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REGION 8

**SOILS MANAGEMENT PLAN**  
**Former Wastewater Treatment Plant**  
**100 Karenlee Drive**  
**Henrietta, NY**

Prepared For:

Town of Henrietta  
475 Calkins Road  
Henrietta, New York 14467

Prepared By:

Lu Engineers  
2230 Penfield Road  
Penfield, New York 14526

SEPTEMBER 2004

## 1. Overview and objectives

The site is a 20 acre, vacant municipal property owned by the Town of Henrietta. The location of the property is shown on Figure 1. The site has been characterized during several previous investigations. The user should refer to the previous investigation reports for more detail, as needed.

The objective of this Soils Management Plan (SMP) is to set guidelines for management of soil material during any future activities which would breach the cover system in the restricted areas of the site. This SMP addresses environmental concerns related to soil management and has been reviewed and approved by the New York State Department of Environmental Conservation (NYSDEC) as shown in Appendix A.

## 2. Nature and extent of contamination

Based on data obtained from previous investigations and the remediation done at the site, a *Report of Field Investigation Activities, April 2004* was developed by Lu Engineers. Two areas were identified in the report where filling has taken place at the site. They are the sludge disposal/fill area and the sludge drying bed area. These areas of the site are identified in Figure 2 as restricted areas. Based on the presence of this fill a Soils Management Plan was recommended to establish procedures for any future development of these areas.

The most recent sampling at the Site, conducted in February 2004, found constituents of potential concern to be present only in the rear sludge disposal/fill area of the site. This portion of the Site is not slated for development at this time. Trace levels of several constituents of concern were also found in the front sludge drying bed. The levels observed were below the NYSDEC Soil Guidance Values established in TAGM 4046. The sludge drying bed area was included as a restricted area of this Soils Management Plan as a provision for potential for future development.

The constituents of potential concern (COPC) for soil consist primarily of metals and PAHs. Results of groundwater sampling indicate that constituents in the soil/fill material have not significantly impacted groundwater quality.

The SVOC's of concern found in surface and subsurface soils within the former sludge disposal/fill area are Benzo (a) anthracene, Benzo (a) pyrene, Benzo (a) Fluoranthene, and Chrysene. The SVOC's identified are higher weight PAH compounds. These materials are less mobile in subsurface environments than lighter weight VOCs (i.e. gasoline or solvents). This characteristic along with the low permeability of the subsurface soils limit constituent migration and likewise on-site/off-site exposure concerns.

The metals of concern found in subsurface soils within the former sludge disposal/fill area were Mercury and Chromium.

### **3. Contemplated use**

As part of the redevelopment project, the property has been identified for office and light industrial uses. Specific uses for this zoning category are as follows:

- Restricted Industrial
- Restricted Commercial

The zoning specifically prohibits day care, child care and medical care uses.

### **4. Purpose and description of surface cover system**

The purpose of the surface cover system is to eliminate the potential for human contact with fill and sludge material and eliminate the potential for contaminated runoff from the property. The cover system will consist of one of the following types of clean material:

- Soil: 12 inches of vegetated soil cover underlain by a demarcation layer, in outdoor or vegetated areas.
- Asphalt: a minimum of 6 inches of material (asphalt and sub base material) in areas that will become roads, sidewalks, and parking lots. Actual cross sections will be determined based on the intended use of the area.
- Concrete: a minimum of 6 inches of material (concrete and sub base material) in areas that will become slab-on-grade structures or for roads, sidewalks, and parking lots in lieu of asphalt. For slab-on-grade structures, an 8-mil polyethylene vapor barrier will be placed beneath the concrete (for sites impacted by VOC contamination only). Actual cross sections will be determined based on the intended use of the area.

### **5. Management of soils/fill and long term maintenance of cover system**

The purpose of this section is to provide environmental guidelines for management of subsurface soils/fill and the long term maintenance of the cover system during any future intrusive work which breaches the cover system.

The SMP includes the following conditions:

- Any breach of the cover system, including for the purposes of construction or utilities work, must be replaced or repaired using an acceptable borrow source free of industrial and/or other potential sources of chemical or petroleum contamination. The repaired area must be covered with clean soil and reseeded or covered with impervious product such as concrete or asphalt, as described in Section 4, to prevent erosion in the future.

- Control of surface erosion and run-off of the entire property at all times, including during construction activities. This includes proper maintenance of the vegetative cover established on the property.
- Site soil that is excavated and is intended to be removed from the property must be managed, characterized, and properly disposed of in accordance with NYSDEC regulations and directives. Refer to Section 5.1 below for procedures in handling excavated and stockpiled soils intended for removal from the site.
- Soil excavated at the site may be reused as backfill material on-site provided it contains no visual or olfactory evidence of contamination, and it is placed beneath a cover system component as described in Section 4.
- Any off-site fill material brought to the site for filling and grading purposes shall be from an acceptable borrow source free of industrial and/or other potential sources of chemical or petroleum contamination. Off-site borrow sources should be subject to collection of one representative composite sample per source. The sample should be analyzed for TCL VOCs, SVOCs, pesticides, PCBs, and TAL metals plus cyanide. The soil will be acceptable for use as cover material provided that all parameters meet the NYSDEC Recommended Soil Cleanup Objectives established in TAGM 4046. These values are included in Appendix B.
- Prior to any construction activities, workers are to be notified of the site conditions with clear instructions regarding how the work is to proceed. Invasive work performed at the property will be performed in accordance with all applicable local, state, and federal regulations to protect worker health and safety.
- The Owner shall complete and submit to the Department an annual report by January 15<sup>th</sup> of each year. Such annual report shall contain certification that the institutional controls put in place, pursuant this Soils Management Plan, are still in place, have not been altered and are still effective; that the remedy and protective cover have been maintained; and that the conditions at the site are fully protective of public health and the environment.

If the cover system has been breached during the year covered by that Annual Report, the Owner of the property shall include the following in that annual report:

- A certification that all work was performed in conformance with this SMP.

In addition, deed restrictions will be implemented in accordance with the requirements of the New York State Voluntary Cleanup program, limiting the future use of the property to restricted industrial and restricted commercial use.



## 5.1 Excavated and stockpiled soil/fill disposal

Soil/fill that is excavated as part of development which cannot be used as fill below the cover system will be further characterized prior to transportation off-site for disposal at a permitted facility. For excavated soil/fill with visual evidence of contamination (i.e., staining or elevated PID measurements), one composite sample and a duplicate sample will be collected for 2,000 cubic yards of stockpiled soil, and a minimum of 1 sample will be collected for volumes less than 2,000 cubic yards.

The composite sample will be collected from five locations within each stockpile. A duplicate composite sample will also be collected. PID measurements will be recorded for each of the five individual locations. One grab sample will be collected from the individual location with the highest PID measurement. If none of the five individual sample locations exhibit PID readings, one location will be selected at random. The composite sample will be analyzed by a NYSDOH ELAP-certified laboratory for pH (EPA Method 9045C), Target Compound List (TCL) SVOCs, pesticides, and PCBs, and TAL metals, and cyanide. The grab sample will be analyzed for TCL VOCs.

Soil samples will be composited by placing equal portions of fill/soil from each of the five composite sample locations into a pre-cleaned, stainless steel (or Pyrex glass) mixing bowl. The soil/fill will be thoroughly homogenized using a stainless steel scope or trowel and transferred to pre-cleaned jars provided by the laboratory. Sample jars will then be labeled and a chain-of-custody form will be prepared.

Additional characterization sampling for off-site disposal may be required by the disposal facility. To potentially reduce off-site disposal requirements/costs, the Owner or site developer may also choose to characterize each stockpile individually. If the analytical results indicate that concentrations exceed the standards for RCRA characteristics, the material will be considered a hazardous waste and must be properly disposed off-site at a permitted disposal facility within 90 days of excavation. If the analytical results indicate that the soil is not a hazardous waste, the material will be properly disposed off-site at a non-hazardous waste facility. Stockpiled soil cannot be transported on or off-site until the analytical results are received.

## 5.2 Subgrade material

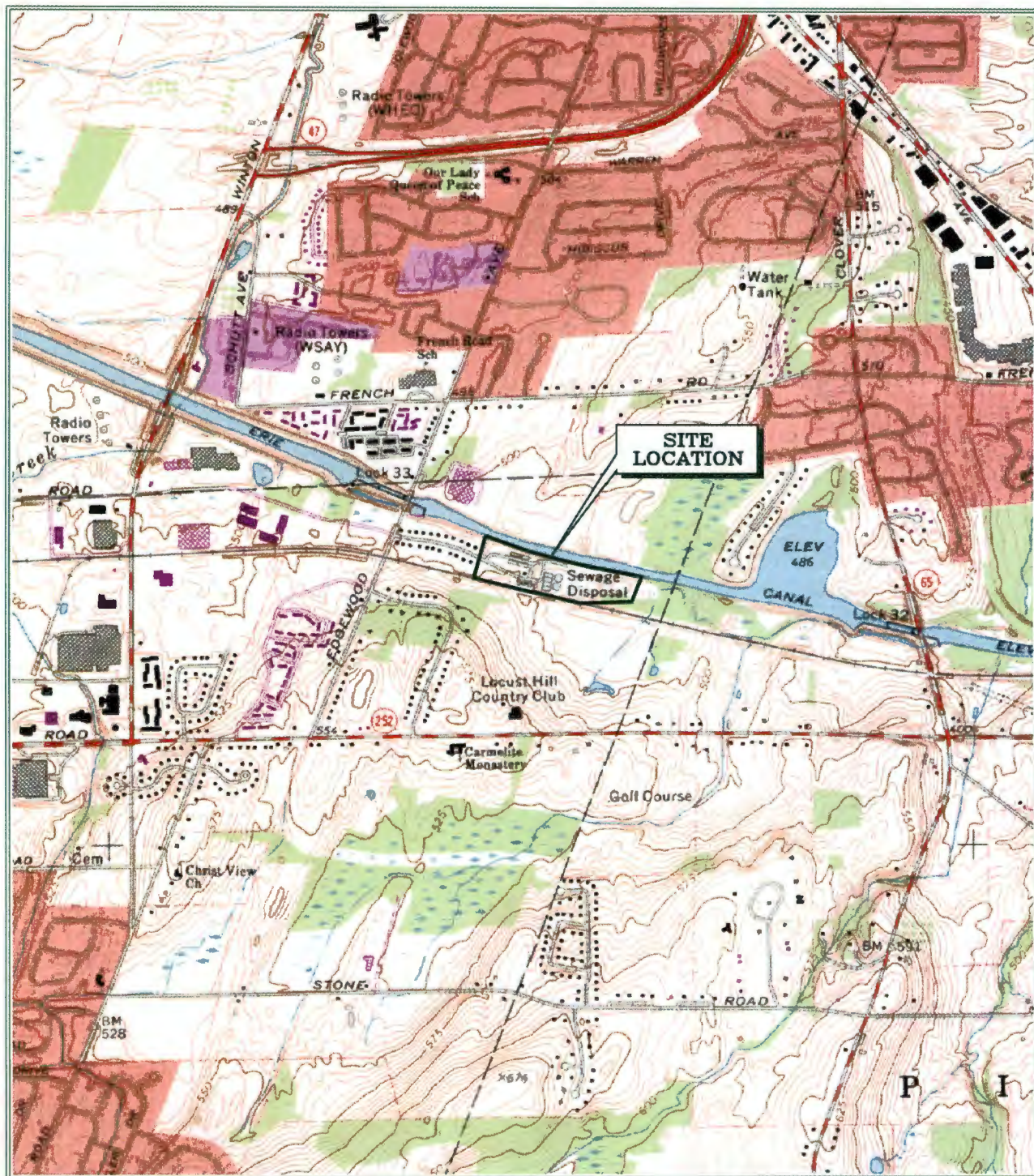
Subgrade material used to backfill excavations or placed to increase site grades or elevation shall meet the following criteria.

- Excavated on-site soil/fill which appears to be visually impacted shall be sampled and analyzed. If analytical results indicate that the contaminants, if any, are present at concentrations below NYSDEC TAGM 4046 recommended soil cleanup objectives the soil/fill can be used as backfill on-site.
- Any off-site fill material brought to the site for filling and grading purposes shall be from an acceptable borrow source free of industrial and/or other potential sources of chemical or petroleum contamination.
- Off-site soils intended for use as site backfill cannot otherwise be defined as a solid waste in accordance with 6 NYCRR Part 360-1.2(a).
- If the contractor designates a source as “virgin” soil, it shall be further documented in writing to be native soil material from areas not having supported any known prior industrial or commercial development or agricultural use.
- Virgin soils should be subject to collection of one representative composite sample per source. The sample should be analyzed for TCL VOCs, SVOCs, pesticides, PCBs, arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and cyanide. The soil will be acceptable for use as backfill provided that all parameters meet the TAGM 4046 objectives.
- Non-virgin soils will be tested via collection of one composite sample per 500 cubic yards of material from each source area. If more than 1,000 cubic yards of soil are borrowed from a given off-site non-virgin soil source area and both samples of the first 1,000 cubic yards meet TAGM 4046 objectives, the sample collection frequency will be reduced to one composite for every 2,500 cubic yards of additional soils from the same source, up to 5,000 cubic yards. For borrow sources greater than 5,000 cubic yards, sampling frequency may be reduced to one sample per 5,000 cubic yards, provided all earlier samples met the TAGM 4046 objectives.

## Figures

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SCALE: 1" = 2000'



2230 PENFIELD ROAD  
PENFIELD, NEW YORK 14526  
TEL: (716) 377-1450  
FAX: (716) 377-1266

## FIGURE 1. SITE LOCATION MAP

FORMER HENRIETTA TREATMENT PLANT  
ROCHESTER, NEW YORK

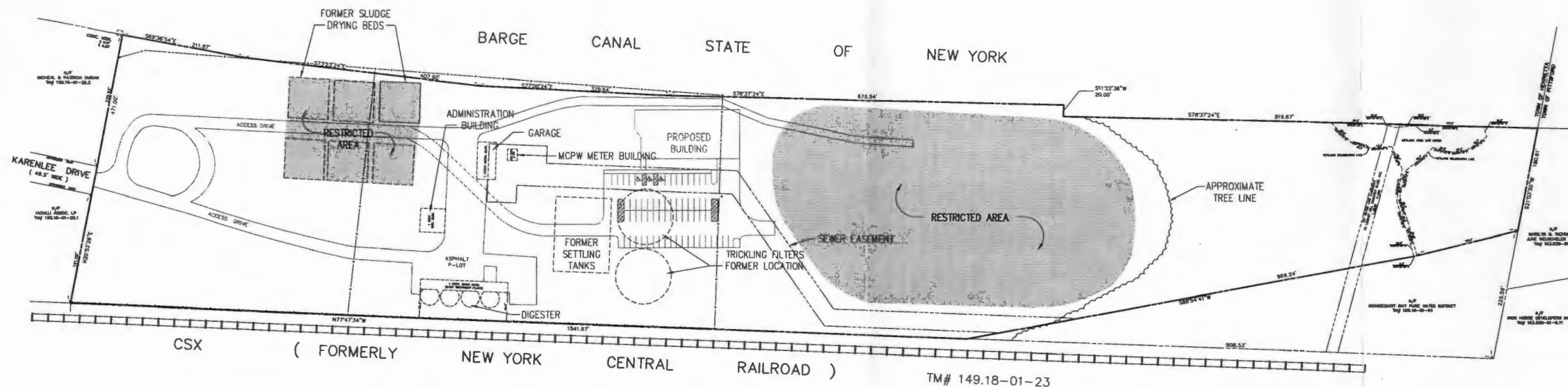
DATE: JULY 2002

SCALE: 1:24,000

DRAWN BY: DLS

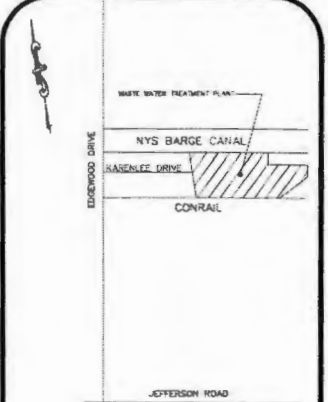
MAP SOURCE: PITTSFORD QUADRANGLE  
NEW YORK - MONROE COUNTY  
7.5 MINUTE SERIES (TOPOGRAPHIC)  
1971 - PHOTOREVISED 1978





**SITE PLAN**  
SCALE: 1" = 200'

LEGEND	
	RESTRICTED AREAS
	PROPOSED FEATURES



NOT TO SCALE		
DATE	REVISIONS	BY
DRAWING ALTERATION		
WARNING: It is a violation of the New York State Education Law, Article 145, Section 7209, Special Provision 2, for any person unless he is acting under the direction of a Licensed Professional Engineer or Land Surveyor to alter or item in any way. If an item bearing the seal of an engineer or land surveyor is altered, the altering engineer or land surveyor shall affix to the item his seal and notation "altered by" followed by his signature and date of such alteration, and a specific description of the alteration.		
1/8" = 160'00" BEARING & DISTANCE		
BY: _____		
DATE: _____		



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LAND SURVEYING, P.C.  
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PROJECT:  
VOLUNTARY  
CLEANUP  
PROGRAM  
  
TOWN HENRIETTA,  
COUNTY OF MONROE,  
STATE OF NEW YORK

CLIENT:  
  
TOWN OF HENRIETTA

DRAWING TITLE:  
  
FIGURE 2

DESIGNED BY: RM	SCALE: 1"=200'
DRAWN BY: DS	DATE: SEPTEMBER 2004
CHECKED BY: RM	PROJECT No. 8811-05
SHEET	DRAWING No.
2 OF 6	2

## Appendix A

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## Appendix B

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TABLE 1  
Recommended soil cleanup objectives (mg/kg or ppm)  
Volatile Organic Contaminants

Contaminant	Partition Coefficient, K <sub>oc</sub>	Groundwater Standards/ Criteria, C <sub>w</sub> (ug/l or ppb)	a Allowable soil conc., C <sub>s</sub> (ppm)	b ** Soil cleanup objectives to protect GW quality (ppm)	USEPA Health Based (ppm)  Carcin-Systemic ogens Toxicants		CRQL (ppb)	*** Rec. Soil Cleanup Objective (ppm)
Acetone	2.2	50	0.0011	0.11	N/A	8,000	10	0.2
Benzene	83	0.7	0.0006	0.06	24	N/A	5	0.06
Benzoic Acid	54 *	50	0.027	2.7	N/A	300,000	5	2.7
2-Butanone	4.5 *	50	0.003	0.3	N/A	4,000	10	0.3
Carbon Disulfide	54 *	50	0.027	2.7	N/A	8,000	5	2.7
Carbon Tetrachloride	110 *	5	0.006	0.6	5.4	60	5	0.6
Chlorobenzene	330	5	0.017	1.7	N/A	2,000	5	1.7
Chloroethane	37 *	50	0.019	1.9	N/A	N/A	10	1.9
Chloroform	31	7	0.003	0.30	114	800	5	0.3
Dibromochloromethane	N/A	50	N/A	N/A	N/A	N/A	5	N/A
1,2-Dichlorobenzene	1,700	4.7	0.079	7.9	N/A	N/A	330	7.9
1,3-Dichlorobenzene	310 *	5	0.0155	1.55	N/A	N/A	330	1.6
1,4-Dichlorobenzene	1,700	5	0.085	8.5	N/A	N/A	330	8.5
1,1-Dichloroethane	30	5	0.002	0.2	N/A	N/A	5	0.2
1,2-Dichloroethane	14	5	0.001	0.1	7.7	N/A	5	0.1
1,1-Dichloroethene	65	5	0.004	0.4	12	700	5	0.4
1,2-Dichloroethene (trans)	59	5	0.003	0.3	N/A	2,000	5	0.3
1-3 dichloropropane	51	5	0.003	0.3	N/A	N/A	5	0.3
Ethylbenzene	1,100	5	0.055	5.5	N/A	8,000	5	5.5
113 Freon (1,1,2 Trichloro-1,2,2 Trifluoroethane)	1,230 *	5	0.060	6.0	N/A	200,000	5	6.0
Methylene chloride	21	5	0.001	0.1	93	5,000	5	0.1
4-Methyl-2-Pentanone	19 *	50	0.01	1.0	N/A	N/A	10	1.0

TABLE 1 (Continued)

Contaminant	Partition Coefficient, Koc	Groundwater Standards/ Criteria, Cw (ug/l or ppb)	a Allowable soil conc., Cs (ppm)	b ** Soil cleanup objectives to protect GW quality (ppm)	USEPA Health Based (ppm) Carcin- Systemic ogens Toxicants		CRQL (ppb)	*** Rec. Soil Cleanup Objective (ppm)
Tetrachloroethene	277	5	0.014	1.4	14	800	5	1.4
1,1,1-Trichloroethane	152	5	0.0076	0.76	N/A	7,000	5	0.8
1,1,2,2-Tetrachloroethane	118	5	0.006	0.6	35	N/A	5	0.6
1,2,3-trichloropropane	68	5	0.0034	0.34	N/A	80	5	0.4
1,2,4-trichlorobenzene	670 *	5	0.034	3.4	N/A	N/A	330	3.4
Toluene	300	5	0.015	1.5	N/A	20,000	5	1.5
Trichloroethene	126	5	0.007	0.70	64	N/A	5	0.7
Vinyl chloride	57	2	0.0012	0.12	N/A	N/A	10	0.2
Xylenes	240	5	0.012	1.2	N/A	200,000	--	1.2

a. Allowable Soil Concentration  $C_s = f \times C_w \times K_{oc}$

b. Soil cleanup objective =  $C_s \times \text{Correction Factor (CF)}$

N/A is not available

\* Partition coefficient is calculated by using the following equation:  
 $\log K_{oc} = -0.55 \log S + 3.64$ , where S is solubility in water in ppm.  
 All other Koc values are experimental values.

\*\* Correction Factor (CF) of 100 is used as per TAGM #4046

\*\*\* As per TAGM #4046, Total VOCs < 10 ppm.

Note: Soil cleanup objectives are developed for soil organic carbon content (f) of 1%,  
 and should be adjusted for the actual soil organic carbon content if it is known.

TABLE 2  
Recommended soil cleanup objectives (mg/kg or ppm)  
Semi-Volatile Organic Contaminants

Contaminant	Partition Coefficient, K <sub>oc</sub>	Groundwater Standards/ Criteria, C <sub>w</sub> (ug/l or ppb)	a Allowable soil conc., C <sub>s</sub> (ppm)	b ** Soil cleanup objectives to protect GW quality (ppm)	USEPA Health Based (ppm)		CRQL (ppb)	*** Rec. Soil Cleanup Objective (ppm)
					Carcin-ogens	Systemic Toxicants		
Acenaphthene	4,600	20	0.9	90.0	N/A	5,000	330	50.0 ***
Acenaphthylene	2,056 *	20	0.41	41.0	N/A	N/A	330	41.0
Aniline	13.8	5	0.001	0.1	123	N/A	330	0.1
Anthracene	14,000	50	7.00	700.0	N/A	20,000	330	50.0 ***
Benzo(a)anthracene	1,380,000	0.002	0.03	3.0	0.224	N/A	330	0.224 or MDL
Benzo (a) pyrene	5,500,000	0.002 (ND)	0.110	11.0	0.0609	N/A	330	0.061 or MDL
Benzo (b) fluoranthene	550,000	0.002	0.011	1.1	N/A	N/A	330	1.1
Benzo (g,h,i) perylene	1,600,000	5	8.0	800	N/A	N/A	330	50.0 ***
Benzo (k) fluoranthene	550,000	0.002	0.011	1.1	N/A	N/A	330	1.1
bis(2-ethylhexyl)phthalate	8,706 *	50	4.35	435.0	50	2,000	330	50.0 ***
Butylbenzylphthlate	2,430	50	1.215	122.0	N/A	20,000	330	50.0 ***
Chrysene	200,000	0.002	0.004	0.4	N/A	N/A	330	0.4
4- Chloroaniline	43 *****	5	0.0022	0.22	200	300	330	0.220 or MDL
4-Chloro-3-methylphenol	47	5	0.0024	0.24	N/A	N/A	330	0.240 or MDL
2-Chlorophenol	15 *	50	0.008	0.8	N/A	400	330	0.8



TABLE 2 (Continued)

Contaminant	Partition Coefficient, K <sub>oc</sub>	Groundwater Standards/ Criteria, C <sub>w</sub> (ug/l or ppb)	a Allowable soil conc., C <sub>s</sub> (ppm)	b ** Soil cleanup objectives to protect GW quality (ppm)	USEPA Health Based (ppm)  Carcin- Systemic ogens Toxicants		CRQL (ppb)	*** Rec. Soil Cleanup Objective (ppm)
Dibenzofuran	1,230 *	5	0.062	6.2	N/A	N/A	330	6.2
Dibenzo(a,h)anthracene	33,000,000	50	1,650	165,000	0.0143	N/A	330	0.014 or MDL
3,3'-Dichlorobenzidine	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,4-Dichlorophenol	380	1	0.004	0.4	N/A	200	330	0.4
2,4-Dinitrophenol	38	5	0.002	0.2	N/A	200	1,600	0.200 or MDL
2,6 Dinitrotoluene	198*	5	0.01	1.0	1.03	N/A	330	1.0
Diethylphthlate	142	50	0.071	7.1	N/A	60,000	330	7.1
Dimethylphthlate	40	50	0.020	2.0	N/A	80,000	330	2.0
Di-n-butyl phthalate	162*	50	0.081	8.1	N/A	8,000	330	8.1
Di-n-octyl phthlate	2,346 *	50	1.2	120.0	N/A	2,000	330	50.0 ***
Fluoranthene	38,000	50	19	1900.0	N/A	3,000	330	50.0 ***
Fluorene	7,300	50	3.5	350.0	N/A	3,000	330	50.0 ***
Hexachlorobenzene	3,900	0.35	0.014	1.4	0.41	60	330	0.41
Indeno (1,2,3-cd)pyrene	1,600,000	0.002	0.032	3.2	N/A	N/A	330	3.2
Isophorone	88.31 *	50	0.044	4.40	1,707	20,000	330	4.40
2-methylnaphthalene	727 *	50	0.364	36.4	N/A	N/A	330	36.4
2-Methylphenol	15	5	0.001	0.1	N/A	N/A	330	0.100 or MDL
4-Methylphenol	17	50	0.009	0.9	N/A	4,000	330	0.9
Naphthalene	1,300	10	0.130	13.0	N/A	300	330	13.0
Nitrobenzene	36	5	0.002	0.2	N/A	40	330	0.200 or MDL

TABLE 2 (Continued)

Contaminant	Partition Coefficient, Koc	Groundwater Standards/ Criteria, Cw (ug/l or ppb)	a Allowable soil conc., Cs (ppm)	b ** Soil cleanup objectives to protect GW quality (ppm)	USEPA Health Based (ppm)		CRQL (ppb)	*** Rec. Soil Cleanup Objective (ppm)
					Carcin-ogens	Systemic Toxicants		
2-Nitroaniline	86	5	0.0043	0.43	N/A	N/A	1,600	0.430 or MDL
2-Nitrophenol	65	5	0.0033	0.33	N/A	N/A	330	0.330 or MDL
4-Nitrophenol	21	5	0.001	0.1	N/A	N/A	1,600	0.100 or MDL
3-Nitroaniline	93	5	0.005	0.5	N/A	N/A	1,600	0.500 or MDL
Pentachlorophenol	1,022	1	0.01	1.0	N/A	2,000	1,600	1.0 or MDL
Phenanthrene	4,365 *	50	2.20	220.0	N/A	N/A	330	50.0 ***
Phenol	27	1	0.0003	0.03	N/A	50,000	330	0.03 or MDL
Pyrene	13,295 *	50	6.65	665.0	N/A	2,000	330	50.0 ***
2,4,5-Trichlorophenol	89 *	1	0.001	0.1	N/A	8,000	330	0.1

a. Allowable Soil Concentration  $C_s = f \times C_w \times K_{oc}$

b. Soil cleanup objective =  $C_s \times \text{Correction Factor (CF)}$

N/A is not available

MDL is Method Detection Limit

\* Partition coefficient is calculated by using the following equation:  
 $\log K_{oc} = -0.55 \log S + 3.64$ , where S is solubility in water in ppm.  
 Other Koc values are experimental values.

\*\* Correction Factor (CF) of 100 is used as per TAGM #4046

\*\*\* As per TAGM #4046, Total VOCs < 10 ppm., Total Semi- VOCs < 500ppm. and Individual Semi-VOCs < 50 ppm.

\*\*\*\* Koc is derived from the correlation  $K_{oc} = 0.63 K_{ow}$  (Determining Soil Response Action Levels..... EPA/540/2-89/057). Kow is obtained from the USEPA computer database 'MAIN'.

Note: Soil cleanup objectives are developed for soil organic carbon content (f) of 1%, and should be adjusted for the actual soil organic carbon content if it is known.

TABLE 3  
Recommended soil cleanup objectives (mg/kg or ppm)  
Organic Pesticides / Herbicides and PCBs

Contaminant	Partition Coefficient, K <sub>oc</sub>	Groundwater Standards/ Criteria, C <sub>w</sub> (ug/l or ppb)	a Allowable soil conc., C <sub>s</sub> (ppm)	b ** Soil cleanup objectives to protect GW quality (ppm)	USEPA Health Based (ppm)		CRQL (ppb)	*** Rec. Soil Cleanup Objective (ppm)
					Carcin-ogens	Systemic Toxicants		
Aldrin	96,000	ND (<0.01)	0.005	0.5	0.041	2	8	0.041
alpha- BHC	3,800	ND (<0.05)	0.002	0.2	0.111	N/A	8	0.11
beta - BHC	3,800	ND (<0.05)	0.002	0.2	3.89	N/A	8	0.2
delta - BHC	6,600	ND (<0.05)	0.003	0.3	N/A	N/A	8	0.3
Chlordane	21,305 *	0.1	0.02	2.0	0.54	50	80	0.54
2,4-D	104 *	4.4	0.005	0.5	N/A	800	800	0.5
4,4'- DDD	770,000 *	ND (<0.01)	0.077	7.7	2.9	N/A	16	2.9
4,4'-DDE	440,000 *	ND (<0.01)	0.0440	4.4	2.1	N/A	16	2.1
4,4'-DDT	243,000 *	ND (<0.01)	0.025	2.5	2.1	40	16	2.1
Dibenzo-P-dioxins (PCDD) 2,3,7,8 TCDD	1709800	0.000035	0.0006	0.06	N/A	N/A	N/A	N/A
Dieldrin	10,700 *	ND (<0.01)	0.0010	0.1	0.044	4	16	0.044
Endosulfan I	8,168 *	0.1	0.009	0.9	N/A	N/A	16	0.9
Endosulfan II	8,031 *	0.1	0.009	0.9	N/A	N/A	16	0.9
Endosulfan Sulfate	10,038 *	0.1	0.01	1.0	N/A	N/A	16	1.0
Endrin	9,157 *	ND (<0.01)	0.001	0.1	N/A	20	8	0.10



TABLE 3 (Continued)

Contaminant	Partition Coefficient, Koc	Groundwater Standards/ Criteria, Cw (ug/l or ppb)	a Allowable soil conc., Cs (ppm)	b ** Soil cleanup objectives to protect GW quality (ppm)	USEPA Health Based (ppm)		CRQL (ppb)	*** Rec. Soil Cleanup Objective (ppm)
					Carcin-ogens	Systemic Toxicants		
Endrin ketone	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
gamma - BHC (Lindane)	1,080	ND (<0.05)	0.0006	0.06	5.4	20	8	0.06
gamma - chlordane	140,000	0.1	0.14	14.0	0.54	5	80	0.54
Heptachlor	12,000	ND (<0.01)	0.0010	0.1	0.16	40	8	0.10
Heptachlor epoxide	220	ND (<0.01)	0.0002	0.02	0.077	0.8	8	0.02
Methoxychlor	25,637	35.0	9.0	900	N/A	400	80	***
Mitotane	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Parathion	760	1.5	0.012	1.2	N/A	500	8	1.2
PCBs	17,510 *	0.1	0.1	10.0	1.0	N/A	160	1.0 (Surface) 10 (sub-surf)
Polychlorinated dibenzo-furans (PCDF)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Silvex	2,600	0.26	0.007	0.7	N/A	600	330	0.7
2,4,5-T	53	35	0.019	1.9	N/A	200	330	1.9

a. Allowable Soil Concentration  $C_s = f \times C_w \times K_{oc}$

b. Soil cleanup objective =  $C_s \times$  Correction Factor (CF)

N/A is not available.

\* Partition coefficient is calculated by using the following equation:

$\log K_{oc} = -0.55 \log S + 3.64$ , where S is solubility in water in ppm.

All other Koc values are experimental values.

\*\* Correction Factor (CF) of 100 is used as per TAGM #4046

\*\*\* As per TAGM #4046, Total VOCs < 10 ppm.

Note: Soil cleanup objectives are developed for soil organic carbon content (f) of 1% (5% for PCBs as per PCB Guidance Document), and should be adjusted for the actual soil organic carbon content if it is known.

TABLE 4  
Recommended soil cleanup objectives (mg/kg or ppm)  
Heavy Metals

Contaminants	Protect Water Quality (ppm)	Eastern USA Background (ppm)	* CRDL (mg/kg or ppm)	***** Rec. Soil Cleanup Objective (ppm)
Aluminum	N/A	33,000	2.0	SB
Antimony	N/A	N/A	0.6	SB
Arsenic	N/A	3-12 **	0.1	7.5 or SB
Barium	N/A	15-600	2.0	300 or SB
Beryllium	N/A	0-1.75	0.05	0.16 (HEAST) or SB
Cadmium	N/A	0.1-1	0.05	1 or SB
Calcium	N/A	130 - 35,000 ***	50.0	SB
Chromium	N/A	1.5 - 40 **	0.1	10 or SB
Cobalt	N/A	2.5 - 60 **	0.5	30 or SB
Copper	N/A	1 - 50	0.25	25 or SB
Cyanide	N/A	N/A	0.1	***
Iron	N/A	2,000 - 550,000	1.0	2,000 or SB
Lead	N/A	****	0.03	SB ****
Magnesium	N/A	100 - 5,000	50.0	SB
Manganese	N/A	50 - 5,000	0.15	SB
Mercury	N/A	0.001 - 0.2	0.002	0.1
Nickel	N/A	0.5 -25	0.4	13 or SB
Potassium	N/A	8,500 - 43,000 **	50.0	SB
Selenium	N/A	0.1 - 3.9	0.05	2 or SB
Silver	N/A	N/A	0.1	SB
Sodium	N/A	6,000 - 8,000	50.0	SB
Thallium	N/A	N/A	0.1	SB
Vanadium	N/A	1-300	0.5	150 or SB
Zinc	N/A	9-50	0.2	20 or SB

Note: Some forms of metal salts such as Aluminum Phosphide, Calcium Cyanide, Potassium Cyanide, Copper cyanide, Silver cyanide, Sodium cyanide, Zinc phosphide, Thallium salts, Vanadium pentoxide and Chromium (VI) compounds are more toxic in nature. Please refer to the USEPA HEASTs database to find cleanup objectives if such metals are present in soil.

SB is site background

N/A is not available

- \* CRDL is contract required detection limit which is approx. 10 times the CRDL for water.
  - \*\* New York State background
  - \*\*\* Some forms of Cyanide are complex and very stable while other forms are pH dependent and hence are very unstable. Site-specific form(s) of Cyanide should be taken into consideration when establishing soil cleanup objective.
  - \*\*\*\* Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.
  - \*\*\*\*\* Recommended soil cleanup objectives are average background concentrations as reported in a 1984 survey of reference material by E. Carol McGovern, NYSDEC.
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