

Appendix A

**DESCRIPTIONS OF
SIGNIFICANT
POINT SOURCE
DISCHARGES BY
SUB-AREA**

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A.1 Buffalo-Lackawanna Sub-AreaA.1.1 Lake Erie Segment

A.1.1.1 City of Lackawanna WWTP - This plant is an advanced secondary treatment facility employing a pure oxygen activated sludge biological process, phosphorus removal, and chlorination. Minimal amounts of industrial wastewater are discharged to the wastewater collection system. DEC monitoring identified the following heavy metals loadings above cutoff values to Smoke Creek from the WWTP effluent:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Copper	0.4	1.0
Lead	0.9	1.9
Zinc	0.6	1.4

Tetrachloroethylene was the only organic parameter above cutoff levels (see Chapter II, section 2.3.1) in the EPA sampling at 0.4 kg/day (0.8 lbs/day).

Acute toxicity analyses were not performed for this discharge at the time of DEC monitoring of the facility.

A.1.1.2 Bethlehem Steel Corporation - The termination in 1983 of steelmaking operations at the Bethlehem Steel Corporation Plant will relegate much of the toxic substances data developed by both EPA and DEC to historical status. The loadings measured by DEC above cutoff values from sidestream outfalls discharging directly or indirectly to Smoke Creek and Blasdel Creek were as follows:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Benzo(a)anthracene	0.5	1.1 ^{1/2}
Benzo(b)fluoranthene	0.8	1.7 ^{1/2}
Benzene	0.6	1.4
Fluoranthene	0.6	1.4
Pyrene	0.5	1.1
2,4-Dimethylphenol	0.3	0.7
2-Nitrophenol	0.3	0.7

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
4-Nitrophenol	0.8	1.8
Phenol	12.0	26.4
Bis(2-ethylhexyl) phthalate	4.9	10.8
Beta-BHC	0.1	0.2
Copper	0.8	1.8
Lead	31.8	70.2
Selenium	2.3	5.1
Nickel	0.9	2.0
Silver	0.4	1.0
Zinc	119.6	263.7
PCB-1248	0.1	0.2
Phenols (4AAP)	3.9	8.7

1/ Loading computed at parameter detection limit. Parameter was identified but not quantified.

Phenolic wastes originating from the Bethlehem gas scrubbers in the blast furnace operations are discharged through Water Quality Station #9 to the Lackawanna Canal. At the time of the DEC sampling, 53 kg/day (117 lbs/day) of the total Bethlehem output of 58 kg/day (127 lbs/day) of phenolics, as measured by the phenols (4AAP) method, were being discharged from this outfall to the Lackawanna Canal. Organic priority pollutants at 13.3 kg/day (29.4 lbs/day) and heavy metals plus cyanides at 101 kg/day (222.5 lbs/day) were also being discharged through this outfall. The flow entering the Lackawanna Canal was used as plant process water.

No organic pollutants were identified or quantified in the EPA sampling of this facility. Heavy metal discharges to Smoke Creek above the cutoff level measured by EPA included zinc 40.3 kg/day (88 lbs/day), arsenic 0.9 kg/day (2.0 lbs/day), copper 6.0 kg/day (13.2 lbs/day), and selenium 0.9 kg/day (2.0 lbs/day). Zinc was measured by EPA in discharges to Blasdell Creek at 0.9 kg/day (2.0 lbs/day).

Outfalls 001 Blasdell Creek, 002 Smoke Creek and 003 Union Ship Canal and 022 Upstream Smoke Creek were found to be non-toxic in the DEC 24-hour acute toxicity screening test.

A.1.2 Buffalo River Segment

A.1.2.1 PVS Chemical Corp. - The PVS Chemical Corporation manufactures oleum, sulfur trioxide, and sulfuric acid. The pollutant loadings above cutoff values from the two outfalls serving PVS Chemicals were:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Silver	0.6	1.4
Vanadium	10.8	23.8
Zinc	0.8	1.7

Effluents from both outfalls were found to be non-toxic in the 24-hour acute toxicity screening tests.

A.1.2.2 Buffalo Color Corporation - The Buffalo Color Corporation manufactures alkylanilines, anhydrides, methyl violet dye, and indigo dye. Its discharge included the following total loadings above cutoff values from two outfalls to the river:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Methylene chloride	0.4	0.8
Chromium	1.5	3.2
Nickel	1.4	3.1
Zinc	0.7	1.6
Cyanides	0.4	1.0

Samples from both outfalls were non-toxic in acute toxicity screening. Most process wastewaters from this firm are discharged to the Buffalo Sewer Authority (BSA) system after pretreatment.

A.1.2.3 Donner Hanna Coke Joint Venture - The Donner Hanna Coke operation produced metallurgical coke. During the DEC sampling period the following parameters were discharged above cutoff values:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Anthracene	4.5	9.9
Benzo(a)anthracene	2.8	6.2
Fluoranthene	2.8	6.2
Pyrene	4.8	10.5
Methylene chloride	1.2	2.7
Cyanides	7.0	15.4
Selenium	0.7	1.5
Zinc	1.4	3.1
Phenols (4AAP)	4.2	9.3

Selenium 0.5 kg/day (1.1 lbs/day) was the only parameter found in the EPA sampling of this facility.

The DEC 24-hour acute toxicity screening tests results were negative.

This facility ceased operations in 1982 subsequent to this sampling.

A.1.2.4 Republic Steel Corporation - Analytical data from the EPA monitoring of Republic Steel indicated the following priority pollutants in the discharges above cutoff values.

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Phenols (4AAP)	0.6	1.3
Copper	1.5	3.2
Lead	3.2	7.0
Zinc	2.7	5.9

Acute toxicity testing was not performed due to the shutdown of this facility in mid-1981. The facility has not operated since this shutdown.

A.1.2.5 Buffalo River Improvement Corporation (BRIC) - The BRIC water pumping station, which draws water from the Outer Harbor, was sampled for priority pollutants. No toxic substances were reported at or above the respective parameter detection limits in the water distributed to the major Buffalo River industries.

A.1.3 Bird Island-Riverside Segment

A.1.3.1 Buffalo Sewer Authority WWTP - This plant is an advanced secondary treatment facility which uses the conventional activated sludge biological process with phosphorus removal, and chlorination. The Buffalo Sewer Authority system serves the City of Buffalo as well as the first ring suburban towns of Cheektowaga and West Seneca, about one half of the Town of Lancaster, and the Villages of Sloan, Depew, and Lancaster. There are about 170 significant industrial users in the City of Buffalo and an additional 50 in the suburban communities that rely upon the WWTP for treatment of their industrial wastes.

The Buffalo Sewer Authority WWTP was monitored for a 72 hour period, September 13-16, 1982 by DEC in conjunction with Environment Canada (DOE). DEC toxic substances sampling equipment was employed to obtain three consecutive 24-hour composite samples of the WWTP final effluent and one 24-hour composite of the plant influent, along with the associated grab samples and field measurements necessary for priority pollutant analyses. The samples, which also included dewatered sludge cake, were split by DOE and DEC.

The plant effluent was also sampled on three previous occasions by DEC during the period of the point source survey program. Analytical results of the six effluent samples have been averaged in the following tabulation:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Benzo(a)anthracene	0.7	1.5
Bis(2-ethylhexyl) phthalate	3.3	7.3
1,4-Dichlorobenzene	0.4	0.8
Di-n-butyl phthalate	0.4	0.9
Fluoranthene	1.6	3.6 $\frac{1}{2}$
Pyrene	1.6	3.6 $\frac{1}{2}$
Bromodichloromethane	0.3	0.7
Chloroform	3.2	7.1
Methylene chloride	12.9	28.4
Tetrachloroethylene	3.2	5.1
Aldrin	0	0.1
Phenols (4AAP)	4.7	10.3

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Beryllium	5.6	12.4
Cadmium	6.0	13.2
Chromium	96.7	213.3
Copper	45.7	100.7
Lead	47.8	105.3
Mercury	0	0.1
Nickel	55.1	121.4
Silver	8.2	18.0
Zinc	136.6	301.1
Cyanides	12.7	27.9

I/ Loading computed at parameter detection limit. Parameter was identified but not quantified.

There was ongoing construction work in the primary treatment section of the plant throughout all six 24-hour sampling periods. Reduced primary clarifier capacity could have caused washout of settled solids in the operating clarifiers, thus reducing overall plant removal efficiencies.

The EPA sampling of this facility indicated the following parameters in the discharge: zinc 161.9 kg/day (357 lbs/day), nickel 31.3 kg/day (69 lbs/day), chromium 27.2 kg/day (60 lbs/day), copper 13.6 kg/day (30 lbs/day), and bis(2-ethylhexyl) phthalate 5.8 kg/day (12.7 lbs/day).

In the DEC acute 24-hour toxicity screening test with chlorine present in the wastewater, the results were positive for acute toxicity for both daphnia and fathead minnows. When the water was dechlorinated, the results were negative for both species.

A.1.4 Black Rock Canal Segment

There are no major direct industrial or municipal discharges to the Black Rock Canal segment. Combined sewer overflows from the Buffalo Sewer Authority collection system do exist along this waterway.

A.2 Tonawanda-North Tonawanda Sub-Area

A.2.1 Town of Tonawanda WWTP - This advanced secondary treatment plant serves the Town of Tonawanda, the City of Tonawanda, and the Village of Kenmore. The treatment process consists of pure oxygen activated sludge, phosphorus removal, rapid sand filtration, and chlorination. There are eight significant industrial users in the system: six in the town and two in the city. The Town of Tonawanda WWTP analytical results from the DEC sampling showed only two organic priority pollutants above the cutoff level in the final effluent:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
1,2-Dichlorobenzene	0.8	1.8 ^{1/}
beta-BHC	0.04	0.1

^{1/} Loading computed at parameter detection limit. Parameter was identified but not quantified.

Metals, cyanides, and phenols in the effluent were identified as follows:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Beryllium	1.6	3.6
Chromium	8.2	18.0
Zinc	4.9	10.8
Cyanides	12.1	26.6
Phenols (4AAP)	2.9	6.3

No beryllium was detected in the influent samples and only 2.6 kg/day (5.8 lb/day) of cyanides were found in the influent.

Phenols (4AAP) totaled 270.7 kg/day (596.7 lbs/day) in the plant influent and 2.9 kg/day (6.3 lbs/day) in the effluent, a removal efficiency of 98.9%. Influent benzene at 688.5 kg/day (1517.9 lbs/day) and toluene at 61.3 kg/day (135.1 lbs/day) were completely removed and undetected at detection limit of 10 ug/L in the final effluent. Over 45.4 kg/day (100 lbs/day) of phenol similarly was removed in the pure oxygen biological system. The beta-BHC pesticide was not detected in the influent samples.

No quantifiable priority pollutant parameters were found in the EPA sampling of this discharge.

The 24-hour toxicity testing showed that the chlorinated effluent was toxic to daphnia and fathead minnows. The dechlorinated effluent was non-toxic to both, but was distressing to the fathead minnows.

A.2.2 Town of Amherst WWTP - The Town of Amherst advanced wastewater treatment plant is located on Tonawanda Creek and serves the Town of Amherst, a portion of the Town of Clarence, and the Village of Williamsville. The plant includes a two-stage pure oxygen activated sludge biological process with phosphorus removal, rapid sand filtration, and chlorination. There are no significant industrial users which discharge to the system. The WWTP discharges to Tonawanda Creek, which is part of the NYS Barge Canal System. Flow in the canal is from west to east (away from the Niagara River) during the navigation season, usually April 15 to November 15. The Niagara River provides an average of about $31.1 \text{ m}^3/\text{s}$ (1100 cubic feet per second) in flow augmentation to the canal during that period.

The Town of Amherst WWTP effluent contained trace quantities of lindane and alpha-endosulfan plus metal priority pollutants above cutoff values as follows:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Lead	15.0	33.0
Nickel	6.8	14.9
Zinc	3.8	8.3

There is no indication in the data of any significant industrial contributions of toxics. However, due to the use of Tygon tubing in the sampler at this facility, the bis(2-ethylhexyl) phthalate concentrations cannot be determined because of the potential for sample contamination.

In the 24-hour acute toxicity test on dechlorinated final effluent, both daphnia and fathead minnows responded negatively. However, the effluent

was distressing to fathead minnows.

A.2.3 City of North Tonawanda WWTP - This plant is an advanced technology treatment facility employing chemical flocculation and precipitation, granular activated carbon, rapid sand filtration, phosphorus removal, and chlorination processes. There are six significant industrial users discharging to the collection system.

The North Tonawanda WWTP final effluent contained the following parameters above cutoff values during the DEC sampling:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Chloroform	0.3	0.6
Phenols (4AAP)	0.4	1.0
Cadmium	0.5	1.1
Chromium	1.7	3.7
Zinc	1.7	3.7
Cyanides	0.7	1.4

Sludge and influent analyses appear normal for a WWTP serving a residential service area.

The chlorinated and dechlorinated effluent samples were non-toxic to both daphnia and fathead minnows, but both screening and definitive tests were distressing to the fathead minnows, with the 48-hour EC50 calculated at 61%. (EC is effective concentration; 50 indicates 50% of the test animals were immobilized).

The EPA sampling preceded the completion of construction of the activated carbon treatment units at this facility.

A.2.4 General Motors Corporation, Chevrolet Division - The Chevrolet Division engine plant and foundry discharge showed the following parameters above cutoff values:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Phenols (4AAP)	1.5	3.3
Cyanides	0.6	1.2
Zinc	14.0	30.9

The 24-hour acute toxicity was reported as non-toxic for daphnia and fathead minnows after removal of chlorine.

General Motors announced the termination of foundry operations at this facility in 1983.

A.2.5 Niagara Mohawk Power Corporation - The magnitude of flow from the coal-fired Niagara Mohawk Huntley Station is significant. Three outfalls, 003, 004, and 005, discharged a total flow of 2,700,000 m³/day (714 MGD) during the 24-hours of sampling. DEC sampled only the largest of the three discharges, 005. Loadings were calculated based on the total flow to the three outfalls, 2,700,000 m³/day (714 MGD), at the concentrations of pollutants identified in the analyses for the samples from 005, as upstream water usage conditions are identical. Based on the total flow of 2,700,000 m³/day (714 MGD) for the three outfalls, the loading results were as follows:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Cyanides	5.4	11.9
Nickel	135.1	297.9
Phenols (4AAP)	5.4	11.9

Outfalls 001, 007, and 008 contained the following parameters above the cutoff values:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Chromium	5.6	12.4
Lead	7.3	16.1

Acute toxicity (24-hour) test results after dechlorination of samples for outfalls 001, 005, 007, and 008 were non-toxic for daphnia and fathead minnows.

A.2.6 Dunlop Tire and Rubber Corporation - The Dunlop Tire discharge contained lead at 3.7 kg/day (8.2 lbs/day) and nickel and zinc at 0.5 kg/day (1.0 lbs/day). Each is a priority pollutant that is above cutoff values. The 24-hour acute toxicity results were negative for both daphnia and fathead minnows.

A.2.7 FMC Corporation - The FMC Corporation manufactures calcium and zinc peroxide plus ammonium, potassium, and sodium persulfates. The discharge analytical results indicated only copper and zinc at 1.2 kg/day (2.6 lbs/day) as priority pollutants above cutoff values. The 24-hour acute toxicity results for FMC were non-toxic for both daphnia and fathead minnows.

A.2.8 Ashland Oil, Incorporated - Ashland Oil refinery effluent indicated phenols (4AAP) at 1.0 kg/day (2.1 lbs/day) and hydrazine at 0.4 kg/day (0.8 lbs/day) in the discharge. Due to the use of Tygon tubing in the sampler at the facility, the bis(2-ethylhexyl) phthalate concentration could not be determined. The 24-hour acute toxicity test results were non-toxic for both daphnia and fathead minnows.

This refinery ceased operations in 1982.

A.2.9 Spaulding Fibre Company - The Spaulding Fibre Company manufactures paper stock, vulcanized fibers, and high pressure plastic laminates. The following priority pollutant metals above cutoff values represent the combined loading from two outfalls from the Spaulding Fibre Company:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Chromium	0.7	1.5
Zinc	34.7	76.6

A PCB, Arochlor 1248, was tentatively identified and quantified in outfall 002 at 0.87 ug/L or 0.001 kg/day (0.0026 lbs/day). The 24-hour acute toxicity results for outfall 001 effluent were non-toxic for both daphnia and fathead minnows.

The 002 effluent sample was non-toxic for the fathead minnows but toxic for the daphnia in the 24-hour screening test with a 48-hour LC50 of 16.5% determined in the definitive test.

A.2.10 Occidental Chemical Corporation, Durez Division - The Durez Division manufactures phenolic resins, phenolic molding compounds, diallyl phthalate molding compounds, alkyd molding compounds, para-tertiary-ostyl phenol, hexamethylenetetramine, and calcium stearate. There are 14 outfalls at the Occidental Chemical Durez Division Plant. Below is a listing by outfall of parameters above cutoff values during the DEC sampling:

<u>Outfall</u>	<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
001	Chlorobenzene	0.7	1.5
002	Phenols (4AAP)	11.2	24.6
003	Phenols (4AAP)	2.8	6.1
004	Phenol	1.3	2.9
005	Phenols (4AAP)	2.1	4.7
	Phenol	1.5	3.2
	1,4-Dichlorobenzene	0.4	0.8
	Benzene	1.3	2.8
006	Chlorobenzene	2.3	5.0
	Phenol	2.2	4.9
	Phenols (4AAP)	3.9	8.6
007	1,2-Dichlorobenzene	0.2	0.5
008	Phenol	0.5	1.2
	1,4-Dichlorobenzene	0.3	0.7

EPA sampling of this facility indicated phenol 2.4 kg/day (5.4 lbs/day) and phenols (4AAP) 4.8 kg/day (10.5 lbs/day) from the plant outfalls.

Complete 24 hour acute toxicity sampling and testing was undertaken for this facility with non-toxic results for outfalls 001, 003, 004, 006,

007, 009, and 010. Toxic determinations for both species for other outfalls are listed below with 48-hour LC50 (percent of effluent in pure water) for fathead minnows and daphnia shown in that order:

<u>Outfall</u>	<u>Concentration Toxicity Criteria</u>	<u>Fathead minnows</u>	<u>Daphnia Magna</u>
002	48-hour LC50	72%	62%
005	48-hour LC50	38%	50-100%
	48-hour EC50 (strong chemical odor)	18%	17.5%
008	48-hour LC50	28%	35%
	48-hour EC50 (strong chemical odor)		10.5%
013	48-hour LC50	4.4%, (Oil in sample; strong organic solvent odor; diisopropylether spill 2 days prior to sampling)	1.5%

A.2.11 E.I. du Pont de Nemours and Company (Tonawanda Plant) - This plant manufactures thin polyvinyl fluoride films and marble-like sheets used as building material. Monitoring data from this firm's SPDES renewal application were used to characterize the discharge from this facility. Priority pollutants identified include the following above cutoff values.

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Methylene chloride	0.7	1.6
Benzene	0.7	1.6
Mercury	0.1	0.2

The 24-hour acute toxicity screening test showed the sample non-toxic to fathead minnows but toxic to daphnia. The definitive test indicated the sample was non-toxic to daphnia.

A.2.12 Union Carbide Corporation, Linde Division - Union Carbide Corporation, Linde Division, in the Town of Tonawanda manufactures and fabricates cryogenic hardware and systems. It discharges from two outfalls into Two Mile Creek, a tributary of the Niagara River. Thirteen PAH

compounds were identified in these outfalls with a combined loading of 1.1 kg/day (2.4 lbs/day).

Discharges from both Union Carbide outfalls were determined non-toxic for both daphnia and fathead minnows in the 24-hour acute toxicity tests.

A.3 Niagara Falls, New York Sub-Area

A.3.1 Wheatfield - Upper River Segment

A.3.1.1 Niagara County Sewer District No. 1 WWTP - This WWTP located in the Town of Wheatfield serves the town, plus portions of the Towns of Lewiston, Niagara, Lockport, and Pendleton. The plant provides advanced secondary treatment utilizing the conventional activated sludge biological process, phosphorus removal, rapid sand filtration, and chlorination. Five significant industrial users are tributary to the system.

The Niagara County Sewer District No. 1 WWTP effluent contained the following loadings above cutoff values during the DEC sampling:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Phenols (4AAP)	1.0	2.1
Lead	1.1	2.5
Nickel	0.9	2.0
Zinc	0.6	1.3

EPA sampling at this facility indicated the following priority pollutants: 1,2-dichloroethane 0.3 kg/day (0.7 lbs/day) and nickel 0.5 kg/day (1.1 lbs/day).

The dechlorinated effluent sample in the DEC 24-hour screening test for acute toxicity proved non-toxic for both daphnia and fathead minnows.

A.3.1.2 Town of Grand Island Sewer District No. 2 WWTP - This plant is an advanced secondary treatment facility utilizing pure oxygen activated sludge biological process, phosphorus removal, rapid sand filtration and

chlorination. The Town of Grand Island WWTP effluent contained the following quantities of priority pollutants above cutoff values:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
2,4-Dinitrotoluene	0.2	0.5 ^{1/}
Copper	0.5	1.1
Lead	1.9	4.2
Nickel	0.5	1.1
Zinc	0.5	1.1

^{1/} Loading computed at parameter detection limit. Parameter was identified but not quantified.

The 24-hour acute toxicity tests indicated non-toxic designations for both daphnia and fathead minnows with the following note: "Sample distressing but not lethal to fish; 0.03 mg/L unionized NH₃."

A.3.1.3 Occidental Chemical Corporation (Niagara Plant) - The Occidental Chemical Niagara Plant manufactures the following products:

chlorine	Dechlorane Plus
caustic soda	3,5-dichlorobenzoyl chloride
hydrogen	Pentac
sulfur monochloride	thionyl chloride
sulfur dichloride	sulfuryl chloride
potassium hydroxide	muratic acid
potassium carbonate	monochlorotoluene
phosphorus chlorides	p-chlorotoluene
phosphorus sulfides	p-chlorobenzotrithloride
hypophosphites	p-chlorobenzotrifluoride
acid phosphates	o-chlorotoluene
benzoyl chloride	dichlorotoluene

Effluent toxics above cutoff values are reported by outfall as follows:

<u>Outfall</u>	<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
001	Bis(2-ethylhexyl) phthalate	0.5	1.1
	Trans-1,2-dichloroethylene	0.3	0.7 ^{1/}
	Tetrachloroethylene	0.3	0.7 ^{1/}
	Trichloroethylene	0.3	0.7 ^{1/}
	Chromium	3.1	6.9
	Silver	0.6	1.4

003	Hexachlorobutadiene	0.2	0.5
	Trans-1,3-dichloropropene	0.2	0.5
	Tetrachloroethylene	0.4	0.8
	Lead	2.3	5.0
	Nickel	1.1	2.5
	Silver	0.5	1.0
	3-Chlorotoluene	0.2	0.5 ^{1/}
	4-Chlorotoluene	0.2	0.5 ^{1/}
	2,4-Dichlorotoluene	0.2	0.5 ^{1/}
	1,2,3,4-Tetrachlorobenzene	0.2	0.5 ^{1/}
	2-Chlorobenzotrifluoride	0.2	0.5 ^{1/}
	Thallium	4.5	10.0
	Dechlorane 515 (Plus)	0.2	0.4
005	2,4-Dinitrophenol	1.7	3.8
	1,2-Dichlorobenzene	0.2	0.5
	1,2,4-Trichlorobenzene	0.4	1.0
	Nickel	1.3	2.8
	Chlorendic Acid	0.9	1.9
	3-Chlorotoluene	3.0	6.6
	2,4-Dichlorotoluene	0.3	0.6 ^{1/}
	2,3,4,5,6-Pentachlorotoluene	0.3	0.6 ^{1/}
	1,2,3,4-Tetrachlorobenzene	0.5	1.2
1,2,3,5-Tetrachlorobenzene	0.3	0.6 ^{1/}	

^{1/} Loading computed at parameter detection limit. Parameter was identified but not quantified.

The 24-hour acute toxicity test results for outfalls 001, 003, and 005 were non-toxic for both daphnia and fathead minnows. The sample from 035 (S-area), tributary to 003, was toxic to both species with the 48-hour LC50 of 17.5% and 4.8% for fathead minnows and daphnia, respectively. The report noted white settleable solids, strong chemical odor, low alkalinity, and elevated hardness, conductivity, and salinity.

Outfall 002 was also toxic for both species with a 48-hour LC50 of 71% and 58% for minnows and daphnia, respectively. The report noted a slight brown color and white settleable solids in the sample.

A.3.1.4 Union Carbide Corporation, Welding Flux - The Union Carbide Welding Flux Plant's two outfalls contained lead above cutoff values at 2.5 kg/day (5.5 lbs/day) in outfall 001.

The 24-hour acute toxicity screening tests for both outfalls were non-toxic to both daphnia and fathead minnows.

A.3.1.5 E.I. du Pont de Nemours and Company (Niagara Plant) - This Du Pont plant manufactures chlorine, sodium, polytetramethylene ether glycol, and polyester glycol polymers. Metallic cyanides were manufactured at the time of sampling, but this operation has since been terminated. Outfall 004 contained lead at 6.0 kg/day (13.2 lbs/day) and nickel at 1.6 kg/day (3.5 lbs/day), which were the only priority pollutants above cutoff values. Nothing of significance was reported in the outfall 005 discharge. Lead at 0.5 kg/day (1.1 lbs/day) was the only parameter above cutoff values reported in outfall 006.

The 24-hour acute toxicity test results for outfalls 004, 005, and 006 were non-toxic for both daphnia and fathead minnows after dechlorination.

A.3.1.6 Carborundum Company - The Carborundum Company Buffalo Avenue Plant manufactures aluminum oxide grains, a ceramic insulation, boron nitride powder and pellets, and boron carbide powder and pellets. Silicon carbide grain production was shut down at the time of sampling. Outfall 001 indicated no toxic pollutants above cutoff values. Outfall 002 contained lead at 1.5 kg/day (3.2 lbs/day).

The 24-hour acute toxicity tests of both outfall samples were non-toxic after dechlorination for both species.

A.3.2 Lower River Segment

A.3.2.1 City of Niagara Falls WWTP - This plant is an advanced technology treatment plant consisting of chemical flocculation and precipitation, granular activated carbon filtration, phosphorus removal, and chlorination. Structural failure of the granular activated carbon filters in 1978, a few months after their operation had commenced, has resulted in the discharge receiving only partial treatment by the chemical flocculation and precipitation process. The granular activated carbon filters are scheduled

to have reconstruction completed by February, 1985. Thirty-one significant industrial users are tributary to the system. Final effluent from the WWTP is discharged to the lower river through the Adams Tailrace Tunnel.

The Niagara Falls WWTP effluent contained the following loadings of toxic chemicals above cutoff values:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Phenol	25.0	55.2
Phenols (4AAP)	106.3	234.4
1,2-Dichlorobenzene	3.9	8.7
1,2,4-Trichlorobenzene	3.4	7.4
Chlorobenzene	2.1	4.6 ^{1/}
Chloroform	10.0	22.1
Trans-1,2-dichloroethylene	2.5	5.5
Ethylbenzene	4.2	9.2
Methylene chloride	7.7	17.0
1,1,2,2-Tetrachloroethane	2.1	4.6 ^{1/}
Tetrachloroethylene	2.3	5.1
Toluene	5.4	12.0
1,1,1-Trichloroethane	4.4	9.7
alpha-BHC	0.2	0.4 ^{2/}
beta-BHC	0.04	0.1 ^{2/}
gamma-BHC	0.04	0.1 ^{2/}
Endosulfan sulfate	0.1	0.3
Arsenic	2.1	4.6
Chromium	20.9	46.0
Copper	27.1	59.8
Selenium	3.5	7.8
Zinc	43.8	96.5
2-Chlorotoluene	43.8	96.5
Trichloroethylene	9.2	20.2
1,2,3-Trichlorobenzene	0.3	0.7

^{1/} Loading computed at parameter detection limit. Parameter was identified but not quantified.

^{2/} Confirmed by second GC column analysis.

The overflow at the Gorge Pumping Station, outfall #003, contained the following toxic chemicals above cutoff values:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Benzo(a)anthracene	0.1	0.21/
Benzo(b)anthracene	0.1	0.21/
Benzo(c)anthracene	0.1	0.21/
Chrysene	0.1	0.21/
Fluoranthene	0.2	0.41/
Pyrene	0.2	0.41/
1,2,4-Trichlorobenzene	0.2	0.4
Chlorobenzene	0.2	0.41/
Methylene chloride	0.2	0.4
1,2-Dichlorobenzene	0.5	1.0
Trans-1,2-dichloroethylene	0.8	1.7
1,1,2,2-Tetrachloroethane	0.3	0.6
Tetrachloroethylene	0.3	0.6
Trichloroethylene	1.5	3.4
Chloroform	0.5	1.2
Copper	3.0	6.7
Chromium	1.6	3.5
Lead	1.6	3.5
Zinc	3.0	6.7

1/ Loading computed at parameter detection limit. Parameter was identified but not quantified.

The 24-hour acute toxicity tests for the WWTP effluent were toxic for both daphnia and fathead minnows in dechlorinated samples. The 48-hour LC50 results were 17.5% and 100% for fathead minnows and daphnia, respectively. The 48-hour EC50 (EC is effective concentration; 50 indicates 50% of the test animals were immobilized) for daphnia was 41%.

A.3.2.2 Town of Lewiston Master Sewer Improvement Area WWTP - This plant serves portions of the Towns of Lewiston and Porter and the Villages of Lewiston and Youngstown. The WWTP provides advanced secondary treatment utilizing the conventional activated sludge biological process, phosphorus removal, rapid sand filtration, and chlorination.

The only toxic priority pollutant loading above cutoff values found in the Town of Lewiston MSIA WWTP effluent was lead at 2.4 kg/day (5.3 lbs/day).

The 24-hour acute toxicity test results were non-toxic for both daphnia and fathead minnows.

A.3.2.3 City Diversion Sewer - Niagara Falls - The City Diversion Sewer is used to divert Occidental Chemical, Du Pont, Olin, and Carborundum cooling water from the collection system leading to the Niagara Falls WWTP. The flow from this diversion sewer enters the Niagara River through the Adams Tailrace Tunnel.

The Occidental Chemical outfall 004 discharge to the diversion sewer contained the following loadings of toxic priority pollutants above cutoff values:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Bis(2-ethylhexyl) phthalate	0.8	1.8
Tetrachloroethylene	0.6	1.4
Toluene	1.0	2.1
1,1,1-Trichloroethane	0.4	0.9 ^{1/}
Trichloroethylene	0.4	0.9 ^{1/}
alpha-BHC	0.1	0.3
gamma-BHC	0.5	1.0
alpha-Endosulfan	0.04	0.1
Benzene	0.4	0.9 ^{1/}
Carbon Tetrachloride	0.4	0.9 ^{1/}
Cyanides	0.5	1.1
Silver	0.9	1.9
2-Chlorotoluene	3.9	8.7
2,6-Dichlorotoluene	0.4	0.9 ^{1/}

^{1/} Loading computed at parameter detection limit. Parameter was identified but not quantified.

The 24-hour acute toxicity test results for outfall 004 were negative for both daphnia and fathead minnows in the screening phase after dechlorination of the sample.

The Du Pont Company has two outfalls to the diversion sewer-001E and 001W. The only priority pollutant loading above cutoff values from the outfalls was lead at 1.2 kg/day (2.6 lbs/day) in 001W. Both discharges were tested for 24-hour acute toxicity and were non-toxic.

The Olin Corporation manufactures liquid chlorine, caustic soda, calcium hypochlorite, sodium methyate, and sodium chlorite. The plant

discharges to the diversion sewer from outfalls 002, 003, 004, and 005. Toxic loadings above cutoff values from 002, 004, and 005 were:

<u>Outfall</u>	<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
002	Trans-1,2-dichloroethylene	2.0	4.3
	1,1,2,2-Tetrachloroethane	1.8	6.1
	Tetrachloroethylene	6.6	14.5
	Trichloroethylene	16.1	35.5
	Chloroform	5.5	12.2
	Zinc	0.9	2.0
	004	Trans-1,2-dichloroethylene	0.3
1,1,2,2-Tetrachloroethane		0.5	1.0
Tetrachloroethylene		1.9	4.2
Trichloroethylene		3.4	7.6
Chloroform		0.7	1.6
Lead		0.9	1.9
Zinc		0.5	1.0
Cyanides		0.3	0.6
005	Trans-1,2-dichloroethylene	0.4	0.9
	1,1,2,2-Tetrachloroethane	0.8	1.7
	Tetrachloroethylene	3.6	8.0
	Trichloroethylene	5.9	13.0
	Chloroform	0.9	1.9
	Zinc	0.5	1.1

Discharges from the above outfalls were non-toxic for both daphnia and fathead minnows in the 24-hour acute toxicity screening tests.

The Carborundum Company outfall 004 had no significant levels of priority pollutants above cutoff values. Phenols (4AAP) were found at 0.8 kg/day (1.7 lbs/day).

The 24-hour acute toxicity tests conducted on outfall 004 were toxic to daphnia before chlorine removal and non-toxic after removal. The discharge was non-toxic to fathead minnows before and after chlorination.

A.3.2.4 SCA Chemical Services Incorporated - This facility provides recovery, treatment, and disposal services for industrial and hazardous wastes. The lagoon water at SCA Chemical Services contained priority pollutant metals above cutoff values as follows:

<u>Parameter</u>	<u>kg/day</u>	<u>lbs/day</u>
Lead	3.2	7.1
Nickel	5.8	12.7

The above loadings are based on a maximum allowable discharge of 3785 m³/day (1.0 mgd); however, the total annual discharge is limited to 189,000 cubic metres (50 million gallons). The discharge is authorized on a lagoon fill and draw basis.

A.4 Fort Erie Sub-Area

The Fort Erie sub-area contains two significant point sources, the Fort Erie Anger Ave. WPCP and Fleet Manufacturing.

A.4.1 Fort Erie (Anger Ave.) WPCP - The Fort Erie WPCP is a primary treatment facility (design capacity 16,400 M³/d) which employs phosphorus removal. The following specific parameters exceeded the cutoff values used to define a significant point source:

<u>Parameter</u>	<u>kg/d</u>	<u>lbs/d</u>
Phenols (4AAP)	0.27	0.60
Copper	0.49	1.08
Zinc	1.30	2.86
1,2-Dichloroethane	0.32	0.70
Trans-1,2-Dichloroethylene	1.79	3.94
Dimethyl phthalate	0.75	1.65
Dibutyl phthalate	0.99	2.18

A.4.2 Fleet Manufacturing - Fleet manufactures aircraft, satellite, and radar equipment and components. The effluent does not comply with the MOE discharge objectives for chromium (1 mg/L), and exceeds the cutoff, producing an estimated load of 1.08 kg/d (2.38 lbs/d).

A plant effluent survey was carried out (under Section 126 of the Ontario Environmental Protection Act), at Fleet in mid-1983. Abatement measures designed to reduce metals discharges, including chromium, have been recommended in the survey report and will be initiated by the company in 1984.

A.5 Chippawa Sub-Area

The Chippawa sub-area does not contain any significant dischargers.

A.6 Niagara Falls, Ontario Sub-Area

The Niagara Falls sub-area contains the bulk of significant Canadian point sources: Atlas Steels, Cyanamid-Niagara Falls Plant, Cyanamid-Welland Plant, Niagara Falls WPCP, Welland WPCP, and the McMaster Ave. Combined Sewer.

A.6.1 Atlas Steels - The following parameters exceeded the cutoff values in the Atlas Steels final effluent:

<u>Parameter</u>	<u>kg/d</u>	<u>lbs/d</u>
Chromium	32.64	71.96
Copper	1.36	3.00
Lead	4.62	10.19
Nickel	27.2	59.98
Zinc	4.35	9.59
Trichloroethylene	3.04	6.70

Atlas Steels takes its process/cooling water from the old Welland Canal; therefore, net loadings were not calculated.

Atlas Steels was under a Ministry of the Environment Control Order which expired on September 30, 1983. The order required that Atlas reduce discharges of solvent extractables, suspended solids, and iron and control pH. The abatement measures stipulated have been implemented. It is anticipated that the most recent measures, the North Plant treatment facility and the new solidification plant (for the treatment of spent acids and alkalis, and pickling rinse waters), have reduced the average discharge loadings of metals.

A.6.2 Cyanamid at Niagara Falls - Cyanamid at Niagara Falls manufactures calcium carbide, cyanide and cyanamide. Four parameters, shown below, exceeded cutoff values. This plant takes its water supply from surface waters; however, net loadings were not calculated:

<u>Parameter</u>	<u>kg/d</u>	<u>lbs/d</u>
Zinc	0.60	1.32
Cyanides	0.96	2.11
Butylbenzyl phthalate	0.35	0.77

While the total discharges of zinc and cyanides from the Cyanamid Niagara Falls plant are above the cutoff values, the concentrations upon which these loadings are based are below Ontario discharge objectives for these parameters.

A.6.3 Cyanamid Welland Plant - The Cyanamid Welland Plant manufactures nitrogen and phosphorus fertilizers, nitric acid, HDS catalyst, and dicyanamide. This plant is presently under a Ministry of the Environment Control Order which expires in September, 1984. The priority pollutant parameters in excess of the cutoff were metals and cyanides as listed below. This plant also takes it's water supply from the Welland River; however, net loadings were not calculated.

<u>Parameter</u>	<u>kg/d</u>	<u>lbs/d</u>
Chromium	4.87	10.7
Nickel	2.34	5.15
Zinc	2.04	4.49
Copper	0.65	1.43
Cyanides	2.29	5.04

Of the parameters in the above list, the Control Order specifically addresses discharges of chromium, nickel, and cyanides. Among these three parameters, only chromium and cyanides were detected (in at least one sample) at concentrations above discharge objectives stipulated in the Control Order (1.0 mg/L and 0.1 mg/L, respectively). The company is on or ahead of the schedule established in the Control Order for implementation of abatement measures. It is anticipated that these parameters will have been reduced to meet the appropriate objective by the compliance date.

A.6.4 Niagara Falls WPCP - The Niagara Falls WPCP provides primary treatment and phosphorus removal with a rated capacity of 58,200 m³/d (15.3 mgd). Upgrading to secondary treatment has been proposed and is in the planning stage.

The following parameters were in excess of the defined cutoff values:

<u>Parameter</u>	<u>kg/d</u>	<u>lbs/d</u>
Phenols (4AAP)	0.87	1.91
Chromium	3.57	7.85
Copper	0.93	2.05
Lead	0.57	1.25
Zinc	11.3	24.9
Methylene chloride	0.39	0.86
Cyanides	0.34	0.75
2,4-Dichlorophenol	0.39	0.86
Dibutyl phthalate	3.40	7.48
Diethyl phthalate	0.79	1.74
Bis(2-ethylhexyl) phthalate	0.30	0.66

A.6.5 Welland WPCP - The Welland WPCP provides secondary treatment (conventional activated sludge) and phosphorus removal and had a design capacity in 1981 of 45,400 M³/d. The plant has since been expanded to 68,100 M³/d. Three heavy metals were present in the effluent in excess of the cutoff values:

<u>Parameter</u>	<u>kg/d</u>	<u>lbs/d</u>
Copper	0.70	1.54
Lead	13.4	29.4
Zinc	1.71	3.76

A.6.6 McMaster Ave. Combined Sewer - The McMaster Ave. Combined Sewer contains industrial and sanitary wastewater, industrial cooling water, and storm water. Since the time of the surveys, some storm water and industrial cooling water have been segregated; however, sanitary and industrial wastewater continue to be directed to the Welland River. At the time of the surveys, the outfall contained the following parameters in excess of the cutoff values:

<u>Parameter</u>	<u>kg/d</u>	<u>lbs/d</u>
Phenols (4AAP)	0.37	0.81
Chromium	2.2	4.84
Copper	1.01	2.22
Lead	4.64	10.2
Nickel	3.56	7.83
Zinc	1.37	3.01
Di-n-butyl phthalate	0.26	0.57
Bis(2-ethylhexyl) phthalate	0.27	0.58

A.7 Additional Support Information

The following tables (A.1 to A.4) and other information are referred to in Chapter II, Point Source Discharges, and are supplied here to give more detailed information on the following:

1. EPA Priority Pollutant List
2. New York Storm Sewer Data
3. Ontario Urban Runoff Studies

Ontario Urban Runoff Studies

Table A.3 shows the estimated loading of toxic substances in urban runoff on an annual basis.

The highest annual loadings were computed for metals, which totalled over 16 tonnes/y (lead-5.9 t/y, zinc-6.2 t/y, chromium-1.8 t/y, nickel-1.0 t/y, and copper-1.1 t/y). Other loadings were 22 kg/y of polycyclic aromatic hydrocarbons, 10 kg/y of chlorinated benzenes, 2 kg/y of PCBs, and 1.5 kg/y of organochlorine pesticides (refer to report by Marsalek and Greck for upper and lower estimates).

Selected compounds (i.e., those detected at the highest levels) were reduced to an average daily loading for comparison to contributions from Canadian point sources. Although it is recognized that the runoff inputs are

a result of precipitation events only and therefore do not occur every day of the year, the basis used for reduction from annual to daily loadings was 365 days per year. During wet weather, the reported equivalent daily loadings may be exceeded by an order of magnitude.

Table A.4 shows that the loading contribution of many compounds from runoff can represent a significant portion of that from point sources in the area studied. For some compounds, eg., pyrene and fluoranthene, the contribution from runoff is greater.

TABLE A.1
EPA PRIORITY POLLUTANTS

Acid Phenolics

2-chlorophenol
2,4-dichlorophenol
2,4-dimethylphenol
4,6-dinitro-o-cresol
2,4-dinitrophenol
2-nitrophenol
4-nitrophenol
p-chloro-m-cresol
pentachlorophenol
phenol
2,4,6-trichlorophenol

Pesticides

Aldrin
alpha-BHC
beta-BHC
delta-BHC
gamma-BHC
Chlordane
4,4'-DDD
4,4'-DDE
4,4'-DDT
Dieldrin
alpha-Endosulfan
beta-Endosulfan
Endosulfan sulfate
Endrin
Endrin aldehyde
Heptachlor
Heptachlor epoxide
PCB-1016
PCB-1221
PCB-1232
PCB-1242
PCB-1248
PCB-1254
PCB-1260
Toxaphene

Base Neutrals

acenaphthene
acenaphthylene
anthracene
benzidine
benzo(a)anthracene
benzo(a)pyrene
benzo(b)fluoranthene
benzo(g,h,i)perylene
benzo(k)fluoranthene
bis(2-chloroethoxy) methane
bis(2-chloroethyl) ether
bis(2-chloroisopropyl) ether
bis(2-ethylhexyl) phthalate
4-bromophenylphenyl ether
butylbenzyl phthalate
2-chloronaphthalene
4-chlorophenylphenylether
chrysene
dibenzo(a,h)anthracene
1,2-dichlorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzene
3,3'-dichlorobenzidine
diethyl phthalate
dimethyl phthalate
di-n-butyl phthalate
2,6-dinitrotoluene
2,4-dinitrotoluene
di-n-octyl phthalate
1,2-diphenylhydrazine
fluoranthene
fluorene
hexachlorobenzene
hexachlorobutadiene
hexachlorocyclopentadiene
hexachloroethane
indeno(1,2,3-cd)pyrene
isophorone
naphthalene

nitrobenzene
N-nitrosodimethylamine
N-nitrosodi-n-propylamine
N-nitrosodiphenylamine
phenanthrene
pyrene
2,3,7,8-tetrachlorodibenzo-
p-dioxin
1,2,4-trichlorobenzene

Volatiles

acrolein
acrylonitrile
benzene
bromodichloromethane
bromoform
bromomethane
carbon tetrachloride
chlorobenzene
chloroethane
2-chloroethylvinyl ether
chloroform
chloromethane
dibromochloromethane
dichlorodifluoromethane
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethylene
trans-1,2-dichloroethylene
1,2-dichloropropane
cis-1,3-dichloropropene
trans-1,3-dichloropropene
ethylbenzene
methylene chloride
1,1,2,2-tetrachloroethane
tetrachloroethylene
toluene

1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethylene
trichlorofluoromethane
vinyl chloride

Inorganics

antimony
arsenic
asbestos
beryllium
cadmium
copper
cyanide
lead
mercury
nickel
selenium
silver
thallium
zinc

TABLE A.2
STORM SEWER SEDIMENT ANALYSES FOR PRIORITY AND SELECTED CATEGORY POLLUTANTS ^{1/}
(ug/g)

Sub-Area Segment	BUFFALO - LACKAWANNA					
	Lake Erie		Buffalo River			
Site	20" SSO ^{2/} to Smokes Cr. @ Kirby Ave. Lackawanna (C) ^{5/}	42" SSO ^{2/} to Smokes Cr. near Rt. 5 Lackawanna (C) ^{5/}	42" SSO ^{2/} to Cayuga Cr. @ French Rd. Cheektowaga (T) ^{5/}	72" SSO ^{2/} to Cayuga Cr. @ Helen St. Ext. ^{5/} Cheektowaga (T) ^{5/}	96" CSO ^{3/} to Buffalo R. from Sloan Drain ^{5/} Buffalo (C)	94" x 58" SS ^{2/} to Cazenovia Cr. near Orchard Park Rd. West Seneca (T) ^{5/}
Categories/Parameters						
ACID EXTRACTABLES						
Phenol	-	-	-	-	-	-
BASE/NEUTRAL EXTRACTABLES						
Acenaphthene	LT	LT	LT	-	-	-
Anthracene	LT	LT	LT	-	-	LT
Benzo(a)anthracene	LT	LT	-	LT	-	LT
Benzo(a)pyrene	LT	LT	-	LT	-	LT
Benzo(b)fluoranthene	LT	LT	LT	LT	-	LT
Benzo(g,h,i)perylene	LT	-	-	-	-	-
Benzo(k)fluoranthene	-	-	-	-	-	-
Bis(2-ethylhexyl)phthalate	-	25	-	-	-	-
Chrysene	LT	LT	-	LT	-	LT
Dibenzo(a,h)anthracene	-	-	-	-	-	-
1,2-Dichlorobenzene	-	-	-	-	-	-
1,3-Dichlorobenzene	-	-	-	-	-	-
1,4-Dichlorobenzene	-	-	-	-	-	-
3,3-Dichlorobenzidine	-	-	-	-	-	-
Di-n-butylphthalate	-	-	-	-	-	-
Di-n-octylphthalate	-	-	-	-	-	-
Fluoranthene	LT	LT	LT	LT	-	LT
Fluorene	-	LT	-	-	-	-
Hexachlorobenzene	-	-	-	-	-	-
Hexachlorobutadiene	-	-	-	-	LT	-
Indeno(1,2,3-cd)pyrene	LT	-	-	-	-	-
Naphthalene	-	LT	-	-	-	-
Phenanthrene	LT	LT	-	LT	-	LT
Pyrene	-	LT	LT	LT	-	LT
PURGEABLES						
Benzene	-	-	-	-	LT	-
Bromomethane	-	LT	-	-	-	-
Chlorobenzene	-	-	-	-	-	-
Chloroethane	-	-	-	-	-	-
Chloroform	-	-	-	-	LT	-
Chloromethane	-	-	-	-	-	-
1,1-Dichloroethane	-	-	-	-	-	-
1,1-Dichloroethylene	-	-	-	-	-	-
Trans-1,2-dichloroethylene	-	-	-	-	-	-
Ethylbenzene	-	LT	-	-	-	-
Methylene chloride	-	-	-	-	LT	-
Tetrachloroethylene	-	LT	-	LT	LT	-
Toluene	-	LT	-	LT	-	LT
1,1,1-Trichloroethane	-	-	-	-	-	-
Trichloroethylene	-	-	-	LT	LT	-
Trichlorofluoromethane	-	-	-	-	-	-
Vinyl chloride	-	-	-	-	-	-
PESTICIDES						
Aldrin	-	-	-	-	-	-
α-BHC	-	-	-	-	-	-
β-BHC	-	-	-	-	-	-
δ-BHC	-	-	-	-	-	-
γ-BHC	-	-	-	-	-	-
4,4'-DDD	-	-	-	-	-	-
4,4'-DDE	-	-	-	-	0.05	-
4,4'-DDT	-	-	-	-	-	-
β-Endosulfan	-	-	-	-	-	-
Endosulfan sulfate	-	-	-	-	-	-
Endrin	-	-	-	-	-	-
Heptachlor	-	-	-	-	-	-
Heptachlor epoxide	-	-	-	-	-	-
PCBs						
PCB-1242	-	-	-	-	2.6	-
PCB-1254	-	-	-	2.1	-	-
PCB-1260	-	-	-	-	-	-
METALS, TOTAL						
Antimony	-	-	15	18	-	-
Arsenic	1.3	14	1.1	2.5	10	9.2
Beryllium	0.4	3.9	-	-	0.9	1.1
Cadmium	48	3.6	0.7	0.6	9.3	-
Chromium	29	42	40	34	18	18
Copper	24	78	96	40	49	28
Lead	360	470	330	210	680	55
Mercury	0.06	-	-	0.01	0.07	-
Nickel	7.5	-	60	29	60	17
Selenium	-	-	-	-	-	-
Silver	2.8	-	1.5	-	4.7	1.1
Thallium	-	-	-	-	-	-
Zinc	250	520	320	210	710	140
CYANIDES, TOTAL	4.6	29	-	1.6	-	-
PHENOLS (4AAP)	0.3	3.4	-	0.9	0.5	0.4

^{1/} LT - Parameter identified but not quantified

^{2/} SSO - Storm sewer outfall

^{3/} CSO - Combined sewer overflow

^{4/} SS - Storm sewer system sample

^{5/} (C)=City, (T)=Town, (V)=Village

TABLE A.2 (Continued)

Sub-Area	BUFFALO - LACKAWANNA				
Segment	Buffalo River				
Site	78" SSO ^{2/} to Cazenovia Cr. @ golf course Buffalo (C) ^{5/}	N 66" SS ^{4/} /trib. to Buffalo R. @ Germania & Tiftt St. Buffalo (C) ^{5/}	S 66" SS ^{4/} /trib. to Buffalo R. @ Germania & Tiftt St. Buffalo (C) ^{5/}	78" CSO ^{3/} to Buffalo R. @ Boone St. Buffalo (C) ^{5/}	SS ^{4/} /trib. to Buffalo R. @ Smith & Seneca St Buffalo (C) ^{5/}
Categories/Parameters					
ACID EXTRACTABLES					
Phenol	-	-	-	-	-
BASE/NEUTRAL EXTRACTABLES					
Acenaphthene	LT	LT	LT	LT	LT
Anthracene	8.3	LT	2.1	2.8	LT
Benzo (a)anthracene	LT	LT	LT	LT	-
Benzo (a)pyrene	-	-	-	-	LT
Benzo (b)fluoranthene	LT	-	-	-	-
Benzo (g,h,i)perylene	-	-	-	-	-
Benzo (k)fluoranthene	-	-	-	-	-
Bis(2-ethylhexyl)phthalate	-	35	-	-	-
Chrysene	LT	LT	LT	LT	LT
Dibenzo (a,h)anthracene	-	-	-	-	-
1,2-Dichlorobenzene	-	-	-	-	-
1,3-Dichlorobenzene	-	-	-	-	-
1,4-Dichlorobenzene	-	-	LT	-	-
3,3-Dichlorobenzidine	-	-	-	-	-
Di-n-butylphthalate	-	-	-	-	-
Di-n-octylphthalate	-	-	-	-	-
Fluoranthene	LT	LT	LT	3.7	LT
Fluorene	LT	-	LT	LT	LT
Hexachlorobenzene	-	-	-	-	-
Hexachlorobutadiene	-	-	-	-	LT
Indeno (1,2,3-cd)pyrene	-	-	-	-	-
Naphthalene	LT	-	-	-	-
Phenanthrene	-	LT	LT	LT	LT
Pyrene	LT	LT	LT	2.5	LT
PURGEABLES					
Benzene	LT	LT	-	LT	LT
Bromomethane	-	-	-	-	-
Chlorobenzene	-	LT	-	-	-
Chloroethane	-	-	-	-	-
Chloroform	-	-	-	LT	LT
Chloromethane	-	-	-	-	-
1,1-Dichloroethane	-	-	-	-	-
1,1-Dichloroethylene	-	-	-	-	-
Trans-1,2-dichloroethylene	-	LT	LT	-	LT
Ethylbenzene	0.02	LT	LT	-	-
Methylene chloride	-	-	LT	0.02	-
Tetrachloroethylene	-	LT	LT	-	-
Toluene	0.1	0.02	LT	LT	LT
1,1,1-Trichloroethane	-	-	-	-	-
Trichloroethylene	-	LT	LT	LT	0.01
Trichlorofluoromethane	-	LT	-	-	LT
Vinyl chloride	-	-	-	-	-
PESTICIDES					
Aldrin	-	-	-	0.04	-
α-BHC	0.04	-	-	0.1	-
β-BHC	-	-	-	-	-
δ-BHC	0.08	-	-	-	-
γ-BHC	-	-	0.07	0.07	-
4,4'-DDD	0.2	-	-	-	-
4,4'-DDE	-	-	-	-	-
4,4'-DDT	-	-	-	0.03	-
β-Endosulfan	0.2	-	-	-	-
Endosulfan sulfate	0.3	-	-	-	-
Endrin	-	-	-	-	-
Heptachlor	0.01	-	-	-	-
Heptachlor epoxide	-	-	-	-	-
PCBs					
PCB-1242	-	-	-	-	6.2
PCB-1254	-	-	-	-	-
PCB-1260	-	-	-	-	3.8
METALS, TOTAL					
Antimony	-	-	-	-	-
Arsenic	5	5.2	1.9	7.8	4.6
Beryllium	1.2	1.1	-	0.4	-
Cadmium	2.7	2.3	1.4	2.1	4.6
Chromium	35	84	160	65	95
Copper	64	100	270	100	240
Lead	320	150	180	590	2500
Mercury	-	0.7	0.3	0.7	.4
Nickel	15	43	30	83	44
Selenium	-	-	-	-	-
Silver	-	-	3.3	-	-
Thallium	-	-	-	-	-
Zinc	420	590	330	380	480
CYANIDES, TOTAL					
	19	-	-	-	-
PHENOLS (4AAP)					
	1.6	4.6	2.7	0.5	1.9

1/ LT - Parameter identified but not quantified

2/ SSO - Storm sewer outfall

3/ CSO - Combined sewer overflow

4/ SS - Storm sewer system sample

5/ (C)=City, (T)=Town, (V)=Village

TABLE A.2 (Continued)

Sub-Area Segment	BUFFALO - LACKAWANNA				
	Buffalo River		Black Rock Canal		
Site	192" x 129" CSO ^{3/} to Buffalo R. @ Smith St. Buffalo (C) ^{5/}	192" x 156" CSO ^{3/} to Buffalo R. "Hamburg Drain" Buffalo (C) ^{5/}	42" SSO ^{2/} to U-Crest Ditch near Sugg Rd. Ext. Cheektowaga (T) ^{5/}	54" SSO ^{2/} to U-Crest Ditch near Calspan property line Cheektowaga (T) ^{5/}	36" SSO ^{2/} to U-Crest Ditch @ Buell Ave. Cheektowaga (T) ^{5/}
Categories/Parameters					
ACID EXTRACTABLES					
Phenol	-	-	-	-	-
BASE/NEUTRAL EXTRACTABLES					
Acenaphthene	-	LT	-	LT	LT
Anthracene	LT	5.3	LT	16	LT
Benzo (a)anthracene	LT	LT	-	6	LT
Benzo (a)pyrene	-	LT	-	20	LT
Benzo (b)fluoranthene	-	LT	-	2.1	LT
Benzo (g,h,i)perylene	-	-	-	7	-
Benzo (k)fluoranthene	-	-	-	-	-
Bis (2-ethylhexyl)phthalate	-	220	-	13	-
Chrysene	LT	LT	-	6.9	LT
Dibenzo (a,h)anthracene	-	-	-	LT	-
1,2-Dichlorobenzene	-	-	-	-	-
1,3-Dichlorobenzene	-	-	-	-	-
1,4-Dichlorobenzene	-	-	-	-	-
3,3-Dichlorobenzidine	-	-	-	6.3	LT
Di-n-butylphthalate	-	-	-	7.4	-
Di-n-octylphthalate	-	-	-	-	-
Fluoranthene	LT	5.7	LT	13.0	LT
Fluorene	LT	LT	-	2.9	LT
Hexachlorobenzene	-	-	-	-	-
Hexachlorobutadiene	-	-	-	-	-
Indeno (1,2,3-cd)pyrene	-	-	-	9.3	-
Naphthalene	LT	5.3	-	2.8	-
Phenanthrene	-	LT	-	LT	LT
Pyrene	LT	LT	LT	9.3	LT
PURGEABLES					
Benzene	-	LT	LT	LT	-
Bromomethane	-	-	-	-	-
Chlorobenzene	-	0.1	-	-	-
Chloroethane	-	-	-	-	-
Chloroform	LT	-	LT	LT	-
Chloromethane	-	-	-	-	-
1,1-Dichloroethane	-	-	-	LT	-
1,1-Dichloroethylene	-	-	-	-	-
Trans-1,2-dichloroethylene	LT	LT	LT	LT	-
Ethylbenzene	-	LT	LT	LT	-
Methylene chloride	-	-	-	-	-
Tetrachloroethylene	-	-	LT	LT	-
Toluene	1.1	0.6	LT	0.01	-
1,1,1-Trichloroethane	-	-	-	LT	-
Trichloroethylene	-	LT	0.08	0.09	-
Trichlorofluoromethane	-	LT	-	0.02	-
Vinyl chloride	-	-	-	-	-
PESTICIDES					
Aldrin	-	-	-	-	-
α-BHC	-	-	-	-	-
β-BHC	-	-	-	-	-
δ-BHC	-	-	-	-	-
γ-BHC	-	-	-	-	-
4,4'-DDD	-	-	-	-	-
4,4'-DDE	0.1	0.4	-	-	-
4,4'-DDT	-	-	-	-	-
β-Endosulfan	-	-	-	-	-
Endosulfan sulfate	-	-	-	-	-
Endrin	-	-	-	-	-
Heptachlor	-	-	-	-	-
Heptachlor epoxide	-	-	-	-	-
PCBs					
PCB-1242	-	4.5	-	-	-
PCB-1254	-	-	-	-	-
PCB-1260	4.3	10	70	1.3	-
METALS, TOTAL					
Antimony	-	-	-	-	19
Arsenic	3.9	5.1	13	1.8	2.9
Beryllium	0.8	-	-	0.4	0.6
Cadmium	48	8	150	17	0.8
Chromium	31	100	600	120	13
Copper	48	280	160	190	23
Lead	220	1100	1500	500	130
Mercury	-	.5	1.3	.4	0.08
Nickel	110	74	24	21	-
Selenium	-	-	-	-	-
Silver	-	15	-	3.5	-
Thallium	-	-	-	-	-
Zinc	450	1100	530	410	140
CYANIDES, TOTAL					
	0.1	-	-	-	-
PHENOLS (4AAP)					
	2.5	16	1.8	2.4	1

1/ LT - Parameter identified but not quantified

2/ SSO - Storm sewer outfall

3/ CSO - Combined sewer overflow

4/ SS - Storm sewer system sample

5/ (C)=City, (T)=Town, (V)=Village

TABLE A.2 (Continued)

Sub-Area Segment	BUFFALO - LACKAWANNA Black Rock Canal		TONAWANDA - NORTH TONAWANDA			
Site	72" SSO ^{2/} to Scajaguada Cr. to Nagel Ave. Cheektowaga (T) ^{5/}	84" SSO ^{2/} to Scajaguada Cr. @ Nokomis Pkwy. Cheektowaga (T) ^{5/}	24" SSO ^{2/} to Niagara R. @ Sheridan Dr. Tonawanda (T) ^{5/}	7' x 9' SSO ^{2/} to Two Mile Cr. @ Masefield Ave. Tonawanda (T) ^{5/}	12" SSO ^{2/} to Two Mile Cr. @ Superior Ave. Tonawanda (T) ^{5/}	48" SSO ^{2/} to Two Mile Cr. @ Thackeray Ct. Tonawanda (T) ^{5/}
Categories/Parameters						
ACID EXTRACTABLES						
Phenol	LT	-	-	-	-	-
BASE/NEUTRAL EXTRACTABLES						
Acenaphthene	LT	-	-	-	-	-
Anthracene	17	-	-	LT	-	LT
Benzo(a)anthracene	LT	LT	-	8	-	LT
Benzo(a)pyrene	-	LT	-	2.4	-	LT
Benzo(b)fluoranthene	-	-	-	2.5	-	-
Benzo(g,h,i)perylene	LT	-	-	LT	-	-
Benzo(k)fluoranthene	-	-	-	LT	-	-
Bis(2-ethylhexyl)phthalate	6.1	-	-	-	-	-
Chrysene	LT	LT	-	11	-	-
Dibenzo(a,h)anthracene	-	-	LT	3.5	-	LT
1,2-Dichlorobenzene	-	-	-	LT	-	-
1,3-Dichlorobenzene	-	-	-	-	-	-
1,4-Dichlorobenzene	-	-	-	-	-	-
3,3-Dichlorobenzidine	LT	-	-	-	-	-
Di-n-butylphthalate	-	-	-	-	-	-
Di-n-octylphthalate	-	-	-	-	-	-
Fluoranthene	12	LT	-	LT	LT	-
Fluorene	4.1	LT	LT	LT	-	-
Hexachlorobenzene	-	-	-	-	-	LT
Hexachlorobutadiene	-	LT	-	-	-	-
Indeno(1,2,3-cd)pyrene	6.6	LT	-	-	-	-
Naphthalene	2.3	LT	-	LT	-	-
Phenanthrene	-	LT	-	LT	LT	-
Pyrene	6.8	LT	LT	LT	-	LT
PURGEABLES						
Benzene	LT	-	-	LT	-	-
Bromomethane	-	-	0.05	-	-	LT
Chlorobenzene	-	-	-	-	-	-
Chloroethane	0.02	-	-	-	-	-
Chloroform	LT	-	-	LT	-	-
Chloromethane	-	-	LT	-	-	-
1,1-Dichloroethane	1.1	-	-	-	-	-
1,1-Dichloroethylene	LT	-	-	LT	-	-
Trans-1,2-dichloroethylene	LT	-	-	0.03	-	-
Ethylbenzene	-	-	-	LT	-	-
Methylene chloride	-	-	-	-	-	-
Tetrachloroethylene	0.01	-	LT	LT	-	-
Toluene	0.04	0.6	-	0.03	-	-
1,1,1-Trichloroethane	10	-	-	-	-	LT
Trichloroethylene	0.03	LT	-	-	-	-
Trichlorofluoromethane	LT	-	-	LT	-	-
Vinyl chloride	-	-	-	0.02	-	-
PESTICIDES						
Aldrin	-	-	0.6	0.4	0.05	0.04
α-BHC	-	-	-	-	-	-
β-BHC	-	-	-	-	-	-
δ-BHC	-	-	-	-	-	-
γ-BHC	-	-	-	-	-	-
4,4'-DDD	-	-	-	-	-	-
4,4'-DDE	-	-	-	-	-	-
4,4'-DDT	-	-	-	0.5	-	-
β-Endosulfan	-	-	-	-	-	-
Endosulfan sulfate	-	-	-	-	-	-
Endrin	-	-	-	-	-	-
Heptachlor	-	-	3.4	3.3	0.1	-
Heptachlor epoxide	-	-	-	0.1	-	-
PCBs						
PCB-1242	-	-	-	-	-	-
PCB-1254	-	-	-	-	-	-
PCB-1260	-	-	-	-	-	-
METALS, TOTAL						
Antimony	16	-	-	-	-	-
Arsenic	3.4	12	27	7.4	6.4	8.6
Beryllium	0.5	1	-	0.7	-	3.6
Cadmium	1	10	4.7	3.4	3.3	1.4
Chromium	26	21	57	100	7.6	0.8
Copper	53	58	300	170	15	8.8
Lead	120	55	100	1800	76	8.9
Mercury	0.3	-	-	0.5	0.4	74
Nickel	12	16	13	23	4.4	0.05
Selenium	-	-	4.2	-	-	4
Silver	9.8	2.1	4.8	-	-	-
Thallium	-	-	-	-	2.9	5.7
Zinc	270	170	1300	340	360	190
CYANIDES, TOTAL						
	-	5.5	29	45	3.1	1.6
PHENOLS (4AAP)						
	15	1.8	9.4	1.9	-	0.4

1/ LT - Parameter identified but not quantified

2/ SSO - Storm sewer outfall

3/ CSO - Combined sewer overflow

4/ SS - Storm sewer system sample

5/ (C)=City, (T)=Town, (V)=Village

TABLE A.2 (Continued)

Sub-Area Segment	TONAWANDA - NORTH TONAWANDA					
Site	90" SSO ^{2/} to Two Mile Cr. @ Oriskany Dr. ^{5/} Tonawanda (T) ^{5/}	30" SSO ^{2/} to Niagara R. @ Wheeler St. ^{5/} Tonawanda (C) ^{5/}	48" SSO ^{2/} to Niagara R. @ Franklin St. ^{5/} Tonawanda (C) ^{5/}	48" SSO ^{2/} to Niagara R. @ Bouck St. ^{5/} Tonawanda (C) ^{5/}	60" SSO ^{2/} to Ellicott Cr. @ State St. ^{5/} Tonawanda (C) ^{5/}	72" SSO ^{2/} to Little R. @ Robinson St. N. Tonawanda (C) ^{5/}
Categories/Parameters						
ACID EXTRACTABLES						
Phenol	-	-	-	-	-	-
BASE/NEUTRAL EXTRACTABLES						
Acenaphthene	LT	LT	LT	LT	LT	-
Anthracene	LT	LT	LT	LT	LT	47
Benzo(a)anthracene	LT	LT	-	-	LT	-
Benzo(a)pyrene	-	-	-	-	-	-
Benzo(b)fluoranthene	-	LT	LT	-	LT	-
Benzo(g,h,i)perylene	-	-	-	-	-	-
Benzo(k)fluoranthene	-	-	-	-	-	-
Bis(2-ethylhexyl)phthalate	-	-	-	-	-	79
Chrysene	LT	LT	-	-	LT	LT
Dibenzo(a,h)anthracene	-	-	-	-	-	-
1,2-Dichlorobenzene	-	-	-	-	-	LT
1,3-Dichlorobenzene	-	-	-	-	-	-
1,4-Dichlorobenzene	-	-	-	-	-	-
3,3-Dichlorobenzidine	-	-	-	-	-	-
Di-n-butylphthalate	-	-	-	-	-	-
Di-n-octylphthalate	-	-	-	-	-	44
Fluoranthene	LT	LT	LT	LT	LT	24
Fluorene	LT	LT	-	-	LT	28
Hexachlorobenzene	-	-	-	-	-	-
Hexachlorobutadiene	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	-	-	-	-	-	-
Naphthalene	-	-	LT	-	-	33
Phenanthrene	LT	LT	LT	-	LT	-
Pyrene	LT	LT	LT	3.9	LT	22
PURGEABLES						
Benzene	LT	-	LT	LT	-	LT
Bromomethane	-	-	-	-	-	-
Chlorobenzene	-	-	LT	LT	-	-
Chloroethane	-	-	-	-	-	-
Chloroform	-	-	LT	LT	-	LT
Chloromethane	-	-	-	LT	-	-
1,1-Dichloroethane	-	-	-	-	-	0.1
1,1-Dichloroethylene	-	-	-	-	-	1.4
Trans-1,2-dichloroethylene	-	LT	-	-	-	0.1
Ethylbenzene	-	-	-	-	-	-
Methylene chloride	0.02	-	-	LT	-	LT
Tetrachloroethylene	LT	-	LT	LT	-	LT
Toluene	LT	-	LT	LT	0.01	0.9
1,1,1-Trichloroethane	-	-	-	-	-	0.1
Trichloroethylene	LT	LT	LT	LT	-	0.1
Trichlorofluoromethane	-	-	-	-	-	-
Vinyl chloride	-	-	-	-	-	0.3
PESTICIDES						
Aldrin	0.06	-	-	-	0.4	11
α-BHC	-	-	-	-	-	4.6
β-BHC	-	-	0.5	-	-	-
δ-BHC	-	0.02	0.2	0.2	-	-
γ-BHC	-	-	-	-	-	-
4,4'-DDD	-	-	-	-	-	-
4,4'-DDE	-	-	0.4	0.8	-	-
4,4'-DDT	0.6	-	1	-	-	-
β-Endosulfan	-	-	-	-	-	-
Endosulfan sulfate	-	-	-	-	-	-
Endrin	-	-	-	-	-	-
Heptachlor	-	-	-	0.06	-	-
Heptachlor epoxide	0.1	-	0.3	-	0.2	35
PCBs						
PCB-1242	-	-	-	-	-	-
PCB-1254	-	-	-	-	3.5	-
PCB-1260	1.9	-	-	-	-	63
METALS, TOTAL						
Antimony	-	10	26	20	-	-
Arsenic	1.6	-	8.8	3.2	3.1	-
Beryllium	2.6	0.6	-	1	0.9	9
Cadmium	10	57	14	16	14	-
Chromium	84	560	160	80	15	65
Copper	16	1100	3000	450	42	150
Lead	120	260	420	240	9900	610
Mercury	-	0.4	1.4	-	0.1	-
Nickel	4.8	140	25	16	3.8	-
Selenium	-	-	-	-	-	-
Silver	0.5	-	-	1.5	-	13
Thallium	-	-	13	-	9.4	-
Zinc	150	330	1100	380	290	650
CYANIDES, TOTAL	8.9	-	-	-	2.5	59
PHENOLS (4AAP)	-	0.1	8.1	1.6	-	45

1/ LT - Parameter identified but not quantified

2/ SSO - Storm sewer outfall

3/ CSO - Combined sewer overflow

4/ SS - Storm sewer system sample

5/ (C)=City, (T)=Town, (V)=Village

TABLE A.2 (Continued)

Sub-Area	TONAWANDA - NORTH TONAWANDA	NIAGARA FALLS		
Segment	-	Wheatfield - Upper River		
Site	5' x 8' SSO ^{2/} to Little R. from Pettitt Flume N. Tonawanda (C) ^{5/}	12" SSO ^{2/} to Bergholtz Cr. @ Walmore Rd. Wheatfield (T) ^{5/}	20" SSO ^{2/} to Bergholtz Cr. @ Walmore Rd. Wheatfield (T) ^{5/}	60" SSO ^{2/} to Niagara River @ 60th St. Niagara Falls (C) ^{5/}
Categories/Parameters				
ACID EXTRACTABLES				
Phenol	-	-	-	-
BASE/NEUTRAL EXTRACTABLES				
Acenaphthene	-	-	-	LT
Anthracene	LT	LT	LT	LT
Benzo(a)anthracene	LT	LT	LT	2.2
Benzo(a)pyrene	-	-	-	LT
Benzo(b)fluoranthene	LT	LT	LT	2.2
Benzo(g,h,i)perylene	-	-	-	-
Benzo(k)fluoranthene	-	-	-	-
Bis(2-ethylhexyl)phthalate	-	-	LT	-
Chrysene	LT	LT	LT	2.3
Dibenzo(e,h)anthracene	-	-	-	LT
1,2-Dichlorobenzene	550	-	-	-
1,3-Dichlorobenzene	66	-	-	-
1,4-Dichlorobenzene	440	-	-	-
3,3-Dichlorobenzidine	-	-	-	-
Di-n-butylphthalate	-	-	-	-
Di-n-octylphthalate	-	-	-	-
Fluoranthene	LT	LT	LT	4.2
Fluorene	-	-	-	LT
Hexachlorobenzene	58	-	-	LT
Hexachlorobutadiene	LT	-	-	-
Indeno(1,2,3-cd)pyrene	-	-	-	-
Naphthalene	LT	-	LT	-
Phenanthrene	LT	-	LT	LT
Pyrene	LT	LT	LT	3.6
PURGEABLES				
Benzene	0.8	-	-	LT
Bromomethane	-	-	-	-
Chlorobenzene	12	-	-	LT
Chloroethane	-	-	-	-
Chloroform	-	-	-	-
Chloromethane	-	-	-	-
1,1-Dichloroethane	-	-	-	-
1,1-Dichloroethylene	-	-	-	-
Trans-1,2-dichloroethylene	0.2	-	-	-
Ethylbenzene	2.7	-	-	-
Methylene chloride	-	-	-	-
Tetrachloroethylene	LT	-	-	-
Toluene	0.4	-	0.01	LT
1,1,1-Trichloroethane	-	-	-	LT
Trichloroethylene	LT	-	-	LT
Trichlorofluoromethane	-	-	-	-
Vinyl chloride	0.03	-	-	-
PESTICIDES				
Aldrin	-	0.04	0.08	0.1
α-BHC	9	-	-	-
β-BHC	4.8	-	-	-
δ-BHC	-	-	-	-
γ-BHC	-	-	-	-
4,4'-DDD	-	-	-	-
4,4'-DDE	6.5	-	-	-
4,4'-DDT	-	-	-	-
β-Endosulfan	-	-	-	-
Endosulfan sulfate	-	-	-	-
Endrin	34	-	-	-
Heptachlor	-	-	-	-
Heptachlor epoxide	-	-	-	-
PCBs				
PCB-1242	-	-	-	-
PCB-1254	-	-	-	-
PCB-1260	-	1.4	-	-
METALS, TOTAL				
Antimony	-	-	-	-
Arsenic	1.7	2.0	2.4	7.2
Beryllium	1.2	0.5	-	0.8
Cadmium	3.1	-	0.3	8.1
Chromium	150	70	150	52
Copper	1300	17	240	27
Lead	570	14	73	12
Mercury	1.4	0.9	-	0.4
Nickel	46	10	32	1.6
Selenium	-	-	0.3	-
Silver	4.7	1.1	4.5	1.9
Thallium	-	-	-	-
Zinc	640	150	330	46
CYANIDES, TOTAL	-	2.6	-	-
PHENOLS (4AAP)	130	-	-	0.4

1/ LT - Parameter identified but not quantified

2/ SSO - Storm sewer outfall

3/ CSO - Combined sewer overflow

4/ SS - Storm sewer system sample

5/ (C)=City, (T)=Town, (V)=Village

TABLE A.3

ANNUAL TOTAL LOADINGS OF TOXIC SUBSTANCES IN URBAN RUNOFF FROM
THE URBAN STUDY AREA
(kg/yr)

SUBSTANCES	ANNUAL TOTAL LOADINGS IN WATER AND SEDIMENT		
	Lower Estimate	Upper Estimate	Best Estimate
PCBs			
Total polychlorinated biphenyls	0.56	4.2	2.1
Organochlorine Pesticides			
Hexachlorobenzene	0.0093	0.060	0.027
alpha - BHC	0.25	0.44	0.34
Lindane	0.093	0.21	0.14
Heptachlor	0.0022	0.047	0.017
Aldrin	0.0002	0.040	0.011
Heptachlor epoxide	0.011	0.055	0.025
gamma - Chlordane	0.050	0.46	0.021
alpha - Chlordane	0.069	0.66	0.29
alpha - Endosulfan	0.0060	0.065	0.025
p,p' - DDE	0.016	0.16	0.073
Dieldrin	0.0032	0.064	0.023
Endrin	0.0097	0.11	0.042
o,p' - DDT	0.0052	0.096	0.034
p,p' - TDE	0.012	0.087	0.034
p,p' - DDT	0.017	0.19	0.080
beta - Endosulfan	0.017	0.082	0.036
Mirex	0.0013	0.066	0.019
Methoxychlor	0.016	0.13	0.056
Polyaromatic Hydrocarbons			
Indene	0.0031	1.8	0.68
1,2,3,4-Tetrahydro-naphthalene	0.0031	1.8	0.68
2-Methylnaphthalene			
Quinoline	0.13	1.8	0.74
1-Methylnaphthalene	0.015	1.8	0.68
beta-Chloronaphthalene	0.056	1.8	0.70
Acenaphthylene	0.11	1.8	0.74
Acenaphthene	0.23	2.0	0.88
Fluorene	0.0062	1.8	0.67
Phenanthrene	0.69	7.2	3.2
Fluoranthene	1.1	9.4	4.3
Pyrene	3.7	34	15.

TABLE A.3 (Continued)

ANNUAL TOTAL LOADINGS OF TOXIC SUBSTANCES IN URBAN RUNOFF FROM
THE URBAN STUDY AREA
(kg/yr)

SUBSTANCES	ANNUAL TOTAL LOADINGS IN WATER AND SEDIMENT		
	Lower Estimate	Upper Estimate	Best Estimate
<u>Chlorinated Benzenes</u>			
1,3-Dichlorobenzene	0.057	0.82	0.26
1,4-Dichlorobenzene	0.11	1.2	0.47
1,2-Dichlorobenzene	1.01	4.6	2.4
1,3,5-Trichlorobenzene	1.5	14.	6.2
1,2,4-Trichlorobenzene	0.036	0.23	0.11
1,2,3-Trichlorobenzene	0.051	0.051	0.22
1,2,4,5- + 1,2,3,5- Tetrachlorobenzene	0.0067	0.12	0.041
1,2,3,4-Tetrachloro- benzene	0.0017	0.092	0.029
Pentachlorobenzene	0.0009	0.089	0.027
Hexachlorobenzene	0.0064	0.055	0.022
<u>Trace Elements</u>			
Arsenic	28	150	76
Cadmium	8	33	18
Copper	390	2100	1100
Cobalt	30	210	96
Chromium	450	4000	1800
Lead	1500	13000	5900
Mercury	100	150	130
Nickel	320	2000	990
Selenium	20	31	27
Zinc	2200	12000	6100

TABLE A.4URBAN RUNOFF/POINT SOURCE RATIOS FOR CANADIAN SOURCES
(kg/d)

SUBSTANCES	RUNOFF OFF LOADING (RL)	POINT SOURCE LOADING (PSL)	RL/PSL
<u>Trace Elements</u>			
Zinc	17	22	0.77
Lead	16	23	0.70
Chromium	4.9	48	0.10
Copper	2.9	4.9	0.59
Nickel	2.7	34	0.08
<u>PCBs</u>			
Total PCBs	0.0057	0.0063	0.91
<u>Pesticides</u>			
alpha - BHC	0.0009	0.014	0.06
Lindane	0.0004	0.0025	0.16
<u>PAHs</u>			
Pyrene	0.04	0.0020	20
Fluoranthene	0.012	0.0010	12
Phenanthrene	0.0088	0.026	0.34
<u>Chlorinated Benzenes</u>			
1,2-Dichlorobenzene	0.0065	0.032	0.20