



ANNUAL STATUS UPDATE FOR: REDUCTION OF TOXICS LOADINGS TO THE NIAGARA RIVER FROM HAZARDOUS WASTE SITES IN THE UNITED STATES

Report for the Year Ending 2013

*Prepared by the United States Environmental Protection Agency-Region 2 in
conjunction with the New York State Department of Environmental
Conservation-Region 9*

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Executive Summary

For over two decades, the Niagara River has been the focus of attention between four environmental agencies in the United States and Canada (“the Four Parties”). On February 4, 1987, the Four Parties signed a Declaration of Intent (DOI) to achieve significant reductions of toxic chemical pollutants in the Niagara River. The DOI outlined the principles and activities to be followed and was combined with a detailed annual work plan which forms the Niagara River Toxics Management Plan (NRTMP). The Four Parties agreed upon a specific list of 18 ‘priority toxics’ targeted for reduction through the NRTMP. A key sub-objective and milestone of the NRTMP DOI was to achieve a 50% reduction of ten specific priority toxics believed to be from significant Niagara River sources by 1996. Overall, the NRTMP has met its 50% reduction goal for the ten targeted priority toxics, and some by more than 75% through actions addressing point and non-point sources of toxic contamination. In December 1996, the Four Parties formally re-affirmed, by Letter of Support, their commitment to continue reductions of priority toxic loadings to the Niagara River.

A 1988 study identified 33 hazardous waste site clusters identified as the principal sources of toxic pollutant loadings to the Niagara River. The sites were prioritized into three categories: Category I (sites with loadings greater than 50 lbs/day), Category II (sites with loadings between 1 and 50 lbs/day), and Category III (sites with loadings less than 1 lb/day). The United States Environmental Protection Agency (EPA) and New York State Department of Environmental Conservation (DEC) consolidated the 33 cluster sites into a priority list of 26 sites consisting mostly of Category I and II, which were determined to be responsible for ~700 lbs/day of the chemical loadings to the Niagara River, and represented the most significant input of non-point source loadings (99.9%) from the U.S. side. The complete remediation of these sites became the primary focus of the NRTMP to achieve the common goals of the Four Parties agreement.

To date, key actions addressing non-point sources include completing 23 of the total 26 priority hazardous waste sites. The remaining three sites (Mobil Oil, Vanadium Corporation Operable Unit (OU) #3, Bethlehem Steel Corporation (BSC) have remedial actions (RAs) pending or underway (detailed status discussed later in this report). Upstream/Downstream (U/D) water quality monitoring data for the period April 2004 through March 2005 shows annual average concentrations for 6 of the 18 priority toxics (mercury, arsenic, lead, total chlordane, octachlorostyrene (OCS), and benzo(a)anthracene (a polycyclic aromatic hydrocarbon [PAH]) are now below the most stringent agency water quality criteria at Fort Erie (FE) and Niagara-on-the-Lake (NOTL), the two primary sampling stations of Environment Canada's U/D Niagara River monitoring program. It is important to note that principal sources for 2 of the priority toxics (tetrachloroethylene and toxaphene), although not being measured as part of the U/D program, have been eliminated by actions taken in other programs. Specifically, tetrachloroethylene contaminated water previously discharged from the Falls Street Tunnel to the Niagara River has been redirected to the Niagara Falls Wastewater Treatment Plant (WWTP). Toxaphene use as a pesticide was discontinued in 1982 before EPA banned all general uses of the compound in the U.S. and its territories in 1990.

The commitment to reduce toxic loadings through the NRTMP continues. The Four Parties are in the process of evaluating past achievements and future opportunities that exist to coordinate with other related program initiatives occurring within the basin utilizing available expertise and resources. Further evaluation is needed on the opportunities that exist to continue to reduce toxic contaminant levels from U.S. sources within the Niagara River. To meet this challenge, the DEC is conducting a project titled “Reassessment of Niagara River

Area of Concern (AOC) Sources of Contamination” scheduled to be completed in 2014. Funded by the EPA Great Lakes Restoration Initiative, this project supports the NRTMP and the Great Lakes Water Quality Agreement, pursuant to Public Law 112-10, and builds upon previous studies and monitoring efforts (completed in the late 1980s to mid 1990s) conducted through the NRTMP. Sample collection and analysis focuses on hazardous waste sites, wastewater discharges and primary tributaries. The expected outcomes include further reduction of toxic substances entering the Niagara River and the eventual removal of five of the seven beneficial use impairments (BUIs) present at this AOC. Specifically, this action will help meet these goals by making progress towards delisting the following five BUIs: restrictions on fish and wildlife consumption; fish tumors or other deformities; restrictions on dredging activities; degradation of benthos; and bird or animal deformities or reproduction problems.

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Acronyms

AAR	Alternatives Analysis Report
AOC	Area of concern
BCP	Brownfield Cleanup Program
BNR	Buffalo Niagara Riverkeeper
BSC	Bethlehem Steel Corporation
BUI	Beneficial Use Impairment
CMS	Corrective Measure Study
COC	Chemical of concern
DDT	Primarily 1,1'-(2,2,2-trichloroethylidene)-bis/4 chlorobenzene
DEC	New York State Department of Environmental Conservation
DNAPL	Dense non-aqueous phase liquids
DOI	Declaration of Intent
EC	Environment Canada
EPA	U.S. Environmental Protection Agency
ERP	Environmental Remediation Project
FE	Fort Erie
HSWA	Hazardous and Solid Waste Amendments
IRM	Interim Remedial Measure
LNAPL	Light nonaqueous phase liquid
MGP	Manufactured gas plant
MOE	Ontario Ministry of the Environment
NAPL	Non-aqueous phase liquids
NOTL	Niagara-on-the-Lake
NPL	National Priorities List
NRTMP	Niagara River Toxics Management Plan
NYSDOH	New York State Department of Health
OCC	Occidental Chemical Corporation
OCS	Octachlorostyrene
OM&M	Operation, Maintenance & Monitoring
OU	Operable Unit
PAH	Polycyclic aromatic hydrocarbon
PCBs	Polychlorinated biphenyls
ppm	Parts per million
PRP	Potentially Responsible Party
RA	Remedial Action
RAC	Remedial Advisory Committee

RAP	Remedial Action Plan
RAS	Remedial Action Selection
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial Design/Remedial Action
RFI	RCRA Facility Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RRT	Requisite Remedial Technology
SSF	State Superfund
SPDES	New York State Pollutant Discharge Elimination System
SVOC	Semivolatile organic carbon
SWMU	Solid Waste Management Unit
TCDD	Tetrachlorodibenzo-p-dioxin
TCLP	Toxicity characteristic leaching procedure
TCP	Trichlorophenol
U/D	Upstream/downstream
USGS	U.S. Geological Survey
VHB	Vertical hydraulic barrier
VOC	Volatile organic compounds
WWTP	Wastewater treatment plant

Introduction

Since 1987, the Niagara River has been the focus of attention for four agencies in the U.S. and Canada, called “The Four Parties signed a Niagara River Intent (DOI), pledging cooperation to reductions of toxic chemical pollutants in the Niagara River (DOI 1987). The DOI and a work plan form the Niagara River Toxics Management Plan (NRTMP).

THE FOUR PARTIES
U.S. Environmental Protection Agency (EPA)

environmental Four Parties”. The Declaration of achieve significant

Table 1. 18 NRTMP Priority Toxic Chemicals

<i>Benz(a)anthracene*</i>	Mirex/PhotoMirex*
Benzo(a)pyrene*	<i>Octachlorostyrene</i>
Benzo(b)fluoranthene*	PCBs*
Benzo(k)fluoranthene*	DDTs
<i>Chlordane</i>	Dioxin*
Chrysene	Tetrachloroethylene*
Dieldrin	<i>Arsenic</i>
Hexachlorobenzene*	<i>Lead</i>
<i>Mercury*</i>	Toxaphene

* Targeted for 50% load reduction by 1996 from point & non-point Niagara River watershed sources using 1987 as a baseline.

Compounds in italics no longer exceed strictest agency criteria at Fort Erie (FE) and Niagara-on-the-Lake (NOTL).

- class compounds show upward trends most recently;
- most of the compounds that still exceed the strictest agency criteria show downward trends; and
- Niagara-on-the-Lake (NOTL) appears to have a greater number of compounds with a downward trend.

Under the NRTMP, the Four Parties identified 18 persistent toxic chemicals as ‘priority toxics’ (Table 1). Actions to reduce the inputs of these priority toxics to the Niagara River have been aimed at point sources and non-point sources. Significant point sources on both sides of the Niagara River have been identified and are being addressed in U.S. and Canadian point source plans. In November 2010, Environment Canada (EC) (R.B Hill and P. Klawunn) completed a concentrations, loads, and trends report of toxic contaminants covering a 20-year period (1986/87 – 2004/05) based on data generated on a total of 72 Niagara River analytes (including the 18 priority toxics) by the Upstream/Downstream (U/D) Monitoring Program.

The report observed the following long-term loading trends:

- most of the 72 analytes have a downward trend and are not exceeding the strictest agency criteria;
- certain polycyclic aromatic hydrocarbon (PAH)

Based on the most recent data available (U/D Program, 2004/05), 6 of the 18 priority toxics (mercury, arsenic, lead, chlordane, octachlorostyrene (OCS), and benzo(a)anthracene) are below the strictest criteria at both Fort Erie (FE) and NOTL, the two primary sampling stations of EC’s U/D Niagara River monitoring program. The downward trends of most compounds at NOTL suggest sources from the Niagara River watershed are being reduced or eliminated and existing management actions under the NRTMP are working. The data does show that further study and evaluation is needed to identify, characterize, and eliminate certain sources of PAH class compounds, specifically benzo(a)pyrene and benzo(b/k)fluoranthene. A targeted study and evaluation to determine the principal sources of these compounds may be warranted.

Non-point sources of toxic chemicals to the Niagara River (e.g., leachate from hazardous waste sites, storm

water runoff, and atmospheric deposition) are more difficult to quantify and control. Given the limited information available about non-point sources, the U.S. has proceeded with its actions based on the assumption that hazardous waste sites are the most significant non-point sources of toxic chemicals to the Niagara River.

In 1988, an EPA study estimated potential toxic pollutant loadings to the Niagara River from all known hazardous waste sites on the U.S. side of the Niagara River (Gradient Corp/Geotrans Inc 1988). The study compiled a list of 70 sites into 33 “cluster sites” largely based on the manner in which data has historically been collected. The study further placed them into three categories based on their potential loadings (in lbs/day) to the Niagara River. Figure 1 shows the locations of these 33 site clusters, as well as several other additional hazardous waste sites.

The study showed that a total estimated 694 lbs/day (315 kg/day) of chemical contaminants have the potential of migrating from these 33 cluster sites to the Niagara River. Because collection of site-specific transport data is ongoing, estimates were made based on certain assumptions (e.g. that groundwater flow is horizontal, and that pollutants behave in a conservative manner). These assumptions yielded conservative estimates (i.e., estimates of toxic loadings are expected to be higher than the actual loadings).

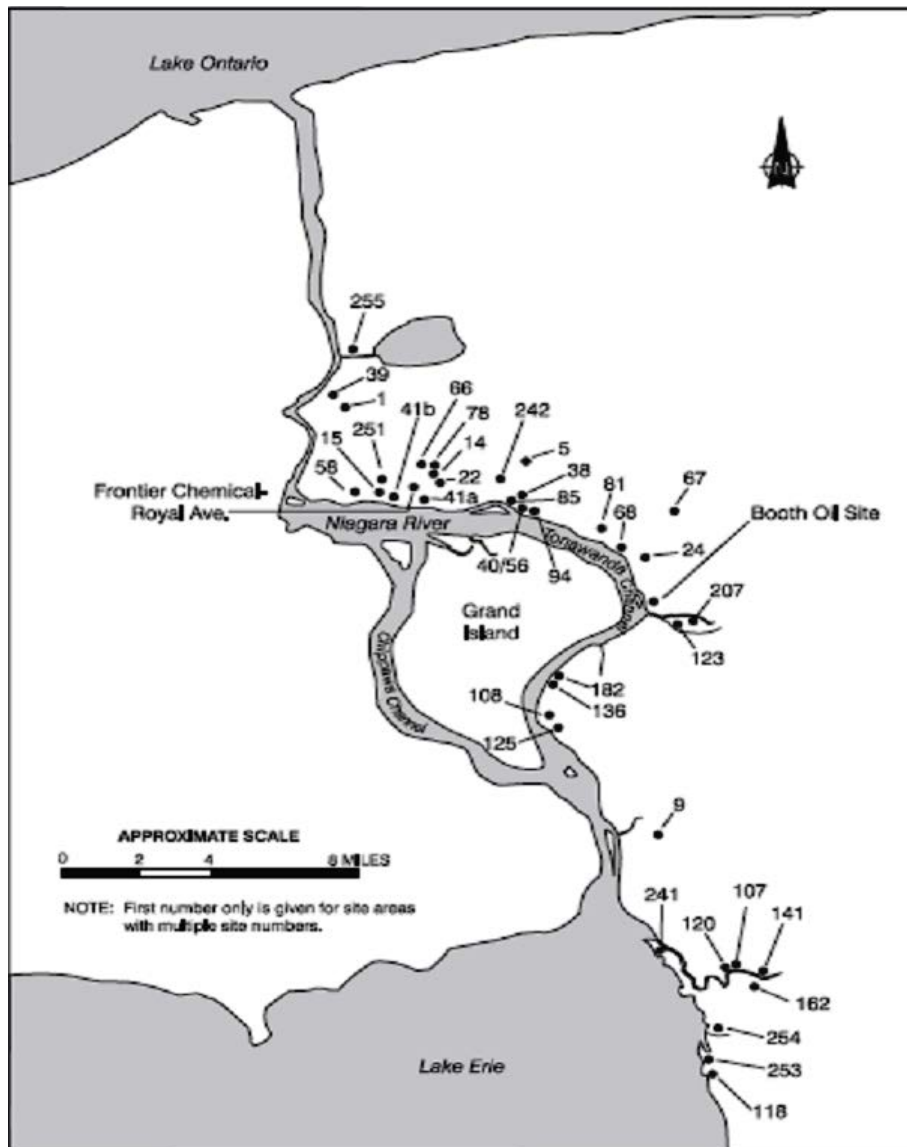


Figure 1. Location of significant Niagara River waste sites addressed in the NRTMP

USGS Site #s	Site Name
41b-49	Occidental Chemical Corp. (OCC), Buffalo Ave.
81	Niagara County Refuse Disposal
14	DuPont Necco Park
78a,b	CECOS International/Niagara Recycling
39	OCC, Hyde Park
40,56,85,94	102nd Street (Occidental 102nd Street site (#40), Olin 102nd Street site (#56), Griffon Park (#85), and Niagara River Belden site (#94))
5	Bell Aerospace Textron
66	Durez Corporation, Packard Road Facility (formally OCC, Durez Div.)
41a	OCC, S-Area
255	Stauffer Plant (PASNY)
251	Solvent Chemical
1	Vanadium Corp. (formerly SKW Alloys)
58,59,248	Olin, Buffalo Avenue
15-19,250	DuPont, Buffalo Avenue Plant
254	Buffalo Harbor Containment
120-122	Buffalo Color Corporation, including Area D
118	Bethlehem Steel Corporation
136	River Road (INS Equipment)
67	Frontier Chemical, Pendleton
24-37	OCC, Durez, North Tonawanda
253	Small Boat Harbor Containment
68	Gratwick Riverside Park
141	Mobil Oil
162	Alltift Realty
242	Charles Gibson
22	Great Lakes Carbon
182	Niagara Mohawk Cherry Farm
241	Times Beach Containment
108	Tonawanda Coke
107	Allied Chemical
207	Tonawanda Landfill
125-127	Dunlop Tire and Rubber
123	Columbus-McKinnon
38	Love Canal
9-15-141	Iroquois Gas/Westwood Pharmaceutical

Table 2 presents the 33 cluster sites divided into three categories, based on estimates of their potential contaminant loads to the Niagara River (Gradient Corp/Geotrans Inc 1988). The categories are as follows:

- Category I: Sites with loading greater than 50 lb/day
- Category II: Sites with loadings from 1 to 50 lb/day
- Category III: Sites with loadings less than 1 lb/day

Sites from Category I and II collectively represented 99.9% of the total estimated loadings.

In November 1989, EPA and the New York State Department of Environmental Conservation (DEC) issued a report which prioritized the 33 cluster sites into a list of 26 hazardous waste sites, consisting mostly of Category I and II, which are responsible for the ~700 lbs/day of the chemical loadings to the Niagara River (EPA/DEC 1989). Since 1989, EPA and DEC have reevaluated the universe of hazardous waste sites to identify those that new information shows are significant sources of toxic chemicals to the Niagara River. Seven additional sites have been added as potential significant sources. Updates on remediation progress at these seven sites are discussed later and summarized in Appendix B of this report.

Table 2. Gradient/Geotrans Prioritization of Waste Sites According to Potential Toxic Loadings to Niagara River in 1988.

Category I: > than 50 lbs/day	Category II: bt. 1 - 50 lbs/day	Category III: < than 1 lb/day
OCC, Buffalo Ave.	OCC, 102nd Street	Alltift Realty
Niagara County Refuse Disposal	Bell Aerospace Textron	Charles Gibson
DuPont Necco Park combined with CECOS International	Durez Corporation, Packard Road Facility (formerly OCC, Durez Division, Niagara Falls)	Great Lakes Carbon
OCC, Hyde Park	OCC, S-Area	Niagara Mohawk, Cherry Farm
	Stauffer Plant (PASNY)	Times Beach Containment
	Solvent Chemical	Tonawanda Coke
	Vanadium Corp. (formerly SKW Alloys)	Allied Chemical
	Olin, Buffalo Avenue Plant	Dunlop Tire and Rubber
	DuPont, Buffalo Avenue Plant	Columbus-McKinnon
	Buffalo Harbor Containment	Love Canal
	Buffalo Color Corporation, including Area D	Tonawanda Landfill
	Bethlehem Steel Corporation	
	River Road (INS Equipment)	
	Frontier Chemical, Pendleton	
	OCC, Durez, North Tonawanda	
	Small Boat Harbor Containment	
	Gratwick Riverside Park	
	Mobil Oil	

Subsequent to the 1988 loading estimate, and after completion of RAs at 21 of the 26 priority hazardous

waste sites, EPA had estimated that contaminant loadings from these sites had been from ~700 lbs/day to less than 50 lbs/day; this represents an approximate 94% reduction from the 1988 contaminant loading estimate. This EPA estimate was based primarily on assuming 100% reduction at sites where the final RA was completed. It did not include the load reductions at other sites where interim remedial measures (IRMs) had been in place and were expected to have already reduced off-site loadings. Within the past year, RAs have been completed at two additional sites. Although reductions in contaminant loadings for these two sites had not been estimated as of this report, it is possible that actual reductions to date from all 26 sites may be greater than the previous estimate of 94%. Table 3 identifies the sites where final RAs are complete and the sites where remediation is not yet completed, but which have interim operational remedial systems that are expected to have reduced contaminant loads to the Niagara River.

Other estimates have been made of the potential loadings of the NRTMP priority chemical concentrations in groundwater and groundwater flow to the Niagara River from priority waste sites. These estimates are based on information that was not available when the Gradient/ Geotrans estimates were developed. For example, a report by several site potentially responsible parties (PRPs) addressing groundwater loadings for ten of the NRTMP priority waste sites estimated priority chemical loadings from ten sites at 5.6 lbs/day (2.5 kg/day) prior to RA, and 0.0048 lbs/day (0.002 kg/day) after RA completion, a reduction of over 99% (CRA 1998). Since these estimates only consider the NRTMP priority chemicals, they are not comparable to the Gradient/Geotrans estimates of total toxic chemical loading. In addition, the report also used some non-conservative assumptions that would tend to reduce load estimates. Therefore, although actual loadings are likely greater than the estimates, the estimates do corroborate the reduction in toxic chemical loadings to the Niagara River achieved through remedial programs.

Table 3. Summary Status of the 26 Priority Waste Sites.

The sites in interim remediation are also under investigation or design, and therefore are listed twice.

Investigation and Design Status	Remedial Action Status
Potentially Responsible Party (PRP) Search	Interim Remedy in Place, Final Pending or Under Construction
No sites in this phase	VANADIUM CORPORATION: OU#3¹
Site Investigation Underway	
	BETHLEHEM STEEL²
Feasibility Study Underway	
MOBIL OIL: OU#2, #3, #5 Bethlehem Steel	MOBIL OIL: OU#4
Remedial Design Underway	Remediation Completed (Operation, Maintenance and Monitoring [OM&M] Ongoing)
No sites in this phase	Stauffer Chemical
	Frontier Chemical, Pendleton
	Frontier Chemical, Royal Avenue
	Bell Aerospace Textron
	CECOS International
	Dupont Necco Park
	Durez Corporation, Packard Road Facility
	OCC, Durez, North Tonawanda
	DuPont Plant Site Buffalo Avenue
	Olin Plant Site
	Buffalo Color, Area D
	OCC, Buffalo Avenue
	102nd Street (Olin /OCC)
	River Road
	Niagara Mohawk, Cherry Farm
	Niagara County Refuse Disposal
	Iroquois Gas-Westwood Pharmacy
	Gratwick Riverside Park
	OCC S-Area
	Solvent Chemical
	Booth Oil
	OCC (AKA Hooker)-Hyde Park

<bold> Bolded sites have updated project highlights reported below in more detail.

<CAPS> These sites, though not completed, have operational remedial systems that are expected to have reduced contaminant loadings to the Niagara River.

¹ Preliminary investigations were completed. Two IRMs have been completed by PRPs for OU#1 and OU#2. A “No Further Action” Record of Decision (ROD) was issued for OUs #1 and #2 in March 2006.

² In 2004 DEC approved an interim corrective measures plan for the remediation of the Benzol Plant Area (i.e., the Coke Oven Area). Recovery-well installation was completed in December 2004. The system includes light non-aqueous phase liquids (LNAPL) recovery and groundwater collection and treatment. The system began operating in April 2005.

In addition to remediation efforts at the waste sites themselves under the NRTMP, it is also important to recognize the role of the Niagara Falls Waste Water Treatment Plant (WWTP) in reducing toxic inputs from a number of waste sites to the Niagara River. Based on information available in 1987, the U.S. identified the Falls Street Tunnel, a major unlined industrial sewer cut into the bedrock under the City of Niagara Falls, as the largest source of toxic pollutants from any of its point sources. By the mid-1980s, the Tunnel was only receiving overflows of wastewater from the sewers of a Niagara Falls industrial area, in addition to contaminated groundwater infiltrating from major waste sites via cracks in the Tunnel's bedrock walls. In contrast to flows from other point sources, effluent from the Falls Street Tunnel entered the Niagara River untreated. In 1993, EPA and DEC required the City of Niagara Falls to treat the Falls Street Tunnel discharges during dry weather at the Niagara Falls WWTP. Subsequent data gathered by the U.S. indicated that WWTP treatment of the Tunnel's dry weather discharge had reduced mercury loadings by 70% relative to 1980 loads, tetrachloroethylene loadings by 85%, and the loadings of four other priority toxic chemicals by almost 100%.

A significant portion of wet weather flows within the Falls Street Tunnel are also effectively captured, stored, and then pumped to the WWTP for treatment. The storage capacity depends on wet weather flow intensity, and pumping capacity of the Gorge pumping station. In addition, there have been periodic improvements and/or modification to the tunnel to reduce the flow of bedrock groundwater infiltration. Most recently, a section of the tunnel was closed in 2012 by placing tunnel bulkheads at a location near Hyde Park Blvd, and at an upstream location near 47th street. This effectively eliminated direct infiltration and transmission of bedrock groundwater from this stretch of the tunnel.

Since the Falls Street Tunnel captures portions of the upper Lockport bedrock groundwater flow from seven hazardous waste sites, the actions taken to control discharge from the Tunnel reduce loadings from the following sites:

DuPont, Buffalo Avenue	Solvent Chemical
OCC, Buffalo Avenue	CECOS International
Frontier Chemical, Royal Avenue	DuPont Necco Park
Durez Division, Packard Road Facility (formally OCC)	

For this report, estimates of site loading reductions do not include those obtained through treatment of the Falls Street Tunnel dry weather flow.

Other program actions outside the NRTMP have eliminated principal sources of priority toxic compounds, such as toxaphene, primarily used in pesticides in the Great Lakes Region during the 1970s. Toxaphene, although not being measured as part of the U/D Program, was discontinued for use as a pesticide in 1982 before EPA banned all general uses of the compound in the United States and its territories in 1990. Although toxaphene is considered a very persistent chemical (lasting for up to 14 years in soil), it is reasonable to conclude that there are unlikely to be harmful releases from sources to the Niagara River due to detoxification by evaporation in the environment over time and its discontinued use for nearly 30 years.

Status of Remediation Progress

Overview

As of the release of this 2013 NRTMP report, final RAs have been completed at 23 of the 26 sites which includes all Category 1 sites (those with estimated contaminant loads of >50 lbs/day of priority toxic chemicals to the river). It is expected that the post-remedial Operation, Maintenance and Monitoring (OM&M) technology installed at certain sites could be effective for up to 30 years or longer at other sites.

RAs at Buffalo Color Corporation Areas A, B, C, and E were completed in 2013, including the installation of a Vertical Hydraulic Barrier (VHB) in Area A to complement the effectiveness of the groundwater control system. Remedial construction at the Frontier Chemical-Royal Ave site was also completed in 2013 with the excavation and thermal treatment of approximately 43,000 tons of contaminated soil from the site.

The remaining three sites (Mobil Oil, Vanadium Corporation Operable Unit (OU) #3, BSC) have RAs pending or underway. These three sites are operating IRMs while progressing with completion of their final RAs.

Construction of the final RA for Vanadium Corporation OU#3 began in August 2013 and is expected to be complete by the fall of 2014.

DEC is evaluating results of a Corrective Measures Study (CMS) required by a Consent Order with Tecumseh Redevelopment (current owner of the BSC site) to complete the remaining projects needed at the site with construction schedules.

Mobil Oil has completed RA at one OU with the remaining OUs in the Feasibility Study or Remedial Design stage. Construction of OU#4 is expected to be substantially complete by 2014.

Project Highlights

For each individual waste site, status summary tables are provided in Appendix A. Also, detailed site information for all 26 sites can be found in DEC's Environmental Site Remediation Database website¹. Updated highlights of completed hazardous waste sites with continuing work and progress made at the three remaining sites with RAs underway, as of this NRTMP progress report, are summarized below.

¹ <http://www.dec.ny.gov/cfm/xtapps/derexternal/index.cfm?pageid=3>

Occidental Chemical – Durez

- Initial remediation of the site was completed in 1995. Based on post remedial monitoring, additional contaminated sediment from the bottom of the Pettit Creek Cove area was removed in May 2000. The most recent data from caged mussel bio-monitoring (~2009) indicates elevated concentrations of dioxins and furans remain in sediment.
- In 2007, the DEC requested that Occidental undertake an investigation to identify the source(s) that is contributing to the contaminant loading in the Pettit Creek Cove and the Niagara River. In 2009 and 2010, reports were submitted detailing investigations of the Pettit Creek Flume and the Cove. In 2013, a drainage improvement and wildlife revitalization project was undertaken during which approximately 7,300 linear feet of the Pettit Creek Flume was inspected, sediment removed where present, and cleaning verified through video inspection. Additional work anticipated in 2014 includes lining approximately 448 feet of a portion of the flume to prevent water and sediment from infiltrating the sewer, and sampling, video inspection and cleaning of the Walck Road storm sewer. Site Management is ongoing at the Plant Site and Pettit Creek Cove. This consists of groundwater collection, treatment and groundwater quality monitoring at the plant site and groundwater quality monitoring and non-aqueous phase liquid (NAPL) removal at the inlet. Soil cover grasses have been allowed to grow at the plant site until after August 15 for habitat objectives. Mowed buffer strips are in place where necessary for security and residential considerations.

OCC (AKA Hooker) Hyde Park Superfund Site

- RAs were completed June 2003. On Monday, August 20, 2012, EPA Region 2 published a direct final Notice of Deletion of the Hooker (Hyde Park) Superfund Site (Site), located in Niagara Falls, New York, from the National Priorities List (NPL). This direct final deletion was published by the EPA with the concurrence of the State of New York, through the DEC, because the EPA determined that all appropriate response actions under CERCLA, other than operation, maintenance, and five-year reviews, had been completed. However, this deletion does not preclude future actions that may be determined to be necessary under Superfund.
- This direct final deletion would have been effective September 30, 2012, however, the EPA received adverse comments from various non-profit environmental advocacy groups and the Canadian Ontario Ministry of the Environment (MOE). Generally, the comments included concerns relating to the possibility of residual toxic contaminants continuing to be present in the groundwater flow from the site to the Niagara River in the vicinity of Bloody Run Creek.
- As a result of the comments received during the public comment period, the EPA suspended the effective date of the deletion from the NPL on September 27, 2012. On October 23, 2013, EPA finalized its decision to remove the Hyde Park Landfill site from the NPL. The site will continue to be monitored by EPA and DEC and remains eligible for cleanup work in the event that a change in site conditions should warrant such an action.

Vanadium Corporation

- An ROD compiling the results OU#1, OU#2, and OU#3 was issued in March 2006.
- RAs were completed at OU#1 and OU#2 in 2007.
- The Remedial Design for OU#3 addressed remaining surficial waste and slag: waste consolidation and capping, site management plan, environmental easement, and periodic

certification with long term monitoring was approved with comments in July 2010. Final RA design report was submitted November 2010. The RA Work Plan was approved in August 2012. The RA to implement the remedy for OU#3 began in August 2013 and is scheduled to be completed in 2014.

- It should be noted that DEC's database has been revised to provide for separate site numbers for each of these OUs. As such, OU#3 has been designated site number 932001 and OU#s 1 and 2 have been designated site numbers 932001B and 932001C, respectively. Remediation of Site 932001B is complete and reclassification to a Class 4 site is pending completion of the filing of an Environmental easement on the property. Site 932001C was reclassified to Class 4 in 2013.

Buffalo Color Corporation Areas A, B, C, and E

- In March 2005 Honeywell (a PRP) entered into an Order on Consent to address groundwater contamination at the site by designing and installing a groundwater collection system. Design was completed in 2005 and construction was completed in 2007.
- Honeywell performed a bulk chemical removal at the site starting in December 2005 and it is presently complete. However, the site is not considered Resource Conservation and Recovery Act (RCRA) clean. The site has been transferred from DEC's RCRA unit to the Division of Environmental Remediation.
- Honeywell has completed their remedial investigation/feasibility study (RI/FS) for Areas A, B, C, and E as part of the June 30, 2006 Consent Order. The fieldwork began in January 2007 with a draft report Remedial Investigation Report submitted in September 2007. The RI/FS was completed in 2008. As a result of the RI/FS, a Brownfield Cleanup Plan application was submitted and was approved by the DEC in April 2009. The Remedial Work Plan was approved in May 2009. In Areas A and B, site preparation and demolition/removal of decommissioned plant facilities and process equipment was completed in 2011. Building slabs and foundations from several demolished buildings were left in place for possible reuse and as interim cover over any residual impacted soils. The final remedial plan for the soil and groundwater in Area A involves the installation of a VHB to compliment the effectiveness of the groundwater control system. The VHB is approximately 1000 feet in length and was completed in 2013. Site preparation also included the abandonment and decommissioning of unused process and storm sewers, which discharge to the Buffalo River, and were replaced by a new water tight storm sewer system. Remedial objectives were achieved by restricting contact to surface soils, removing impacted soils, and installing a passive groundwater remediation system. The final remediation plan also included the placement of a site wide integrated cover system. The final remedial plan for soil and groundwater in Areas C and E involved the removal of source material impacting groundwater quality and placement of oxidizing materials to treat residual volatile organic carbon (VOC)/semivolatile organic carbon (SVOC) groundwater contamination. Future routine monitoring will be used to gauge the effectiveness of the remedy for VOCs/SVOCs and determine if additional in-situ VOC/SVOC remediation measures are required. Certificates of completion, indicating that cleanup and groundwater control objectives have been met, were issued in 2010 (Area C), 2011 (Area E) and 2013 (Area A).

Bethlehem Steel Corporation (BSC) Site

- RCRA Facility Investigation (RFI) and human health risk assessment reports have been completed. The final RFI report was submitted by Tecumseh Redevelopment, Inc. in 2005, and was conditionally approved by USEPA in 2006. The RFI report provides the basis for identifying Solid Waste Management Units, watercourses and resources (e.g. groundwater) that are being further investigated in an ongoing Corrective Measures Study (CMS), which was required as part of a 2009 consent order with DEC.
- More detailed status updates for the various ongoing programs at this site are provided in Appendix A.

Frontier Chemical - Royal Avenue

- In January 2001 the site was referred for RI/FS action under the NY State Superfund program. The RI/FS for the soils and upper bedrock (OU#1) was completed in early 2004. The ROD for OU#1 was signed in March 2006. The remedy calls for: removal of above grade structures and debris; excavation of soils containing VOCs >100 parts per million (ppm); soil or asphalt cover system; groundwater control/treatment; a site management plan; an environmental easement; long-term operation, monitoring, and maintenance; and periodic certification of the controls.
- In August 2008, an Order on Consent was executed with the PRP group to complete additional contaminated soils delineation for OU#1 and an RI/FS for OU#2. A work plan for those activities was approved by the DEC and attached to the Consent Order. The RI/FS began in September 2008 and was completed in the spring of 2009. The final report was submitted in October 2010. The terms of the initial Consent Order have been fulfilled and the Order has automatically terminated.
- DEC has completed negotiations for a remedial design/remedial action (RD/RA) order with the PRP group on the implementation of OU#1 and #2 remedies. A ROD amendment was issued and approved in March 2012 which revises the original remedy to allow for on-site thermal soil treatment instead of off-site disposal. Remedial activities commenced in March 2013.

Mobil Oil

- Several environmental investigations and IRMs have been completed at the site, and on April 3, 2006, the site was entered into the Brownfield Cleanup Program (BCP) to address the comprehensive remediation of the site. Discharges from the site are currently mitigated by the operation of a well pumping system that acts to impede groundwater discharge to the Buffalo River.
- The ExxonMobil site has been segregated into five OUs, based on historic use and nature of the identified contamination.
 - OU#1 encompasses several former residential parcels within the City of Buffalo. In 2007, OU#1 was remediated to commercial standards, which was accomplished through the removal and off-site disposal of 5,615 tons of soils contaminated with SVOCs.
 - OU#2 was formerly used for the storage of refining and petroleum materials. Remediation of OU#2 in 2007 has resulted in the removal of approximately 22 miles of subsurface process piping. Recent investigations have been conducted, within OU#2, to determine the nature and extent of contaminated soil/fill materials. Bench scale and field investigative studies have been completed to assess remedial options in order to address

any grossly contaminated soils. An Alternatives Analysis Report (AAR) is expected to be issued in 2014.

- OU#3 is located along the northern shore of the Buffalo River, and had formerly been used for the housing and storage of petroleum and refining materials. Currently, active petroleum storage occurs at OU#3. Remedial efforts include the use of groundwater and product pumping systems, designed to capture product and prevent the migration of materials from entering the Buffalo River. An AAR is expected to be issued in 2014.
- OU#4 is located along the north shore of the Buffalo River. In the early 1900s, this area was filled with municipal wastes in order to realign the Buffalo River. More recently, OU#4 was used for the disposal of tank bottom sludge and petroleum storage. Completed remedial efforts for OU#4 include the operation of a Chem-Ox system to oxidize and mobilize (for extraction) a plume of free product. Operation of the Chem-Ox system was terminated in 2009, while additional remediation for the area is still necessary. The Remedial Design was approved in 2012. Implementation began in the spring of 2013 and is expected to be completed in the fall of 2014.
- OU#5 includes the river sediments located along the north shore of the Buffalo River. No remedy has been developed yet.

Estimated Remediation Costs

Estimates of the cost of remediation are available for most of the 26 priority hazardous waste sites. Where available, individual project costs for each site are provided for quick reference in summary tables located in Appendix A of this report. As indicated below, the total costs incurred to date are estimated to be at least \$442,869,000. Total future additional remedial and O&M costs are estimated to reach at least \$262,150,000.

Based on available estimates for 21 sites, following is the total amount incurred to date (costs for the remaining 5 sites are unavailable):

Federal	\$ 39.832 million
State	\$ 7.425 million
<u>PRPs</u>	<u>\$ 395.772 million</u>
Total	\$ 443.029 million

Based on available estimates for 12 sites, the total additional remedial and operation and maintenance costs expected in the future are as follows (costs for the remaining 14 sites are unavailable):

Federal	\$ 1.875 million
State	\$ 0.710 million
<u>PRPs</u>	<u>\$ 259.564 million</u>
Total	\$ 262.149 million

The estimated costs to date cannot be compared to the estimated costs expected in the future, because different sites are included in the estimates. It is also difficult to compare the relative contributions of federal, state, and PRP expenditures, because cost information for some sites was incomplete (e.g., some sites may have been able to provide federal or state costs but not PRP costs). However, the cost

information does provide a sense of the magnitude of U.S. expenditures for hazardous waste site remediation in the Niagara River basin.

Future Challenges and Opportunities for the NRTMP

A number of related initiatives are underway that present opportunities for possible merging or coordination with other activities and resources. These current initiatives include coordination of the NRTMP with the Niagara and Buffalo River Area of Concern (AOC) Remedial Action Plan (RAP) process; future monitoring, data collection and analysis; and remediation of additional pollutant sources.

AOC RAP and Delistings – The AOC delisting initiative is a top priority for the Four Parties over the next several years. The beneficial use impairments (BUIs) listed by both the binational Niagara River AOC and Buffalo River AOC are believed to be based in large part on impacts of toxics chemicals which have been closely linked to the hazardous waste site inputs to the rivers.

Niagara River Area of Concern RAP: The U.S. portion of the Niagara River AOC is located in Erie and Niagara counties. It extends from Smokes Creek near the southern end of the Buffalo Harbor north to the mouth of the Niagara River at Lake Ontario. In 1994, the DEC, through an appointed Remedial Advisory Committee (RAC), completed and published an RAP. To date, the RAC has identified 7 BUIs to be addressed (Table 4). Past municipal and industrial discharges and hazardous waste disposal sites have been sources of contaminants to the Niagara River which have been linked to several BUIs in the AOC. Of the 26 priority waste sites discussed in this report, 21 sites are located directly in the Niagara River watershed basin. Of these 21 sites, 20 sites have completed remedial construction and one site (Vanadium Corporation) has a RA currently underway. It is understood by the Four Parties that the NRTMP initiative contributes greatly towards the restoration of wildlife and aquatic habitats, re-designation of beneficial uses from impaired to un-impaired, and the ultimate de-listing of the Niagara River AOC. Therefore, it is noted by the joint agencies as an example of bi-national cooperation on the Niagara River and as an important contribution to the RAP process in the AOC. It is expected that RAP implementation will progress at an aggressive pace over the next several years while the NRTMP works towards removing all remaining toxic pollutant inputs to the river.

Buffalo River Area of Concern RAP: The Buffalo River AOC is located in the City of Buffalo in Western New York State. The river flows from the east and discharges into Lake Erie near the head waters of the Niagara River. In 1989, an RAP was prepared by the DEC for the Buffalo River AOC. The DEC acted as RAP coordinator from 1989 – 2005 until the EPA Great Lakes National Program Office selected the Buffalo Niagara Riverkeeper (BNR) as RAP implementation lead coordinators. To date, the BNR has identified nine BUIs to be addressed (Table 4). Of the 26 priority waste sites discussed in this report, one site (BSC Site) has direct local impacts to Buffalo Harbor to the north and on the western boundary of Lake Erie and four sites (Buffalo Color Corporation Site – Area A and B, Buffalo Color – Area C, D, E, Mobil Oil, and Iroquois Gas-Westwood Pharmaceutical) have direct local impacts to the Buffalo River. These five sites are part of the NRTMP 26 priority sites since they in turn have impacts to the head waters of the Niagara River (Figure 1). Buffalo Color–Areas A, B, C, D, E have completed remedial construction and Mobil Oil, BSC have RAs currently underway BSC and Mobil Oil operate IRMs while final RAs are completed. While it had been previously reported that remedial construction at the Iroquois Gas-Westwood Pharmaceuticals site had been completed, DEC recently determined, through review of operating data, that the system is not operating as designed. The RP has submitted a Corrective Action work plan to address the system failure and DEC plans to issue an Explanation of Significant

Difference (ESD) for the change in the remedy in 2014. Remedial construction is expected in late 2014/early 2015. These NRTMP waste sites are listed as part of the Buffalo River RAP to be addressed towards restoring beneficial uses.

Restoration and re-designation of the BUIs in Buffalo and Niagara Rivers will ultimately result in delisting of the Buffalo River AOC as well as the Niagara River AOC.

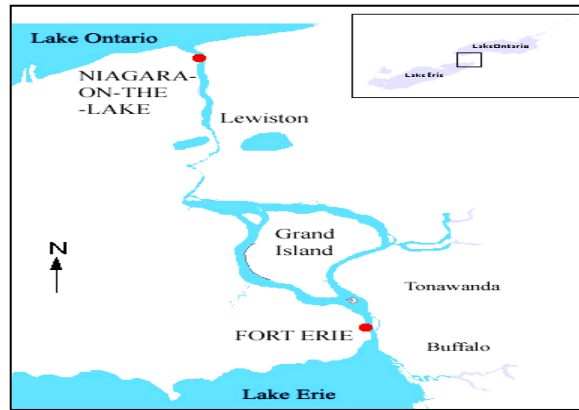
Table 4. Beneficial Use Impairments for Niagara River and Buffalo River AOCs.

Niagara River AOC BUIs	Buffalo River AOC BUIs
Restrictions on fish and wildlife consumption	Restrictions on fish and wildlife consumption
Fish tumors or other deformities	Fish tumors or other deformities
Degradation of benthos	Degradation of aesthetics
Restriction on dredging activities	Degradation of benthos
Loss of fish and wildlife habitat	Restriction on dredging activities
Degradation of fish and wildlife populations	Loss of fish and wildlife habitat
Bird or animal deformities or reproductive problems	Tainting of fish and wildlife flavor
	Degradation of fish and wildlife populations
	Bird or animal deformities or reproductive problems

Future Monitoring, Data Collection and Analysis – In addition to the effectiveness of pollutant removal at the waste sites themselves, it is important to note that there are three components to the NRTMP monitoring plan: EC U/D Program; bio-monitoring (mussels, young-of-year fish, wildlife); and source track down & analysis screening. In 2010, the Niagara River Secretariat prepared a trend analysis report covering the past 20 years of data collected in-water and compare concentration inputs at FE and NOTL. The EC U/D Program is expected to continue to be a valuable tool for assessing overall progress and future priorities as explained below in more detail.

In addition, DEC is conducting a project titled “Reassessment of Niagara River AOC Sources of Contamination” scheduled to be completed in 2014. This project, funded by the EPA Great Lakes Restoration Initiative, supports the NRTMP and the Great Lakes Water Quality Agreement, pursuant to Public Law 112-10, and builds upon previous studies and monitoring efforts (completed in the late 1980s to mid 1990s) conducted through the NRTMP. Sample collection and analysis will focus on hazardous waste sites, wastewater discharges and primary tributaries.

NRTMP Monitoring Program Plan: The NRTMP’s primary mechanism for measuring improvements in water quality is the EC U/D Program. The U/D Program measures approximately 50 organic chemicals and includes the 18 NRTMP Priority Toxics in the dissolved and particulate phases at the head (FE) and the mouth (MOTL) of the Niagara River where it enters Lake Ontario (Figure 2). Three of the 18 priority toxics (toxaphene, tetrachloroethylene and dioxin) are no longer monitored on a regular basis



**Figure 2. Environment Canada's
Niagara River Upstream/Downstream
Surface Water Sampling Locations**

due to being either a banned substance for over 20 years, high volatilization, or is being measured in the EC bio-monitoring program. The most recent U/D Program report was published in 2007 and includes data from 2004/2005. Since 1987, high quality U.S. and Canadian government monitoring program information provide clear evidence of reductions for most of the 18 Niagara River Priority Toxics in water, sediment and biological indicators in the range of 50% or greater by the 1996 target year. The EC U/D 20-year data trend report covering the period 1986/87 – 2004/05 was completed in 2010 and is currently being evaluated for setting priorities such as future track down and analysis studies to identify potential new sources of contaminants, new emerging chemicals, and NRTMP management strategies for reducing these chemicals.

Remediation of Additional Pollutant Sources – The 1989 EPA/DEC Hazardous Waste Site Report identified the NRTMP's original 26 waste sites as highest priorities due to their potential to contribute over 90% of the total toxic chemical loadings to the Niagara River. These 26 sites and the estimated loadings were based on earlier studies and often on preliminary data. Although these 26 sites were of top priority for the NRTMP, numerous investigations and RAs at other site areas, some consisting of multiple individual sites, were being addressed under New York State's remedial programs. The additional efforts by DEC and EPA have included seven additional sites described below now known to be significant contributors of toxic contamination to the river but for which insufficient data existed in 1989 to include them in the NRTMP. For quick reference, see the summary tables for these projects located in Appendix B of this report. Also, detailed site information for all sites can be found on DEC's Environmental Site Remediation Database website².

Citizens Gas Works/ Fourth Street Manufactured Gas Plant (MGP) – DEC Site #915167

The site is located on Fourth and Village Court streets in the City of Buffalo and is located in a mixed residential, commercial, and recreational setting approximately 1500 feet from the Lake Erie shoreline. The Citizens Gas Works operated on this property starting from the early 1900's. From 1934 to 1958, a portion of the property was also used by Greyhound Bus Company to service its vehicles. During a site evaluation in 1992, black tar material was found in one area of the property.

Soil/tar and groundwater were tested during the investigation and results showed some samples contained up to 3,300 ppm of benzene, 3,000 ppm of toluene, 2,700 ppm of xylenes, 3,000 ppm of phenolic

² <http://www.dec.ny.gov/cfm/external/derexternal/index.cfm?pageid=3>

compounds, and 53,000 ppm of PAHs. Site groundwater also exceeded groundwater standards for benzene, toluene, xylenes, PAHs, and phenolic compounds. In August 1996, DEC and the New York State Department of Health (NYSDOH) did additional testing which detected surface soil samples containing up to 420 ppm of PAHs. The tar material was found to be a hazardous waste as it failed toxicity characteristic leaching procedure (TCLP) for benzene. The City of Buffalo conducted an investigation and submitted the RI/FS report in January 2001. An ROD was issued in 2001 requiring the removal of all contaminated tar materials from the site. The RA consisted of source removal by excavation; off-site disposal and /or treatment began in 2005 and was completed in early 2006. The excavated areas were backfilled with clean fill and restored as a surface parking lot and driveways for the Waterfront School. Contaminated soils along the main sewer were left behind and will be subject to an environmental easement. The site is being maintained and monitored according to the Site Management Plan, dated September 2006. DEC completed groundwater monitoring events in 2007, 2008, 2010, and 2012. The results do not show significant groundwater contamination in the overburden strata. In 2013, the site was removed from the Registry of Inactive Hazardous Waste Disposal Sites and redesignated a Class C non-Registry site.

Former Buffalo Service Center – DEC Site #C915194

This site is the location of a former Manufactured Gas Plant (MGP) which was operated by various companies from 1848 to 1948. The site was initially investigated by the owner (National Fuel Gas) during the period 1989 to 2004. The investigation confirmed the presence of MGP wastes (containing benzene, toluene, ethylbenzene, xylenes, PAHs, total cyanides) in soil and groundwater at the site. In June 2005, a volunteer applied to the Brownfield Cleanup Program to remediate the site in preparation for building an office building. The site remediation consisted of excavation and off-site disposal of contaminated soils above the predetermined cleanup levels and backfilling with clean soil/material. Work began in summer 2005 and was completed in early 2006. An environmental easement requiring a Site Management Plan was filed on September 7, 2006 in the Erie County Clerk's office. Remaining groundwater contamination will be monitored by an operation and monitoring plan. A Certificate of Completion was issued on November 30, 2006. The cleanup has resulted in the construction of an approximately 350,000 square foot Health Now building by Duke Realty at the remediated site. Groundwater at the site is being monitored in accordance with the Site Management Plan, dated October 2, 2006.

Alltft Landfill – DEC Site #915054

This site is a former landfill that was previously used for the disposal of domestic and industrial wastes. Environmental studies documented surface and groundwater contamination. According to Phase II Investigation documentation, Allied Corp. (National Aniline Division) disposed miscellaneous organic chemicals, chrome sludge, copper sulfate, nitrobenzene, monochlorobenzene, and naphthalene on a monthly basis in the landfill. A smaller landfill containing automobile shredder wastes, demolition debris, fly-ash and sand wastes was situated on top of the older chemical waste landfill. This smaller landfill was operated between 1975 and 1984. A Consent Order for the completion of a RI/FS of the site was signed by Allied Signal in 1991.

A RI/FS report was submitted in 1992 and indicated that groundwater and the ponds adjacent to the site were impacted by the landfill. Contaminants of concern included metals, pesticides, PCBs, chlorinated solvents, and PAHs and would be tributary to the Buffalo River drainage basin.

An ROD was signed on March 27, 1995 requiring capping, waste consolidation, wetlands restoration, and groundwater collection. RA began in 2004 and was completed in 2005. An OM&M plan was put in place

in 2006 and implementation is ongoing. RA included consolidation and capping of contaminated soils and sediments. Wetlands were restored and a groundwater collection trench has been installed that captures upgradient groundwater and groundwater beneath the landfill. Restrictions in the forms of environmental notices and deed restrictions are in place on the impacted properties. This site was reclassified to Class 4 to reflect the on-going operation, maintenance and monitoring.

Steelfields – DEC Site #V00619

The Steelfields Site is located in the City of Buffalo adjacent to the Buffalo River. The site is comprised of four distinct areas based on their historical uses: Area I-Republic Steel Area, Area II-Donner-Hanna Coke Plant, Area III- Republic Steel Warehouse, and the Area IV-Coke Storage Yard. The former above-ground facilities were demolished previously by the LTV Steel Company. Today the site is largely vacant except for the former August Feine building located just north of Area II where a newly constructed containment cell exists. In 2006, Area IV was separated from the site and entered into the Brownfield Cleanup Program as Steelfields Area IV Site#C915204. Area IV is also listed on the NYS Registry as a Class 3 hazardous waste site under Site #915017. The Steelfields site was the location of a former steel and coke-making facility. The site had significant amount of fill material (2 to 20 feet in depth) from past activities. The fill consisted of waste slag and coke, in addition to significant quantities of chemically contaminated soils from past disposal practices on the site. LTV Steel, the previous Volunteer for this site (V00133) went bankrupt in 2000. In October 2002 Steelfields Ltd. purchased the site out of bankruptcy. Steelfields Ltd. entered into the Voluntary Cleanup Program and agreed to undertake the necessary investigation and cleanup of the 218 acres. A work plan outlining the work to be performed was approved in 2002. Remedial work was completed on the 90-acre Area I in 2004. Remedial work was completed in all areas of the site by October 2007. Declaration of Covenants and Restrictions were filed for Area I in 2007 and for Areas II and III in 2008. A Release of Liability and Covenant Not-To-Sue was issued on September 3, 2008 by the Office of General Counsel. Long term site management is ongoing.

Niacet Corporation – DEC Site #V00373

The Niacet facility, formally a Union Carbide Corporation facility, is located on 19.42 acres at the intersection of 47th St and Pine Ave in the City of Niagara Falls. The facility is an active manufacturing facility first constructed in 1925 and operated as the Niacet Chemical Company. The plant originally produced acetaldehyde, paraldehyde, aldol and crotonaldehyde. The production of acetic acid was begun in 1928 and the manufacture of sodium acetate and other acetates began in 1935. Vinyl acetate production was added in 1937. In 1957 the facility name was changed to Union Carbide Corporation. The plant produced a variety of wastes including mercury/aluminum sludge, 2-ethylexoate, zincacetate, acetic acid, acetate salts and overflows from the vinyl division. In 1978 Niacet purchased the property from Union Carbide Corporation and currently manufactures specialty chemical products for food, pharmaceutical and industrial applications. A site investigation was completed in 2002 indicating the presence of mercury contaminated soil. A supplemental site investigation was completed in March 2006. A draft Remedial Action Selection (RAS) Report was submitted in November 2006. Based on the characterization of the mercury waste, an IRM Work Plan was developed and approved in November 2012 to address the most significant areas of contamination (visible mercury or positive hazardous waste characterization test). The IRM work began in February 2013, but was suspended in June 2013 due to the inability to control mercury vapors. Work is anticipated to resume in 2014 and continue into 2015. The scope of the remedial effort to remove the visible mercury contamination is significantly larger than anticipated and the presence of Technologically-Enhanced, Naturally-Occurring Radioactive Material (TENORM) fill intermingled with some of the mercury waste has complicated disposal. The IRM work plan approved in

2012 included provisions for a plant wide cover system. A work plan to implement the cover system will be developed and implemented after the completion of the visible mercury excavation phase of the remedial work.

Spaulding Fiber – DEC Site #915050/E915050

The 46 acre Spaulding Composites Site is located at 310 Wheeler Street in the City of Tonawanda. Spaulding manufactured composite laminates and vulcanized fiber between 1911 and 1992 at this now abandoned facility. The paper used to produce vulcanized fiber, and many of the phenolic resins used in the production of the composite laminates, were also manufactured on site. Site drainage and contaminant transport was tributary to the Niagara River through the municipal storm sewer system. All RI/FS/Corrective Measure Studies have been completed for RCRA/Superfund portions of the site. The ROD for this site was issued in March 2003. Seventeen Solid Waste Management Units (SWMUs) within approximately 2.5 acres of property around the plant buildings were identified (included in four separate OUs) as requiring remediation as a part of the State Superfund (SSF) project; the rest of the property is being addressed as part of an Environmental Remediation Project (ERP). Remediation of OU#2 was performed as an IRM to address PCB contamination of surface and subsurface soils. OU #s 1, 3, and 4 were remediated under the State Superfund Program (~3 acres) from October 2009 thru May 2010. In February thru March 2010, remediation of OU#5 and OU#6 was performed as an IRM by excavating contaminated soils. In March 2011 an ROD was issued by DEC for OUs 5 and 6 requiring No Further Action with site management as the selected remedy because surface and subsurface soils after the IRM generally met the Part 375 restricted residential soil cleanup objectives. A Remedial Alternatives Report for OU#7 was completed in January 2009. In March 2009 a No Action ROD was issued by DEC for OU#7 because surface and subsurface soils met the Part 375 residential soil cleanup objectives. The City of Tonawanda submitted an environmental easement package in September 2011. The environmental easement was subsequently granted in August 2012. The site was delisted from the Registry of Inactive Hazardous Waste Disposal Sites in August 2013.

Tonawanda Coke Corporation – DEC Site #915055

The site is located about 1/2 mile south of I-190 on both sides of River Road. The surrounding area is almost entirely industrial although a small residential cluster exists about a 1/4 mile south of the plant. This site consists of three landfills (OUs) used for general disposal of fly-ash cinders and coal tar sludge (site 108), bricks, rubble, sand, demolition material (site 109), and wood shavings impregnated with iron oxide and coal tar sludge (site 110), a coal storage area, and manufacturing area. The site is adjacent to the Niagara River. In 1981, DEC collected sediment and surface water samples from the Tonawanda Coke drainage basin. PAHs were detected in soil, sediment and water samples. Groundwater exceeded standards for iron, phenols, cyanide, benzene and other organics. Organic priority pollutants were detected at all three landfill areas, most of which were below 100 ppb. Impacts on an adjacent wetland were indicated by contamination with benzene, phenol, naphthalene, and benzo(a)pyrene. In 1982 and 1983, the U.S. Geological Survey (USGS) collected soil, groundwater, and surface water samples from this site. A Phase II Investigation has been completed by the responsible party. In 1992, the PRP submitted a report describing investigation completed during 1991 and 1992. Analytical results are consistent with previous investigations. The responsible party has completed a Summary Remedial Investigation utilizing existing analytical data in 1997. Analytical results from the previous investigation indicate the presence of widespread contamination on the site and the necessity of an expanded RI/FS. Additional investigative work was completed in 2005 to clear up discrepancies in the data. A report describing the additional investigation work, the results and the conclusion was submitted in April 2006 and a revised report was submitted in January 2008. Based on the findings of the investigation the site

does not pose a significant threat to public health and the environment because site security and fencing make the site inaccessible to the public. The groundwater contamination at the site is insignificant and the surface water discharge from the site to the river is managed under a New York State Pollutant Discharge Elimination System (SPDES) permit. Therefore, Institutional/Engineering Controls are the remedy for the OU#s 1 and 2 of the site. OU#3 along with the river sediments will be deferred for further investigation and evaluation for an appropriate RA. A public meeting was held on March 18, 2008. The ROD for OU#s 1 and 2 was signed on March 31, 2008. The consent order to conduct the RI at OU#3 was signed on September 17, 2009. While the work plan was submitted by the PRP to dredge the sediments at OU#3 and has been reviewed and approved by DEC, it has not been implemented to date. Other notable activities of late include a joint EPA/DEC Air Quality Study completed in 2008 and follow-up multi-media investigations of the facility conducted in 2009 in response to concerns raised by the community. These investigations resulted in formal criminal and civil enforcement actions taken by DEC and EPA for SPDES water quality, air quality, and RCRA violations during 2010. The Criminal action has been settled with the Company being fined approximately \$25M, the results of the civil action is still pending.

Glossary

A

Ambient

A surrounding medium, such as water or air. Used in contrast to a specific source.

Aquatic

Growing in, living in, or dependent upon water.

Atmospheric deposition

Pollution from the atmosphere associated with dry deposition in the form of dust, wet deposition in the form of rain and snow, or as a result of vapor exchanges.

B

Barrier wall

A wall constructed underground in a hazardous waste site or landfill to stop the flow of contaminated groundwater.

Basin

The land that drains into a waterbody.

Bedrock groundwater

Water flowing through a rock layer underground, under a top layer of mixed soil and loose rock called the overburden.

Benzo(a)pyrene [B(a)P]

A PAH that is formed by the incomplete combustion of fossil fuels, wood, and tobacco; the incineration of garbage; and in steel production.

Bioaccumulation

The process by which chemical substances accumulate in the tissues of an organism that drinks contaminated water or eats contaminated food.

C

Cap

A cover over hazardous waste sites, usually made of clean soils or clay, that prevents rainwater from seeping through soil and causing the contaminants in the soil to flow into the groundwater.

Capture Zone

Area in which groundwater is flowing towards a pumping well; used as remediation technique for hazardous waste sites, to 'capture' contaminated groundwater and treat it.

Chlordane

A persistent toxic chemical that was used to control ants, grasshoppers, and other insects on certain crops.

Collection drain

System of pipes around a hazardous waste site or landfill that collects surface or groundwater and directs it toward a treatment plant.

Combined sewer overflow (CSO)

Water discharged into a waterbody from a sewer system that carries both sanitary sewage and stormwater runoff. During dry weather the combined sewer system's flow is normally treated at a wastewater treatment plant, but during rain events, the plant's capacity may be exceeded and the flow may be bypassed to discharge, untreated, directly into a waterbody.

Consent decree

A legal document, approved by a judge, which puts into effect a remedy (i.e., actions to correct an environmental problem).

Contaminant

A substance that is not naturally present in the environment or is present in amounts that can adversely affect the environment.

D

Dredging

Removal of sediment from the bottom of a waterbody.

DDT

Dichloro-diphenyl-trichloroethane. A persistent toxic chemical that was used as a pesticide, particularly for mosquito control. DDT is banned in U.S. and Canada. DDE and DDD are metabolites of DDT.

Dieldrin

A persistent toxic chemical that was used mainly as a soil insecticide.

Dioxins/furans

Dioxin: A family of persistent toxic chemicals known as dibenzo-p-dioxins. Dioxins can enter the environment as the by-products of industrial processes or as a result of combustion processes in incinerators and motor vehicles using leaded fuel. The compound called '2,3,7,8-TCDD' is the most toxic member of the dioxin family.

Furans are a class of chemicals similar to dioxins, which are created at high temperatures, such as incineration of PCBs and other organic wastes containing chlorine.

DNAPL (Dense Non-Aqueous Phase Liquid)

An oily, sludge-like mixture of chemicals that is denser than water. DNAPL flows with gravity or along geological formations, not always in the same direction as groundwater.

Downstream

In the direction with the flow of a stream or river; down river. For Niagara River, downstream is towards Niagara-on-the-Lake and Lake Ontario.

E

Embayment

A bay. A part of a waterbody (such as a river or lake) that makes an indentation into the adjacent land.

F

Force main

A pipe that carries contaminated groundwater drawn out of hazardous waste sites by pumping wells to a treatment plant.

Four Parties

The four agencies who implement the Niagara River Toxics Management Plan: U.S. Environmental Protection Agency, Environment Canada, New York State Department of Environmental Protection, and Ontario Ministry of Environment and Energy.

G

Groundwater

The fresh or saline waters found beneath the Earth's surface that often supply wells and springs. Contrast to "Surface water".

H

Habitat

Place where a particular type of plant or animal lives. An organism's habitat must provide all of the basic requirements for its life.

Hazardous Waste Site

Land disposal site for hazardous wastes.

Hazardous Waste Substance

Any substance that is a by-product of society classified under U.S. or Canadian law as potentially harmful to human health or the environment and are subject to special handling, shipping, storage, and disposal requirements under the law.

Heavy metals

Metallic elements with high atomic weights that tend to be toxic and bioaccumulate. Examples are mercury, arsenic, lead, etc.

Hexachlorobenzene (HCB)

A persistent toxic chemical that was originally manufactured as a fungicide for cereal crops. It is also generated as a by-product in the manufacture of pesticides and can be formed during the combustion of substances containing chlorine.

I

Infiltration

Passing through or filtering through, as in rain water that filters through soil to join groundwater.

Inorganic substance

A chemical compound that does not contain carbon. Inorganic substances are often derived from minerals.

Insecticide

A chemical used to kill or control the growth of insects.

L

Landfill

Land disposal site for hazardous (or non-hazardous) wastes.

Leachate

Liquid derived from rain or snow melt that percolates through a hazardous waste site.

Load or Loading

The mass amount of a material entering a system over a given time interval.

M

Medium (plural: Media)

A surrounding substance in the environment: water, air, or sediment.

Metabolite

A substance that is the product of biological changes to a chemical.

Mirex

A persistent toxic substance that was used as an insecticide and a fire retardant.

Multi-media

Involving multiple media, such as water and air, or air and sediment, or all three.

N

National Priorities List (NPL)

An EPA list of the most serious uncontrolled or abandoned U.S. hazardous waste sites identified for long-term remedial action under Superfund.

Non-Point Source

Diffuse pollution sources (i.e., without a single point of origin or not introduced into a waterbody from a specific outlet). Generally carried off the land by stormwater. Common sources can be associated with a variety of land-uses (e.g., agriculture, forestry, and urban) and activities (e.g., construction)

O

Octachlorostyrene (OCS)

A persistent toxic chemical that was released as a by-product when chlorine was manufactured using certain processes that are no longer used.

Organic substance

A chemical compound that contains carbon.

Overburden groundwater

Water flowing through a layer of mixed soil and loose rock that lies over the rock layer called bedrock.

P

PAHs

Polycyclic or polynuclear aromatic hydrocarbons. A class of persistent toxic compounds that are

formed from the combustion of organic material, such as forest fires or gasoline in cars.

PCBs

Polychlorinated biphenyls. A group of persistent toxic chemicals used in electrical and hydraulic equipment for insulating or lubricating purposes.

Persistent toxic chemical

Any toxic chemical that is difficult to destroy or that breaks down slowly in the environment (i.e., with a half-life in water greater than eight weeks).

Pesticide

A chemical used for preventing, destroying, or repelling any pest.

Point source

Any discernible confined and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, container, landfill, leachate collection system, vessel or other floating craft from which pollutants are or may be discharged from.

Pollution prevention

Any action that reduces or eliminates pollutants before they enter the environment.

Potentially Responsible Party (PRP)

Any individual or company potentially responsible for, or contributing to, the contamination problems at U.S. hazardous waste sites.

Pretreatment

Processes used to reduce, eliminate, or alter pollutants from industrial sources before they are discharged into publicly-owned sewage treatment systems.

Priority toxic chemicals

Under the NRTMP, 18 toxic chemicals that exceeded water quality or fish tissue standards in the Niagara River or Lake Ontario.

R

RCRA

Resource Conservation and Recovery Act. A U.S. program to remediate active hazardous waste sites. Sites are remediated by potentially responsible parties whenever this can be arranged.

Record of Decision (ROD)

A public document that explains what actions will be taken to remediate a U.S. hazardous waste site.

Remedial Investigation/Feasibility Study (RI/FS)

The RI defines the areal and vertical extent of the hazardous waste problem at a Superfund site through numerous sampling wells, an extended environmental sampling program and a full geophysical survey. Based on the RI, the FS develops and evaluates alternative solutions to the problem.

Requisite Remedial Technology (RRT)

An RRT is the equivalent of an FS (see RI/FS above) for a pre- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 agreement.

Runoff

Water that flows over the land surface into a waterbody.

S

Slurry wall

Barrier made of a thin, watery mixture of fine, insoluble material (e.g., clay, cement, soil).

Solid Waste Management Units (SWMUs)

Areas within a hazardous waste site where hazardous materials are stored or managed. SWMUs are generally storage areas, treatment systems, disposal areas, spill areas, or containment cells.

Superfund

A U.S. program to remediate inactive or abandoned hazardous waste sites in an emergency or for the long-term. Sites are remediated by potentially responsible parties whenever this can be arranged.

Surface water

All water open to the atmosphere (e.g., rivers, lakes, reservoirs, seas, etc.). Contrast to “Groundwater”.

T

Toxaphene

A persistent toxic chemical that was used as an insecticide.

Toxic substance

Any substance that adversely affects the health or well-being of a living organism, e.g., causing death, disease, birth defects, behavioral abnormalities, cancer, genetic mutations, physiological/reproductive malfunctions, or physical deformities.

U

Upstream

In the direction against the flow of a stream or river; upriver. For Niagara River, upstream is towards Fort Erie and Lake Erie.

V

Volatile substance

A substance that evaporates readily.

W

Wetland

An area that is saturated with water or has a water level at or near the surface. A wetland has organic soils and plant/animal species that are adapted to a wet environment.

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APPENDIX A

PRIORITY NIAGARA RIVER HAZARDOUS WASTE SITES:

SITE REMEDIATION STATUS SUMMARIES

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Site Name: USGS Site # : DEC Site #: Program:	Contents / Pollutants of Concern	Remedial Actions Completed	Formal Remedial Compliance and/or Enforcement Actions	Post-Remedial Action O&M Status	Total Remediation Costs to Date	Additional Comments
Occidental Chemical Corp. #41b-49 #932019 RCRA (State & Federal)	Chlororganics, cell brine sludges, phosphorus sludges	December 1998	NYS Part 373 and EPA RCRA permits issued	Bedrock & Overburden Groundwater Monitoring, Collection & Treatment	Not available at this time	Implementation of the Bedrock & Overburden Stabilization Programs will effectively eliminate future off-site loadings from the Main Plant Site.
Niagara Co. Refuse Disposal #81 #932026 Federal Superfund	Phenolic resins, plating tank sludges, brine sludge	December 1999; NPL deletion in July 2004	EPA Consent Order and ROD issued	Groundwater Monitoring Program on- going	Fed: \$1,495,400 PRP: \$14,015,000	The site is still monitored by EPA/State and data supports that the remedy is effective and operating as designed.
Dupont Necco Park #14 #932047 Federal Superfund	Brine sludge, barium salts, chlorinated organic chemicals	September 2007	EPA Consent Orders and ROD issued	Groundwater Monitoring, Collection & Treatment on- going	Fed: \$2,155,000 State: \$141,000 PRP: 42,500,000	Site is in OM&M phase. Ground water pump and treat performing satisfactorily. Upgrades completed in 2009 to improve pumping efficiency at PW-10. Quarterly and annual reports submitted to USEPA and DEC.
CECOS International / #78 N/A RCRA (State & Federal)	Acetone, 2- butanone, benzene, chloroform, toluene, chlorobenzene, methylene chloride, tetrachlorethane	February 1995	EPA RCRA Hazardous and Solid Waste Amendments (HSWA) and NYS Part 373 permits issued	Groundwater Extraction & Treatment; landfill cap maintenance; site access restrictions	Not available at this time.	Corrective Measure Implementation including aquifer pumping test program to control contaminant migration continues to operate satisfactorily.
OCC (AKA Hooker)– Hyde Park #39 #932021 Federal/State Superfund Co- lead	Brine sludge, organic phosphates, dechlorane, chlorotoluenes, trichlorophenol (TCP), benzoyl chloride, chlorobenzenes, acid chlorides	June 2003	EPA/DEC/OCC Stipulation and Judgment Approving Settlement Agreement	Overburden Groundwater Monitoring, Collection & Treatment	Fed: \$12,100,000 PRP: \$78,000,000	It is estimated that \$2,000,000/year will be spent on the O&M of the site for approximately the next 30 years. The Site was reclassified by DEC from a Class 2 (significant threat) to a Class 4 (Site remediated and in long term OM&M) site in June 2008. EPA delisted the site from the NPL in October 2013.

102nd Street #40, 56, 85, and 94 #932922 & #932031 Federal Superfund	Benzenes, chlorobenzenes, chlorophenols, hexa- chlorocyclohexanes, mercury	December 1998	EPA ROD completed 1990 & Administrative Order issued September 1991	Long-term leachate pump and treat system installed and optimized in March 1999.	Fed/State: \$9,900,000 PRP: \$26,000,000	Long-term leachate pump and treat system operating optimally. It is estimated that future O&M costs to be paid by the PRP will be approximately \$100,000/year.
Bell Aerospace Textron #5 #932052 RCRA (State and Federal)	Chlorinated solvents, rocket fuel, misc. chemicals	1987	NYS Part 373 and EPA RCRA permits issued	Hydraulic groundwater containment pump and treat system in place	PRP: \$1,898,891 (Capital and O&M) Future O&M estimated \$400,000/year	Recent maintenance and upgrades in 2007 to the treatment system has increased operational efficiency.
OCC – Durez Corp. Packard Rd. #66 #932040 RCRA (State and Federal)	Phenolic wastes	1995	NYS Part 373 and EPA RCRA permits issued	Groundwater pump and treat program; maintenance of landfill cap; site access restrictions	Not available at this time.	EPA and DEC have determined that the existing groundwater pump and treat program is capable of serving as the final groundwater remedy for the site.
OCC S-Area #41A #932019A Federal/State Superfund Co- lead	CaF2 sludge, organic phosphates, chlororganics, sulfides	August 2002	EPA/DEC lead responsibility under 1985 judicial settlement agreement	Operation and maintenance of S-Area landfill cap; groundwater collection and treatment.	Fed/State \$10,500,000 PRP: \$45,000,000 Future O&M estimated Fed: \$1,000,000; PRP: \$5,000,000 capital and up to \$3,000,000 /year for 30 years.	Continued optimization of the performance of groundwater pump and treat system effective.

Stauffer Chemical #255 #932053 DEC Superfund	Carbon tetrachloride, various metallic chlorides, methylene chloride, tetrachloroethylene	December 1995	DEC Consent Order	Bedrock groundwater pump and treat system; soil vapor extraction and dewatering system.	State: \$180,000 PRP: \$5,100,000 State O&M: \$10,000 PRP: \$1,300,000/year for 30 years.	Groundwater treatment system has been modified to include granular activated carbon prior to discharge to the NYPA Forebay.
Solvent Chemical #251 #932096 DEC Superfund	Chlorobenzenes, zinc	May 2001	ROD issued December 1994; U.S. District Court Judgment issued October 1997.	Bedrock groundwater pump and treat system.	State: \$1,170,000 PRP: \$7,374,000 PRP O&M: \$4,600,000	Continued operation and maintenance of bedrock groundwater pump and treat system.
Vanadium Corp. #1 #932001, 932001B, 932001C DEC Superfund	Chromium, VOCs, phenol, caustic waste	Projected completion 2014	ROD issued March 2006: OU#1 - No Further Action OU#2 - No Further Action OU#3 - Consolidation and capping	OU#1 - Containment and storm water control, approved OM&M plan; OU#2- landfill cap, groundwater collection and treat system, approved OM&M plan	State: \$454,000 PRP: \$9,900,000 (OU#1 & OU#2) Projected future OU#3 PRP cost to completion \$12,000,000	Final Remedial Design for OU#3 was submitted in 2008. The Remedial Action Work Plan was approved in August 2012. Construction of the final RA for Vanadium Corporation OU#3 began in August 2013 and is expected to be complete by the fall of 2014. Reclassification of Site 932001B to a Class 4 site is pending filing of the Environmental Easement on the site. Reclassification of Site 932001C was completed in 2013.
Olin Corporation #58, 59 #932051 State and Federal RCRA	Mercury brine sludges, chlororganics, fly ash	October 1997	DEC Consent Order	Groundwater and treat.	Not available at this time.	Remedial system close to meeting optimum effectiveness; recent performance reports indicate system improvements.

<p>Dupont – Buffalo Ave. #15-19 #932013 DEC Superfund</p>	<p>Carbon tetrachloride, chloroform, dichloroethylene, methylene chloride, trichloroethylene, tetrachloroethylene, vinyl chloride, PCBs, barium, and other organic and inorganic compounds</p>	<p>January 1992</p>	<p>DEC Consent Order ROD issued January 1990</p>	<p>Groundwater remediation system (pump and treat)</p>	<p>State: \$75,000 PRP: \$74,000,000 (includes Gill Creek cleanup) Projected future O&M by PRP: \$1,100,000 / year.</p>	<p>Periodic post monitoring reports indicate effective groundwater pump and treat system. Blast fractured bedrock trenches installed in SW plant area have greatly increased hydraulic containment and pump rates. GWRS system upgrades replaced steam stripper and added therm-ox unit to treat off-gasses to handle additional flow from trenches. Through September 2009, the recovery system and the Olin deep well have removed approximately 153,200 pounds of organic compounds from the groundwater.</p>
<p>Buffalo Color Corp. Plant Site Areas A, B, C, and E #120, 122 #C915230, C915231, C915232 State and Federal RCRA State Brownfield Program</p>	<p>Aniline, N-methylaniline, N-dimethylaniline, N-diethylaniline, cyanide, methanol, nickel, chromium, arsenic, lead, mercury, VOCs, SVOCs</p>	<p>IRM pump and treat system installed 12/2007. Site preparation and demolition/removal of decommissioned plant facilities and process equipment was completed in 2011.</p>	<p>NYS Part 373 and EPA RCRA permits issued; DEC Consent Orders issued 3/12/2005 and 6/30/2006.</p>	<p>Groundwater pump and treat system operational 12/2007.</p>	<p>Not available at this time.</p>	<p>Draft RI/FS completed in March 2008. As a result of the RI/FS, a Brownfield Cleanup Plan application was submitted and was approved by the DEC in April 2009. The Remedial Work Plan was approved in May 2009. Design investigation activities and development of a detailed remediation plan for Areas A and B continued into 2012, and remediation construction activities were substantially completed in 2013. The final remedial plan involved the installation of a VHB to compliment the groundwater control system. The final remedial plan for Areas C and E involved removal of source material and placement of oxidizing materials to treat residual VOC/SVOC groundwater contamination. The contaminant source area soil removal was completed in 2010 (Area C) and 2011 (Area E). The remediation also includes the placement of a site-wide integrated cover system.</p>

Buffalo Color – Area D #120-122 #915012 DEC Superfund	Iron oxide sludges containing organics	September 1998	DEC Consent Order	Slurry wall; sediment dredging; landfill cap; groundwater pump & treat system	State: \$200,000 PRP: \$14,000,000	Groundwater pump and treat system is operating satisfactorily.
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Bethlehem Steel Corp. #118 #915009	Tar decanter sludge, ammonia still lime, sludge, pickling liquor, metals, VOCs, SVOCs/PAHs	Operable Unit #2 – Interim Corrective Measure completed 2013.	DEC Consent Order		Estimated at \$15 million	915009 - RCRA regulated portion of property. Order implementing the remedy was issued 5/10/2010. Slurry wall (Phase I) remedial design approved 2010, trenching began in 2011 and continued into 2012. Capping design (Phase II) under final review; temporary cap installed in 2012, final cap placement in 2013.
C915197, C915198, C915199,	SVOC/PAHs and Metals associated with steel manufacturing	Two sub-parcels have been remediated (C91599G and C915199H)	Brownfield Clean-up Agreement (BCA)	Cover maintenance, institutional controls	Estimate \$1 million	C915197 - Tecumseh Phase I Business Park - IRM completed 2009. A Decision Document (DD) defining the proposed remedy has been issued, and the Site has been broken into smaller parcels in 2012.
C915205	SVOC/PAHs and Metals associated with steel manufacturing	Completed 2007	BCA	Protective cover, passive groundwater treatment, Easement	Estimate \$2 million	C915198 - Tecumseh Phase II Business Park - SI/AAR in review, site split into smaller parcels in 2012. DDs for sub-parcels being prepared. C915199 – Final RI/AAR submitted in 2012, a DD defining the proposed remedy is in progress. The Site has been broken into smaller parcels in 2012. C915205 - Tecumseh Redevelopment, Inc.-Steel winds – Completed
C915218	SVOC/PAHs and Metals associated with steel manufacturing	Remedial Investigation to be completed 2014.	BCA			C915216 - Steel Winds IA - Denied entry into BCP. C915217 - Steel Winds II - Submitted RI/AAR WP but never implemented Site included in C915199. C915218 - Tecumseh Phase IA Business Park - SI/AAR submitted in 2012 and is under review.

River Road (INS Equipment) # 136 #915031 DEC Superfund	Foundry sand, cutting oils, industrial sludges, PCBs, PAHs, metals	January 2000	DEC Consent Order. ROD issued March 1994	OM&M activities underway.	State: \$546,000 PRP: \$15,000,000	RA completed in January 2000 for the Cherry Farm and River Rd sites. OM&M activities underway. Periodic reports submitted to the DEC.
Niagara Mohawk – Cherry Farm # NA #915063 DEC Superfund	Foundry sand, cutting oils, industrial sludges, PCBs, PAHs, metals	See Site 915031 above.	ROD issued Feb 1991 Amended ROD Oct 1993	OM&M activities underway.	See Site 915031 above.	See Site 915031 above.
Frontier Chemical - Pendleton # 67 #932043 DEC Superfund	Solvents, oils, acids, dyes, paint wastes, heavy metal sludges, metal salt sludges, pickling liquors	March 1997	DEC ROD issued March 1992; DEC Consent Order	Landfill cap and leachate collection and treatment	State: \$1,430,000 PRP: \$14,120,000 Future O&M costs State: PRP: \$50,000 annually	Long-term O&M includes landfill cap maintenance and pump and treat of leachate from the site.
Frontier Chemical, Royal Avenue # #932110 EPA and DEC Superfund	Monochlorotoluene, methylene chloride, chloroform, dichlorobenzene, tetrachloroethylene and other organic contaminants	Projected completion date June 2014	DEC ROD - OU#1 issued March 2006; OU#2 issued March 2011	Remediation on- going	Fed: \$3,690,000 State: \$600,000 PRP: \$4,600,000	A DEC RI/FS Order for OU#2 with PRP group was signed in 2008. Investigative work was completed in 2009 and a final report was submitted in 2010. DEC has completed negotiating a RD/RA order with the PRP group on the implementation of OU#1 and #2 remedies. Remedial work was completed in 2013. The site is in long term OM&M requiring GW monitoring.

<p>Occidental Chemical – Durez Division, North Tonawanda # 24-37 #932018 DEC Superfund</p>	<p>Phenol tars containing chlorobenzenes and chlorophenols</p>	<p>Plant site:1990 City sewer cleaning:1992 Inlet/Cove: 1992 &2000</p>	<p>DEC ROD OU#1/2 -Feb 1989; ROD OU#3 - March 1992.</p>	<p>Plant site includes cover system and groundwater control/treatment. Inlet and cove & north lobe removal and containment work is being monitored.</p>	<p>State: \$510,000 PRP: \$39,000,000</p>	<p>In May 2000, additional contaminated sediment from the bottom of the cove were removed. The most recent report (~2006), indicates elevated concentrations of dioxins and furans. A work plan for source investigation and additional sediment removal as needed has been approved. In 2009 and 2010, reports were submitted detailing investigations of the Pettit Creek Flume and the cove. A draft work plan was also submitted for a Fish and Wildlife Impact Analysis of the cove. The DEC provided comments in Sept. 2010. Site Management is ongoing at the Plant Site and Inlet Cove. This consists of GW collection, treatment and GWQ monitoring at the Plant Site and GWQ monitoring and NAPL removal at the Inlet. ChemOx injections were completed at the Inlet in April and October 2011 in an attempt to abate elevated organics in monitoring wells 20I and 22I. In 2013, a drainage improvement and wildlife revitalization project was undertaken during which approximately 7,300 linear feet of the Pettit Creek Flume was inspected, sediment removed where present, and cleaning verified through video inspection.</p>
<p>Gratwick Riverside Park # 68 #932060 DEC Superfund</p>	<p>Phenolic resins, PCBs</p>	<p>December 2005</p>	<p>DEC ROD- Feb. 1991; Amended ROD - Jan. 1999</p>	<p>Landfill cap and leachate collection and treatment</p>	<p>State: \$2,550,000 PRP: \$5,000,000 Future O&M costs estimated to be \$1,140,000 over 10 years.</p>	<p>The Site was reclassified by DEC from a Class 2 (significant threat) to a Class 4 (Site remediated and in long term OM&M) site in June 2008.</p>

<p>Mobil Oil # 141 #915040 & C915201 DEC Brownfield</p>	<p>Tetraethyl lead and lube sludges, spent catalysts, Air floatation unit and gravity oil/water separator sludges, VOCs, SVOCs, metals</p>	<p>OU#1 in 2007; OU#2 partially completed in 2007, additional work is necessary; Additional work is ongoing/necessary at OU#3, OU#4, and OU#5.</p>	<p>DEC Consent Order issued in 1985. NYS Brownfield Cleanup Agreement executed April 3, 2006</p>	<p>Remediation ongoing</p>	<p>Not available at this time.</p>	<p>Site segregated into (5) operable units. Remediation of OU#1 completed in 2007 to commercial standards via excavation of contaminated fill with no required monitoring. Removal of Pipelines in OU#2 completed in 2007 with further Investigation of OU#2 ongoing (AAR in progress). OU#3 (AAR in progress), OU#4 final remedy implementation anticipated in 2014, and OU#5: Additional work scheduled for future years</p>
<p>Iroquois Gas – Westwood Pharmaceutical # NA # 915141A & B DEC Superfund</p>	<p>PAHs (Polynuclear Aromatic Hydrocarbons) BTEX (Benzene, Toluene, Ethyl benzene, Xylene), lead, and cyanide</p>	<p>Main plant site in 1997 and Scajaquada Creek sediments in March 1999. 915141A: 1997 915141B: 2001</p>	<p>DEC ROD issued March 1994 for both sites.</p>	<p>915141A: hydraulic control; groundwater pump and treat 915141B: DNAPL extraction</p>	<p>State: \$ 250,000 PRP: \$ 7,000,000</p>	<p>915141A: hydraulic control, and groundwater pump and treat are effective. 915141B: DNAPL from under the creek continues to be collected In 2013 the DEC notified the RP that it has been determined that the existing remedial system had failed and that Corrective measures were necessary. The RP submitted a CM work plan and DEC plans to issue a ESD for the site in late 2014 with plans to implement the revised remedy in early 2015.</p>
<p>Booth Oil # NA #932100 DEC Superfund</p>	<p>Waste oils, PCBs, VOCs, semi-VOCs, and PAHs</p>	<p>November 2004</p>	<p>DEC ROD issued March 1992 and March 1993, ROD amendments in August 2002</p>	<p>Haz waste removed, residual PAH contamination. OM&M plan for site cover maintenance. Deed restrictions in place</p>	<p>State: \$1,318,900 PRP: \$6,000,000</p>	<p>RA completed Nov 1994. Additional remedial work to address gasoline vapor impacts to adjacent home continued through 2005. Previously unknown USTs removed with soil disposal and vapor extraction. Monitoring wells installed to monitor groundwater for gasoline impacts. Deed restrictions filed for site. The site was reclassified from a Class 2 to a Class 4 on November 27, 2007.</p>

APPENDIX B

REMEDICATION of ADDITIONAL POLLUTANT SOURCES:

SITE REMEDIATION STATUS SUMMARIES

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Site Name: USGS Site # : DEC Site #: Program:	Contents /Pollutants of Concern	Remedial Actions Completed	Formal Remedial Compliance and/or Enforcement Actions	Post-Remedial Action O&M Status	Total Remediation Costs to Date	Additional Comments
Citizen's Gasworks Fourth Street Site NA 915167 NYS Superfund	benzene, toluene, xylenes, phenolic compounds, PAHs	Completed in 2006	State Superfund Program	Environmental Easement	State: \$10,000,000	RA included excavation and off-site disposal of all contaminated media above clean-up goals. The site is being maintained and monitored according to the Site Management Plan, dated September 2006. Redesignated Class C (non- Registry) site in 2013.
Former Buffalo Service Center NA C915194 NYS Brownfield Clean-up Program	benzene, toluene, ethylbenzene, xylenes, PAHs, total cyanides	Completed in 2006	Brownfield Clean- up Agreement	Groundwater monitoring and Environmental Easement	PRP: \$16,500,000	RA included excavation and off-site disposal of all contaminated media above clean-up goals. Groundwater at the site is being monitored in accordance with the Site Management Plan, dated October 2006.

Site Name: USGS Site # : DEC Site #: Program:	Contents /Pollutants of Concern	Remedial Actions Completed	Formal Remedial Compliance and/or Enforcement Actions	Post-Remedial Action O&M Status	Total Remediation Costs to Date	Additional Comments
Alltft Landfill NA 915054 NYS Superfund	miscellaneous organic chemicals, chrome sludge, copper sulfate, nitrobenzene, monochlorobenzene, naphthalene, automobile shredder wastes, demolition debris, fly-ash and sand wastes, metals, pesticides, PCBs, VOCs, PAHs	Completed in 2005	SSF Consent Order	Groundwater monitoring and Environmental Easement (filed September 2012)	PRP: \$14,000,000	RA included consolidation and capping of contaminated soils and sediments. Wetlands were restored and a groundwater collection trench has been installed that captures upgradient groundwater and groundwater beneath the landfill. Operation, Maintenance and Monitoring is on-going. Restrictions in the forms of Environmental Notices and Deed Restrictions are in place on the impacted properties. This site was re-classified to Class 4 to reflect the on-going operation, maintenance and monitoring.
Steelfields Site NA V00619/C915204 NYS Voluntary Clean-up Program	waste slag and coke, significant quantities of chemically contaminated fill soils, VOCs, SVOCs, metals	Completed in 2007	Voluntary Clean-up Agreement	Groundwater monitoring and Declaration of Covenants and Restrictions	PRP: \$16,500,000	On-site Landfill and groundwater containment system of non-hazardous waste, Groundwater monitoring, RA included excavation and off-site disposal of all contaminated media above clean-up goals.

Site Name: USGS Site # : DEC Site #: Program:	Contents /Pollutants of Concern	Remedial Actions Completed	Formal Remedial Compliance and/or Enforcement Actions	Post-Remedial Action O&M Status	Total Remediation Costs to Date	Additional Comments
Niacet Corporation NA V00373 NYS Voluntary Clean-up Program	mercury/ acetaldehyde, sodium acetate, paraldehyde, aldol, crotonaldehyde, aluminum sludge, 2- ethylexoate, zincacetate, acetic acid, acetate salts	Not completed.	Voluntary Clean- up Agreement	Remedial Design Underway	Not available at this time.	An IRM Work Plan was developed and approved in November 2012 to address the most significant areas of contamination (visible mercury or positive hazardous waste characterization test). Project design activities and final RDWP was submitted and approved and the remedial activities are on- going. The extent of mercury contamination has far exceeded the design expectations of the approved design, therefore a completion date for the work is unknown at this time.

Site Name: USGS Site # : DEC Site #: Program:	Contents /Pollutants of Concern	Remedial Actions Completed	Formal Remedial Compliance and/or Enforcement Actions	Post-Remedial Action O&M Status	Total Remediation Costs to Date	Additional Comments
Spaulding Fiber NA 915050/E915050 NYS Superfund/Environmental Restoration program	PCBs, Metals, phenolic compounds	OUs 1, 3 and 4: excavated approximately 30,000 tons of non-hazardous materials and5,300 tons of hazardous materials; OU#2: excavated 1,600 tons of non- hazardous materials and approximately 440 tons of hazardous materials	State Superfund Program State Assistance Contract	RAs completed in 2010 – 2011.	State: \$6,000,000	Demolition of plant structures ongoing through efforts by City of Tonawanda and Erie County. A No further Action - ROD for the ERP project (OU#7) was issued in March 2009. Remediation of the Superfund areas (OU1, OU#2, OU#3, & OU#4) were completed in 2010. In March 2011 a ROD was issued by DEC for OU#s 5 and 6. No Further Action was the selected remedy because surface and subsurface soils after the IRM met the Part 375 residential soil cleanup objectives. The City of Tonawanda submitted the environmental easement package in September 2011. The environmental easement was subsequently granted in August 2012 and filed in January 2013. The site was delisted from the Registry of Inactive Hazardous Waste Disposal Sites in August 2013.

Site Name: USGS Site # : DEC Site #: Program:	Contents /Pollutants of Concern	Remedial Actions Completed	Formal Remedial Compliance and/or Enforcement Actions	Post-Remedial Action O&M Status	Total Remediation Costs to Date	Additional Comments
Tonawanda Coke Corp. N/A/ #915055 DEC/EPA CWA, Superfund, RCRA, CAA	PAHs, iron, phenols, cyanide, benzene, naphthalene, benzo(a)pyrene	OU#1 and #2 completed 2008.	ROD for OU#1 and #2 signed 3/31/08. Consent order to conduct the RI at OU#3 signed 9/17/09. Formal enforcement actions taken by DEC and EPA for SPDES water quality, air quality, and RCRA violations during 2010.	The groundwater contamination at the site is insignificant and the surface water discharge from the site to the river is managed under an SPDES permit. Institutional/Engine ering Controls are ongoing at OU#1 and #2 of the site.	N/A	Notable activities of late include a joint EPA/DEC Air Quality Study completed in 2008 and follow-up multi- media investigations of the facility conducted in 2009 in response to concerns raised by the community. The study results and investigations resulted in formal enforcement actions taken by DEC and EPA for SPDES water quality, air quality, and RCRA violations during 2010. The work plan submitted by the PRP to dredge the sediments at OU3 has been reviewed and approved by DEC. Due to the failure of the Company to implement the approved WP in a timely manner a CO has been issued to the Company. The CO requires further investigation of the site based on new information regarding suspected areas of contamination.