to assess ecological risks varies for each data value selected. While all ESLs used in this SLERA are associated with some degree of uncertainty, it is the general trend described by the comparisons between

exposure concentrations and effects concentrations, and the overall confidence in such comparisons, that are most important. Available information suggests that the ESLs selected for use in this SLERA are generally similar to other ESLs, are commonly accepted for screening, and adequate for estimating risk using conservative assumptions.

Detected concentrations of COPCs may not be indicative of bioavailable concentrations. All contaminant data used in the assessment were based upon the total concentration of the chemical present, as opposed to the bioavailable fraction. Both metals and organic compounds may bind to the sediment, making them less available to aquatic life, particularly higher receptors. Thus, risk may be overestimated in some cases.

Another potential source of uncertainty is the small amount of biological or ecological survey data to support this SLERA. The types of surveys needed to aid in the determination of cause and effect relationships, especially at the community or population level, are highly dependent on data quality and data quantity. Such data, however, are not typically included in a SLERA. Recent observations based on a more general site visit/survey are used to qualitatively evaluate habitat quality, habitat use, presence of receptors, and observations of adverse impacts.

Finally, the risk characterization method itself can contribute to uncertainty. HQs depend on a single value for both exposure concentration and effects concentration. Selecting a single screening level, only after consulting multiple sources to ensure some degree of consistency, minimizes the uncertainty associated with any single value. Incorporating site observations into final conclusions also reduces the dependence on strict quantitative risk estimates that, in some cases, can be highly uncertain.

Section 7
Summary and Conclusions

Based on a comparison of maximum detected concentrations of contaminants in site sediment and surface water to conservatively derived ESLs, the potential for ecological risk may occur. Specifically, HQs > 1.0 were calculated which indicate potential risk from exposure to the following media-specific contaminants:

- Sediment
  - VOCs: acetone and carbon disulfide
  - SVOCs: acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i,)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene
  - Pesticides: 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-BHC, beta-BHC, alpha-chlordane, and gamma-chlordane
  - Inorganics: antimony, arsenic, cadmium, chromium, copper, cyanide, iron, lead, manganese, nickel, selenium, and silver

- Surface Water
  - SVOCs: benzo(a)pyrene and fluoranthene
  - Pesticides: 4,4'-DDT, gamma-chlordane, and heptachlor
  - Inorganics: barium, copper, iron, manganese, and vanadium

Potential risk from the following media-specific contaminants cannot be concluded as ESLs were not available for these compounds.

- Sediment: barium, beryllium, thallium, vanadium, dichlorodifluoromethane and acetophenone
- Surface water: chloromethane

COPCs were comprised of different classes of contaminants in this SLERA; however, it is unlikely that any are site-related. Review of site background and historical information (Section 2.1.2) show the primary contaminants and associated media at the site are TCE, 1,1,1-TCA, chloromethane, 1,1-DCE, *cis*-1,2-DCE, MEK (2-butanone), and PCE in ground water. 1,1,1-TCA and TCE were detected in some surface water samples; however, levels detected were orders of magnitude below their respective screening criteria. In addition, MEK (2-butanone) was detected in one sediment sample below its screening criteria. These site-related compounds were not retained as COPCs due to their low concentrations. Chloromethane has been identified as a site-related contaminant and was retained as a COPC because no ESL was located; however, only trace levels were detected in surface water. It is unlikely any risks exist to ecological receptors from exposure to this compound.

Responses to risk questions identified in Section 2, Problem Formulation, of this SLERA indicate no risk to ecological receptors from site-related contaminants. COPCs such as polycyclic aromatic hydrocarbons (PAHs) and pesticides are typically

associated with suburban/agricultural areas such as those within the study area, and are unlikely to be site related. In addition, Whortlekill Creek receives surface and road runoff via overland flow and storm water drains; other surface water bodies are subject to overland flow further contributing to the loading of non site-related COPCs. Although groundwater has been observed to discharge to several surface water bodies in the site vicinity (e.g., Whortlekill Creek, Redwing Lake, and the gravel pit), the groundwater plume appears to be dissipating and contaminant levels discharging to water bodies are expected to remain at extremely low levels or decrease as the groundwater plume continues to dissipate. Therefore, it is recommended that no further investigations or ecological risk assessments are warranted.

Section 8
References

CDM Federal Programs Corporation (CDM). 2006a. Final Work Plan, Remedial Investigation/Feasibilty Study Hopewell Precision Site, Hopewell Junction, New York.

CDM. 2006b. Final Quality Assurance Project Plan, Remedial Investigation/Feasibilty Study Hopewell Precision Site, Hopewell Junction, New York.

_____2008. Final Remedial Investigation Report, Hopewell Precision Site, Hopewell Junction, New York.

Chapman, P. M., F. Wang, C. R. Janssen, R. R. Goulet, and C. N. Kamunde. 2003. Conducting ecological risk assessments of inorganic metals and metalloids: Current status. Human Ecol. Risk Assess. 9(4): 641-697.

U.S. Environmental Protection Agency (EPA) 2007. EPA Region 3 BTAG Screening Benchmarks, Mid-Atlantic Risk Assessment: Ecological Risk Assessment (on-line 2007).

_____2006. National Recommended Water Quality Criteria. EPA-822-R-02-047.

_____2003. Ecological Soil Screening Level for Aluminum, Interim Final, OSWER Directive 9285.7-60, Office of Solid Waste and Emergency Response, 1200 Pennsylvania Avenue, N.W. Washington, DC 20460.

_____1998. Guidelines for Ecological Risk Assessment. EPA/630-R-95/002F.

_____1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. EPA 540-R-97-006. .16736.

Jones, D.S., G.W. Suter,II, and R.N. Hull. 1997. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment-Associated Biota: 1997 Revision Oak Ridge National Laboratory. ES/ER/TM-95/R4.

New York State Department of Environmental Conservation (NYSDEC). 1999. Technical Guidance for Benthic Aquatic Life Chronic Toxicity and for Wildlife Bioaccumulation.

_____1998. Technical Operational Guidance, Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations.

National Oceanic and Atmospheric Administration (NOAA). 2006. Screening Quick Reference Tables.

Roy F. Weston (Weston). 2004. Hazard Ranking System Documentation Package Hopewell Precision Area Site, Dutchess County, New York. July

Smith, S.L., D.D. MacDonald, K.A. Keenleyside, C.G. Ingersoll and L.J. Field. 1996. A Preliminary Evaluation of Sediment Quality Assessment Values for Freshwater Ecosystems. J. Great Lakes Res. 22(3):624-638.

Washington State Department of Ecology. 1997. Freshwater Sediment Quality Values.

Table 2-1
List of Plant Species Observed
Hopewell Precision Site
Hopewell Junction, New York

Common Name	Scientific Name	Areas Observed
Alder	*Alnus* spp.	RWL; GP
American beech	*Fagus grandifolia*	WC
American Hornbeam	*Carpinus caroliniana*	WC
Asiatic bittersweet	*Celastrus orbiculatus*	RDW
Asiatic dayflower	*Commelina communis*	WC
Aspen	*Populus* spp.	RWL; RDW; GP
Aster	*Aster* spp.	RWL
Azalea	*Azalea* spp.	WC
Bedstraw	*Galium* spp.	WC
Black gum	*Nyssa sylvatica*	RWL; GP; WC
Black locust	*Robinia pseudoacacia*	WC; RWL; GP; UP2
Bladder campion	*Silene vulgaris*	RWL
Boxelder	*Acer negundo*	RWL
Bracken fern	*Pteridium aquilinum*	WC
Buckthorn	*Rhamnus* spp.	RDW
Buttonbush	*Cephalanthus occidentalis*	RDW
Cardinal flower	*Lobelia cardinalis*	WC
Cattail	*Typha latifolia*	GP
Cherry	*Prunus* spp.	RDW
Chicory	*Cichorium intybus*	RWL; UP2
Cinnamon fern	*Osmunda cinnamomea*	WC
Clearweed	*Pilea pumila*	WC; RDW
Coltsfoot	*Tussilago farfara*	RWL
Common mullein	*Verbascum thapsus*	GP
Common reed	*Phragmites australis*	RWL; GP
Crab apple	*Malus* spp.	RDW
Dandelion	*Taraxacum officinale*	UP2
Dogwood	*Cornus* spp.	WC; RDW
Duckweed	*Lemna* spp.	WC
False nettle	*Boehmeria cylindrica*	RDW
Foxtail	*Setaria* spp.	GP
Garlic mustard	*Alliaria officinalis*	WC; UP2; RDW

Table 2-1
List of Plant Species Observed
Hopewell Precision Site
Hopewell Junction, New York

Common Name	Scientific Name	Areas Observed
Goldenrod	*Solidago* spp.	WC; GP; RDW
Green ash	*Fraxinus pennsylvanica*	WC; RDW
Grey birch	*Betula populifolia*	RWL; RRL; GP
Hickory	*Carya* spp.	WC; UP2
Honeysuckle	*Lonicera* spp.	RDW
Ironwood	*Ostrya virginiana*	WC
Jack-in-the-pulpit	*Arisaeme triphyllum*	RWL; WC
Japanese barberry	*Berberis thunbergii*	WC
Japanese stiltgrass	*Microstegium viminieum*	RWL; RDW
Lady's thumb	*Polygonum persicaria*	WC; UP2; RDW
Maple leaf viburnum	*Viburnum acerifolium*	GP
Milkweed	*Asclepias* spp.	RWL
Mulitflora rose	*Rosa mulitflora*	RWL
Partridge berry	*Mitchella repens*	WC
Plantain	*Plantago* spp.	UP2
Poison ivy	*Toxicodendron radicans*	WC; RWL; GP; UP2; RDW
Purple gerardia	*Gerardia purpurea*	WC
Purple loosestrife	*Lythrum salicaria*	RWL; GP; WC
Queen Annes lace	*Daucus carota*	RWL; GP
Ragweed	*Ambrosia artemisiifolia*	GP; RDW
Red cedar	*Juniperus virginiana*	RWL; RDW
Red maple	*Acer rubrum*	WC; RWL; GP; UP2; RDW
Red oak	*Quercus rubra*	WC; GP; RDW
Royal fern	*Osmunda regalis*	WC
Sassafras	*Sassafras albidum*	WC; GP
Scouring rush	*Equisetum hyemale*	GP
Sensitive fern	*Onoclea sensibilis*	WC; GP; RDW
Shagbark hickory	*Carya ovata*	WC; UP2; GP; RDW
Skunk cabbage	*Symplocarpus foetidus*	GP; WC
Spice bush	*Lindera benzoin*	WC
Spotted wintergreen	*Chimaphila maculata*	WC; GP
Spruce	*Picea* spp.	GP

Table 2-1
List of Plant Species Observed
Hopewell Precision Site
Hopewell Junction, New York

Common Name	Scientific Name	Areas Observed
Sumac	*Rhus* spp.	RWL; GP
Sycamore	*Platanus occidentalis*	RWL
Thistle	*Cirsium* spp.	WC
Touch-me-not	*Impatiens pallida*	RWL; UP2; WC; RDW
Tree-of-heaven	*Ailanthus altissima*	GP
Virginia creeper	*Parthenocissus quinquefolia*	WC; RWL; GP; RDW
Weeping willow	*Salix babylonica*	RWL
White oak	*Quercus alba*	GP; UP2
White pine	*Pinus strobus*	RWL; GP; UP2; RDW
White snakeroot	*Eupatorium rugosum*	WC; RWL
Wild grape	*Vitis* spp.	RDW
Willow	*Salix* spp.	RWL; GP
Winterberry holly	*Illex verticillata*	WC; RDW

RWL - Redwing Lake
GP - Gravel Pit
UP2 - Unnamed Pond 2
WC - Whortlekill Creek
RDW - Ryan Drive Wetland

Table 2-2
Wildlife Species Observed
Hopewell Precision Site
Hopewell Junction, New York

Common Name	Scientific Name	Areas Observed
American crow	*Corvus brachyrhynchos*	RWL
American robin	*Turdus migratorius*	WC
Aquatic snails	Gastropoda	WC
Blue jay	*Cyanocitta cristata*	RWL; WC
Broad-winged hawk	*Buteo platypterus*	WC
Canada goose	*Branta canadensis*	RWL
Chipmunk	*Tamias striatus*	RWL; WC
Crayfish	Decapoda	WC
Eastern cottontail	*Sylvilagus floridanus*	RDW
Freshwater clam	Bivalva	WC
Gray catbird	*Dumetella carolinensis*	WC
Gray squirrel	*Sciurus carolinensis*	RWL; WC
Great blue heron	*Ardea herodias*	GP
Green frog	*Rana clamitans*	WC
Green heron	*Butorides virescens*	WC
Grey tree frog	*Hyla versicolor*	GP; UP2
Groundhog	*Marmota monax*	WC
Hairy woodpecker	*Picoides villosus*	WC
Killdeer	*Charadrius vociferus*	RWL
Largemouth bass	*Micropterus salmoides*	RWL; GP
Misc. forage fish	not identified	RWL; GP; WC
Northern Cardinal	*Cardinalis cardinalis*	RWL
Northern flicker	*Colaptes auratus*	WC; RWL
Painted turtle	*Chrysemys picta*	RWL; GP
Pickerel frog	*Rana palustris*	GP; WC; RDW; UP2
Pileated woodpecker	*Dryocopus pileatus*	RWL
Raccoon	*Procyon lotor*	RWL; GP; RDW
Red-back salamander	*Plethodon cinereus*	RWL
Snapping turtle	*Chelydra serpentina*	RWL
Spring peeper	*Hyla crucifer*	RDW
Sunfish	*Lepomis* spp	RWL; GP; WC
Two-lined salamander	*Eurycea bislineata*	WC

Table 2-2
Wildlife Species Observed
Hopewell Precision Site
Hopewell Junction, New York

Common Name	Scientific Name	Areas Observed
Unidentified hawk	*Buteo* spp.	WC
White sucker	*Catostomus commersoni*	WC
White tail deer	*Odocoileus virginianus*	WC; RWL; GP; RDW
Wild turkey	*Meleagris gallopavo*	WC
Wood frog	*Rana sylvatica*	RWL; GP

RWL - Redwing Lake
GP - Gravel Pit
UP2 - Unnamed Pond 2
WC - Whortlekill Creek
RDW - Ryan Drive Wetland

Table 2-3
Organic Compounds Detected in Sediment
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemicals	CAS Number	Ryan Drive Wetland	Unnamed Pond 1		Unnamed Pond 2		
		SD-001	SD-002	SD-003	SD-004	SD-005	SD-006
VOCs (µg/kg)							
Dichlorodifluoromethane	75-71-8	38 UJ	58 UJ	32 UJ	57 UJ	12 U	18 UJ
Acetone	67-64-1	38 UJ	58 UJ	32 UJ	57 UJ	12 U	18 UJ
Carbon Disulfide	75-15-0	38 UJ	58 UJ	32 UJ	57 UJ	12 U	18 UJ
2-Butanone	78-93-3	38 UJ	58 UJ	32 UJ	57 UJ	12 U	18 UJ
SVOCs (µg/kg)							
Acenaphthene	83-32-9	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Acetophenone	98-86-2	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Anthracene	120-12-7	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Benzo(a)anthracene	56-55-3	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Benzo(a)pyrene	50-32-8	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Benzo(b)fluoranthene	205-99-2	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Benzo(g,h,i)perylene	191-24-2	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Benzo(k)fluoranthene	207-08-9	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
bis(2-Ethylhexyl) phthalate	117-81-7	1400 UJ	2100 UJ	830 UJ	1800 UJ	100 J	670 UJ
Chrysene	218-01-9	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Dibenz(a,h)anthracene	53-70-3	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Dibenzofuran	132-64-9	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Fluoranthene	206-44-0	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Fluorene	86-73-7	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Indeno(1,2,3-cd)pyrene	193-39-5	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Phenanthrene	85-01-8	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Pyrene	129-00-0	1400 UJ	2100 UJ	830 UJ	1800 UJ	420 U	670 UJ
Pesticides (µg/kg)							
4,4'-DDD	72-54-8	14 UJ	14 J	8.3 UJ	18 UJ	4.2 U	6.7 UJ
4,4'-DDE	72-55-9	2.8 J	13 J	2.1 J	18 UJ	1.3 J	2.8 J
4,4'-DDT	50-29-3	14 UJ	21 UJ	8.3 UJ	18 UJ	4.2 U	6.7 UJ
alpha-BHC	319-84-6	7.1 UJ	11 UJ	4.3 UJ	9.4 UJ	2.2 U	3.5 UJ
alpha-Chlordane	5103-71-9	7.1 UJ	11 UJ	4.3 UJ	6.8 J	2.2 U	3.5 UJ
beta-BHC	319-85-7	7.1 UJ	11 UJ	4.3 UJ	9.4 UJ	2.2 U	3.5 UJ
Dieldrin	60-57-1	14 UJ	21 UJ	8.3 UJ	18 UJ	4.2 U	6.7 UJ
gamma-Chlordane	5103-74-2	7.1 UJ	11 UJ	4.3 UJ	9.4 UJ	2.2 U	3.5 UJ

µg/kg - microgram per kilogram
CBR - Clove Branch Road
J - estimated
SVOCs - Semi-Volatile Organic Compounds
U - non-detect
VOCs - Volatile Organic Compounds

Table 2-3
Organic Compounds Detected in Sediment
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemicals	CAS Number	Redwing Lake									
		SD-007	SD-008	SD-009	SD-010	SD-011	SD-012	SD-013	SD-014	SD-015	SD-016
VOCs (µg/kg)											
Dichlorodifluoromethane	75-71-8	14 U	4 J	12 U	12 U	12 U	10 U	10 U	12 U	83 UJ	23 UJ
Acetone	67-64-1	76 J	11 UJ	12 UJ	12 UJ	12 UJ	12 UJ	10 UJ	27 UJ	83 UJ	51 UJ
Carbon Disulfide	75-15-0	14 U	11 U	12 U	12 U	12 U	10 U	10 U	12 U	83 UJ	23 UJ
2-Butanone	78-93-3	14 UJ	11 U	12 UJ	12 UJ	12 UJ	10 UJ	10 UJ	7 J	83 UJ	23 UJ
SVOCs (µg/kg)											
Acenaphthene	83-32-9	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Acetophenone	98-86-2	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	690 J	660 U
Anthracene	120-12-7	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Benzo(a)anthracene	56-55-3	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Benzo(a)pyrene	50-32-8	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Benzo(b)fluoranthene	205-99-2	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Benzo(g,h,i)perylene	191-24-2	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Benzo(k)fluoranthene	207-08-9	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
bis(2-Ethylhexyl) phthalate	117-81-7	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Chrysene	218-01-9	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Dibenz(a,h)anthracene	53-70-3	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Dibenzofuran	132-64-9	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Fluoranthene	206-44-0	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Fluorene	86-73-7	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Indeno(1,2,3-cd)pyrene	193-39-5	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Phenanthrene	85-01-8	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Pyrene	129-00-0	480 U	420 U	410 U	390 UJ	420 U	380 U	370 U	430 U	3000 UJ	660 U
Pesticides (µg/kg)											
4,4'-DDD	72-54-8	4.8 U	4.2 U	4.1 U	3.9 U	4.2 U	3.8 U	3.7 U	4.3 U	30 UJ	6.6 U
4,4'-DDE	72-55-9	4.8 U	4.2 U	4.1 U	3.9 U	4.2 U	3.8 U	3.7 U	4.3 U	30 UJ	6.6 U
4,4'-DDT	50-29-3	4.8 U	4.2 U	4.1 U	3.9 U	4.2 U	3.8 U	3.7 U	4.3 U	30 UJ	6.6 U
alpha-BHC	319-84-6	2.5 U	2.2 U	2.4	2 U	2.2 U	1.9 U	1.9 U	2.2 U	15 UJ	3.4 U
alpha-Chlordane	5103-71-9	2.5 U	2.2 U	2.1 U	2 U	2.2 U	1.9 U	1.9 U	2.2 U	15 UJ	3.4 U
beta-BHC	319-85-7	2.5 U	2.2 U	2.1 U	2 U	2.2 U	1.9 U	1.9 U	2.2 U	7.3 J	3.4 U
Dieldrin	60-57-1	4.8 U	4.2 U	4.1 U	3.9 U	4.2 U	3.8 U	3.7 U	4.3 U	9.9 J	6.6 U
gamma-Chlordane	5103-74-2	2.5 U	2.2 U	2.1 U	2 U	2.2 U	1.9 U	1.9 U	2.2 U	15 UJ	3.4 U

µg/kg - microgram per kilogram
CBR - Clove Branch Road
J - estimated
SVOCs - Semi-Volatile Organic Compounds
U - non-detect
VOCs - Volatile Organic Compounds

Table 2-3
Organic Compounds Detected in Sediment
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemicals	CAS Number	Gravel Pit										CBR Pond
		SD-017	SD-018	SD-019	SD-020	SD-021	SD-022	SD-023	SD-024	SD-025	SD-026	SD-027
VOCs (µg/kg)												
Dichlorodifluoromethane	75-71-8	12 U	2 J	10 U	12 U	5 J	10 J	4 J	20 UJ	11 U	13 J	11 U
Acetone	67-64-1	12 UJ	10 U	13 UJ	12 UJ	11 U	10 U	14 U	20 UJ	11 U	26 J	11 UJ
Carbon Disulfide	75-15-0	12 U	10 U	10 U	12 U	11 U	10 U	14 U	5 J	11 U	19 UJ	11 U
2-Butanone	78-93-3	12 U	10 UJ	10 U	12 U	11 UJ	10 UJ	14 UJ	20 UJ	11 UJ	19 UJ	11 UJ
SVOCs (µg/kg)												
Acenaphthene	83-32-9	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Acetophenone	98-86-2	430 U	380 UJ	370 U	400 U	380 U	380 U	140 J	690 UJ	390 U	150 J	400 U
Anthracene	120-12-7	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Benzo(a)anthracene	56-55-3	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Benzo(a)pyrene	50-32-8	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Benzo(b)fluoranthene	205-99-2	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Benzo(g,h,i)perylene	191-24-2	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Benzo(k)fluoranthene	207-08-9	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
bis(2-Ethylhexyl) phthalate	117-81-7	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Chrysene	218-01-9	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Dibenz(a,h)anthracene	53-70-3	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Dibenzofuran	132-64-9	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Fluoranthene	206-44-0	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Fluorene	86-73-7	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Indeno(1,2,3-cd)pyrene	193-39-5	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Phenanthrene	85-01-8	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Pyrene	129-00-0	430 U	380 UJ	370 U	400 U	380 U	380 U	490 U	690 UJ	390 U	690 UJ	400 U
Pesticides (µg/kg)												
4,4'-DDD	72-54-8	4.3 U	3.8 U	2.4 J	4 U	3.8 U	3.8 U	4.9 U	6.9 UJ	3.9 U	6.9 UJ	4 U
4,4'-DDE	72-55-9	4.3 U	3.8 U	3.7 U	4 U	3.8 U	3.8 U	4.9 U	6.9 UJ	3.9 U	6.9 UJ	4 U
4,4'-DDT	50-29-3	4.3 U	3.8 U	26	4 U	3.8 U	3.8 U	4.9 U	6.9 UJ	3.9 U	6.9 UJ	4 U
alpha-BHC	319-84-6	2.2 U	2 U	1.9 U	2 U	2 U	2 U	2.5 U	3.5 UJ	2 U	3.5 UJ	2 U
alpha-Chlordane	5103-71-9	2.2 U	2 U	1.9 U	2 U	2 U	2 U	2.5 U	3.5 UJ	2 U	3.5 UJ	2 U
beta-BHC	319-85-7	2.2 U	2 U	1.9 U	2 U	2 U	2 U	2.5 U	3.5 UJ	2 U	3.5 UJ	2 U
Dieldrin	60-57-1	4.3 U	3.8 U	3.7 U	4 U	3.8 U	3.8 U	4.9 U	6.9 UJ	3.9 U	6.9 UJ	4 U
gamma-Chlordane	5103-74-2	2.2 U	2 U	1.9 U	2 U	2 U	2 U	2.5 U	3.5 UJ	2 U	3.5 UJ	2 U

µg/kg - microgram per kilogram
CBR - Clove Branch Road
J - estimated
SVOCs - Semi-Volatile Organic Compounds
U - non-detect
VOCs - Volatile Organic Compounds

Table 2-3
Organic Compounds Detected in Sediment
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemicals	CAS Number	Whortlekill Creek										Background	
		SD-028	SD-029	SD-030	SD-031	SD-032	SD-033	SD-034	SD-035	SD-036	SD-037	SD-038	SD-039
VOCs (µg/kg)													
Dichlorodifluoromethane	75-71-8	14 U	31 UJ	12 U	14 U	10 U	12 U	11 U	3 J	14 U	15 U	17 UJ	52 UJ
Acetone	67-64-1	14 UJ	31 UJ	12 U	14 UJ	10 U	12 UJ	11 UJ	11 UJ	14 U	15 U	17 UJ	52 UJ
Carbon Disulfide	75-15-0	14 U	31 UJ	12 U	14 U	10 U	12 U	11 U	11 U	14 U	15 U	17 UJ	52 UJ
2-Butanone	78-93-3	14 UJ	31 UJ	12 U	14 UJ	10 UJ	12 UJ	11 UJ	11 UJ	14 U	15 U	17 UJ	52 UJ
SVOCs (µg/kg)													
Acenaphthene	83-32-9	480 U	870 UJ	360 J	430 U	370 UJ	430 U	410 U	410 U	400 U	390 U	720 UJ	2200 UJ
Acetophenone	98-86-2	480 U	870 UJ	450 U	430 U	370 UJ	430 U	410 U	410 U	400 U	390 U	720 UJ	2200 UJ
Anthracene	120-12-7	480 U	870 UJ	720	430 U	370 UJ	430 U	410 U	410 U	400 U	96 J	720 UJ	2200 UJ
Benzo(a)anthracene	56-55-3	480 U	870 UJ	2600	430 U	370 UJ	430 U	410 U	410 U	88 J	220 J	720 UJ	2200 UJ
Benzo(a)pyrene	50-32-8	480 U	870 UJ	2400	430 U	370 UJ	430 U	410 U	410 U	400 U	190 J	720 UJ	2200 UJ
Benzo(b)fluoranthene	205-99-2	480 U	870 UJ	3300	430 U	370 UJ	430 U	410 U	410 U	85 J	200 J	720 UJ	2200 UJ
Benzo(g,h,i)perylene	191-24-2	480 U	870 UJ	1500	430 U	370 UJ	430 U	410 U	410 U	400 U	130 J	720 UJ	2200 UJ
Benzo(k)fluoranthene	207-08-9	480 U	870 UJ	2400	430 U	370 UJ	430 U	410 UJ	410 UJ	87 J	170 J	720 UJ	2200 UJ
bis(2-Ethylhexyl) phthalate	117-81-7	160 J	870 UJ	450 U	430 U	370 UJ	430 U	410 U	410 U	400 U	390 U	720 UJ	2200 UJ
Chrysene	218-01-9	480 U	870 UJ	3200	430 U	370 UJ	430 U	410 U	410 U	110 J	260 J	720 UJ	2200 UJ
Dibenz(a,h)anthracene	53-70-3	480 U	870 UJ	750	430 U	370 UJ	430 U	410 U	410 U	400 U	390 U	720 UJ	2200 UJ
Dibenzofuran	132-64-9	480 U	870 UJ	190 J	430 U	370 UJ	430 U	410 U	410 U	400 U	390 U	720 UJ	2200 UJ
Fluoranthene	206-44-0	480 U	870 UJ	6600	430 U	370 UJ	430 U	140 J	410 U	200 J	500	720 UJ	2200 UJ
Fluorene	86-73-7	480 U	870 UJ	450	430 U	370 UJ	430 U	410 U	410 U	400 U	390 U	720 UJ	2200 UJ
Indeno(1,2,3-cd)pyrene	193-39-5	480 U	870 UJ	1700	430 U	370 UJ	430 U	410 U	410 U	400 U	150 J	720 UJ	2200 UJ
Phenanthrene	85-01-8	480 U	870 UJ	4300	430 U	370 UJ	430 U	410 U	410 U	110 J	420	720 UJ	2200 UJ
Pyrene	129-00-0	480 U	870 UJ	4800	430 U	370 UJ	430 U	140 J	410 U	200 J	490	720 UJ	2200 UJ
Pesticides (µg/kg)													
4,4'-DDD	72-54-8	4.8 U	8.7 UJ	4.5 U	4.3 U	3.7 U	3.3 U	3.3 U	3.3 U	3.3 U	3.9 U	7.2 UJ	22 UJ
4,4'-DDE	72-55-9	2.9 J	2.2 J	4.5 U	1.2 J	3.7 U	3.3 U	3.3 U	3.3 U	3.3 U	3.9 U	3.2 J	11 J
4,4'-DDT	50-29-3	4.8 U	8.7 UJ	4.5 U	4.3 U	3.7 U	3.3 U	3.3 U	3.3 U	3.3 U	3.9 U	7.2 UJ	22 UJ
alpha-BHC	319-84-6	2.5 U	4.5 UJ	2.3 U	2.2 U	1.9 U	1.7 U	1.7 U	1.7 U	1.7 U	2 U	3.7 UJ	11 UJ
alpha-Chlordane	5103-71-9	2.5 U	4.5 UJ	2.3 U	2.2 U	1.9 U	1.7 U	1.7 U	0.38 J	1.7 U	2 U	3.7 UJ	11 UJ
beta-BHC	319-85-7	2.5 U	4.5 UJ	2.3 U	2.2 U	1.9 U	1.7 U	1.7 U	1.7 U	1.7 U	2 U	3.7 UJ	11 UJ
Dieldrin	60-57-1	4.8 U	8.7 UJ	4.5 U	4.3 U	3.7 U	3.3 U	3.3 U	3.3 U	3.3 U	3.9 U	7.2 UJ	22 UJ
gamma-Chlordane	5103-74-2	2.5 U	4.5 UJ	10	2.2 U	1.9 U	1.7 U	1.7 U	0.62 J	1.7 U	2 U	3.7 UJ	11 UJ

µg/kg - microgram per kilogram
CBR - Clove Branch Road
J - estimated
SVOCs - Semi-Volatile Organic Compounds
U - non-detect
VOCs - Volatile Organic Compounds

Table 2-4
Inorganics Detected in Sediment
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemical	CAS Number	Ryan Drive Wetland	Unnamed Pond 1		Unnamed Pond 2		
		SD-001	SD-002	SD-003	SD-004	SD-005	SD-006
Inorganic (mg/kg)							
Aluminum	7429-90-5	27000	12000	16000	7200	17000	13000
Antimony	7440-36-0	5.4 U	5.7 U	3.8 U	5.4 U	3.7	2.9
Arsenic	7440-38-2	8.5	4.6	0.96	3.4	6.1	5.6
Barium	7440-39-3	150	91	36	55	54	58
Beryllium	7440-41-7	0.95	0.71 U	0.47 U	0.67 U	0.6	0.54
Cadmium	7440-43-9	0.68 U	0.89	0.47 U	0.72	0.6	0.5
Calcium	7440-70-2	5200	13000	5100	23000	4000	4800
Chromium	7440-47-3	25	17	15	12	16	15
Cobalt	7440-48-4	16	9.2	8.5	5	11	9.5
Copper	7440-50-8	54	21	12	29	25	21
Iron	7439-89-6	37000	23000	27000	13000	35000	28000
Lead	7439-92-1	38	47	15	31	52	40
Magnesium	7439-95-4	8900	4300	7600	3300	6800	5300
Manganese	7439-96-5	770	1200	290	580	900	690
Nickel	7440-02-0	39	19	26	15	27	20
Potassium	7440-09-7	1500	680	650	740	690	530
Selenium	7782-49-2	4.8 U	4.9 U	3.3 U	5.3	2.1 U	1.8 U
Silver	7440-22-4	0.68 U	0.71 U	0.47 U	0.67 U	0.3 U	0.26 U
Sodium	7440-23-5	140 U	140 U	94 U	130 U	60 U	52 U
Thallium	7440-28-0	14 U	14 U	9.4 U	13 U	6 U	5.2 U
Vanadium	7440-62-2	31	15	15	17	19	17
Zinc	7440-66-6	2.7 U	2.8 U	1.9 U	2.7 U	1.2 U	1 U
Cyanide	57-12-5	0.32 U	0.29 U	0.22 U	0.9	0.21	0.23

mg/kg - milligram per kilogram
U - non-detect
J - estimated
CBR - Clove Branch Road

Table 2-4
Inorganics Detected in Sediment
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemical	CAS Number	Redwing Lake									
		SD-007	SD-008	SD-009	SD-010	SD-011	SD-012	SD-013	SD-014	SD-015	SD-016
Inorganic (mg/kg)											
Aluminum	7429-90-5	13000	12000	9100	760	6000	11000	12000	12000	7400	11000
Antimony	7440-36-0	280	5 U	4.9 U	5.1 U	3.1 U	2.8 U	4.9 U	3	9.4 U	2.8
Arsenic	7440-38-2	4.2	2.8	2.9	1.3 U	2.8	2.9	2.9	3.6	2.4 U	2.6
Barium	7440-39-3	33	19	14	13 U	13	21	18	25	57	30
Beryllium	7440-41-7	0.25 U	0.62 U	0.61 U	0.64 U	0.39 U	0.35 U	0.62 U	0.27 U	1.2 U	0.29 U
Cadmium	7440-43-9	0.25 U	0.62 U	0.61 U	0.64 U	0.39 U	0.35 U	0.62 U	0.37	1.2 U	0.53
Calcium	7440-70-2	61000 J	5700	13000	21000	94000	3300	35000	62000	30000	65000
Chromium	7440-47-3	13	11	8.9	2.4	6.1	10	9.6	14	43	15
Cobalt	7440-48-4	12	9.5	6.9	2.6 U	4.5	10	9.4	10	4.7 U	8.6
Copper	7440-50-8	23	19	15	3.2 U	12	23	18	25	25	17
Iron	7439-89-6	27000	25000	19000	1800	13000	24000	26000	26000	9200	25000
Lead	7439-92-1	20	15	13	1.4	6.5	13	16	23	49	23
Magnesium	7439-95-4	11000	7600	11000	12000	53000	6000	7100	8500	3700	8400
Manganese	7439-96-5	880	410	270	42	280	380	430	410	63	400
Nickel	7440-02-0	22	21	16	2.6 U	10	21	24	23	14	19
Potassium	7440-09-7	340	420	420	65	710	270	340	460	480	420
Selenium	7782-49-2	1.8 U	4.4 U	4.3 U	4.5 U	2.7 U	2.5 U	4.3 U	1.9 U	11	2.4
Silver	7440-22-4	0.25 U	0.62 U	0.61 U	0.64 U	0.39 U	0.35 U	0.62 U	0.27 U	1.2 U	0.29 U
Sodium	7440-23-5	390	160 J	120 U	130 U	77 U	70 U	120 U	54 U	240 U	58 U
Thallium	7440-28-0	5 U	12 U	12 U	13 U	7.7 U	7 U	12 U	5.4 U	24 U	5.8 U
Vanadium	7440-62-2	13	11	8.5	2.9	6.4	10	11	13	6	10
Zinc	7440-66-6	68	2.5 U	2.5 U	2.6 U	1.5 U	1.4 U	2.5 U	1.1 U	4.7 U	1.2 U
Cyanide	57-12-5	0.11 U	0.068 U	0.061 U	0.061 U	0.12 U	0.072 U	0.072 U	0.072 U	0.91	0.13 U

mg/kg - milligram per kilogram
U - non-detect
J - estimated
CBR - Clove Branch Road

Table 2-4
Inorganics Detected in Sediment
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemical	CAS Number	Gravel Pit										CBR Pond
		SD-017	SD-018	SD-019	SD-020	SD-021	SD-022	SD-023	SD-024	SD-025	SD-026	SD-027
Inorganic (mg/kg)												
Aluminum	7429-90-5	10000	13000	8700	12000	13000	12000	10000	4900	11000	9700	11000
Antimony	7440-36-0	2.9 U	4.8 U	4.8 U	3	4.5 U	3	1100	1300	5 U	2.6	4.9 U
Arsenic	7440-38-2	3.2	5.6	6.2	4.1	6.2	3.8	25	82	5.3	5.9	5.8
Barium	7440-39-3	15	25	24	16	23	16	20	10	16	32	22
Beryllium	7440-41-7	0.36 U	0.6 U	0.93	0.35 U	0.57 U	0.35 U	0.64 U	0.25 U	0.63 U	0.29 U	0.62 U
Cadmium	7440-43-9	0.36 U	0.6 U	0.6 U	0.35 U	0.57 U	0.35 U	0.64 U	0.25 U	0.63 U	0.4	0.62 U
Calcium	7440-70-2	13000	5400	8700	3700	1800	2300	1500	4200	7200	61000	1200
Chromium	7440-47-3	10	13	8.8	11	13	12	9.5	6.2	12	10	11
Cobalt	7440-48-4	8.6	12	8.5	11	12	10	7.7	4.6	11	12	9.5
Copper	7440-50-8	26	29	22	26	30	25	27	25	25	29	34
Iron	7439-89-6	23000	29000	23000	27000	30000	27000	21000	9900	30000	22000	27000
Lead	7439-92-1	19	20	21	23	22	22	49000	25000	19	21	28
Magnesium	7439-95-4	6300	7700	5200	6900	6500	6600	5000	2900	7200	10000	5800
Manganese	7439-96-5	480	860	510	390	840	340	490	120	570	1200	820
Nickel	7440-02-0	19	25	22	24	24	23	18	10	25	20	21
Potassium	7440-09-7	360	450	330	340	420	330	340	310	420	470	360
Selenium	7782-49-2	2.5 U	4.2 U	4.2 U	2.5 U	4 U	2.5 U	4.5 U	1.8 U	4.4 U	2.1 U	4.3 U
Silver	7440-22-4	0.36 U	0.6 U	0.6 U	0.35 U	0.57 U	0.35 U	0.64 U	1.1	0.63 U	0.29 U	0.62 U
Sodium	7440-23-5	72 U	120 U	120 U	71 U	110 U	71 U	130 U	51 U	130 U	59 U	120 U
Thallium	7440-28-0	7.2 U	12 U	12 U	7.1 U	11 U	7.1 U	13 U	5.1 U	13 U	5.9 U	12 U
Vanadium	7440-62-2	11	12	10	11	12	13	9.8	5.7	12	10	10
Zinc	7440-66-6	1.4 U	2.4 U	2.4 U	1.4 U	2.3 U	1.4 U	2.6 U	1 U	2.5 U	1.2 U	2.5 U
Cyanide	57-12-5	0.086 U	0.054 U	0.07 U	0.083 U	0.052 U	0.082 U	0.058 U	0.11 U	0.054 U	0.097 U	0.07 U

mg/kg - milligram per kilogram
U - non-detect
J - estimated
CBR - Clove Branch Road

Table 2-4
Inorganics Detected in Sediment
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemical	CAS Number	Whortlekill Creek										Background	
		SD-028	SD-029	SD-030	SD-031	SD-032	SD-033	SD-034	SD-035	SD-036	SD-037	SD-038	SD-039
Inorganic (mg/kg)													
Aluminum	7429-90-5	16000	18000	16000	9800	11000	7500 J	14000 J	13000 J	14000	12000	13000	11000
Antimony	7440-36-0	3.2	4.9 U	3.4	2.8 U	5.1 U	1.7 J	3.5 J	3.8 J	5.2 U	3.4	3.4	9.9 U
Arsenic	7440-38-2	3.3	2.2	5.7	2.9	2.7	1.4 J	7.3 J	10 J	8.9	8.6	8	3.3
Barium	7440-39-3	35	55	47	20	15	9.9 J	40 J	64 J	160	64	110	85
Beryllium	7440-41-7	0.44	0.61 U	0.43	0.35 U	0.64 U	0.21 UJ	0.42 J	0.39 UJ	0.65 U	0.43	0.47	1.2 U
Cadmium	7440-43-9	0.66	0.61 U	0.51	0.35 U	0.64 U	0.21 UJ	0.39 UJ	0.39 UJ	0.65 U	0.45	0.85	1.2 U
Calcium	7440-70-2	4100	6500	4300	1400	2100	2700 J	2700 J	2100 J	2800	3900	7700	23000
Chromium	7440-47-3	16	22	15	12	9.7	7.5 J	16 J	14 J	18	16	16	30
Cobalt	7440-48-4	12	7.9	11	7.4	9.4	5.5 J	12 J	12 J	16	11	11	5.2
Copper	7440-50-8	26	19	24	6.9	14	6.1 J	20 J	16 J	20	16	42	28
Iron	7439-89-6	31000	25000	32000	23000	26000	14000 J	29000 J	31000 J	32000	32000	32000	19000
Lead	7439-92-1	32	42	26	15	22	9.6 J	23 J	28 J	26	28	75	88
Magnesium	7439-95-4	7300	6500	9200	5400	6100	4700 J	8200 J	6200 J	6500	6800	6400	3200
Manganese	7439-96-5	410	310	1300	570	380	170 J	1200 J	1300 J	2200	1300	3400	210
Nickel	7440-02-0	26	24	26	17	20	12 J	25 J	22 J	26	22	24	19
Potassium	7440-09-7	450	680	370	220	300	180 J	390 J	540 J	600	410	650	890
Selenium	7782-49-2	2.2 U	4.3 U	2.4 U	2.5 U	4.5 U	1.4 UJ	2.6 UJ	2.6 UJ	4.6 U	2.5 U	2.7	13
Silver	7440-22-4	0.31 U	0.61 U	0.35 U	0.35 U	0.64 U	0.21 UJ	0.39 UJ	0.39 UJ	0.65 U	0.36 U	0.36 U	1.2 U
Sodium	7440-23-5	62 U	120 U	69 U	71 U	130 U	69 UJ	130 UJ	130 UJ	130 U	73 U	72 U	250 U
Thallium	7440-28-0	6.2 U	12 U	6.9 U	7.1 U	13 U	1.7 J	3.6 J	4.4 J	13 U	7.3 U	7.2 U	25 U
Vanadium	7440-62-2	16	16	16	10	10	7.3 J	14 J	14 J	15	15	19	17
Zinc	7440-66-6	1.2 U	2.4 U	1.4 U	1.4 U	2.6 U	1.4 UJ	2.6 UJ	2.6 UJ	2.6 U	1.5 U	1.4 U	5 U
Cyanide	57-12-5	0.14 U	0.29 U	0.094	0.075 U	0.073 U	0.08 UJ	0.075 UJ	0.059 J	0.075	0.082 U	0.16 U	0.55 U

mg/kg - milligram per kilogram
U - non-detect
J - estimated
CBR - Clove Branch Road

Table 2-5
Organic Compounds Detected in Surface Water
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemicals	CAS Number	Ryan Drive Wetland	Unnamed Pond 1		Unnamed Pond 2		
		SW-001	SW-002	SW-003	SW-004	SW-005	SW-006
VOCs (µg/L)							
1,1,1-Trichloroethane	71-55-6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acetone	67-64-1	36 U	5 U	5 U	5 U	5 U	5 U
Carbon Disulfide	75-15-0	0.2 J	0.5 U	0.5 U	0.12 J	0.5 U	0.5 U
Chloroform	67-66-3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	74-87-3	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	79-01-6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SVOCs (µg/L)							
Anthracene	120-12-7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(a)pyrene	50-32-8	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
bis(2-Ethylhexyl) phthalate	117-81-7	5.4 U	5.6 UJ	5.3 U	5 U	5 U	5 U
Fluoranthene	206-44-0	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Fluorene	86-73-7	0.12	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Pesticides (µg/L)							
4,4'-DDT	50-29-3	0.1 U	0.1 U	0.1 UJ	0.1 U	0.1 U	0.1 U
alpha-BHC	319-84-6	0.05 U	0.05 U	0.05 UJ	0.05 U	0.05 U	0.05 U
beta-BHC	319-85-7	0.05 U	0.05 U	0.05 UJ	0.05 U	0.05 U	0.05 U
delta-BHC	319-86-8	0.05 U	0.05 U	0.05 UJ	0.05 U	0.05 U	0.05 U
Dieldrin	60-57-1	0.0025 J	0.1 U	0.1 UJ	0.1 U	0.1 U	0.1 U
Endosulfan sulfate	1031-07-8	0.1 U	0.1 U	0.1 UJ	0.1 U	0.1 U	0.1 U
Endrin	72-20-8	0.1 U	0.1 U	0.1 UJ	0.1 U	0.1 U	0.1 U
Endrin aldehyde	7421-93-4	0.024 J	0.1 U	0.1 UJ	0.1 U	0.1 U	0.1 U
gamma-BHC (Lindane)	58-89-9	0.05 U	0.05 U	0.05 UJ	0.05 U	0.05 U	0.05 U
gamma-Chlordane	5103-74-2	0.0074 J	0.05 U	0.05 UJ	0.05 U	0.05 U	0.05 U
Heptachlor	76-44-8	0.05 U	0.05 U	0.02 J	0.05 U	0.05 U	0.05 U

µg/L - microgram per liter
CBR - Clove Branch Road
J - estimated
SVOCs - Semi-Volatile Organic Compounds
U - non-detect
R - rejected
VOCs - Volatile Organic Compounds

Table 2-5
Organic Compounds Detected in Surface Water
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemicals	CAS Number	Redwing Lake									
		SW-007	SW-008	SW-009	SW-010	SW-011	SW-012	SW-013	SW-014	SW-015	SW-016
VOCs (µg/L)											
1,1,1-Trichloroethane	71-55-6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acetone	67-64-1	5.2 U	8 U	5 U	5 U	6.1 U	5 U	5.5 U	5 UJ	5 U	5 U
Carbon Disulfide	75-15-0	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	67-66-3	0.5 U	0.5 U	0.13 J	0.14 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	74-87-3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	79-01-6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SVOCs (µg/L)											
Anthracene	120-12-7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(a)pyrene	50-32-8	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
bis(2-Ethylhexyl) phthalate	117-81-7	5.6 UJ	5 U	5 UJ	4.8 J	4 J	5 U	9.2	5 U	5 U	5.6 UJ
Fluoranthene	206-44-0	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Fluorene	86-73-7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Pesticides (µg/L)											
4,4'-DDT	50-29-3	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 UJ	0.1 R
alpha-BHC	319-84-6	0.05 U	0.05 U	0.05 U	0.05 U	0.0068 J	0.0038 J	0.05 U	0.05 U	0.05 UJ	0.05 R
beta-BHC	319-85-7	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 R
delta-BHC	319-86-8	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.065	0.05 U	0.05 U	0.05 UJ	0.05 R
Dieldrin	60-57-1	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 UJ	0.1 R
Endosulfan sulfate	1031-07-8	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 UJ	0.1 R
Endrin	72-20-8	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 UJ	0.1 R
Endrin aldehyde	7421-93-4	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 UJ	0.1 R
gamma-BHC (Lindane)	58-89-9	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.0015 J	0.05 U	0.05 UJ	0.05 UJ
gamma-Chlordane	5103-74-2	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 R
Heptachlor	76-44-8	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ

µg/L - microgram per liter
CBR - Clove Branch Road
J - estimated
SVOCs - Semi-Volatile Organic Compour
U - non-detect
R - rejected
VOCs - Volatile Organic Compounds

Table 2-5
Organic Compounds Detected in Surface Water
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemicals	CAS Number	Gravel Pit										CBR Pond
		SW-017	SW-018	SW-019	SW-020	SW-021	SW-022	SW-023	SW-024	SW-025	SW-026	SW-027
VOCs (µg/L)												
1,1,1-Trichloroethane	71-55-6	0.14 J	0.13 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acetone	67-64-1	17 U	4.8 J	7.5 U	7 U	12	10	6.9 U	6.1 U	7.2 U	5.3 U	5 U
Carbon Disulfide	75-15-0	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.22 J	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	67-66-3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.1 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	74-87-3	0.11 J	0.5 U	0.5 U	0.5 U	0.13 J	0.5 U	0.5 U	0.5 U	0.16 J	0.11 J	0.5 U
Trichloroethene	79-01-6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.28 J
SVOCs (µg/L)												
Anthracene	120-12-7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5.6 U	0.1 U
Benzo(a)pyrene	50-32-8	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5.6 UJ	0.1 U
bis(2-Ethylhexyl) phthalate	117-81-7	5 UJ	5 UJ	8.6	5 UJ	8.9	5 U	5.3 U	5.1 U	5.4 UJ	5.6 UJ	5 U
Fluoranthene	206-44-0	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5.6 U	0.1 U
Fluorene	86-73-7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	5.6 U	0.1 U
Pesticides (µg/L)												
4,4'-DDT	50-29-3	0.1 U	0.021 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ	0.1 R
alpha-BHC	319-84-6	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 R
beta-BHC	319-85-7	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 R
delta-BHC	319-86-8	0.0068 J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 R
Dieldrin	60-57-1	0.1 U	0.1 U	0.1 U	0.1 U	0.0011 J	0.1 U	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ	0.1 R
Endosulfan sulfate	1031-07-8	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 UJ	0.1 UJ	0.1 UJ	0.0074 J	0.1 R
Endrin	72-20-8	0.1 U	0.1 U	0.1 U	0.1 U	0.0015 J	0.1 U	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ	0.1 R
Endrin aldehyde	7421-93-4	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ	0.1 R
gamma-BHC (Lindane)	58-89-9	0.05 U	0.0064 J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 R
gamma-Chlordane	5103-74-2	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 R
Heptachlor	76-44-8	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 R

µg/L - microgram per liter
CBR - Clove Branch Road
J - estimated
SVOCs - Semi-Volatile Organic Compour
U - non-detect
R - rejected
VOCs - Volatile Organic Compounds

Table 2-5
Organic Compounds Detected in Surface Water
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemicals	CAS Number	Whortlekill Creek										Background	
		SW-028	SW-029	SW-030	SW-031	SW-032	SW-033	SW-034	SW-035	SW-036	SW-037	SW-038	SW-039
VOCs (µg/L)													
1,1,1-Trichloroethane	71-55-6	0.13 J	0.16 J	0.14 J	0.14 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acetone	67-64-1	5 U	5 U	5 U	5 U	6.7	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Carbon Disulfide	75-15-0	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.16 J	0.5 U	0.5 U
Chloroform	67-66-3	0.5 U	0.5 U	0.5 U	0.5 U	0.11 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	74-87-3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	79-01-6	0.5 U	0.5 U	0.11 J	0.18 J	0.5 U	0.21 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SVOCs (µg/L)													
Anthracene	120-12-7	0.1 U	0.061 J	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(a)pyrene	50-32-8	0.1 U	0.06 J	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
bis(2-Ethylhexyl) phthalate	117-81-7	5 U	5 U	5 U	9.5	5 U	5.3 U	5 U	5.1 U	5 U	6.8	5 UJ	5 U
Fluoranthene	206-44-0	0.1 U	0.054 J	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Fluorene	86-73-7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Pesticides (µg/L)													
4,4'-DDT	50-29-3	0.1 UJ	0.1 R	0.1 U	0.1 R	0.1 U	0.1 UJ	0.1 UJ	0.1 UJ	0.1 U	0.1 U	0.1 R	0.1 UJ
alpha-BHC	319-84-6	0.05 UJ	0.05 R	0.05 U	0.05 R	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	0.05 R	0.05 UJ
beta-BHC	319-85-7	0.05 UJ	0.05 R	0.05 J	0.05 R	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	0.05 R	0.05 UJ
delta-BHC	319-86-8	0.05 UJ	0.05 R	0.05 U	0.05 R	0.003 J	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	0.05 R	0.05 UJ
Dieldrin	60-57-1	0.1 UJ	0.1 R	0.1 U	0.1 R	0.1 U	0.1 UJ	0.1 UJ	0.1 UJ	0.1 U	0.1 U	0.1 R	0.1 UJ
Endosulfan sulfate	1031-07-8	0.1 UJ	0.1 R	0.1 U	0.1 R	0.1 U	0.1 UJ	0.1 UJ	0.1 UJ	0.1 U	0.1 U	0.1 R	0.1 UJ
Endrin	72-20-8	0.1 UJ	0.1 R	0.1 U	0.1 R	0.1 U	0.1 UJ	0.1 UJ	0.1 UJ	0.1 U	0.1 U	0.1 R	0.1 UJ
Endrin aldehyde	7421-93-4	0.1 UJ	0.1 R	0.1 U	0.1 R	0.1 U	0.1 UJ	0.1 UJ	0.1 UJ	0.1 U	0.1 U	0.1 R	0.1 UJ
gamma-BHC (Lindane)	58-89-9	0.05 UJ	0.05 R	0.05 U	0.05 R	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	0.05 R	0.05 UJ
gamma-Chlordane	5103-74-2	0.05 UJ	0.05 R	0.05 U	0.05 R	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	0.05 R	0.05 UJ
Heptachlor	76-44-8	0.05 UJ	0.05 R	0.05 U	0.05 R	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	0.05 R	0.05 UJ

µg/L - microgram per liter
CBR - Clove Branch Road
J - estimated
SVOCs - Semi-Volatile Organic Compour
U - non-detect
R - rejected
VOCs - Volatile Organic Compounds

Table 2-6
Inorganics Detected in Surface Water Samples
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemical	CAS Number	Ryan Drive Wetland	Unnamed Pond 1		Unnamed Pond 2		
		SW-001	SW-002	SW-003	SW-004	SW-005	SW-006
Inorganic (µg/L)							
Aluminum	7429-90-5	17000	320	210	100 U	100 U	100 U
Arsenic	7440-38-2	13	10 U	10 U	10 U	10 U	10 U
Barium	7440-39-3	110	100 U	100 U	100 U	100 U	100 U
Calcium	7440-70-2	25000	55000	24000	51000	50000	52000
Chromium	7440-47-3	15	10 U	10 U	10 U	10 U	10 U
Copper	7440-50-8	27	25 U	25 U	25 U	25 U	25 U
Iron	7439-89-6	35000	790	1600	230	190	320
Lead	7439-92-1	33	10 U	10 U	10 U	10 U	10 U
Magnesium	7439-95-4	9900	8900	3800	8200	8000	8300
Manganese	7439-96-5	1800	300	270	48	38	150
Nickel	7440-02-0	25	20 U	20 U	20 U	20 U	20 U
Potassium	7440-09-7	3600	1100	3700	1000	1100	1000
Sodium	7440-23-5	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Vanadium	7440-62-2	26	20 U	20 U	20 U	20 U	20 U
Cyanide	57-12-5	5 U	5 U	5 U	5 U	5 U	5 U

µg/L - microgram per liter
U - non-detect
J - estimated
R - rejected
CBR - Clove Branch Road

Table 2-6
Inorganics Detected in Surface Water Samples
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemical	CAS Number	Redwing Lake									
		SW-007	SW-008	SW-009	SW-010	SW-011	SW-012	SW-013	SW-014	SW-015	SW-016
Inorganic (µg/L)											
Aluminum	7429-90-5	100 U	100 U	100 U	130	100 U	100 U	100 U	100 U	440	100 U
Arsenic	7440-38-2	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Barium	7440-39-3	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Calcium	7440-70-2	42000	40000	41000	46000	32000	31000	39000	39000	43000	41000
Chromium	7440-47-3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Copper	7440-50-8	25 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	25 U
Iron	7439-89-6	50 U	50 U	55	210	50 U	50 U	50 U	50 U	480	66
Lead	7439-92-1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Magnesium	7439-95-4	15000	14000	14000	15000	13000	13000	14000	14000	9700	15000
Manganese	7439-96-5	13	10 U	12	34	10 U	11	10 U	10 U	11	10 U
Nickel	7440-02-0	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Potassium	7440-09-7	930	870	880	950	870	910	860	840	890	920
Sodium	7440-23-5	1000 U	51000	53000	54000	51000	51000	51000	49000	57000	1000 U
Vanadium	7440-62-2	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Cyanide	57-12-5	5 U	5 U	5 U	5 U	5	5 U	5 U	5 U	5 U	5 U

µg/L - microgram per liter
U - non-detect
J - estimated
R - rejected
CBR - Clove Branch Road

Table 2-6
Inorganics Detected in Surface Water Samples
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemical	CAS Number	Gravel Pit										CBR Pond
		SW-017	SW-018	SW-019	SW-020	SW-021	SW-022	SW-023	SW-024	SW-025	SW-026	SW-027
Inorganic (µg/L)												
Aluminum	7429-90-5	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Arsenic	7440-38-2	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Barium	7440-39-3	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Calcium	7440-70-2	33000	37000	43000	35000	38000	36000	39000	38000	35000	45000	36000
Chromium	7440-47-3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Copper	7440-50-8	15 U	15 U	15 U	15 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Iron	7439-89-6	50 U	170	110	66	120	50 U	58	78	50 U	500	110
Lead	7439-92-1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	41	10 U	10 U	10 U
Magnesium	7439-95-4	13000	14000	15000	14000	14000	14000	15000	14000	14000	13000	11000
Manganese	7439-96-5	10 U	16	22	10 U	20	10	14	10 U	10 U	240	18
Nickel	7440-02-0	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Potassium	7440-09-7	640	740	790	670	710	730	690	690	690	1500	660
Sodium	7440-23-5	46000	47000	50000	48000	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Vanadium	7440-62-2	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Cyanide	57-12-5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U

µg/L - microgram per liter
U - non-detect
J - estimated
R - rejected
CBR - Clove Branch Road

Table 2-6
Inorganics Detected in Surface Water Samples
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemical	CAS Number	Whortlekill Creek										Background	
		SW-028	SW-029	SW-030	SW-031	SW-032	SW-033	SW-034	SW-035	SW-036	SW-037	SW-038	SW-039
Inorganic (µg/L)													
Aluminum	7429-90-5	140	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	230	590
Arsenic	7440-38-2	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Barium	7440-39-3	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Calcium	7440-70-2	59000	60000	59000	61000	60000	65000	56000	52000	55000	52000	40000	46000
Chromium	7440-47-3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Copper	7440-50-8	25 U	25 U	25 U	25 U	15 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Iron	7439-89-6	250	81	130	81	87	120	92	110	76	160	480	950
Lead	7439-92-1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Magnesium	7439-95-4	10000	10000	10000	9700	9600	10000	8700	8400	8500	8400	5700	6000
Manganese	7439-96-5	71	48	80	20	23	52	13	21	12	34	150	24
Nickel	7440-02-0	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Potassium	7440-09-7	890	840	880	850	760	800	830	860	850	910	790	970
Sodium	7440-23-5	1000 U	1000 U	1000 U	1000 U	62000	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Vanadium	7440-62-2	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Cyanide	57-12-5	5 U	5 U	5 U	5 U	5 U	5 UJ	5 UJ	5 UJ	5 U	5 U	5 U	5 U

µg/L - microgram per liter
U - non-detect
J - estimated
R - rejected
CBR - Clove Branch Road

Table 5-1
Chemicals of Potential Concern Detected in Sediment
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemical	CAS Number	Minimum Concentration Detected	Maximum Concentration Detected	Sample Location of Maximum Concentration	Frequency of Detection	Sediment Screening Value [1]		Background Concentration	Hazard Quotient	COPC	Rationale
Volatile Organics (µg/kg)											
2-Butanone	78-93-3	7 J	7 J	SD-014	1 / 39	621	c	ND	0.01	No	BSL
Acetone	**67-64-1**	**26 J**	**76 J**	**SD-007**	**2 / 39**	**20**	**c**	**ND**	**3.8**	**Yes**	**ASL**
Carbon Disulfide	**75-15-0**	**5 J**	**5 J**	**SD-024**	**1 / 39**	**0.19**	**d**	**ND**	**26.3**	**Yes**	**ASL**
Dichlorodifluoromethane	**75-71-8**	**2 J**	**13 J**	**SD-026**	**7 / 39**	**NV**		**ND**	**NC**	**Yes**	**NV**
Semi-Volatile Organics (µg/kg)											
Acenaphthene	**83-32-9**	**360 J**	**360 J**	**SD-030**	**1 / 39**	**322**	**a**	**ND**	**1.1**	**Yes**	**ASL**
Acetophenone	**98-86-2**	**140 J**	**690 J**	**SD-015**	**3 / 39**	**NV**		**ND**	**NC**	**Yes**	**NV**
Anthracene	**120-12-7**	**96 J**	**720**	**SD-030**	**3 / 39**	**246**	**a**	**ND**	**2.9**	**Yes**	**ASL**
Benzo(a)anthracene	**56-55-3**	**88 J**	**2600**	**SD-030**	**4 / 39**	**27.6**	**a**	**ND**	**94.2**	**Yes**	**ASL**
Benzo(a)pyrene	**50-32-8**	**165 J**	**2400**	**SD-030**	**3 / 39**	**7.45**	**b**	**ND**	**322.1**	**Yes**	**ASL**
Benzo(b)fluoranthene	**205-99-2**	**85 J**	**3300**	**SD-030**	**4 / 39**	**27**	**d**	**ND**	**122.2**	**Yes**	**ASL**
Benzo(g,h,i)perylene	**191-24-2**	**115 J**	**1500**	**SD-030**	**3 / 39**	**69**	**b**	**ND**	**21.7**	**Yes**	**ASL**
Benzo(k)fluoranthene	**207-08-9**	**87 J**	**2400**	**SD-030**	**4 / 39**	**6.26**	**b**	**ND**	**383.4**	**Yes**	**ASL**
bis(2-Ethylhexyl) phthalate	117-81-7	100 J	160 J	SD-028	2 / 39	459	a	ND	0.35	No	BSL
Chrysene	**218-01-9**	**110 J**	**3200**	**SD-030**	**4 / 39**	**6.17**	**b**	**ND**	**518.6**	**Yes**	**ASL**
Dibenz(a,h)anthracene	**53-70-3**	**750**	**750**	**SD-030**	**1 / 39**	**2.3**	**b**	**ND**	**326.1**	**Yes**	**ASL**
Dibenzofuran	**132-64-9**	**190 J**	**190 J**	**SD-030**	**1 / 39**	**95**	**d**	**ND**	**2.0**	**Yes**	**ASL**
Fluoranthene	**206-44-0**	**140 J**	**6600**	**SD-030**	**5 / 39**	**2346**	**a**	**ND**	**2.8**	**Yes**	**ASL**
Fluorene	**86-73-7**	**450**	**450**	**SD-030**	**1 / 39**	**18.4**	**a**	**ND**	**24.5**	**Yes**	**ASL**
Indeno(1,2,3-cd)pyrene	**193-39-5**	**135 J**	**1700**	**SD-030**	**3 / 39**	**4**	**b**	**ND**	**425.0**	**Yes**	**ASL**
Phenanthrene	**85-01-8**	**110 J**	**4300**	**SD-030**	**4 / 39**	**276**	**a**	**ND**	**15.6**	**Yes**	**ASL**
Pyrene	**129-00-0**	**140 J**	**4800**	**SD-030**	**5 / 39**	**2210**	**a**	**ND**	**2.2**	**Yes**	**ASL**
Pesticides (µg/kg)											
4,4'-DDD	**72-54-8**	**2.4 J**	**14 J**	**SD-002**	**2 / 39**	**2.3**	**a**	**ND**	**6.1**	**Yes**	**ASL**
4,4'-DDE	**72-55-9**	**1.2 J**	**13 J**	**SD-002**	**8 / 39**	**2.3**	**a**	**11**	**5.7**	**Yes**	**ASL**
4,4'-DDT	**50-29-3**	**26**	**26**	**SD-019**	**1 / 39**	**2.3**	**a**	**ND**	**11.3**	**Yes**	**ASL**
alpha-BHC	**319-84-6**	**2.4**	**2.4**	**SD-009**	**1 / 39**	**0.069**	**a**	**ND**	**34.8**	**Yes**	**ASL**
alpha-Chlordane	**5103-71-9**	**0.38 J**	**6.8 J**	**SD-004**	**2 / 39**	**1.03**	**b**	**ND**	**6.60**	**Yes**	**ASL**
beta-BHC	**319-85-7**	**7.3 J**	**7.3 J**	**SD-015**	**1 / 39**	**0.069**	**a**	**ND**	**106**	**Yes**	**ASL**
Dieldrin	60-57-1	9.9 J	9.9 J	SD-015	1 / 39	20.7	a	ND	0.48	No	BSL
gamma-Chlordane	**5103-74-2**	**0.62 J**	**10**	**SD-030**	**2 / 39**	**0.22**	**b**	**ND**	**45.5**	**Yes**	**ASL**

Table 5-1
Chemicals of Potential Concern Detected in Sediment
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemical	CAS Number	Minimum Concentration Detected	Maximum Concentration Detected	Sample Location of Maximum Concentration	Frequency of Detection	Sediment Screening Value [1]	Background Concentration	Hazard Quotient	COPC	Rationale
Inorganics (mg/kg)										
Aluminum	7429-90-5	760	27000	SD-001	39 / 39	25500 b	13000	1.1	No	NT
Antimony	**7440-36-0**	**1.7 J**	**1300**	**SD-024**	**18 / 39**	**2 a**	**3.4**	**650**	**Yes**	**ASL**
Arsenic	**7440-38-2**	**0.96**	**82**	**SD-024**	**37 / 39**	**6 a**	**8**	**13.7**	**Yes**	**ASL**
Barium	**7440-39-3**	**9.9 J**	**160**	**SD-036**	**38 / 39**	**NV**	**110**	**NC**	**Yes**	**NV**
Beryllium	**7440-41-7**	**0.42 J**	**0.95**	**SD-001**	**9 / 39**	**NV**	**0.47**	**NC**	**Yes**	**NV**
Cadmium	**7440-43-9**	**0.37**	**0.89**	**SD-002**	**11 / 39**	**0.6 a**	**0.85**	**1.5**	**Yes**	**ASL**
Calcium	7440-70-2	1200	94000	SD-011	39 / 39	NA	23000	NC	No	EN
Chromium	**7440-47-3**	**2.4**	**43**	**SD-015**	**39 / 39**	**26 a**	**30**	**1.7**	**Yes**	**ASL**
Cobalt	7440-48-4	4.5	16	SD-036	37 / 39	50 d	11	0.32	No	BSL
Copper	**7440-50-8**	**6.1 J**	**54**	**SD-001**	**38 / 39**	**16 a**	**42**	**3.4**	**Yes**	**ASL**
Cyanide	**57-12-5**	**0.059 J**	**0.91**	**SD-015**	**8 / 39**	**0.1 d**	**ND**	**9.1**	**Yes**	**ASL**
Iron	**7439-89-6**	**1800**	**37000**	**SD-001**	**39 / 39**	**20,000 a**	**32000**	**1.9**	**Yes**	**ASL**
Lead	**7439-92-1**	**1.4**	**49000**	**SD-023**	**39 / 39**	**31 a**	**88**	**1581**	**Yes**	**ASL**
Magnesium	7439-95-4	2900	53000	SD-011	39 / 39	NA	6400	NC	No	EN
Manganese	**7439-96-5**	**42**	**2200**	**SD-036**	**39 / 39**	**460 a**	**3400**	**4.8**	**Yes**	**ASL**
Nickel	**7440-02-0**	**10**	**39**	**SD-001**	**38 / 39**	**16 a**	**24**	**2.4**	**Yes**	**ASL**
Potassium	7440-09-7	65	1500	SD-001	39 / 39	NA	890	NC	No	EN
Selenium	**7782-49-2**	**2.4**	**11**	**SD-015**	**3 / 39**	**2 d**	**13**	**5.5**	**Yes**	**ASL**
Silver	**7440-22-4**	**1.1**	**1.1**	**SD-024**	**1 / 39**	**1 a**	**ND**	**1.1**	**Yes**	**ASL**
Sodium	7440-23-5	160 J	390	SD-007	2 / 39	NA	ND	NC	No	EN
Thallium	**7440-28-0**	**1.7 J**	**4.4 J**	**SD-035**	**3 / 39**	**NV**	**ND**	**NC**	**Yes**	**NV**
Vanadium	**7440-62-2**	**2.9**	**31**	**SD-001**	**39 / 39**	**NV**	**19**	**NC**	**Yes**	**NV**
Zinc	7440-66-6	68	68	SD-007	1 / 39	120 a	ND	0.57	No	BSL

µg/kg - microgram per kilogram
mg/kg - milligram per kilogram
ASL - above screening level
BSL - below screening level
COPC - chemical of potential concern
EN - essential nutrient
NA - not applicable
NV - no screening value located
NC - no hazard quotient calculated
ND - not detected
NT - toxicity not expected at a pH of 5.0 or higher (EPA 2003); measured pH in sediment exceeded 6.2 at all locations

Screening levels for organic compounds were adjusted for total organic carbon (TOC) using lowest TOC concentration of 0.23%.

1 - Source

a - NYSDEC.1999. Technical Guidance for Screening Contaminated Sediment-Sediment Criteria for Benthic Aquatic Life Chronic Toxicity

b - NOAA. 2006. Squirts

c - Jones, D.S., G.W. Suter,II, and R.N. Hull. 1997. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment-Associated Biota: 1997 Revison. Oak Ridge National Laboratory. ES/ER/TM-95/R4

d - Environmental Protection Agency. 2006. Region 3 BTAG Region 3 BTAG Freshwater Sediment Screening Benchmarks

Table 5-2
Chemicals of Potential Concern Detected in Surface Water
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemical	CAS Number	Minimum Concentration Detected	Maximum Concentration Detected	Sample Location of Maximum Concentration	Frequency of Detection	Freshwater Screening Value [1]		Background Concentration	Hazard Quotient	COPC	Rationale
Volatile Organics (µg/L)											
1,1,1-Trichloroethane	71-55-6	0.13 J	0.16 J	SW-029	6 / 39	11	c	ND	0.01	No	BSL
Acetone	67-64-1	4.8 J	12	SW-021	4 / 39	1500	d	ND	0.008	No	BSL
Carbon Disulfide	75-15-0	0.12 J	0.22 J	SW-023	5 / 39	0.92	d	ND	0.24	No	BSL
Chloroform	67-66-3	0.1 J	0.14 J	SW-010	4 / 39	1.8	d	ND	0.0778	No	BSL
Chloromethane	**74-87-3**	**0.11 J**	**0.16 J**	**SW-025**	**4 / 39**	**NV**		**ND**	**NC**	**Yes**	**NV**
Trichloroethene	79-01-6	0.11 J	0.28 J	SW-027	4 / 39	21	d	ND	0.01333	No	BSL
Semi-Volatile Organics (µg/L)											
Anthracene	120-12-7	0.061 J	0.061 J	SW-029	1 / 38	3.8	a	ND	0.016	No	BSL
Benzo(a)pyrene	**50-32-8**	**0.06 J**	**0.06 J**	**SW-029**	**1 / 38**	**0.014**	**c**	**ND**	**4.3**	**Yes**	**ASL**
bis(2-Ethylhexyl) phthalate	117-81-7	4 J	9.5	SW-031	9 / 39	16	d	ND	0.59	No	BSL
Fluoranthene	**206-44-0**	**0.054 J**	**0.054 J**	**SW-029**	**1 / 38**	**0.04**	**c**	**ND**	**1.4**	**Yes**	**ASL**
Fluorene	86-73-7	0.12	0.12	SW-001	1 / 38	0.54	a	ND	0.22	No	BSL
Pesticides (µg/L)											
4,4'-DDT	**50-29-3**	**0.021 J**	**0.021 J**	**SW-018**	**1 / 35**	**0.0005**	**c**	**ND**	**42**	**Yes**	**ASL**
alpha-BHC	319-84-6	0.0038 J	0.0068 J	SW-011	2 / 35	100	c	ND	0.00007	No	BSL
beta-BHC	319-85-7	0.05 J	0.05 J	SW-030	1 / 35	100	c	ND	0.0005	No	BSL
delta-BHC	319-86-8	0.0027 J	0.065	SW-012	4 / 35	100	c	ND	0.0007	No	BSL
Dieldrin	60-57-1	0.0011 J	0.0025 J	SW-001	2 / 35	0.056	a	ND	0.04	No	BSL
Endosulfan sulfate	1031-07-8	0.0074 J	0.0074 J	SW-026	1 / 35	0.009	a	ND	0.82	No	BSL
Endrin	72-20-8	0.0015 J	0.0015 J	SW-021	1 / 35	0.036	a	ND	0.04	No	BSL
Endrin aldehyde	7421-93-4	0.024 J	0.024 J	SW-001	1 / 35	0.036	a	ND	0.67	No	BSL
gamma-BHC (Lindane)	58-89-9	0.0015 J	0.0064 J	SW-018	2 / 36	0.01	d	ND	0.64	No	BSL
gamma-Chlordane	**5103-74-2**	**0.0074 J**	**0.0074 J**	**SW-001**	**1 / 35**	**0.0022**	**d**	**ND**	**3.4**	**Yes**	**ASL**
Heptachlor	**76-44-8**	**0.02 J**	**0.02 J**	**SW-003**	**1 / 36**	**0.0019**	**c**	**ND**	**10.5**	**Yes**	**ASL**

Table 5-2
Chemicals of Potential Concern Detected in Surface Water
Hopewell Precision Site
Hopewell Junction, New York

Detected Chemical	CAS Number	Minimum Concentration Detected	Maximum Concentration Detected	Sample Location of Maximum Concentration	Frequency of Detection	Freshwater Screening Value [1]	Background Concentration	Hazard Quotient	COPC	Rationale
Inorganics (µg/L)										
Aluminum	7429-90-5	130	17000	SW-001	6 / 39	100 a	590	170	No	NT
Arsenic	7440-38-2	13	13	SW-001	1 / 39	150 a	ND	0.09	No	BSL
Barium	**7440-39-3**	**110**	**110**	**SW-001**	**1 / 39**	**4 c**	**ND**	**27.5**	**Yes**	**ASL**
Calcium	7440-70-2	24000	65000	SW-033	39 / 39	NA	46000	NC	No	EN
Chromium*	7440-47-3	15	15	SW-001	1 / 39	570 a	ND	0.03	No	BSL
Copper*	**7440-50-8**	**27**	**27**	**SW-001**	**1 / 39**	**13 a**	**ND**	**2.0**	**Yes**	**ASL**
Cyanide	57-12-5	5	5	SW-011	1 / 39	5.2 a	ND	0.96	No	BSL
Iron	**7439-89-6**	**55**	**35000**	**SW-001**	**30 / 39**	**300 a**	**950**	**117**	**Yes**	**ASL**
Lead*	7439-92-1	33	41	SW-024	2 / 39	151 a	ND	0.27	No	BSL
Magnesium	7439-95-4	3800	15000	SW-023	39 / 39	NA	6000	NC	No	EN
Manganese	**7439-96-5**	**10**	**1800**	**SW-001**	**30 / 39**	**120 c**	**150**	**15**	**Yes**	**ASL**
Nickel*	7440-02-0	25	25	SW-001	1 / 39	468 a	ND	0.05	No	BSL
Potassium	7440-09-7	640	3700	SW-003	39 / 39	NA	970	NC	No	EN
Sodium	7440-23-5	46000	62000	SW-032	14 / 39	NA	ND	NC	No	EN
Vanadium	**7440-62-2**	**26**	**26**	**SW-001**	**1 / 39**	**14 a**	**ND**	**1.86**	**Yes**	**ASL**

µg/L - microgram per liter
ASL - above screening level
BSL - below screening level
EN - essential nutrient
COPC - chemical of potential concern
NA - not applicable
NV - no screening value located
NC - no hazard quotient calculated
ND - not detected
NT - toxicity not expected at a pH of 5.0 or higher (EPA 2003); measured pH in surface water exceeded 6.1 at all locations
* Inorganic whose screening level was adjusted for hardness. The hardness was chosen based on the location of maximum concentration in surface water.
For example, the maximum concentration of copper was located at SW-001; therefore, the hardness at SW-001 was used to adjust the screening level.
1 - Source
a - NYSDEC.1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations
b - Environmental Protection Agency (EPA), 2006. National Recommended Water Quality Criteria
c - NOAA. 2006. Squirts
d - EPA. 2006. Region 3 BTAG Region 3 BTAG Freshwater Screening Benchmarks

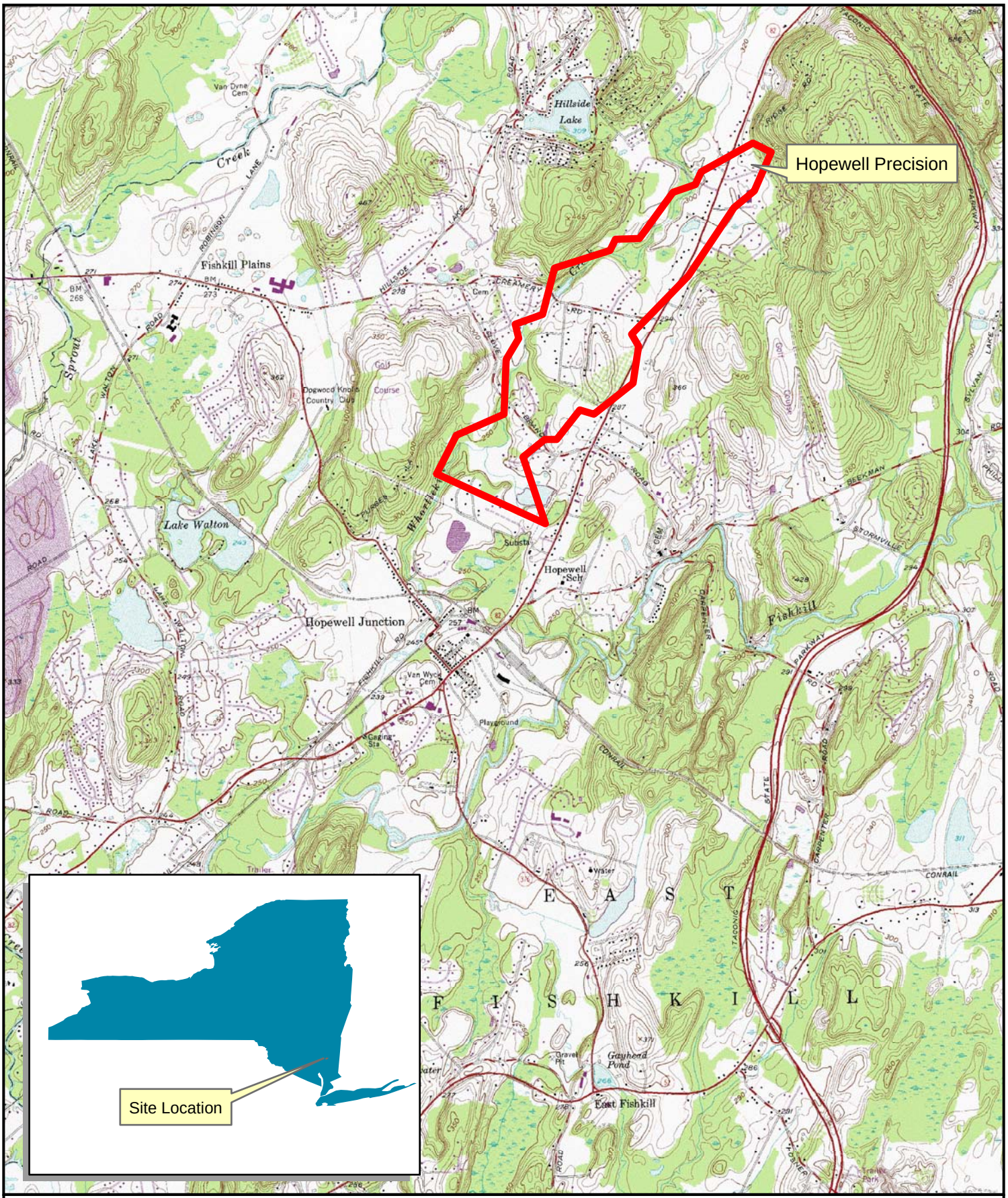

Figure 2-1
Site Location Map
Hopewell Precision Site
Hopewell Junction, New York

CDM

C:\IMS\GIS\Hopewell\GIS_projects\Slera\SWSD_Locations_2007_slera.mxd

Surface Water and Sediment Sample Location

Hopewell Precision Facility

N

0 500 1,000 2,000 Feet

CDM

Figure 2-2
Surface Water and Sediment Sample Locations
Hopewell Precision Site
Hopewell Junction, New York

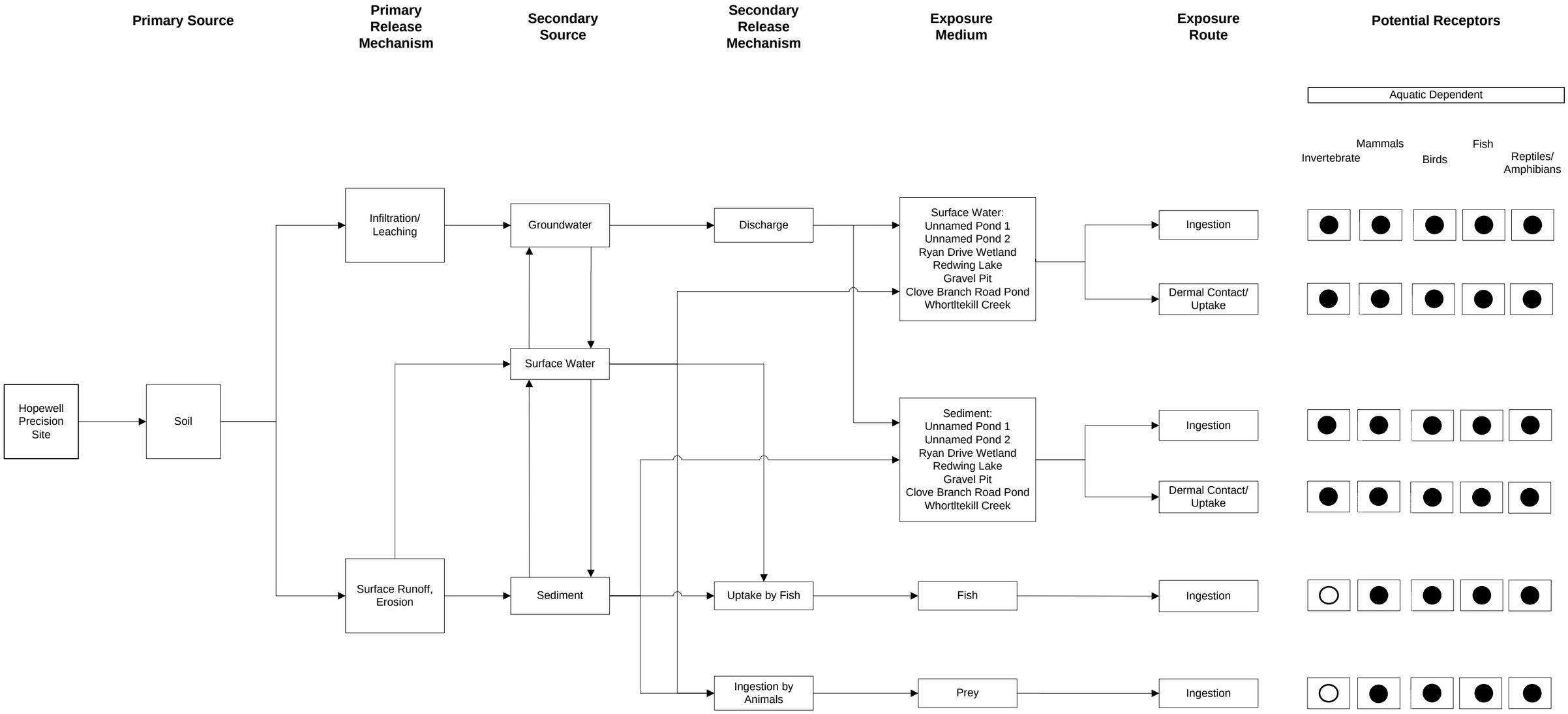

Figure 2-3
Conceptual Site Model
Hopewell Precision Site
Hopewell Junction, New York

CDM

Appendix A
Letter from
the United States Fish and Wildlife Service (USFWS)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, NY 13045

September 19, 2006

Ms. Grace Musumeci, Chief
Environmental Review Section
U.S. Environmental Protection Agency
290 Broadway
New York, NY 10007-1866

Dear Ms. Musumeci:

This responds to your August 10, 2006, letter requesting information on the presence of endangered or threatened species within the vicinity of the Hopewell Precision Superfund Site located in Hopewell Junction, Dutchess County, New York, pursuant to 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

There is potential for the Federally- and State-listed endangered Indiana bat (*Myotis sodalis*) to occur within the proposed project area, which is approximately 1 mile from known roosts and approximately 23 miles from known hibernacula in Ulster County. In addition, there is potential for the Federally-listed threatened and State-listed endangered bog turtle (*Clemmys muhlenbergii*) to occur within the proposed project area, which is within 5 miles of known bog turtle sites. Please visit our website for more information on Indiana bats and bog turtles.*

In addition, the New England cottontail (*Sylvilagus transitionalis*) is known to occur in Dutchess County. The New England cottontail is a candidate species which is being considered by the U.S. Fish and Wildlife Service (Service) for addition to the Federal List of Endangered and Threatened Wildlife and Plants. Candidate species are species for which the Service has on file sufficient information on the biological vulnerability and threat(s) to support issuance of a proposal to list, but issuance of a proposed rule is currently precluded by higher priority listing actions. Candidate species do not receive substantive or procedural protection under the ESA; however, the Service does encourage Federal agencies and other appropriate parties to consider these species in the project planning process.

Should the New England cottontail be proposed for listing as endangered or threatened prior to completion of this project, conference procedures pursuant to Section 7(a)(4) of the ESA may be necessary if your project involves Federal authorizations. Should this species be listed prior to completion of the project, further coordination or consultation pursuant to the ESA will be required to evaluate potential adverse effects of project implementation on the New England cottontail or its habitat, and to determine if formal consultation is necessary. Please visit our website for more information on New England cottontail.*

Except for the potential for Indiana bat, bog turtle, New England cottontail, and occasional transient individuals, no other Federally-listed, proposed, or candidate endangered or threatened

species under our jurisdiction are known to exist in the project action area. In addition, no habitat in the project area is currently designated or proposed "critical habitat" in accordance with provisions of the ESA. Should project plans change, or if additional information on listed or proposed species or critical habitat becomes available, this determination may be reconsidered. The most recent compilation of Federally-listed and proposed endangered and threatened species in New York is available for your information.* Until the proposed project is complete, we recommend that you check our website every 90 days from the date of this letter to ensure that listed species presence/absence information for the proposed project is current.*

The above comments pertaining to endangered species under our jurisdiction are provided as technical assistance pursuant to the ESA. This response does not preclude additional Service comments under other legislation.

Blanding's turtle (*Emydoidea blandingii*) sites are known within 2 miles of the proposed project area. The Blanding's turtle is considered a species of concern (formerly known as Category 2 Candidate species) by the Service and its status is being monitored throughout much of its range. Species of concern do not receive substantive or procedural protection under the ESA; however, the Service does encourage Federal agencies and other appropriate parties to consider these species in the project planning process. An evaluation of any existing habitat and its ability to support the Blanding's turtle should be completed. If the evaluation indicates that the site has the potential to support the Blanding's turtle or its habitat, the site should be surveyed by a qualified person to determine the presence or absence of this species.

As stated above, the Indiana bat and bog turtle are listed as endangered and the Blanding's turtle is listed as threatened by the State of New York. The New England cottontail is a New York State Species of Special Concern. Any additional information regarding the project and its potential to impact listed species should be coordinated with both this office and with the New York State Department of Environmental Conservation (NYSDEC). The NYSDEC contact for the Endangered Species Program is Mr. Peter Nye, Endangered Species Unit, 625 Broadway, Albany, NY 12233 (telephone: [518] 402-8859).

For additional information on fish and wildlife resources or State-listed species, we suggest you contact the appropriate NYSDEC regional office(s) and the New York Natural Heritage Program Information Services.*

Thank you for your time. If you require additional information please contact Robyn Niver at (607) 753-9334. Future correspondence with us on this project should reference project file 61563.

Sincerely,

David A. Stilwell
Field Supervisor

*Additional information referred to above may be found on our website at:
http://www.fws.gov/northeast/nyfo/es/section7.htm

cc: NYSDEC, New Paltz, NY (Attn: S. Joule/A. Ciesluk)
NYSDEC, Albany, NY (Endangered Species; Attn: P. Nye)
NYSDEC, Albany, NY (Natural Heritage)
COE, New York, NY

Appendix B
Analytical Results

Table B-1
Sediment Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-001 8/14/2006		SD-002 8/14/2006		SD-003 8/22/2006		SD-004 8/16/2006		SD-005 8/16/2006		SD-006 8/16/2006		SD-007 8/14/2006		SD-008 8/4/2006		SD-009 8/1/2006		SD-010 8/1/2006	
	Volatile Organic Compounds																						
75-71-8	Dichlorodifluoromethane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	4	J	12	U	12	U
74-87-3	Chloromethane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
75-01-4	Vinyl Chloride	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
74-83-9	Bromomethane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
75-00-3	Chloroethane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
75-69-4	Trichlorofluoromethane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
75-35-4	1,1-Dichloroethene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
67-64-1	Acetone	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	76	J	11	UJ	12	UJ	12	UJ
75-15-0	Carbon Disulfide	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
79-20-9	Methyl Acetate	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
75-09-2	Methylene Chloride	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
156-60-5	trans-1,2-Dichloroethene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
1634-04-4	Methyl tert-Butyl Ether	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
75-34-3	1,1-Dichloroethane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
156-59-2	cis-1,2-Dichloroethene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
78-93-3	2-Butanone	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	UJ	11	U	12	UJ	12	UJ
67-66-3	Chloroform	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
71-55-6	1,1,1-Trichloroethane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
110-82-7	Cyclohexane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
56-23-5	Carbon Tetrachloride	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
71-43-2	Benzene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
107-06-2	1,2-Dichloroethane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
79-01-6	Trichloroethene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
108-87-2	Metylcyclohexane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
78-87-5	1,2-Dichloropropane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
75-27-4	Bromodichloromethane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
10061-01-5	cis-1,3-Dichloropropene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
108-10-1	4-Methyl-2-pentanone	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
108-88-3	Toluene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
10061-02-6	trans-1,3-Dichloropropene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
79-00-5	1,1,2-Trichloroethane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
127-18-4	Tetrachloroethene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
591-78-6	2-Hexanone	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	UJ	12	UJ
124-48-1	Dibromochloromethane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
106-93-4	1,2-Dibromoethane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
108-90-7	Chlorobenzene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
100-41-4	Ethylbenzene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
100-42-5	Styrene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
75-25-2	Bromoform	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
98-82-8	Isopropylbenzene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
79-34-5	1,1,2,2-Tetrachloroethane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
541-73-1	1,3-Dichlorobenzene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
106-46-7	1,4-Dichlorobenzene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
95-50-1	1,2-Dichlorobenzene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U
96-12-8	1,2-Dibromo-3-chloropropane	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	--	R	--	R	--	R
120-82-1	1,2,4-Trichlorobenzene	VOA-S	µg/kg	38	UJ	58	UJ	32	UJ	57	UJ	12	U	18	UJ	14	U	11	U	12	U	12	U

Table B-1
Sediment Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-001 8/14/2006		SD-002 8/14/2006		SD-003 8/22/2006		SD-004 8/16/2006		SD-005 8/16/2006		SD-006 8/16/2006		SD-007 8/14/2006		SD-008 8/4/2006		SD-009 8/1/2006		SD-010 8/1/2006	
	Semi-Volatile Organic Compounds																						
100-52-7	Benzaldehyde	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
108-95-2	Phenol	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
111-44-4	bis(2-Chloroethyl) ether	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
95-57-8	2-Chlorophenol	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
95-48-7	2-Methylphenol	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
108-60-1	2,2'-oxybis(1-Chloropropane)	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	UJ	420	U	410	U	390	UJ
98-86-2	Acetophenone	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
106-44-5	4-Methylphenol	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
621-64-7	n-Nitroso-di-n-propylamine	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
67-72-1	Hexachloroethane	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
98-95-3	Nitrobenzene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
78-59-1	Isophorone	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
88-75-5	2-Nitrophenol	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
105-67-9	2,4-Dimethylphenol	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
111-91-1	bis(2-Chloroethoxy)methane	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
120-83-2	2,4-Dichlorophenol	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
91-20-3	Naphthalene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
106-47-8	4-Chloroaniline	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
87-68-3	Hexachlorobutadiene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
105-60-2	Caprolactam	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
59-50-7	4-Chloro-3-methylphenol	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
91-57-6	2-Methylnaphthalene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
77-47-4	Hexachlorocyclopentadiene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	UJ	670	UJ	480	U	420	UJ	410	UJ	390	UJ
88-06-2	2,4,6-Trichlorophenol	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
95-95-4	2,4,5-Trichlorophenol	SVOA-S	µg/kg	3500	UJ	5200	UJ	2100	UJ	4600	UJ	1100	U	1700	UJ	1200	U	1100	U	1000	U	980	UJ
92-52-4	1,1'-Biphenyl	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
91-58-7	2-Chloronaphthalene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
88-74-4	2-Nitroaniline	SVOA-S	µg/kg	3500	UJ	5200	UJ	2100	UJ	4600	UJ	1100	U	1700	UJ	1200	U	1100	U	1000	U	980	UJ
131-11-3	Dimethylphthalate	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
606-20-2	2,6-Dinitrotoluene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
208-96-8	Acenaphthylene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
99-09-2	3-Nitroaniline	SVOA-S	µg/kg	3500	UJ	5200	UJ	2100	UJ	4600	UJ	1100	U	1700	UJ	1200	U	1100	U	1000	U	980	UJ
83-32-9	Acenaphthene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
51-28-5	2,4-Dinitrophenol	SVOA-S	µg/kg	3500	UJ	5200	UJ	2100	UJ	4600	UJ	1100	UJ	1700	UJ	1200	U	--	R	--	R	980	UJ
100-02-7	4-Nitrophenol	SVOA-S	µg/kg	3500	UJ	5200	UJ	2100	UJ	4600	UJ	1100	U	1700	UJ	1200	U	1100	UJ	1000	UJ	980	UJ
132-64-9	Dibenzofuran	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
121-14-2	2,4-Dinitrotoluene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
84-66-2	Diethylphthalate	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
86-73-7	Fluorene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
7005-72-3	4-Chlorophenyl-phenylether	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
100-01-6	4-Nitroaniline	SVOA-S	µg/kg	3500	UJ	5200	UJ	2100	UJ	4600	UJ	1100	U	1700	UJ	1200	UJ	1100	UJ	1000	UJ	980	UJ
534-52-1	4,6-Dinitro-2-methylphenol	SVOA-S	µg/kg	3500	UJ	5200	UJ	2100	UJ	4600	UJ	1100	U	1700	UJ	1200	U	1100	UJ	1000	UJ	980	UJ
86-30-6	n-Nitrosodiphenylamine	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
101-55-3	4-Bromophenyl-phenylether	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
118-74-1	Hexachlorobenzene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
1912-24-9	Atrazine	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
87-86-5	Pentachlorophenol	SVOA-S	µg/kg	3500	UJ	5200	UJ	2100	UJ	4600	UJ	1100	U	1700	UJ	1200	U	1100	UJ	1000	UJ	980	UJ
85-01-8	Phenanthrene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
120-12-7	Anthracene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
84-74-2	Di-n-butylphthalate	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
206-44-0	Fluoranthene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
129-00-0	Pyrene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
85-68-7	Butylbenzylphthalate	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
91-94-1	3,3'-Dichlorobenzidine	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
56-55-3	Benzo(a)anthracene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
218-01-9	Chrysene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ

Table B-1
Sediment Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-001 8/14/2006		SD-002 8/14/2006		SD-003 8/22/2006		SD-004 8/16/2006		SD-005 8/16/2006		SD-006 8/16/2006		SD-007 8/14/2006		SD-008 8/4/2006		SD-009 8/1/2006		SD-010 8/1/2006	
	Semi-Volatile Organic Compounds																						
117-81-7	bis(2-Ethylhexyl) phthalate	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	100	J	670	UJ	480	U	420	U	410	U	390	UJ
117-84-0	Di-n-octylphthalate	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
205-99-2	Benzo(b)fluoranthene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
207-08-9	Benzo(k)fluoranthene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
50-32-8	Benzo(a)pyrene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
193-39-5	Indeno(1,2,3-cd)pyrene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
53-70-3	Dibenz(a,h)anthracene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
191-24-2	Benzo(g,h,i)perylene	SVOA-S	µg/kg	1400	UJ	2100	UJ	830	UJ	1800	UJ	420	U	670	UJ	480	U	420	U	410	U	390	UJ
	Pesticides/PCBs																						
319-84-6	alpha-BHC	Pest-S	µg/kg	7.1	UJ	11	UJ	4.3	UJ	9.4	UJ	2.2	U	3.5	UJ	2.5	U	2.2	U	2.4		2	U
319-85-7	beta-BHC	Pest-S	µg/kg	7.1	UJ	11	UJ	4.3	UJ	9.4	UJ	2.2	U	3.5	UJ	2.5	U	2.2	U	2.1	U	2	U
319-86-8	delta-BHC	Pest-S	µg/kg	7.1	UJ	11	UJ	4.3	UJ	9.4	UJ	2.2	U	3.5	UJ	2.5	U	2.2	U	2.1	U	2	U
58-89-9	gamma-BHC (Lindane)	Pest-S	µg/kg	7.1	UJ	11	UJ	4.3	UJ	9.4	UJ	2.2	U	3.5	UJ	2.5	U	2.2	U	2.1	U	2	U
76-44-8	Heptachlor	Pest-S	µg/kg	7.1	UJ	11	UJ	4.3	UJ	9.4	UJ	2.2	U	3.5	UJ	2.5	U	2.2	U	2.1	U	2	U
309-00-2	Aldrin	Pest-S	µg/kg	7.1	UJ	11	UJ	4.3	UJ	9.4	UJ	2.2	U	3.5	UJ	2.5	U	2.2	U	2.1	U	2	U
1024-57-3	Heptachlor epoxide	Pest-S	µg/kg	7.1	UJ	11	UJ	4.3	UJ	9.4	UJ	2.2	U	3.5	UJ	2.5	U	2.2	U	2.1	U	2	U
959-98-8	Endosulfan I	Pest-S	µg/kg	7.1	UJ	11	UJ	4.3	UJ	9.4	UJ	2.2	U	3.5	UJ	2.5	U	2.2	U	2.1	U	2	U
60-57-1	Dieldrin	Pest-S	µg/kg	14	UJ	21	UJ	8.3	UJ	18	UJ	4.2	U	6.7	UJ	4.8	U	4.2	U	4.1	U	3.9	U
72-55-9	4,4'-DDE	Pest-S	µg/kg	2.8	J	13	J	2.1	J	18	UJ	1.3	J	2.8	J	4.8	U	4.2	U	4.1	U	3.9	U
72-20-8	Endrin	Pest-S	µg/kg	14	UJ	21	UJ	8.3	UJ	18	UJ	4.2	U	6.7	UJ	4.8	U	4.2	U	4.1	U	3.9	U
33213-65-9	Endosulfan II	Pest-S	µg/kg	14	UJ	21	UJ	8.3	UJ	18	UJ	4.2	U	6.7	UJ	4.8	U	4.2	U	4.1	U	3.9	U
72-54-8	4,4'-DDD	Pest-S	µg/kg	14	UJ	14	J	8.3	UJ	18	UJ	4.2	U	6.7	UJ	4.8	U	4.2	U	4.1	U	3.9	U
1031-07-8	Endosulfan sulfate	Pest-S	µg/kg	14	UJ	21	UJ	8.3	UJ	18	UJ	4.2	U	6.7	UJ	4.8	U	4.2	U	4.1	U	3.9	U
50-29-3	4,4'-DDT	Pest-S	µg/kg	14	UJ	21	UJ	8.3	UJ	18	UJ	4.2	U	6.7	UJ	4.8	U	4.2	U	4.1	U	3.9	U
72-43-5	Methoxychlor	Pest-S	µg/kg	71	UJ	110	UJ	43	UJ	94	UJ	22	U	35	UJ	25	U	22	U	21	U	20	U
53494-70-5	Endrin ketone	Pest-S	µg/kg	14	UJ	21	UJ	8.3	UJ	18	UJ	4.2	U	6.7	UJ	4.8	U	4.2	U	4.1	U	3.9	U
7421-93-4	Endrin aldehyde	Pest-S	µg/kg	14	UJ	21	UJ	8.3	UJ	18	UJ	4.2	U	6.7	UJ	4.8	U	4.2	U	4.1	U	3.9	U
5103-71-9	alpha-Chlordane	Pest-S	µg/kg	7.1	UJ	11	UJ	4.3	UJ	6.8	J	2.2	U	3.5	UJ	2.5	U	2.2	U	2.1	U	2	U
5103-74-2	gamma-Chlordane	Pest-S	µg/kg	7.1	UJ	11	UJ	4.3	UJ	9.4	UJ	2.2	U	3.5	UJ	2.5	U	2.2	U	2.1	U	2	U
8001-35-2	Toxaphene	Pest-S	µg/kg	710	UJ	1100	UJ	430	UJ	940	UJ	220	U	350	UJ	250	U	220	U	210	U	200	U
12674-11-2	Aroclor-1016	Pest-S	µg/kg	140	UJ	210	UJ	83	UJ	180	UJ	42	U	67	UJ	48	U	42	U	41	U	39	U
11104-28-2	Aroclor-1221	Pest-S	µg/kg	280	UJ	420	UJ	170	UJ	370	UJ	86	U	140	UJ	97	U	85	U	83	U	79	U
11141-16-5	Aroclor-1232	Pest-S	µg/kg	140	UJ	210	UJ	83	UJ	180	UJ	42	U	67	UJ	48	U	42	U	41	U	39	U
53469-21-9	Aroclor-1242	Pest-S	µg/kg	140	UJ	210	UJ	83	UJ	180	UJ	42	U	67	UJ	48	U	42	U	41	U	39	U
12672-29-6	Aroclor-1248	Pest-S	µg/kg	140	UJ	210	UJ	83	UJ	180	UJ	42	U	67	UJ	48	U	42	U	41	U	39	U
11097-69-1	Aroclor-1254	Pest-S	µg/kg	140	UJ	210	UJ	83	UJ	180	UJ	42	U	67	UJ	48	U	42	U	41	U	39	U
11096-82-5	Aroclor-1260	Pest-S	µg/kg	140	UJ	210	UJ	83	UJ	180	UJ	42	U	67	UJ	48	U	42	U	41	U	39	U
	Inorganic Analytes																						
7429-90-5	Aluminum	ICP-AES-S	mg/Kg	27000		12000		16000		7200		17000		13000		13000		12000		9100		760	
7440-36-0	Antimony	ICP-AES-S	mg/Kg	5.4	U	5.7	U	3.8	U	5.4	U	3.7		2.9		280		5	U	4.9	U	5.1	U
7440-38-2	Arsenic	ICP-AES-S	mg/Kg	8.5		4.6		0.96		3.4		6.1		5.6		4.2		2.8		2.9		1.3	U
7440-39-3	Barium	ICP-AES-S	mg/Kg	150		91		36		55		54		58		33		19		14		13	U
7440-41-7	Beryllium	ICP-AES-S	mg/Kg	0.95		0.71	U	0.47	U	0.67	U	0.6		0.54		0.25	U	0.62	U	0.61	U	0.64	U
7440-43-9	Cadmium	ICP-AES-S	mg/Kg	0.68	U	0.89		0.47	U	0.72		0.6		0.5		0.25	U	0.62	U	0.61	U	0.64	U
7440-70-2	Calcium	ICP-AES-S	mg/Kg	5200		13000		5100		23000		4000		4800		61000	J	5700		13000		21000	
7440-47-3	Chromium	ICP-AES-S	mg/Kg	25		17		15		12		16		15		13		11		8.9		2.4	
7440-48-4	Cobalt	ICP-AES-S	mg/Kg	16		9.2		8.5		5		11		9.5		12		9.5		6.9		2.6	U
7440-50-8	Copper	ICP-AES-S	mg/Kg	54		21		12		29		25		21		23		19		15		3.2	U
7439-89-6	Iron	ICP-AES-S	mg/Kg	37000		23000		27000		13000		35000		28000		27000		25000		19000		1800	
7439-92-1	Lead	ICP-AES-S	mg/Kg	38		47		15		31		52		40		20		15		13		1.4	
7439-95-4	Magnesium	ICP-AES-S	mg/Kg	8900		4300		7600		3300		6800		5300		11000		7600		11000		12000	
7439-96-5	Manganese	ICP-AES-S	mg/Kg	770		1200		290		580		900		690		880		410		270		42	
7439-97-6	Mercury	ICP-AES-S	mg/Kg	0.14	U	0.14	U	0.094	U	0.13	U	0.06	U	0.052	U	0.05	U	0.062	U	0.061	U	0.064	U

Table B-1
Sediment Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-001 8/14/2006		SD-002 8/14/2006		SD-003 8/22/2006		SD-004 8/16/2006		SD-005 8/16/2006		SD-006 8/16/2006		SD-007 8/14/2006		SD-008 8/4/2006		SD-009 8/1/2006		SD-010 8/1/2006	
	Inorganic Analytes																						
7440-02-0	Nickel	ICP-AES-S	mg/Kg	39		19		26		15		27		20		22		21		16		2.6	U
7440-09-7	Potassium	ICP-AES-S	mg/Kg	1500		680		650		740		690		530		340		420		420		65	
7782-49-2	Selenium	ICP-AES-S	mg/Kg	4.8	U	4.9	U	3.3	U	5.3		2.1	U	1.8	U	1.8	U	4.4	U	4.3	U	4.5	U
7440-22-4	Silver	ICP-AES-S	mg/Kg	0.68	U	0.71	U	0.47	U	0.67	U	0.3	U	0.26	U	0.25	U	0.62	U	0.61	U	0.64	U
7440-23-5	Sodium	ICP-AES-S	mg/Kg	140	U	140	U	94	U	130	U	60	U	52	U	390		160	J	120	U	130	U
7440-28-0	Thallium	ICP-AES-S	mg/Kg	14	U	14	U	9.4	U	13	U	6	U	5.2	U	5	U	12	U	12	U	13	U
7440-62-2	Vanadium	ICP-AES-S	mg/Kg	31		15		15		17		19		17		13		11		8.5		2.9	
7440-66-6	Zinc	ICP-AES-S	mg/Kg	2.7	U	2.8	U	1.9	U	2.7	U	1.2	U	1	U	68		2.5	U	2.5	U	2.6	U
57-12-5	Cyanide	Cyanide-S	mg/Kg	0.32	U	0.29	U	0.22	U	0.9		0.21		0.23		0.11	U	0.068	U	0.061	U	0.061	U
	Wet Chemistry																						
pH	pH	SW9045C	s.u.	6.9		7.2		6.6		7.2		7.3		7.4		7.6		8		8.1		8.3	
TOC	Total Organic Carbon	LLOYD KAHN	mg/kg	110000		160000		87000		64000		160000		9800		60000		3400		3800		7200	
% Granule	% GRANULE & LARGER >2 MM	ASTM-D421	%	0				32				72	J	60		12		47		56		12	
Very coarse	% VERY COURSE SAND >1 - 2 MM	ASTM-D421	%	1.8				13				11		9.7		16		17		15		15	
Coarse	% COARSE SAND >.5 - 1 MM	ASTM-D421	%	3.4				10				6.7		5.5		17		17		15		31	
Medium	% MEDIUM SAND >.25 - .5 MM	ASTM-D421	%	4.4				9.7				2.8		3.3		14		14		9.8		34	
Fine	% FINE SAND >.125 - .25 MM	ASTM-D421	%	4.3				6.7				1.2		2		8.3		3.7		2.5		7.1	
Very Fine	% VERY FINE SAND >.0625 - .125 MM	ASTM-D421	%	3.2				4.8				0.6		1.6		6.3		0.8		0.4		0.5	
% Silt	% SILT	ASTM-D421	%	53				21				4.9		17		23		0		0		0.2	
% Clay	% CLAY & COLLOIDS	ASTM-D421	%	30				3.5				1.3		1.4		3.3		1.1		1		0.9	

Notes:
-- - No value available
ARO-W - Polychlorinate Biphenols - Water
Cyanide-W - Cyanide-Water
ICP-AES-S - Inductively Coupled Plasma-Automatic Emissions Spectra-Soil
J - Value estimated
mg/kg - miligram per kilogram
N/A - Not Available
PCBs - Polychlorinated Biphenols
Pest-S - Pesticides-Soil
R - Value rejected
SD - Sediment
s.u. - scientific units
SVOA-S - Semi-Volatile Organic Analysis-Soil
SVOA - Semi-Volatile Organic Analysis-Soil
U - Value detected below reporting limit
µg/kg - microgram per kilogram
UJ - Value estimated to be below reporting limit

Table B-1
Sediment Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-011 8/3/2006		SD-012 8/3/2006		SD-013 8/3/2006		SD-014 8/3/2006		SD-015 8/9/2006		SD-016 8/21/2006		SD-017 8/8/2006		SD-018 8/10/2006		SD-019 8/8/2006		SD-020 8/8/2006	
	Volatile Organic Compounds																						
75-71-8	Dichlorodifluoromethane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	2	J	10	U	12	U
74-87-3	Chloromethane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
75-01-4	Vinyl Chloride	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
74-83-9	Bromomethane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
75-00-3	Chloroethane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
75-69-4	Trichlorofluoromethane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
75-35-4	1,1-Dichloroethene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
67-64-1	Acetone	VOA-S	µg/kg	12	UJ	12	UJ	10	UJ	27	UJ	83	UJ	51	UJ	12	UJ	10	U	13	UJ	12	UJ
75-15-0	Carbon Disulfide	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
79-20-9	Methyl Acetate	VOA-S	µg/kg	12	UJ	10	UJ	10	UJ	12	UJ	83	UJ	23	UJ	12	U	10	U	10	U	12	U
75-09-2	Methylene Chloride	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
156-60-5	trans-1,2-Dichloroethene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
1634-04-4	Methyl tert-Butyl Ether	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
75-34-3	1,1-Dichloroethane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
156-59-2	cis-1,2-Dichloroethene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
78-93-3	2-Butanone	VOA-S	µg/kg	12	UJ	10	UJ	10	UJ	7	J	83	UJ	23	UJ	12	U	10	UJ	10	U	12	U
67-66-3	Chloroform	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
71-55-6	1,1,1-Trichloroethane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
110-82-7	Cyclohexane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
56-23-5	Carbon Tetrachloride	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
71-43-2	Benzene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
107-06-2	1,2-Dichloroethane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
79-01-6	Trichloroethene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
108-87-2	Metylcyclohexane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
78-87-5	1,2-Dichloropropane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
75-27-4	Bromodichloromethane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
10061-01-5	cis-1,3-Dichloropropene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
108-10-1	4-Methyl-2-pentanone	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
108-88-3	Toluene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
10061-02-6	trans-1,3-Dichloropropene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
79-00-5	1,1,2-Trichloroethane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
127-18-4	Tetrachloroethene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
591-78-6	2-Hexanone	VOA-S	µg/kg	12	UJ	10	UJ	10	UJ	12	UJ	83	UJ	23	UJ	12	U	10	U	10	U	12	U
124-48-1	Dibromochloromethane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
106-93-4	1,2-Dibromoethane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
108-90-7	Chlorobenzene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
100-41-4	Ethylbenzene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
100-42-5	Styrene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
75-25-2	Bromoform	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
98-82-8	Isopropylbenzene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
79-34-5	1,1,2,2-Tetrachloroethane	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
541-73-1	1,3-Dichlorobenzene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
106-46-7	1,4-Dichlorobenzene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
95-50-1	1,2-Dichlorobenzene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U
96-12-8	1,2-Dibromo-3-chloropropane	VOA-S	µg/kg	--	R	--	R	--	R	--	R	83	UJ	23	UJ	--	R	10	U	--	R	--	R
120-82-1	1,2,4-Trichlorobenzene	VOA-S	µg/kg	12	U	10	U	10	U	12	U	83	UJ	23	UJ	12	U	10	U	10	U	12	U

Table B-1
Sediment Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-011 8/3/2006		SD-012 8/3/2006		SD-013 8/3/2006		SD-014 8/3/2006		SD-015 8/9/2006		SD-016 8/21/2006		SD-017 8/8/2006		SD-018 8/10/2006		SD-019 8/8/2006		SD-020 8/8/2006	
	Semi-Volatile Organic Compounds																						
100-52-7	Benzaldehyde	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
108-95-2	Phenol	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
111-44-4	bis(2-Chloroethyl) ether	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
95-57-8	2-Chlorophenol	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
95-48-7	2-Methylphenol	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
108-60-1	2,2'-oxybis(1-Chloropropane)	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	UJ	430	U	380	UJ	370	U	400	U
98-86-2	Acetophenone	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	690	J	660	U	430	U	380	UJ	370	U	400	U
106-44-5	4-Methylphenol	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
621-64-7	n-Nitroso-di-n-propylamine	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
67-72-1	Hexachloroethane	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
98-95-3	Nitrobenzene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
78-59-1	Isophorone	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
88-75-5	2-Nitrophenol	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
105-67-9	2,4-Dimethylphenol	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
111-91-1	bis(2-Chloroethoxy)methane	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
120-83-2	2,4-Dichlorophenol	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
91-20-3	Naphthalene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
106-47-8	4-Chloroaniline	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
87-68-3	Hexachlorobutadiene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
105-60-2	Caprolactam	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
59-50-7	4-Chloro-3-methylphenol	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
91-57-6	2-Methylnaphthalene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
77-47-4	Hexachlorocyclopentadiene	SVOA-S	µg/kg	420	UJ	380	UJ	370	UJ	430	UJ	3000	UJ	660	U	430	UJ	380	UJ	370	UJ	400	UJ
88-06-2	2,4,6-Trichlorophenol	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
95-95-4	2,4,5-Trichlorophenol	SVOA-S	µg/kg	1100	U	940	U	920	U	1100	U	7500	UJ	1700	U	1100	U	950	UJ	930	U	1000	U
92-52-4	1,1'-Biphenyl	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
91-58-7	2-Chloronaphthalene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
88-74-4	2-Nitroaniline	SVOA-S	µg/kg	1100	U	940	U	920	U	1100	U	7500	UJ	1700	U	1100	U	950	UJ	930	U	1000	U
131-11-3	Dimethylphthalate	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
606-20-2	2,6-Dinitrotoluene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
208-96-8	Acenaphthylene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
99-09-2	3-Nitroaniline	SVOA-S	µg/kg	1100	U	940	U	920	U	1100	U	7500	UJ	1700	U	1100	U	950	UJ	930	U	1000	U
83-32-9	Acenaphthene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
51-28-5	2,4-Dinitrophenol	SVOA-S	µg/kg	--	R	--	R	--	R	--	R	7500	UJ	1700	UJ	--	R	950	UJ	--	R	--	R
100-02-7	4-Nitrophenol	SVOA-S	µg/kg	1100	UJ	940	UJ	920	UJ	1100	UJ	7500	UJ	1700	U	1100	UJ	950	UJ	930	UJ	1000	UJ
132-64-9	Dibenzofuran	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
121-14-2	2,4-Dinitrotoluene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
84-66-2	Diethylphthalate	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
86-73-7	Fluorene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
7005-72-3	4-Chlorophenyl-phenylether	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
100-01-6	4-Nitroaniline	SVOA-S	µg/kg	1100	UJ	940	UJ	920	UJ	1100	UJ	7500	UJ	1700	UJ	1100	UJ	950	UJ	930	UJ	1000	UJ
534-52-1	4,6-Dinitro-2-methylphenol	SVOA-S	µg/kg	1100	UJ	940	UJ	920	UJ	1100	UJ	7500	UJ	1700	UJ	1100	UJ	950	UJ	930	UJ	1000	UJ
86-30-6	n-Nitrosodiphenylamine	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
101-55-3	4-Bromophenyl-phenylether	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
118-74-1	Hexachlorobenzene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
1912-24-9	Atrazine	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
87-86-5	Pentachlorophenol	SVOA-S	µg/kg	1100	UJ	940	UJ	920	UJ	1100	UJ	7500	UJ	1700	UJ	1100	UJ	950	UJ	930	UJ	1000	UJ
85-01-8	Phenanthrene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
120-12-7	Anthracene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
84-74-2	Di-n-butylphthalate	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
206-44-0	Fluoranthene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
129-00-0	Pyrene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
85-68-7	Butylbenzylphthalate	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
91-94-1	3,3'-Dichlorobenzidine	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
56-55-3	Benzo(a)anthracene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
218-01-9	Chrysene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U

Table B-1
Sediment Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-011 8/3/2006		SD-012 8/3/2006		SD-013 8/3/2006		SD-014 8/3/2006		SD-015 8/9/2006		SD-016 8/21/2006		SD-017 8/8/2006		SD-018 8/10/2006		SD-019 8/8/2006		SD-020 8/8/2006	
	Semi-Volatile Organic Compounds																						
117-81-7	bis(2-Ethylhexyl) phthalate	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
117-84-0	Di-n-octylphthalate	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
205-99-2	Benzo(b)fluoranthene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
207-08-9	Benzo(k)fluoranthene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
50-32-8	Benzo(a)pyrene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
193-39-5	Indeno(1,2,3-cd)pyrene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
53-70-3	Dibenz(a,h)anthracene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
191-24-2	Benzo(g,h,i)perylene	SVOA-S	µg/kg	420	U	380	U	370	U	430	U	3000	UJ	660	U	430	U	380	UJ	370	U	400	U
	Pesticides/PCBs																						
319-84-6	alpha-BHC	Pest-S	µg/kg	2.2	U	1.9	U	1.9	U	2.2	U	15	UJ	3.4	U	2.2	U	2	U	1.9	U	2	U
319-85-7	beta-BHC	Pest-S	µg/kg	2.2	U	1.9	U	1.9	U	2.2	U	7.3	J	3.4	U	2.2	U	2	U	1.9	U	2	U
319-86-8	delta-BHC	Pest-S	µg/kg	2.2	U	1.9	U	1.9	U	2.2	U	15	UJ	3.4	U	2.2	U	2	U	1.9	U	2	U
58-89-9	gamma-BHC (Lindane)	Pest-S	µg/kg	2.2	U	1.9	U	1.9	U	2.2	U	15	UJ	3.4	U	2.2	U	2	U	1.9	U	2	U
76-44-8	Heptachlor	Pest-S	µg/kg	2.2	U	1.9	U	1.9	U	2.2	U	15	UJ	3.4	U	2.2	U	2	U	1.9	U	2	U
309-00-2	Aldrin	Pest-S	µg/kg	2.2	U	1.9	U	1.9	U	2.2	U	15	UJ	3.4	U	2.2	U	2	U	1.9	U	2	U
1024-57-3	Heptachlor epoxide	Pest-S	µg/kg	2.2	U	1.9	U	1.9	U	2.2	U	15	UJ	3.4	U	2.2	U	2	U	1.9	U	2	U
959-98-8	Endosulfan I	Pest-S	µg/kg	2.2	U	1.9	U	1.9	U	2.2	U	15	UJ	3.4	U	2.2	U	2	U	1.9	U	2	U
60-57-1	Dieldrin	Pest-S	µg/kg	4.2	U	3.8	U	3.7	U	4.3	U	9.9	J	6.6	U	4.3	U	3.8	U	3.7	U	4	U
72-55-9	4,4'-DDE	Pest-S	µg/kg	4.2	U	3.8	U	3.7	U	4.3	U	30	UJ	6.6	U	4.3	U	3.8	U	3.7	U	4	U
72-20-8	Endrin	Pest-S	µg/kg	4.2	U	3.8	U	3.7	U	4.3	U	30	UJ	6.6	U	4.3	U	3.8	U	3.7	U	4	U
33213-65-9	Endosulfan II	Pest-S	µg/kg	4.2	U	3.8	U	3.7	U	4.3	U	30	UJ	6.6	U	4.3	U	3.8	U	3.7	U	4	U
72-54-8	4,4'-DDD	Pest-S	µg/kg	4.2	U	3.8	U	3.7	U	4.3	U	30	UJ	6.6	U	4.3	U	3.8	U	2.4	J	4	U
1031-07-8	Endosulfan sulfate	Pest-S	µg/kg	4.2	U	3.8	U	3.7	U	4.3	U	30	UJ	6.6	U	4.3	U	3.8	U	3.7	U	4	U
50-29-3	4,4'-DDT	Pest-S	µg/kg	4.2	U	3.8	U	3.7	U	4.3	U	30	UJ	6.6	U	4.3	U	3.8	U	26		4	U
72-43-5	Methoxychlor	Pest-S	µg/kg	22	U	19	U	19	U	22	U	150	UJ	34	U	22	U	20	U	19	U	20	U
53494-70-5	Endrin ketone	Pest-S	µg/kg	4.2	U	3.8	U	3.7	U	4.3	U	30	UJ	6.6	U	4.3	U	3.8	U	3.7	U	4	U
7421-93-4	Endrin aldehyde	Pest-S	µg/kg	4.2	U	3.8	U	3.7	U	4.3	U	30	UJ	6.6	U	4.3	U	3.8	U	3.7	U	4	U
5103-71-9	alpha-Chlordane	Pest-S	µg/kg	2.2	U	1.9	U	1.9	U	2.2	U	15	UJ	3.4	U	2.2	U	2	U	1.9	U	2	U
5103-74-2	gamma-Chlordane	Pest-S	µg/kg	2.2	U	1.9	U	1.9	U	2.2	U	15	UJ	3.4	U	2.2	U	2	U	1.9	U	2	U
8001-35-2	Toxaphene	Pest-S	µg/kg	220	U	190	U	190	U	220	U	1500	UJ	340	U	220	U	200	U	190	U	200	U
12674-11-2	Aroclor-1016	Pest-S	µg/kg	42	U	38	U	37	U	43	U	300	UJ	66	U	43	U	38	U	37	U	40	U
11104-28-2	Aroclor-1221	Pest-S	µg/kg	86	U	76	U	74	U	88	U	610	UJ	130	U	87	U	77	U	75	U	81	U
11141-16-5	Aroclor-1232	Pest-S	µg/kg	42	U	38	U	37	U	43	U	300	UJ	66	U	43	U	38	U	37	U	40	U
53469-21-9	Aroclor-1242	Pest-S	µg/kg	42	U	38	U	37	U	43	U	300	UJ	66	U	43	U	38	U	37	U	40	U
12672-29-6	Aroclor-1248	Pest-S	µg/kg	42	U	38	U	37	U	43	U	300	UJ	66	U	43	U	38	U	37	U	40	U
11097-69-1	Aroclor-1254	Pest-S	µg/kg	42	U	38	U	37	U	43	U	300	UJ	66	U	43	U	38	U	37	U	40	U
11096-82-5	Aroclor-1260	Pest-S	µg/kg	42	U	38	U	37	U	43	U	300	UJ	66	U	43	U	38	U	37	U	40	U
	Inorganic Analytes																						
7429-90-5	Aluminum	ICP-AES-S	mg/Kg	6000		11000		12000		12000		7400		11000		10000		13000		8700		12000	
7440-36-0	Antimony	ICP-AES-S	mg/Kg	3.1	U	2.8	U	4.9	U	3		9.4	U	2.8		2.9	U	4.8	U	4.8	U	3	
7440-38-2	Arsenic	ICP-AES-S	mg/Kg	2.8		2.9		2.9		3.6		2.4	U	2.6		3.2		5.6		6.2		4.1	
7440-39-3	Barium	ICP-AES-S	mg/Kg	13		21		18		25		57		30		15		25		24		16	
7440-41-7	Beryllium	ICP-AES-S	mg/Kg	0.39	U	0.35	U	0.62	U	0.27	U	1.2	U	0.29	U	0.36	U	0.6	U	0.93		0.35	U
7440-43-9	Cadmium	ICP-AES-S	mg/Kg	0.39	U	0.35	U	0.62	U	0.37		1.2	U	0.53		0.36	U	0.6	U	0.6	U	0.35	U
7440-70-2	Calcium	ICP-AES-S	mg/Kg	94000		3300		35000		62000		30000		65000		13000		5400		8700		3700	
7440-47-3	Chromium	ICP-AES-S	mg/Kg	6.1		10		9.6		14		43		15		10		13		8.8		11	
7440-48-4	Cobalt	ICP-AES-S	mg/Kg	4.5		10		9.4		10		4.7	U	8.6		8.6		12		8.5		11	
7440-50-8	Copper	ICP-AES-S	mg/Kg	12		23		18		25		25		17		26		29		22		26	
7439-89-6	Iron	ICP-AES-S	mg/Kg	13000		24000		26000		26000		9200		25000		23000		29000		23000		27000	
7439-92-1	Lead	ICP-AES-S	mg/Kg	6.5		13		16		23		49		23		19		20		21		23	
7439-95-4	Magnesium	ICP-AES-S	mg/Kg	53000		6000		7100		8500		3700		8400		6300		7700		5200		6900	
7439-96-5	Manganese	ICP-AES-S	mg/Kg	280		380		430		410		63		400		480		860		510		390	
7439-97-6	Mercury	ICP-AES-S	mg/Kg	0.077	U	0.07	U	0.062	U	0.054	U	0.24	U	0.058	U	0.072	U	0.06	U	0.06	U	0.071	U

Table B-1
Sediment Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-011 8/3/2006		SD-012 8/3/2006		SD-013 8/3/2006		SD-014 8/3/2006		SD-015 8/9/2006		SD-016 8/21/2006		SD-017 8/8/2006		SD-018 8/10/2006		SD-019 8/8/2006		SD-020 8/8/2006	
	Inorganic Analytes																						
7440-02-0	Nickel	ICP-AES-S	mg/Kg	10		21		24		23		14		19		19		25		22		24	
7440-09-7	Potassium	ICP-AES-S	mg/Kg	710		270		340		460		480		420		360		450		330		340	
7782-49-2	Selenium	ICP-AES-S	mg/Kg	2.7	U	2.5	U	4.3	U	1.9	U	11		2.4		2.5	U	4.2	U	4.2	U	2.5	U
7440-22-4	Silver	ICP-AES-S	mg/Kg	0.39	U	0.35	U	0.62	U	0.27	U	1.2	U	0.29	U	0.36	U	0.6	U	0.6	U	0.35	U
7440-23-5	Sodium	ICP-AES-S	mg/Kg	77	U	70	U	120	U	54	U	240	U	58	U	72	U	120	U	120	U	71	U
7440-28-0	Thallium	ICP-AES-S	mg/Kg	7.7	U	7	U	12	U	5.4	U	24	U	5.8	U	7.2	U	12	U	12	U	7.1	U
7440-62-2	Vanadium	ICP-AES-S	mg/Kg	6.4		10		11		13		6		10		11		12		10		11	
7440-66-6	Zinc	ICP-AES-S	mg/Kg	1.5	U	1.4	U	2.5	U	1.1	U	4.7	U	1.2	U	1.4	U	2.4	U	2.4	U	1.4	U
57-12-5	Cyanide	Cyanide-S	mg/Kg	0.12	U	0.072	U	0.072	U	0.072	U	0.91		0.13	U	0.086	U	0.054	U	0.07	U	0.083	U
	Wet Chemistry																						
pH	pH	SW9045C	s.u.	8.2		8		8.2		7.4		7.3		7.5		8		8.2		8.2		7.8	
TOC	Total Organic Carbon	LLOYD KAHN	mg/kg	25000		9700		5700		33000		250000		130000		6500		7300		4000		7800	
% Granule	% GRANULE & LARGER >2 MM	ASTM-D421	%	42		61		57		58				40		40		38		66		35	
Very coarse	% VERY COURSE SAND >1 - 2 MM	ASTM-D421	%	17		15		17		9.5				14		14		16		14		17	
Coarse	% COARSE SAND >.5 - 1 MM	ASTM-D421	%	13		14		15		8.3				13		16		16		9.1		22	
Medium	% MEDIUM SAND >.25 - .5 MM	ASTM-D421	%	19		7.3		7.4		5.9				9.6		19		16		6		16	
Fine	% FINE SAND >.125 - .25 MM	ASTM-D421	%	7.6		1.4		1.7		2.8				5.2		6.9		8.2		2		5.2	
Very Fine	% VERY FINE SAND >.0625 - .125 MM	ASTM-D421	%	0.1		0.3		0.5		2.7				2.5		1.6		3.5		0.7		2.2	
% Silt	% SILT	ASTM-D421	%	0.2		0		0.1		13				14		0.3		0		1		2.7	
% Clay	% CLAY & COLLOIDS	ASTM-D421	%	1.8		1.3		1.4		0				2.2		2.6		3.1		0.8		0.8	

Notes:
-- - No value available
ARO-W - Polychlorinate Biphenols - Water
Cyanide-W - Cyanide-Water
ICP-AES-S - Inductively Coupled Plasma-Automatic Emissions Spectra-Soil
J - Value estimated
mg/kg - miligram per kilogram
N/A - Not Available
PCBs - Polychlorinated Biphenols
Pest-S - Pesticides-Soil
R - Value rejected
SD - Sediment
s.u. - scientific units
SVOA-S - Semi-Volatile Organic Analysis-Soil
SVOA - Semi-Volatile Organic Analysis-Soil
U - Value detected below reporting limit
µg/kg - microgram per kilogram
UJ - Value estimated to be below reporting limit

Table B-1
Sediment Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-021 8/10/2006		SD-022 8/10/2006		SD-023 8/11/2006		SD-024 8/11/2006		SD-025 8/11/2006		SD-026 8/11/2006		SD-027 8/21/2006		SD-028 8/21/2006		SD-029 8/21/2006		SD-030 8/16/2006	
	Volatile Organic Compounds																						
75-71-8	Dichlorodifluoromethane	VOA-S	µg/kg	5	J	10	J	4	J	20	UJ	11	U	13	J	11	U	14	U	31	UJ	12	U
74-87-3	Chloromethane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
75-01-4	Vinyl Chloride	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
74-83-9	Bromomethane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
75-00-3	Chloroethane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
75-69-4	Trichlorofluoromethane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
75-35-4	1,1-Dichloroethene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
67-64-1	Acetone	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	26	J	11	UJ	14	UJ	31	UJ	12	U
75-15-0	Carbon Disulfide	VOA-S	µg/kg	11	U	10	U	14	U	5	J	11	U	19	UJ	11	U	14	U	31	UJ	12	U
79-20-9	Methyl Acetate	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	UJ	14	UJ	31	UJ	12	U
75-09-2	Methylene Chloride	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
156-60-5	trans-1,2-Dichloroethene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
1634-04-4	Methyl tert-Butyl Ether	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
75-34-3	1,1-Dichloroethane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
156-59-2	cis-1,2-Dichloroethene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
78-93-3	2-Butanone	VOA-S	µg/kg	11	UJ	10	UJ	14	UJ	20	UJ	11	UJ	19	UJ	11	UJ	14	UJ	31	UJ	12	U
67-66-3	Chloroform	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
71-55-6	1,1,1-Trichloroethane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
110-82-7	Cyclohexane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	UJ	14	UJ	31	UJ	12	U
56-23-5	Carbon Tetrachloride	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
71-43-2	Benzene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
107-06-2	1,2-Dichloroethane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
79-01-6	Trichloroethene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
108-87-2	Metylcyclohexane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
78-87-5	1,2-Dichloropropane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
75-27-4	Bromodichloromethane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
10061-01-5	cis-1,3-Dichloropropene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
108-10-1	4-Methyl-2-pentanone	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
108-88-3	Toluene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
10061-02-6	trans-1,3-Dichloropropene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
79-00-5	1,1,2-Trichloroethane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
127-18-4	Tetrachloroethene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
591-78-6	2-Hexanone	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
124-48-1	Dibromochloromethane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
106-93-4	1,2-Dibromoethane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
108-90-7	Chlorobenzene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
100-41-4	Ethylbenzene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
100-42-5	Styrene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
75-25-2	Bromoform	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
98-82-8	Isopropylbenzene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
79-34-5	1,1,2,2-Tetrachloroethane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
541-73-1	1,3-Dichlorobenzene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
106-46-7	1,4-Dichlorobenzene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
95-50-1	1,2-Dichlorobenzene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
96-12-8	1,2-Dibromo-3-chloropropane	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U
120-82-1	1,2,4-Trichlorobenzene	VOA-S	µg/kg	11	U	10	U	14	U	20	UJ	11	U	19	UJ	11	U	14	U	31	UJ	12	U

Table B-1
Sediment Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-021 8/10/2006		SD-022 8/10/2006		SD-023 8/11/2006		SD-024 8/11/2006		SD-025 8/11/2006		SD-026 8/11/2006		SD-027 8/21/2006		SD-028 8/21/2006		SD-029 8/21/2006		SD-030 8/16/2006	
	Semi-Volatile Organic Compounds																						
100-52-7	Benzaldehyde	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
108-95-2	Phenol	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
111-44-4	bis(2-Chloroethyl) ether	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
95-57-8	2-Chlorophenol	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
95-48-7	2-Methylphenol	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
108-60-1	2,2'-oxybis(1-Chloropropane)	SVOA-S	µg/kg	380	U	380	UJ	490	UJ	690	UJ	390	U	690	UJ	400	UJ	480	UJ	870	UJ	450	U
98-86-2	Acetophenone	SVOA-S	µg/kg	380	U	380	U	140	J	690	UJ	390	U	150	J	400	U	480	U	870	UJ	450	U
106-44-5	4-Methylphenol	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
621-64-7	n-Nitroso-di-n-propylamine	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
67-72-1	Hexachloroethane	SVOA-S	µg/kg	380	UJ	380	U	490	U	690	UJ	390	UJ	690	UJ	400	U	480	U	870	UJ	450	U
98-95-3	Nitrobenzene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
78-59-1	Isophorone	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
88-75-5	2-Nitrophenol	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
105-67-9	2,4-Dimethylphenol	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
111-91-1	bis(2-Chloroethoxy)methane	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
120-83-2	2,4-Dichlorophenol	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
91-20-3	Naphthalene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
106-47-8	4-Chloroaniline	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
87-68-3	Hexachlorobutadiene	SVOA-S	µg/kg	380	UJ	380	U	490	U	690	UJ	390	UJ	690	UJ	400	U	480	U	870	UJ	450	U
105-60-2	Caprolactam	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
59-50-7	4-Chloro-3-methylphenol	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
91-57-6	2-Methylnaphthalene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
77-47-4	Hexachlorocyclopentadiene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	UJ
88-06-2	2,4,6-Trichlorophenol	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
95-95-4	2,4,5-Trichlorophenol	SVOA-S	µg/kg	950	U	970	U	1200	U	1700	UJ	980	U	1700	UJ	1000	U	1200	U	2200	UJ	1100	U
92-52-4	1,1'-Biphenyl	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
91-58-7	2-Chloronaphthalene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
88-74-4	2-Nitroaniline	SVOA-S	µg/kg	950	U	970	U	1200	U	1700	UJ	980	U	1700	UJ	1000	U	1200	U	2200	UJ	1100	U
131-11-3	Dimethylphthalate	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
606-20-2	2,6-Dinitrotoluene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
208-96-8	Acenaphthylene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
99-09-2	3-Nitroaniline	SVOA-S	µg/kg	950	U	970	U	1200	U	1700	UJ	980	U	1700	UJ	1000	U	1200	U	2200	UJ	1100	U
83-32-9	Acenaphthene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	360	J
51-28-5	2,4-Dinitrophenol	SVOA-S	µg/kg	950	UJ	970	U	1200	U	1700	UJ	980	UJ	1700	UJ	1000	UJ	1200	UJ	2200	UJ	1100	UJ
100-02-7	4-Nitrophenol	SVOA-S	µg/kg	950	U	970	U	1200	U	1700	UJ	980	U	1700	UJ	1000	U	1200	U	2200	UJ	1100	U
132-64-9	Dibenzofuran	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	190	J
121-14-2	2,4-Dinitrotoluene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
84-66-2	Diethylphthalate	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
86-73-7	Fluorene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	
7005-72-3	4-Chlorophenyl-phenylether	SVOA-S	µg/kg	380	UJ	380	U	490	U	690	UJ	390	UJ	690	UJ	400	U	480	U	870	UJ	450	U
100-01-6	4-Nitroaniline	SVOA-S	µg/kg	950	U	970	UJ	1200	UJ	1700	UJ	980	U	1700	UJ	1000	UJ	1200	UJ	2200	UJ	1100	U
534-52-1	4,6-Dinitro-2-methylphenol	SVOA-S	µg/kg	950	U	970	U	1200	U	1700	UJ	980	U	1700	UJ	1000	UJ	1200	UJ	2200	UJ	1100	U
86-30-6	n-Nitrosodiphenylamine	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
101-55-3	4-Bromophenyl-phenylether	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
118-74-1	Hexachlorobenzene	SVOA-S	µg/kg	380	UJ	380	U	490	U	690	UJ	390	UJ	690	UJ	400	U	480	U	870	UJ	450	U
1912-24-9	Atrazine	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
87-86-5	Pentachlorophenol	SVOA-S	µg/kg	950	U	970	U	1200	U	1700	UJ	980	U	1700	UJ	1000	UJ	1200	UJ	2200	UJ	1100	U
85-01-8	Phenanthrene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	4300	
120-12-7	Anthracene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	720	
84-74-2	Di-n-butylphthalate	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
206-44-0	Fluoranthene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	6600	
129-00-0	Pyrene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	4800	
85-68-7	Butylbenzylphthalate	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
91-94-1	3,3'-Dichlorobenzidine	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
56-55-3	Benzo(a)anthracene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	2600	
218-01-9	Chrysene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	3200	

Table B-1
Sediment Analytical Results
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CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-021 8/10/2006		SD-022 8/10/2006		SD-023 8/11/2006		SD-024 8/11/2006		SD-025 8/11/2006		SD-026 8/11/2006		SD-027 8/21/2006		SD-028 8/21/2006		SD-029 8/21/2006		SD-030 8/16/2006	
	Semi-Volatile Organic Compounds																						
117-81-7	bis(2-Ethylhexyl) phthalate	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	160	J	870	UJ	450	U
117-84-0	Di-n-octylphthalate	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	450	U
205-99-2	Benzo(b)fluoranthene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	3300	
207-08-9	Benzo(k)fluoranthene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	2400	
50-32-8	Benzo(a)pyrene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	2400	
193-39-5	Indeno(1,2,3-cd)pyrene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	1700	
53-70-3	Dibenz(a,h)anthracene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	750	
191-24-2	Benzo(g,h,i)perylene	SVOA-S	µg/kg	380	U	380	U	490	U	690	UJ	390	U	690	UJ	400	U	480	U	870	UJ	1500	
	Pesticides/PCBs																						
319-84-6	alpha-BHC	Pest-S	µg/kg	2	U	2	U	2.5	U	3.5	UJ	2	U	3.5	UJ	2	U	2.5	U	4.5	UJ	2.3	U
319-85-7	beta-BHC	Pest-S	µg/kg	2	U	2	U	2.5	U	3.5	UJ	2	U	3.5	UJ	2	U	2.5	U	4.5	UJ	2.3	U
319-86-8	delta-BHC	Pest-S	µg/kg	2	U	2	U	2.5	U	3.5	UJ	2	U	3.5	UJ	2	U	2.5	U	4.5	UJ	2.3	U
58-89-9	gamma-BHC (Lindane)	Pest-S	µg/kg	2	U	2	U	2.5	U	3.5	UJ	2	U	3.5	UJ	2	U	2.5	U	4.5	UJ	2.3	U
76-44-8	Heptachlor	Pest-S	µg/kg	2	U	2	U	2.5	U	3.5	UJ	2	U	3.5	UJ	2	U	2.5	U	4.5	UJ	2.3	U
309-00-2	Aldrin	Pest-S	µg/kg	2	U	2	U	2.5	U	3.5	UJ	2	U	3.5	UJ	2	U	2.5	U	4.5	UJ	2.3	U
1024-57-3	Heptachlor epoxide	Pest-S	µg/kg	2	U	2	U	2.5	U	3.5	UJ	2	U	3.5	UJ	2	U	2.5	U	4.5	UJ	2.3	U
959-98-8	Endosulfan I	Pest-S	µg/kg	2	U	2	U	2.5	U	3.5	UJ	2	U	3.5	UJ	2	U	2.5	U	4.5	UJ	2.3	U
60-57-1	Dieldrin	Pest-S	µg/kg	3.8	U	3.8	U	4.9	U	6.9	UJ	3.9	U	6.9	UJ	4	U	4.8	U	8.7	UJ	4.5	U
72-55-9	4,4'-DDE	Pest-S	µg/kg	3.8	U	3.8	U	4.9	U	6.9	UJ	3.9	U	6.9	UJ	4	U	2.9	J	2.2	J	4.5	U
72-20-8	Endrin	Pest-S	µg/kg	3.8	U	3.8	U	4.9	U	6.9	UJ	3.9	U	6.9	UJ	4	U	4.8	U	8.7	UJ	4.5	U
33213-65-9	Endosulfan II	Pest-S	µg/kg	3.8	U	3.8	U	4.9	U	6.9	UJ	3.9	U	6.9	UJ	4	U	4.8	U	8.7	UJ	4.5	U
72-54-8	4,4'-DDD	Pest-S	µg/kg	3.8	U	3.8	U	4.9	U	6.9	UJ	3.9	U	6.9	UJ	4	U	4.8	U	8.7	UJ	4.5	U
1031-07-8	Endosulfan sulfate	Pest-S	µg/kg	3.8	U	3.8	U	4.9	U	6.9	UJ	3.9	U	6.9	UJ	4	U	4.8	U	8.7	UJ	--	R
50-29-3	4,4'-DDT	Pest-S	µg/kg	3.8	U	3.8	U	4.9	U	6.9	UJ	3.9	U	6.9	UJ	4	U	4.8	U	8.7	UJ	4.5	U
72-43-5	Methoxychlor	Pest-S	µg/kg	20	U	20	U	25	U	35	UJ	20	U	35	UJ	20	U	25	U	45	UJ	--	R
53494-70-5	Endrin ketone	Pest-S	µg/kg	3.8	U	3.8	U	4.9	U	6.9	UJ	3.9	U	6.9	UJ	4	U	4.8	U	8.7	UJ	4.5	U
7421-93-4	Endrin aldehyde	Pest-S	µg/kg	3.8	U	3.8	U	4.9	U	6.9	UJ	3.9	U	6.9	UJ	4	U	4.8	U	8.7	UJ	4.5	U
5103-71-9	alpha-Chlordane	Pest-S	µg/kg	2	U	2	U	2.5	U	3.5	UJ	2	U	3.5	UJ	2	U	2.5	U	4.5	UJ	2.3	U
5103-74-2	gamma-Chlordane	Pest-S	µg/kg	2	U	2	U	2.5	U	3.5	UJ	2	U	3.5	UJ	2	U	2.5	U	4.5	UJ	10	
8001-35-2	Toxaphene	Pest-S	µg/kg	200	U	200	U	250	U	350	UJ	200	U	350	UJ	200	U	250	U	450	UJ	230	U
12674-11-2	Aroclor-1016	Pest-S	µg/kg	38	U	38	U	49	U	69	UJ	39	U	69	UJ	40	U	48	U	87	UJ	45	U
11104-28-2	Aroclor-1221	Pest-S	µg/kg	77	U	78	U	100	U	140	UJ	79	U	140	UJ	81	U	97	U	180	UJ	91	U
11141-16-5	Aroclor-1232	Pest-S	µg/kg	38	U	38	U	49	U	69	UJ	39	U	69	UJ	40	U	48	U	87	UJ	45	U
53469-21-9	Aroclor-1242	Pest-S	µg/kg	38	U	38	U	49	U	69	UJ	39	U	69	UJ	40	U	48	U	87	UJ	45	U
12672-29-6	Aroclor-1248	Pest-S	µg/kg	38	U	38	U	49	U	69	UJ	39	U	69	UJ	40	U	48	U	87	UJ	45	U
11097-69-1	Aroclor-1254	Pest-S	µg/kg	38	U	38	U	49	U	69	UJ	39	U	69	UJ	40	U	48	U	87	UJ	45	U
11096-82-5	Aroclor-1260	Pest-S	µg/kg	38	U	38	U	49	U	69	UJ	39	U	69	UJ	40	U	48	U	87	UJ	45	U
	Inorganic Analytes																						
7429-90-5	Aluminum	ICP-AES-S	mg/Kg	13000		12000		10000		4900		11000		9700		11000		16000		18000		16000	
7440-36-0	Antimony	ICP-AES-S	mg/Kg	4.5	U	3		1100		1300		5	U	2.6		4.9	U	3.2		4.9	U	3.4	
7440-38-2	Arsenic	ICP-AES-S	mg/Kg	6.2		3.8		25		82		5.3		5.9		5.8		3.3		2.2		5.7	
7440-39-3	Barium	ICP-AES-S	mg/Kg	23		16		20		10		16		32		22		35		55		47	
7440-41-7	Beryllium	ICP-AES-S	mg/Kg	0.57	U	0.35	U	0.64	U	0.25	U	0.63	U	0.29	U	0.62	U	0.44		0.61	U	0.43	
7440-43-9	Cadmium	ICP-AES-S	mg/Kg	0.57	U	0.35	U	0.64	U	0.25	U	0.63	U	0.4		0.62	U	0.66		0.61	U	0.51	
7440-70-2	Calcium	ICP-AES-S	mg/Kg	1800		2300		1500		4200		7200		61000		1200		4100		6500		4300	
7440-47-3	Chromium	ICP-AES-S	mg/Kg	13		12		9.5		6.2		12		10		11		16		22		15	
7440-48-4	Cobalt	ICP-AES-S	mg/Kg	12		10		7.7		4.6		11		12		9.5		12		7.9		11	
7440-50-8	Copper	ICP-AES-S	mg/Kg	30		25		27		25		25		29		34		26		19		24	
7439-89-6	Iron	ICP-AES-S	mg/Kg	30000		27000		21000		9900		30000		22000		27000		31000		25000		32000	
7439-92-1	Lead	ICP-AES-S	mg/Kg	22		22		49000		25000		19		21		28		32		42		26	
7439-95-4	Magnesium	ICP-AES-S	mg/Kg	6500		6600		5000		2900		7200		10000		5800		7300		6500		9200	
7439-96-5	Manganese	ICP-AES-S	mg/Kg	840		340		490		120		570		1200		820		410		310		1300	
7439-97-6	Mercury	ICP-AES-S	mg/Kg	0.057	U	0.071	U	0.064	U	0.051	U	0.063	U	0.059	U	0.062	U	0.062	U	0.12	U	0.069	U

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CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-021 8/10/2006		SD-022 8/10/2006		SD-023 8/11/2006		SD-024 8/11/2006		SD-025 8/11/2006		SD-026 8/11/2006		SD-027 8/21/2006		SD-028 8/21/2006		SD-029 8/21/2006		SD-030 8/16/2006	
	Inorganic Analytes																						
7440-02-0	Nickel	ICP-AES-S	mg/Kg	24		23		18		10		25		20		21		26		24		26	
7440-09-7	Potassium	ICP-AES-S	mg/Kg	420		330		340		310		420		470		360		450		680		370	
7782-49-2	Selenium	ICP-AES-S	mg/Kg	4	U	2.5	U	4.5	U	1.8	U	4.4	U	2.1	U	4.3	U	2.2	U	4.3	U	2.4	U
7440-22-4	Silver	ICP-AES-S	mg/Kg	0.57	U	0.35	U	0.64	U	1.1		0.63	U	0.29	U	0.62	U	0.31	U	0.61	U	0.35	U
7440-23-5	Sodium	ICP-AES-S	mg/Kg	110	U	71	U	130	U	51	U	130	U	59	U	120	U	62	U	120	U	69	U
7440-28-0	Thallium	ICP-AES-S	mg/Kg	11	U	7.1	U	13	U	5.1	U	13	U	5.9	U	12	U	6.2	U	12	U	6.9	U
7440-62-2	Vanadium	ICP-AES-S	mg/Kg	12		13		9.8		5.7		12		10		10		16		16		16	
7440-66-6	Zinc	ICP-AES-S	mg/Kg	2.3	U	1.4	U	2.6	U	1	U	2.5	U	1.2	U	2.5	U	1.2	U	2.4	U	1.4	U
57-12-5	Cyanide	Cyanide-S	mg/Kg	0.052	U	0.082	U	0.058	U	0.11	U	0.054	U	0.097	U	0.07	U	0.14	U	0.29	U	0.094	
	Wet Chemistry																						
pH	pH	SW9045C	s.u.	8.3		8		7.6		7.6		8.2		7.3		7.6		7.4		6.3		7.7	
TOC	Total Organic Carbon	LLOYD KAHN	mg/kg	2300		9400		2700		35000		3800		10000		6000		50000		73000		27000	
% Granule	% GRANULE & LARGER >2 MM	ASTM-D421	%	38		49		49				58		0		41		68		16		41	
Very coarse	% VERY COURSE SAND >1 - 2 MM	ASTM-D421	%	18		15		16				15		0.1		30		8.4		15		23	
Coarse	% COARSE SAND >.5 - 1 MM	ASTM-D421	%	19		14		15				9.1		1		19		8.4		14		19	
Medium	% MEDIUM SAND >.25 - .5 MM	ASTM-D421	%	18		12		12				9		4		5.9		5.6		13		8.1	
Fine	% FINE SAND >.125 - .25 MM	ASTM-D421	%	5.2		3.6		3.2				4		5.7		1.4		1.7		6.8		1.8	
Very Fine	% VERY FINE SAND >.0625 - .125 MM	ASTM-D421	%	1		1.3		1				1.4		1.9		0.7		1.1		4.6		1	
% Silt	% SILT	ASTM-D421	%	1.9		2.8		2.3				2.7		87		1.9		5.9		30		4.6	
% Clay	% CLAY & COLLOIDS	ASTM-D421	%	0		2.2		0.2				0.6		0.5		0.6		0.5		0		1.9	

Notes:
-- - No value available
ARO-W - Polychlorinate Biphenols - Water
Cyanide-W - Cyanide-Water
ICP-AES-S - Inductively Coupled Plasma-Automatic Emissions Spectra-Soil
J - Value estimated
mg/kg - miligram per kilogram
N/A - Not Available
PCBs - Polychlorinated Biphenols
Pest-S - Pesticides-Soil
R - Value rejected
SD - Sediment
s.u. - scientific units
SVOA-S - Semi-Volatile Organic Analysis-Soil
SVOA - Semi-Volatile Organic Analysis-Soil
U - Value detected below reporting limit
µg/kg - microgram per kilogram
UJ - Value estimated to be below reporting limit

Table B-1
Sediment Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-031 8/21/2006		SD-032 8/9/2006		SD-033 8/18/2006		SD-034 8/18/2006		SD-035 8/18/2006		SD-036 8/17/2006		SD-037 8/17/2006		SD-038 8/22/2006		SD-039 8/22/2006	
	Volatile Organic Compounds																				
75-71-8	Dichlorodifluoromethane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	3	J	14	U	15	U	17	UJ	52	UJ
74-87-3	Chloromethane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
75-01-4	Vinyl Chloride	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
74-83-9	Bromomethane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
75-00-3	Chloroethane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
75-69-4	Trichlorofluoromethane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
75-35-4	1,1-Dichloroethene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
67-64-1	Acetone	VOA-S	µg/kg	14	UJ	10	U	12	UJ	11	UJ	11	UJ	14	U	15	U	17	UJ	52	UJ
75-15-0	Carbon Disulfide	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
79-20-9	Methyl Acetate	VOA-S	µg/kg	14	UJ	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
75-09-2	Methylene Chloride	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
156-60-5	trans-1,2-Dichloroethene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
1634-04-4	Methyl tert-Butyl Ether	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
75-34-3	1,1-Dichloroethane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
156-59-2	cis-1,2-Dichloroethene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
78-93-3	2-Butanone	VOA-S	µg/kg	14	UJ	10	UJ	12	UJ	11	UJ	11	UJ	14	U	15	U	17	UJ	52	UJ
67-66-3	Chloroform	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
71-55-6	1,1,1-Trichloroethane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
110-82-7	Cyclohexane	VOA-S	µg/kg	14	UJ	10	U	12	UJ	11	UJ	11	UJ	14	U	15	U	17	UJ	52	UJ
56-23-5	Carbon Tetrachloride	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
71-43-2	Benzene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
107-06-2	1,2-Dichloroethane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
79-01-6	Trichloroethene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
108-87-2	Metylcyclohexane	VOA-S	µg/kg	14	U	10	U	12	UJ	11	UJ	11	UJ	14	U	15	U	17	UJ	52	UJ
78-87-5	1,2-Dichloropropane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
75-27-4	Bromodichloromethane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
10061-01-5	cis-1,3-Dichloropropene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
108-10-1	4-Methyl-2-pentanone	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
108-88-3	Toluene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
10061-02-6	trans-1,3-Dichloropropene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
79-00-5	1,1,2-Trichloroethane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
127-18-4	Tetrachloroethene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
591-78-6	2-Hexanone	VOA-S	µg/kg	14	U	10	U	12	UJ	11	UJ	11	UJ	14	U	15	U	17	UJ	52	UJ
124-48-1	Dibromochloromethane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
106-93-4	1,2-Dibromoethane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
108-90-7	Chlorobenzene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
100-41-4	Ethylbenzene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
100-42-5	Styrene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
75-25-2	Bromoform	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
98-82-8	Isopropylbenzene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
79-34-5	1,1,2,2-Tetrachloroethane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
541-73-1	1,3-Dichlorobenzene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
106-46-7	1,4-Dichlorobenzene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
95-50-1	1,2-Dichlorobenzene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
96-12-8	1,2-Dibromo-3-chloropropane	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ
120-82-1	1,2,4-Trichlorobenzene	VOA-S	µg/kg	14	U	10	U	12	U	11	U	11	U	14	U	15	U	17	UJ	52	UJ

Table B-1
Sediment Analytical Results
Hopewell Precision Site
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CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-031 8/21/2006		SD-032 8/9/2006		SD-033 8/18/2006		SD-034 8/18/2006		SD-035 8/18/2006		SD-036 8/17/2006		SD-037 8/17/2006		SD-038 8/22/2006		SD-039 8/22/2006	
	Semi-Volatile Organic Compounds																				
100-52-7	Benzaldehyde	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
108-95-2	Phenol	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
111-44-4	bis(2-Chloroethyl) ether	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
95-57-8	2-Chlorophenol	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
95-48-7	2-Methylphenol	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
108-60-1	2,2'-oxybis(1-Chloropropane)	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
98-86-2	Acetophenone	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
106-44-5	4-Methylphenol	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
621-64-7	n-Nitroso-di-n-propylamine	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
67-72-1	Hexachloroethane	SVOA-S	µg/kg	430	U	370	UJ	430	UJ	410	UJ	410	UJ	400	UJ	390	UJ	720	UJ	2200	UJ
98-95-3	Nitrobenzene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
78-59-1	Isophorone	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
88-75-5	2-Nitrophenol	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
105-67-9	2,4-Dimethylphenol	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
111-91-1	bis(2-Chloroethoxy)methane	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
120-83-2	2,4-Dichlorophenol	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
91-20-3	Naphthalene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
106-47-8	4-Chloroaniline	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
87-68-3	Hexachlorobutadiene	SVOA-S	µg/kg	430	U	370	UJ	430	UJ	410	UJ	410	UJ	400	UJ	390	UJ	720	UJ	2200	UJ
105-60-2	Caprolactam	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
59-50-7	4-Chloro-3-methylphenol	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
91-57-6	2-Methylnaphthalene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
77-47-4	Hexachlorocyclopentadiene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	UJ	410	UJ	400	U	390	U	720	UJ	2200	UJ
88-06-2	2,4,6-Trichlorophenol	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
95-95-4	2,4,5-Trichlorophenol	SVOA-S	µg/kg	1100	U	930	UJ	1100	U	1000	U	1000	U	1000	U	990	U	1800	UJ	5500	UJ
92-52-4	1,1'-Biphenyl	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
91-58-7	2-Chloronaphthalene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
88-74-4	2-Nitroaniline	SVOA-S	µg/kg	1100	U	930	UJ	1100	U	1000	U	1000	U	1000	U	990	U	1800	UJ	5500	UJ
131-11-3	Dimethylphthalate	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
606-20-2	2,6-Dinitrotoluene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
208-96-8	Acenaphthylene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
99-09-2	3-Nitroaniline	SVOA-S	µg/kg	1100	U	930	UJ	1100	U	1000	U	1000	U	1000	U	990	U	1800	UJ	5500	UJ
83-32-9	Acenaphthene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
51-28-5	2,4-Dinitrophenol	SVOA-S	µg/kg	--	R	930	UJ	1100	UJ	1000	UJ	1000	UJ	1000	UJ	990	UJ	1800	UJ	5500	UJ
100-02-7	4-Nitrophenol	SVOA-S	µg/kg	1100	U	930	UJ	1100	U	1000	U	1000	U	1000	U	990	U	1800	UJ	5500	UJ
132-64-9	Dibenzofuran	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
121-14-2	2,4-Dinitrotoluene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
84-66-2	Diethylphthalate	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
86-73-7	Fluorene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
7005-72-3	4-Chlorophenyl-phenylether	SVOA-S	µg/kg	430	U	370	UJ	430	UJ	410	UJ	410	UJ	400	UJ	390	UJ	720	UJ	2200	UJ
100-01-6	4-Nitroaniline	SVOA-S	µg/kg	1100	U	930	UJ	1100	U	1000	UJ	1000	UJ	1000	U	990	U	1800	UJ	5500	UJ
534-52-1	4,6-Dinitro-2-methylphenol	SVOA-S	µg/kg	1100	UJ	930	UJ	1100	U	1000	U	1000	U	1000	U	990	U	1800	UJ	5500	UJ
86-30-6	n-Nitrosodiphenylamine	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
101-55-3	4-Bromophenyl-phenylether	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
118-74-1	Hexachlorobenzene	SVOA-S	µg/kg	430	U	370	UJ	430	UJ	410	UJ	410	UJ	400	UJ	390	UJ	720	UJ	2200	UJ
1912-24-9	Atrazine	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
87-86-5	Pentachlorophenol	SVOA-S	µg/kg	1100	UJ	930	UJ	1100	U	1000	U	1000	U	1000	U	990	U	1800	UJ	5500	UJ
85-01-8	Phenanthrene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	110	J	420		720	UJ	2200	UJ
120-12-7	Anthracene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	96	J	720	UJ	2200	UJ
84-74-2	Di-n-butylphthalate	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
206-44-0	Fluoranthene	SVOA-S	µg/kg	430	U	370	UJ	430	U	140	J	410	U	200	J	500		720	UJ	2200	UJ
129-00-0	Pyrene	SVOA-S	µg/kg	430	U	370	UJ	430	U	140	J	410	U	200	J	490		720	UJ	2200	UJ
85-68-7	Butylbenzylphthalate	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
91-94-1	3,3'-Dichlorobenzidine	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
56-55-3	Benzo(a)anthracene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	88	J	220	J	720	UJ	2200	UJ
218-01-9	Chrysene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	110	J	260	J	720	UJ	2200	UJ

Table B-1
Sediment Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-031 8/21/2006		SD-032 8/9/2006		SD-033 8/18/2006		SD-034 8/18/2006		SD-035 8/18/2006		SD-036 8/17/2006		SD-037 8/17/2006		SD-038 8/22/2006		SD-039 8/22/2006	
	Semi-Volatile Organic Compounds																				
117-81-7	bis(2-Ethylhexyl) phthalate	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
117-84-0	Di-n-octylphthalate	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
205-99-2	Benzo(b)fluoranthene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	85	J	200	J	720	UJ	2200	UJ
207-08-9	Benzo(k)fluoranthene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	UJ	410	UJ	87	J	170	J	720	UJ	2200	UJ
50-32-8	Benzo(a)pyrene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	190	J	720	UJ	2200	UJ
193-39-5	Indeno(1,2,3-cd)pyrene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	150	J	720	UJ	2200	UJ
53-70-3	Dibenz(a,h)anthracene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	390	U	720	UJ	2200	UJ
191-24-2	Benzo(g,h,i)perylene	SVOA-S	µg/kg	430	U	370	UJ	430	U	410	U	410	U	400	U	130	J	720	UJ	2200	UJ
	Pesticides/PCBs																				
319-84-6	alpha-BHC	Pest-S	µg/kg	2.2	U	1.9	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U	3.7	UJ	11	UJ
319-85-7	beta-BHC	Pest-S	µg/kg	2.2	U	1.9	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U	3.7	UJ	11	UJ
319-86-8	delta-BHC	Pest-S	µg/kg	2.2	U	1.9	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U	3.7	UJ	11	UJ
58-89-9	gamma-BHC (Lindane)	Pest-S	µg/kg	2.2	U	1.9	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U	3.7	UJ	11	UJ
76-44-8	Heptachlor	Pest-S	µg/kg	2.2	U	1.9	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U	3.7	UJ	11	UJ
309-00-2	Aldrin	Pest-S	µg/kg	2.2	U	1.9	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U	3.7	UJ	11	UJ
1024-57-3	Heptachlor epoxide	Pest-S	µg/kg	2.2	U	1.9	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U	3.7	UJ	11	UJ
959-98-8	Endosulfan I	Pest-S	µg/kg	2.2	U	1.9	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U	3.7	UJ	11	UJ
60-57-1	Dieldrin	Pest-S	µg/kg	4.3	U	3.7	U	3.3	U	3.3	U	3.3	U	3.3	U	3.9	U	7.2	UJ	22	UJ
72-55-9	4,4'-DDE	Pest-S	µg/kg	1.2	J	3.7	U	3.3	U	3.3	U	3.3	U	3.3	U	3.9	U	3.2	J	11	J
72-20-8	Endrin	Pest-S	µg/kg	4.3	U	3.7	U	3.3	U	3.3	U	3.3	U	3.3	U	3.9	U	7.2	UJ	22	UJ
33213-65-9	Endosulfan II	Pest-S	µg/kg	4.3	U	3.7	U	3.3	U	3.3	U	3.3	U	3.3	U	3.9	U	7.2	UJ	22	UJ
72-54-8	4,4'-DDD	Pest-S	µg/kg	4.3	U	3.7	U	3.3	U	3.3	U	3.3	U	3.3	U	3.9	U	7.2	UJ	22	UJ
1031-07-8	Endosulfan sulfate	Pest-S	µg/kg	4.3	U	3.7	U	3.3	U	3.3	U	3.3	U	3.3	U	3.9	U	7.2	UJ	22	UJ
50-29-3	4,4'-DDT	Pest-S	µg/kg	4.3	U	3.7	U	3.3	U	3.3	U	3.3	U	3.3	U	3.9	U	7.2	UJ	22	UJ
72-43-5	Methoxychlor	Pest-S	µg/kg	22	U	19	U	17	U	17	U	17	U	17	U	20	U	37	UJ	110	UJ
53494-70-5	Endrin ketone	Pest-S	µg/kg	4.3	U	3.7	U	3.3	U	3.3	U	3.3	U	3.3	U	3.9	U	7.2	UJ	22	UJ
7421-93-4	Endrin aldehyde	Pest-S	µg/kg	4.3	U	3.7	U	3.3	U	3.3	U	3.3	U	3.3	U	3.9	U	7.2	UJ	22	UJ
5103-71-9	alpha-Chlordane	Pest-S	µg/kg	2.2	U	1.9	U	1.7	U	1.7	U	0.38	J	1.7	U	2	U	3.7	UJ	11	UJ
5103-74-2	gamma-Chlordane	Pest-S	µg/kg	2.2	U	1.9	U	1.7	U	1.7	U	0.62	J	1.7	U	2	U	3.7	UJ	11	UJ
8001-35-2	Toxaphene	Pest-S	µg/kg	220	U	190	U	170	U	170	U	170	U	170	U	200	U	370	UJ	1100	UJ
12674-11-2	Aroclor-1016	Pest-S	µg/kg	43	U	37	U	33	U	33	U	33	U	33	U	39	U	72	UJ	220	UJ
11104-28-2	Aroclor-1221	Pest-S	µg/kg	87	U	75	U	67	U	67	U	67	U	67	U	80	U	150	UJ	450	UJ
11141-16-5	Aroclor-1232	Pest-S	µg/kg	43	U	37	U	33	U	33	U	33	U	33	U	39	U	72	UJ	220	UJ
53469-21-9	Aroclor-1242	Pest-S	µg/kg	43	U	37	U	33	U	33	U	33	U	33	U	39	U	72	UJ	220	UJ
12672-29-6	Aroclor-1248	Pest-S	µg/kg	43	U	37	U	33	U	33	U	33	U	33	U	39	U	72	UJ	220	UJ
11097-69-1	Aroclor-1254	Pest-S	µg/kg	43	U	37	U	33	U	33	U	33	U	33	U	39	U	72	UJ	220	UJ
11096-82-5	Aroclor-1260	Pest-S	µg/kg	43	U	37	U	33	U	33	U	33	U	33	U	39	U	72	UJ	220	UJ
	Inorganic Analytes																				
7429-90-5	Aluminum	ICP-AES-S	mg/Kg	9800		11000		7500	J	14000	J	13000	J	14000		12000		13000		11000	
7440-36-0	Antimony	ICP-AES-S	mg/Kg	2.8	U	5.1	U	1.7	J	3.5	J	3.8	J	5.2	U	3.4		3.4		9.9	U
7440-38-2	Arsenic	ICP-AES-S	mg/Kg	2.9		2.7		1.4	J	7.3	J	10	J	8.9		8.6		8		3.3	
7440-39-3	Barium	ICP-AES-S	mg/Kg	20		15		9.9	J	40	J	64	J	160		64		110		85	
7440-41-7	Beryllium	ICP-AES-S	mg/Kg	0.35	U	0.64	U	0.21	UJ	0.42	J	0.39	UJ	0.65	U	0.43		0.47		1.2	U
7440-43-9	Cadmium	ICP-AES-S	mg/Kg	0.35	U	0.64	U	0.21	UJ	0.39	UJ	0.39	UJ	0.65	U	0.45		0.85		1.2	U
7440-70-2	Calcium	ICP-AES-S	mg/Kg	1400		2100		2700	J	2700	J	2100	J	2800		3900		7700		23000	
7440-47-3	Chromium	ICP-AES-S	mg/Kg	12		9.7		7.5	J	16	J	14	J	18		16		16		30	
7440-48-4	Cobalt	ICP-AES-S	mg/Kg	7.4		9.4		5.5	J	12	J	12	J	16		11		11		5.2	
7440-50-8	Copper	ICP-AES-S	mg/Kg	6.9		14		6.1	J	20	J	16	J	20		16		42		28	
7439-89-6	Iron	ICP-AES-S	mg/Kg	23000		26000		14000	J	29000	J	31000	J	32000		32000		32000		19000	
7439-92-1	Lead	ICP-AES-S	mg/Kg	15		22		9.6	J	23	J	28	J	26		28		75		88	
7439-95-4	Magnesium	ICP-AES-S	mg/Kg	5400		6100		4700	J	8200	J	6200	J	6500		6800		6400		3200	
7439-96-5	Manganese	ICP-AES-S	mg/Kg	570		380		170	J	1200	J	1300	J	2200		1300		3400		210	
7439-97-6	Mercury	ICP-AES-S	mg/Kg	0.071	U	0.064	U	0.069	UJ	0.065	UJ	0.066	UJ	0.065	U	0.073	U	0.074		0.25	U

Table B-1
Sediment Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #	Chemical Name	Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SD-031 8/21/2006		SD-032 8/9/2006		SD-033 8/18/2006		SD-034 8/18/2006		SD-035 8/18/2006		SD-036 8/17/2006		SD-037 8/17/2006		SD-038 8/22/2006		SD-039 8/22/2006	
	Inorganic Analytes																				
7440-02-0	Nickel	ICP-AES-S	mg/Kg	17		20		12	J	25	J	22	J	26		22		24		19	
7440-09-7	Potassium	ICP-AES-S	mg/Kg	220		300		180	J	390	J	540	J	600		410		650		890	
7782-49-2	Selenium	ICP-AES-S	mg/Kg	2.5	U	4.5	U	1.4	UJ	2.6	UJ	2.6	UJ	4.6	U	2.5	U	2.7		13	
7440-22-4	Silver	ICP-AES-S	mg/Kg	0.35	U	0.64	U	0.21	UJ	0.39	UJ	0.39	UJ	0.65	U	0.36	U	0.36	U	1.2	U
7440-23-5	Sodium	ICP-AES-S	mg/Kg	71	U	130	U	69	UJ	130	UJ	130	UJ	130	U	73	U	72	U	250	U
7440-28-0	Thallium	ICP-AES-S	mg/Kg	7.1	U	13	U	1.7	J	3.6	J	4.4	J	13	U	7.3	U	7.2	U	25	U
7440-62-2	Vanadium	ICP-AES-S	mg/Kg	10		10		7.3	J	14	J	14	J	15		15		19		17	
7440-66-6	Zinc	ICP-AES-S	mg/Kg	1.4	U	2.6	U	1.4	UJ	2.6	UJ	2.6	UJ	2.6	U	1.5	U	1.4	U	5	U
57-12-5	Cyanide	Cyanide-S	mg/Kg	0.075	U	0.073	U	0.08	UJ	0.075	UJ	0.059	J	0.075		0.082	U	0.16	U	0.55	U
	Wet Chemistry																				
pH	pH	SW9045C	s.u.	7.5		7.7		7.7		7.9		7.8		7.1		7.5		7.3		6.9	
TOC	Total Organic Carbon	LLOYD KAHN	mg/kg	25000		5400		40000		12000		6000		24000		14000		87000		230000	
% Granule	% GRANULE & LARGER >2 MM	ASTM-D421	%	52		47		57		71		41		42		42		61	J		
Very coarse	% VERY COURSE SAND >1 - 2 MM	ASTM-D421	%	14		21		15		21		37		14		17		7.6			
Coarse	% COARSE SAND >.5 - 1 MM	ASTM-D421	%	16		20		13		4.7		15		12		16		5.2			
Medium	% MEDIUM SAND >.25 - .5 MM	ASTM-D421	%	8.1		8.8		9.1		1.9		4.3		16		9.4		3.1			
Fine	% FINE SAND >.125 - .25 MM	ASTM-D421	%	4.2		1.3		3.1		0.6		0.8		7.8		3.3		2.1			
Very Fine	% VERY FINE SAND >.0625 - .125 MM	ASTM-D421	%	1.7		0.5		0.9		0.2		0.4		2.3		1.5		1.3			
% Silt	% SILT	ASTM-D421	%	3.5		0.6		1.8		0		0		3.9		9		17			
% Clay	% CLAY & COLLOIDS	ASTM-D421	%	1.1		0.5		0.9		1.2		1.2		2.3		2.1		2.8			

Notes:
-- - No value available
ARO-W - Polychlorinate Biphenols - Water
Cyanide-W - Cyanide-Water
ICP-AES-S - Inductively Coupled Plasma-Automatic Emissions Spectra-Soil
J - Value estimated
mg/kg - miligram per kilogram
N/A - Not Available
PCBs - Polychlorinated Biphenols
Pest-S - Pesticides-Soil
R - Value rejected
SD - Sediment
s.u. - scientific units
SVOA-S - Semi-Volatile Organic Analysis-Soil
SVOA - Semi-Volatile Organic Analysis-Soil
U - Value detected below reporting limit
µg/kg - microgram per kilogram
UJ - Value estimated to be below reporting limit

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-001 8/14/2006		SW-002 8/14/2006		SW-003 8/22/2006		SW-004 8/16/2006		SW-005 8/16/2006		SW-006 8/16/2006		SW-007 8/14/2006		SW-008 8/4/2006		SW-009 8/1/2006		SW-010 8/1/2006	
	Volatile Organic Compounds																						
75-71-8	Dichlorodifluoromethane	TVOA	µg/L	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	U
74-87-3	Chloromethane	TVOA	µg/L	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-01-4	Vinyl Chloride	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
74-83-9	Bromomethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-00-3	Chloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-69-4	Trichlorofluoromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-35-4	1,1-Dichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	TVOA	µg/L	0.5	UJ	0.5	UJ	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U
67-64-1	Acetone	TVOA	µg/L	36	U	5	U	5	U	5	U	5	U	5	U	5.2	U	8	U	5	U	5	U
75-15-0	Carbon Disulfide	TVOA	µg/L	0.2	J	0.5	U	0.5	U	0.12	J	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ
79-20-9	Methyl Acetate	TVOA	µg/L	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	UJ	0.5	UJ
75-09-2	Methylene Chloride	TVOA	µg/L	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
156-60-5	trans-1,2-Dichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1634-04-4	Methyl tert-Butyl Ether	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-34-3	1,1-Dichloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
156-59-2	cis-1,2-Dichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
78-93-3	2-Butanone	TVOA	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
74-97-5	Chlorobromomethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U
67-66-3	Chloroform	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.13	J	0.14	J
71-55-6	1,1,1-Trichloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
110-82-7	Cyclohexane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U
56-23-5	Carbon Tetrachloride	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
71-43-2	Benzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
107-06-2	1,2-Dichloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U
79-01-6	Trichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
108-87-2	Metylcyclohexane	TVOA	µg/L	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U
78-87-5	1,2-Dichloropropane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U
75-27-4	Bromodichloromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U
10061-01-5	cis-1,3-Dichloropropene	TVOA	µg/L	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U
108-10-1	4-Methyl-2-pentanone	TVOA	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
108-88-3	Toluene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
10061-02-6	trans-1,3-Dichloropropene	TVOA	µg/L	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U
79-00-5	1,1,2-Trichloroethane	TVOA	µg/L	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U
127-18-4	Tetrachloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
591-78-6	2-Hexanone	TVOA	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
124-48-1	Dibromochloromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
106-93-4	1,2-Dibromoethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
108-90-7	Chlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
100-41-4	Ethylbenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
100-42-5	Styrene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-25-2	Bromoform	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
98-82-8	Isopropylbenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
79-34-5	1,1,2,2-Tetrachloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
541-73-1	1,3-Dichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
106-46-7	1,4-Dichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
95-50-1	1,2-Dichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
96-12-8	1,2-Dibromo-3-chloropropane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
120-82-1	1,2,4-Trichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
87-61-6	1,2,3-Trichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
95-47-6	o-Xylene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
179601-23-1	m,p-Xylene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-001 8/14/2006		SW-002 8/14/2006		SW-003 8/22/2006		SW-004 8/16/2006		SW-005 8/16/2006		SW-006 8/16/2006		SW-007 8/14/2006		SW-008 8/4/2006		SW-009 8/1/2006		SW-010 8/1/2006	
	Semi-Volatile Organic Compounds																						
100-52-7	Benzaldehyde	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
108-95-2	Phenol	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
111-44-4	bis(2-Chloroethyl) ether	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
95-57-8	2-Chlorophenol	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
95-48-7	2-Methylphenol	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
108-60-1	2,2'-oxybis(1-Chloropropane)	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
98-86-2	Acetophenone	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
106-44-5	4-Methylphenol	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
621-64-7	n-Nitroso-di-n-propylamine	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
67-72-1	Hexachloroethane	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
98-95-3	Nitrobenzene	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
78-59-1	Isophorone	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
88-75-5	2-Nitrophenol	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
105-67-9	2,4-Dimethylphenol	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
111-91-1	bis(2-Chloroethoxy)methane	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
120-83-2	2,4-Dichlorophenol	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	UJ	5	U	5	U	5	U
91-20-3	Naphthalene	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
106-47-8	4-Chloroaniline	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
87-68-3	Hexachlorobutadiene	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	UJ	5	U	5	U	5	U
105-60-2	Caprolactam	SVOA-W	µg/L	5.4	U	5.6	UJ	5.3	U	5	U	5	U	5	U	5.6	UJ	5	U	5	UJ	5	U
59-50-7	4-Chloro-3-methylphenol	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	UJ	5	U	5	U	5	U
91-57-6	2-Methylnaphthalene	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
77-47-4	Hexachlorocyclopentadiene	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
88-06-2	2,4,6-Trichlorophenol	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	UJ	5	U	5	U	5	U
95-95-4	2,4,5-Trichlorophenol	SVOA-W	µg/L	22	U	22	U	21	U	20	U	20	U	20	U	22	UJ	20	U	20	U	20	U
92-52-4	1,1'-Biphenyl	SVOA-W	µg/L	5.4	U	5.6	UJ	5.3	U	5	U	5	U	5	U	5.6	UJ	5	U	5	UJ	5	U
91-58-7	2-Chloronaphthalene	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
88-74-4	2-Nitroaniline	SVOA-W	µg/L	22	U	22	U	21	U	20	U	20	U	20	U	22	U	20	U	20	U	20	U
131-11-3	Dimethylphthalate	SVOA-W	µg/L	5.4	U	5.6	UJ	5.3	U	5	U	5	U	5	U	5.6	UJ	5	U	5	UJ	5	U
606-20-2	2,6-Dinitrotoluene	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
208-96-8	Acenaphthylene	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
99-09-2	3-Nitroaniline	SVOA-W	µg/L	22	U	22	U	21	U	20	U	20	U	20	U	22	U	20	U	20	U	20	U
83-32-9	Acenaphthene	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
51-28-5	2,4-Dinitrophenol	SVOA-W	µg/L	22	U	22	U	21	UJ	20	U	20	U	20	U	22	U	20	U	20	U	20	U
100-02-7	4-Nitrophenol	SVOA-W	µg/L	22	U	22	U	21	U	20	U	20	U	20	U	22	U	20	U	20	U	20	U
132-64-9	Dibenzofuran	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
121-14-2	2,4-Dinitrotoluene	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
84-66-2	Diethylphthalate	SVOA-W	µg/L	5.4	U	5.6	UJ	5.3	U	5	U	5	U	5	U	5.6	UJ	5	U	5	UJ	5	U
86-73-7	Fluorene	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
7005-72-3	4-Chlorophenyl-phenylether	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
100-01-6	4-Nitroaniline	SVOA-W	µg/L	22	U	22	U	21	U	20	U	20	U	20	U	22	U	20	U	20	U	20	U
534-52-1	4,6-Dinitro-2-methylphenol	SVOA-W	µg/L	22	U	22	U	21	U	20	U	20	U	20	U	22	U	20	U	20	U	20	U
86-30-6	n-Nitrosodiphenylamine	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
95-94-3	1,2,4,5-Tetrachlorobenzene	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	UJ	5	U	5	U	5	U
101-55-3	4-Bromophenyl-phenylether	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
118-74-1	Hexachlorobenzene	SVOA-W	µg/L	5.4	UJ	5.6	U	5.3	UJ	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
1912-24-9	Atrazine	SVOA-W	µg/L	5.4	UJ	5.6	U	5.3	UJ	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
87-86-5	Pentachlorophenol	SVOA-W	µg/L	11	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	UJ	5	U	5	U	5	U
85-01-8	Phenanthrene	SVOA-W	µg/L	5.4	UJ	5.6	U	5.3	UJ	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
120-12-7	Anthracene	SVOA-W	µg/L	5.4	UJ	5.6	U	5.3	UJ	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
84-74-2	Di-n-butylphthalate	SVOA-W	µg/L	5.4	U	5.6	UJ	5.3	U	5	U	5	U	5	U	5.6	UJ	5	U	5	UJ	5	U
206-44-0	Fluoranthene	SVOA-W	µg/L	5.4	UJ	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
129-00-0	Pyrene	SVOA-W	µg/L	5.4	UJ	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
85-68-7	Butylbenzylphthalate	SVOA-W	µg/L	5.4	U	5.6	UJ	5.3	U	5	U	5	U	5	U	5.6	UJ	5	U	5	UJ	5	U
91-94-1	3,3'-Dichlorobenzidine	SVOA-W	µg/L	5.4	U	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
56-55-3	Benzo(a)anthracene	SVOA-W	µg/L	5.4	UJ	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U
218-01-9	Chrysene	SVOA-W	µg/L	5.4	UJ	5.6	U	5.3	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-001 8/14/2006		SW-002 8/14/2006		SW-003 8/22/2006		SW-004 8/16/2006		SW-005 8/16/2006		SW-006 8/16/2006		SW-007 8/14/2006		SW-008 8/4/2006		SW-009 8/1/2006		SW-010 8/1/2006	
	Semi-Volatile Organic Compounds																						
117-81-7	bis(2-Ethylhexyl) phthalate	SVOA-W	µg/L	5.4	U	5.6	UJ	5.3	U	5	U	5	U	5	U	5.6	UJ	5	U	5	UJ	4.8	J
117-84-0	Di-n-octylphthalate	SVOA-W	µg/L	5.4	U	5.6	UJ	5.3	U	5	U	5	U	5	U	5.6	UJ	5	U	5	UJ	5	U
205-99-2	Benzo(b)fluoranthene	SVOA-W	µg/L	5.4	UJ	5.6	U	5.3	UJ	5	U	5	U	5	UJ	5.6	UJ	5	U	5	U	5	UJ
207-08-9	Benzo(k)fluoranthene	SVOA-W	µg/L	5.4	UJ	5.6	U	5.3	UJ	5	U	5	U	5	UJ	5.6	UJ	5	UJ	5	U	5	UJ
50-32-8	Benzo(a)pyrene	SVOA-W	µg/L	5.4	UJ	5.6	U	5.3	UJ	5	U	5	U	5	UJ	5.6	UJ	5	U	5	U	5	UJ
193-39-5	Indeno(1,2,3-cd)pyrene	SVOA-W	µg/L	5.4	UJ	5.6	U	5.3	UJ	5	UJ	5	UJ	5	UJ	5.6	UJ	5	U	5	U	5	UJ
53-70-3	Dibenz(a,h)anthracene	SVOA-W	µg/L	5.4	UJ	5.6	U	5.3	UJ	5	UJ	5	UJ	5	UJ	5.6	UJ	5	U	5	U	5	UJ
191-24-2	Benzo(g,h,i)perylene	SVOA-W	µg/L	5.4	UJ	5.6	U	5.3	UJ	5	U	5	U	5	UJ	5.6	UJ	5	U	5	U	5	UJ
91-20-3	Naphthalene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
91-57-6	2-Methylnaphthalene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
208-96-8	Acenaphthylene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
83-32-9	Acenaphthene	SVSIM	µg/L	0.11	U	0.11	U	0.11	U	0.1	U	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U
86-73-7	Fluorene	SVSIM	µg/L	0.12		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
87-86-5	Pentachlorophenol	SVSIM	µg/L	0.22	U	0.22	U	0.21	U	0.2	U	0.2	U	0.2	U	0.22	U	0.2	U	0.2	U	0.2	U
85-01-8	Phenanthrene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
120-12-7	Anthracene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
206-44-0	Fluoranthene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
129-00-0	Pyrene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
56-55-3	Benzo(a)anthracene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
218-01-9	Chrysene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
205-99-2	Benzo(b)fluoranthene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
207-08-9	Benzo(k)fluoranthene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
50-32-8	Benzo(a)pyrene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
193-39-5	Indeno(1,2,3-cd)pyrene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
53-70-3	Dibenz(a,h)anthracene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
191-24-2	Benzo(g,h,i)perylene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
	Pesticides																						
319-84-6	alpha-BHC	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-85-7	beta-BHC	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta-BHC	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
58-89-9	gamma-BHC (Lindane)	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
76-44-8	Heptachlor	Pest-W	µg/L	0.05	U	0.05	U	0.02	J	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
309-00-2	Aldrin	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
1024-57-3	Heptachlor epoxide	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
959-98-8	Endosulfan I	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
60-57-1	Dieldrin	Pest-W	µg/L	0.0025	J	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
72-55-9	4,4'-DDE	Pest-W	µg/L	0.1	U	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
72-20-8	Endrin	Pest-W	µg/L	0.1	U	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
33213-65-9	Endosulfan II	Pest-W	µg/L	0.1	U	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
72-54-8	4,4'-DDD	Pest-W	µg/L	0.1	U	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
1031-07-8	Endosulfan sulfate	Pest-W	µg/L	0.1	U	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
50-29-3	4,4'-DDT	Pest-W	µg/L	0.1	U	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
72-43-5	Methoxychlor	Pest-W	µg/L	0.5	UJ	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
53494-70-5	Endrin ketone	Pest-W	µg/L	0.1	U	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
7421-93-4	Endrin aldehyde	Pest-W	µg/L	0.024	J	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
5103-71-9	alpha-Chlordane	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
5103-74-2	gamma-Chlordane	Pest-W	µg/L	0.0074	J	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
8001-35-2	Toxaphene	Pest-W	µg/L	5	U	5	U	5	UJ	5	U	5	U	5	U	5	U	5	U	5	U	5	U
	PCBs																						
12674-11-2	Aroclor-1016	ARO-W	µg/L	1	U	1	U	1	U	1	UJ	1	U	1	U	1	U	1	U	1	U	1	U
11104-28-2	Aroclor-1221	ARO-W	µg/L	1	U	1	U	1	U	1	UJ	1	U	1	U	1	U	1	U	1	U	1	U
11141-16-5	Aroclor-1232	ARO-W	µg/L	1	U	1	U	1	U	1	UJ	1	U	1	U	1	U	1	U	1	U	1	U
53469-21-9	Aroclor-1242	ARO-W	µg/L	1	U	1	U	1	U	1	UJ	1	U	1	U	1	U	1	U	1	U	1	U
12672-29-6	Aroclor-1248	ARO-W	µg/L	1	U	1	U	1	U	1	UJ	1	U	1	U	1	U	1	U	1	U	1	U
11097-69-1	Aroclor-1254	ARO-W	µg/L	1	U	1	U	1	U	1	UJ	1	U	1	U	1	U	1	U	1	U	1	U
11096-82-5	Aroclor-1260	ARO-W	µg/L	1	U	1	U	1	U	1	UJ	1	U	1	U	1	U	1	U	1	U	1	U
37324-23-5	Aroclor-1262	ARO-W	µg/L	1	U	1	U	1	U	1	UJ	1	U	1	U	1	U	1	U	1	U	1	U
11100-14-4	Aroclor-1268	ARO-W	µg/L	1	U	1	U	1	U	1	UJ	1	U	1	U	1	U	1	U	1	U	1	U

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-001 8/14/2006		SW-002 8/14/2006		SW-003 8/22/2006		SW-004 8/16/2006		SW-005 8/16/2006		SW-006 8/16/2006		SW-007 8/14/2006		SW-008 8/4/2006		SW-009 8/1/2006		SW-010 8/1/2006	
	Inorganic Analytes																						
7429-90-5	Aluminum	DESA-Met-W	µg/L	17000		320		210		100	U	100	U	100	U	100	U	100	U	100	U	130	
7440-36-0	Antimony	DESA-Met-W	µg/L	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U
7440-38-2	Arsenic	DESA-Met-W	µg/L	13		10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
7440-39-3	Barium	DESA-Met-W	µg/L	110		100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U
7440-41-7	Beryllium	DESA-Met-W	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
7440-43-9	Cadmium	DESA-Met-W	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
7440-70-2	Calcium	DESA-Met-W	µg/L	25000		55000		24000		51000		50000		52000		42000		40000		41000		46000	
7440-47-3	Chromium	DESA-Met-W	µg/L	15		10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
7440-48-4	Cobalt	DESA-Met-W	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
7440-50-8	Copper	DESA-Met-W	µg/L	27		25	U	25	U	25	U	25	U	25	U	25	U	15	U	15	U	15	U
7439-89-6	Iron	DESA-Met-W	µg/L	35000		790		1600		230		190		320		50	U	50	U	55		210	
7439-92-1	Lead	DESA-Met-W	µg/L	33		10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
7439-95-4	Magnesium	DESA-Met-W	µg/L	9900		8900		3800		8200		8000		8300		15000		14000		14000		15000	
7439-96-5	Manganese	DESA-Met-W	µg/L	1800		300		270		48		38		150		13		10	U	12		34	
7439-97-6	Mercury	DESA-Met-W	µg/L	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	UJ	0.2	U	0.2	U
7440-02-0	Nickel	DESA-Met-W	µg/L	25		20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
7440-09-7	Potassium	DESA-Met-W	µg/L	3600		1100		3700		1000		1100		1000		930		870		880		950	
7782-49-2	Selenium	DESA-Met-W	µg/L	35	U	35	U	35	U	35	U	35	U	35	U	35	U	35	U	35	U	35	U
7440-22-4	Silver	DESA-Met-W	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
7440-23-5	Sodium	DESA-Met-W	µg/L	1000	U	1000	U	1000	U	1000	U	1000	U	1000	U	1000	U	51000		53000		54000	
7440-28-0	Thallium	DESA-Met-W	µg/L	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
7440-62-2	Vanadium	DESA-Met-W	µg/L	26		20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
7440-66-6	Zinc	DESA-Met-W	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
57-12-5	Cyanide	Cyanide-W	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
	Wet Chemistry																						
CACOA-H	Hardness As CaCO3	SM2340B	mg/L	100		180		75		160		160		160		170		160		160		180	
NH3	Nitrogen, Ammonia	MCAWW350-1	mg/L	0.58		0.05	U	0.36		0.069		0.05	U	0.05	U	0.1	U	0.05	UJ	0.05	U	0.05	U
CL	Chloride	MCAWW325-3	mg/L	17		110		16		100		100		100		83		84		84		86	
SO4	Sulfate	MCAWW375-	mg/L	5	U	26		5	U	37		20		25		20		22		23		22	
TDS	Total Dissolved Solids	MCAWW160-1	mg/L	190		370		140		380		330		360		350		330		350		370	
TSS	Total Suspended Solids	MCAWW160-2	mg/L	980		27		14		10	U	10	U	10	U	10	U	10	U	10	U	10	U
TKN	Nitrogen, Total Kjeldahl	MCAWW351-	mg/L	2.7		0.57		2.3		0.48		0.42		0.69		0.6		0.27		0.76		1.4	
TOC	Total Organic Carbon	SW9060	mg/L	39		3.7	J	20		12		2.2		1.7		2.2		2.9		2.1		2.1	

Notes:
-- - No value available
ARO-W - Polychlorinate Biphenols - Water
Cyanide-W - Cyanide-Water
DESA-Met-W - Division of Environment, Science and Assessment-Metals-Water
J - Value estimated
mg/L - miligram per liter
N/A - Not Available
PCBs - Polychlorinated Biphenols
Pest-W - Pesticides-Water
R - Value rejected
SVOA-W - Semi-Volatile Organic Analysis-Water
SVOC - Semi-Volatile Organic Compounds
SVSIM - Simutaneous Ion Monitoring for Semi Volatile Analysis
SW - Surface Water
TVOA - Trace Volatile Organic Analytes
TVSIM - Simutaneous Ion Monitoring for Volatile Organic Analysis
U - Value detected below reporting limit
µg/L - microgram per liter
UJ - Value estimated to be below reporting limit

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-011 8/3/2006		SW-012 8/3/2006		SW-013 8/3/2006		SW-014 8/3/2006		SW-015 8/9/2006		SW-016 8/21/2006		SW-017 8/8/2006		SW-018 8/10/2006		SW-019 8/8/2006		SW-020 8/8/2006	
	Volatile Organic Compounds																						
75-71-8	Dichlorodifluoromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U
74-87-3	Chloromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.11	J	0.5	U	0.5	U	0.5	U
75-01-4	Vinyl Chloride	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
74-83-9	Bromomethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-00-3	Chloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-69-4	Trichlorofluoromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U
75-35-4	1,1-Dichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
67-64-1	Acetone	TVOA	µg/L	6.1	U	5	U	5.5	U	5	UJ	5	U	5	U	17	U	4.8	J	7.5	U	7	U
75-15-0	Carbon Disulfide	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
79-20-9	Methyl Acetate	TVOA	µg/L	--	R	--	R	--	R	--	R	0.5	UJ	0.5	UJ	0.5	U	0.5	UJ	0.5	U	0.5	U
75-09-2	Methylene Chloride	TVOA	µg/L	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	UJ	0.5	U	0.5	U
156-60-5	trans-1,2-Dichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1634-04-4	Methyl tert-Butyl Ether	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-34-3	1,1-Dichloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
156-59-2	cis-1,2-Dichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
78-93-3	2-Butanone	TVOA	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
74-97-5	Chlorobromomethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
67-66-3	Chloroform	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
71-55-6	1,1,1-Trichloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.14	J	0.13	J	0.5	U	0.5	U
110-82-7	Cyclohexane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
56-23-5	Carbon Tetrachloride	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
71-43-2	Benzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
107-06-2	1,2-Dichloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
79-01-6	Trichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
108-87-2	Metylcyclohexane	TVOA	µg/L	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	--	R	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
78-87-5	1,2-Dichloropropane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-27-4	Bromodichloromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
10061-01-5	cis-1,3-Dichloropropene	TVOA	µg/L	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U
108-10-1	4-Methyl-2-pentanone	TVOA	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
108-88-3	Toluene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
10061-02-6	trans-1,3-Dichloropropene	TVOA	µg/L	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U
79-00-5	1,1,2-Trichloroethane	TVOA	µg/L	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U
127-18-4	Tetrachloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
591-78-6	2-Hexanone	TVOA	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
124-48-1	Dibromochloromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
106-93-4	1,2-Dibromoethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
108-90-7	Chlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
100-41-4	Ethylbenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
100-42-5	Styrene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-25-2	Bromoform	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
98-82-8	Isopropylbenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
79-34-5	1,1,2,2-Tetrachloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
541-73-1	1,3-Dichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
106-46-7	1,4-Dichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
95-50-1	1,2-Dichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
96-12-8	1,2-Dibromo-3-chloropropane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
120-82-1	1,2,4-Trichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U
87-61-6	1,2,3-Trichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U
95-47-6	o-Xylene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
179601-23-1	m,p-Xylene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-011 8/3/2006		SW-012 8/3/2006		SW-013 8/3/2006		SW-014 8/3/2006		SW-015 8/9/2006		SW-016 8/21/2006		SW-017 8/8/2006		SW-018 8/10/2006		SW-019 8/8/2006		SW-020 8/8/2006	
	Semi-Volatile Organic Compounds																						
100-52-7	Benzaldehyde	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
108-95-2	Phenol	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
111-44-4	bis(2-Chloroethyl) ether	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
95-57-8	2-Chlorophenol	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
95-48-7	2-Methylphenol	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
108-60-1	2,2'-oxybis(1-Chloropropane)	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
98-86-2	Acetophenone	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
106-44-5	4-Methylphenol	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
621-64-7	n-Nitroso-di-n-propylamine	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	UJ	5	U	5	UJ	5	UJ
67-72-1	Hexachloroethane	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
98-95-3	Nitrobenzene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
78-59-1	Isophorone	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
88-75-5	2-Nitrophenol	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
105-67-9	2,4-Dimethylphenol	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
111-91-1	bis(2-Chloroethoxy)methane	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
120-83-2	2,4-Dichlorophenol	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
91-20-3	Naphthalene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
106-47-8	4-Chloroaniline	SVOA-W	µg/L	5	U	5	U	--	R	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
87-68-3	Hexachlorobutadiene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
105-60-2	Caprolactam	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	UJ	5	UJ	5	UJ	5	U	5	UJ
59-50-7	4-Chloro-3-methylphenol	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
91-57-6	2-Methylnaphthalene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
77-47-4	Hexachlorocyclopentadiene	SVOA-W	µg/L	5	U	5	U	--	R	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
88-06-2	2,4,6-Trichlorophenol	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
95-95-4	2,4,5-Trichlorophenol	SVOA-W	µg/L	20	U	20	U	20	U	20	U	20	U	22	U	20	U	20	U	20	U	20	U
92-52-4	1,1'-Biphenyl	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	UJ	5	UJ	5	UJ	5	U	5	UJ
91-58-7	2-Chloronaphthalene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
88-74-4	2-Nitroaniline	SVOA-W	µg/L	20	U	20	U	20	U	20	U	20	U	22	U	20	U	20	U	20	U	20	U
131-11-3	Dimethylphthalate	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	UJ	5	UJ	5	UJ	5	U	5	UJ
606-20-2	2,6-Dinitrotoluene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
208-96-8	Acenaphthylene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
99-09-2	3-Nitroaniline	SVOA-W	µg/L	20	U	20	U	20	U	20	U	20	U	22	U	20	U	20	U	20	U	20	U
83-32-9	Acenaphthene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
51-28-5	2,4-Dinitrophenol	SVOA-W	µg/L	20	U	20	U	20	U	20	U	20	U	22	U	20	U	20	U	20	U	20	U
100-02-7	4-Nitrophenol	SVOA-W	µg/L	20	U	20	U	20	U	20	U	20	U	22	U	20	U	20	U	20	U	20	U
132-64-9	Dibenzofuran	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
121-14-2	2,4-Dinitrotoluene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
84-66-2	Diethylphthalate	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	UJ	5	UJ	5	UJ	5	U	5	UJ
86-73-7	Fluorene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
7005-72-3	4-Chlorophenyl-phenylether	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
100-01-6	4-Nitroaniline	SVOA-W	µg/L	20	U	20	U	20	U	20	U	20	U	22	U	20	U	20	U	20	U	20	U
534-52-1	4,6-Dinitro-2-methylphenol	SVOA-W	µg/L	20	U	20	U	20	U	20	U	20	U	22	U	20	U	20	U	20	U	20	U
86-30-6	n-Nitrosodiphenylamine	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
95-94-3	1,2,4,5-Tetrachlorobenzene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
101-55-3	4-Bromophenyl-phenylether	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
118-74-1	Hexachlorobenzene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
1912-24-9	Atrazine	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
87-86-5	Pentachlorophenol	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
85-01-8	Phenanthrene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
120-12-7	Anthracene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
84-74-2	Di-n-butylphthalate	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	UJ	5	UJ	5	UJ	5	U	5	UJ
206-44-0	Fluoranthene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
129-00-0	Pyrene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
85-68-7	Butylbenzylphthalate	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	UJ	5	UJ	5	UJ	5	U	5	UJ
91-94-1	3,3'-Dichlorobenzidine	SVOA-W	µg/L	5	U	5	U	--	R	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
56-55-3	Benzo(a)anthracene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
218-01-9	Chrysene	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-011 8/3/2006		SW-012 8/3/2006		SW-013 8/3/2006		SW-014 8/3/2006		SW-015 8/9/2006		SW-016 8/21/2006		SW-017 8/8/2006		SW-018 8/10/2006		SW-019 8/8/2006		SW-020 8/8/2006	
	Semi-Volatile Organic Compounds																						
117-81-7	bis(2-Ethylhexyl) phthalate	SVOA-W	µg/L	4	J	5	U	9.2		5	U	5	U	5.6	UJ	5	UJ	5	UJ	8.6		5	UJ
117-84-0	Di-n-octylphthalate	SVOA-W	µg/L	5	U	5	U	5	U	5	U	5	U	5.6	UJ	5	UJ	5	UJ	5	U	5	UJ
205-99-2	Benzo(b)fluoranthene	SVOA-W	µg/L	5	U	5	U	5	UJ	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
207-08-9	Benzo(k)fluoranthene	SVOA-W	µg/L	5	U	5	U	5	UJ	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
50-32-8	Benzo(a)pyrene	SVOA-W	µg/L	5	U	5	U	5	UJ	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
193-39-5	Indeno(1,2,3-cd)pyrene	SVOA-W	µg/L	5	U	5	U	5	UJ	5	U	5	U	5.6	UJ	5	U	5	U	5	U	5	U
53-70-3	Dibenz(a,h)anthracene	SVOA-W	µg/L	5	U	5	U	5	UJ	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
191-24-2	Benzo(g,h,i)perylene	SVOA-W	µg/L	5	U	5	U	5	UJ	5	U	5	U	5.6	U	5	U	5	U	5	U	5	U
91-20-3	Naphthalene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
91-57-6	2-Methylnaphthalene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
208-96-8	Acenaphthylene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
83-32-9	Acenaphthene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U
86-73-7	Fluorene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
87-86-5	Pentachlorophenol	SVSIM	µg/L	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.22	U	0.2	U	0.2	U	0.2	U	0.2	U
85-01-8	Phenanthrene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
120-12-7	Anthracene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
206-44-0	Fluoranthene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
129-00-0	Pyrene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
56-55-3	Benzo(a)anthracene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
218-01-9	Chrysene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
205-99-2	Benzo(b)fluoranthene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
207-08-9	Benzo(k)fluoranthene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
50-32-8	Benzo(a)pyrene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
193-39-5	Indeno(1,2,3-cd)pyrene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
53-70-3	Dibenz(a,h)anthracene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
191-24-2	Benzo(g,h,i)perylene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
	Pesticides																						
319-84-6	alpha-BHC	Pest-W	µg/L	0.0068	J	0.0038	J	0.05	U	0.05	U	0.05	UJ	--	R	0.05	U	0.05	U	0.05	U	0.05	U
319-85-7	beta-BHC	Pest-W	µg/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ	--	R	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta-BHC	Pest-W	µg/L	0.05	U	0.065		0.05	U	0.05	U	0.05	UJ	--	R	0.0068	J	0.05	U	0.05	U	0.05	U
58-89-9	gamma-BHC (Lindane)	Pest-W	µg/L	0.05	U	0.05	U	0.0015	J	0.05	U	0.05	UJ	.05	UJ	0.05	U	0.0064	J	0.05	U	0.05	U
76-44-8	Heptachlor	Pest-W	µg/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ	.05	UJ	0.05	U	0.05	U	0.05	U	0.05	U
309-00-2	Aldrin	Pest-W	µg/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ	--	R	0.05	U	0.05	U	0.05	U	0.05	U
1024-57-3	Heptachlor epoxide	Pest-W	µg/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ	--	R	0.05	U	0.05	U	0.05	U	0.05	U
959-98-8	Endosulfan I	Pest-W	µg/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ	--	R	0.05	U	0.05	U	0.05	U	0.05	U
60-57-1	Dieldrin	Pest-W	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ	--	R	0.1	U	0.1	U	0.1	U	0.1	U
72-55-9	4,4'-DDE	Pest-W	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ	--	R	0.1	U	0.1	U	0.1	U	0.1	U
72-20-8	Endrin	Pest-W	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ	--	R	0.1	U	0.1	U	0.1	U	0.1	U
33213-65-9	Endosulfan II	Pest-W	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ	--	R	0.1	U	0.1	U	0.1	U	0.1	U
72-54-8	4,4'-DDD	Pest-W	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ	--	R	0.1	U	0.1	U	0.1	U	0.1	U
1031-07-8	Endosulfan sulfate	Pest-W	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ	--	R	0.1	U	0.1	U	0.1	U	0.1	U
50-29-3	4,4'-DDT	Pest-W	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ	--	R	0.1	U	0.021	J	0.1	U	0.1	U
72-43-5	Methoxychlor	Pest-W	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	--	R	0.5	U	0.5	U	0.5	U	0.5	U
53494-70-5	Endrin ketone	Pest-W	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ	--	R	0.1	U	0.1	U	0.1	U	0.1	U
7421-93-4	Endrin aldehyde	Pest-W	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ	--	R	0.1	U	0.1	U	0.1	U	0.1	U
5103-71-9	alpha-Chlordane	Pest-W	µg/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ	--	R	0.05	U	0.05	U	0.05	U	0.05	U
5103-74-2	gamma-Chlordane	Pest-W	µg/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ	--	R	0.05	U	0.05	U	0.05	U	0.05	U
8001-35-2	Toxaphene	Pest-W	µg/L	5	U	5	U	5	U	5	U	5	UJ	--	R	5	U	5	U	5	U	5	U
	PCBs																						
12674-11-2	Aroclor-1016	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	UJ	--	R	1	U	1	U	1	U	1	U
11104-28-2	Aroclor-1221	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	UJ	--	R	1	U	1	U	1	U	1	U
11141-16-5	Aroclor-1232	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	UJ	--	R	1	U	1	U	1	U	1	U
53469-21-9	Aroclor-1242	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	UJ	--	R	1	U	1	U	1	U	1	U
12672-29-6	Aroclor-1248	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	UJ	--	R	1	U	1	U	1	U	1	U
11097-69-1	Aroclor-1254	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	UJ	--	R	1	U	1	U	1	U	1	U
11096-82-5	Aroclor-1260	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	UJ	--	R	1	U	1	U	1	U	1	U
37324-23-5	Aroclor-1262	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	UJ	--	R	1	U	1	U	1	U	1	U
11100-14-4	Aroclor-1268	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	UJ	--	R	1	U	1	U	1	U	1	U

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-011 8/3/2006		SW-012 8/3/2006		SW-013 8/3/2006		SW-014 8/3/2006		SW-015 8/9/2006		SW-016 8/21/2006		SW-017 8/8/2006		SW-018 8/10/2006		SW-019 8/8/2006		SW-020 8/8/2006	
	Inorganic Analytes																						
7429-90-5	Aluminum	DESA-Met-W	µg/L	100	U	100	U	100	U	100	U	440		100	U	100	U	100	U	100	U	100	U
7440-36-0	Antimony	DESA-Met-W	µg/L	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U
7440-38-2	Arsenic	DESA-Met-W	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
7440-39-3	Barium	DESA-Met-W	µg/L	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U
7440-41-7	Beryllium	DESA-Met-W	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
7440-43-9	Cadmium	DESA-Met-W	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
7440-70-2	Calcium	DESA-Met-W	µg/L	32000		31000		39000		39000		43000		41000		33000		37000		43000		35000	
7440-47-3	Chromium	DESA-Met-W	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
7440-48-4	Cobalt	DESA-Met-W	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
7440-50-8	Copper	DESA-Met-W	µg/L	15	U	15	U	15	U	15	U	15	U	25	U	15	U	15	U	15	U	15	U
7439-89-6	Iron	DESA-Met-W	µg/L	50	U	50	U	50	U	50	U	480		66		50	U	170		110		66	
7439-92-1	Lead	DESA-Met-W	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
7439-95-4	Magnesium	DESA-Met-W	µg/L	13000		13000		14000		14000		9700		15000		13000		14000		15000		14000	
7439-96-5	Manganese	DESA-Met-W	µg/L	10	U	11		10	U	10	U	11		10	U	10	U	16		22		10	U
7439-97-6	Mercury	DESA-Met-W	µg/L	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
7440-02-0	Nickel	DESA-Met-W	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
7440-09-7	Potassium	DESA-Met-W	µg/L	870		910		860		840		890		920		640		740		790		670	
7782-49-2	Selenium	DESA-Met-W	µg/L	35	U	35	U	35	U	35	U	35	U	35	U	35	U	35	U	35	U	35	U
7440-22-4	Silver	DESA-Met-W	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
7440-23-5	Sodium	DESA-Met-W	µg/L	51000		51000		51000		49000		57000		1000	U	46000		47000		50000		48000	
7440-28-0	Thallium	DESA-Met-W	µg/L	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
7440-62-2	Vanadium	DESA-Met-W	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
7440-66-6	Zinc	DESA-Met-W	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
57-12-5	Cyanide	Cyanide-W	µg/L	5		5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
	Wet Chemistry																						
CACOA-H	Hardness As CaCO3	SM2340B	mg/L	140		130		150		160		150		160		140		150		170		140	
NH3	Nitrogen, Ammonia	MCAWW350-1	mg/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.2	U	0.1	U	0.05	U	0.1	U	0.05	U
CL	Chloride	MCAWW325-3	mg/L	83		82		81		82		85		82		110		100		100		100	
SO4	Sulfate	MCAWW375-	mg/L	22		23		20		19		25		21		23		20		23		22	
TDS	Total Dissolved Solids	MCAWW160-1	mg/L	310		310		310		330		330		310		300		300		290		280	
TSS	Total Suspended Solids	MCAWW160-2	mg/L	10	U	10	U	10	U	10	U	59		10	U	10	U	10	U	10	U	10	U
TKN	Nitrogen, Total Kjeldahl	MCAWW351-	mg/L	0.26		0.45		0.13		0.35		0.45		0.15		0.27		0.13		0.38		0.26	
TOC	Total Organic Carbon	SW9060	mg/L	2		1.7		1.3		2		1	U	1	U	2.1		1	U	2.4		3.3	

Notes:
-- - No value available
ARO-W - Polychlorinate Biphenols - Water
Cyanide-W - Cyanide-Water
DESA-Met-W - Division of Environment, Science and Assessment-Metals-Water
J - Value estimated
mg/L - miligram per liter
N/A - Not Available
PCBs - Polychlorinated Biphenols
Pest-W - Pesticides-Water
R - Value rejected
SVOA-W - Semi-Volatile Organic Analysis-Water
SVOC - Semi-Volatile Organic Compounds
SVSIM - Simutaneous Ion Monitoring for Semi Volatile Analysis
SW - Surface Water
TVOA - Trace Volatile Organic Analytes
TVSIM - Simutaneous Ion Monitoring for Volatile Organic Analysis
U - Value detected below reporting limit
µg/L - microgram per liter
UJ - Value estimated to be below reporting limit

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-021 8/10/2006		SW-022 8/10/2006		SW-023 8/11/2006		SW-024 8/11/2006		SW-025 8/11/2006		SW-026 8/11/2006		SW-027 8/21/2006		SW-028 8/21/2006		SW-029 8/21/2006		SW-030 8/16/2006	
	Volatile Organic Compounds																						
75-71-8	Dichlorodifluoromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
74-87-3	Chloromethane	TVOA	µg/L	0.13	J	0.5	U	0.5	U	0.5	U	0.16	J	0.11	J	0.5	U	0.5	U	0.5	U	0.5	U
75-01-4	Vinyl Chloride	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
74-83-9	Bromomethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-00-3	Chloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-69-4	Trichlorofluoromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U
75-35-4	1,1-Dichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	UJ
67-64-1	Acetone	TVOA	µg/L	12		10		6.9	U	6.1	U	7.2	U	5.3	U	5	U	5	U	5	U	5	U
75-15-0	Carbon Disulfide	TVOA	µg/L	0.5	U	0.5	U	0.22	J	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
79-20-9	Methyl Acetate	TVOA	µg/L	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
75-09-2	Methylene Chloride	TVOA	µg/L	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
156-60-5	trans-1,2-Dichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1634-04-4	Methyl tert-Butyl Ether	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-34-3	1,1-Dichloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
156-59-2	cis-1,2-Dichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
78-93-3	2-Butanone	TVOA	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
74-97-5	Chlorobromomethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ
67-66-3	Chloroform	TVOA	µg/L	0.5	U	0.1	J	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
71-55-6	1,1,1-Trichloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.13	J	0.16	J	0.14	J
110-82-7	Cyclohexane	TVOA	µg/L	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ
56-23-5	Carbon Tetrachloride	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
71-43-2	Benzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
107-06-2	1,2-Dichloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ
79-01-6	Trichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.28	J	0.5	U	0.5	U	0.11	J
108-87-2	Metylcyclohexane	TVOA	µg/L	--	R	--	R	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
78-87-5	1,2-Dichloropropane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ
75-27-4	Bromodichloromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ
10061-01-5	cis-1,3-Dichloropropene	TVOA	µg/L	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U
108-10-1	4-Methyl-2-pentanone	TVOA	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
108-88-3	Toluene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
10061-02-6	trans-1,3-Dichloropropene	TVOA	µg/L	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U
79-00-5	1,1,2-Trichloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U
127-18-4	Tetrachloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
591-78-6	2-Hexanone	TVOA	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
124-48-1	Dibromochloromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
106-93-4	1,2-Dibromoethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
108-90-7	Chlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
100-41-4	Ethylbenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
100-42-5	Styrene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-25-2	Bromoform	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
98-82-8	Isopropylbenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
79-34-5	1,1,2,2-Tetrachloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
541-73-1	1,3-Dichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
106-46-7	1,4-Dichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
95-50-1	1,2-Dichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
96-12-8	1,2-Dibromo-3-chloropropane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
120-82-1	1,2,4-Trichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U
87-61-6	1,2,3-Trichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U
95-47-6	o-Xylene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
179601-23-1	m,p-Xylene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-021 8/10/2006		SW-022 8/10/2006		SW-023 8/11/2006		SW-024 8/11/2006		SW-025 8/11/2006		SW-026 8/11/2006		SW-027 8/21/2006		SW-028 8/21/2006		SW-029 8/21/2006		SW-030 8/16/2006	
	Semi-Volatile Organic Compounds																						
100-52-7	Benzaldehyde	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
108-95-2	Phenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
111-44-4	bis(2-Chloroethyl) ether	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
95-57-8	2-Chlorophenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
95-48-7	2-Methylphenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
108-60-1	2,2'-oxybis(1-Chloropropane)	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
98-86-2	Acetophenone	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
106-44-5	4-Methylphenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
621-64-7	n-Nitroso-di-n-propylamine	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
67-72-1	Hexachloroethane	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
98-95-3	Nitrobenzene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
78-59-1	Isophorone	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
88-75-5	2-Nitrophenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
105-67-9	2,4-Dimethylphenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
111-91-1	bis(2-Chloroethoxy)methane	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
120-83-2	2,4-Dichlorophenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
91-20-3	Naphthalene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
106-47-8	4-Chloroaniline	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
87-68-3	Hexachlorobutadiene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
105-60-2	Caprolactam	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	UJ	5.6	UJ	5	U	5	U	5	U	5	U
59-50-7	4-Chloro-3-methylphenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
91-57-6	2-Methylnaphthalene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
77-47-4	Hexachlorocyclopentadiene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
88-06-2	2,4,6-Trichlorophenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
95-95-4	2,4,5-Trichlorophenol	SVOA-W	µg/L	20	U	20	U	21	U	21	U	22	U	22	U	20	U	20	U	20	U	20	U
92-52-4	1,1'-Biphenyl	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	UJ	5.6	UJ	5	U	5	U	5	U	5	U
91-58-7	2-Chloronaphthalene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
88-74-4	2-Nitroaniline	SVOA-W	µg/L	20	U	20	U	21	U	21	U	22	U	22	U	20	U	20	U	20	U	20	U
131-11-3	Dimethylphthalate	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	UJ	5.6	UJ	5	U	5	U	5	U	5	U
606-20-2	2,6-Dinitrotoluene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
208-96-8	Acenaphthylene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
99-09-2	3-Nitroaniline	SVOA-W	µg/L	20	U	20	U	21	U	21	U	22	U	22	U	20	U	20	U	20	U	20	U
83-32-9	Acenaphthene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
51-28-5	2,4-Dinitrophenol	SVOA-W	µg/L	20	U	20	U	21	U	21	U	22	U	22	U	20	U	20	UJ	20	UJ	20	U
100-02-7	4-Nitrophenol	SVOA-W	µg/L	20	U	20	U	21	U	21	U	22	U	22	U	20	U	20	U	20	U	20	U
132-64-9	Dibenzofuran	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
121-14-2	2,4-Dinitrotoluene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
84-66-2	Diethylphthalate	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	UJ	5.6	UJ	5	U	5	U	5	U	5	U
86-73-7	Fluorene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
7005-72-3	4-Chlorophenyl-phenylether	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
100-01-6	4-Nitroaniline	SVOA-W	µg/L	20	U	20	U	21	U	21	U	22	U	22	U	20	U	20	U	20	U	20	U
534-52-1	4,6-Dinitro-2-methylphenol	SVOA-W	µg/L	20	U	20	U	21	U	21	U	22	U	22	U	20	U	20	U	20	U	20	U
86-30-6	n-Nitrosodiphenylamine	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
95-94-3	1,2,4,5-Tetrachlorobenzene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
101-55-3	4-Bromophenyl-phenylether	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
118-74-1	Hexachlorobenzene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	UJ	5	U	5	U	5	U
1912-24-9	Atrazine	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	UJ	5	U	5	U	5	U
87-86-5	Pentachlorophenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
85-01-8	Phenanthrene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	UJ	5	U	5	U	5	U
120-12-7	Anthracene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	UJ	5	U	5	U	5	U
84-74-2	Di-n-butylphthalate	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	UJ	5.6	UJ	5	U	5	U	5	U	5	U
206-44-0	Fluoranthene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
129-00-0	Pyrene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
85-68-7	Butylbenzylphthalate	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	UJ	5.6	UJ	5	U	5	U	5	U	5	U
91-94-1	3,3'-Dichlorobenzidine	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
56-55-3	Benzo(a)anthracene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U
218-01-9	Chrysene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	U	5	U	5	U	5	U	5	U

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-021 8/10/2006		SW-022 8/10/2006		SW-023 8/11/2006		SW-024 8/11/2006		SW-025 8/11/2006		SW-026 8/11/2006		SW-027 8/21/2006		SW-028 8/21/2006		SW-029 8/21/2006		SW-030 8/16/2006	
	Semi-Volatile Organic Compounds																						
117-81-7	bis(2-Ethylhexyl) phthalate	SVOA-W	µg/L	8.9		5	U	5.3	U	5.1	U	5.4	UJ	5.6	UJ	5	U	5	U	5	U	5	U
117-84-0	Di-n-octylphthalate	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	UJ	5.6	UJ	5	U	5	U	5	U	5	U
205-99-2	Benzo(b)fluoranthene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	UJ	5	U	5	U	5	U	5	U
207-08-9	Benzo(k)fluoranthene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	UJ	5	U	5	U	5	U	5	U
50-32-8	Benzo(a)pyrene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	UJ	5	U	5	U	5	U	5	U
193-39-5	Indeno(1,2,3-cd)pyrene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	UJ	5	UJ	5	U	5	U	5	UJ
53-70-3	Dibenz(a,h)anthracene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	UJ	5	U	5	U	5	U	5	UJ
191-24-2	Benzo(g,h,i)perylene	SVOA-W	µg/L	5	U	5	U	5.3	U	5.1	U	5.4	U	5.6	UJ	5	U	5	U	5	U	5	U
91-20-3	Naphthalene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
91-57-6	2-Methylnaphthalene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
208-96-8	Acenaphthylene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
83-32-9	Acenaphthene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.11	U			0.1	U	0.1	U	0.1	U	0.1	U
86-73-7	Fluorene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
87-86-5	Pentachlorophenol	SVSIM	µg/L	0.2	U	0.2	U	0.21	U	0.21	U	0.22	U			0.2	U	0.2	U	0.2	U	0.2	U
85-01-8	Phenanthrene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
120-12-7	Anthracene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.061	J	0.1	U
206-44-0	Fluoranthene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.054	J	0.1	U
129-00-0	Pyrene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
56-55-3	Benzo(a)anthracene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
218-01-9	Chrysene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
205-99-2	Benzo(b)fluoranthene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
207-08-9	Benzo(k)fluoranthene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
50-32-8	Benzo(a)pyrene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.06	J	0.1	U
193-39-5	Indeno(1,2,3-cd)pyrene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
53-70-3	Dibenz(a,h)anthracene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
191-24-2	Benzo(g,h,i)perylene	SVSIM	µg/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
	Pesticides																						
319-84-6	alpha-BHC	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	--	R	0.05	UJ	--	R	0.05	U
319-85-7	beta-BHC	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	--	R	0.05	UJ	--	R	0.05	J
319-86-8	delta-BHC	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	--	R	0.05	UJ	--	R	0.05	U
58-89-9	gamma-BHC (Lindane)	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	--	R	0.05	UJ	--	R	0.05	U
76-44-8	Heptachlor	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	--	R	0.05	UJ	--	R	0.05	U
309-00-2	Aldrin	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	--	R	0.05	UJ	--	R	0.05	U
1024-57-3	Heptachlor epoxide	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	--	R	0.05	UJ	--	R	0.05	U
959-98-8	Endosulfan I	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	--	R	0.05	UJ	--	R	0.05	U
60-57-1	Dieldrin	Pest-W	µg/L	0.0011	J	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	--	R	0.1	UJ	--	R	0.1	U
72-55-9	4,4'-DDE	Pest-W	µg/L	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	--	R	0.1	UJ	--	R	0.1	U
72-20-8	Endrin	Pest-W	µg/L	0.0015	J	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	--	R	0.1	UJ	--	R	0.1	U
33213-65-9	Endosulfan II	Pest-W	µg/L	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	--	R	0.1	UJ	--	R	0.1	U
72-54-8	4,4'-DDD	Pest-W	µg/L	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	--	R	0.1	UJ	--	R	0.1	U
1031-07-8	Endosulfan sulfate	Pest-W	µg/L	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.0074	J	--	R	0.1	UJ	--	R	0.1	U
50-29-3	4,4'-DDT	Pest-W	µg/L	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	--	R	0.1	UJ	--	R	0.1	U
72-43-5	Methoxychlor	Pest-W	µg/L	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	--	R	0.5	UJ	--	R	0.5	U
53494-70-5	Endrin ketone	Pest-W	µg/L	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	--	R	0.1	UJ	--	R	0.1	U
7421-93-4	Endrin aldehyde	Pest-W	µg/L	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	--	R	0.1	UJ	--	R	0.1	U
5103-71-9	alpha-Chlordane	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	--	R	0.05	UJ	--	R	0.05	U
5103-74-2	gamma-Chlordane	Pest-W	µg/L	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	--	R	0.05	UJ	--	R	0.05	U
8001-35-2	Toxaphene	Pest-W	µg/L	5	U	5	U	5	UJ	5	UJ	5	UJ	5	UJ	--	R	5	UJ	--	R	5	U
	PCBs																						
12674-11-2	Aroclor-1016	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	UJ	--	R	1	U
11104-28-2	Aroclor-1221	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	UJ	--	R	1	U
11141-16-5	Aroclor-1232	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	UJ	--	R	1	U
53469-21-9	Aroclor-1242	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	UJ	--	R	1	U
12672-29-6	Aroclor-1248	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	UJ	--	R	1	U
11097-69-1	Aroclor-1254	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	UJ	--	R	1	U
11096-82-5	Aroclor-1260	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	UJ	--	R	1	U
37324-23-5	Aroclor-1262	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	UJ	--	R	1	U
11100-14-4	Aroclor-1268	ARO-W	µg/L	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	UJ	--	R	1	U

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-021 8/10/2006		SW-022 8/10/2006		SW-023 8/11/2006		SW-024 8/11/2006		SW-025 8/11/2006		SW-026 8/11/2006		SW-027 8/21/2006		SW-028 8/21/2006		SW-029 8/21/2006		SW-030 8/16/2006	
	Inorganic Analytes																						
7429-90-5	Aluminum	DESA-Met-W	µg/L	100	U	100	U	100	U	100	U	100	U	100	U	100	U	140		100	U	100	U
7440-36-0	Antimony	DESA-Met-W	µg/L	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U
7440-38-2	Arsenic	DESA-Met-W	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
7440-39-3	Barium	DESA-Met-W	µg/L	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U
7440-41-7	Beryllium	DESA-Met-W	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
7440-43-9	Cadmium	DESA-Met-W	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
7440-70-2	Calcium	DESA-Met-W	µg/L	38000		36000		39000		38000		35000		45000		36000		59000		60000		59000	
7440-47-3	Chromium	DESA-Met-W	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
7440-48-4	Cobalt	DESA-Met-W	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
7440-50-8	Copper	DESA-Met-W	µg/L	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
7439-89-6	Iron	DESA-Met-W	µg/L	120		50	U	58		78		50	U	500		110		250		81		130	
7439-92-1	Lead	DESA-Met-W	µg/L	10	U	10	U	10	U	41		10	U	10	U	10	U	10	U	10	U	10	U
7439-95-4	Magnesium	DESA-Met-W	µg/L	14000		14000		15000		14000		14000		13000		11000		10000		10000		10000	
7439-96-5	Manganese	DESA-Met-W	µg/L	20		10		14		10	U	10	U	240		18		71		48		80	
7439-97-6	Mercury	DESA-Met-W	µg/L	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
7440-02-0	Nickel	DESA-Met-W	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
7440-09-7	Potassium	DESA-Met-W	µg/L	710		730		690		690		690		1500		660		890		840		880	
7782-49-2	Selenium	DESA-Met-W	µg/L	35	U	35	U	35	U	35	U	35	U	35	U	35	U	35	U	35	U	35	U
7440-22-4	Silver	DESA-Met-W	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
7440-23-5	Sodium	DESA-Met-W	µg/L	1000	U	1000	U	1000	U	1000	U	1000	U	1000	U	1000	U	1000	U	1000	U	1000	U
7440-28-0	Thallium	DESA-Met-W	µg/L	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
7440-62-2	Vanadium	DESA-Met-W	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
7440-66-6	Zinc	DESA-Met-W	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
57-12-5	Cyanide	Cyanide-W	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
	Wet Chemistry																						
CACOA-H	Hardness As CaCO3	SM2340B	mg/L	150		150		160		150		150		170		130		190		190		190	
NH3	Nitrogen, Ammonia	MCAWW350-1	mg/L	0.05	U	0.05	U	0.2	U	0.34		0.05	U	0.2	U	0.05	U	0.2	U	0.2	U	0.1	U
CL	Chloride	MCAWW325-3	mg/L	100		100		100		100		100		110		31		120		120		120	
SO4	Sulfate	MCAWW375-	mg/L	21		15		21		15		40		15		16		22		22		24	
TDS	Total Dissolved Solids	MCAWW160-1	mg/L	300		300		230		310		290		370		210		390		400		420	
TSS	Total Suspended Solids	MCAWW160-2	mg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
TKN	Nitrogen, Total Kjeldahl	MCAWW351-	mg/L	0.1	U	1.4		0.41		0.38		0.32		0.74		0.29		0.13		0.1	U	0.45	
TOC	Total Organic Carbon	SW9060	mg/L	1	U	1	U	1	U	3		1.3		4		1	U	1	U	1	U	2.7	L

Notes:
-- - No value available
ARO-W - Polychlorinate Biphenols - Water
Cyanide-W - Cyanide-Water
DESA-Met-W - Division of Environment, Science and Assessment-Metals-Water
J - Value estimated
mg/L - miligram per liter
N/A - Not Available
PCBs - Polychlorinated Biphenols
Pest-W - Pesticides-Water
R - Value rejected
SVOA-W - Semi-Volatile Organic Analysis-Water
SVOC - Semi-Volatile Organic Compounds
SVSIM - Simutaneous Ion Monitoring for Semi Volatile Analysis
SW - Surface Water
TVOA - Trace Volatile Organic Analytes
TVSIM - Simutaneous Ion Monitoring for Volatile Organic Analysis
U - Value detected below reporting limit
µg/L - microgram per liter
UJ - Value estimated to be below reporting limit

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-031 8/21/2006		SW-032 8/9/2006		SW-033 8/18/2006		SW-034 8/18/2006		SW-035 8/18/2006		SW-036 8/17/2006		SW-037 8/17/2006		SW-038 8/22/2006		SW-039 8/22/2006	
	Volatile Organic Compounds																				
75-71-8	Dichlorodifluoromethane	TVOA	µg/L	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
74-87-3	Chloromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-01-4	Vinyl Chloride	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
74-83-9	Bromomethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-00-3	Chloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-69-4	Trichlorofluoromethane	TVOA	µg/L	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ
75-35-4	1,1-Dichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U
67-64-1	Acetone	TVOA	µg/L	5	U	6.7		5	U	5	U	5	U	5	U	5	U	5	U	5	U
75-15-0	Carbon Disulfide	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.16	J	0.5	U	0.5	U
79-20-9	Methyl Acetate	TVOA	µg/L	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
75-09-2	Methylene Chloride	TVOA	µg/L	0.5	UJ	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
156-60-5	trans-1,2-Dichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1634-04-4	Methyl tert-Butyl Ether	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-34-3	1,1-Dichloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
156-59-2	cis-1,2-Dichloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
78-93-3	2-Butanone	TVOA	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
74-97-5	Chlorobromomethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	U	0.5	U
67-66-3	Chloroform	TVOA	µg/L	0.5	U	0.11	J	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
71-55-6	1,1,1-Trichloroethane	TVOA	µg/L	0.14	J	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
110-82-7	Cyclohexane	TVOA	µg/L	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U
56-23-5	Carbon Tetrachloride	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
71-43-2	Benzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
107-06-2	1,2-Dichloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U
79-01-6	Trichloroethene	TVOA	µg/L	0.18	J	0.5	U	0.21	J	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
108-87-2	Metylcyclohexane	TVOA	µg/L	0.5	UJ	--	R	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
78-87-5	1,2-Dichloropropane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	U	0.5	U
75-27-4	Bromodichloromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	U	0.5	U
10061-01-5	cis-1,3-Dichloropropene	TVOA	µg/L	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ
108-10-1	4-Methyl-2-pentanone	TVOA	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
108-88-3	Toluene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
10061-02-6	trans-1,3-Dichloropropene	TVOA	µg/L	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ
79-00-5	1,1,2-Trichloroethane	TVOA	µg/L	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ
127-18-4	Tetrachloroethene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
591-78-6	2-Hexanone	TVOA	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
124-48-1	Dibromochloromethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
106-93-4	1,2-Dibromoethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
108-90-7	Chlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
100-41-4	Ethylbenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
100-42-5	Styrene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
75-25-2	Bromoform	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
98-82-8	Isopropylbenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
79-34-5	1,1,2,2-Tetrachloroethane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
541-73-1	1,3-Dichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
106-46-7	1,4-Dichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
95-50-1	1,2-Dichlorobenzene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
96-12-8	1,2-Dibromo-3-chloropropane	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
120-82-1	1,2,4-Trichlorobenzene	TVOA	µg/L	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ
87-61-6	1,2,3-Trichlorobenzene	TVOA	µg/L	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ
95-47-6	o-Xylene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
179601-23-1	m,p-Xylene	TVOA	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-031 8/21/2006		SW-032 8/9/2006		SW-033 8/18/2006		SW-034 8/18/2006		SW-035 8/18/2006		SW-036 8/17/2006		SW-037 8/17/2006		SW-038 8/22/2006		SW-039 8/22/2006	
	Semi-Volatile Organic Compounds																				
100-52-7	Benzaldehyde	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
108-95-2	Phenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
111-44-4	bis(2-Chloroethyl) ether	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
95-57-8	2-Chlorophenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
95-48-7	2-Methylphenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
108-60-1	2,2'-oxybis(1-Chloropropane)	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
98-86-2	Acetophenone	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
106-44-5	4-Methylphenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
621-64-7	n-Nitroso-di-n-propylamine	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
67-72-1	Hexachloroethane	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
98-95-3	Nitrobenzene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
78-59-1	Isophorone	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
88-75-5	2-Nitrophenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
105-67-9	2,4-Dimethylphenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
111-91-1	bis(2-Chloroethoxy)methane	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
120-83-2	2,4-Dichlorophenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
91-20-3	Naphthalene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
106-47-8	4-Chloroaniline	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	--	R
87-68-3	Hexachlorobutadiene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
105-60-2	Caprolactam	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	UJ
59-50-7	4-Chloro-3-methylphenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
91-57-6	2-Methylnaphthalene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
77-47-4	Hexachlorocyclopentadiene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	--	R
88-06-2	2,4,6-Trichlorophenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
95-95-4	2,4,5-Trichlorophenol	SVOA-W	µg/L	20	U	20	U	21	U	20	U	21	U	20	U	20	U	20	U	20	U
92-52-4	1,1'-Biphenyl	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	U
91-58-7	2-Chloronaphthalene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
88-74-4	2-Nitroaniline	SVOA-W	µg/L	20	U	20	U	21	U	20	U	21	U	20	U	20	U	20	U	20	U
131-11-3	Dimethylphthalate	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	U
606-20-2	2,6-Dinitrotoluene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
208-96-8	Acenaphthylene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
99-09-2	3-Nitroaniline	SVOA-W	µg/L	20	U	20	U	21	U	20	U	21	U	20	U	20	U	20	U	20	U
83-32-9	Acenaphthene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
51-28-5	2,4-Dinitrophenol	SVOA-W	µg/L	20	U	20	U	21	U	20	U	21	U	20	U	20	U	20	U	20	U
100-02-7	4-Nitrophenol	SVOA-W	µg/L	20	U	20	U	21	U	20	U	21	U	20	U	20	U	20	U	20	U
132-64-9	Dibenzofuran	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
121-14-2	2,4-Dinitrotoluene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
84-66-2	Diethylphthalate	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	U
86-73-7	Fluorene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
7005-72-3	4-Chlorophenyl-phenylether	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
100-01-6	4-Nitroaniline	SVOA-W	µg/L	20	U	20	U	21	U	20	U	21	U	20	U	20	U	20	U	20	U
534-52-1	4,6-Dinitro-2-methylphenol	SVOA-W	µg/L	20	U	20	U	21	U	20	U	21	U	20	U	20	U	20	U	20	UJ
86-30-6	n-Nitrosodiphenylamine	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
95-94-3	1,2,4,5-Tetrachlorobenzene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
101-55-3	4-Bromophenyl-phenylether	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
118-74-1	Hexachlorobenzene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	U
1912-24-9	Atrazine	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	U
87-86-5	Pentachlorophenol	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
85-01-8	Phenanthrene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	U
120-12-7	Anthracene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	U
84-74-2	Di-n-butylphthalate	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	U
206-44-0	Fluoranthene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
129-00-0	Pyrene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
85-68-7	Butylbenzylphthalate	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	U
91-94-1	3,3'-Dichlorobenzidine	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	--	R
56-55-3	Benzo(a)anthracene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U
218-01-9	Chrysene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	U	5	U

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-031 8/21/2006		SW-032 8/9/2006		SW-033 8/18/2006		SW-034 8/18/2006		SW-035 8/18/2006		SW-036 8/17/2006		SW-037 8/17/2006		SW-038 8/22/2006		SW-039 8/22/2006	
	Semi-Volatile Organic Compounds																				
117-81-7	bis(2-Ethylhexyl) phthalate	SVOA-W	µg/L	9.5		5	U	5.3	U	5	U	5.1	U	5	U	6.8		5	UJ	5	U
117-84-0	Di-n-octylphthalate	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	U
205-99-2	Benzo(b)fluoranthene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	UJ
207-08-9	Benzo(k)fluoranthene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	UJ
50-32-8	Benzo(a)pyrene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	UJ
193-39-5	Indeno(1,2,3-cd)pyrene	SVOA-W	µg/L	5	UJ	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	UJ
53-70-3	Dibenz(a,h)anthracene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	UJ
191-24-2	Benzo(g,h,i)perylene	SVOA-W	µg/L	5	U	5	U	5.3	U	5	U	5.1	U	5	U	5	U	5	UJ	5	UJ
91-20-3	Naphthalene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
91-57-6	2-Methylnaphthalene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
208-96-8	Acenaphthylene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
83-32-9	Acenaphthene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
86-73-7	Fluorene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
87-86-5	Pentachlorophenol	SVSIM	µg/L	0.2	U	0.2	U	0.21	U	0.2	U	0.21	U	0.2	U	0.2	U	0.2	U	0.2	U
85-01-8	Phenanthrene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
120-12-7	Anthracene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
206-44-0	Fluoranthene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
129-00-0	Pyrene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
56-55-3	Benzo(a)anthracene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
218-01-9	Chrysene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
205-99-2	Benzo(b)fluoranthene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
207-08-9	Benzo(k)fluoranthene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
50-32-8	Benzo(a)pyrene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
193-39-5	Indeno(1,2,3-cd)pyrene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
53-70-3	Dibenz(a,h)anthracene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
191-24-2	Benzo(g,h,i)perylene	SVSIM	µg/L	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
	Pesticides																				
319-84-6	alpha-BHC	Pest-W	µg/L	--	R	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	U	0.05	U	--	R	0.05	UJ
319-85-7	beta-BHC	Pest-W	µg/L	--	R	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	U	0.05	U	--	R	0.05	UJ
319-86-8	delta-BHC	Pest-W	µg/L	--	R	0.0027	J	0.05	UJ	0.05	UJ	0.05	UJ	0.05	U	0.05	U	--	R	0.05	UJ
58-89-9	gamma-BHC (Lindane)	Pest-W	µg/L	--	R	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	U	0.05	U	--	R	0.05	UJ
76-44-8	Heptachlor	Pest-W	µg/L	--	R	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	U	0.05	U	--	R	0.05	UJ
309-00-2	Aldrin	Pest-W	µg/L	--	R	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	U	0.05	U	--	R	0.05	UJ
1024-57-3	Heptachlor epoxide	Pest-W	µg/L	--	R	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	U	0.05	U	--	R	0.05	UJ
959-98-8	Endosulfan I	Pest-W	µg/L	--	R	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	U	0.05	U	--	R	0.05	UJ
60-57-1	Dieldrin	Pest-W	µg/L	--	R	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	U	0.1	U	--	R	0.1	UJ
72-55-9	4,4'-DDE	Pest-W	µg/L	--	R	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	U	0.1	U	--	R	0.1	UJ
72-20-8	Endrin	Pest-W	µg/L	--	R	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	U	0.1	U	--	R	0.1	UJ
33213-65-9	Endosulfan II	Pest-W	µg/L	--	R	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	U	0.1	U	--	R	0.1	UJ
72-54-8	4,4'-DDD	Pest-W	µg/L	--	R	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	U	0.1	U	--	R	0.1	UJ
1031-07-8	Endosulfan sulfate	Pest-W	µg/L	--	R	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	U	0.1	U	--	R	0.1	UJ
50-29-3	4,4'-DDT	Pest-W	µg/L	--	R	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	U	0.1	U	--	R	0.1	UJ
72-43-5	Methoxychlor	Pest-W	µg/L	--	R	0.5	U	0.5	UJ	0.5	UJ	0.5	UJ	0.5	U	0.5	U	--	R	0.5	UJ
53494-70-5	Endrin ketone	Pest-W	µg/L	--	R	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	U	0.1	U	--	R	0.1	UJ
7421-93-4	Endrin aldehyde	Pest-W	µg/L	--	R	0.1	U	0.1	UJ	0.1	UJ	0.1	UJ	0.1	U	0.1	U	--	R	0.1	UJ
5103-71-9	alpha-Chlordane	Pest-W	µg/L	--	R	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	U	0.05	U	--	R	0.05	UJ
5103-74-2	gamma-Chlordane	Pest-W	µg/L	--	R	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	U	0.05	U	--	R	0.05	UJ
8001-35-2	Toxaphene	Pest-W	µg/L	--	R	5	U	5	UJ	5	UJ	5	UJ	5	U	5	U	--	R	5	UJ
	PCBs																				
12674-11-2	Aroclor-1016	ARO-W	µg/L	--	R	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	U
11104-28-2	Aroclor-1221	ARO-W	µg/L	--	R	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	U
11141-16-5	Aroclor-1232	ARO-W	µg/L	--	R	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	U
53469-21-9	Aroclor-1242	ARO-W	µg/L	--	R	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	U
12672-29-6	Aroclor-1248	ARO-W	µg/L	--	R	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	U
11097-69-1	Aroclor-1254	ARO-W	µg/L	--	R	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	U
11096-82-5	Aroclor-1260	ARO-W	µg/L	--	R	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	U
37324-23-5	Aroclor-1262	ARO-W	µg/L	--	R	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	U
11100-14-4	Aroclor-1268	ARO-W	µg/L	--	R	1	U	1	U	1	U	1	U	1	U	1	U	--	R	1	U

Table B-2
Surface Water Analytical Results
Hopewell Precision Site
Hopewell Junction, New York

CAS #		Analytic Method	Sample Code / Sample Name / Sample Date / Unit \\	SW-031 8/21/2006		SW-032 8/9/2006		SW-033 8/18/2006		SW-034 8/18/2006		SW-035 8/18/2006		SW-036 8/17/2006		SW-037 8/17/2006		SW-038 8/22/2006		SW-039 8/22/2006	
	Inorganic Analytes																				
7429-90-5	Aluminum	DESA-Met-W	µg/L	100	U	100	U	100	U	100	U	100	U	100	U	100	U	230		590	
7440-36-0	Antimony	DESA-Met-W	µg/L	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U
7440-38-2	Arsenic	DESA-Met-W	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
7440-39-3	Barium	DESA-Met-W	µg/L	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U	100	U
7440-41-7	Beryllium	DESA-Met-W	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
7440-43-9	Cadmium	DESA-Met-W	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
7440-70-2	Calcium	DESA-Met-W	µg/L	61000		60000		65000		56000		52000		55000		52000		40000		46000	
7440-47-3	Chromium	DESA-Met-W	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
7440-48-4	Cobalt	DESA-Met-W	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
7440-50-8	Copper	DESA-Met-W	µg/L	25	U	15	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
7439-89-6	Iron	DESA-Met-W	µg/L	81		87		120		92		110		76		160		480		950	
7439-92-1	Lead	DESA-Met-W	µg/L	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
7439-95-4	Magnesium	DESA-Met-W	µg/L	9700		9600		10000		8700		8400		8500		8400		5700		6000	
7439-96-5	Manganese	DESA-Met-W	µg/L	20		23		52		13		21		12		34		150		24	
7439-97-6	Mercury	DESA-Met-W	µg/L	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
7440-02-0	Nickel	DESA-Met-W	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
7440-09-7	Potassium	DESA-Met-W	µg/L	850		760		800		830		860		850		910		790		970	
7782-49-2	Selenium	DESA-Met-W	µg/L	35	U	35	U	35	U	35	U	35	U	35	U	35	U	35	U	35	U
7440-22-4	Silver	DESA-Met-W	µg/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
7440-23-5	Sodium	DESA-Met-W	µg/L	1000	U	62000		1000	U	1000	U	1000	U	1000	U	1000	U	1000	U	1000	U
7440-28-0	Thallium	DESA-Met-W	µg/L	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
7440-62-2	Vanadium	DESA-Met-W	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
7440-66-6	Zinc	DESA-Met-W	µg/L	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
57-12-5	Cyanide	Cyanide-W	µg/L	5	U	5	U	5	UJ	5	UJ	5	UJ	5	U	5	U	5	U	5	U
	Wet Chemistry																				
CACOA-H	Hardness As CaCO3	SM2340B	mg/L	190		180		200		180		170		170		160		120		140	
NH3	Nitrogen, Ammonia	MCAWW350-1	mg/L	0.05	U	0.05	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.05	U	0.05	U
CL	Chloride	MCAWW325-3	mg/L	120		120		130		120		110		110		110		100		110	
SO4	Sulfate	MCAWW375-	mg/L	25		27		24		22		22		21		18		18		25	
TDS	Total Dissolved Solids	MCAWW160-1	mg/L	420		400		430		380		350		370		350		310		350	
TSS	Total Suspended Solids	MCAWW160-2	mg/L	10	U	10	U	10	U	10	U	10	U	10	U	13		13		20	
TKN	Nitrogen, Total Kjeldahl	MCAWW351-	mg/L	0.17		0.1	U	0.11		0.11		0.1	U	0.11		0.2		0.26		0.27	
TOC	Total Organic Carbon	SW9060	mg/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U

Notes:
-- - No value available
ARO-W - Polychlorinate Biphenols - Water
Cyanide-W - Cyanide-Water
DESA-Met-W - Division of Environment, Science and Assessment-Metals-Water
J - Value estimated
mg/L - miligram per liter
N/A - Not Available
PCBs - Polychlorinated Biphenols
Pest-W - Pesticides-Water
R - Value rejected
SVOA-W - Semi-Volatile Organic Analysis-Water
SVOC - Semi-Volatile Organic Compounds
SVSIM - Simutaneous Ion Monitoring for Semi Volatile Analysis
SW - Surface Water
TVOA - Trace Volatile Organic Analytes
TVSIM - Simutaneous Ion Monitoring for Volatile Organic Analysis
U - Value detected below reporting limit
µg/L - microgram per liter
UJ - Value estimated to be below reporting limit

Appendix C
Fate, Transport and Toxicity of Chemicals of Potential Concern (COPCs)

C.1 Metals and Cyanide

Fate, transport and toxicity of 14 metals and cyanide retained as COPCs are discussed in the following subsections.

C.1.1 Antimony

Fate and Transport: Antimony is a silvery white metal of medium hardness and low solubility in water. Metallic antimony is stable under ordinary conditions and is not readily altered by air or water. Antimony displays four oxidation states, Sb(-3), Sb(0), Sb(+3), and Sb(+5); the +3 state is the most common and stable (ATSDR 1992). Very little antimony occurs free in nature, and most is derived from stibnite (Sb_2S_3), which contains 71 to 75 percent of this element when nearly pure. Mean antimony concentration in the earth's crust has been estimated to be 0.2 ppm (NAS 1980). Antimony can be released from volcanic eruptions, sea spray, and forest fires. The majority of antimony released to the environment arises from anthropogenic sources including nonferrous metal mining, smelting and refining; the production, use and disposal of antimony alloys and compounds; coal combustion; and refuse and sludge combustion.

The speciation and physicochemical state of antimony are important to its behavior in the environment and availability to biota. Antimony that is incorporated into mineral lattices is inert and not bioavailable. Mobility of antimony released to the soil is determined by the nature of the soil, the form of antimony deposited, and the pH of the soil. Antimony sorbs strongly to soil and sediment; its sorption is primarily correlated with the content of iron, aluminum and manganese in the soil with which it coprecipitates as hydroxylated oxides (ATSDR 1992, Lintschinger *et al.* 1998). Trivalent antimony sorbs to soil more strongly than the pentavalent form (Lintschiner *et al.* 1998).

Antimony is transported into aquatic systems via natural weathering of soil and from anthropogenic sources. Antimony released to water will generally end up in sediment where it is associated with iron, manganese and aluminum hydroxyoxides. Antimony in aerobic water mostly occurs as Sb(+5), although small amounts of Sb(+3) are present. Trivalent antimony is the dominant form present in anaerobic water. Antimony can be reduced and methylated by microorganisms in anaerobic sediment, thereby mobilizing the antimony (ATSDR 1992). Methylated antimony compounds are soluble and readily oxidized (HSDB 2007).

Toxicity: The majority of effects in animals resulting from the inhalation of antimony (Sb) is attributed to the accumulation of antimony dust in the lung (pneumoconiosis), which may progress to a proliferation of alveolar macrophages to fibrosis. The heart is another target organ in antimony exposure, resulting in altered blood pressure, increased heart rate, and decreased contractile force. Antimony is known historically for its emetic properties, causing vomiting, diarrhea, gastric discomfort, and ulcers. Dietary exposure studies have reported decreased hemoglobin and hematocrit levels, altered erythrocyte counts, and swelling of the hepatic cords (ATSDR 1992).

C.1.2 Arsenic

Fate and Transport: Arsenic has four valence states (-3, 0, +3, and +5), rarely

occurring in its free state in nature. It is usually a component of sulfidic ores, occurring as arsenides and arsenates, along with arsenic trioxide, which is a weathering product of arsenides. Biotransformations may occur, resulting in volatile arsenicals that normally are returned to land where soil adsorption, plant uptake, erosion, leaching, reduction to arsines, and other processes occur. Inorganic arsenic is more mobile than organic arsenic, and thus poses greater problems by leaching into surface waters and groundwater. The trivalent arsenic species (+3) are generally considered to be more toxic, more soluble, and more mobile than As (+5) species (Eisler 1988b).
Arsenic in water exists primarily as a dissolved ionic species. Particulates account for less than one percent of the total measurable arsenic. Arsenates are more strongly adsorbed to sediments than are other arsenic forms. In bodies of water that become stratified in summer, arsenic released from sediments accumulates in the hypolimnion until turnover, when it is mixed with epilimnetic waters. This mixing may result in a ten to twenty percent increase in arsenic concentrations (Eisler 1988b).

Toxicity: Eisler (1988b) reports the following points: (1) arsenic may be absorbed by ingestion, inhalation, or permeation of the skin or mucous membrane, (2) cells accumulate arsenic by using an active transport system normally used in phosphate transport, (3) arsenicals are readily absorbed after ingestion, most being rapidly excreted in the urine during the first few days, (4) the toxicity of arsenicals conforms to the following order from greatest to least toxicity: arsines > inorganic arsenites > organic trivalent compounds (arsenoxides) > inorganic arsenates > organic pentavalent compounds > arsonium compounds > elemental arsenic, (5) solubility in water and body fluids appear to be directly related to toxicity, and (6) the mechanisms of arsenical toxicity differ considerably among arsenic species, although signs of poisoning appear similar for all arsenicals.

The primary mechanism of inorganic trivalent arsenic toxicity is through reaction with sulfhydryl groups of proteins and subsequent enzyme inhibition; inorganic pentavalent arsenic does not react as readily with sulfhydryl groups. Inorganic trivalent arsenic interrupts oxidative metabolic pathways and sometimes causes morphological changes in liver mitochondria. Methylation greatly reduces the toxicity of inorganic arsenic (both trivalent and pentavalent) and is usually the major detoxification mechanism (Eisler 1988b).

The mechanism of organic arsenic toxicity begins with its initial metabolism to the trivalent arsenoxide form, followed by its subsequent reaction with sulfhydryl groups of tissue proteins and enzymes, to form an arylbis (organylthio) arsine. This form inhibits oxidative degradation of carbohydrates and decreases cellular ATP (Eisler 1988b).

C.1.3 Barium

Fate and Transport: Barium is widely distributed in both terrestrial and aquatic environments. Although it is found in most aquatic environments, most barium precipitates out in the form of insoluble salts (EPA 1986). Transport of barium by suspended sediments in lotic water bodies may be significant. Barium is not expected to bioconcentrate significantly in plants or freshwater aquatic organisms.

Barium occurs naturally in most surface water and groundwater. In groundwater and surface water, barium is likely to precipitate out of solution as an insoluble salt (EPA 1986). The chemical form of barium largely dictates its adsorption into soils and sediments. Barium in sediments is found largely in the relatively insoluble form of barium sulfate and also in the insoluble form of barium carbonate. Humid and fulvic acid have not been found to increase the mobility of barium (ATSDR 2005).

Toxicity: The oral toxicity of barium compounds depends on their solubility. The soluble compounds, which include the chloride, nitrate, and hydroxide are the most toxic. The insoluble sulfate and carbonate are relatively nontoxic. The cardiovascular system appears to be a primary target of barium toxicity in humans and laboratory animals (ATSDR 2005). Barium has no known function in vertebrates, although it has been reported that insufficient dietary barium may depress growth rate in laboratory animals (NRC 1980).

Barium interacts with potassium, calcium, and magnesium. It has been shown that barium produces hypokalemia (i.e., lowered blood potassium), possibly by causing the build-up of intracellular potassium, and that symptoms of cardiotoxicity, muscle weakness, and paralysis resulting from barium exposure can be reversed in humans by potassium treatment (ATSDR 2005a).

C.1.4 Beryllium

Fate and Transport: Beryllium occurs naturally in the earth's crust, in coal, and in minerals such as plagiocase feldspar and beryl Beryllium is found in the plant-derived organic component of coal (HSDB 2007). Beryllium is used in the manufacture of electrical components, in nuclear reactors, aerospace applications, ceramics and X-ray tubes. However, the majority of anthropomorphically produced beryllium in the environment is the result of coal and oil combustion.

If released to soil, beryllium is expected to be essentially immobile. Based on its geochemical similarity to aluminum, beryllium may be expected to adsorb onto clay surfaces at low pH, and it may remain precipitated as insoluble complexes at higher pH (ATSDR 2002). Beryllium enters aquatic systems through the weathering of rock and soil, deposition of atmospheric beryllium, and discharge from anthropogenic sources. Under typical environmental conditions, the hydroxo-complex $BeOH^+$ and Be (+2) are expected to be the dominant dissolved forms present in aquatic systems. $Be(OH)_2$ is expected to precipitate from water based on its low solubility at the pH range of most natural systems. Beryllium may adsorb to suspended mineral solids and to sediment. Beryllium is not expected to bioconcentrate in aquatic animals and no evidence for significant biomagnification within food chains has been found (ATSDR 2002).

Toxicity: The respiratory tract in humans and animals is the primary target of inhalation exposure to beryllium (Be) and its compounds. Inhalation exposure to beryllium has been associated with lung cancer in animals. Inhalation of some forms of beryllium can cause obstructive and restrictive diseases of the lung, known as

chronic beryllium disease (berylliosis), and inhalation of high concentrations can cause chemical pneumonitis. The development of chronic beryllium disease appears to involve cell-mediated immune responses that are genetically regulated (ATSDR 2002).

Oral exposure to beryllium compounds has been shown to result in hepatic necrosis. Ingested soluble beryllium compounds may interact with phosphate to form insoluble beryllium phosphate particles that are sequestered in Kupffer cells of the liver. Diffusion of beryllium from the deposited particulates may cause damage to these cells and necrosis of the liver. Beryllium may also be taken up by lysosomes and cause release of lysosomal enzymes, and it may interfere with DNA synthesis in the nucleus (ATSDR 2002).

The degree of beryllium toxicity to freshwater fishes is related to hardness, with toxicity decreasing with increasing hardness (EPA 1980). This is partially due to the increasing buffering capacity of hard water and the antagonism of calcium to beryllium. It is also possible that beryllium may penetrate to vital organs more readily in soft water than hard water. Beryllium toxicity to fish appears to be a function of the effects on vital organs, rather than a function of total beryllium uptake. In an uptake study in guppies, beryllium levels were shown to be highest in the gastrointestinal tract, followed by kidneys and ovaries. Pre-exposure to low levels of beryllium can increase the tolerance of fish to very high concentrations at a later time (Drury *et al.* 1978).

C.1.5 Cadmium

Fate and Transport: Cadmium is a naturally occurring, rare, but widely distributed element. It may enter the environment through mining, ore processing, and smelting of zinc and zinc-lead ores; the recovery of metal by processing scrap; the casting of alloys for coating products (telephone cables, electrodes, sprinkling systems, fire alarms, switches, relays, circuit breakers, solder, and jewelry); the production of sewage-sludges and phosphate fertilizers; the combustion of coal and fossil fuels, and the use of paint, pigment, and batteries, (Eisler 1985a).

In the environment, cadmium occurs primarily as a divalent metal that is insoluble in water, but its chloride and sulfate salts are freely soluble (Eisler 1985a). If released or deposited on soil, cadmium is largely retained in the surface layers; it is adsorbed to soil but to a much lesser extent than most other heavy metals. Because adsorption increases with pH and organic content, solublization and leaching is more apt to occur under acid conditions in sandy soil.

The bioavailability of cadmium is dependent on a number of factors including pH, Eh (redox potential), concentration, and chemical speciation (Eisler 1985a). Cadmium enters the food chain through uptake by plants from soils; only cadmium in soil solution is thought to be directly available for uptake (Shore and Douben 1994, as cited in EPA 2003b, 2005). The main routes of cadmium absorption for mammals are via respiration and ingestion, including dietary transfer. Factors that appear to affect dietary cadmium absorption from the gastrointestinal tract include age, sex, chemical form, and protein concentration of the diet, and is inversely proportional to dietary

intake of other metals, particularly iron and calcium (Friberg 1979).

Toxicity: Cadmium does not have any known essential or beneficial biological function (Eisler 1985a). It is classified as a B1, probable human carcinogen (IRIS 2007). Cadmium replaces essential metals (e.g., zinc) at critical sites on proteins and enzymes and may inhibit a variety of enzymatic reactions. Concentrations increase with the age of an organism and eventually act as a cumulative poison (Hammons *et al.* 1978).

Cadmium is readily taken up from soil through plant roots and interferes with root uptake of essential elements including iron, manganese, magnesium, nitrogen, and possibly calcium. Symptoms of cadmium toxicity in plants include poor root development, reduced conductivity of stems, tissue necrosis, reduced growth, and reduced photosynthetic activity due to impaired stomatal functioning (Bazzaz *et al.* 1974, as cited in EPA 2003b, 2005; Efroymson *et al.* 1997b). Mammals and birds are more resistant to effects of cadmium contamination than are aquatic organisms, but may show toxicological effects including growth retardation, anemia, impaired kidney function, poor reproductive capacity, and birth defects (Eisler 1985a).

C.1.6 Chromium

Fate and Transport: Chromium is widely distributed in the earth's crust. Major atmospheric emissions of chromium are from the chromium alloy and metal producing industries; lesser amounts come from coal combustion, municipal incinerators, cement production, and cooling towers (Towill *et al.* 1978, as cited in Eisler 1986a). Chromium in phosphates used as fertilizers may be an important source of chromium in soil, water, and some foods (Langard and Norseth 1979, as cited in Eisler 1986a).

Chromium can exist in oxidation states ranging from Cr (+2) to Cr (+6), but it is most frequently converted to the relatively stable chromium (+3) and chromium (+6) oxidation states (Eisler 1986a). The solubility and bioavailability of chromium are governed by soil pH and organic complexing substances, although organic complexes play a more significant role (James and Bartlett 1983a,b, as cited in Eisler 1986a). Hexavalent chromium is not strongly sorbed to soil components and may be mobile in groundwater; however, it is quickly reduced to chromium (+3) in poorly drained soils having a high organic content.

Chromium may biomagnify, although because of its relatively low membrane permeability, chromium (+3) generally does not have the biomagnification potential of chromium (+6). However, organo-trivalent chromium compounds may have very different bioaccumulation tendencies; some cases of large degrees of accumulation by aquatic and terrestrial plants and animals in lower trophic levels have been documented, though the mechanism of accumulation remains largely unknown (Eisler 1986a).

Toxicity: The biological effects of chromium depend upon the chemical form, solubility, and valence. Chromium (+3) is the form usually found in biological materials. Chromium is beneficial, but not essential, to higher plants (Eisler 1986a). It

functions as an essential element in mammals and birds by maintaining vascular integrity and efficient glucose, lipid, and protein metabolism (Steven *et al.* 1976, as cited in Eisler 1986a). However, chromium may also be mutagenic, carcinogenic, and teratogenic. While EPA regards all chromium compounds as toxic, the most toxic tend to be strongly oxidizing forms of chromium (+6). Toxic effects of chromium in plants include the disruption of carbon, nitrogen, phosphorus, and iron metabolism; inhibition of photosynthesis and reduced growth; poorly developed roots; and curled leaves. Chromium toxicity in birds and mammals is associated with abnormal histopathology, enzyme activity and blood chemistry; lowered resistance to pathogenic organisms; behavioral modifications; disrupted feeding; and alterations in population structure (Eisler 1986a). However, in mammalian species, chromium is considered one of the least toxic trace elements, because hexavalent chromium is converted to trivalent chromium under the normal stomach conditions of low pH (Irwin *et al.* 1997).

C.1.7 Copper

Fate and Transport: Copper is an essential element and widely distributed in nature (Amdur et al. 1993). Naturally occurring concentrations of copper have been calculated at 70 ppm in the earth's crust and 0.001 to 0.02 ppm in seawater (HSDB 2007). Artificial sources of copper include smelting processes and non-ferrous metal production. The terrestrial fate of copper is related to degree of weathering, the nature and intensity of soil formation, drainage, pH, re-dox potential and organic content (HSDB 2007). The relationship between pH and copper determines the fate of copper where alkaline conditions in soil and surface water promote precipitation while acidic conditions favor solubility of copper.

Toxicity: Copper does not appear to have mutagenic properties and is not classified as a human carcinogen (IRIS 2007). Copper is caustic, and acute toxicity is primarily related to this property (Hatch 1978). Copper is an essential element for animals and is a component of many metalloenzymes and respiratory pigments (Demayo *et al.* 1982). It is also essential for iron utilization and functions in enzymes for energy production, connective tissue formation, and pigmentation. Excess copper ingestion leads to accumulation in tissues, especially in the liver. High levels of copper modify hepatic metabolism (Brooks 1988), which may lead to inability of the liver to store and excrete additional copper. When the liver concentration exceeds a certain level, the metal is released into the blood, causing hemolysis and jaundice. High copper levels also inhibit essential metabolic enzymes (Demayo et al. 1982). Toxic symptoms appear when the liver accumulates 3 to 15 times the normal level of copper (Demayo et al. 1982).

C.1.8 Cyanide

Fate and Transport: Elevated cyanide levels are found in more than 1,000 species of food plants and forage crops, representing the greatest source of cyanide exposure and toxicosis. Cyanide is produced by species including fungi, bacteria, algae, higher plants, and arthropods in defense against herbivory and predation (Eisler 1991). Anthropogenic sources of cyanide in the environment include certain industrial processes such as the manufacture of synthetic fibers and plastics, electroplating baths

and metal mining operations, pesticide use, and the development of cyanogenic drugs and warfare agents.

Cyanide occurs in the environment in many forms, including free cyanide, metallocyanide complexes, and synthetic organocyanides (nitriles); however, free cyanide (i.e., the sum of molecular hydrogen cyanide, HCN, and the cyanide anion, CN^-) is the primary toxic agent. Transport and fate of cyanide in the environment is dependent upon its chemical form; while free cyanide is fairly mobile in soils due to a low soil sorption capability, cyanide is generally complexed by trace metals, metabolized by microorganisms, or lost through volatilization as HCN (EPA 1978a). Mobility is lowest in soils with low pH and high concentrations of free iron oxides and clays. Cyanide does not biomagnify, probably owing to the rapid detoxification of cyanide by living organisms.

Toxicity: Cyanide is not mutagenic, teratogenic, or carcinogenic. The major effect of cyanide on plants is a reduction of respiration via inhibition of the cytochrome oxidase enzyme and a decrease in ATP production and other related processes, such as ion uptake and phloem translocation. These physiological disturbancess may eventually lead to the death of affected plants (Towill *et al.* 1978, as cited by Eisler 1991). At lower concentrations, effects include inhibition of germination and growth, although cyanide sometimes enhances seed germination by stimulating the pentose phosphate pathway and inhibiting catalase (Towill *et al.* 1978; Solomonson 1981, as cited by Eisler 1991). Some plant species can accumulate high concentrations of cyanogenic glycosides, which can pose a risk to herbivores that ingest them.

In animals, cyanide is a respiratory poison; toxicity is mainly due to a decrease in the ability of tissues to utilize oxygen, resulting in a state of histotoxic anoxia. Target organs are primarily the central nervous system and heart, with depression of the central nervous system (the tissue most sensitive to anoxia) ultimately resulting in respiratory arrest and death (EPA 1978a).

Birds and mammals do not accumulate or store cyanide in tissue; sublethal doses of cyanide are rapidly detoxified and excreted as thiocyanate in urine (Eisler 1991). This allows animals to ingest sublethal doses over extended periods without harm. However, chronic symptoms of cyanide poisoning may develop with continuous intake. Organs affected by chronic exposure include the central nervous system, reproductive system, and thyroid gland (ATSDR 2006). The route of exposure is important in determining toxicity, since exposure via inhalation bypasses the major detoxification route in the liver (EPA 1990).

C.1.9 Iron

Fate and Transport: Iron is the fourth most common element in the earth's crust. Iron concentrations in soil can range from 0.2 to 55 percent and can vary significantly even within localized areas (Bodek *et al.* 1988). Iron is used primarily in the production of steel and other alloys. The iron ore formed is dependent upon the availability of other chemicals (e.g., sulfur is required to produce FeS_2, or pyrite). Important iron ores are hematite, magnetite, limonite and siderite.

Under typical environmental conditions, iron is found in either the more soluble and bioavailable divalent form (ferrous iron or Fe^{+2}) or the less soluble and less bioavailable trivalent form (ferric iron or Fe^{+3}) (EPA 2003b, 2005). Valence state is determined by the pH and Eh of the system. In general, oxidizing and alkaline conditions promote the precipitation of insoluble ferric oxide or hydroxic precipitates, while acidic and reducing conditions promote the solution of ferrous compounds. Iron does not bioaccumulate because it is regulated by the body and excess iron is eliminated.

Toxicity: Iron is an essential micro-nutrient to most forms of life, from plants to man, and is internally regulated by most organisms. In plants, iron is a critical component of energy transformations needed for syntheses and other life processes of the cells. In animals, iron is a component of various enzymes and proteins, including hemoglobin, which carries oxygen to the cells.

If excess ferrous iron is present, toxicity to plants may occur. However, sensitivity to iron is highly dependent upon plant species. In animals, adverse effects of iron toxicity may include renal failure and hepatic cirrhosis. The mechanism of toxicity begins with acute mucosal cell damage and absorption of ferrous ions directly into circulation, resulting in capillary endothelial cell damage to the liver (Shacklette and Boerngen 1984). However, the greatest environmental threat posed by high iron concentrations typically relates to the precipitation of iron oxides in aquatic systems, resulting in the smothering and embedding of the bottom substrate of the water body. Iron in soil generally does not impart significant ecological risk.

C.1.10 Lead

Fate and Transport: Lead is present in the earth's crust at a concentration of approximately 15 g/ton (HSDB 2007). Lead naturally enters the environment from lead bearing minerals and median lead concentrations in soil are 15 to16 µg Pb/soil (HSDB 2007). The processes of erosion and leaching may transfer lead from soil into surface waters and the atmosphere. Anthropogenic sources via smelting, mining, ore processing, refining use, recycling or disposal, are the most common release sources of lead into the environment (HSDB 2007). In soil, lead is typically in the upper 2 to 5 cm and leaching is not expected to be significant (HSDB 2007). In water, precipitation of lead is significant if the pH is relatively high where the amount of lead that can remain in water is related to pH and dissolved salt content. Metallic lead will simply sink into the sediment and will adsorb to organic matter and clay minerals or precipitate out as an insoluble salt (HSDB 2007). Bioconcentration does not appear to be high in fish although BCFs for various saltwater bivalves, molluscs, diatoms and phytoplankton have been found to range from 1.24 after 56 days in hard clams to 3.40 after 130 days in mussels (HSDB 2007).

Toxicity: Lead does not biomagnify to a great extent in food chains, although accumulation by plants and animals has been extensively documented (Wixson and Davis 1993; Eisler 1988a). Older organisms typically contain the highest tissue lead concentrations, with the majority of the accumulation occurring in the bony tissue of vertebrates (Eisler 1988a).

The toxic effects of lead on aquatic and terrestrial organisms are extremely varied and include mortality, reduced growth and reproductive output, blood chemistry alterations, lesions, and behavioral changes. However, many effects exhibit general trends in their toxic mechanism. Generally, lead inhibits the formation of heme, adversely affects blood chemistry, and accumulates at hematopoietic organs (Eisler 1988a). At high concentrations near levels causing mortality, marked changes to the central nervous system occur prior to death (Eisler 1988a).

C.1.11 Manganese

Fate and Transport: Manganese does not occur as a free metal in the environment but is a component of numerous minerals. Elemental manganese and inorganic manganese compounds have negligible vapor pressures, but may exist in air as suspended particulate matter derived from industrial emissions or the erosion of soil. Removal from the atmosphere is mostly through gravitational settling. The transport and partitioning of manganese in water are controlled by the solubility of the specific chemical form present. The metal may exist in water in any of four oxidation states (2+, 3+, 4+, or 7+). Divalent manganese (Mn^{+2}) predominates in most waters (pH 4 to 7), but may become oxidized at a pH greater than 8 or 9. Manganese is often transported in moving water as suspended sediments. The tendency of soluble manganese compounds to adsorb to soils and sediments depends mainly on the cation exchange capacity (CEC). Cation exchange capacity is related to soil's organic content and texture; where CEC increases with organic matter and in finer textured soils. Increasing pH also increases CEC. Adsorption of manganese and other metals to soil colloid particles increases with increasing CEC (Brady 1974). Manganese in water may be significantly bioconcentrated at lower trophic levels. However, biomagnification in the food chain may not be significant (ATSDR 2000).

Toxicity: Manganese is a common element that is essential for normal physiologic functioning in all animal species. In most animals, the amount of manganese absorbed across the gastrointestinal tract is variable and less than 5 percent. There does not appear to be a marked difference between manganese ingested in food or in water. One of the key determinants of absorption appears to be dietary iron intake, with low iron levels leading to increased manganese absorption. This is probably because both iron and manganese are absorbed by the same transport system in the gut in aquatic and terrestrial species (ATSDR 2000).

In studies where repeated oral doses were given to animals in an attempt to induce chronic manganese disease, moderate doses did not induce any injury (HSDB 2007). Female rats fed a concentration of 154 to 1004 mg/kg dry weight during pregnancy and weaning had fetuses with elevated concentrations of manganese in the liver although no gross malformations were observed (HSDB 2007). When manganese was administered orally to monkeys, degenerative, histological changes (demyelination of the posterior column) were observed in the chiasma and spinal cord (HSDB 2007).

C.1.12 Nickel

Fate and Transport: Pure nickel is a hard, white metal that is usually used in the formation of alloys (such as stainless steel), and nickel combined with other elements is found in all soils. Nickel is the twenty-fourth most abundant element and is found

in the environment as oxides or sulfides. It may be released into the environment through mining, oil-burning power plants, coal-burning power plants, and incinerators. Nickel will attach to soil or sediment particles, especially those containing iron or manganese. Under acidic conditions, nickel may become more mobile and seep into the groundwater. The typical nickel concentration reported in soils is from 4 to 80 mg/kg. The speciation and physicochemical state of nickel is important in considering its behavior in the environment and its availability to biota (ATSDR 2005).

Toxicity: The most probable exposure routes of nickel are through dermal contact, inhalation of dust, and ingestion of nickel-contaminated soil. The respiratory system is the primary target of nickel exposure following inhalation. Manifestations such as inflammation of the lungs, fibrosis, macrophage hyperplasia, and increased lung weight have been noted in animals exposed to nickel. Animals (species not given) exposed to nickel through oral exposure were noted to have lethargy, ataxia, irregular breathing, salivation, and squinting (ATSDR 2005).

In a 1.5 year study on the effects of nickel inhalation in guinea pigs, rats, mice and hamsters, 15 g/m^3 of metallic nickel powder caused lung irritation in rats and guinea pigs and nasal sinus inflammations and ulcers in rats (HSDB 2007). No adverse effects and no tissue accumulation were observed in 104 mice administered 5 ppm of Ni in drinking water for the duration of their life (HSDB 2007). The prenatal effects of nickel result from direct insults to the mammalian embryo and from indirect effects of maternal damage.

Maternally, nickel may upset the mother's hormonal balance thereby impairing the development of the preimplantation embryo. The fetus is affected as nickel can cross the feto-maternal barrier and directly enter the fetus. In addition to increases in prenatal and neonatal mortality, nickel can produce different types of malformations in the surviving embryos but its teratogenic action seems to be delayed, probably as a result of retarded transfer via the placenta. However, no definite conclusions can be reached as to whether the embryotoxicity and fetal toxicity of nickel are eventually related to its mutagenic properties. Nickel alters macromolecular synthesis but no convincing evidence has been provided of its ability to produce gene mutations or structural chromosome aberrations in mammalian cells (HSDB 2007).

C.1.13 Selenium

Fate and Transport: Selenium was used as a plant pesticide in the early 1900's and is still used sparingly to control pests of greenhouse chrysanthemums and carnations (Rosenfeld and Beath 1964, as cited by Eisler 1985b). The use of selenium pesticides has generally been discontinued, however, because of their high price, their stability in soils and resultant contamination of food crops, and their proven toxicity to mammals. Shampoos containing small amounts (about 1 percent) of selenium are still used to control dandruff, dermatitis, and mange (Eisler 1985b). Selenium is also extensively used in the manufacture and production of glass, pigments, rubber, metal alloys, textiles, petroleum, medical therapeutic agents, and photographic emulsions.

Selenium chemistry is complex; there are six stable isotopes of varying allopatric forms and valence states. Isotopes Se-80 and Se-78 are the most common. Soluble selenates (+6), which are readily taken up by plants, occur in alkaline soil and are slowly reduced to less soluble selenites (+4). In acid or neutral soils, the amount of biologically available selenium steadily declines; selenites are easily reduced to elemental selenium, which is insoluble and largely not bioavailable, although it is capable of satisfying nutritional requirements for selenium (Eisler 1985b). Selenium volatilizes from soils at rates that are modified by temperature, moisture, time, season, concentration of water-soluble selenium, and microbiological activity (Eisler 1985b). Selenium bioaccumulates, but does not appear to biomagnify.

Toxicity: Selenium is an essential nutrient for some plants and animals, constituting an integral part of proteins and enzymes including cytochrome C, hemoglobin, myoglobin, myosin, glutathione peroxidase, and various ribonucleoproteins (Eisler 1985b). It may also play a role in the formation of other compounds, such as vitamin E and the enzyme formic dehydrogenase. In many systems, selenium deficiency is a greater problem than selenium toxicity, though the dividing line between selenium acting as a micronutrient or as a toxin may be fine. Additionally, sensitivity to selenium varies widely, even among similar taxonomic groups (Eisler 1985b).

Selenium accumulation in certain species of plants may be extremely high. Plants that accumulate selenium tend to be more deep-rooted than grasses, thereby serving as principal forage for herbivorous animals during dry conditions and potentially leading to high rates of selenium intake. Toxic effects resulting from consumption of selenium accumulating plants include reproductive sterility, congenital malformations, growth retardation, anemia, respiratory failure, chromosomal aberrations, intestinal lesions, behavioral modifications, and death (Eisler 1985b). Selenium appears to bioaccumulate in animals as well as plants, since concentrations tend to be higher in older than in younger individuals. However, some organisms (e.g., rats) appear able to regulate selenium. Excretion occurs primarily through urine, with smaller amounts excreted in feces, breath, perspiration, and bile (Eisler 1985b).

C.1.14 Silver

Fate and Transport: Silver is a rare but naturally occurring metal, often found deposited as a mineral ore. The principal industrial use of silver is as silver halide in the manufacturing of photographic imaging materials; other uses include jewelry, coins, inks, and silverware. Silver is also used for medical purposes. In the United States, the photographic industry accounts for about 47 percent of all anthropogenically discharged silver (Eisler 1996). Other sources include mining and smelting operations, the disposal of electrical supplies, coal combustion, and cloud seeding.

Silver occurs naturally in several oxidation states, the most common being elemental silver (Ag^0) and the monovalent ion (Ag^+). The primary silver compounds formed under oxidizing conditions are bromides, chlorides, and iodides; under reducing conditions, the free metal and silver sulfide predominate (ATSDR 1990, as cited by Eisler 1996). Silver is leached from soils by an acidic environment and good drainage;

soil organisms that render nitrogen compounds soluble as nitrates also increase mobility of silver (Smith and Carson 1977).

An alkaline environment, potassium clay minerals, negatively charged hydrated iron and manganese oxides, organic matter, and precipitating anions tend to fix silver in the soil. Thus, while the redox potential of soils has little direct effect on silver bioavailability, soil Eh indirectly plays a major role in determining the mobility and bioavailability of silver because of its impact on soil processes including the hydrolysis of iron and manganese and precipitation of their oxide hydrates, the production of sulfide ions, and the oxidation of organic material. Silver is considered bioaccumulative; however, considerable differences exist in the ability of animals to accumulate, retain, and eliminate silver (Baudin *et al.* 1994, as cited in Eisler 1996).

Toxicity: Silver is a normal trace constituent of many organisms (Smith and Carson 1977). It is not known to be mutagenic, teratogenic, or carcinogenic. However, effects of silver toxicity have been documented in a wide variety of organisms including crop plants, numerous aquatic species, avian and mammalian livestock, and laboratory animals, although little research has been done on terrestrial wildlife species. Observed effects include reduced growth and death in plants and weight loss, cardiac enlargement, vascular hypertension, hepatic necrosis, anemia, enzyme inhibition, lowered immunological activity, ocular and neurological impairment, kidney damage, and mortality in animals (Smith and Carson 1977, Eisler 1996).

C.1.15 Thallium

Fata and Transport: Thallium is a common element with a concentration of about 0.3 to 0.6 ppm in the earth crust (HSDB 2007). The metal cation commonly occurs in potash minerals, pyrites, and is a minor constituent of many iron, copper sulfide and selenite ore; in nature it does not occur in the elemental state. It is one of the most toxic of the heavy metals. Metallic thallium is soft and malleable, similar to lead in both appearance and physical properties. Freshly-prepared thallium oxidizes rapidly. Thallium is mainly used in the electrical and electronic industries, and in the production of special glasses. Thallium is also found in pyrites used to make sulfuric acid. Mining and smelting, sulfuric acid production, cement factories, and coal burning power plants are the major anthropogenic sources of thallium to the environment (Mulkey and Oehme 1993).

Toxicity: Thallium has been shown to adversely affect protein synthesis. Mammalian ribosomes are strictly dependent on K^{+} and Mg^{+2} for normal interactions between ribosomal subunits. Thallium (+) can replace K+ causing progressive destabilization and irreversible damage to ribosomes. Interactions between thallium and riboflavin may play a role in toxicity. Thallium may impair cell energy metabolism by causing a deficiency of riboflavin and riboflavin-derived cofactors (Mulkey and Oehme 1993).

Thallium is teratogenic in chick embryos, causing achondoplasia, leg bone curvature, parrot-beak deformity, microcephaly, and decreased fetal size. Teratological investigations in mammals have produced conflicting results (Mulkey and Oehme 1993).

C.1.16 Vanadium

Fate and Transport: Elemental vanadium does not occur free in nature but is a component of dozens of different minerals and fossil fuels (EPA 2003b, 2005). Anthropogenic sources include acid-mine leachate, sewage sludge, and fertilizers. It is also a by-product of petroleum refining and the combustion of hydrocarbon fuels (EPA 2003b, 2005). Vanadium is principally used as an alloy constituent, especially in steel, as well as in pigment manufacturing, photography, and insecticides.

Vanadium can take various valence states, from +2 to +5. It is found in rocks and soil in the relatively insoluble trivalent form, and as vanadates of a variety of metals in the +5 oxidation state. (EPA 2003b, 2005). It can also form both cationic and anionic salts. The release of vanadium to soil occurs as a result of the weathering of rocks and from soil erosion, both of which generally convert the less-soluble trivalent form to the more-soluble pentavalent form. Mobility of vanadium in soils is determined by pH, Eh, and organic content. In contrast to most metals, vanadium is fairly mobile in neutral or alkaline soils and less mobile in acidic soils. Soluble vanadium in soils appears to be easily taken up by plant roots (Hopkins *et al.* 1977, as cited by EPA 2003b, 2005). Vanadium is not considered bioaccumulative.

Toxicity: Toxicity of vanadium has not been demonstrated in plants. In animals, the toxic action is largely confined to the respiratory tract, because inhalation is the most common route of exposure; absorption of vanadium through the gastrointestinal tract of animals is low. Inhalation of vanadium damages the alveolar macrophages by decreasing the macrophage membrane integrity; damaged macrophages inhibit the ability of the respiratory system to clear itself of other particles. However, ingestion of high concentrations of vanadium compounds (V_2O_5) may lead to acute poisoning characterized by marked effects on the nervous system, hemorrhage, paralysis, convulsions, and respiratory depression. Subacute exposures at high concentrations may adversely affect the liver, adrenals, and bone marrow (Klassen *et al.* 1986). In vitro experiments in mice indicate that the mechanism of toxicity of vanadium is by inhibiting sodium-potassium ATPase activity, which inhibits the sodium-potassium pump. This pump is necessary for the transport of material across cell membranes (Nechay and Saunders 1978).

C.2 Volatile Organic Compounds

Fate and transport and toxicity of four VOCs retained as COPCs is discussed in the following subsections.

C.2.1 Acetone

Fate and Transport: Acetone is one of the least hazardous industrial solvents, but it is highly volatile. It is also released naturally from volcanoes and forest fires, and it is a natural product of plant and animal metabolism. Acetone in soil will volatilize and leach into the groundwater, whereupon it may biodegrade. Biodegradation and volatilization occur to acetone in water. Bioconcentration in aquatic organisms and adsorption to sediment are not considered to be significant. One experimental study reported a bioconcentration factor of 0.69 for adult haddock at 7 to 9°C in a static system (Howard 1990).

Toxicity: Most studies on the effects of acetone have focused on inhalation exposure where the primary result appears to be depression of the central nervous system (CNS). However, some single-dose oral lethality studies have reported the following results: 14-day oral LD_{50} of 10.7 mL/kg (8.5 grams per kilogram [g/kg]) for female rats; LD_{50} of 5.3 g/kg for an unstated sex and strain of rabbits; and LD_{50} between 4 and 8 g/kg for an unstated strain and sex of mouse (HSDB 2007).

C.2.2 Carbon Disulfide

Fate and Transport: Carbon disulfide is a natural product of anaerobic biodegradation and also arises from geothermal sources. It may be released as emissions and in wastewater during its production and use; as a result of the production of viscose rayon, cellophane, and carbon tetrachloride. It volatilizes readily from soil and may also readily leach into the groundwater, whereupon it may biodegrade. Volatilization is also the primary means of removal from water; bioconcentration by aquatic organisms and adsorption to sediment are not considered to be significant (Howard 1990).

Toxicity: In an organism, carbon disulfide reacts with a variety of nucleophilic functional groups to form dithiocarbamic acids, trithiocarbamic acids, xanthogenic acids, and heterocycles. A small amount of carbon disulfide is converted to hydrogen sulfide, which is rapidly oxidized to sulfate and excreted in the urine. Carbon disulfide is recognized as an inhibitor of brain monoamine oxidase. Monoamine oxidase also contains copper and utilizes pyrodoxylphosphate (a form of vitamin B6) as a coenzyme. Since carbon disulfide can react with pyridoxamine to form pyridoxamine dithiocarbamic acid (which in turn can be oxidized by iodine *in vitro* to an analogue of disulfiram). Two possible mechanisms exist for inhibition of monoamine oxidase (HSDB 2007). Carbon disulfide also causes vitamin B deficiency, which in turn upsets carbohydrate metabolism and more particularly metabolism of cerebral carbohydrates (HSBD 2007). Carbon disulfide exposure can also induce kynureninase and lead to disorders of tryptophan metabolism (HSDB 2007).

C.2.3 Chloromethane

Fate and Transport: Chloromethane, also commonly referred to as methyl chloride, occurs naturally in oceans, from forest and brush fires, and from volcanoes. Anthropogenic sources of this compound are significant, and arise from its production and use in the manufacture of silicones and other chemicals, and as a solvent and propellant. Chloromethane volatilizes rapidly from water and soil, although in soil there is the potential for leaching into ground water. Once in the ground water, this compound biodegrades and hydrolyzes very slowly. Chloromethane has a very low log octanol/water partition coefficient, suggesting that it does not bioconcentrate to any appreciable degree in aquatic organisms (Howard 1989). In the mammalian body, chloromethane is broken down into methanol and hydrochloric acid. The speed and extent of this breakdown is not known. The methanol resulting from this reaction is subsequently oxidized to formaldehyde (EPA 1978b).

Toxicity: The primary effect of chloromethane is cytotoxicity through disruption of cell metabolism and altered electron transport processes of the respiratory chain

(Mamedov and Aliev 1986). Chloromethane was tested for carcinogenicity in male and female Fischer 344 rats exposed via inhalation to several vapor concentrations. The treatment had no adverse effects with respect to mortality rates, ophthalmologic or neurofunctional (clutch response) examination, clinical signs, hematology, or urinalysis. High exposure level rats had decreased body, relative testes, and relative brain weights, and increased relative heart, kidney (males), and liver weights (females). High-exposure level males had bilateral, diffuse degeneration and atrophy of the seminiferous tubules. No treatment-related malignancies were observed in the rats (HSDB 2007).

Few studies on aquatic organisms could be located. The toxicity of chloromethane in two species of fish resulted in 96-hour LC50s of 270 ppm and 550 ppm for *Lepomis macrochirus* and *Menidia beryllina*, respectively (HSDB 2007).

C.2.4 Dichlorodifluoromethane

Fate and Transport: No longer produced in the United States, dichlorodifluoromethane was used as an aerosol propellent, foaming agent and refrigerant. Based on it's vapor pressure dichlorodifluoromethane is expected to exist solely in the gas-phase in the ambient atmosphere. Gas-phase dichlorodifluoromethane is extremely stable in the troposphere. This compound does not react with photochemically produced hydroxyl radicals, ozone molecules or nitrate radicals in the troposphere. This compound will gradually diffuse into the stratosphere above the ozone layer where it will slowly degrade (HSDB 2007).

Dichlorodifluoromethane is expected to have moderate mobility in soils. This compound is expected to volatilize rapidly from dry soil surfaces based on its measured vapor pressure. Volatilization from moist soil surfaces is expected. Dichlorodifluoromethane was degraded under anaerobic conditions in laboratory tests, but does not biodegrade under aerobic conditions. In water, dichlorodifluoromethane is not expected to adsorb to sediment or particulate matter given its estimated Koc value. This compound is expected to volatilize rapidly from water surfaces (HSDB 2007).

Toxicity: Groups of beagle dogs were orally administered CFC-12 (in frozen dog food) at measured doses of 0, 8, or 80 mg/kg per day for 2 years. None of the dogs died or showed signs of toxicity. No significant differences between treated and control groups were found in food consumption, body weight, periodic hematology, clinical chemistry and urine testing, organ weights, or histopathological findings. There was no evidence of carcinogenicity in dogs, monkeys, rats, rabbits & guinea pigs continuously exposed to 10 ppm of FC 12 daily for 90 days. No deaths were attributed to exposure and pathologic changes occurred only in guinea pigs, who showed microscopic liver injury (HSDB 2007).

Other effects of are mostly associated with ozone depletion /caused by the atmospheric chlorofluorocarbons/, would have deleterious effects on both terrestrial and aquatic biota. Despite uncertainties resulting from the complexities of field experiments, the data currently available suggest that crop yields and forest productivity are vulnerable to increased levels of solar UV-B radiation. Existing data

also suggest that increased UV-B radiation will notify the distribution and abundance of plants, and change ecosystem structure. Various studies of marine ecosystems have demonstrated that UV-B radiation causes damage to fish larvae and juveniles, shrimp larvae, crab larvae, copepods, and plants essential to the marine food web. These damaging effects include decreased fecundity, growth, and survival (HSDB 2007).

C.3 Semi-volatile Organic Compounds

Fate and transport and toxicity of SVOCs are discussed in the following subsections. With exception to acetophenone, all other SVOCs are discussed collectively as PAHs.

C.3.1 Acetophenone

Fate and Transport: Acetophenone is released to the environment from a variety of combustion processes and may be released during its manufacture and the manufacture of propylene oxide, kraft bleaching and from its use in certain perfumes. In soils, microbial degradation is likely to be the major degradation pathway. It is expected to be moderately to highly mobile in soil and it therefore has the potential to migrate into the groundwater. Evaporation from dry soil surfaces is another important terrestrial fate process. In aquatic systems biodegradation and volatilization are expected to be the major loss processes. Acetophenone is very soluble in water.

The estimated biodegradation half-lives in groundwater, river water and lake water samples were 32 days, 8 days and 4.5 days, respectively. Hydrolysis, oxidation, bioconcentration, and adsorption to sediments and suspended particles are not likely to be important fate processes. Oxidation by hydroxyl radicals in air has an estimated half-life of 2.2 days. Other oxidants (e.g., ozone) and photolysis do not appear to be important loss mechanism of this compound in air (HSDB 2007).

Toxicity: No compound-specific toxic mechanisms were available in the literature for this compound. Acetophenone is biodegraded into ethylphenylcarbinol and 1-phenylethanol in rabbits. In rats acetophenone appears to be precursor of mandelic acid, benzoylformic acid, and benzoic acid (HSDB 2007).

C.3.2 Poly Aromatic Hydrocarbons

Fate and Transport: Polycyclic aromatic hydrocarbons (PAHs) are organic substances made up of carbon and hydrogen atoms grouped into at least two condensed aromatic ring structures. These are divided into two categories: low molecular weight compounds composed of fewer than four rings and high molecular weight compounds of four or more rings.

PAHs can be introduced to the environment by residential wood burning, cooking foods, and combustion of fossil fuels, as well as discharges from industrial plants, waste water treatment plants, and escape from waste storage containers. Other industrial sources of PAHs are machine lubricating, cutting, and color printing oils. PAHs are found in creosote which is used as a wood preservative. PAHs are also found in coal tar which is used in roofing, surface coatings, and as a binder for aluminum smelting electrons in the aluminum reduction process. PAHs are released to the environment in nature by volcanic activity and forest fires. Only a few

PAHs are produced commercially. In general, PAHs are unintentionally generated during combustion or pyrolysis processes (HSDB 2007).

Toxicity: In general, it appears that toxicity associated with PAHs is due not to the initial compound, but rather to metabolized intermediates (Fourman 1989). The majority of the enzymatic activity associated with the metabolism of PAH compounds takes place in the liver (Fourman 1989). The first step in the metabolic process is the oxidation of PAHs by cytochrome P450 and P448 enzyme systems. The metabolic by-products go through a series of reactions, ultimately forming diol-epoxides and phenol-oxides, which are believed to be the carcinogenic intermediates of PAHs (Stein *et al.* 1990). These compounds have the ability to form DNA adducts by covalently bonding with genetic material (Varnasi *et al.* 1989). Metabolic activation of PAHs can also involve the formation of free radicals and carbonium ions as metabolized intermediates; these are potential carcinogens and will affect metabolic pathways (HSDB 2007).

PAHs are also potent immunotoxic compounds, suppressing humoral and cell-mediated immune response. Many PAHs have been shown to adversely affect host tumoricidal activities, resulting in tumor formation (Peakall 1993). For example, application of carcinogenic PAHs to skin leads to destruction of sebaceous glands, hyperplasia, hyperkeratosis, ulceration, and potential tumor induction (Eisler 1987b).

Target organs for PAH toxic effects are diverse because these compounds are extensively distributed in the body and they tend to selectively attack proliferating cells. Damage to the hematopoietic and lymphoid system in experimental animals is common. Target organs can also be species specific. In rats, the target organs for 7,12-dimethylbenz(a)anthracene are skin, small intestine, kidney and mammary gland, whereas in fish the primary target organ is the liver (Eisler 1987b).

C.4 Pesticides/PCBs

Fate and transport and toxicity of seven pesticides retained as COPCs are discussed in the following subsections.

C.4.1 alpha, and beta-BHC

Fate and Transport: The former production of BHC and its metabolites and use as an insecticide resulted in its direct release to the environment. Although technical-grade BHC and none of the isomers are manufactured in the US any longer, gamma-BHC (lindane) is still imported and formulated into various products. Most of these formulated products are pesticides that can still be used as a seed treatment for various grain crops. gamma-BHC is also used in very small quantities as a prescription medication for the treatment of scabies and head lice.

Once released into the environment, BHC can partition to all environmental media. If released to air, its atmospheric lifetime is long however BHC can be degraded by reacting with photochemically produced hydroxyl radicals or can be removed from air by wet and dry deposition. If released to soil or water, biodegradation is believed to be the dominant decomposition process for BHC, although hydrolysis and photolysis may also occur to a lesser extent. The rates of degradation depend on the

ambient environmental conditions. Although technical-grade BHC has essentially been banned in the United States for many years, alpha-, beta-, and delta-BHC continue to be detected in environmental media because of the long environmental persistence of these compounds. BHC has been detected in air, surface water, groundwater, sediment, soil, fish and other aquatic organisms, wildlife, food, and humans (HSDB 2007).

Toxicity: BHC was formerly used in the United States as an insecticide. Beta-benzene hexachloride (beta-BHC) is present in technical mixtures of BHC at approximately 6 to 8 percent. Unlike gamma-BHC (lindane), beta-BHC is a central nervous system depressant, and it causes lameness and a peculiar flaccidity of the entire musculature. beta-BHC is not as toxic as gamma-BHC, and in fact has been shown to partially ameliorate the toxic effects of gamma-BHC (HSDB 2007). The primary result of delta-BHC toxicity is CNS depression although the precise mechanism of toxicity is unknown (HSDB 2007). If death occurs in animals it is usually delayed compared to the effect of gamma-BHC (lindane). Although all the isomers are present in the environmental media, delta- and beta-BHC isomers are the most problematic and present a serious environmental problem.

C.4.2 gamma-Chlordane

Fate and Transport: Technical chlordane is an organochloride pesticide that was introduced in the United States of America in 1947 (Eisler 1990). After concerns of its potential carcinogenicity, the production of chlordane was reduced and it was banned from use in 1983, except when used for the control of underground termites. Technical chlordane consists of roughly 45 components, primarily cis-chlordane, trans-chlordane, heptachlor and various other chlordane isomers (Eisler 1990). Chlordane persists in soil because of its low solubility in water, relatively low vapor pressure and great tendency to adsorb to soil particles.

The major route of global dissemination for chlordane is generally considered to be atmospheric transport. Some chlordane isomers will persist in soil for 3 to 15 years but plants generally do not appear to accumulate it in their tissues. Chlordane concentrations in living organisms are typically greatest near areas where chlordane has been applied for termite and pest control, in predatory species and in tissues with high lipid content (Eisler 1990). Except in certain marine mammals, food chain biomagnification of chlordane is usually low (Eisler 1990).

Toxicity: Chlordane is a nerve stimulant causing lack of coordination and hyperexcitability in animals at low chronic doses, and tremors and convulsions at high acute doses (Ingle 1965; Klassen et al. 1986). Chlordane is readily absorbed by warm-blooded animals through skin, diet and inhalation (Eisler 1990). Quickly distributed through the body, it concentrates in the liver and fat (WHO 1984). Large amounts of chlordane (75 percent) were absorbed in the gut in oral dosing studies using rats and mice (Nomeir and Hajjar 1987), while rabbits absorbed 33 percent after an oral dose (EPA 1988a). Chlordane residues in mammals were not measurable 4 to 8 weeks after exposure (Ingle 1965).

C.4.3 4,4'-DDE, 4,4'-DDD and 4,4'DDT

Fate and Transport: Dichlorodiphenyltrichloroethane (DDT) and its metabolites (referred to collectively in this section as DDTr) are hydrophobic, and thus would not be expected to be present in surface waters at high concentrations. The majority of DDTr entering aquatic systems is expected to accumulate in sediments and biological tissues. DDTr is known to accumulate in biological tissues, particularly lipids, where they may be stored for extended periods of time and be passed on to higher trophic level organisms. Several studies have indicated that DDTr biomagnifies, or is found in biological tissues at increasing concentrations at higher trophic levels. Biologically accumulated DDT (or its metabolites) may be metabolized to another form (i.e., DDT may be transformed to DDE). When fat reserves are metabolized, the DDT or transformed metabolite is released into the system, where it may result in a toxic response. DDTr may act as a direct toxin to some receptors; however, because of its tendency to concentrate in biological tissues, higher trophic level receptors may be at increased risk through ingestion of contaminated food sources (HSDB 2007).

Toxicity: DDT and its metabolites appear to affect the reproductive success of many receptors. One well documented response is eggshell thinning in birds exposed to *p,p'*-DDE, which affects the activity of Ca^{2+} ATP-ase systems in the shell gland, thereby interfering with the deposition of calcium in the shell (Lundholm 1987; Lundholm 1988; Miller *et al.* 1976). Eggshell thinning of greater than 20 percent has been associated with decreased nesting success due to eggshell breakage (Anderson and Hickey 1972, Dilworth *et al.* 1972). Because of the tendency of DDT to magnify in food chains, higher trophic level birds (i.e., piscivorous raptors) appear to be at greater risk for egg loss due to shell thinning.

Another well-defined effect of DDT exposure is inhibition of acetylcholinesterase (AChE) activity. Inhibition of this enzyme results in the accumulation of acetylcholine in the nerve synapses, resulting in disrupted nerve function. Chronic inhibition of 50 percent of brain AChE has been associated with mortality in birds.

The effects of DDT on other receptor groups are not as clearly defined as in birds. Recent studies indicate that DDT (especially *o,p'* isomers) may mimic estrogen, resulting in adverse reproductive effects. Observed effects include feminization and increased female:male population ratios for some receptors. Other responses include histopathological changes, alterations in thyroid function, and changes in the activity of various enzyme groups (Peakall 1993).

C.4.4 Heptachlor

Fate and Transport: Heptachlor is used in the United States primarily for termite and other wood-destroying insect control (in 1983, the use of heptachlor as an insecticide was restricted to termite control). The application of this pesticide thus results in the contamination of soil surrounding wooden structures and buried cable closures (EPA 1988b). The release of heptachlor to soil surfaces results in the volatilization of this compound, usually occurring more rapidly in moist soil than in dry soil. Hydrolysis is expected to be a significant mechanism of heptachlor removal if the compound is incorporated into the soil. The half-life of heptachlor in soil was calculated to range from 0.4 to 0.8 years.

In soil, heptachlor will degrade to 1-hydroxychlordene, heptachlor epoxide, and an unidentified metabolite that is more hydrophilic than heptachlor epoxide. Biodegradation may be important, especially under anaerobic conditions. Heptachlor is expected to adsorb strongly to soils and, therefore, to resist leaching into groundwater. The release of heptachlor to water will result in hydrolysis to 1-hydroxychlordene (half-life of about one day) and volatilization. Bioconcentration by aquatic organisms may contribute to heptachlor removal from water. The adsorption to sediments is expected to be slow compared to hydrolysis (Howard 1991, EPA 1988b).

Toxicity: Heptachlor exhibits moderate acute toxicity to terrestrial organisms but is extremely toxic to aquatic organisms and birds. It is persistent in the environment, virtually insoluble in water, stable in daylight and air, and bioaccumulates. In biological systems, heptachlor is rapidly transformed to heptachlor epoxide. The precise mode of action in biological systems is not known (EPA 1988b). The toxic effects of heptachlor are not specific for any one organ system. The liver and central nervous system are most significantly affected by heptachlor. Effects have also been observed in the reproductive, hematopoietic, immune, and renal systems.

C.5 Literature Cited

Agency for Toxic Substances and Disease Registry (ATSDR). 2006. Toxicological Profile for Cyanide. U.S. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

ATSDR. 2006. Toxicological Profile for Aluminum. U.S. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

ATSDR. 2005a. Toxicological Profile for Barium and Compounds. U.S. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

ATSDR. 2005b. Toxicological Profile for Nickel. U.S. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

ATSDR. 2002. Toxicological Profile for Beryllium. U.S. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

ATSDR. 2000. Toxicological Profile for Manganese. U.S. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

ATSDR. 1992. Toxicological Profile for Antimony. U.S. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

ATSDR. 1990. Toxicological Profile for Silver. U.S. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry, Atlanta, GA.

Amdur, M.O., J. Doull and C.D. Klaassen (eds.). 1993. Casarett and Doull's

Toxicology: The Basic Science of Poisons. Fourth Edition. New York, New York: McGraw-Hill, Inc.

Anderson, D.W. and J.J. Hickey. 1972. Eggshell changes in certain north American birds. In: Proceedings: XV International Ornithological Congress. Ed. K.H. Voous. The Hague. Netherlands. p. 514-540.

Baudin, J. P., J. Garnier-Laplace, and A. Lambrechts. 1994. Uptake from water, depuration and tissue distribution of 110m Ag in a freshwater fish *Cyprinus carpio* L. Water, Air, and Soil Pollution 72:129-141.

Bazzaz, F. A., R.W. Carlson, and G.L. Rolfe. 1974. The effect of heavy metals on plants: Part 1. Inhibition of gas exchange in sunflower by Pb, Cd, Ni, and Ti. Environ Pollut. 7:241-246.

Bodek, I., W. J. Lyman, W. F. Reehl, and D. H. Rosenblatt. 1988. Environmental Inorganic Chemistry: Properties, Processes, and Estimation Methods. New York, NY: Pergamon Press.

Brady, N.C. 1974. The Nature and Property of Soils. 8th Edition. New York, NY: MacMillan Publishing Co. On. 639 p.

Brooks, L. 1988. Inhibition of NADPH-cytochrome c reductase and attenuation of acute diethylnitrosamine hepatotoxicity by copper. Ph.D. Dissertation, Rutgers University, New Brunswick, N.J.

Demayo, A., M.C. Taylor and K.W. Taylor. 1982. Effects of copper on humans, laboratory and farm animals, terrestrial plants and aquatic life. *CRC Critical Reviews in Environmental Control*, 12(3):183-255.

Dilworth, T.G., J.A. Keith, P.A. Pearce and L.M. Reynolds. 1972. DDE and eggshell thickness in New Brunswick woodcock. J. of Wild. Manage., 36(4):1186-1193.

Drury, J.S., C.R. Shriner, E.B. Lewis, L.E. Towill, and A.S. Hammons. 1978. Reviews of the environmental effects of pollutants: VI. Beryllium\rdblquote. Prepared for Office of Research and Development, U.S. Environmental Protection Agency. EPA-600/1-78-028.

Efroymson, R.A., M. E. Will, G.W. Suter, and A.C. Wooten. 1997b. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision. Oak Ridge National Laboratory, Oak Ridge, TN.

Eisler, R. 1996. Silver hazards to fish, wildlife, and invertebrates: A synoptic review. National Biological Service Biological Report 32. 44 pp.

Eisler, R. 1991. Cyanide Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish Wildl. Serv., Biol. Rep. 85(1.23).

Eisler, R. 1990. Chlordane Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish and Wildlife Service Biological Report, 85(1.21). 49 p.

Eisler, R. 1988a. Lead Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish and Wildlife Service Biological Report, 85(1.14). 134 p.

Eisler, R. 1988b. Arsenic Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish and Wildlife Service Biological Report, 85(1.12). 92 p.

Eisler, R. 1987b. Polycyclic Aromatic Hydrocarbon Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish and Wildlife Service Biological Report, 85(1.11). 81 p.

Eisler, R. 1986a. Chromium Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish and Wildlife Service Biological Report 85 (1.6).

Eisler, R. 1985a. Cadmium Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish and Wildlife Service Biological Report 85 (1.2).

Eisler R. 1985b. Selenium Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish and Wildlife Service Biological Report 85 (1.5).

EPA. 2005. Ecological Soil Screening Levels (Eco-SSLs). Washington, D.C.: U.S. Environmental Protection Agency.

EPA. 1993. Wildlife Exposure Factors Handbook, Volume I of II. Washington, DC, United States Environmental Protection Agency, Office of Research and Development.

EPA. 1990. Summary Review of Health Effects Associated with Hydrogen Cyanide. EPA/600/8-90/002F.

EPA. 1988a. United States Environmental Protection Agency Office of Drinking Water Health Advisories. Chlordane. Rev. Environ. Contam. Toxicol., 104:47-62.

EPA. 1988b. Pesticide Fact Handbook. Noyes Data Corporation, Mill Road, NJ.

EPA. 1986. Quality Criteria for Water. U.S. Environmental Protection. Agency Rep. 440-5-86-001

EPA. 1980. Ambient Water Quality Criteria for Beryllium. Office of Water Regulations and Standards. PB81-117350.

EPA. 1978a. Reviews of the Environmental Effects of Pollutants: V. Cyanide. EPA 600/1-78/027.

EPA. 1978b. "Chemical Hazard Information Profile: Chloromethane." EPA-560/10-78-001.

Fourman, G.L. 1989. Enzymes involved in the metabolism of PAHs by fish and other aquatic animals: Part II, conjugative enzymes (or Phase II enzymes). In: Metabolism of Polycyclic Aromatic Hydrocarbons in the Aquatic Environment. Ed. U. Varnasi. Boca Raton, FL: CRC Press. p. 185-202.

Friberg, L., G. F. Norberg, and V. B. Vouk (editors). 1979. Handbook of the Toxicity of Metals. Elsevier/North-Holland Biomedical Press, Amsterdam, NY. 748 pp.

Hammons, A.S., J.E. Huff, H.M. Braunstein, J.S. Drury, C.R. Shriner, E.B. Lewis, B.L. Whitfield, and L.E. Towill. 1978. Reviews of the Environmental Effects of Pollutants: IV Cadmium. EPA 600/1-78-026. 251pp.

Hatch, R.C. 1978. "Poisons Causing Respiratory Insufficiency. In: Veterinary Pharmacology and Therapeutics. L.M. Jones, N.H. Booth and L.E. McDonald (eds.). Ames Press, Iowa State University. Ames, Iowa.

Hazardous Substances Data Bank (HSDB). 2007. National Library of Medicine, Bethesda, Maryland.

Hopkins, L. L., H.L. Cannon, A.T. Musch, R.M. Welch, and F.H. Neilsen. 1977. Vanadium. Geochem. Environ. 2: 93-107.

Howard, P.H. 1989. "Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volume I, Large Production and Priority Pollutants." Lewis Publishers, Chelsea, MI.

Howard, P.H. 1990. Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volume II, Solvents. Lewis Publishers, Chelsea, MI.

Howard, P.H. 1991. Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volume III: Pesticides. Chelsea, MI: Lewis Publishers.

Ingle, L. 1965. A Monograph on Chlordane. Toxicological and Pharmacological Properties. Library of Congress Number 65-28686. 88 p.

Integrated Risk Information System (IRIS). 2007. U.S. Environmental Protection Agency, Office of Research and Development, Center for Environmental Risk Assessment.

Irwin, R.J., M. Van Mouwerik, L. Stevens, M.D. Seese, and W. Basham. 1997. Environmental Contaminants Encyclopedia. National Park Service, Water Resources Division, Fort Collins, Colorado.

James, B. R., and R. J. Bartlett. 1983a. Behavior of chromium in soils: V. Fate of organically complexed Cr (III) added to soil. J. Environ. Qual. 12:169-172.

James, B. R., and R. J. Bartlett. 1983b. Behavior of chromium in soils. VI. Interactions

between oxidation-reduction and organic complexation. J. Environ. Qual. 12:173-176.

Klassen, C.D., M.O. Amdur and J. Doull. 1986. Casarett and Doull's Toxicology. 3rd ed. New York: MacMillan Publishing Company. 974 p.

Langard, S. and T. Norseth. 1979. Chromium. Pages 383-397 in L. Friberg, G. F. Nordberg, and V. B. Vouk (eds.). Handbook on the toxicology of metals. Elsevier/North Holland Biomedical Press.

Lintschinget, J. B. Michalke, S. Schulte-Hostede and P. Schramel. 1998. Studies on speciation of antimony in soil contaminated by industrial activity. Intern. J. Environ. Anal. Chem. 72(1):11-25.

Lundholm, E. 1987. Thinning of eggshells of birds by DDE: mode of action on the eggshell gland. Comp. Biochem. Physiol., 88C:1-22.

Lundholm, E. 1988. The effects of DDE, PCB and chlordane on the binding of progesterone to its cytoplasmic receptor in the eggshell gland mucosa of birds and the endometrium of the mammalian uterus. Comp. Biochem. Physiol., 89:361-368.

Mamedov, A.M. and V.A. Aliev. 1986. *Gig Sanit* 4:84-85.

Miller, D.S., W.B. Kinter, and D.B. Peakall. 1976. Enzymatic basis for DDE-induced eggshell thinning in a sensitive bird. Nature, 259:122-124.

Mulkey , J.P. and F.W. Oehme. 1993. A review of thallium toxicity. Vet. Human Toxicol., 35(5):445-453.

National Academy of Sciences (NAS). 1980. Antimony. Pages 24- 39 in: Mineral Tolerance of Domestic Animals.

Nechay, B.R. and J.P. Saunders. 1978. Inhibition by vanadium of sodium and potassium dependent ATPase derived from animal and human tissues. J. Environ. Pathol. Toxicol. 2:247-262.

Nomeir, A.A. and N.P. Hajjar. 1987. Metabolism of chlordane in mammals. Rev. Environ. Contam. Toxicol., 100:1-22.

NRC. 1980. Drinking Water and Health, Volume 3. National Research Council. Washington, D.C.: National Academy Press.

Peakall, D. 1993. Animal Biomarkers as Pollution Indicators. Ecotoxicology Series 1. London, England: Chapman and Hall.

Shacklette, H.T. and J.G. Boerngen. 1984. Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States. Alexandria, VA: USGS. 105 p.

Shore, R. and P. Douben. 1994. The ecotoxicological significance of cadmium intake and residues in terrestrial small mammals. Ecotoxicol. Environ. Safe. 29: 101-112.

Smith, I.C. and B.L. Carson. 1977. Trace metals in the environment. Vol 2: Silver. Ann Arbor Science Publishers, Ann Arbor, MI. 469 pp.

Solomonson, L. P. 1981. Cyanide as a metabolic inhibitor. Pages 11-28 in B. Vennesland, E. E. Conn, C. J. Knowles, J. Westley, and F. Wissing (eds.). Cyanide in Biology. Academic Press, New York.

Stein, J.E., W.L. Reichert, M. Nishimoto and U. Varnasi. 1990. Overview of studies on liver carcinogenesis in English sole from Puget Sound: evidence for a xenobiotic chemical etiology. II: biochemical studies. Sci. Tot. Environment, 94:51-69.

Steven, J. D., L. J. Davies, E. K. Stanley, R. A. Abbott, M. Ihnat, L. Bidstrup, and J. F. Jaworski. 1976. Effects of Chromium in the Canadian Environment. Nat. Res. Coun. Canada, NRCC No. 15017. 168 pp. Avail. from Publications, NRCC/CNRC, Ottawa, Canada, K1A OR6.

Towill, L. E., C. R. Shriner, J. S. Drury, A. S. Hammons, and J. W. Holleman. 1978. Reviews of the Environmental Effects of Pollutants: III Chromium. EPA 600/1-78-023. 287 pp.

Wixson, B.G. and B.E. Davis. 1993. Lead in Soil. Lead in Soil Task Force, Science Reviews, Northwood.132 p.

Varnasi, U., W.L. Reichert and J.E. Stein. 1989. ^{32}P-Postlabeling Analysis of DNA adducts in liver of wild English sole (*Parophrys vetulus*) and winter flounder (*Pseudopleuronectes americanus*). Cancer Research, 49:1171-1177.

World Health Organization (WHO) 1984. Chlordane. Environmental Health Criteria 34. World Health Organization. Geneva, Switzerland. 82 p.