04-23177

Northern Environmental℠
Hydrologists • Engineers • Geologists

647 Academy Drive
Northbrook, IL 60062
847-562-8577
888-680-8101
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December 22, 2004
(05-2203-0254)

0311955090
North Suburban
Cleaners
SR | tech

Mr. James L. Baldwin, LPG
Project Manager
Voluntary Site Remediation Unit
Remedial Project Management Section
Bureau of Land
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62794-9276

RELEASABLE
DEC 3 0 2004
REVIEWER MD

Re: LPC # 0311955090 – Cook County
Morton Grove / North Suburban Cleaners
Site Remediation / Technical Reports

Dear Mr. Baldwin:

Northern Environmental has completed additional round of drilling and sampling for North Suburban Cleaners located at 7620 – 7622 Dempster Street, Morton Grove, IL (the Site) on August 13, 2004. This investigation was conducted in response to your letter dated April 6, 2004. Northern Environmental is pleased to submit results of the investigation to address all your concern outlined into your letter dated April 6, 2004 regarding your review of the Phase I Environmental Site Assessment and Focused Site Investigation and Remediation Objectives Reports completed for North Suburban Cleaners. A copy of the April 6, 2004 letter is included in Attachment A.

A total of four boring B1100, B1200, B1300, and B1400 were drilled at the site. Also, B1100 and B1400 borings were converted into monitoring wells MW1100 and MW1400. All new borelogs and well construction log can be found in Attachment B. New soil and groundwater data can be found in Attachment C. Revised figures are in Attachment D. New lab data and chain of custody's can be found in Attachment E. Revised hydraulic conductivity analysis in Attachment F, and revised Tier II calculation can be found in Attachment G.

The response to your concerns and comments are as follows.

ORIGINAL

Response 1:

The hydraulic conductivity test was reevaluated and was analyzed as per Bouwer – Rice's method. The new hydraulic conductivity value is 1.51×10^{-6} cm / sec. The new hydraulic conductivity was used in the revised calculation for Tier II models. The hydraulic conductivity data can be found in the Attachment F. Based on the corrected hydraulic conductivity value the Tier II equations were revised. TACO remediation objective summary tables for each contaminant of concern can be found in Attachment G. The revised Tier II results do not effect the conclusion of the Focused Site Investigation and Remediation Objectives Reports.

Response 2:

A total of four boring B1100, B1200, B1300, and B1400 were drilled at the site in north and west side along the sewer, gas and water line. Also, B1100 and B1400 borings were converted into MW1100 and

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IEPA/BOL

MW 1400. All new boring logs and well construction logs in Attachment B, groundwater data in Attachment C - Table 3, new revised figures are in Attachment D, and lab data and chain of custody's are in Attachment E. Based on the additional investigation it appears that some migration along the pathways has occurred near the source as detected in B1400 (Figure 5a). However four borings along the utility pathways (B1000 to B1300) located in the northwest corner of the property demonstrate the migration of the release is limited.

Response 3:

Northern Environmental will prepare Remedial Action Plan for the Site once the Focused Site Investigation and Remediation Objectives Reports are approved by IL EPA. At the time of the preparation of the Remedial Action Plan appropriate consideration will be given to the soil exceeding Tier II soil saturation limit in northern and eastern edge of the property. Also at that time proper institutional controls will be evaluated for ingestion, inhalation and groundwater exposure route.

Response 4:

Northern Environmental does take note of the point made by the IL EPA. When Remedial Action Plan is developed the off-site contamination issues will be discussed in detail with the owner of the property and with the Illinois Dry Cleaner Environmental Response Trust Fund.

Response 5:

At this time Northern Environmental is not requesting to issue NFR letter. When a remedial action plan is developed a report will include legal description or reference to plat showing the boundaries of the remediation site and real estate permanent identification number(s) (PIN) for the site, if requesting for the NFR letter.

Response 6:

As requested pursuant to 35 IAC 740.210(a)(7)(E) and 740.425 (b)(2)(d) a site base map has been prepared. The site base map is included in Attachment D for your review. The site base map does include all the following information

- A distance of a least 1,000 feet around the remediation site at scale of one inch equals 200 feet.
- Site base map does include north arrow orientation, date, and location of the site with respect to township, range and section.
- Remediation Site boundary lines with the owners of the property adjacent to the remediation site has been clearly marked.
- Surrounding land use has been clearly shown into the site base map.

Conclusions & Recommendations

Additional sampling of soil and groundwater at the Site provided further information to delineate the contaminant plumes. Based on the additional focused site investigation it appears that some migration along the pathways has occurred near the source as detected in B1400 (Figure 5a). However four borings

along the utility pathways (B1000 to B1300) located in the northwest corner of the property demonstrate the migration of the release is limited. The new hydraulic conductivity calculation and additional data from B1100 to B1400 has been considered in the development and calculation of Tier II remedial objectives. Considering data from additional site investigation and new hydraulic conductivity analysis, the revised Tier II results do not effect the conclusion of the Focused Site Investigation and Remediation Objectives Reports.

Northern Environmental has conducted additional site investigation in accordance with IAC 35, sections 740 and 742. Based on the revised site information provided in this letter, Northern Environmental recommends that the Phase I Environmental Site Assessment and Focused Site Investigation and Remediation Objectives Reports be fully approved with this additional information. The next phase of the project will be preparing the Remedial Action Plan report for the site. Northern Environmental requests that the IL EPA provide a letter regarding the approval of the submitted report with additional information.

Please review our response to the questions and comments proposed in your letter and call us with any questions at (847) 562-8577.

Sincerely,
Northern Environmental Technologies, Incorporated

D. M. Shah

Dhaval M. Shah
Environmental Engineer

Christopher J. Lee
Project Manager

Bob C. Soni

Bob C. Soni, P.E.
Director

Attachments

ATTACHMENT A

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276, 217-782-3397
JAMES R. THOMPSON CENTER, 100 WEST RANDOLPH, SUITE 11-300, CHICAGO, IL 60601, 312-814-6026

ROD R. BLAGOJEVICH, GOVERNOR RENEE CIPRIANO, DIRECTOR

(217) 782-6761

0254

7002 3150 0000 1258 3227

April 6, 2004

Ms. Maria Bougas
MMA Enterprises, Inc.
7620-7622 Dempster Street
Morton Grove, IL. 60053

Re: LPC# 0311955090 -- Cook County
Morton Grove / North Suburban Cleaners
Site Remediation / Technical Reports

Dear Ms. Bougas:

The Illinois Environmental Protection Agency (Illinois EPA) has reviewed the *Phase I Environmental Site Assessment* and *Focused Site Investigation and Remediation Objectives Report - Chlorinated Solvent Release* (received March 18, 2004, as Log No. 04-19311), submitted by Northern Environmental for the Site Remediation Project located at 7620 - 7622 Dempster Street, Morton Grove, Illinois. The referenced documents are temporarily denied until the following comments have been adequately addressed.

1) The proposed Tier 2 soil ingestion, soil inhalation, and the soil component of the groundwater ingestion exposure route remediation objectives for tetrachloroethene (PCE), trichloroethene (TCE), cis 1,2 dicloroethene (cis-DCE), and vinyl chloride (VC) are approved. However, due to anomalously low hydraulic conductivity ($K = 4.85 \times 10^{-10}$ cm/sec) used for predicting the contaminant fate transport models, the Tier 2 remediation objectives proposed for the groundwater exposure route are not approved. In a phone conversation with Chris Lee, Northern Environmental, the hydraulic conductivity value used to model the contaminate transport was in error. Revised transport model results need to be provided along with documentation displaying the hydraulic conductivity evaluation.

2) In accordance with Section 742.300, no exposure route may be excluded from consideration until characterization of the extent and concentrations of the contaminants of concern at the site has been preformed. The proposed PCE soil contaminate plume, as proposed on figure 5b, indicates that contaminant migration westward along the gas, water, and sewer utility lines is possible. Additional soil and groundwater samples should be collected along these utility lines to determine if soil/groundwater contamination is present along these potential migration pathways.

3) On-site soil concentration of PCE detected along the northern and eastern edge of the proposed property boundary in five soil borings exceeds the approved Tier 2 soil saturation limit (Csat = 350 mg/kg). A remedial action plan needs to be proposed to remediate the on-site PCE Csat soil contamination levels and define the institutional control(s) that will be used to exclude the ingestion, inhalation, and groundwater exposure routes.

4) Figure 5b, *Focused Site Investigation and Remediation Objectives Report - Chlorinated Solvent Release,* reveals the likelihood of PCE Csat soil concentration levels extending off-site onto the neighboring residential property. The remedial applicant will need to consult with the Illinois Drycleaner Environmental Response Trust Fund to address how the observed PCE soil contamination exceedances are to be handled. The contents of the requested no further remediation letter, when issued, will correspond only to the defined site remediation boundary. All remaining off-site contamination need not be addressed. Any proposed groundwater institutional control, such as the Village of Morton Grove groundwater ordinance, only restricts the off-site property owners from placement of any groundwater potable wells. It should be noted that if off-site residential property is to be remediated, the off-site soil quality would probably be required to meet Tier 1 residential remediation objectives.

5) Pursuant to 35 IAC 740.425(b)(2)(E), the report must include a legal description or reference to plat showing the boundaries of the Remediation Site. Also, please include the real estate permanent identification number(s) (PIN) for the site. This information will be required for drafting the NFR letter.

6) In accordance with Sections 740.210(a)(7) and 740.425(b)(2)(D), the site basemap should include the following:
   a. a distance of a least 1,000 feet around the remediation site at a scale no smaller than one inch equals 200 feet;
   b. map scale, north arrow orientation, date, and location of the site with respect to township, range and section;
   c. Remediation Site boundary lines, with the owners of property adjacent to the remediation site clearly indicated;
   d. the identification of surrounding land uses.

The Illinois EPA requests a written response to the comments presented above. Please submit the original and one copy of all future reports or correspondence to the Illinois EPA regarding this site. Also, the Illinois EPA requests not less than fourteen (14) calendar days notification of all future site investigation and remedial activities in order to coordinate Illinois EPA oversight. This notification is particularly important when groundwater or soil samples are being collected. Failure to notify the Illinois EPA may invalidate sample analysis results and/or other site activities. If you have any questions regarding the comments above, I may be contacted at the address above or (217) 524-7207.

Sincerely,

James L. Baldwin

James L. Baldwin, LPG
Project Manager
Voluntary Site Remediation Unit
Remedial Project Management Section
Division of Remediation Management
Bureau of Land

JLB:jlb

cc: Mr. John Boveri
Affiliated Realty & Management Company
1720 West Algonquin Road
Mount Prospect, IL 60056

Mr. Christopher Lee
Northern Environmental
647 Academy Drive
Northbrook, IL 60062

ATTACHMENT B

IEMA Incident No.: NA	Boring Number: B1100	Page: 1 of 1
Site Name: North Suburban Cleaners Address: 7620 Dempster St Morton Grove, IL	Boring Location: Approximately 7' south and 3' west from the NW corner of building.	Date: 08/13/004 Start 9:20 AM Finish 10:31 AM

Sample Number	Sample Device	Sample Recovery	Lithology Symbol	Depth (feet)	Detailed Soil and Rock Description	Natural Moisture Content %	Hand Penetrometer Qu	OVA/PID/FID/OVM
S1101	DP	15	FL	0 – 2.5	Top 2" asphalt & gravel fill, bottom 13" silty clay, 10YR 4/3, low to medium plasticity, no solvent odor	M	1	0.6
S1102	DP	15	CL	2.5 – 5	Silty Clay with Trace Gravel, 10 YR 3/1. 4/3,& 4/2, low plasticity, no solvent odor, till	M	1	1.6
S1103	DP	24	CL	5 – 7		D/M	3	1.8
S1104	DP	24	CL	7 – 9		D/M	3.5	1.8
S1105	DP	24	CL	9 – 11		D/M	4.5	2
S1106	DP	24	CL	11 – 13		D/M	4.5	1.4
S1107	DP	24	CL	13 – 15	Silty Clay with Trace Gravel, 10 YR 4/1, medium plasticity, no solvent odor, till	M	2.5	0.6
S1108	DP	24	CL	15 – 17		M	2.5	1
S1109	DP	24	CL	17 – 19		M/W	2	0.6
S1110	DP	24	CL	19 – 21		W	1	1.4
S1111	DP	24	CL	21 – 23		W	1.5	0
S1112	DP	24	CL	23 – 25		W	1.5	0
					Abandoned with bentonite @ 25 fbg			

Remarks

D = Dry
W = Wet
M = Moist
fbg = Feet below grade
DP = Direct Push

▼ Depth While Drilling NA
▽ Depth After Drilling NA

Rig GeoProbe
GP Depth 25 Geologist Martha Stevenson
Driller/Co. Mid America

Illinois Environmental Protection Agency

The Agency is authorized to require this information under 415 ILCS 5/4 and 21. Disclosure of this information is required. Failure to do so may result in a civil penalty up to $25,000.00 for each day the failure continues, a fine up to $50,000.00 and imprisonment up to five years. This form has been approved by the Forms Management Center.

IEMA Incident No.: NA	Boring Number: B1200	Page: 1 of 1
Site Name: North Suburban Cleaners Address: 7620 Dempster St Morton Grove, IL	Boring Location: Approximately 3.5' E and 7' N from the NW corner of building.	Date: 08/13/004 Start 10:56 AM Finish 11:31 AM

Sample Number	Sample Device	Sample Recovery	Lithology Symbol	Depth (feet)	Detailed Soil and Rock Description	Natural Moisture Content %	Hand Penetrometer Qu	OVA/PID/FID/OVM
S1201	DP	30	FL	0 – 2.5	Top 6" asphalt & gravel fill, bottom 24" silty clay, 10YR 3/1, low plasticity, petrol odor	M	1	9
S1202	DP	30	CL	2.5 – 5	Silty Clay with Trace Gravel, 10 YR 3/1, low plasticity, petrol odor, till	M	1	5.4
S1203	DP	20	CL	5 – 7	Silty Clay with Trace Gravel, 10 YR 4/1, 3/1, 4/3, & 4/2, low to medium plasticity, no solvent odor, till	M	1	1
S1204	DP	20	CL	7 – 9		M/W	11.5	0
S1205	DP	24	CL	9 – 11		W	2	1.2
S1206	DP	24	CL	11 – 13		W	3	0
S1207	DP	24	CL	13 – 15		W	1.5	1.2
S1208	DP	24	CL	15 – 17		W	1.5	0
S1209	DP	24	CL	17 – 19		W	1	0
S1210	DP	24	CL	19 – 21		W	1	0
S1211	DP	24	CL	21 – 23		W	1	0
S1212	DP	24	CL	23 – 25		W	1	0
					Abandoned with bentonite @ 25 fbg			

Remarks

D = Dry
W = Wet
M = Moist
fbg = Feet below grade
DP = Direct Push

▼ Depth While Drilling NA
▽ Depth After Drilling NA

Rig GeoProbe
GP Depth 25 Geologist Martha Stevenson
Driller/Co. Mid America

Illinois Environmental Protection Agency

The Agency is authorized to require this information under 415 ILCS 5/4 and 21. Disclosure of this information is required. Failure to do so may result in a civil penalty up to $25,000.00 for each day the failure continues, a fine up to $50,000.00 and imprisonment up to five years. This form has been approved by the Forms Management Center.

IEMA Incident No.: NA	Boring Number: B1300	Page: 1 of 1
Site Name: North Suburban Cleaners Address: 7620 Dempster St Morton Grove, IL	Boring Location: Approximately 35' E and 10' N from the NW corner of bui ding.	Date: 08/13/004 Start 12:24 PM Finish 12:50 PM

Sample Number	Sample Device	Sample Recovery	Lithology Symbol	Depth (feet)	Detailed Soil and Rock Description	Natural Moisture Content %	Hand Penetrometer Qu	OVA/PID/FID/OVM
S1301	DP	24	FL	0 – 2.5	Top 6" asphalt & gravel fill, bottom 18" silty clay, 10YR 3/1, low plasticity, no solvent odor	D/M	3	2
S1302	DP	24	CL	2.5 – 5	Silty Clay with Trace Gravel, 10 YR 3/1, low plasticity, no solvent odor, till	D/M	3	2.3
S1303	DP	24	CL	5 – 7	Silty Clay with Trace Gravel, 10 YR 4/2, 4/3, medium plasticity, no solvent odor, till	M/W	2	34
S1304	DP	24	CL	7 – 9		W	1	50
S1305	DP	24	CL	9 – 11		W	2.5	21
S1306	DP	24	CL	11 – 13		W	2.5	5
S1307	DP	0	NR	13 – 15	No Recocvery	NR	NR	NR
S1308	DP	3	CL	15 – 17	Silty Clay with Trace Gravel, 10 YR 4/1, medium plasticity, no solvent odor, till	W	1	0
S1309	DP	24	CL	17 – 19		W	1	0
S1310	DP	24	CL	19 – 21		W	1	0
S1311	DP	12	CL	21 – 23		W	1	0
S1312	DP	12	CL	23 – 25		W	1	0
					Abandoned with bentonite @ 25 fbg			

Remarks	
D	= Dry
W	= Wet
M	= Moist
fbg	= Feet below grade
DP	= Direct Push

▼ Depth While Drilling NA

▽ Depth After Drilling NA

Rig GeoProbe

GP Depth 25 Geologist Martha Stevenson

Driller/Co. Mid America

Illinois Environmental Protection Agency

The Agency is authorized to require this information under 415 ILCS 5/4 and 21. Disclosure of this information is required. Failure to do so may result in a civil penalty up to $25,000.00 for each day the failure continues, a fine up to $50,000.00 and imprisonment up to five years. This form has been approved by the Forms Management Center.

IEMA Incident No.: NA	Boring Number: B1400	Page: 1 of 1
Site Name: North Suburban Cleaners Address: 7620 Dempster St Morton Grove, IL	Boring Location: Approximately 55' W and 5' N from the NE corner of building.	Date: 08/13/004 Start 1:14 PM Finish 1:52 PM

Sample Number	Sample Device	Sample Recovery	Lithology Symbol	Depth (feet)	Detailed Soil and Rock Description	Natural Moisture Content %	Hand Penetrometer Qu	OVA/PID/FID/OVM	Remarks
S1401	DP	20	FL	0 – 2.5	Top 6" asphalt & gravel fill, bottom 14" silty clay, 10YR 3/1, low to medium plasticity, no solvent odor		1	0	
S1402	DP	20	CL	2.5 – 5	Silty Clay with Trace Gravel, 10 YR 3/1, 4/2, & 4/1, medium plasticity, low at 13-17', no solvent odor, till	M	1	0	D = Dry W = Wet M = Moist fbg = Feet below grade DP = Direct Push
S1403	DP	24	CL	5 – 7		W	1	0	
S1404	DP	24	CL	7 – 9		W	1	0	
S1405	DP	24	CL	9 – 11		W	2.5	4	
S1406	DP	24	CL	11 – 13		W	2.5	1	
S1407	DP	24	NR	13 – 15		W	2.5	17	
S1408	DP	24	CL	15 – 17		W	3	3	
S1409	DP	24	CL	17 – 19		W	2.5	0	
S1410	DP	24	CL	19 – 21		W	2.5	0	
S1411	DP	24	CL	21 – 23		W	3	0	
S1412	DP	24	CL	23 – 25		W	2.5	0	
					Abandoned with bentonite @ 25 fbg				

▼ Depth While Drilling NA

▽ Depth After Drilling NA

Rig GeoProbe

GP Depth 25 Geologist Martha Stevenson

Driller/Co. Mid America

Illinois Environmental Protection Agency

The Agency is authorized to require this information under 415 ILCS 5/4 and 21. Disclosure of this information is required. Failure to do so may result in a civil penalty up to $25,000.00 for each day the failure continues, a fine up to $50,000.00 and imprisonment up to five years. This form has been approved by the Forms Management Center.

The Agency is authorized to require this information under 415 ILCS 5/4 and 21. Disclosure of this information is required. Failure to do so may result in a civil penalty to $25,000.00 for each day the failure continues, a fine up to $50,000.00 and imprisonment up to five years. This form has been approved byt eh Forms Management

Illinois Environmental Protection Agency

Well Completion Report

Incident No.:	NA	Well No.:	B1100/MW1100
Site Name:	North Suburban Cleaner	Date Drilled Start:	08/13/004
Drilling Contractor:	Drilling Ulimited	Date Completed:	8/13/2004
Driller:	Mike & Josh	Geologist:	Martha Stevenson
Drilling Model:	GeoProbe	Drilling Fluids (type):	None

Annular Space Details

Type of Surface Seal:	Concrete
Type of Annular Seal:	Concrete
Type of Bentonite Seal (Granular, Pellet):	3/8" Pellets
Type of Sand Pack:	Coarse sand #30, Fine sand #45-55

Well Construction Materials

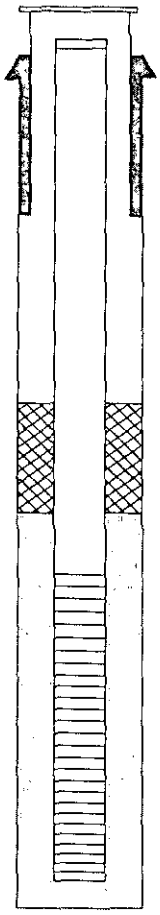
	Stainless Steel Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			
Riser pipe above w.t.		1"DIAsch40	
Riser pipe below w.t.		1"DIAsch40	
Screen		1"DIAsch40	
Coupling joint screen to riser			
Protective casing	6"DIA Steel		

Measurements

To .01 ft (where applicable)

Riser pipe length (feet)	7.65
Screen length (feet)	10.00
Screen slot size	.01"
Protective casing length	8"
Depth to water	16.63
Elevation of water	639.67
Free product thickness	0.00"
Gallons removed (developed)	<0.5
Gallons removed (purged)	<.05
Other	

Completed By: Anthony DeMauro



Elevations - .01 ft.

656.52	Top of Protective Casing
656.30	Top of Riser Pipe
656.52	Ground Surface
656.52	Top of Annular Sealant
0"	Casing Stickup
655.02	Top of Seal
4.37	Total Seal Interval
650.65	Top of Sand
648.65	Top of Screen
10.00	Total Screen Interval
638.65	Bottom of Screen
631.52	Bottom of Borehole

The Agency is authorized to require this information under 415 ILCS 5/4 and 21. Disclosure of this information is required. Failure to do so may result in a civil penalty to $25,000.00 for each day the failure continues, a fine up to $50,000.00 and imprisonment up to five years. This form has been approved byt eh Forms Management

Illinois Environmental Protection Agency

Well Completion Report

Incident No.:	NA	Well No.:	B1400/MW1400
Site Name:	North Suburban Cleaner	Date Drilled Start:	08/13/004
Drilling Contractor:	Drilling Ulimited	Date Completed:	8/13/2004
Driller:	Mike & Josh	Geologist:	Martha Stevenson
Drilling Model:	GeoProbe	Drilling Fluids (type):	None

Annular Space Details

Type of Surface Seal:	Concrete
Type of Annular Seal:	Concrete
Type of Bentonite Seal (Granular, Pellet):	3/8" Pellets
Type of Sand Pack:	Coarse sand #30, Fine sand #45-55

Well Construction Materials

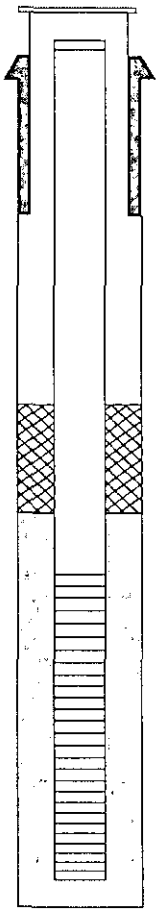
	Stainless Steel Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			
Riser pipe above w.t.		1"DIAsch40	
Riser pipe below w.t.		1"DIAsch40	
Screen		1"DIAsch40	
Coupling joint screen to riser			
Protective casing	6"DIA Steel		

Measurements

To .01 ft (where applicable)

Riser pipe length (feet)	1.70
Screen length (feet)	10.00
Screen slot size	.01"
Protective casing length	8"
Depth to water	0.84
Elevation of water	655.95
Free product thickness	0.00"
Gallons removed (developed)	<0.5
Gallons removed (purged)	>1.0
Other	

Completed By: Anthony DeMauro



Elevations - .01 ft.

657.01	Top of Protective Casing
656.79	Top of Riser Pipe
657.01	Ground Surface
657.01	Top of Annular Sealant
0"	Casing Stickup
655.51	Top of Seal
-1.58	Total Seal Interval
657.09	Top of Sand
655.09	Top of Screen
10.00	Total Screen Interval
645.09	Bottom of Screen
632.01	Bottom of Borehole

ATTACHMENT C

Table 1. Groundwater Elevation Data, North Suburban Cleaners, Morton Grove, Illinois

Well	Date	Ground Surface Elevation (feet MSL)	Reference Point Elevation (feet MSL)	Depth to Water Below Reference Point (feet)	Water Table Elevation (feet MSL)
MW-500	9/8/2003	657.21	656.40	>25.00	<631.4
	10/22/2003	657.21	656.40	21.30	635.10
	10/27/2003	657.21	656.40	20.68	635.72
	8/26/2004	657.21	656.40	6.97	649.43
MW-600	9/8/2003	656.92	656.57	7.61	648.96
	10/22/2003	656.92	656.57	5.88	650.69
	8/26/2004	656.92	656.57	4.94	651.63
MW-700	9/8/2003	656.84	656.59	3.84	652.75
	10/22/2003	656.84	656.59	4.21	652.38
	8/26/2004	656.84	656.59	1.64	654.95
MW-800	9/8/2003	656.93	656.62	6.15	650.47
	10/22/2003	656.93	656.62	4.90	651.72
	8/26/2004	656.93	656.62	4.15	652.47
MW-1100	8/18/2004	656.52	656.30	16.63	639.67
	8/26/2004	656.52	656.30	14.25	642.05
MW-1400	8/18/2004	657.01	656.79	0.84	655.95
	8/26/2004	657.01	656.79	0.40	656.39

Notes: The Benchmark is the north point of the sewer lid manhole located on Ottawa Street.

Estimated benchmark elevation = 656.00 feet above mean sea level (MSL).

Table 2 (Continued) Soil Sample Field Screening and Laboratory Analytical Results, North Suburban Cleaners, Morton Grove, IL.

Bore Hole ID	Sample Label	Sample Date	Time Sampled	Time Analyzed	Sample Depth (feet)	PID Result	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2-Dichloroethane	1,2-Dichloropropane	2-Butanone	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Ethylbenzene	Methylene chloride	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Vinyl Chloride	Xylenes (total)	Sample Description
							Laboratory Results (microgram per kilogram)																																	
B1100	S1101	8/13/04	9:20	9:40	0-2.5	0.6	<0.97	<0.95	<0.89	<1.4	<1.4	<0.87	<0.97	<4.4	<2.5	<2.0	<1.5	<0.66	<1.1	<1.3	<2.8	<1.6	<1.1	<0.77	<1.2	<1.8	<1.1	<1.5	<1.2	<1.1	<0.64	<1.4	<0.66	12.4	<1.2	<1.1	<0.81	<0.70	<1.5	<0.64	Gravel fill and Silty Clay
	S1102	8/13/04	9:20	9:40	2.5-5	1.6																																			Silty Clay w/ gravel
	S1103	8/13/04	9:25	9:51	5-7	1.8																																			Silty Clay w/ gravel
	S1104	8/13/04	9:25	9:51	7-9	1.8																																			Silty Clay w/ gravel
	S1105	8/13/04	9:28	9:57	9-11	2	<0.90	<0.88	<0.82	<1.3	<1.3	<0.81	<0.90	<4.0	<2.3	<1.9	12	<0.61	<0.99	<1.2	<2.6	<1.5	<0.99	<0.72	<1.1	<1.7	<0.99	<1.4	<1.1	<0.99	<0.59	<1.3	<0.61	<1.3	<1.1	<0.99	<0.75	<0.65	<1.4	<0.59	Silty Clay w/ gravel
	S1106	8/13/04	9:28	9:57	11-13	1.4																																			Silty Clay w/ gravel
	S1107	8/13/04	9:48	10:10	13-15	0.6																																			Silty Clay w/ gravel
	S1108	8/13/04	9:48	10:10	15-17	1																																			Silty Clay w/ gravel
	S1109	8/13/04	10:06	10:24	17-19	0.6																																			Silty Clay w/ gravel
	S1110	8/13/04	10:06	10:24	19-21	1.4																																			Silty Clay w/ gravel
	S1111	8/13/04	10:31	10:45	21-23	0																																			Silty Clay w/ gravel
	S1112	8/13/04	10:31	10:45	23-25	0	<.80	<.78	<.73	<1.1	<1.1	<.72	<.80	<3.6	<2.1	<1.7	14	<.59	<.88	<1.0	<2.3	2.2	<.88	<.64	<0.96	<1.5	<.88	<1.3	<0.96	<.88	<.53	<1.1	<.54	<1.2	<0.96	<0.88	<0.67	<0.57	<1.3	<0.53	Silty Clay w/ gravel
B1200	S1201	8/13/04	10:56	11:12	0-2.5	9																																			Gravel fill and Silty Clay
	S1202	8/13/04	10:56	11:12	2.5-5	5.4	<1.1	<1.1	<1	<1.6	<1.6	<1	<1.1	33	<2.9	<2.4	110	26	>1.2	<1.5	<3.3	<1.9	<1.2	<0.9	<1.3	<2.1	<1.2	<1.8	<1.3	<1.2	<0.74	<1.6	<0.76	<1.7	<1.3	<1.2	<0.94	<0.81	<1.8	<0.74	Silty Clay w/ gravel
	S1203	8/13/04	11:00	11:14	5-7	1																																			Silty Clay w/ gravel
	S1204	8/13/04	11:00	11:14	7-9	0																																			Silty Clay w/ gravel
	S1205	8/13/04	11:04	11:24	9-11	1.2																																			Silty Clay w/ gravel
	S1206	8/13/04	11:04	11:24	11-13	0																																			Silty Clay w/ gravel
	S1207	8/13/04	11:08	11:25	13-15	1.2																																			Silty Clay w/ gravel
	S1208	8/13/04	11:08	11:25	15-17	0																																			Silty Clay w/ gravel
	S1209	8/13/04	11:19	11:43	17-19	0																																			Silty Clay w/ gravel
	S1210	8/13/04	11:19	11:43	19-21	0																																			Silty Clay w/ gravel
	S1211	8/13/04	11:31	11:44	21-23	0																																			Silty Clay w/ gravel
	S1212	8/13/04	11:31	11:46	23-25	0	<0.97	<0.95	<0.89	<1.4	<1.4	<0.87	<0.97	<4.4	<2.5	<2.0	13	<0.66	<1.1	<1.3	<2.8	<1.6	<1.1	<0.78	<1.2	<1.8	<1.1	<1.6	<1.2	<1.1	<0.64	<1.4	<0.66	<1.5	<1.2	<1.1	<0.82	<0.70	<1.6	<0.64	Silty Clay w/ gravel
B1300	S1301	8/13/04	12:11	12:24	0-2.5	2																																			*Gravel fill and Silty Clay*
	S1302	8/13/04	12:11	12:24	2.5-5	2.3																																			Silty Clay w/ gravel
	S1303	8/13/04	12:14	12:41	5-7	34																																			Silty Clay w/ gravel
	S1304	8/13/04	12:14	12:41	7-9	50	<25	<27	<31	<25	<28	<27	<28	<94	<79	<34	<74	<19	<25	<26	<32	<26	<21	<12	<25	<32	<24	<26	780	<19	<19	<19	<15	<21	<11	130	<19	<26	190	<19	Silty Clay w/ gravel
	S1305	8/13/04	12:17	12:42	9-11	21																																			Silty Clay w/ gravel
	S1306	8/13/04	12:17	12:42	11-13	5																																			Silty Clay w/ gravel
	S1307	8/13/04	NR	NR	13-15	NR																																			NO RECOVERY
	S1308	8/13/04	12:23	12:45	15-17	0																																			Silty Clay w/ gravel
	S1309	8/13/04	12:38	12:57	17-19	0																																			Silty Clay w/ gravel
	S1310	8/13/04	12:38	12:57	19-21	0																																			Silty Clay w/ gravel
	S1311	8/13/04	12:50	1:00	21-23	0																																			Silty Clay w/ gravel
	S1312	8/13/04	12:50	1:00	23-25	0	<0.90	<0.89	<0.83	<1.3	<1.3	<0.81	<0.90	<4.1	<2.3	<1.9	13	<0.61	<0.99	<1.2	<2.6	<1.5	<0.99	<0.72	<1.1	<1.7	<0.99	<1.4	<1.1	<0.99	<0.60	<1.3	<0.61	<1.4	<1.1	<0.99	<0.76	<0.65	<1.4	<0.60	Silty Clay w/ gravel
B1400	S1401	8/13/04	1:14	1:35	0-2.5	0																																			Gravel fill and Silty Clay
	S1402	8/13/04	1:14	1:35	2.5-5	0																																			Silty Clay w/ gravel
	S1403	8/13/04	1:17	1:36	5-7	0																																			Silty Clay w/ gravel
	S1404	8/13/04	1:17	1:36	7-9	0																																			Silty Clay w/ gravel
	S1405	8/13/04	1:21	1:38	9-11	4																																			Silty Clay w/ gravel
	S1406	8/13/04	1:21	1:38	11-13	1																																			Silty Clay w/ gravel
	S1407	8/13/04	1:24	1:39	13-15	17	<1200	<1300	<1500	<1200	<1400	<1300	<1300	<4500	<3800	<1600	<3600	<900	<1200	<1200	<1500	<1200	<1000	<590	<1200	<1500	<1100	<1300	**3800**	<900	<930	<900	<740	**390000**	<530	<900	<930	**17000**	<900	<930	Silty Clay w/ gravel
	S1408	8/13/04	1:24	1:39	15-17	2																																			Silty Clay w/ gravel
	S1409	8/13/04	1:32	1:50	17-19	0																																			Silty Clay w/ gravel
	S1410	8/13/04	1:32	1:50	19-21	0																																			Silty Clay w/ gravel
	S1411	8/13/04	1:40	1:52	21-23	0																																			Silty Clay w/ gravel
	S1412	8/13/04	1:40	1:52	23-25	0	<0.96	<0.94	<0.88	<1.3	<1.3	<0.86	<0.96	<4.3	<2.5	<2.0	<1.5	<0.65	<1.1	<1.2	<2.8	<1.6	<1.1	<0.77	<1.2	<1.8	<1.1	<1.5	<1.2	<1.1	<0.63	<1.3	<0.65	<1.4	<1.2	<1.1	<0.81	<0.69	<1.5	<0.63	Silty Clay w/ gravel

TACO Tier 1 Soil Remediation Objective (microgram per kilogram)	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2-Dichloroethane	1,2-Dichloropropane	2-Butanone	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Ethylbenzene	Methylene chloride	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Vinyl Chloride	Xylenes (total)
Class I Groundwater Ingestion	2000	NR	20	23000	60	20	30	NR	NR	NR	16000	30	600	800	NR	32000	70	1000	NR	NR	600	NR	400	4	13000	20,000	4000	160	12000	700	4	60	10	150000
Class II Groundwater Ingestion	9600	NR	300	110000	300	100	150	NR	NR	NR	16000	170	600	800	NR	160000	330	6500	NR	NR	2900	NR	1100	20	19000	200	18000	1300	29000	3400	20	300	70	150000
Residential Ingestion	NR	NR	310000	8E+06	700000	7000	9000	NR	NR	NR	8E+06	22000	10000	81000	NR	8E+06	5000	2E+06	NR	NR	100000	NR	780000	4000	8E+06	85000	16000000	12000	2E+07	2E+06	4000	58000	460	1.6E+08
Residential Inhalation	1E+06	NR	2E+06	1E+06	2E+06	400	15000	NR	NR	NR	1E+08	800	3E+06	53000	NR	720000	300	130000	NR	NR	300	NR	1E+06	100	400000	13000	1500000	11000	350000	3E+06	100	5000	280	410000
Industrial/Commercial Ingestion	NR	NR	8E+06	2E+08	2E+07	63000	84000	NR	NR	NR	2E+08	200000	92000	720000	NR	2E+08	44000	41000000	NR	NR	940000	NR	2E+07	33000	2E+08	760000	410000000	110000	4E+08	4E+07	33000	520000	7900	1E+09
Industrial/Commercial Inhalation	1E+06	NR	2E+06	2E+06	2E+06	700	23000	NR	NR	NR	1E+08	1500	3E+06	100000	NR	720000	640	210000	NR	NR	540	NR	1E+06	230	400000	24000	1500000	20000	650000	3E+06	230	8900	1100	410000
Construction Worker Ingestion	NR	NR	8E+06	2E+08	2E+05	1E+06	2E+06	NR	NR	NR	2E+08	4E+06	2E+06	2E+07	NR	200000000	410000	4E+06	NR	NR	2E+05	NR	2E+07	610000	2E+07	1E+07	41000000	2400000	4.1E+08	4E+07	610000	1E+06	170000	4.1E+08
Construction Worker Inhalation	1E+06	NR	2E+06	130000	2E+06	990	500	NR	NR	NR	1E+08	2100	3E+06	140000	NR	9000	900	1300	NR	NR	760	NR	1E+06	330	58000	34000	430000	28000	42000	3E+06	330	12000	1100	410000

Notes:
PID = photoionization detector
"J" = concentration detected between limit of detection and limit of quantification
NR = not regulated
TACO = Tiered Approach to Corrective Action Objectives, Title 35, Part 742, IL Adm. Code
xxx = indicates detected concentration above applicable Tier 1 Soil Remediation Objective

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Table 3 Groundwater Quality Data Analytical Results, North Suburban Cleaners, Morton Grove, Illinois

Monitoring Well	Date Collected	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2-Dichloroethane	1,2-Dichloropropane	2-Butanone	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Ethylbenzene	Methylene chloride	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Vinyl Chloride	Xylenes (total)
		Laboratory Results (microgram per liter)																																	
MW500	10/27/2003	<0.9	<0.2	<0.42	<0.75	<0.57	<0.36	<0.46	<4.3	<1.1	<1.2	<2.2	<0.41	<0.56	<0.94	<0.91	<0.66	<0.49	<0.41	<0.81	<0.97	<0.37	<0.24	<0.83	<0.19	<0.54	<0.43	<0.86	<0.45	<0.67	<0.89	<0.19	<0.48	<0.18	<0.83
MW600	9/17/2003	<9.0	<2.0	<4.2	<7.5	<5.7	<3.6	<4.6	<43	<11	<12	62	<4.1	<5.6	<9.4	<9.1	<6.6	<4.9	<4.1	<8.1	<9.7	<3.7	<2.7	**270**	<1.9	<5.4	<4.3	<8.6	9.9	<6.7	<8.9	<1.9	<4.8	**1400**	<26.3
MW700	9/17/2003	<450	<100	<210	<380	<280	<180	<230	<2200	<550	<600	<1100	<200	<280	<470	<460	<330	<240	<200	<400	<480	<180	<120	**49000**	<95	<270	<220	<430	**59000**	<340	490	<95	**3100**	**17000**	<1320
MW800	9/17/2003	<.90	<.20	<.42	<.75	<.57	<36	<.46	<4.3	<1.1	<1.2	<2.2	<.41	<.56	<.94	<.91	<.66	<.49	<.41	<.81	<.97	<.37	<.24	55	<.19	<.54	<.43	<.86	19	<.67	1.6	<.19	2.5	**94**	<2.63
DUP	9/17/2003	<.90	<.20	<.42	<.75	<.57	<36	<.46	<4.3	<1.1	<1.2	3.8	<.41	<.56	<.94	<.91	<.66	<.49	<.41	<.81	<.97	<.37	<.24	56	<.19	<.54	<.43	<.86	5.4	<.67	1.8	<.19	2.7	**110**	<2.63
TRIP	9/17/2003	<.90	<.20	<.42	<.75	<.57	<36	<.46	<4.3	<1.1	<1.2	<2.2	<.41	<.56	<.94	<.91	<.66	<.49	<.41	<.81	<.97	<.37	<.24	<.83	<.19	<.54	<.43	<.86	<.45	<.67	<.89	<.19	<.48	<0.18	<2.63
MW1100	8/26/2004	<.90	<.20	<.42	<.75	<.57	<36	<.46	<4.3	<1.1	<1.2	3.4	<.41	<.56	<.94	<.91	5.1	<.49	<.41	<.81	<.97	<.37	<.24	<.83	<.19	<.54	<.43	<.86	<.45	<.67	<.89	<.19	<.48	<0.18	<.83
*MW1400	8/26/2004	<9	<2	<4.2	<7.5	<5.7	<3.6	<4.6	<43	<11	<12	<22	<4.1	<5.6	<9.4	<9.1	<6.6	<4.9	<4.1	<8.1	<9.7	<3.7	<2.4	**690**	<1.9	<5.4	<4.3	<8.6	**1800**	<6.7	<8.9	<1.9	**160**	3.7	<8.3
DUP(MW1400)	8/26/2004	<9	<2	<4.2	<7.5	<5.7	<3.6	<4.6	<43	<11	<12	<22	<4.1	<5.6	<9.4	<9.1	<6.6	<4.9	<4.1	<8.1	<9.7	<3.7	<2.4	**580**	<1.9	<5.4	<4.3	<8.6	**1700**	<6.7	<8.9	<1.9	**150**	<1.8	<8.3
TRIP	8/26/2004	<.90	<.20	<.42	<.75	<.57	<36	<.46	<4.3	<1.1	<1.2	8.8	<.41	<.56	<.94	<.91	<.66	<.49	<.41	<.81	<.97	<.37	<.24	<.83	<.19	<.54	<.43	<.86	<.45	<.67	<.89	<.19	<.48	<0.18	<.83
TACO Tier 1 Remediation Objective (microgram per liter)																																			
Class I Groundwater Ingestion		200	NR	5	700	7	5	5	NR	NR	NR	700	5	0.02	0.2	NR	700	5	100	NR	NR	0.02	NR	70	1	700	5	100	5	1000	100	1	5	2	10,000
Class II Groundwater Ingestion		1000	NR	50	3500	35	25	25	NR	NR	NR	700	25	0.02	0.2	NR	3500	25	500	NR	NR	0.1	NR	**200**	5	1000	50	500	**25**	2500	500	5	**25**	**10**	10,000

Notes:

"J" = concentration detected between limit of detection and limit of quantification

NR = not regulated

TACO = Tiered Approach to Corrective Action Objectives, Title 35, Part 742, IL Adm. Code

xxx = indicates detected concentration above applicable Tier 1 Groundwater Remediation Objective

* = duplicate sample

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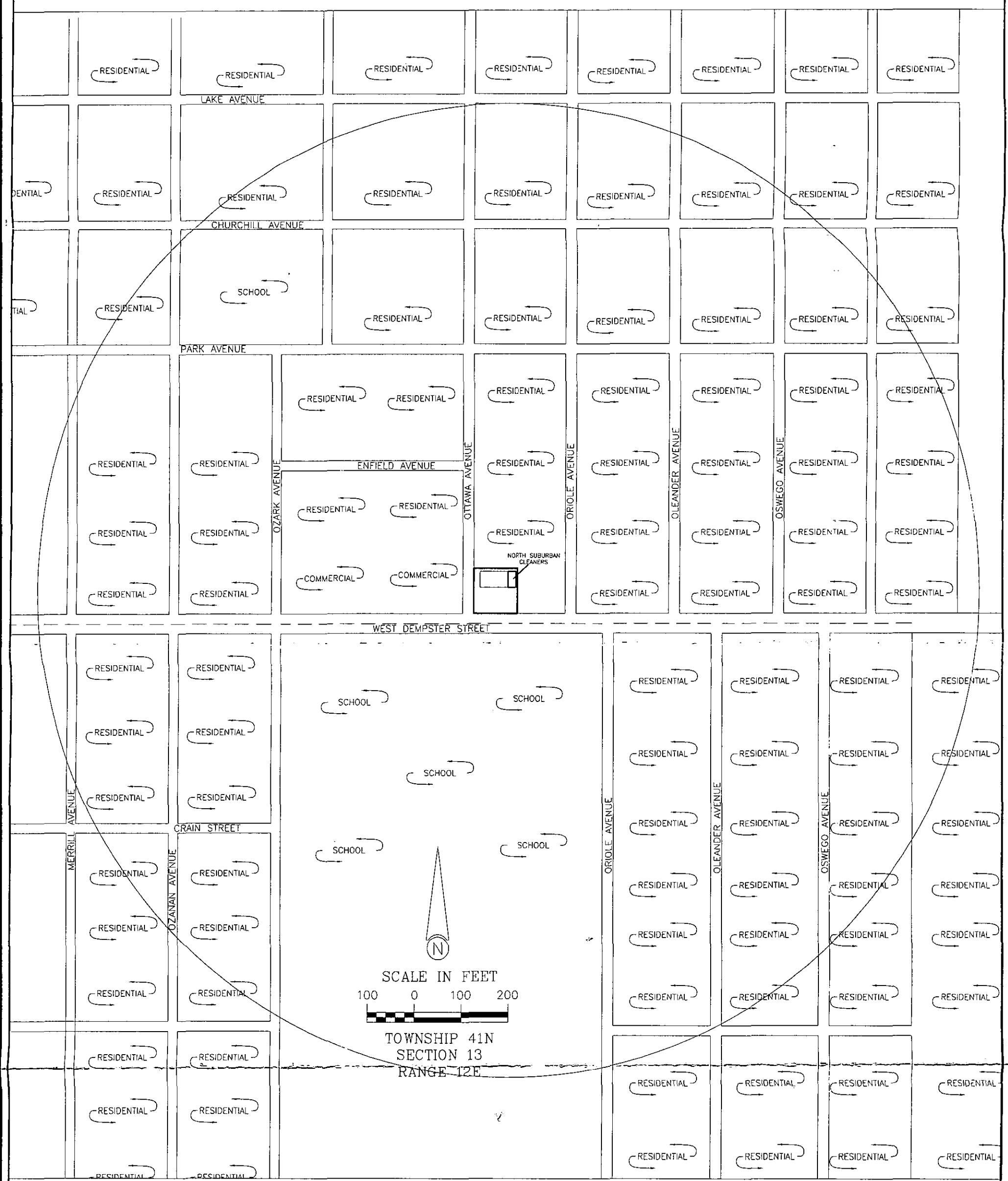
projects/0254/Table 3

ATTACHMENT D



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SITE BASEMAP

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PROJECT NUMBER: 05-2203-0254
FIGURE 2

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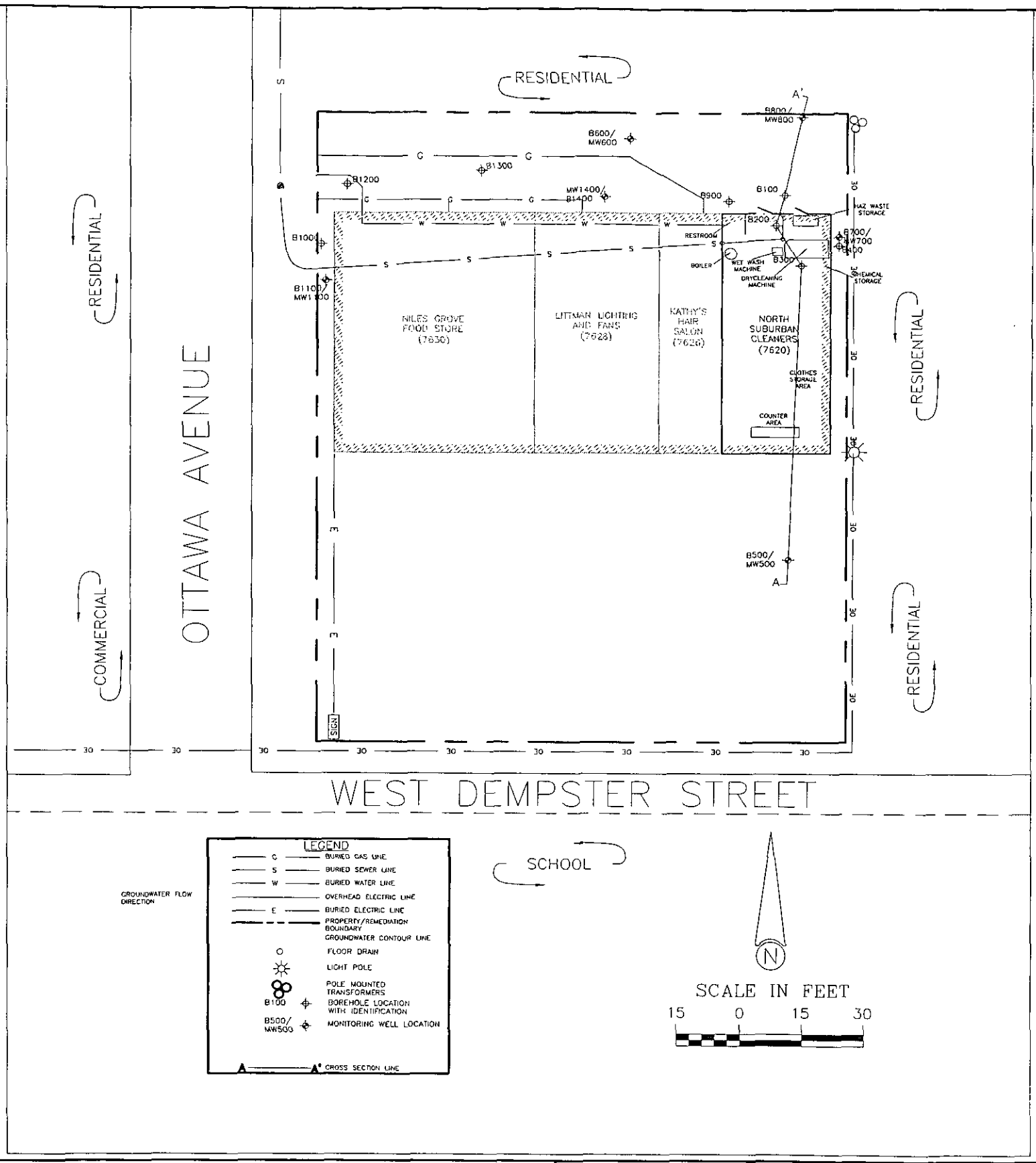

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SITE LAYOUT AND BOREHOLE & MONITORING WELL LOCATIONS

NORTH SUBURBAN CLEANERS
7620-22 DEMPSTER STREET
MORTON GROVE, ILLINOIS

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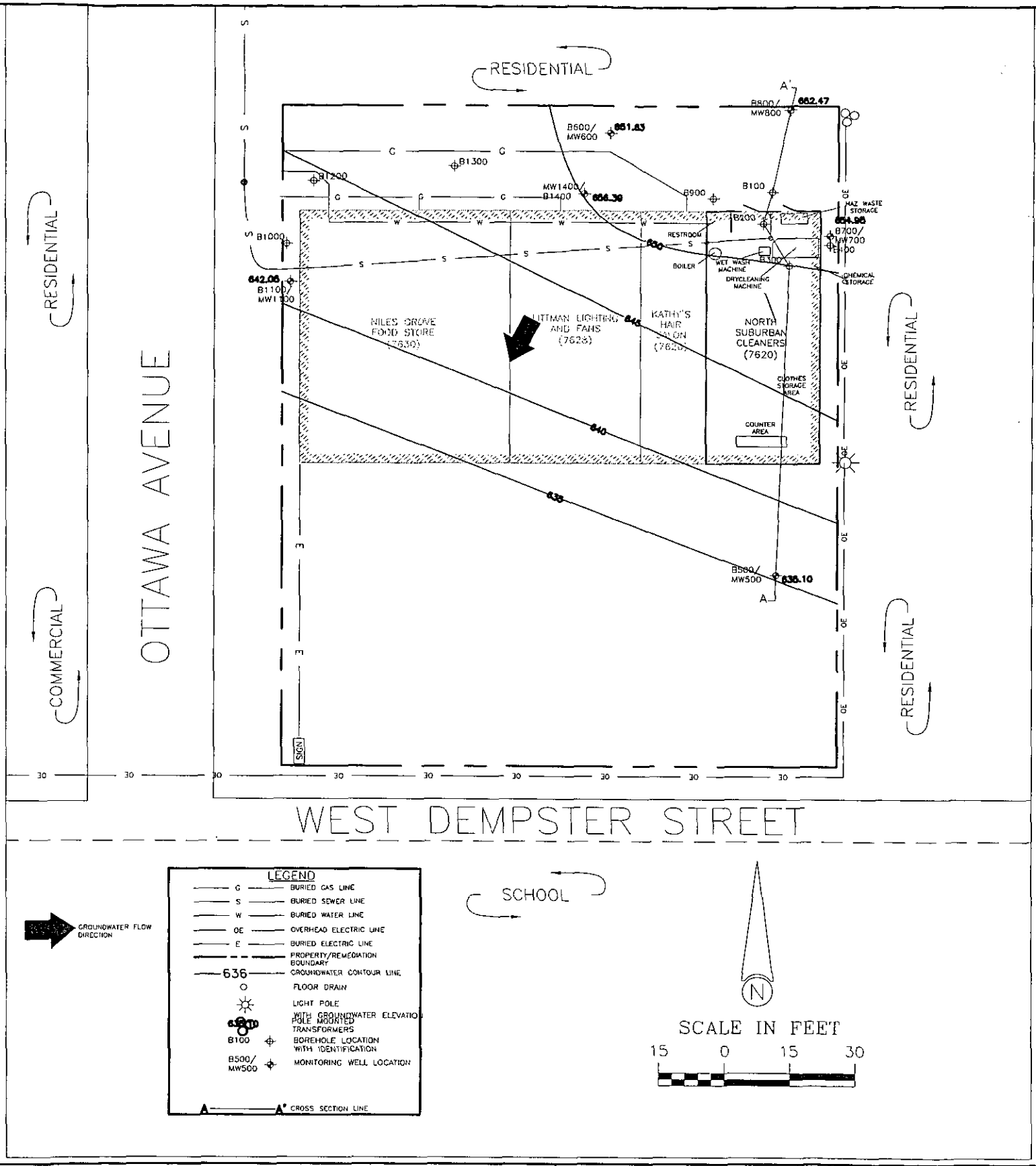
PROJECT NUMBER: 05-2203-0254 FIGURE 3



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GROUNDWATER FLOW MAP, AUGUST 26, 2004

NORTH SUBURBAN CLEANERS
7620-22 DEMPSTER STREET
MORTON GROVE, ILLINOIS

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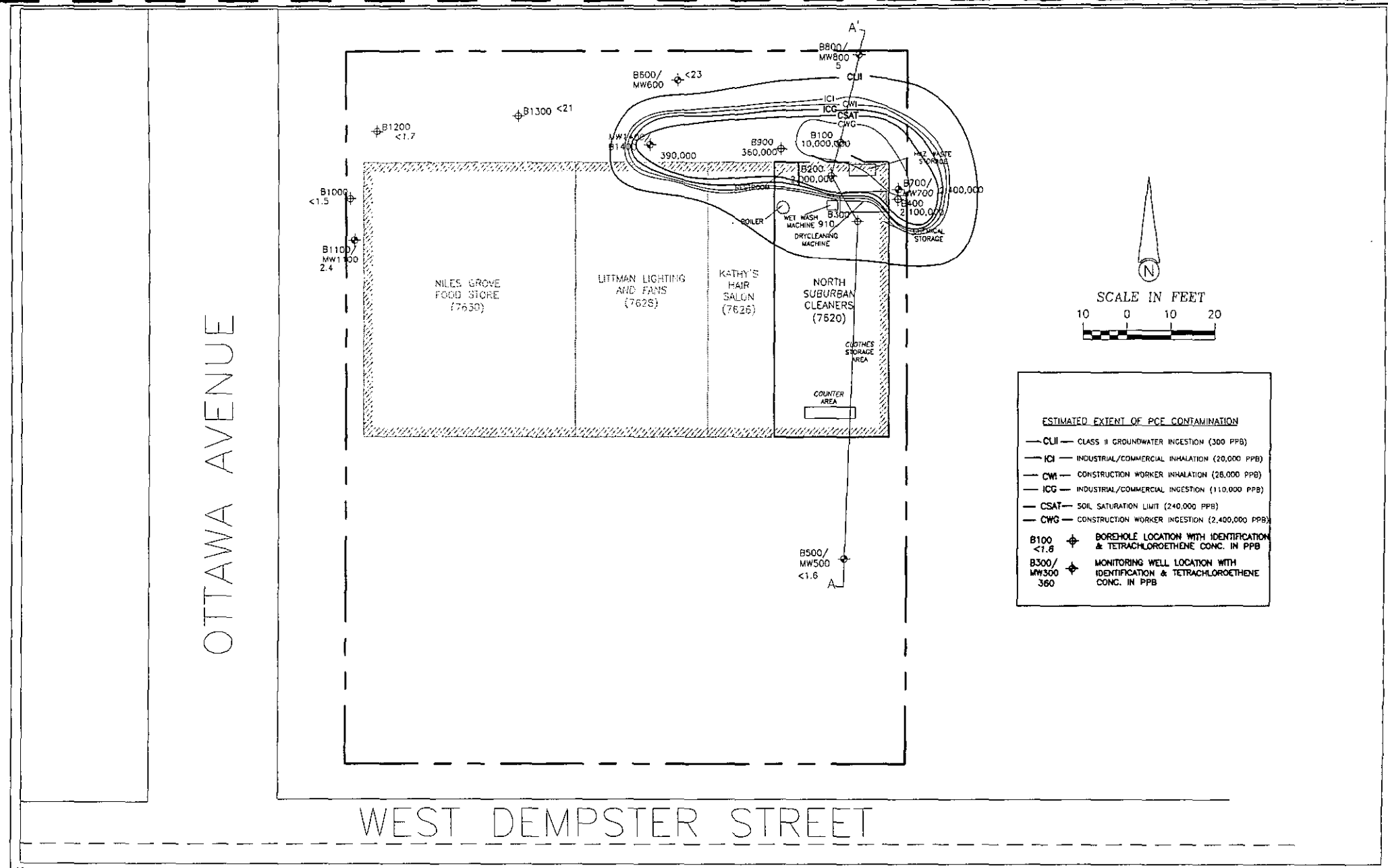
REVISION DATE: 09/20/04	

PROJECT NUMBER: 05-2203-0254 FIGURE 4



Northern Environmental℠
Hydrologists · Engineers · Geologists
647 Academy Drive, Northbrook, Illinois
Phone: 847-562-8577 Fax 847-562-8552
WISCONSIN ▲ MICHIGAN ▲ ILLINOIS ▲ MINNESOTA ▲ IOWA

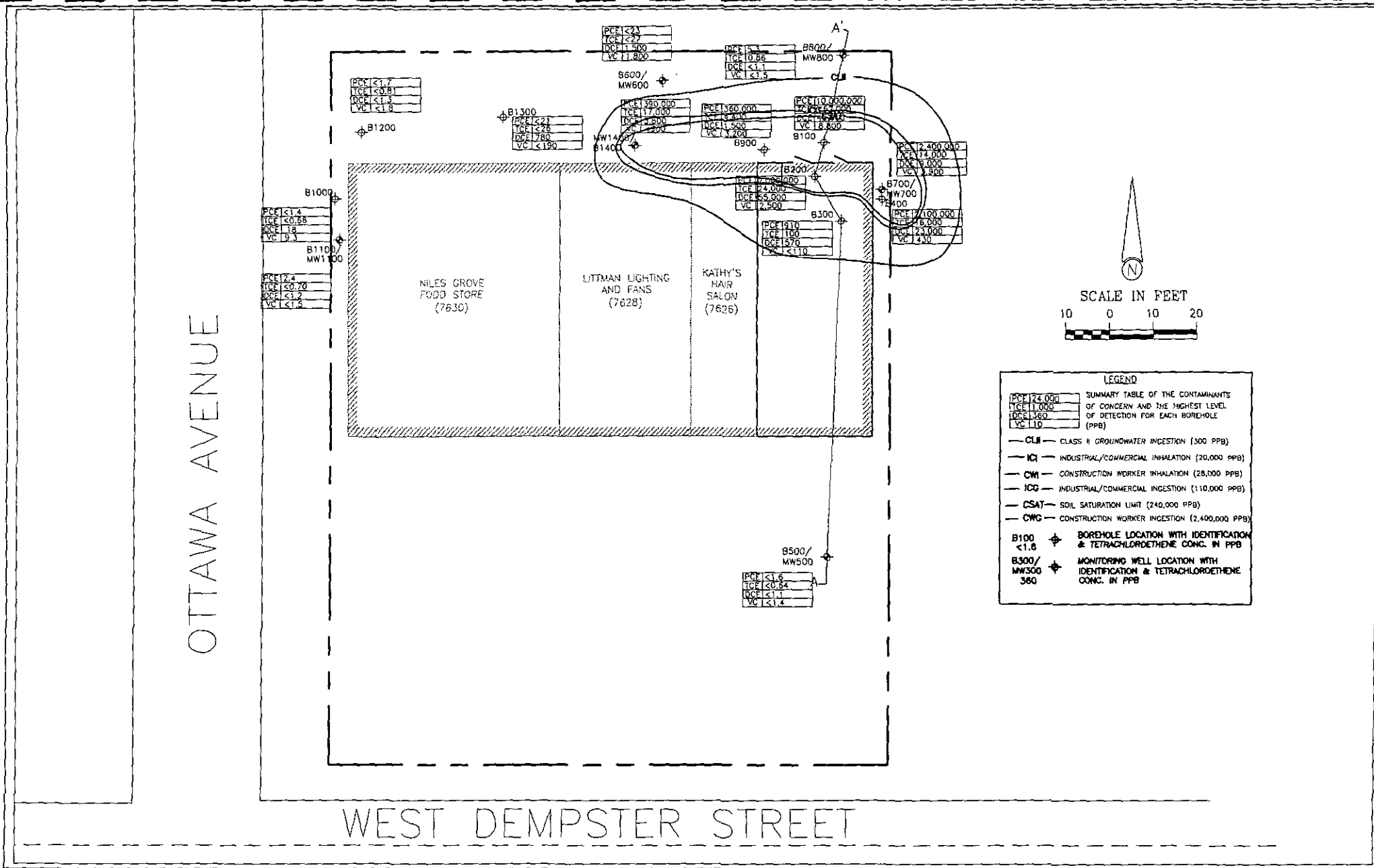
ESTIMATED EXTENT OF SOIL EXCEEDING TIER 2 REMEDIAL OBJECTIVES FOR TETRACHLOROETHENE

NORTH SUBURBAN CLEANERS
7620-22 DEMPSTER STREET
MORTON GROVE, ILLINOIS

CREATION DATE: 06/25/03	THIS DRAWING AND ALL INFORMATION CONTAINED THEREON IS THE PROPERTY OF NORTHERN ENVIRONMENTAL INCORPORATED AND SHALL NOT BE COPIED OR USED EXCEPT FOR THE PURPOSE FOR WHICH IT IS EXPRESSLY FURNISHED.
DRAWN BY: MJS	
REVISION DATE: 11/19/03	

PROJECT NUMBER: 05-2203-0254

FIGURE 5a



Northern Environmental SM
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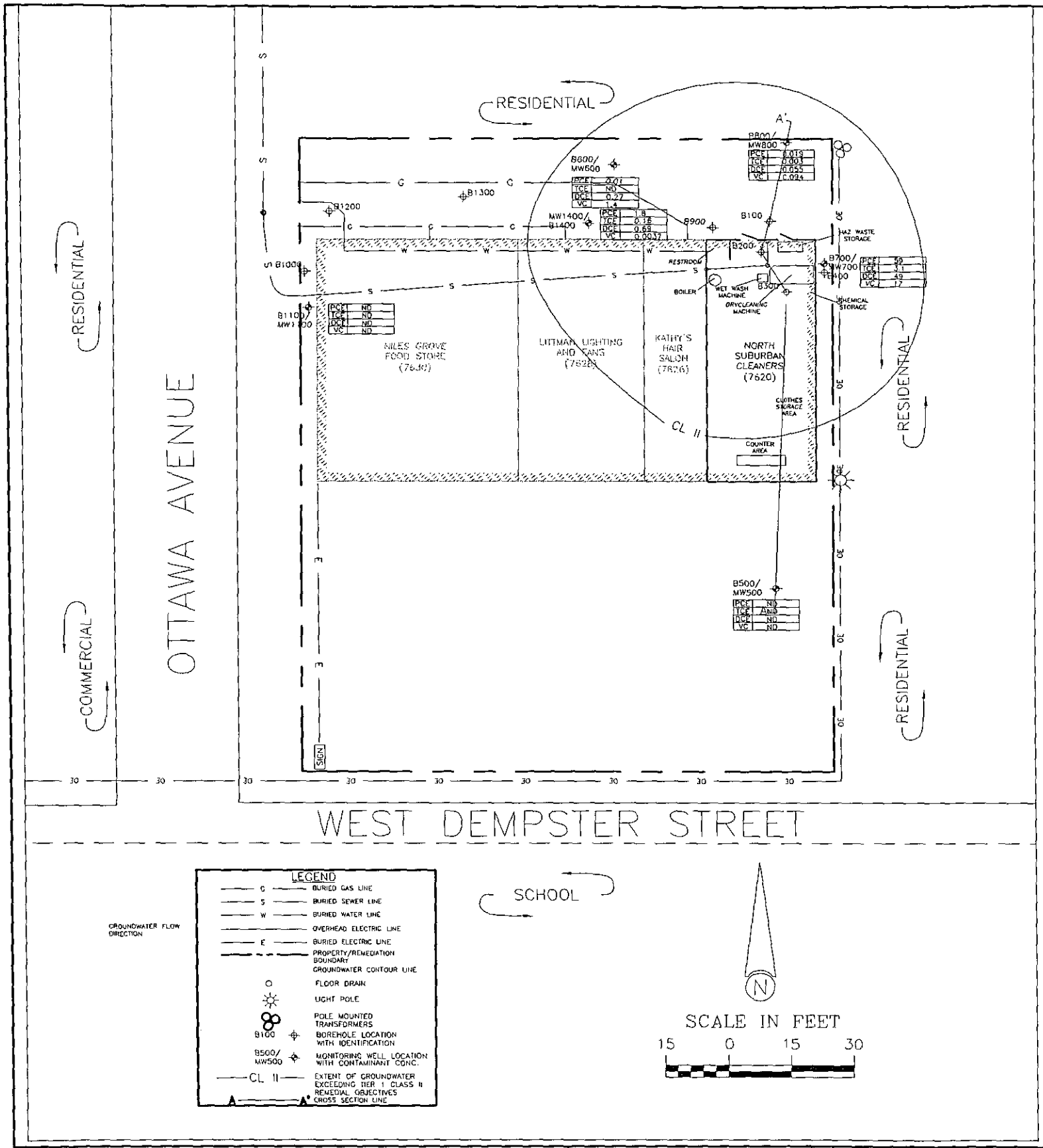
HIGHEST LEVELS OF THE CONTAMINANTS OF CONCERN DETECTED IN SOIL SAMPLING

NORTH SUBURBAN CLEANERS
7620-22 DEMPSTER STREET
MORTON GROVE, ILLINOIS

CREATION DATE: 06/25/03	THIS DRAWING AND ALL INFORMATION CONTAINED THEREON IS THE PROPERTY OF NORTHERN ENVIRONMENTAL INCORPORATED AND SHALL NOT BE COPIED OR USED EXCEPT FOR THE PURPOSE FOR WHICH IT IS EXPRESSLY FURNISHED.
DRAWN BY: MJS	
REVISION DATE: 09/17/04	

PROJECT NUMBER: 05-2203-0254

FIGURE 5b



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CREATION DATE: 12/30/03
DRAWN BY: MCB
REVISION DATE: 09/17/04

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EXTENT OF GROUNDWATER EXCEEDING TIER 1 CLASS II REMEDIAL OBJECTIVES

NORTH SUBURBAN CLEANERS
7620-22 DEMPSTER STREET
MORTON GROVE, ILLINOIS

PROJECT NUMBER: 05-2203-0254

FIGURE 7

ATTACHMENT E

Northern Environmental
Hydrologists • Engineers • Geologists

CHAIN OF CUSTODY RECORD REQUEST FOR ANALYSIS

No: [illegible]

Check office originating request

- [ ] 954 Circle Drive, Green Bay, WI 54304, 920-592-8400, FAX 920-592-8444
- [ ] 330 South 4th Avenue, Park Falls, WI 54552, 715-762-1544, Fax 715-762-1844
- [x] 647 Academy Drive, Northbrook, IL 60062, 847-562-8577, FAX 847-562-8552
- [ ] 3349 Southgate Court SW #102, Cedar Rapids, IA 52404, 319-365-0466, FAX 319-365-0464
- [ ] 1214 W. Venture Ct., Mequon, WI 53092, 262-241-3133, FAX 262-241-8222
- [ ] 1203 Storbeck Drive, Waupun, WI 53963, 920-324-8600, FAX 920-324-3023
- [ ] 203 West Upham Street, Marshfield, WI 54449, 715-486-1300, FAX 715-486-1313
- [ ] 15851 S. U.S. 27 - Blg. 30, Suite 318, Lansing, MI 48906, 517-702-0470, FAX 517-702-0477

Project No: [illegible]-0254 Task No:
Project Location: (city) Morton Grove, IL
Project Manager: Chris Lee
Sampler: (name) Anthony DeMarco
Sampler: (Signature) [signature]
Sampling Date(s): 8/26/04
Reports to be Sent to: Chris Lee

Laboratory: En Chem
Wisconsin DNR Certification #:
Laboratory Contact:
Price Quote:

TURNAROUND TIME REQUIRED
[x] Normal [ ] Rush
Date Needed

Sample Integrity - To be completed by receiving lab
Seal intact upon receipt [x] yes [ ] no
Method of shipment [illegible]
Contents Temperature 10°C °C Refrigerator No.

ANALYSES REQUESTED

Lab ID No.	Sample No.	Collection Date	Collection Time	No. of Containers, Size & Type	Description Water	Description Soil	Description Other	Preservative	DRO (WI Modified Method)	GRO (WI Modified Method)	BETX (EPA Method 8020)	PVOC (EPA Method 8020)	VOC (EPA Method 8021)	PAH (EPA Method	Pb (EPA Method
001	MW1100	8/26	12:05P	3 40 mL vials	X								X		
002	MW1400	8/26	12:10P		X								X		
003	DUP		12:15P		X								X		
004	TRIP		12:35P	NON EN Chem [illegible]	X								X		

850371

Packed for Shipping by: Anthony DeMarco
Shipment Date: 8/26/04

Comments: IL Samples

Relinquished By:	Date:	Relinquished By:	Date:	Relinquished By:	Date:
[signature]	8/26/04		8/27/04		
Company: LETI	Time: 5:45P	Company: Fedex	Time: 0930	Company:	Time:
Received By:	Date:	Received By: [illegible]	Date: 8/27/04	Received By: [illegible]	Date:
Company:	Time:	Company: En Chem	Time: 0930	Company:	Time:

EN CHEM INC.

Corporate Office & Laboratory
1241 Bellevue Street, Suite 9, Green Bay, WI 54302
920-469-2436, Fax: 920-469-8827
www.enchem.com

Analytical Report Number: 850371

Client: NORTHERN ENVIRONMENTAL-NORTHBROOK
Project Name: MORTON GROVE, IL
Project Number: 05-2200-0254

Lab Contact: Laurie Woelfel
Collected By: ANTHONY DEMARCO
Report Serial No: 850371090120040851

Lab Sample Number	Field ID	Matrix	Collection Date
850371-001	MW1100	WATER	08/26/04 12:25
850371-002	MW1400	WATER	08/26/04 12:10
850371-003	DUP	WATER	08/26/04 12:15
850371-004	TRIP	WATER	08/26/04 12:35

I certify that the data contained in this Final Report has been generated and reviewed in accordance with approved methods and Laboratory Standard Operating Procedure. Exceptions, if any, are discussed in the accompanying sample comments. Release of this final report is authorized by Laboratory management, as is verified by the following signature. Reported results shall not be reproduced, except in full, without the written approval of the lab. The sample results relate only to the analytes of interest tested.

Approval Signature

Date 9/2/04

En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436

Analytical Report Number: 850371

Client : NORTHERN ENVIRONMENTAL-NORTHBROOK
Project Name : MORTON GROVE, IL
Project Number : 05-2200-0254
Field ID : MW1100

Matrix Type : WATER
Collection Date : 08/26/04
Report Date : 09/01/04
Lab Sample Number : 850371-001

VOC MOD 3.4 List (Spec 12DCE/ XYL+MTBE) Prep Date: 08/30/04

Analyte		Result		MDL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
1,1,1-Trichloroethane	<	0.90		0.90	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
1,1,2,2-Tetrachloroethane	<	0.20		0.20	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
1,1,2-Trichloroethane	<	0.42		0.42	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
1,1-Dichloroethane	<	0.75		0.75	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
1,1-Dichloroethene	<	0.57		0.57	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
1,2-Dichloroethane	<	0.36		0.36	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
1,2-Dichloropropane	<	0.46		0.46	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
2-Butanone	<	4.3		4.3	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
2-Hexanone	<	1.1		1.1	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
4-Methyl-2-pentanone	<	1.2		1.2	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Acetone		3.4	J	2.2	1	ug/L	B	08/30/04	SW846 5030B	SW846 8260B
Benzene	<	0.41		0.41	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Bromodichloromethane	<	0.56		0.56	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Bromoform	<	0.94		0.94	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Bromomethane	<	0.91		0.91	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Carbon Disulfide		5.1		0.66	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Carbon Tetrachloride	<	0.49		0.49	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Chlorobenzene	<	0.41		0.41	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Chlorodibromomethane	<	0.81		0.81	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Chloroethane	<	0.97		0.97	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Chloroform	<	0.37		0.37	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Chloromethane	<	0.24		0.24	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
cis-1,2-Dichloroethene	<	0.83		0.83	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
cis-1,3-Dichloropropene	<	0.19		0.19	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Ethylbenzene	<	0.54		0.54	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Methylene Chloride	<	0.43		0.43	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Methyl-tert-butyl-ether	<	0.61		0.61	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Styrene	<	0.86		0.86	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Tetrachloroethene	<	0.45		0.45	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Toluene	<	0.67		0.67	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
trans-1,2-Dichloroethene	<	0.89		0.89	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
trans-1,3-Dichloropropene	<	0.19		0.19	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Trichloroethene	<	0.48		0.48	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Vinyl Chloride	<	0.18		0.18	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Xylene, o	<	0.83		0.83	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Xylenes, m + p	<	1.8		1.8	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
4-Bromofluorobenzene		103		---	1	%Recov		08/30/04	SW846 5030B	SW846 8260B
Toluene-d8		110		---	1	%Recov		08/30/04	SW846 5030B	SW846 8260B
Dibromofluoromethane		113		---	1	%Recov		08/30/04	SW846 5030B	SW846 8260B

En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436

Analytical Report Number: 850371

Client : NORTHERN ENVIRONMENTAL-NORTHBROOK
Project Name : MORTON GROVE, IL
Project Number : 05-2200-0254
Field ID : MW1400

Matrix Type : WATER
Collection Date : 08/26/04
Report Date : 09/01/04
Lab Sample Number : 850371-002

VOC MOD 3.4 List (Spec 12DCE/ XYL+MTBE) Prep Date: 08/31/04

Analyte		Result		MDL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
1,1,1-Trichloroethane	<	9.0		9.0	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
1,1,2,2-Tetrachloroethane	<	2.0		2.0	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
1,1,2-Trichloroethane	<	4.2		4.2	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
1,1-Dichloroethane	<	7.5		7.5	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
1,1-Dichloroethene	<	5.7		5.7	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
1,2-Dichloroethane	<	3.6		3.6	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
1,2-Dichloropropane	<	4.6		4.6	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
2-Butanone	<	43		43	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
2-Hexanone	<	11		11	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
4-Methyl-2-pentanone	<	12		12	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Acetone	<	22		22	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Benzene	<	4.1		4.1	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Bromodichloromethane	<	5.6		5.6	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Bromoform	<	9.4		9.4	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Bromomethane	<	9.1		9.1	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Carbon Disulfide	<	6.6		6.6	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Carbon Tetrachloride	<	4.9		4.9	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Chlorobenzene	<	4.1		4.1	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Chlorodibromomethane	<	8.1		8.1	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Chloroethane	<	9.7		9.7	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Chloroform	<	3.7		3.7	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Chloromethane	<	2.4		2.4	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
cis-1,2-Dichloroethene		690		8.3	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
cis-1,3-Dichloropropene	<	1.9		1.9	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Ethylbenzene	<	5.4		5.4	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Methylene Chloride	<	4.3		4.3	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Methyl-tert-butyl-ether	<	6.1		6.1	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Styrene	<	8.6		8.6	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Tetrachloroethene		1800		4.5	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Toluene	<	6.7		6.7	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
trans-1,2-Dichloroethene	<	8.9		8.9	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
trans-1,3-Dichloropropene	<	1.9		1.9	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Trichloroethene		160		4.8	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Vinyl Chloride		3.7	J	1.8	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Xylene, o	<	8.3		8.3	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Xylenes, m + p	<	18		18	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
4-Bromofluorobenzene		111		---	10	%Recov		08/31/04	SW846 5030B	SW846 8260B
Toluene-d8		116		---	10	%Recov		08/31/04	SW846 5030B	SW846 8260B
Dibromofluoromethane		98		---	10	%Recov		08/31/04	SW846 5030B	SW846 8260B

En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436

Analytical Report Number: 850371

Client : NORTHERN ENVIRONMENTAL-NORTHBROOK
Project Name : MORTON GROVE, IL
Project Number : 05-2200-0254
Field ID : DUP

Matrix Type : WATER
Collection Date : 08/26/04
Report Date : 09/01/04
Lab Sample Number : 850371-003

VOC MOD 3.4 List (Spec 12DCE/ XYL+MTBE)

Prep Date: 08/31/04

Analyte		Result	MDL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
1,1,1-Trichloroethane	<	9.0	9.0	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
1,1,2,2-Tetrachloroethane	<	2.0	2.0	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
1,1,2-Trichloroethane	<	4.2	4.2	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
1,1-Dichloroethane	<	7.5	7.5	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
1,1-Dichloroethene	<	5.7	5.7	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
1,2-Dichloroethane	<	3.6	3.6	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
1,2-Dichloropropane	<	4.6	4.6	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
2-Butanone	<	43	43	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
2-Hexanone	<	11	11	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
4-Methyl-2-pentanone	<	12	12	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Acetone	<	22	22	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Benzene	<	4.1	4.1	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Bromodichloromethane	<	5.6	5.6	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Bromoform	<	9.4	9.4	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Bromomethane	<	9.1	9.1	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Carbon Disulfide	<	6.6	6.6	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Carbon Tetrachloride	<	4.9	4.9	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Chlorobenzene	<	4.1	4.1	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Chlorodibromomethane	<	8.1	8.1	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Chloroethane	<	9.7	9.7	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Chloroform	<	3.7	3.7	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Chloromethane	<	2.4	2.4	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
cis-1,2-Dichloroethene		580	8.3	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
cis-1,3-Dichloropropene	<	1.9	1.9	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Ethylbenzene	<	5.4	5.4	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Methylene Chloride	<	4.3	4.3	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Methyl-tert-butyl-ether	<	6.1	6.1	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Styrene	<	8.6	8.6	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Tetrachloroethene		1700	4.5	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Toluene	<	6.7	6.7	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
trans-1,2-Dichloroethene	<	8.9	8.9	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
trans-1,3-Dichloropropene	<	1.9	1.9	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Trichloroethene		150	4.8	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Vinyl Chloride	<	1.8	1.8	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Xylene, o	<	8.3	8.3	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
Xylenes, m + p	<	18	18	10	ug/L		08/31/04	SW846 5030B	SW846 8260B
4-Bromofluorobenzene		112	---	10	%Recov		08/31/04	SW846 5030B	SW846 8260B
Toluene-d8		116	---	10	%Recov		08/31/04	SW846 5030B	SW846 8260B
Dibromofluoromethane		107	---	10	%Recov		08/31/04	SW846 5030B	SW846 8260B

En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436

Analytical Report Number: 850371

Client : NORTHERN ENVIRONMENTAL-NORTHBROOK
Project Name : MORTON GROVE, IL
Project Number : 05-2200-0254
Field ID : TRIP

Matrix Type : WATER
Collection Date : 08/26/04
Report Date : 09/01/04
Lab Sample Number : 850371-004

VOC MOD 3.4 List (Spec 12DCE/ XYL+MTBE) Prep Date: 08/30/04

Analyte		Result	MDL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
1,1,1-Trichloroethane	<	0.90	0.90	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
1,1,2,2-Tetrachloroethane	<	0.20	0.20	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
1,1,2-Trichloroethane	<	0.42	0.42	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
1,1-Dichloroethane	<	0.75	0.75	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
1,1-Dichloroethene	<	0.57	0.57	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
1,2-Dichloroethane	<	0.36	0.36	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
1,2-Dichloropropane	<	0.46	0.46	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
2-Butanone	<	4.3	4.3	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
2-Hexanone	<	1.1	1.1	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
4-Methyl-2-pentanone	<	1.2	1.2	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Acetone		8.8	2.2	1	ug/L	B	08/30/04	SW846 5030B	SW846 8260B
Benzene	<	0.41	0.41	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Bromodichloromethane	<	0.56	0.56	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Bromoform	<	0.94	0.94	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Bromomethane	<	0.91	0.91	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Carbon Disulfide	<	0.66	0.66	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Carbon Tetrachloride	<	0.49	0.49	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Chlorobenzene	<	0.41	0.41	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Chlorodibromomethane	<	0.81	0.81	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Chloroethane	<	0.97	0.97	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Chloroform	<	0.37	0.37	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Chloromethane	<	0.24	0.24	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
cis-1,2-Dichloroethene	<	0.83	0.83	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
cis-1,3-Dichloropropene	<	0.19	0.19	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Ethylbenzene	<	0.54	0.54	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Methylene Chloride	<	0.43	0.43	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Methyl-tert-butyl-ether	<	0.61	0.61	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Styrene	<	0.86	0.86	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Tetrachloroethene	<	0.45	0.45	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Toluene	<	0.67	0.67	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
trans-1,2-Dichloroethene	<	0.89	0.89	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
trans-1,3-Dichloropropene	<	0.19	0.19	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Trichloroethene	<	0.48	0.48	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Vinyl Chloride	<	0.18	0.18	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Xylene, o	<	0.83	0.83	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
Xylenes, m + p	<	1.8	1.8	1	ug/L		08/30/04	SW846 5030B	SW846 8260B
4-Bromofluorobenzene		105	---	1	%Recov		08/30/04	SW846 5030B	SW846 8260B
Toluene-d8		110	---	1	%Recov		08/30/04	SW846 5030B	SW846 8260B
Dibromofluoromethane		108	---	1	%Recov		08/30/04	SW846 5030B	SW846 8260B

Qualifier Codes

Flag	Applies To	Explanation
A	Inorganic	Analyte is detected in the method blank. Method blank criteria is evaluated to the laboratory method detection limit. Additionally, method blank acceptance may be based on project specific criteria or determined from analyte concentrations in the sample and are evaluated on a sample by sample basis.
B	Inorganic	The analyte has been detected between the method detection limit and the reporting limit.
B	Organic	Analyte is present in the method blank. Method blank criteria is evaluated to the laboratory method detection limit. Additionally, method blank acceptance may be based on project specific criteria or determined from analyte concentrations in the sample and are evaluated on a sample by sample basis.
C	All	Elevated detection limit.
D	All	Analyte value from diluted analysis or surrogate result not applicable due to sample dilution.
E	Inorganic	Estimated concentration due to matrix interferences. During the metals analysis the serial dilution failed to meet the established control limits of 0-10%. The sample concentration is greater than 50 times the IDL for analysis done on the ICP or 100 times the IDL for analysis done on the ICP-MS. The result was flagged with the E qualifier to indicate that a physical interference was observed.
E	Organic	Analyte concentration exceeds calibration range.
F	Inorganic	Due to potential interferences for this analysis by Inductively Coupled Plasma techniques (SW-846 Method 6010), this analyte has been confirmed by and reported from an alternate method.
F	Organic	Surrogate results outside control criteria.
H	All	Preservation, extraction or analysis performed past holding time.
HF	Inorganic	This test is considered a field parameter, and the recommended holding time is 15 minutes from collection. The analysis was performed in the laboratory beyond the recommended holding time.
J	Inorganic	The analyte has been detected between the method detection limit and the reporting limit.
J	Organic	Concentration detected is greater than the method detection limit but less than the reporting limit.
K	Inorganic	Sample received unpreserved. Sample was either preserved at the time of receipt or at the time of sample preparation.
K	Organic	Detection limit may be elevated due to the presence of an unrequested analyte.
L	All	Elevated detection limit due to low sample volume.
M	Organic	Sample pH was greater than 2
N	All	Spiked sample recovery not within control limits.
O	Organic	Sample received overweight.
P	Organic	The relative percent difference between the two columns for detected concentrations was greater than 40%.
Q	All	The analyte has been detected between the limit of detection (LOD) and limit of quantitation (LOQ). The results are qualified due to the uncertainty of analyte concentrations within this range.
S	Organic	The relative percent difference between quantitation and confirmation columns exceeds internal quality control criteria. Because the result is unconfirmed, it has been reported as a non-detect with an elevated detection limit.
U	All	The analyte was not detected at or above the reporting limit.
V	All	Sample received with headspace.
W	All	A second aliquot of sample was analyzed from a container with headspace.
X	All	See Sample Narrative.
&	All	Laboratory Control Spike recovery not within control limits.
*	All	Precision not within control limits.
<	All	The analyte was not detected at or above the reporting limit.
1	Inorganic	Dissolved analyte or filtered analyte greater than total analyte; analyses passed QC based on precision criteria.
2	Inorganic	Dissolved analyte or filtered analyte greater than total analyte; analyses failed QC based on precision criteria.
3	Inorganic	BOD result is estimated due to the BOD blank exceeding the allowable oxygen depletion.
4	Inorganic	BOD duplicate precision not within control limits. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency.
5	Inorganic	BOD result is estimated due to insufficient oxygen depletion. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency.
6	Inorganic	BOD laboratory control sample not within control limits. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency.
7	Inorganic	BOD result is estimated due to complete oxygen depletion. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency.

En Chem Inc.

Analysis Summary by Laboratory

1241 Bellevue Street
Green Bay, WI 54302

1090 Kennedy Avenue
Kimberly, WI 54136

Test Group Name	850371-001	850371-002	850371-003	850371-004
VOC MOD 3.4 List (Spec 12DCE/ XYL+	G	G	G	G

Illinois Certification	
G = En Chem Green Bay	100313
K = En Chem Kimberly	200035
S = En Chem Superior	Not Applicable
C = Subcontracted Analysis	

Batch No. 850371

En Chem, Inc. Cooler Receipt Log

Project Name or ID 05-2200-0254 No. of Coolers: 1 Temps: 1.0°C

A. Receipt Phase: Date cooler was opened: 8/27/04 By: GD

1: Were samples received on ice? (Must be ≤ 6 C) ..... YES NO[2] NA

2. Was there a Temperature Blank? ..... YES NO

3: Were custody seals present and intact on cooler? (Record on COC) ..... YES NO

4: Are COC documents present? ..... YES NO[2]

5: Does this Project require quick turn around analysis? ..... YES NO

6: Is there any sub-work? ..... YES NO

7: Are there any short hold time tests? ..... YES NO

8: Are any samples nearing expiration of hold-time? (Within 2 days) ..... YES[1] NO Contacted by/Who _____

9: Do any samples need to be Filtered or Preserved in the lab? ..... YES[1] NO Contacted by/Who _____

B. Check-in Phase: Date samples were Checked-in: 8/27/04 By: GD

1: Were all sample containers listed on the COC received and intact? ..... YES NO[2] NA

2: Sign the COC as received by En Chem. Completed ..... YES NO

3: Do sample labels match the COC? ..... YES NO[2]

4: Completed pH check on preserved samples ..... YES NO NA
(This statement does not apply to water: VOC, O&G, TOC, DRO, Total Rec. Phenolics)

5: Do samples have correct chemical preservation? ..... YES NO[2] NA
(This statement does not apply to water: VOC, O&G, TOC, DRO, Total Rec. Phenolics)

6: Are dissolved parameters field filtered? ..... YES NO[2] NA

7: Are sample volumes adequate for tests requested? ..... YES NO[2]

8: Are VOC samples free of bubbles >6mm ..... YES NO[2] NA

9: Enter samples into logbook. Completed ..... YES NO

10: Place laboratory sample number on all containers and COC. Completed ..... YES NO

11: Complete Laboratory Tracking Sheet (LTS). Completed ..... YES NO NA

12: Start Nonconformance form. ..... YES NO NA

13: Initiate Subcontracting procedure. Completed ..... YES NO NA

14: Check laboratory sample number on all containers and COC. ..... YES NO NA

Short Hold-time tests:

24 Hours or less	48 Hours	7 days	Footnotes
Coliform	BOD	Ash	1 Notify proper lab group immediately.
Corrosivity = pH	Color	Aqueous Extractable Organics- ALL	2 Complete nonconformance memo.
Dissolved Oxygen	Nitrite or Nitrate	Flashpoint	
Hexavalent Chromium	Ortho Phosphorus	Free Liquids	
HPC	Surfactants	Sulfide	
Ferrous Iron	Turbidity	TDS	
Eh	En Core Preservation	TSS	
Odor	Power stop preservation	Total Solids	
Residual Chlorine		TVS	
Sulfite		TVSS	
		Unpreserved VOC's	

Rev. 2/05/04, Attachment to 1-REC-5.
Subject to QA Audit.

Reviewed by/date 8/30/04

p:/everyone/forms/samplereceiving/crl.doc

Northern Environmental
Hydrologists • Engineers • Geologists

CHAIN OF CUSTODY RECORD REQUEST FOR ANALYSIS

No: 18816

Check office originating request

- [ ] 954 Circle Drive, Green Bay, WI 54304, 920-592-8400, FAX 920-592-8444
- [ ] 330 South 4th Avenue, Park Falls, WI 54552, 715-762-1544, Fax 715-762-1844
- [x] 647 Academy Drive, Northbrook, IL 60062, 847-562-8577, FAX 847-562-8552
- [ ] 3349 Southgate Court SW #102, Cedar Rapids, IA 52404, 319-365-0466, FAX 319-365-0464
- [ ] 1214 W. Venture Ct., Mequon, WI 53092, 262-241-3133, FAX 262-241-8222
- [ ] 1203 Storbeck Drive, Waupun, WI 53963, 920-324-8600, FAX 920-324-3023
- [ ] 203 West Upham Street, Marshfield, WI 54449, 715-486-1300, FAX 715-486-1313
- [ ] 15851 S. U.S. 27 - Blg. 30, Suite 318, Lansing, MI 48906, 517-702-0470, FAX 517-702-0477

Project No: 05-2208-0254 Task No: 500
Project Location: (city) Morton Grove
Project Manager: Chris Lee
Sampler: (name) Martha Stevenson
Sampler: (Signature) [signature]
Sampling Date(s): 8/13/04
Reports to be Sent to: clee@northernenvironmental.com

Laboratory: Enchem
Wisconsin DNR Certification #: —
Laboratory Contact: Laurie
Price Quote: —

TURNAROUND TIME REQUIRED
[x] Normal [ ] Rush
Date Needed

Sample Integrity - To be completed by receiving lab
Seal intact upon receipt [ ] yes [ ] no N/A
Method of shipment
Contents Temperature 2.0°C °C Refrigerator No.

ANALYSES REQUESTED

849910

Lab ID No.	Sample No.	Collection Date	Collection Time	No. of Containers, Size & Type	Description Water	Description Soil	Description Other	Preservative	DRO (WI Modified Method)	GRO (WI Modified Method)	BETX (EPA Method 8020)	PVOC (EPA Method 8020)	VOC (EPA Method ~~8021~~ 8260)	PAH (EPA Method)	Pb (EPA Method)	TOC									
001	1412	8/13/04	1:40PM	3x40mL+1x4oz		X		MeOH+H2O					X					1-4oz Poly, 1-4oz Fe, 2-4oz H2O							
002	1312	↓	12:50PM	↓		X		↓					X					↓							
003	1212	↓	11:31AM	↓		X		↓					X					↓							
004	1112	↓	10:31AM	↓		X		↓					X					↓							
005	1105	↓	9:28AM	↓		X		↓					X					↓							
006	1202	↓	10:56AM	↓		X		↓					X					↓							
007	1407	↓	1:24PM	3x40mL+2x4oz		X		↓					X			X		↓		+1-4oz Poly					
008	1304	↓	12:14PM	"		X		↓					X			X		↓		↓					

Packed for Shipping by: MJS
Shipment Date: 8/13/04

Comments: Please e-mail results.

Relinquished By:	Date:	Relinquished By:	Date:	Relinquished By:	Date:
[signature]	8/13/04	Fed Ex	8/14/04		
Company: NETI	Time: 3:44PM	Company:	Time: 0900	Company:	Time:
Received By:	Date:	Received By: [signature]	Date: 8/14/04	Received By:	Date:
Company:	Time:	Company: Enchem	Time: 0900	Company:	Time:

EN CHEM INC.

Corporate Office & Laboratory
1241 Bellevue Street, Suite 9, Green Bay, WI 54302
920-469-2436, Fax: 920-469-8827
www.enchem.com

Analytical Report Number: 849910

Client: NORTHERN ENVIRONMENTAL-NORTHBROOK
Project Name: MORTON GROVE
Project Number: 05-2203-0254

Lab Contact: Laurie Woelfel
Collected By: MARTHA STEVENSON
Report Serial No: 849910082620041039

Lab Sample Number	Field ID	Matrix	Collection Date
849910-001	1412	SOIL	08/13/04 13:40
849910-002	1312	SOIL	08/13/04 12:50
849910-003	1212	SOIL	08/13/04 11:31
849910-004	1112	SOIL	08/13/04 10:31
849910-005	1105	SOIL	08/13/04 09:28
849910-006	1202	SOIL	08/13/04 10:56
849910-007	1407	SOIL	08/13/04 13:24
849910-008	1304	SOIL	08/13/04 12:14

I certify that the data contained in this Final Report has been generated and reviewed in accordance with approved methods and Laboratory Standard Operating Procedure. Exceptions, if any, are discussed in the accompanying sample comments. Release of this final report is authorized by Laboratory management, as is verified by the following signature. Reported results shall not be reproduced, except in full, without the written approval of the lab. The sample results relate only to the analytes of interest tested.

Laurie Woelfel
Approval Signature

8/26/04
Date

En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436

Analytical Report Number: 849910

Client : NORTHERN ENVIRONMENTAL-NORTHBROOK
Project Name : MORTON GROVE
Project Number : 05-2203-0254
Field ID : 1412

Matrix Type : SOIL
Collection Date : 08/13/04
Report Date : 08/26/04
Lab Sample Number : 849910-001

INORGANICS

Test	Result	EQL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
Percent Solids	79.8		1	%		08/16/04	SM 2540G M	SM 2540G M

VOC MOD 3.4 List (Spec 12DCE/ XYL+MTBE)

Prep Date: 08/17/04

Analyte		Result	MDL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
1,1,1-Trichloroethane	<	0.96	0.96	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1,2,2-Tetrachloroethane	<	0.94	0.94	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1,2-Trichloroethane	<	0.88	0.88	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1-Dichloroethane	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1-Dichloroethene	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,2-Dichloroethane	<	0.86	0.86	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,2-Dichloropropane	<	0.96	0.96	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
2-Butanone	<	4.3	4.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
2-Hexanone	<	2.5	2.5	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
4-Methyl-2-pentanone	<	2.0	2.0	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Acetone	<	1.5	1.5	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Benzene	<	0.65	0.65	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromodichloromethane	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromoform	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromomethane	<	2.8	2.8	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Carbon Disulfide	<	1.6	1.6	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Carbon Tetrachloride	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chlorobenzene	<	0.77	0.77	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chlorodibromomethane	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloroethane	<	1.8	1.8	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloroform	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloromethane	<	1.5	1.5	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
cis-1,2-Dichloroethene	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
cis-1,3-Dichloropropene	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Ethylbenzene	<	0.63	0.63	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Methylene Chloride	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Methyl-tert-butyl-ether	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Styrene	<	0.65	0.65	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Tetrachloroethene	<	1.4	1.4	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Toluene	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
trans-1,2-Dichloroethene	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
trans-1,3-Dichloropropene	<	0.81	0.81	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Trichloroethene	<	0.69	0.69	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Vinyl Chloride	<	1.5	1.5	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Xylene, o	<	0.63	0.63	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Xylenes, m + p	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
4-Bromofluorobenzene		71	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B
Toluene-d8		85	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B
Dibromofluoromethane		94	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B

All soil results are reported on a dry weight basis unless otherwise noted.

2

En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436

Analytical Report Number: 849910

Client : NORTHERN ENVIRONMENTAL-NORTHBROOK
Project Name : MORTON GROVE
Project Number : 05-2203-0254
Field ID : 1312

Matrix Type : SOIL
Collection Date : 08/13/04
Report Date : 08/26/04
Lab Sample Number : 849910-002

INORGANICS

Test	Result	EQL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
Percent Solids	80.3		1	%		08/16/04	SM 2540G M	SM 2540G M

VOC MOD 3.4 List (Spec 12DCE/ XYL+MTBE)

Prep Date: 08/17/04

Analyte		Result	MDL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
1,1,1-Trichloroethane	<	0.90	0.90	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1,2,2-Tetrachloroethane	<	0.89	0.89	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1,2-Trichloroethane	<	0.83	0.83	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1-Dichloroethane	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1-Dichloroethene	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,2-Dichloroethane	<	0.81	0.81	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,2-Dichloropropane	<	0.90	0.90	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
2-Butanone	<	4.1	4.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
2-Hexanone	<	2.3	2.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
4-Methyl-2-pentanone	<	1.9	1.9	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Acetone		13	1.4	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Benzene	<	0.61	0.61	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromodichloromethane	<	0.99	0.99	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromoform	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromomethane	<	2.6	2.6	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Carbon Disulfide	<	1.5	1.5	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Carbon Tetrachloride	<	0.99	0.99	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chlorobenzene	<	0.72	0.72	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chlorodibromomethane	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloroethane	<	1.7	1.7	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloroform	<	0.99	0.99	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloromethane	<	1.4	1.4	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
cis-1,2-Dichloroethene	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
cis-1,3-Dichloropropene	<	0.99	0.99	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Ethylbenzene	<	0.60	0.60	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Methylene Chloride	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Methyl-tert-butyl-ether	<	0.99	0.99	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Styrene	<	0.61	0.61	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Tetrachloroethene	<	1.4	1.4	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Toluene	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
trans-1,2-Dichloroethene	<	0.99	0.99	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
trans-1,3-Dichloropropene	<	0.76	0.76	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Trichloroethene	<	0.65	0.65	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Vinyl Chloride	<	1.4	1.4	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Xylene, o	<	0.60	0.60	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Xylenes, m + p	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
4-Bromofluorobenzene		60	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B
Toluene-d8		99	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B
Dibromofluoromethane		90	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B

All soil results are reported on a dry weight basis unless otherwise noted.

En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436

Analytical Report Number: 849910

Client : NORTHERN ENVIRONMENTAL-NORTHBROOK
Project Name : MORTON GROVE
Project Number : 05-2203-0254
Field ID : 1212

Matrix Type : SOIL
Collection Date : 08/13/04
Report Date : 08/26/04
Lab Sample Number : 849910-003

INORGANICS

Test	Result	EQL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
Percent Solids	80.4		1	%		08/16/04	SM 2540G M	SM 2540G M

VOC MOD 3.4 List (Spec 12DCE/ XYL+MTBE)

Prep Date: 08/17/04

Analyte		Result	MDL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
1,1,1-Trichloroethane	<	0.97	0.97	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1,2,2-Tetrachloroethane	<	0.95	0.95	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1,2-Trichloroethane	<	0.89	0.89	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1-Dichloroethane	<	1.4	1.4	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1-Dichloroethene	<	1.4	1.4	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,2-Dichloroethane	<	0.87	0.87	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,2-Dichloropropane	<	0.97	0.97	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
2-Butanone	<	4.4	4.4	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
2-Hexanone	<	2.5	2.5	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
4-Methyl-2-pentanone	<	2.0	2.0	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Acetone		13	1.6	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Benzene	<	0.66	0.66	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromodichloromethane	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromoform	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromomethane	<	2.8	2.8	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Carbon Disulfide	<	1.6	1.6	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Carbon Tetrachloride	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chlorobenzene	<	0.78	0.78	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chlorodibromomethane	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloroethane	<	1.8	1.8	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloroform	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloromethane	<	1.6	1.6	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
cis-1,2-Dichloroethene	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
cis-1,3-Dichloropropene	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Ethylbenzene	<	0.64	0.64	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Methylene Chloride	<	1.4	1.4	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Methyl-tert-butyl-ether	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Styrene	<	0.66	0.66	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Tetrachloroethene	<	1.5	1.5	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Toluene	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
trans-1,2-Dichloroethene	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
trans-1,3-Dichloropropene	<	0.82	0.82	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Trichloroethene	<	0.70	0.70	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Vinyl Chloride	<	1.6	1.6	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Xylene, o	<	0.64	0.64	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Xylenes, m + p	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
4-Bromofluorobenzene		62	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B
Toluene-d8		90	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B
Dibromofluoromethane		92	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B

All soil results are reported on a dry weight basis unless otherwise noted.

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En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436

Analytical Report Number: 849910

Client : NORTHERN ENVIRONMENTAL-NORTHBROOK
Project Name : MORTON GROVE
Project Number : 05-2203-0254
Field ID : 1112

Matrix Type : SOIL
Collection Date : 08/13/04
Report Date : 08/26/04
Lab Sample Number : 849910-004

INORGANICS

Test	Result	EQL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
Percent Solids	88.6		1	%		08/16/04	SM 2540G M	SM 2540G M

VOC MOD 3.4 List (Spec 12DCE/ XYL+MTBE)

Prep Date: 08/17/04

Analyte		Result		MDL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
1,1,1-Trichloroethane	<	0.80		0.80	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
1,1,2,2-Tetrachloroethane	<	0.78		0.78	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
1,1,2-Trichloroethane	<	0.73		0.73	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
1,1-Dichloroethane	<	1.1		1.1	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
1,1-Dichloroethene	<	1.1		1.1	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
1,2-Dichloroethane	<	0.72		0.72	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
1,2-Dichloropropane	<	0.80		0.80	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
2-Butanone	<	3.6		3.6	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
2-Hexanone	<	2.1		2.1	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
4-Methyl-2-pentanone	<	1.7		1.7	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Acetone		14		1.3	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Benzene		0.59	J	0.54	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Bromodichloromethane	<	0.88		0.88	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Bromoform	<	1.0		1.0	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Bromomethane	<	2.3		2.3	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Carbon Disulfide		2.2	J	1.4	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Carbon Tetrachloride	<	0.88		0.88	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Chlorobenzene	<	0.64		0.64	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Chlorodibromomethane	<	0.96		0.96	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Chloroethane	<	1.5		1.5	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Chloroform	<	0.88		0.88	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Chloromethane	<	1.3		1.3	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
cis-1,2-Dichloroethene	<	0.96		0.96	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
cis-1,3-Dichloropropene	<	0.88		0.88	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Ethylbenzene	<	0.53		0.53	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Methylene Chloride	<	1.1		1.1	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Methyl-tert-butyl-ether	<	0.88		0.88	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Styrene	<	0.54		0.54	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Tetrachloroethene	<	1.2		1.2	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Toluene	<	0.96		0.96	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
trans-1,2-Dichloroethene	<	0.88		0.88	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
trans-1,3-Dichloropropene	<	0.67		0.67	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Trichloroethene	<	0.57		0.57	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Vinyl Chloride	<	1.3		1.3	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Xylene, o	<	0.53		0.53	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
Xylenes, m + p	<	1.0		1.0	1	ug/kg	X	08/18/04	SW846 5035	SW846 8260B
4-Bromofluorobenzene		51		---	1	%Recov		08/18/04	SW846 5035	SW846 8260B
Toluene-d8		115		---	1	%Recov		08/18/04	SW846 5035	SW846 8260B
Dibromofluoromethane		98		---	1	%Recov		08/18/04	SW846 5035	SW846 8260B

All soil results are reported on a dry weight basis unless otherwise noted.

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En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436

Analytical Report Number: 849910

Client : NORTHERN ENVIRONMENTAL-NORTHBROOK
Project Name : MORTON GROVE
Project Number : 05-2203-0254
Field ID : 1105

Matrix Type : SOIL
Collection Date : 08/13/04
Report Date : 08/26/04
Lab Sample Number : 849910-005

INORGANICS

Test	Result	EQL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
Percent Solids	84.5		1	%		08/16/04	SM 2540G M	SM 2540G M

VOC MOD 3.4 List (Spec 12DCE/ XYL+MTBE)

Prep Date: 08/17/04

Analyte		Result	MDL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
1,1,1-Trichloroethane	<	0.90	0.90	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1,2,2-Tetrachloroethane	<	0.88	0.88	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1,2-Trichloroethane	<	0.82	0.82	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1-Dichloroethane	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1-Dichloroethene	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,2-Dichloroethane	<	0.81	0.81	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,2-Dichloropropane	<	0.90	0.90	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
2-Butanone	<	4.0	4.0	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
2-Hexanone	<	2.3	2.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
4-Methyl-2-pentanone	<	1.9	1.9	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Acetone		12	1.4	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Benzene	<	0.61	0.61	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromodichloromethane	<	0.99	0.99	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromoform	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromomethane	<	2.6	2.6	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Carbon Disulfide	<	1.5	1.5	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Carbon Tetrachloride	<	0.99	0.99	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chlorobenzene	<	0.72	0.72	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chlorodibromomethane	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloroethane	<	1.7	1.7	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloroform	<	0.99	0.99	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloromethane	<	1.4	1.4	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
cis-1,2-Dichloroethene	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
cis-1,3-Dichloropropene	<	0.99	0.99	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Ethylbenzene	<	0.59	0.59	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Methylene Chloride	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Methyl-tert-butyl-ether	<	0.99	0.99	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Styrene	<	0.61	0.61	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Tetrachloroethene	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Toluene	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
trans-1,2-Dichloroethene	<	0.99	0.99	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
trans-1,3-Dichloropropene	<	0.75	0.75	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Trichloroethene	<	0.65	0.65	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Vinyl Chloride	<	1.4	1.4	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Xylene, o	<	0.59	0.59	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Xylenes, m + p	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
4-Bromofluorobenzene		59	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B
Toluene-d8		94	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B
Dibromofluoromethane		94	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B

All soil results are reported on a dry weight basis unless otherwise noted.

En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436

Analytical Report Number: 849910

Client : NORTHERN ENVIRONMENTAL-NORTHBROOK
Project Name : MORTON GROVE
Project Number : 05-2203-0254
Field ID : 1202

Matrix Type : SOIL
Collection Date : 08/13/04
Report Date : 08/26/04
Lab Sample Number : 849910-006

INORGANICS

Test	Result	EQL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
Percent Solids	74.3		1	%		08/16/04	SM 2540G M	SM 2540G M

VOC MOD 3.4 List (Spec 12DCE/ XYL+MTBE)

Prep Date: 08/17/04

Analyte		Result	MDL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
1,1,1-Trichloroethane	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1,2,2-Tetrachloroethane	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1,2-Trichloroethane	<	1.0	1.0	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1-Dichloroethane	<	1.6	1.6	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,1-Dichloroethene	<	1.6	1.6	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,2-Dichloroethane	<	1.0	1.0	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
1,2-Dichloropropane	<	1.1	1.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
2-Butanone		33	5.0	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
2-Hexanone	<	2.9	2.9	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
4-Methyl-2-pentanone	<	2.4	2.4	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Acetone		110	1.8	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Benzene		26	0.76	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromodichloromethane	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromoform	<	1.5	1.5	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Bromomethane	<	3.3	3.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Carbon Disulfide	<	1.9	1.9	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Carbon Tetrachloride	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chlorobenzene	<	0.90	0.90	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chlorodibromomethane	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloroethane	<	2.1	2.1	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloroform	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Chloromethane	<	1.8	1.8	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
cis-1,2-Dichloroethene	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
cis-1,3-Dichloropropene	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Ethylbenzene	<	0.74	0.74	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Methylene Chloride	<	1.6	1.6	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Methyl-tert-butyl-ether	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Styrene	<	0.76	0.76	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Tetrachloroethene	<	1.7	1.7	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Toluene	<	1.3	1.3	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
trans-1,2-Dichloroethene	<	1.2	1.2	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
trans-1,3-Dichloropropene	<	0.94	0.94	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Trichloroethene	<	0.81	0.81	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Vinyl Chloride	<	1.8	1.8	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Xylene, o	<	0.74	0.74	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
Xylenes, m + p	<	1.5	1.5	1	ug/kg		08/18/04	SW846 5035	SW846 8260B
4-Bromofluorobenzene		72	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B
Toluene-d8		83	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B
Dibromofluoromethane		86	---	1	%Recov		08/18/04	SW846 5035	SW846 8260B

All soil results are reported on a dry weight basis unless otherwise noted.

En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436

Analytical Report Number: 849910

Client : NORTHERN ENVIRONMENTAL-NORTHBROOK
Project Name : MORTON GROVE
Project Number : 05-2203-0254
Field ID : 1407

Matrix Type : SOIL
Collection Date : 08/13/04
Report Date : 08/26/04
Lab Sample Number : 849910-007

INORGANICS

Test	Result	EQL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
Percent Solids	80.6		1	%		08/16/04	SM 2540G M	SM 2540G M
TOC as NPOC	9300	8900	1	mg/kg		08/25/04	SW846 M9060	SW846 M9060

VOC MOD 3.4 List (Spec 12DCE/ XYL+MTBE)

Prep Date: 08/17/04

Analyte		Result	MDL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
1,1,1-Trichloroethane	<	1200	1200	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
1,1,2,2-Tetrachloroethane	<	1300	1300	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
1,1,2-Trichloroethane	<	1500	1500	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
1,1-Dichloroethane	<	1200	1200	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
1,1-Dichloroethene	<	1400	1400	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
1,2-Dichloroethane	<	1300	1300	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
1,2-Dichloropropane	<	1300	1300	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
2-Butanone	<	4500	4500	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
2-Hexanone	<	3800	3800	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
4-Methyl-2-pentanone	<	1600	1600	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Acetone	<	3600	3600	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Benzene	<	900	900	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Bromodichloromethane	<	1200	1200	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Bromoform	<	1200	1200	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Bromomethane	<	1500	1500	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Carbon Disulfide	<	1200	1200	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Carbon Tetrachloride	<	1000	1000	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Chlorobenzene	<	590	590	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Chlorodibromomethane	<	1200	1200	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Chloroethane	<	1500	1500	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Chloroform	<	1100	1100	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Chloromethane	<	1300	1300	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
cis-1,2-Dichloroethene		3800	1200	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
cis-1,3-Dichloropropene	<	900	900	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Ethylbenzene	<	930	930	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Methylene Chloride	<	900	900	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Methyl-tert-butyl-ether	<	930	930	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Styrene	<	740	740	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Tetrachloroethene		390000	1000	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Toluene	<	530	530	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
trans-1,2-Dichloroethene	<	900	900	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
trans-1,3-Dichloropropene	<	930	930	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Trichloroethene		17000	1200	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Vinyl Chloride	<	900	900	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Xylene, o	<	930	930	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
Xylenes, m + p	<	1300	1300	2500	ug/kg		08/18/04	5035/5030B	SW846 8260B
4-Bromofluorobenzene		98	---	2500	%Recov		08/18/04	5035/5030B	SW846 8260B
Toluene-d8		98	---	2500	%Recov		08/18/04	5035/5030B	SW846 8260B
Dibromofluoromethane		99	---	2500	%Recov		08/18/04	5035/5030B	SW846 8260B

All soil results are reported on a dry weight basis unless otherwise noted.

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En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436

Analytical Report Number: 849910

Client : NORTHERN ENVIRONMENTAL-NORTHBROOK
Project Name : MORTON GROVE
Project Number : 05-2203-0254
Field ID : 1304

Matrix Type : SOIL
Collection Date : 08/13/04
Report Date : 08/26/04
Lab Sample Number : 849910-008

INORGANICS

Test	Result	EQL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
Percent Solids	77.4		1	%		08/16/04	SM 2540G M	SM 2540G M
TOC as NPOC	9000	8000	1	mg/kg		08/25/04	SW846 M9060	SW846 M9060

VOC MOD 3.4 List (Spec 12DCE/ XYL+MTBE)

Prep Date: 08/17/04

Analyte		Result	MDL	Dilution	Units	Code	Anl Date	Prep Method	Anl Method
1,1,1-Trichloroethane	<	25	25	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
1,1,2,2-Tetrachloroethane	<	27	27	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
1,1,2-Trichloroethane	<	31	31	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
1,1-Dichloroethane	<	25	25	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
1,1-Dichloroethene	<	28	28	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
1,2-Dichloroethane	<	27	27	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
1,2-Dichloropropane	<	28	28	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
2-Butanone	<	94	94	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
2-Hexanone	<	79	79	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
4-Methyl-2-pentanone	<	34	34	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Acetone	<	74	74	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Benzene	<	19	19	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Bromodichloromethane	<	25	25	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Bromoform	<	26	26	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Bromomethane	<	32	32	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Carbon Disulfide	<	26	26	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Carbon Tetrachloride	<	21	21	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Chlorobenzene	<	12	12	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Chlorodibromomethane	<	25	25	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Chloroethane	<	32	32	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Chloroform	<	24	24	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Chloromethane	<	26	26	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
cis-1,2-Dichloroethene		7800	26	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
cis-1,3-Dichloropropene	<	19	19	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Ethylbenzene	<	19	19	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Methylene Chloride	<	19	19	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Methyl-tert-butyl-ether	<	19	19	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Styrene	<	15	15	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Tetrachloroethene	<	21	21	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Toluene	<	11	11	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
trans-1,2-Dichloroethene		130	19	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
trans-1,3-Dichloropropene	<	19	19	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Trichloroethene	<	26	26	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Vinyl Chloride		190	19	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Xylene, o	<	19	19	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
Xylenes, m + p	<	28	28	50	ug/kg		08/18/04	5035/5030B	SW846 8260B
4-Bromofluorobenzene		82	---	50	%Recov		08/18/04	5035/5030B	SW846 8260B
Toluene-d8		90	---	50	%Recov		08/18/04	5035/5030B	SW846 8260B
Dibromofluoromethane		93	---	50	%Recov		08/18/04	5035/5030B	SW846 8260B

All soil results are reported on a dry weight basis unless otherwise noted.

En Chem Inc.

1241 Bellevue Street
Green Bay, WI 54302
920-469-2436
Fax: 920-469-8827

Lab Number	TestGroupID	Field ID	Comment
849910-004	TCLV34+-S	1112	X - Internal standard was below the QC limits. This was confirmed by a second analysis on 08/18/2004.

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Qualifier Codes

Flag	Applies To	Explanation
A	Inorganic	Analyte is detected in the method blank. Method blank criteria is evaluated to the laboratory method detection limit. Additionally, method blank acceptance may be based on project specific criteria or determined from analyte concentrations in the sample and are evaluated on a sample by sample basis.
B	Inorganic	The analyte has been detected between the method detection limit and the reporting limit.
B	Organic	Analyte is present in the method blank. Method blank criteria is evaluated to the laboratory method detection limit. Additionally, method blank acceptance may be based on project specific criteria or determined from analyte concentrations in the sample and are evaluated on a sample by sample basis.
C	All	Elevated detection limit.
D	All	Analyte value from diluted analysis or surrogate result not applicable due to sample dilution.
E	Inorganic	Estimated concentration due to matrix interferences. During the metals analysis the serial dilution failed to meet the established control limits of 0-10%. The sample concentration is greater than 50 times the IDL for analysis done on the ICP or 100 times the IDL for analysis done on the ICP-MS. The result was flagged with the E qualifier to indicate that a physical interference was observed.
E	Organic	Analyte concentration exceeds calibration range.
F	Inorganic	Due to potential interferences for this analysis by Inductively Coupled Plasma techniques (SW-846 Method 6010), this analyte has been confirmed by and reported from an alternate method.
F	Organic	Surrogate results outside control criteria.
H	All	Preservation, extraction or analysis performed past holding time.
HF	Inorganic	This test is considered a field parameter, and the recommended holding time is 15 minutes from collection. The analysis was performed in the laboratory beyond the recommended holding time.
J	Inorganic	The analyte has been detected between the method detection limit and the reporting limit.
J	Organic	Concentration detected is greater than the method detection limit but less than the reporting limit.
K	Inorganic	Sample received unpreserved. Sample was either preserved at the time of receipt or at the time of sample preparation.
K	Organic	Detection limit may be elevated due to the presence of an unrequested analyte.
L	All	Elevated detection limit due to low sample volume.
M	Organic	Sample pH was greater than 2
N	All	Spiked sample recovery not within control limits.
O	Organic	Sample received overweight.
P	Organic	The relative percent difference between the two columns for detected concentrations was greater than 40%.
Q	All	The analyte has been detected between the limit of detection (LOD) and limit of quantitation (LOQ). The results are qualified due to the uncertainty of analyte concentrations within this range.
S	Organic	The relative percent difference between quantitation and confirmation columns exceeds internal quality control criteria. Because the result is unconfirmed, it has been reported as a non-detect with an elevated detection limit.
U	All	The analyte was not detected at or above the reporting limit.
V	All	Sample received with headspace.
W	All	A second aliquot of sample was analyzed from a container with headspace.
X	All	See Sample Narrative.
&	All	Laboratory Control Spike recovery not within control limits.
*	All	Precision not within control limits.
<	All	The analyte was not detected at or above the reporting limit.
1	Inorganic	Dissolved analyte or filtered analyte greater than total analyte; analyses passed QC based on precision criteria.
2	Inorganic	Dissolved analyte or filtered analyte greater than total analyte; analyses failed QC based on precision criteria.
3	Inorganic	BOD result is estimated due to the BOD blank exceeding the allowable oxygen depletion.
4	Inorganic	BOD duplicate precision not within control limits. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency.
5	Inorganic	BOD result is estimated due to insufficient oxygen depletion. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency.
6	Inorganic	BOD laboratory control sample not within control limits. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency.
7	Inorganic	BOD result is estimated due to complete oxygen depletion. Due to the 48 hour holding time for this test, it is not practical to reanalyze and try to correct the deficiency.

En Chem Inc.

Analysis Summary by Laboratory

1241 Bellevue Street
Green Bay, WI 54302

1090 Kennedy Avenue
Kimberly, WI 54136

Test Group Name	849910-001	849910-002	849910-003	849910-004	849910-005	849910-006	849910-007	849910-008
PERCENT SOLIDS	G	G	G	G	G	G	G	G
TOC AS NPOC							K	K
VOC MOD 3.4 List (Spec 12DCE/ XYL+	G	G	G	G	G	G	G	G

Illinois Certification	
G = En Chem Green Bay	100313
K = En Chem Kimberly	200035
S = En Chem Superior	Not Applicable
C = Subcontracted Analysis	

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En Chem, Inc. Cooler Receipt Log

Batch No. 849910

Project Name or ID Morton Grove No. of Coolers: 1 Temps: 2.0°C

A. Receipt Phase: Date cooler was opened: 8-14-04 By: KM

1: Were samples received on ice? (Must be ≤ 6 C)	YES	NO[2]	NA
2. Was there a Temperature Blank?	YES	NO	
3: Were custody seals present and intact on cooler? (Record on COC)	YES	NO	
4: Are COC documents present?	YES	NO[2]	
5: Does this Project require quick turn around analysis?	YES	NO	
6: Is there any sub-work?	YES	NO	
7: Are there any short hold time tests?	YES	NO	
8: Are any samples nearing expiration of hold-time? (Within 2 days)	YES[1]	NO	Contacted by/Who
9: Do any samples need to be Filtered or Preserved in the lab?	YES[1]	NO	Contacted by/Who

B. Check-in Phase: Date samples were Checked-in: 8-14-04 By: KM

1: Were all sample containers listed on the COC received and intact?	YES	NO[2]	NA
2: Sign the COC as received by En Chem. Completed	YES	NO	
3: Do sample labels match the COC?	YES	NO[2]	
4: Completed pH check on preserved samples.. *(This statement does not apply to water: VOC, O&G, TOC, DRO, Total Rec. Phenolics)*	YES	NO	NA
5: Do samples have correct chemical preservation? *(This statement does not apply to water: VOC, O&G, TOC, DRO, Total Rec. Phenolics)*	YES	NO[2]	NA
6: Are dissolved parameters field filtered?	YES	NO[2]	NA
7: Are sample volumes adequate for tests requested?	YES	NO[2]	
8: Are VOC samples free of bubbles >6mm	YES	NO[2]	NA
9: Enter samples into logbook. Completed	YES	NO	
10: Place laboratory sample number on all containers and COC. Completed	YES	NO	
11: Complete Laboratory Tracking Sheet (LTS). Completed	YES	NO	NA
12: Start Nonconformance form.	YES	NO	NA
13: Initiate Subcontracting procedure. Completed	YES	NO	NA
14: Check laboratory sample number on all containers and COC. KM	YES	NO	NA

Short Hold-time tests:

24 Hours or less	48 Hours	7 days	Footnotes
Coliform	BOD	Ash	1 Notify proper lab group immediately.
Corrosivity = pH	Color	Aqueous Extractable Organics- ALL	2 Complete nonconformance memo.
Dissolved Oxygen	Nitrite or Nitrate	Flashpoint	
Hexavalent Chromium	Ortho Phosphorus	Free Liquids	
HPC	Surfactants	Sulfide	
Ferrous Iron	Turbidity	TDS	
Eh	En Core Preservation	TSS	
Odor	Power stop preservation	Total Solids	
Residual Chlorine		TVS	
Sulfite		TVSS	
		Unpreserved VOC's	

Rev. 2/05/04. Attachment to 1-REC-5.
Subject to QA Audit.

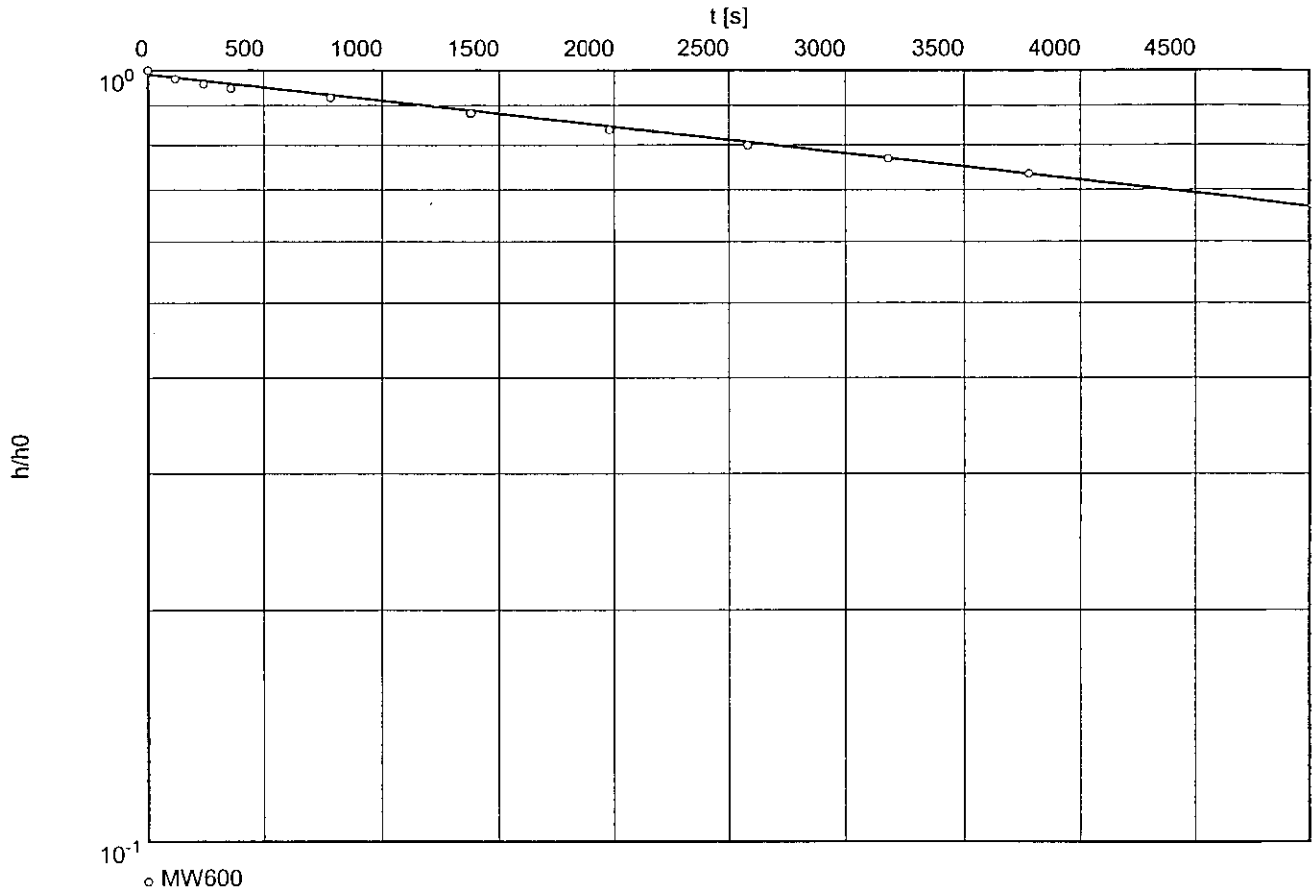
Reviewed by/date WJ 8/16/04

p./everyone/forms/samplereceiving/crl.doc

ATTACHMENT F

Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	slug/bail test analysis BOUWER-RICE's method	Page 1 Project: 05-2203-0254 Evaluated by: MJS	Date: 18.11.2003

Slug Test No.	Test conducted on: 10.22.2003
MW600	



Hydraulic conductivity [cm/s]: 1.51×10^{-6}

Waterloo Hydrogeologic
180 Columbia St. W.
Waterloo,Ontario,Canada
ph.(519)746-1798

slug/bail test analysis
BOUWER-RICE's method

Project: 05-2203-0254

Evaluated by: MJS | Date: 18.11.2003

Slug Test No.	Test conducted on: 10.22.2003
MW600	MW600

Static water level: 179.2 cm below datum

	Pumping test duration [s]	Water level [cm]	Drawdown [cm]	
1	0	322.2	143.0	
2	120	318.5	139.3	
3	240	316.4	137.2	
4	360	314.6	135.4	
5	780	310.9	131.7	
6	1380	304.8	125.6	
7	1980	298.7	119.5	
8	2580	293.2	114.0	
9	3180	289.0	109.8	
10	3780	284.1	104.9	

ATTACHMENT G

TIER 2 REMEDIAL OBJECTIVES

Residential, Industrial/Commerical & Construction Worker Remedial Objectives for the Soil Ingestion and Inhalation Exposure Routes and Calculation of the Soil Saturation Limit Csat

Site Name: North Suburban Cleaners

Location: Morton Grove, Illinois

Compound : Tetrachloroethylene

TACO Remediation Objectives Summary Table

Compound : Tetrachloroethylene

	Residential		Industrial/Commercial		Construction Worker		Units
	Tier 1 Remediation Objective	Tier 2 Remediation Objective	Tier 1 Remediation Objective	Tier 2 Remediation Objective	Tier 1 Remediation Objective	Tier 2 Remediation Objective	
Soil Ingestion Exposure Route	12.0	**12.3**	**110**	110	**2400**	2388	mg/kg
Soil Inhalation Exposure Route	11.0	**246**	20.0	**469**	28.0	**660**	mg/kg
Soil Component of the Groundwater Ingestion Route	0.06	**0.87**	0.06	**0.87**	0.06	**0.87**	mg/kg

	Tier 1 Remediation Objective	Tier 2 Remediation Objective	Units
Soil Saturation Limit (Csat)	240	**350**	mg/kg

	Total Organic Carbon	Units
Soil Attenuation Capacity	9467	mg/kg

SUMMARY OF INPUT PARAMETERS FOR THE SSL EQUATIONS

Residential, Industrial/Commerical & Construction Worker Remedial Objectives for the Soil Ingestion and Inhalation Exposure Routes and Calculation of the Soil Saturation Limit Csat

Site Name: North Suburban Cleaners

Location: Morton Grove, Illinois

Compound : Tetrachloroethylene

Symbol	Input Value(s) Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
1/(2b+3)	0.042	0.042	0.042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K
ATc	70	70	70	yr	Averaging Time for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
BW	70	70	70	kg	Body Weight	IAC Title 35, Part 742, Appendix C, Table B
Cw	0.50	0.50	0.50	mg/L	Target Soil Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A, Equation S18
Csat	350	350	350	mg/kg	Soil Saturation Concentration	IAC Title 35, Part 742, Appendix C, Table A, Equation S29
ED	-	25	1	yr	Exposure Duration for Ingestion of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
ED	30	25	1	yr	Exposure Duration for Inhalation of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
ED	30	25	1	yr	Exposure Duration for Direct Ingestion of Groundwater	IAC Title 35, Part 742, Appendix C, Table B
EF	350	250	30	d/yr	Exposure Frequency	IAC Title 35, Part 742, Appendix C, Table B
Foc	0.0095	0.0095	0.0095	g/g	Organic Carbon Content of Soil	Field Measurement
d	8.0	8.0	8.0	m	Mixing Zone Depth	IAC Title 35, Part 742, Appendix C, Table A, Equation S25
da	10.0	10.0	10.0	m	Aquifer Thickness	Site Specific
DF	20.00	20.00	20.00	unitless	Dilution Factor	IAC Title 35, Part 742, Appendix C, Table A, Equation S22
GWobj	0.025	0.025	0.025	mg/L	Groundwater Remediation Objective	IAC Title 35, Part 742, Appendix C, Table E
IFsoil-adj	114	-	-	(mg-yr)/(kg-d)	Age Adjusted Soil Ingestion Factor for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
IRsoil	200	50	480	mg/d	Soil Ingestion Rate	IAC Title 35, Part 742, Appendix C, Table B
IRw	2.0	1.0	-	L/d	Dailty Water Ingestion Rate	IAC Title 35, Part 742, Appendix C, Table B
K	0.48000	0.48000	0.48000	m/yr	Aquifer Hydraulic Conductivity	Site Specific
H	0.754	0.754	0.754	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
i	0.2300	0.2300	0.2300	m/m	Hydraulic Gradient	Site Specific
I	0.30	0.30	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
Kd	1.47	1.47	1.47	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Koc	155	155	155	L/kg	Organic Carrbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Ks	5.0	5.0	5.0	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K
L	5.0	5.0	5.0	m	Source Length Parallel to Groundwater Flow	Site Specific
n	0.43	0.43	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24
Oa	0.05	0.05	0.05	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Ow	0.39	0.39	0.39	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
pb	1.5	1.5	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
ps	2.65	2.65	2.65	kg/L	Soil Particle Density	IAC Title 35, Part 742, Appendix C, Table B
S	200	200	200	mg/L	Solubility in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
URF	5.80E-07	5.80E-07	5.80E-07	(ug/m3)^-1	Inhalation Unit Risk Factor	Toxicological-Specific
T	9.5E+08	7.9E+08	3.6E+06	s	Exposure Interval	IAC Title 35, Part 742, Appendix C, Table B
TR	1.00E-06	1.00E-06	1.00E-06	unitless	Target Cancer Risk	IAC Title 35, Part 742, Appendix C, Table B
VF	5.86E+04	6.66E+04	4.50E+03	m3/kg	Volatilization Factor	IAC Title 35, Part 742, Appendix C, Table A, Equation S8
VF'	-	-	4.50E+02	m3/kg	Volatilization Factor adjusted for Agitation	IAC Title 35, Part 742, Appendix C, Table A, Equation S9
SFo	5.20E-02	5.20E-02	5.20E-02	(mg/kg-d)^-1	Oral Slope Factor	Toxicological-Specific
Um	4.69	4.69	4.69	m/s	Mean Annual Windspeed	IAC Title 35, Part 742, Appendix C, Table B
Ut	11.32	11.32	11.32	m/s	Equivalent Threshold Value of Windspeed at 7m	IAC Title 35, Part 742, Appendix C, Table B
F(x)	0.194	0.194	0.194	unitless	Function dependent on Um/Ut	IAC Title 35, Part 742, Appendix C, Table B
V	0.00	0.00	0.00	unitless	Fraction of Vegatative Cover	IAC Title 35, Part 742, Appendix C, Table B or Site Specific
Q/C	6.88E+01	8.58E+01	8.58E+01	(g-m2-s)/(kg/m3)	Inverse of mean concentration at the center of a square source (for VF equations)	IAC Title 35, Part 742, Appendix C, Table B
Q/C	9.08E+01	8.58E+01	8.58E+01	(g-m2-s)/(kg/m3)	Inverse of mean concentration at the center of a square source (for PEF equations)	IAC Title 35, Part 742, Appendix C, Table B
Da	4.58E-06	4.58E-06	4.58E-06	cm2/s	Apparent Diffusivity	IAC Title 35, Part 742, Appendix C, Table A, Equation S10
Di	7.20E-02	7.20E-02	7.20E-02	cm2/s	Diffusivity in Air	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Dw	8.20E-06	8.20E-06	8.20E-06	cm2/s	Diffusivity in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific

SSL Equation S2 and S3
Compound : Tetrachloroethylene

Equation S2 RO=(TR*ATc*365)/(SFo*10^-6*EF*IRsoil-adj)

Equation S3 RO=(TR*BW*ATc*365)/(SFo*10^-6*EF*ED*IRsoil)

	Input Value(s)					
Symbol	Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
TR	1.0E-06	1.0E-06	1.0E-06	unitless	Target Cancer Risk	IAC Title 35, Part 742, Appendix C, Table B
ATc	70	70	70	yr	Averaging Time for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
SFo	5.20E-02	5.20E-02	5.20E-02	(mg/kg-d)^-1	Oral Slope Factor	-Toxicological-Specific
EF	350	250	30	d/yr	Exposure Frequency	IAC Title 35, Part 742, Appendix C, Table B
ED	-	25	1	yr	Exposure Duration for Ingestion of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
IFsoil-adj	114	-	-	(mg-yr)/(kg-d)	Age Adjusted Soil Ingestion Factor for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
IRsoil	200	50	480	mg/d	Soil Ingestion Rate	IAC Title 35, Part 742, Appendix C, Table B
BW	70	70	70	kg	Body Weight	IAC Title 35, Part 742, Appendix C, Table B
Symbol		Output Value		Units	Explanation	
RO	12.3	110	2388	mg/kg	Soil Ingestion Remediation Objective	

SSL Equation S6 and S7
Compound : Tetrachloroethylene

Equation S6 RO=(TR*ATc*365)/(URF*1000*EF*ED*(1/VF))

Equation S7 RO=(TR*ATc*365)/(URF*1000*EF*ED*(1/VF'))

Symbol	Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
		Input Value(s)				
TR	1.0E-06	1.0E-06	1.0E-06	unitless	Target Cancer Risk	IAC Title 35, Part 742, Appendix C, Table B
ATc	70	70	70	yr	Averaging Time for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
URF	5.8E-07	5.8E-07	5.8E-07	(ug/m3)^-1	Inhalation Unit Risk Factor	Toxicological-Specific
EF	350	250	30	d/yr	Exposure Frequency	IAC Title 35, Part 742, Appendix C, Table B
ED	30	25	1	yr	Exposure Duration for Inhalation of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
VF	5.86E+04	6.66E+04	4.50E+03	m3/kg	Volatilization Factor	IAC Title 35, Part 742, Appendix C, Table A, Equation S8
VF'	-	-	4.50E+02	m3/kg	Volatilization Factor adjusted for Agitation	IAC Title 35, Part 742, Appendix C, Table A, Equation S9
Symbol		Output Value		Units	Explanation	
RO	246	469	660	mg/kg	Soil Inhalation Remediation Objective	

SSL Equation S8 and S9
Compound : Tetrachloroethylene

Equation S8 VF=(Q/C)*((3.14*Da*T)^.5/(2*pb*Da))*10^-4

Equation S9 VF'=VF/10

Symbol	Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
		Input Value(s)				
Q/C	6.88E+01	8.58E+01	8.58E+01	(g-m2-s)/(kg/m3)	Inverse of mean concentration at the center of a square source (for VF equations)	IAC Title 35, Part 742, Appendix C, Table B
Da	4.58E-06	4.58E-06	4.58E-06	cm2/s	Apparent Diffusivity	IAC Title 35, Part 742, Appendix C, Table A, Equation S10
T	9.50E+08	7.90E+08	3.60E+06	s	Exposure Interval	IAC Title 35, Part 742, Appendix C, Table B
pb	1.5	1.5	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Symbol		Output Value		Units	Explanation	
VF	58564	66599	4496	mg^3/kg	Volatilization Factor	
VF'	-	-	450	mg^3/kg	Volatilization Factor adjusted for agitation	

SSL Equation S10
Compound : Tetrachloroethylene

Equation S10 Da= (((Oa^3.33*Di*H')+(Ow^3.33*Dw))/n^2)+(1/((pb*Kd)+Ow+(Oa*H'))

Symbol	Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
		Input Value(s)				
Oa	0.05	0.05	0.05	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Di	0.07	0.07	0.07	cm2/s	Diffusivity in Air	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
H	0.754	0.754	0.754	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Ow	0.39	0.39	0.39	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
Dw	8.2E-06	8.2E-06	8.2E-06	cm2/s	Diffusivity in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
n	0.43	0.43	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24
pb	1.50	1.5	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Kd	1.47	1.47	1.47	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Symbol		Output Value		Units	Explanation	
Da	4.58E-06	4.58E-06	4.58E-06	cm2/s	Apparent Diffusivity	

SSL Equation S17
Compound : Tetrachloroethylene

Equation S17 RO=Cw(Kd+((Ow+Oa*H')/pb))

Symbol	Input Value(s)	Units	Explanation	Source
Cw	0.500	mg/L	Target Soil Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A, Equation S18
pb	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Kd	1.47	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Ow	0.39	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
Oa	0.05	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
H	0.754	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific

Symbol	Output Value	Units	Explanation
RO	0.87	mg/kg	Soil Component of the Groundwater Remediation Objective

SSL Equation S18
Compound : Tetrachloroethylene

Equation S18 Cw=DF*Gwobj

Symbol	Input Value(s)	Units	Explanation	Source
DF	20.00	unitless	Dilution Factor	IAC Title 35, Part 742, Appendix C, Table A, Equation S22
GWobj	0.025	mg/L	Groundwater Remediation Objective	IAC Title 35, Part 742, Appendix C, Table E

Symbol	Output Value	Units	Explanation
Cw	0.500	mg/L	Target Soil Leachate Concentration

SSL EQUATION S19
Compound : Tetrachloroethylene

Equation S19 Kd=Koc*foc

Symbol	Input Value(s)	Units	Explanation	Source
Koc	155	L/kg	Organic Carrbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Foc	0.01	g/g	Organic Carbon Content of Soil	Field Measurement

Symbol	Output Value	Units	Explanation
Kd	1.47	L/kg	Soil-Water Partition Coefficient

SSL Equation S20
Compound : Tetrachloroethylene

Equation S20 Ow=n*(I/Ks)^(1/2b+3)

Symbol	Input Value(s)	Units	Explanation	Source
n	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24 or IAC Title 35, Part 742, Appendix C, Table B
I	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
Ks	5.0	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K
1/(2b+3)	0.042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K

Symbol	Output Value	Units	Explanation
Ow	0.39	L/L	Water-Filled Soil Porosity

SSL Equation S21
Compound : Tetrachloroethylene

Equation S21 Oa=n-Ow

Symbol	Input Value(s)	Units	Explanation	Source
n	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24 or IAC Title 35, Part 742, Appendix C, Table B
Ow	0.39	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20 or IAC Title 35, Part 742, Appendix C, Table B

Symbol	Output Value	Units	Explanation
Oa	0.05	L/L	Air-Filled Soil Porosity

SSL Equation S22
Compound : Tetrachloroethylene

Equation S22 DF=1+((K*i*d)/(I*L))

Symbol	Input Value(s)	Units	Explanation	Source
K	0.48	m/yr	Aquifer Hydraulic Conductivity	Site Specific
i	0.23	m/m	Hydraulic Gradient	Site Specific
d	7.96	m	Mixing Zone Depth	IAC Title 35, Part 742, Appendix C, Table A, Equation S25
I	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
L	5.0	m	Source Length Parallel to Groundwater Flow	Site Specific

Symbol	Output Value	Units	Explanation
DF	20.00	unitless	Dilution Factor

SSL Equation S24
Compound : Tetrachloroethylene

Equation S24 n=1-pb/ps

Symbol	Input Value(s)	Units	Explanation	Source
pb	1.50	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
ps	2.65	kg/L	Soil Particle Density	IAC Title 35, Part 742, Appendix C, Table B

Symbol	Output Value	Units	Explanation
n	0.43	L/L	Total Soil Porosity

SSL Equation S25
Compound : Tetrachloroethylene

Equation S25 d=(0.0112*L^2)^0.5+da(1-e^((-L*I)/(K*I*da)))

Symbol	Input Value(s)	Units	Explanation	Source
da	10.0	m	Aquifer Thickness	Site Specific
L	5.0	m	Source Length Parallel to Groundwater Flow	Site Specific
I	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
K	0.48	m/yr	Aquifer Hydraulic Conductivity	Site Specific
i	0.23	m/m	Hydraulic Gradient	Site Specific

Symbol	Output Value	Units	Explanation
d	7.96	m	Mixing Zone Depth

SSL Equation S29
Equation for the Derivation of the Soil Saturation Limit C_{sat}
Compound : Tetrachloroethylene

Equation S29 C_{sat}=(S/pb)*((Kd*pb)+Ow+(H*Oa))

Symbol	Input Value(s)	Units	Explanation	Source
S	200	mg/L	Solubility in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
pb	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Kd	1.47	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Ow	0.39	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20 or IAC Title 35, Part 742, Appendix C, Table B
H	0.754	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Oa	0.048	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21 or IAC Title 35, Part 742, Appendix C, Table B

Symbol	Output Value	Units	Explanation
C_{sat}	350	mg/kg	Soil Saturation Limit

TIER 2 REMEDIAL OBJECTIVES

Residential, Industrial/Commerical & Construction Worker Remedial Objectives for the Soil Ingestion and Inhalation Exposure Routes and Calculation of the Soil Saturation Limit Csat

Site Name: North Suburban Cleaners

Location: Morton Grove, Illinois

Compound : Trichloroethylene

TACO Remediation Objectives Summary Table

Compound: Trichloroethylene

	Residential		Industrial/Commercial		Construction Worker		Units
	Tier 1 Remediation Objective	Tier 2 Remediation Objective	Tier 1 Remediation Objective	Tier 2 Remediation Objective	Tier 1 Remediation Objective	Tier 2 Remediation Objective	
Soil Ingestion Exposure Route	58.0	**58.2**	**520**	520	1200	**11291**	mg/kg
Soil Inhalation Exposure Route	5.0	**110**	8.9	**210**	12.0	**295**	mg/kg
Soil Component of the Groundwater Ingestion Route	0.06	**0.92**	0.06	**0.92**	0.06	**0.92**	mg/kg

	Tier 1 Remediation Objective	Tier 2 Remediation Objective	Units
Soil Saturation Limit (Csat)	1300	**2026**	mg/kg

	Total Organic Carbon	Units
Soil Attenuation Capacity	9467	mg/kg

SUMMARY OF INPUT PARAMETERS FOR THE SSL EQUATIONS

Residential, Industrial/Commerical & Construction Worker Remedial Objectives for the Soil Ingestion and Inhalation Exposure Routes and Calculation of the Soil Saturation Limit Csat

Site Name: North Suburban Cleaners

Location: Morton Grove, Illinois

Compound : Trichloroethylene

Symbol	Input Value(s) Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
1/(2b+3)	0.042	0.042	0.042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K
ATc	70	70	70	yr	Averaging Time for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
BW	70	70	70	kg	Body Weight	IAC Title 35, Part 742, Appendix C, Table B
Cw	0.50	0.50	0.50	mg/L	Target Soil Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A, Equation S18
Csat	2026	2026	2026	mg/kg	Soil Saturation Concentration	IAC Title 35, Part 742, Appendix C, Table A, Equation S29
ED	-	25	1	yr	Exposure Duration for Ingestion of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
ED	30	25	1	yr	Exposure Duration for Inhalation of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
ED	30	25	1	yr	Exposure Duration for Direct Ingestion of Groundwater	IAC Title 35, Part 742, Appendix C, Table B
EF	350	250	30	d/yr	Exposure Frequency	IAC Title 35, Part 742, Appendix C, Table B
Foc	0.0095	0.0095	0.0095	g/g	Organic Carbon Content of Soil	Field Measurement
d	8.0	8.0	8.0	m	Mixing Zone Depth	IAC Title 35, Part 742, Appendix C, Table A, Equation S25
da	10.0	10.0	10.0	m	Aquifer Thickness	Site Specific
DF	20.00	20.00	20.00	unitless	Dilution Factor	IAC Title 35, Part 742, Appendix C, Table A, Equation S22
GWobj	0.025	0.025	0.025	mg/L	Groundwater Remediation Objective	IAC Title 35, Part 742, Appendix C, Table E
IFsoil-adj	114	-	-	(mg-yr)/(kg-d)	Age Adjusted Soil Ingestion Factor for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
IRsoil	200	50	480	mg/d	Soil Ingestion Rate	IAC Title 35, Part 742, Appendix C, Table B
IRw	2.0	1.0	-	L/d	Dailty Water Ingestion Rate	IAC Title 35, Part 742, Appendix C, Table B
K	0.48000	0.48000	0.48000	m/yr	Aquifer Hydraulic Conductivity	Site Specific
H	0.422	0.422	0.422	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
i	0.230	0.230	0.230	m/m	Hydraulic Gradient	Site Specific
I	0.30	0.30	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
Kd	1.57	1.57	1.57	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Koc	166	166	166	L/kg	Organic Carrbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Ks	5.0	5.0	5.0	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K
L	5.0	5.0	5.0	m	Source Length Parallel to Groundwater Flow	Site Specific
n	0.43	0.43	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24
Oa	0.05	0.05	0.05	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Ow	0.39	0.39	0.39	L/L	Water-Filled Soil Prosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
pb	1.5	1.5	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
ps	2.65	2.65	2.65	kg/L	Soil Particle Density	IAC Title 35, Part 742, Appendix C, Table B
S	1100	1100	1100	mg/L	Solubility in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
URF	1.70E-06	1.70E-06	1.70E-06	(ug/m3)^-1	Inhalation Unit Risk Factor	Toxicological-Specific
T	9.5E+08	7.9E+08	3.6E+06	s	Exposure Interval	IAC Title 35, Part 742, Appendix C, Table B
TR	1.00E-06	1.00E-06	1.00E-06	unitless	Target Cancer Risk	IAC Title 35, Part 742, Appendix C, Table B
VF	7.67E+04	6.72E+04	5.89E+03	m3/kg	Volatilization Factor	IAC Title 35, Part 742, Appendix C, Table A, Equation S8
VF'	-	-	5.89E+02	m3/kg	Volatilization Factor adjusted for Agitation	IAC Title 35, Part 742, Appendix C, Table A, Equation S9
SFo	1.10E-02	1.10E-02	1.10E-02	(mg/kg-d)^-1	Oral Slope Factor	Toxicological-Specific
Um	4.69	4.69	4.69	m/s	Mean Annual Windspeed	IAC Title 35, Part 742, Appendix C, Table B
Ut	11.32	11.32	11.32	m/s	Equivalent Threshold Value of Windspeed at 7m	IAC Title 35, Part 742, Appendix C, Table B
F(x)	0.194	0.194	0.194	unitless	Function dependent on Um/Ut	IAC Title 35, Part 742, Appendix C, Table B
V	0.00	0.00	0.00	unitless	Fraction of Vegatative Cover	IAC Title 35, Part 742, Appendix C, Table B or Site Specific
Q/C	6.88E+01	8.58E+01	8.58E+01	(g-m2-s)/(kg/m3)	Inverse of mean concentration at the center of a square source (for VF equations)	IAC Title 35, Part 742, Appendix C, Table B
Q/C	9.08E+01	8.58E+01	8.58E+01	(g-m2-s)/(kg/m3)	Inverse of mean concentration at the center of a square source (for PEF equations)	IAC Title 35, Part 742, Appendix C, Table B
Da	2.67E-06	2.67E-06	2.67E-06	cm2/s	Apparent Diffusivity	IAC Title 35, Part 742, Appendix C, Table A, Equation S10
Di	7.90E-02	7.90E-02	7.90E-02	cm2/s	Diffusivity in Air	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Dw	9.10E-06	9.10E-06	9.10E-06	cm2/s	Diffusivity in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific

SSL Equation S2 and S3

Compound : Trichloroethylene

Equation S2 RO=(TR*ATc*365)/(SFo*10^-6*EF*IRsoil-adj)

Equation S3 RO=(TR*BW*ATc*365)/(SFo*10^-6*EF*ED*IRsoil)

	Input Value(s)					
Symbol	Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
TR	1.0E-06	1.0E-06	1.0E-06	unitless	Target Cancer Risk	IAC Title 35, Part 742, Appendix C, Table B
ATc	70	70	70	yr	Averaging Time for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
SFo	1.10E-02	1.10E-02	1.10E-02	(mg/kg-d)^-1	Oral Slope Factor	Toxicological-Specific
EF	350	250	30	d/yr	Exposure Frequency	IAC Title 35, Part 742, Appendix C, Table B
ED	-	25	1	yr	Exposure Duration for Ingestion of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
IFsoil-adj	114	-	-	(mg-yr)/(kg-d)	Age Adjusted Soil Ingestion Factor for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
IRsoil	200	50	480	mg/d	Soil Ingestion Rate	IAC Title 35, Part 742, Appendix C, Table B
BW	70	70	70	kg	Body Weight	IAC Title 35, Part 742, Appendix C, Table B
Symbol		Output Value		Units	Explanation	
RO	58.2	520	11291	mg/kg	Soil Ingestion Remediation Objective	

SSL Equation S6 and S7
Compound : Trichloroethylene

Equation S6 RO=(TR*ATc*365)/(URF*1000*EF*ED*(1/VF))

Equation S7 RO=(TR*ATc*365)/(URF*1000*EF*ED*(1/VF'))

Symbol	Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
		Input Value(s)				
TR	1.0E-06	1.0E-06	1.0E-06	unitless	Target Cancer Risk	IAC Title 35, Part 742, Appendix C, Table B
ATc	70	70	70	yr	Averaging Time for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
URF	1.7E-06	1.7E-06	1.7E-06	(ug/m3)^-1	Inhalation Unit Risk Factor	Toxicological-Specific
EF	350	250	30	d/yr	Exposure Frequency	IAC Title 35, Part 742, Appendix C, Table B
ED	30	25	1	yr	Exposure Duration for Inhalation of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
VF	7.67E+04	8.72E+04	5.89E+03	m3/kg	Volatilization Factor	IAC Title 35, Part 742, Appendix C, Table A, Equation S8
VF'	-	-	5.89E+02	m3/kg	Volatilization Factor adjusted for Agitation	IAC Title 35, Part 742, Appendix C, Table A, Equation S9
Symbol		Output Value		Units	Explanation	
RO	110	210	295	mg/kg	Soil Inhalation Remediation Objective	

SSL Equation S8 and S9
Compound : Trichloroethylene

Equation S8 VF=(Q/C)*((3.14*Da*T)^.5/(2*pb*Da))*10^-4

Equation S9 VF'=VF/10

Symbol	Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
		Input Value(s)				
Q/C	6.86E+01	8.58E+01	8.58E+01	(g-m2-s)/(kg/m3)	*Inverse of mean concentration at the center of a* square source (for VF equations)	IAC Title 35, Part 742, Appendix C, Table B
Da	2.67E-06	2.67E-06	2.67E-06	cm2/s	Apparent Diffusivity	IAC Title 35, Part 742, Appendix C, Table A, Equation S10
T	9.50E+08	7.90E+08	3.60E+06	s	Exposure Interval	IAC Title 35, Part 742, Appendix C, Table B
pb	1.5	1.5	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Symbol		Output Value		Units	Explanation	
VF	76703	87227	5888	mg^3/kg	Volatilization Factor	
VF'	-	-	589	mg^3/kg	Volatilization Factor adjusted for agitation	

SSL Equation S10
Compound : Trichloroethylene

Equation S10 Da= {((Oa^3.33*Di*H')+(Ow^3.33*Dw))/n^2}+(1/((pb*Kd)+Ow+(Oa*H'))

Symbol	Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
		Input Value(s)				
Oa	0.05	0.05	0.05	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Di	0.08	0.08	0.08	cm2/s	Diffusivity in Air	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
H	0.422	0.422	0.422	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Ow	0.39	0.39	0.39	L/L	Water-Filled Soil Prosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
Dw	9.1E-06	9.1E-06	9.1E-06	cm2/s	Diffusivity in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
n	0.43	0.43	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24
pb	1.50	1.5	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Kd	1.57	1.57	1.57	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Symbol		Output Value		Units	Explanation	
Da	2.67E-06	2.67E-06	2.67E-06	cm2/s	Apparent Diffusivity	

SSL Equation S17
Compound : Trichloroethylene

Equation S17 RO=Cw(Kd+((Ow+Oa*H')/pb))

Symbol	Input Value(s)	Units	Explanation	Source
Cw	0.500	mg/L	Target Soil Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A, Equation S18
pb	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Kd	1.57	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Ow	0.39	L/L	Water-Filled Soil Prosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
Oa	0.05	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
H	0.422	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific

Symbol	Output Value	Units	Explanation
RO	0.92	mg/kg	Soil Component of the Groundwater Remediation Objective

SSL Equation S18
Compound : Trichloroethylene

Equation S18 Cw=DF*Gwobj

Symbol	Input Value(s)	Units	Explanation	Source
DF	20.00	unitless	Dilution Factor	IAC Title 35, Part 742, Appendix C, Table A, Equation S22
GWobj	0.025	mg/L	Groundwater Remediation Objective	IAC Title 35, Part 742, Appendix C, Table E

Symbol	Output Value	Units	Explanation
Cw	0.500	mg/L	Target Soil Leachate Concentration

SSL EQUATION S19
Compound : Trichloroethylene

Equation S19 Kd=Koc*foc

Symbol	Input Value(s)	Units	Explanation	Source
Koc	166	L/kg	Organic Carrbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Foc	0.01	g/g	Organic Carbon Content of Soil	Field Measurement

Symbol	Output Value	Units	Explanation
Kd	1.57	L/kg	Soil-Water Partition Coefficient

SSL Equation S20
Compound : Trichloroethylene

Equation S20 Ow=n*(I/Ks)^(1/2b+3)

Symbol	Input Value(s)	Units	Explanation	Source
n	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24 or IAC Title 35, Part 742, Appendix C, Table B
I	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
Ks	5.0	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K
1/(2b+3)	0.042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K

Symbol	Output Value	Units	Explanation
Ow	0.39	L/L	Water-Filled Soil Porosity

SSL Equation S21
Compound : Trichloroethylene

Equation S21 Oa=n-Ow

Symbol	Input Value(s)	Units	Explanation	Source
n	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24 or IAC Title 35, Part 742, Appendix C, Table B
Ow	0.39	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20 or IAC Title 35, Part 742, Appendix C, Table B

Symbol	Output Value	Units	Explanation
Oa	0.05	L/L	Air-Filled Soil Porosity

SSL Equation S22
Compound : Trichloroethylene

Equation S22 DF=1+((K*i*d)/(I*L))

Symbol	Input Value(s)	Units	Explanation	Source
K	0.48	m/yr	Aquifer Hydraulic Conductivity	Site Specific
i	0.23	m/m	Hydraulic Gradient	Site Specific
d	7.96	m	Mixing Zone Depth	IAC Title 35, Part 742, Appendix C, Table A, Equation S25
I	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
L	5.0	m	Source Length Parallel to Groundwater Flow	Site Specific

Symbol	Output Value	Units	Explanation
DF	20.00	unitless	Dilution Factor

SSL Equation S24
Compound : Trichloroethylene

Equation S24 n=1-pb/ps

Symbol	Input Value(s)	Units	Explanation	Source
pb	1.50	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
ps	2.65	kg/L	Soil Particle Density	IAC Title 35, Part 742, Appendix C, Table B

Symbol	Output Value	Units	Explanation
n	0.43	L/L	Total Soil Porosity

SSL Equation S25
Compound : Trichloroethylene

Equation S25 d=(0.0112*L^2)^0.5+da(1-e^((-L*I)/(K*I*da)))

Symbol	Input Value(s)	Units	Explanation	Source
da	10.0	m	Aquifer Thickness	Site Specific
L	5.0	m	Source Length Parallel to Groundwater Flow	Site Specific
I	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
K	0.48	m/yr	Aquifer Hydraulic Conductivity	Site Specific
i	0.23	m/m	Hydraulic Gradient	Site Specific

Symbol	Output Value	Units	Explanation
d	7.96	m	Mixing Zone Depth

SSL Equation S29

Equation for the Derivation of the Soil Saturation Limit C_{sat}

Compound : Trichloroethylene

Equation S29 $C_{sat}=(S/pb)*((Kd*pb)+Ow+(H*Oa))$

Symbol	Input Value(s)	Units	Explanation	Source
S	1100	mg/L	Solubility in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
pb	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Kd	1.57	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Ow	0.39	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20 or IAC Title 35, Part 742, Appendix C, Table B
H	0.422	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Oa	0.048	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21 or IAC Title 35, Part 742, Appendix C, Table B

Symbol	Output Value	Units	Explanation
C_{sat}	2026	mg/kg	Soil Saturation Limit

TIER 2 REMEDIAL OBJECTIVES

Residential, Industrial/Commerical & Construction Worker Remedial Objectives for the Soil Ingestion and Inhalation Exposure Routes and Calculation of the Soil Saturation Limit Csat

Site Name: North Suburban Cleaners

Location:Morton Grove, Illinois

Compound : Cis-1,2-Dichloroethene

TACO Remediation Objectives Summary Table

Compound : Cis-1,2-Dichloroethene

	Residential		Industrial/Commercial		Construction Worker		Units
	Tier 1 Remediation Objective	Tier 2 Remediation Objective	Tier 1 Remediation Objective	Tier 2 Remediation Objective	Tier 1 Remediation Objective	Tier 2 Remediation Objective	
Soil Ingestion Exposure Route	**780.00**		**20000.00**		**20000.00**		mg/kg
Soil Inhalation Exposure Route	**1200.00**		**1200.00**		**12000.00**		mg/kg
Soil Component of the Groundwater Ingestion Route	1.10	**2.38**	1.10	**2.38**	1.10	**2.38**	mg/kg

	Tier 1 Remediation Objective	Tier 2 Remediation Objective	Units
Soil Saturation Limit (Csat)	240	**2086**	mg/kg

	Total Organic Carbon	Units
Soil Attenuation Capacity	9467	mg/kg

= Toxilogical data is not available at this time to assess this exposure route

SUMMARY OF INPUT PARAMETERS FOR THE SSL EQUATIONS

Residential, Industrial/Commerical & Construction Worker Remedial Objectives for the Soil Ingestion and Inhalation Exposure Routes and Calculation of the Soil Saturation Limit Csat

Site Name: North Suburban Cleaners

Location:Morton Grove, Illinois

Compound : Cis-1,2-Dichloroethene

Symbol	Input Value(s) Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
1/(2b+3)	0.042	0.042	0.042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K
ATc	70	70	70	yr	Averaging Time for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
BW	70	70	70	kg	Body Weight	IAC Title 35, Part 742, Appendix C, Table B
Cw	4.00	4.00	4.00	mg/L	Target Soil Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A, Equation S18
Csat	2086	2086	2086	mg/kg	Soil Saturation Concentration	IAC Title 35, Part 742, Appendix C, Table A, Equation S29
ED	-	25	1	yr	Exposure Duration for Ingestion of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
ED	30	25	1	yr	Exposure Duration for Inhalation of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
ED	30	25	1	yr	Exposure Duration for Direct Ingestion of Groundwater	IAC Title 35, Part 742, Appendix C, Table B
EF	350	250	30	d/yr	Exposure Frequency	IAC Title 35, Part 742, Appendix C, Table B
Foc	0.0095	0.0095	0.0095	g/g	Organic Carbon Content of Soil	Field Measurement
d	8.0	8.0	8.0	m	Mixing Zone Depth	IAC Title 35, Part 742, Appendix C, Table A, Equation S25
da	10.0	10.0	10.0	m	Aquifer Thickness	Site Specific
DF	20.00	20.00	20.00	unitless	Dilution Factor	IAC Title 35, Part 742, Appendix C, Table A, Equation S22
GWobj	0.200	0.200	0.200	mg/L	Groundwater Remediation Objective	IAC Title 35, Part 742, Appendix C, Table E
IFsoil-adj	114	-	-	(mg-yr)/(kg-d)	Age Adjusted Soil Ingestion Factor for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
IRsoil	200	50	480	mg/d	Soil Ingestion Rate	IAC Title 35, Part 742, Appendix C, Table B
IRw	2.0	1.0	-	L/d	Dailty Water Ingestion Rate	IAC Title 35, Part 742, Appendix C, Table B
K	0.48000	0.48000	0.48000	m/yr	Aquifer Hydraulic Conductivity	Site Specific
H	0.167	0.167	0.167	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
i	0.2300	0.2300	0.2300	m/m	Hydraulic Gradient	Site Specific
I	0.30	0.30	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
Kd	0.34	0.34	0.34	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Koc	35.5	35.5	35.5	L/kg	Organic Carrbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Ks	5.0	5.0	5.0	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K
L	5.0	5.0	5.0	m	Source Length Parallel to Groundwater Flow	Site Specific
n	0.43	0.43	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24
Oa	0.05	0.05	0.05	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Ow	0.38	0.38	0.38	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
pb	1.5	1.5	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
ps	2.65	2.65	2.65	kg/L	Soil Particle Density	IAC Title 35, Part 742, Appendix C, Table B
S	3500	3500	3500	mg/L	Solubility in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
URF	NA	NA	NA	(ug/m3)^-1	Inhalation Unit Risk Factor	Toxicological-Specific
T	9.5E+08	7.9E+08	3.6E+06	s	Exposure Interval	IAC Title 35, Part 742, Appendix C, Table B
TR	1.00E-06	1.00E-06	1.00E-06	unitless	Target Cancer Risk	IAC Title 35, Part 742, Appendix C, Table B
VF	7.31E+04	8.31E+04	5.61E+03	m3/kg	Volatilization Factor	IAC Title 35, Part 742, Appendix C, Table A, Equation S8
VF'	-	-	5.61E+02	m3/kg	Volatilization Factor adjusted for Agitation	IAC Title 35, Part 742, Appendix C, Table A, Equation S9
SFo	5.20E-02	5.20E-02	5.20E-02	(mg/kg-d)^-1	Oral Slope Factor	Toxicological-Specific
Um	4.69	4.69	4.69	m/s	Mean Annual Windspeed	IAC Title 35, Part 742, Appendix C, Table B
Ut	11.32	11.32	11.32	m/s	Equivalent Threshold Value of Windspeed at 7m	IAC Title 35, Part 742, Appendix C, Table B
F(x)	0.194	0.194	0.194	unitless	Function dependent on Um/Ut	IAC Title 35, Part 742, Appendix C, Table B
V	0.00	0.00	0.00	unitless	Fraction of Vegatative Cover	IAC Title 35, Part 742, Appendix C, Table B or Site Specific
Q/C	6.88E+01	8.58E+01	8.58E+01	(g-m2-s)/(kg/m3)	Inverse of mean concentration at the center of a square source (for VF equations)	IAC Title 35, Part 742, Appendix C, Table B
Q/C	9.08E+01	8.58E+01	8.58E+01	(g-m2-s)/(kg/m3)	Inverse of mean concentration at the center of a square source (for PEF equations)	IAC Title 35, Part 742, Appendix C, Table B
Da	2.94E-06	2.94E-06	2.94E-06	cm2/s	Apparent Diffusivity	IAC Title 35, Part 742, Appendix C, Table A, Equation S10
Di	7.20E-02	7.20E-02	7.20E-02	cm2/s	Diffusivity in Air	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Dw	8.20E-06	8.20E-06	8.20E-06	cm2/s	Diffusivity in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific

SSL Equation S2 and S3
Compound : Cis-1,2-Dichloroethene

Equation S2 RO=(TR*ATc*365)/(SFo*10^-6*EF*IRsoil-adj)

Equation S3 RO=(TR*BW*ATc*365)/(SFo*10^-6*EF*ED*IRsoil)

	Input Value(s)					
Symbol	Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
TR	1.0E-06	1.0E-06	1.0E-06	unitless	Target Cancer Risk	IAC Title 35, Part 742, Appendix C, Table B
ATc	70	70	70	yr	Averaging Time for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
SFo	5.20E-02	5.20E-02	5.20E-02	(mg/kg-d)^-1	Oral Slope Factor	Toxicological-Specific
EF	350	250	30	d/yr	Exposure Frequency	IAC Title 35, Part 742, Appendix C, Table B
ED	-	25	1	yr	Exposure Duration for Ingestion of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
IFsoil-adj	*114*	-	-	*(mg-yr)/(kg-d)*	Age Adjusted Soil Ingestion Factor for *Carcinogens*	*IAC Title 35, Part 742, Appendix C, Table B*
IRsoil	200	50	480	mg/d	Soil Ingestion Rate	IAC Title 35, Part 742, Appendix C, Table B
BW	70	70	70	kg	Body Weight	IAC Title 35, Part 742, Appendix C, Table B

Symbol	Output Value			Units	Explanation
RO	12.3	110	2388	mg/kg	Soil Ingestion Remediation Objective

SSL Equation S6 and S7
Compound : Cis-1,2-Dichloroethene

Equation S6 RO=(TR*ATc*365)/(URF*1000*EF*ED*(1/VF))

Equation S7 RO=(TR*ATc*365)/(URF*1000*EF*ED*(1/VF'))

Symbol	Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
		Input Value(s)				
TR	1.0E-06	1.0E-06	1.0E-06	unitless	Target Cancer Risk	IAC Title 35, Part 742, Appendix C, Table B
ATc	70	70	70	yr	Averaging Time for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
URF	NA	NA	NA	(ug/m3)^-1	Inhalation Unit Risk Factor	Toxicological-Specific
EF	350	250	30	d/yr	Exposure Frequency	IAC Title 35, Part 742, Appendix C, Table B
ED	30	25	1	yr	Exposure Duration for Inhalation of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
VF	7.31E+04	8.31E+04	5.61E+03	m3/kg	Volatilization Factor	IAC Title 35, Part 742, Appendix C, Table A, Equation S8
VF'	-	-	5.61E+02	m3/kg	Volatilization Factor adjusted for Agitation	IAC Title 35, Part 742, Appendix C, Table A, Equation S9
Symbol		Output Value		Units	Explanation	
RO	#DIV/0!	#DIV/0!	#DIV/0!	mg/kg	Soil Inhalation Remediation Objective	

SSL Equation S8 and S9
Compound : Cis-1,2-Dichloroethene

Equation S8 VF=(Q/C)*((3.14*Da*T)^.5/(2*pb*Da))*10^-4

Equation S9 VF'=VF/10

Symbol	Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
		Input Value(s)				
Q/C	6.88E+01	8.58E+01	8.58E+01	(g-m2-s)/(kg/m3)	Inverse of mean concentration at the center of a square source (for VF equations)	IAC Title 35, Part 742, Appendix C, Table B
Da	2.94E-06	2.94E-06	2.94E-06	cm2/s	Apparent Diffusivity	IAC Title 35, Part 742, Appendix C, Table A, Equation S10
T	9.50E+08	7.90E+08	3.60E+06	s	Exposure Interval	IAC Title 35, Part 742, Appendix C, Table B
pb	1.5	1.5	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Symbol		Output Value		Units	Explanation	
VF	73099	83126	5612	mg^3/kg	Volatilization Factor	
VF'	-	-	561	mg^3/kg	Volatilization Factor adjusted for agitation	

SSL Equation S10
Compound : Cis-1,2-Dichloroethene

Equation S10 Da= (((Oa^3.33*Di*H')+(Ow^3.33*Dw))/n^2)+(1/((pb*Kd)+Ow+(Oa*H'))

Symbol	Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
		Input Value(s)				
Oa	0.05	0.05	0.05	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Di	0.07	0.07	0.07	cm2/s	Diffusivity in Air	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
H	0.167	0.167	0.167	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Ow	0.38	0.38	0.38	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
Dw	8.2E-06	8.2E-06	8.2E-06	cm2/s	Diffusivity in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
n	0.43	0.43	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24
pb	1.50	1.5	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Kd	0.34	0.34	0.34	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Symbol		Output Value		Units	Explanation	
Da	2.94E-06	2.94E-06	2.94E-06	cm2/s	Apparent Diffusivity	

SSL Equation S17
Compound : Cis-1,2-Dichloroethene

Equation S17 RO=Cw(Kd+((Ow+Oa*H')/pb))

Symbol	Input Value(s)	Units	Explanation	Source
Cw	4.000	mg/L	Target Soil Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A, Equation S18
pb	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Kd	0.34	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Ow	0.38	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
Oa	0.05	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
H	0.167	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific

Symbol	Output Value	Units	Explanation
RO	2.38	mg/kg	Soil Component of the Groundwater Remediation Objective

SSL Equation S18
Compound : Cis-1,2-Dichloroethene

Equation S18 Cw=DF*Gwobj

Symbol	Input Value(s)	Units	Explanation	Source
DF	20.00	unitless	Dilution Factor	IAC Title 35, Part 742, Appendix C, Table A, Equation S22
GWobj	0.200	mg/L	Groundwater Remediation Objective	IAC Title 35, Part 742, Appendix C, Table E

Symbol	Output Value	Units	Explanation
Cw	4.000	mg/L	Target Soil Leachate Concentration

SSL EQUATION S19
Compound : Cis-1,2-Dichloroethene

Equation S19 Kd=Koc*foc

Symbol	Input Value(s)	Units	Explanation	Source
Koc	36	L/kg	Organic Carrbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Foc	0.01	g/g	Organic Carbon Content of Soil	Field Measurement

Symbol	Output Value	Units	Explanation
Kd	0.34	L/kg	Soil-Water Partition Coefficient

SSL Equation S20
Compound : Cis-1,2-Dichloroethene

Equation S20 Ow=n*(I/Ks)^(1/2b+3)

Symbol	Input Value(s)	Units	Explanation	Source
n	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24 or IAC Title 35, Part 742, Appendix C, Table B
I	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
Ks	5.0	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K
1/(2b+3)	0.042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K

Symbol	Output Value	Units	Explanation
Ow	0.38	L/L	Water-Filled Soil Porosity

SSL Equation S21
Compound : Cis-1,2-Dichloroethene

Equation S21 Oa=n-Ow

Symbol	Input Value(s)	Units	Explanation	Source
n	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24 or IAC Title 35, Part 742, Appendix C, Table B
Ow	0.38	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20 or IAC Title 35, Part 742, Appendix C, Table B

Symbol	Output Value	Units	Explanation
Oa	0.05	L/L	Air-Filled Soil Porosity

SSL Equation S22
Compound : Cis-1,2-Dichloroethene

Equation S22 DF=1+((K*i*d)/(I*L))

Symbol	Input Value(s)	Units	Explanation	Source
K	0.48	m/yr	Aquifer Hydraulic Conductivity	Site Specific
i	0.23	m/m	Hydraulic Gradient	Site Specific
d	7.96	m	Mixing Zone Depth	IAC Title 35, Part 742, Appendix C, Table A, Equation S25
I	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
L	5.0	m	Source Length Parallel to Groundwater Flow	Site Specific

Symbol	Output Value	Units	Explanation
DF	20.00	unitless	Dilution Factor

SSL Equation S24
Compound : Cis-1,2-Dichloroethene

Equation S24 n=1-pb/ps

Symbol	Input Value(s)	Units	Explanation	Source
pb	1.50	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
ps	2.65	kg/L	Soil Particle Density	IAC Title 35, Part 742, Appendix C, Table B

Symbol	Output Value	Units	Explanation
n	0.43	L/L	Total Soil Porosity

SSL Equation S25
Compound : Cis-1,2-Dichloroethene

Equation S25 d=(0.0112*L^2)^0.5+da(1-e^((-L*I)/(K*I*da)))

Symbol	Input Value(s)	Units	Explanation	Source
da	10.0	m	Aquifer Thickness	Site Specific
L	5.0	m	Source Length Parallel to Groundwater Flow	Site Specific
I	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
K	0.48	m/yr	Aquifer Hydraulic Conductivity	Site Specific
i	0.23	m/m	Hydraulic Gradient	Site Specific

Symbol	Output Value	Units	Explanation
d	7.96	m	Mixing Zone Depth

SSL Equation S29
Equation for the Derivation of the Soil Saturation Limit C_{sat}
Compound : Cis-1,2-Dichloroethene

Equation S29 C_{sat}=(S/pb)*((Kd*pb)+Ow+(H*Oa))

Symbol	Input Value(s)	Units	Explanation	Source
S	3500	mg/L	Solubility in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
pb	1.5	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Kd	0.34	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Ow	0.38	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20 or IAC Title 35, Part 742, Appendix C, Table B
H	0.167	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Oa	0.048	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21 or IAC Title 35, Part 742, Appendix C, Table B

Symbol	Output Value	Units	Explanation
C_{sat}	2086	mg/kg	Soil Saturation Limit

TIER 2 REMEDIAL OBJECTIVES

Residential, Industrial/Commerical & Construction Worker Remedial Objectives for the Soil Ingestion and Inhalation Exposure Routes and Calculation of the Soil Saturation Limit Csat

Site Name: North Suburban Cleaners

Location: Morton Grove, Illinois

Compound: Vinyl Chloride

TACO Remediation Objectives Summary Table

Compound: Vinyl Chloride

	Residential		Industrial/Commercial		Construction Worker		
	Tier 1 Remediation Objective	Tier 2 Remedation Objective	Tier 1 Remediation Objective	Tier 2 Remedation Objective	Tier 1 Remediation Objective	Tier 2 Remedation Objective	Units
Soil Ingestion Exposure Route	0.30	**8.89**	3.00	**79.49**	65.00	**1725.02**	mg/kg
Soil Inhalation Exposure Route	0.03	**11.4292**	0.06	**21.8355**	0.08	**30.7086**	mg/kg
Soil Component of the Groundwater Ingestion Route	0.0700	**0.0933**	0.0700	**0.0933**	0.0700	**0.0933**	mg/kg

	Tier 1 Remediation Objective	Tier 2 Remediation Objective	Units
Soil Saturation Limit (Csat)	1200	**1286**	mg/kg

	Organic Carbon	Units
Soil Attenuation Capacity	9467	mg/kg

SUMMARY OF INPUT PARAMETERS FOR THE SSL EQUATIONS

Residential, Industrial/Commerical & Construction Worker Remedial Objectives for the Soil Ingestion and Inhalation

Exposure Routes and Calculation of the Soil Saturation Limit Csat

Site Name: North Suburban Cleaners

Location: Morton Grove, Illinois

Compound : Vinyl Chloride

Symbol	Input Value(s) Residential	Industrial/Commercial	Construction Worker	Units	Explanation	Source
1/(2b+3)	0.042	0.042	0.042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K
ATc	70.00	70.00	70.00	yr	Averaging Time for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
BW	70.00	70.00	70.00	kg	Body Weight	IAC Title 35, Part 742, Appendix C, Table B
Cw	0.20	0.20	0.20	mg/L	*Target Soil Leachate Concentration*	IAC Title 35, Part 742, Appendix C, Table A, Equation S18
Csat	1286.90	1286.90	1286.90	mg/kg	Soil Saturation Concentration	IAC Title 35, Part 742, Appendix C, Table A, Equation S29
ED	-	25.00	1.00	yr	Exposure Duration for Ingestion of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
ED	30.00	25.00	1.00	yr	Exposure Duration for Inhalation of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
ED	30.00	25.00	1.00	yr	Exposure Duration for Direct Ingestion of Groundwater	IAC Title 35, Part 742, Appendix C, Table B
EF	350.00	250.00	30.00	d/yr	Exposure Frequency	IAC Title 35, Part 742, Appendix C, Table B
Foc	0.0095	0.0095	0.0095	g/g	Organic Carbon Content of Soil	Field Measurement
d	7.9592	7.9592	7.9592	m	*Mixing Zone Depth*	IAC Title 35, Part 742, Appendix C, Table A, Equation S25
da	10.0000	10.0000	10.0000	m	Aquifer Thickness	Site Specific
DF	20.0000	20.0000	20.0000	unitless	Dilution Factor	Default Value
GWobj	0.0100	0.0100	0.0100	mg/L	Groundwater Remediation Objective	IAC Title 35, Part 742, Appendix C, Table E
IFsoil-adj	114.0000	114.0000	114.0000	(mg-yr)/(kg-d)	Age Adjusted Soil Ingestion Factor for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
IRsoil	200.0000	50.0000	480.0000	mg/d	Soil Ingestion Rate	IAC Title 35, Part 742, Appendix C, Table B
IRw	2.0000	1.0000	-	L/d	Daily Water Ingestion Rate	IAC Title 35, Part 742, Appendix C, Table B
K	0.48000	0.48000	0.48000	m/yr	*Aquifer Hydraulic Conductivity*	*Site Specific*
H	1.110	1.110	1.110	unitless	Henry's Law Constant	*IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific*
i	0.230	0.230	0.230	m/m	Hydraulic Gradient	Site Specific
I	0.30	0.30	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
Kd	0.18	0.18	0.18	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Koc	18.60	18.60	18.60	L/kg	Organic Carbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Ks	5.00	5.00	5.00	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K
L	5.00	5.00	5.00	m	Source Length Parallel to Groundwater Flow	*Site Specific*
n	0.43	0.43	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24
Oa	0.05	0.05	0.05	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Ow	0.38	0.38	0.38	L/L	*Water-Filled Soil Prosity*	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
pb	1.50	1.50	1.50	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
ps	2.65	2.65	2.65	kg/L	Soil Particle Density	IAC Title 35, Part 742, Appendix C, Table B
S	2760.00	2760.00	2760.00	mg/L	Solubility in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
URF	4.40E-06	4.40E-06	4.40E-06	(ug/m3)^-1	Inhalation Unit Risk Factor	Toxicological-Specific
T	950000000.00	790000000.00	3600000.00	s	Exposure Interval	IAC Title 35, Part 742, Appendix C, Table B
TR	1.00E-06	1.00E-06	1.00E-06	unitless	Target Cancer Risk	IAC Title 35, Part 742, Appendix C, Table B
VF	2.07E+04	2.35E+04	1.59E+03	m3/kg	Volatilization Factor	IAC Title 35, Part 742, Appendix C, Table A, Equation S8
VF'	-	-	1.59E+02	m3/kg	*Volatilization Factor adjusted for Agitation*	IAC Title 35, Part 742, Appendix C, Table A, Equation S9
SFo	7.20E-02	7.20E-02	7.20E-02	(mg/kg-d)^-1	Oral Slope Factor	Toxicological-Specific
Um	4.69	4.69	4.69	m/s	Mean Annual Windspeed	IAC Title 35, Part 742, Appendix C, Table B
Ut	11.32	11.32	11.32	m/s	Equivalent Threshold Value of Windspeed at 7m	IAC Title 35, Part 742, Appendix C, Table B
F(x)	0.194	0.194	0.194	unitless	Function dependent on Um/Ut	IAC Title 35, Part 742, Appendix C, Table B
V	0.00	0.00	0.00	unitless	*Fraction of Vegatative Cover*	IAC Title 35, Part 742, Appendix C, Table B or Site Specific
Q/C	6.88E+01	8.58E+01	8.58E+01	(g-m2-s)/(kg/m3)	Inverse of mean concentration at the center of a square source (for VF equations)	IAC Title 35, Part 742, Appendix C, Table B
Q/C	9.08E+01	8.58E+01	8.58E+01	(g-m2-s)/(kg/m3)	Inverse of mean concentration at the center of a square source (for PEF equations)	IAC Title 35, Part 742, Appendix C, Table B
Da	3.67E-05	3.67E-05	3.67E-05	cm2/s	Apparent Diffusivity	IAC Title 35, Part 742, Appendix C, Table A, Equation S10
Di	1.06E-01	1.06E-01	1.06E-01	cm2/s	Diffusivity in Air	*IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific*
Dw	1.23E-06	1.23E-06	1.23E-06	cm2/s	Diffusivity in Water	*IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific*

SSL Equation S2 and S3
Compound :Vinyl Chloride

Equation S2 RO=(TR*ATc*365)/(SFo*10^-6*EF*IRsoil-adj)

Equation S3 RO=(TR*BW*ATc*365)/(SFo*10^-6*EF*ED*IRsoil)

Symbol	Input Value(s)			Units	Explanation	Source
	Residential	Industrial/Commercial	Construction Worker			
TR	1.00E-06	1.00E-06	1.00E-06	unitless	Target Cancer Risk	IAC Title 35, Part 742, Appendix C, Table B
ATc	70.00	70.00	70.00	yr	Averaging Time for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
SFo	7.20E-02	7.20E-02	7.20E-02	(mg/kg-d)^-1	Oral Slope Factor	Toxicological-Specific
EF	350.00	250.00	30.00	d/yr	Exposure Frequency	IAC Title 35, Part 742, Appendix C, Table B
ED	-	25.00	1.00	yr	Exposure Duration for Ingestion of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
IFsoil-adj	114	114	114	(mg-yr)/(kg-d)	Age Adjusted Soil Ingestion Factor for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
IRsoil	200	50	480	mg/d	Soil Ingestion Rate	IAC Title 35, Part 742, Appendix C, Table B
BW	70.00	70.00	70.00	kg	Body Weight	IAC Title 35, Part 742, Appendix C, Table B

Symbol	Output Value			Units	Explanation
RO	8.8938	79.4889	1725.0193	mg/L	Soil Ingestion Remediation Objective

SSL Equation S6 and S7
Compound :Vinyl Chloride

Equation S6 RO=(TR*ATc*365)/(URF*1000*EF*ED*(1/VF))

Equation S7 RO=(TR*ATc*365)/(URF*1000*EF*ED*(1/VF'))

Symbol	Input Value(s)			Units	Explanation	Source
	Residential	Industrial/Commercial	Construction Worker			
TR	1.00E-06	1.00E-06	1.00E-06	unitless	Target Cancer Risk	IAC Title 35, Part 742, Appendix C, Table B
ATc	70.00	70.00	70.00	yr	Averaging Time for Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
URF	4.40E-06	4.40E-06	4.40E-06	(ug/m3)^-1	Inhalatio Unit Risk Factor	Toxicological-Specific
EF	350.00	250.00	30.00	d/yr	Exposure Frequency	IAC Title 35, Part 742, Appendix C, Table B
ED	30.00	25.00	1.00	yr	Exposure Duration for Inhalation of Carcinogens	IAC Title 35, Part 742, Appendix C, Table B
VF	2.07E+04	2.35E+04	1.59E+03	m3/kg	Volatilization Factor	IAC Title 35, Part 742, Appendix C, Table A, Equation S8
VF'	-	-	1.59E+02	m3/kg	Volatilization Factor adjusted for Agitation	IAC Title 35, Part 742, Appendix C, Table A, Equation S9
Symbol	Output Value			Units	Explanation	
RO	11.42920588	21.83551426	30.70859113	mg/kg	Soil Inhalation Remediation Objective	

SSL Equation S8 and S9
Compound :Vinyl Chloride

Equation S8 VF=(Q/C)*((3.14*Da*T)^.5/(2*pb*Da))*10^-4

Equation S9 VF'=VF/10

Symbol	Input Value(s)			Units	Explanation	Source
	Residential	Industrial/Commercial	Construction Worker			
Q/C	6.88E+01	8.58E+01	8.58E+01	(g-m2-s)/(kg/m3)	Inverse of mean concentration at the center of a square source (for VF equations)	IAC Title 35, Part 742, Appendix C, Table B
Da	3.67E-05	3.67E-05	3.67E-05	cm2/s	Apparent Diffusivity	IAC Title 35, Part 742, Appendix C, Table A, Equation S10
T	9.50E+08	7.90E+08	3.60E+06	s	Exposure Interval	IAC Title 35, Part 742, Appendix C, Table B
pb	1.50	1.50	1.50	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Symbol	Output Value			Units	Explanation	
VF	20666.50926	23502.02122	1586.510383	mg/L	Volatilization Factor	
VF'	-	-	158.651	mg/L	Volatilization Factor adjusted for agitation	

SSL Equation S10
Compound :Vinyl Chloride

Equation S10 Da= (((Oa^3.33*Di*H')+(Ow^3.33*Dw))/n^2)+(1/((pb*Kd)+Ow+(Oa*H'))

Symbol	Input Value(s)			Units	Explanation	Source
	Residential	Industrial/Commercial	Construction Worker			
Oa	4.79E-02	4.79E-02	4.79E-02	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Di	0.11	0.11	0.11	cm2/s	Diffusivity in Air	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
H	1.11	1.11	1.11	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Ow	0.38	0.38	0.38	L/L	Water-Filled Soil Prosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
Dw	1.23E-06	1.23E-06	1.23E-06	cm2/s	Diffusivity in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
n	0.43	0.43	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24
pb	1.50	1.50	1.50	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Kd	1.76E-01	1.76E-01	1.76E-01	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Symbol	Output Value			Units	Explanation	
Da	3.67434E-05	3.67434E-05	3.67434E-05	cm2/s	Apparent Diffusivity	

SSL Equation S17
Compound :Vinyl Chloride

Equation S17 RO=Cw(Kd+((Ow+Oa*H')/pb))

Symbol	Input Value(s)	Units	Explanation	Source
Cw	0.200	mg/L	Target Soil Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A, Equation S18
pb	1.500	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Kd	0.176	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Ow	0.382	L/L	Water-Filled Soil Prosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
Oa	0.048	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
H	1.110	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific

Symbol	Output Value	Units	Explanation
RO	0.093	mg/kg	Soil Component of the Groundwater Remediation Objective

SSL Equation S18
Compound :Vinyl Chloride

Equation S18 Cw=DF*Gwobj

Symbol	Input Value(s)	Units	Explanation	Source
DF	20.000	unitless	Dilution Factor	Default Value
GWobj	0.010	mg/L	Groundwater Remediation Objective	IAC Title 35, Part 742, Appendix C, Table E

Symbol	Output Value	Units	Explanation
Cw	0.200	mg/L	Target Soil Leachate Concentration

SSL EQUATION S19
Compound :Vinyl Chloride

Equation S19 Kd=Koc*foc

Symbol	Input Value(s)	Units	Explanation	Source
Koc	18.600	L/kg	Organic Carrbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Foc	0.009	g/g	Organic Carbon Content of Soil	Field Measurement

Symbol	Output Value	Units	Explanation
Kd	0.176	L/kg	Soil-Water Partition Coefficient

SSL Equation S20
Compound :Vinyl Chloride

Equation S20 Ow=n*(I/Ks)^(1/2b+3)

Symbol	Input Value(s)	Units	Explanation	Source
n	0.430	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24 or IAC Title 35, Part 742, Appendix C, Table B
I	0.300	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
Ks	5.000	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K
1/(2b+3)	0.042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K

Symbol	Output Value	Units	Explanation	
Ow	0.382	L/L	Water-Filled Soil Prosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20

SSL Equation S21
Compound :Vinyl Chloride

Equation S21 Oa=n-Ow

Symbol	Input Value(s)	Units	Explanation	Source
n	0.430	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24 or IAC Title 35, Part 742, Appendix C, Table B
Ow	0.382	L/L	Water-Filled Soil Prosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20 or IAC Title 35, Part 742, Appendix C, Table B

Symbol	Output Value	Units	Explanation
Oa	0.048	cm	

SSL Equation S22
Compound :Vinyl Chloride

Equation S22 DF=1+((K*i*d)/(I*L))

Symbol	Input Value(s)	Units	Explanation	Source
K	0.480	m/yr	Aquifer Hydraulic Conductivity	Site Specific
i	0.230	m/m	Hydraulic Gradient	Site Specific
d	7.959	m	Mixing Zone Depth	IAC Title 35, Part 742, Appendix C, Table A, Equation S25
I	0.300	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
L	5.000	m	Source Length Parallel to Groundwater Flow	Site Specific

Symbol	Output Value	Units	Explanation	
DF	20.000	unitless	Dilution Factor	Default Value

SSL Equation S24
Compound :Vinyl Chloride

Equation S24 n=1-pb/ps

Symbol	Input Value(s)	Units	Explanation	Source
pb	1.500	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
ps	2.650	kg/L	Soil Particle Density	IAC Title 35, Part 742, Appendix C, Table B

Symbol	Output Value	Units	Explanation	
n	0.434	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S24 or IAC Title 35, Part 742, Appendix C, Table B

SSL Equation S25
Compound :Vinyl Chloride

Equation S25 d=(0.0112*L^2)^0.5+da(1-e^((-L*I)/(K*I*da)))

Symbol	Input Value(s)	Units	Explanation	Source
da	10.000	m	Aquifer Thickness	Site Specific
L	5.000	m	Source Length Parallel to Groundwater Flow	Site Specific
I	0.300	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
K	0.480	m/yr	Aquifer Hydraulic Conductivity	Site Specific
i	0.230	m/m	Hydraulic Gradient	Site Specific

Symbol	Output Value	Units	Explanation
d	7.959	m	Mixing Zone Depth

SSL Equation S29

Equation for the Derivation of the Soil Saturation Limit C_{sat}

Compound :Vinyl Chloride

Equation S29 C_{sat}=(S/pb)*((Kd*pb)+Ow+(H*Oa))

Symbol	Input Value(s)	Units	Explanation	Source
S	2760.000	mg/L	Solubility in Water	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
pb	1.500	kg/L	Dry Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B
Kd	0.1761	L/kg	Soil Water Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table A, Equation S19
Ow	0.382	L/L	Water-Filled Soil Prosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20 or IAC Title 35, Part 742, Appendix C, Table B
H	1.110	unitless	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Oa	0.048	L/L	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21 or IAC Title 35, Part 742, Appendix C, Table B

Symbol	Output Value	Units	Explanation	
C_{sat}	1287	mg/l	Soil Saturation Limit	

Groundwater Modeling Equations
Tetrachloroethylene (PCE)
Contaminant Migration to Class I Groundwater Compliance
Site Name North Suburban Cleaners
Location: Morton Grove, Illinois

INPUT PARAMETERS FOR RBCA GROUNDWATER EQUATIONS
SOIL COMPONENT OF GROUNDWATER INGESTION AND GROUNDWATER INGESTION EXPOSURE ROUTES
Dissolved Solvent Concentration Along the Centerline of the Plume to the Nearest Property Boundary
Compound: Tetrachloroethylene

Symbol	Input Value(s)	Units	Explanation	Source
Gwobj	286.34	mg/L	Theoretical groundwater concentration at the source area	IAC Title 35, Part 742, Appendix C, Table A (See Equation S18)
Cw	5726.75	mg/L	Target Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A (See Equation S17)
1/(2b+3)	0.042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K
erf1	0.9993	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G (See Equation R26)
erf2	1.0000	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G (See Equation R26)
H'	0.754	cm^3water/cm^3air	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
I	0.3	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table D
i	0.23	unitless	Hydraulic Gradient	Field Measurement
Foc	0.009467	g/g	Organic Carbon Content of Soil	Field Measurement
kd	1.467385	cm3/g	Soil Water Sorption Coefficient	IAC Title 35, Part 742, Appendix C, Table A (See Equation S19)
Koc	155	cm3/g	Organic Carbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
K	1.30E-01	cm/d	Aquifer Hydraulic Conductivity	Field Measurement
λ	0.00096	d^-1	First Order Degradation Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Oa	0.05	cm3/cm3	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Ow	0.38	cm3/cm3	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
n	0.43	cm^3/cm^3soil	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific
Pb	1.50	g/cm^3	Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B- Soil Specific
Sd	915	cm	Source Width Perpendicular to Ground Water Flow Direction in a Vertical Plane	Field Measurement
Sw	1920	cm	Source Width Perpendicular to Ground Water Flow Direction in a Horizontal Plane	Field Measurement
w	0.15	g/g	Average Soil Moisture Content	IAC Title 35, Part 742, Appendix C, Table D
X	1174	cm	Distance along the centerline of the ground water plume emanating from the source (i.e.., UST bed) to the point of compliance. The X direction is the groundwater flow direction.	Field Measurement
Ro	10000	mg/kg	Maximum Concentration in Soil or Remediation Objective	Field Measurement or Remedial Objective
DF	20.0	unitless	Dilution Factor (Default Value)	IAC Title 35, Part 742, Appendix C, Table B
Ks	5	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K

Theoretical Groundwater Concentration at the Source

Equation S18 GWobj=Cw/DF

Symbol	Input Value(s)	Units	Explanation	Source
DF	20.0	unitless	Dilution Factor (Default Value)	IAC Title 35, Part 742, Appendix C, Table B
Cw	5726.7	mg/L	Target Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A (See Equation S17)

Symbol	Output Value	Units	Explanation
GWobj	286.34	mg/L	Theoretical Groundwater Concentration at the Source

Target Leachate Concentration Equation

Equation S17 Cw=Ro/(Kd+((Ow+Oa*H')/pb))

Symbol	Input Value(s)	Units	Explanation	Source
Ro	10000.0	mg/kg	Maximum Concentration in Soil or Remediation Objective	Field Measurement or Remedial Objective
Pb	1.5	g/cm^3	Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B- Soil specific
kd	1.47	cm3/g	Soil Water Sorption Coefficient	IAC Title 35, Part 742, Appendix C, Table A (See Equation S19)
Ow	0.38	cm3/cm3	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Oa	0.05	cm3/cm3	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
H	0.754	cm^3water/cm^3air	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific

Symbol	Output Value	Units	Explanation
Cw	5726.75	mg/L	Target Leachate Concentration

Longitudinal Dispersivity Equation

*Equation R16 ox=0.1*X*

Symbol	Input Value(s)	Units	Explanation	Source
X	1174	cm	Distance along the centerline of the ground water plume emanating from the source (i.e.., UST bed) to the point of compliance. The X direction is the groundwater flow direction	Field Measurement

Symbol	Output Value	Units	Explanation
ox	117.40	cm	Longitudinal Dispersivity

Transverse Dispersivity Equation

Equation R17 oy=ox/3

Symbol	Input Value(s)	Units	Explanation	Source
ox	117.40	cm	Longitudinal Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R16

Symbol	Output Value	Units	Explanation
oy	39.13	cm	Transvers Dispersivity

Vertical Dispersivity Equation

Equation R18 oz=ox/20

Symbol	Input Value(s)	Units	Explanation	Source
ox	117.40	cm	Longitudinal Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R16

Symbol	Output Value	Units	Explanation
oz	5.87	cm	Vertical Dispersivity

Specific Discharge Equation

Equation R19 U=(K*i)/n

Symbol	Input Value(s)	Units	Explanation	Source
K	0.1305	cm/d	Aquifer Hydrualic Conductivity	Field Measurement
i	0.2300	unitless	Hydraulic Gradient	Field Measurement
n	0.43	cm^3/cm^3soil	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific

Symbol	Output Value	Units	Explanation
U	0.07	cm/d	Specific Discharge

Soil-Water Partition Coefficent Equation

Equation S19 Kd=Koc*Foc

Symbol	Input Value(s)	Units	Explanation	Source
Koc	155.00	cm3/g	Organic Carbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Foc	0.0095	g/g	Organic Carbon Content of Soil	Field Measurement

Symbol	Output Value	Units	Explanation
kd	1.47	cm3/g	Soil Water Sorption Coefficient

Water Filled Porosity Equation

Equation S20 Ow=n*(I/Ks)^(1/2b+3)

Symbol	Input Value(s)	Units	Explanation	Source
n	0.43	cm^3/cm^3soil	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific
I	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
Ks	5.00	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K
1/(2b+3)	0.042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K

Symbol	Output Value	Units	Explanation
Ow	0.38	L/L	Water-Filled Soil Porosity

Air Filled Porosity Equation

Equation S21 Oa=n-Ow

Symbol	Input Value(s)	Units	Explanation	Source
n	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific
Ow	0.38	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20

Symbol	Output Value	Units	Explanation
Oa	0.05	L/L	Air-Filled Soil Porosity

RBCA GROUNDWATER EQUATION R26

EQUATION FOR THE GROUNDWATER INGESTION EXPOSURE ROUTE

Dissolved Solvent Concentration Along the Centerline of the Plume to the Nearest Property Boundary

Compound: Tetrachloroethylene

Equation R26 C(x)=Csource*(exp((x/2ox)*(1-(1+(4L*ox/U))^0.5)*erf1((Sw/(4*(oy*x)^0.5))*erf2(Sd/(2*oz*x)))

Symbol	Input Value(s)	Units	Explanation	Source
x	1174	cm	Distance along the centerline of the ground water plume emanating from the source (ie., UST bed) to the point of compliance. The x direction is the groundwater flow direction.	Field Measurement
ox	117.40	cm	Longitudinal Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R16
λ	0.00096	d^-1	First Order Degradation Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
U	0.07	cm/d	Specific Discharge	IAC Title 35, Part 742, Appendix C, Table C, Equation R19
erf1	0.999299	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
erf2	0.999999	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
Sw	1920.00	cm	Source Width Perpendicular to Ground Water Flow Direction in a Horizontal Plane	Field Measurement
oy	39.13	cm	Transverse Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R17
Sd	915.00	cm	Source Width Perpendicular to Ground Water Flow Direction in a Vetrical Plane	Field Measurement
oz	5.87	cm	Vertical Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R18
Error Term 1	2.2394	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
Error Term 2	5.5111	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
Csource	286.34	mg/L	Greatest Potential concentration at source	IAC Title 35, Part 742, Appendix B, Table E

Symbol	Output Value	Units	Explanation
C(x)=	0.04977	mg/l	Steady State Attenuation Along the Center line of a Dissolved Plume

Groundwater Modeling Equations
Trichloroethylene (TCE)
Contaminant Migration to Class I Groundwater Compliance
Site Name North Suburban Cleaners
Location: Morton Grove, Illinois

INPUT PARAMETERS FOR RBCA GROUNDWATER EQUATIONS
SOIL COMPONENT OF GROUNDWATER INGESTION AND GROUNDWATER INGESTION EXPOSURE ROUTES
Dissolved Solvent Concentration Along the Centerline of the Plume to the Nearest Property Boundary
Compound: Trichloroethylene (Forward)

Symbol	Input Value(s)	Units	Explanation	Source
Gwobj	0.65	mg/L	Theoretical groundwater concentration at the source area	IAC Title 35, Part 742, Appendix C, Table A (See Equation S18)
Cw	13.05	mg/L	Target Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A (See Equation S17)
1/(2b+3)	0.042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K
erf1	0.9978	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G (See Equation R26)
erf2	1.0000	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G (See Equation R26)
H'	0.422	cm^3water/cm^3air	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
I	0.3	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table D
i	0.23	unitless	Hydraulic Gradient	Field Measurement
Foc	0.009467	g/g	Organic Carbon Content of Soil	Field Measurement
kd	1.571522	cm3/g	Soil Water Sorption Coefficient	IAC Title 35, Part 742, Appendix C, Table A (See Equation S19)
Koc	166	cm3/g	Organic Carbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
K	1.30E-01	cm/d	Aquifer Hydraulic Conductivity	Field Measurement
λ	0.00042	d^-1	First Order Degradation Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Oa	0.05	cm3/cm3	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Ow	0.38	cm3/cm3	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
n	0.43	cm^3/cm^3soil	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific
Pb	1.50	g/cm^3	Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B- Soil Specific
Sd	915	cm	Source Width Perpendicular to Ground Water Flow Direction in a Vertical Plane	Field Measurement
Sw	1920	cm	Source Width Perpendicular to Ground Water Flow Direction in a Horizontal Plane	Field Measurement
w	0.15	g/g	Average Soil Moisture Content	IAC Title 35, Part 742, Appendix C, Table D
X	1203	cm	Distance along the centerline of the ground water plume emanating from the source (i.e.., UST bed) to the point of compliance. The X direction is the groundwater flow direction.	Field Measurement
Ro	24	mg/kg	Maximum Concentration in Soil or Remediation Objective	Field Measurement or Remedial Objective
DF	20.0	unitless	Dilution Factor (Default Value)	IAC Title 35, Part 742, Appendix C, Table B
Ks	5	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K

Theoretical Groundwater Concentration at the Source

Equation S18 GWobj=Cw/DF

Symbol	Input Value(s)	Units	Explanation	Source
DF	20.0	unitless	Dilution Factor (Default Value)	IAC Title 35, Part 742, Appendix C, Table B
Cw	13.0	mg/L	Target Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A (See Equation S17)
Symbol	**Output Value**	**Units**	**Explanation**	
GWobj	0.65	mg/L	Theoretical Groundwater Concentration at the Source	

Target Leachate Concentration Equation

*Equation S17 Cw=Ro/(Kd+((Ow+Oa*H')/pb))*

Symbol	Input Value(s)	Units	Explanation	Source
Ro	*24.0*	*mg/kg*	*Maximum Concentration in Soil or Remediation Objective*	*Field Measurement or Remedial Objective*
Pb	1.5	g/cm^3	Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B- Soil specific
kd	1.57	cm3/g	Soil Water Sorption Coefficient	IAC Title 35, Part 742, Appendix C, Table A (See Equation S19)
Ow	0.38	cm3/cm3	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Oa	*0.05*	*cm3/cm3*	*Water-Filled Soil Porosity*	*IAC Title 35, Part 742, Appendix C, Table A, Equation S20*
H	0.422	cm^3water/cm^3air	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Symbol	**Output Value**	**Units**	**Explanation**	
Cw	*13.05*	*mg/L*	*Target Leachate Concentration*	

Longitudinal Dispersivity Equation

Equation R16 ox=0.1*X

Symbol	Input Value(s)	Units	Explanation	Source
X	1203	cm	Distance along the centerline of the ground water plume emanating from the source (i.e.., UST bed) to the point of compliance. The X direction in the groundwater flow direction	Field Measurement
Symbol	*Output Value*	*Units*	*Explanation*	
ox	120.30	cm	Longitudinal Dispersivity	

Transverse Dispersivity Equation

Equation R17 oy=ox/3

Symbol	Input Value(s)	Units	Explanation	Source
ox	120.30	cm	Longitudinal Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R16
Symbol	**Output Value**	**Units**	**Explanation**	
oy	40.10	cm	Transvers Dispersivity	

Vertical Dispersivity Equation

Equation R18 oz=ox/20

Symbol	Input Value(s)	Units	Explanation	Source
ox	120.30	cm	Longitudinal Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R16
Symbol	**Output Value**	**Units**	**Explanation**	
oz	6.02	cm	Vertical Dispersivity	

Specific Discharge Equation

Equation R19 U=(K*i)/n

Symbol	Input Value(s)	Units	Explanation	Source
K	0.1305	cm/d	Aquifer Hydrualic Conductivity	Field Measurement
i	0.2300	unitless	Hydraulic Gradient	Field Measurement
n	0.43	cm^3/cm^3soil	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific

Symbol	Output Value	Units	Explanation
U	0.07	cm/d	Specific Discharge

Soil-Water Partition Coefficent Equation

Equation S19 Kd=Koc*Foc

Symbol	Input Value(s)	Units	Explanation	Source
Koc	166.00	cm3/g	Organic Carbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Foc	0.0095	g/g	Organic Carbon Content of Soil	Field Measurement

Symbol	Output Value	Units	Explanation
kd	1.57	cm3/g	Soil Water Sorption Coefficient

Water Filled Porosity Equation

Equation S20 Ow=n*(I/Ks)^(1/2b+3)

Symbol	Input Value(s)	Units	Explanation	Source
n	0.43	cm^3/cm^3soil	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific
I	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
Ks	5.00	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K
1/(2b+3)	0.042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K

Symbol	Output Value	Units	Explanation
Ow	0.38	L/L	Water-Filled Soil Porosity

Air Filled Porosity Equation

Equation S21 Oa=n-Ow

Symbol	Input Value(s)	Units	Explanation	Source
n	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific
Ow	0.38	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20

Symbol	Output Value	Units	Explanation
Oa	0.05	L/L	Air-Filled Soil Porosity

RBCA GROUNDWATER EQUATION R26

EQUATION FOR THE GROUNDWATER INGESTION EXPOSURE ROUTE

Dissolved Solvent Concentration Along the Centerline of the Plume to the Nearest Property Boundary

Compound: Trichloroethylene (Forward)

Equation R26 C(x)=Csource*(exp((x/2ox)*(1-(1+(4L*ox/U))^0.5)*erf1((Sw/(4*(oy*x)^0.5))*erf2(Sd/(2*oz*x)))

Symbol	Input Value(s)	Units	Explanation	Source
x	1203	cm	Distance along the centerline of the ground water plume emanating from the source (ie., UST bed) to the point of compliance. The x direction is the groundwater flow direction.	Field Measurement
αx	120.30	cm	Longitudinal Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R16
λ	0.00042	d^-1	First Order Degradation Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
U	0.07	cm/d	Specific Discharge	IAC Title 35, Part 742, Appendix C, Table C, Equation R19
erf1	0.997800	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
erf2	0.999999	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
Sw	1920.00	cm	Source Width Perpendicular to Ground Water Flow Direction in a Horizontal Plane	Field Measurement
αy	40.10	cm	Transverse Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R17
Sd	915.00	cm	Source Width Perpendicular to Ground Water Flow Direction in a Vetrical Plane	Field Measurement
αz	6.02	cm	Vertical Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R18
Error Term 1	2.1854	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
Error Term 2	5.3782	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
Csource	0.65	mg/L	Greatest Potential concentration at source	IAC Title 35, Part 742, Appendix B, Table E

Symbol	Output Value	Units	Explanation
C(x)=	0.00500	mg/l	Steady State Attenuation Along the Center line of a Dissolved Plume

Groundwater Modeling Equations
Cis-1,2 Dichloroethylene (DCE)
Contaminant Migration to Class I Groundwater Compliance
Site Name North Suburban Cleaners
Location: Morton Grove, Illinois

INPUT PARAMETERS FOR RBCA GROUNDWATER EQUATIONS
SOIL COMPONENT OF GROUNDWATER INGESTION AND GROUNDWATER INGESTION EXPOSURE ROUTES
Dissolved Solvent Concentration Along the Centerline of the Plume to the Nearest Property Boundary
Compound: Cis-1,2-dichloroethene (Forward)

Symbol	Input Value(s)	Units	Explanation	Source
Gwobj	4.42	mg/L	Theoretical groundwater concentration at the source area	IAC Title 35, Part 742, Appendix C, Table A (See Equation S18)
Cw	88.32	mg/L	Target Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A (See Equation S17)
1/(2b+3)	0..042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K
erf1	0.9690	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G (See Equation R26)
erf2	1.0000	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G (See Equation R26)
H'	0.167	cm^3water/cm^3air	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
I	0.3	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table D
i	0.23	unitless	Hydraulic Gradient	Field Measurement
Foc	0.009467	g/g	Organic Carbon Content of Soil	Field Measurement
kd	0.3360785	cm3/g	Soil Water Sorption Coefficient	IAC Title 35, Part 742, Appendix C, Table A (See Equation S19)
Koc	35.5	cm3/g	Organic Carbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
K	1.30E-01	cm/d	Aquifer Hydraulic Conductivity	Field Measurement
λ	0.00024	d^-1	First Order Degradation Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Oa	0.00	cm3/cm3	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Ow	0.43	cm3/cm3	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
n	0.43	cm^3/cm^3soil	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific
Pb	1.50	g/cm^3	Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B- Soil Specific
Sd	915	cm	Source Width Perpendicular to Ground Water Flow Direction in a Vertical Plane	Field Measurement
Sw	1920	cm	Source Width Perpendicular to Ground Water Flow Direction in a Horizontal Plane	Field Measurement
w	0.15	g/g	Average Soil Moisture Content	IAC Title 35, Part 742, Appendix C, Table D
X	1690	cm	Distance along the centerline of the ground water plume emanating from the source (i.e.., UST bed) to the point of compliance. The X direction is the groundwater flow direction.	Field Measurement
Ro	55	mg/kg	Maximum Concentration in Soil or Remediation Objective	Field Measurement or Remedial Objective
DF	20.0	unitless	Dilution Factor (Default Value)	IAC Title 35, Part 742, Appendix C, Table B
Ks	5	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K

Theoretical Groundwater Concentration at the Source

Equation S18 GWobj=Cw/DF

Symbol	Input Value(s)	Units	Explanation	Source
DF	20.0	unitless	Dilution Factor (Default Value)	IAC Title 35, Part 742, Appendix C, Table B
Cw	88.3	mg/L	Target Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A (See Equation S17)

Symbol	Output Value	Units	Explanation
GWobj	4.42	mg/L	Theoretical Groundwater Concentration at the Source

Target Leachate Concentration Equation

Equation S17 Cw=Ro/(Kd+((Ow+Oa*H')/pb))

Symbol	Input Value(s)	Units	Explanation	Source
Ro	55.0	mg/kg	Maximum Concentration in Soil or Remediation Objective	Field Measurement or Remedial Objective
Pb	1.5	g/cm^3	Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B- Soil specific
kd	0.34	cm3/g	Soil Water Sorption Coefficient	IAC Title 35, Part 742, Appendix C, Table A (See Equation S19)
Ow	0.43	cm3/cm3	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Oa	0.00	cm3/cm3	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
H	0.167	cm^3water/cm^3air	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific

Symbol	Output Value	Units	Explanation
Cw	88.32	mg/L	Target Leachate Concentration

Longitudinal Dispersivity Equation

Equation R16 ox=0.1*X

Symbol	Input Value(s)	Units	Explanation	Source
X	1690	cm	Distance along the centerline of the ground water plume emanating from the source (i.e.., UST bed) to the point of compliance. The X direction in the groundwater flow direction	Field Measurement

Symbol	Output Value	Units	Explanation
ox	169.00	cm	Longitudinal Dispersivity

Transverse Dispersivity Equation

Equation R17 oy=ox/3

Symbol	Input Value(s)	Units	Explanation	Source
ox	169.00	cm	Longitudinal Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R16

Symbol	Output Value	Units	Explanation
oy	56.33	cm	Transvers Dispersivity

Vertical Dispersivity Equation

Equation R18 oz=ox/20

Symbol	Input Value(s)	Units	Explanation	Source
ox	169.00	cm	Longitudinal Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R16

Symbol	Output Value	Units	Explanation
oz	8.45	cm	Vertical Dispersivity

Specific Discharge Equation

Equation R19 U=(K*i)/n

Symbol	Input Value(s)	Units	Explanation	Source
K	0.1305	cm/d	Aquifer Hydrualic Conductivity	Field Measurement
i	0.2300	unitless	Hydraulic Gradient	Field Measurement
n	0.43	cm^3/cm^3soil	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific

Symbol	Output Value	Units	Explanation
U	0.07	cm/d	Specific Discharge

Soil-Water Partition Coefficent Equation

Equation S19 Kd=Koc*Foc

Symbol	Input Value(s)	Units	Explanation	Source
Koc	35.50	cm3/g	Organic Carbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Foc	0.0095	g/g	Organic Carbon Content of Soil	Field Measurement

Symbol	Output Value	Units	Explanation
kd	0.34	cm3/g	Soil Water Sorption Coefficient

Water Filled Porosity Equation

Equation S20 Ow=n*(I/Ks)^(1/2b+3)

Symbol	Input Value(s)	Units	Explanation	Source
n	0.43	cm^3/cm^3soil	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific
I	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
Ks	5.00	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K
1/(2b+3)	0..042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K

Symbol	Output Value	Units	Explanation
Ow	0.43	L/L	Water-Filled Soil Porosity

Air Filled Porosity Equation

Equation S21 Oa=n-Ow

Symbol	Input Value(s)	Units	Explanation	Source
n	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific
Ow	0.43	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20

Symbol	Output Value	Units	Explanation
Oa	0.00	L/L	Air-Filled Soil Porosity

RBCA GROUNDWATER EQUATION R26

EQUATION FOR THE GROUNDWATER INGESTION EXPOSURE ROUTE

Dissolved Solvent Concentration Along the Centerline of the Plume to the Nearest Property Boundary

Compound: Cis-1,2-dichloroethene (Forward)

Equation R26 C(x)=Csource*(exp((x/2ox)*(1-(1+(4L*ox/U))^0.5)*erf1((Sw/(4*(oy*x)^0.5))*erf2(Sd/(2*oz*x)))

Symbol	Input Value(s)	Units	Explanation	Source
x	1690	cm	Distance along the centerline of the ground water plume emanating from the source (ie., UST bed) to the point of compliance. The x direction is the groundwater flow direction.	Field Measurement
ox	169.00	cm	Longitudinal Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R16
λ	0.00024	d^-1	First Order Degradation Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
U	0.07	cm/d	Specific Discharge	IAC Title 35, Part 742, Appendix C, Table C, Equation R19
erf1	0.969000	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
erf2	0.999999	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
Sw	1920.00	cm	Source Width Perpendicular to Ground Water Flow Direction in a Horizontal Plane	Field Measurement
oy	56.33	cm	Transverse Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R17
Sd	915.00	cm	Source Width Perpendicular to Ground Water Flow Direction in a Vetrical Plane	Field Measurement
oz	8.45	cm	Vertical Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R18
Error Term 1	1.5557	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
Error Term 2	3.8284	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
Csource	4.4159	mg/L	Greatest Potential concentration at source	IAC Title 35, Part 742, Appendix B, Table E

Symbol	Output Value	Units	Explanation
C(x)=	0.070	mg/l	Steady State Attenuation Along the Center line of a Dissolved Plume

Groundwater Modeling Equations
Vinyl Chloride (VC)
Contaminant Migration to Class I Groundwater Compliance
Site Name North Suburban Cleaners
Location: Morton Grove, Illinois

INPUT PARAMETERS FOR RBCA GROUNDWATER EQUATIONS
SOIL COMPONENT OF GROUNDWATER INGESTION AND GROUNDWATER INGESTION EXPOSURE ROUTES
Dissolved Solvent Concentration Along the Centerline of the Plume to the Nearest Property Boundary
Compound: Vinyl Chloride (Forward)

Symbol	Input Value(s)	Units	Explanation	Source
Gwobj	0.94	mg/L	Theoretical groundwater concentration at the source area	IAC Title 35, Part 742, Appendix C, Table A (See Equation S18)
Cw	18.87	mg/L	Target Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A (See Equation S17)
1/(2b+3)	0.042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K
erf1	0.8600	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G (See Equation R26)
erf2	0.9996	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G (See Equation R26)
H'	1.11	cm^3water/cm^3air	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
I	0.3	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table D
i	0.21	unitless	Hydraulic Gradient	Field Measurement
Foc	0.009467	g/g	Organic Carbon Content of Soil	Field Measurement
kd	0.1760862	cm3/g	Soil Water Sorption Coefficient	IAC Title 35, Part 742, Appendix C, Table A (See Equation S19)
Koc	18.6	cm3/g	Organic Carbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
K	1.30E-01	cm/d	Aquifer Hydraulic Conductivity	Field Measurement
λ	0.00024	d^-1	First Order Degradation Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Oa	0.05	cm3/cm3	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Ow	0.38	cm3/cm3	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
n	0.43	cm^3/cm^3soil	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific
Pb	1.50	g/cm^3	Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B- Soil Specific
Sd	915	cm	Source Width Perpendicular to Ground Water Flow Direction in a Vertical Plane	Field Measurement
Sw	1920	cm	Source Width Perpendicular to Ground Water Flow Direction in a Horizontal Plane	Field Measurement
w	0.15	g/g	Average Soil Moisture Content	IAC Title 35, Part 742, Appendix C, Table D
X	2500	cm	Distance along the centerline of the ground water plume emanating from the source (i.e.., UST bed) to the point of compliance. The X direction is the groundwater flow direction.	Field Measurement
Ro	9	mg/kg	Maximum Concentration in Soil or Remediation Objective	Field Measurement or Remedial Objective
DF	20.0	unitless	Dilution Factor (Default Value)	IAC Title 35, Part 742, Appendix C, Table B
Ks	5	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K

Theoretical Groundwater Concentration at the Source

Equation S18 GWobj=Cw/DF

Symbol	Input Value(s)	Units	Explanation	Source
DF	20.0	unitless	Dilution Factor (Default Value)	IAC Title 35, Part 742, Appendix C, Table B
Cw	18.9	mg/L	Target Leachate Concentration	IAC Title 35, Part 742, Appendix C, Table A (See Equation S17)

Symbol	Output Value	Units	Explanation
GWobj	0.94	mg/L	Theoretical Groundwater Concentration at the Source

Target Leachate Concentration Equation

Equation S17 Cw=Ro/(Kd+((Ow+Oa*H')/pb))

Symbol	Input Value(s)	Units	Explanation	Source
Ro	8.8	mg/kg	Maximum Concentration in Soil or Remediation Objective	Field Measurement or Remedial Objective
Pb	1.5	g/cm^3	Soil Bulk Density	IAC Title 35, Part 742, Appendix C, Table B- Soil specific
kd	0.18	cm3/g	Soil Water Sorption Coefficient	IAC Title 35, Part 742, Appendix C, Table A (See Equation S19)
Ow	0.38	cm3/cm3	Air-filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S21
Oa	0.05	cm3/cm3	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20
H	1.110	cm^3water/cm^3air	Henry's Law Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific

Symbol	Output Value	Units	Explanation
Cw	18.87	mg/L	Target Leachate Concentration

Longitudinal Dispersivity Equation

Equation R16 ox=0.1*X

Symbol	Input Value(s)	Units	Explanation	Source
X	2500	cm	Distance along the centerline of the ground water plume emanating from the source (i.e.., UST bed) to the point of compliance. The X direction is the groundwater flow direction.	Field Measurement

Symbol	Output Value	Units	Explanation
ox	250.00	cm	Longitudinal Dispersivity

Transverse Dispersivity Equation

Equation R17 oy=ox/3

Symbol	Input Value(s)	Units	Explanation	Source
ox	250.00	cm	Longitudinal Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R16

Symbol	Output Value	Units	Explanation
oy	83.33	cm	Transvers Dispersivity

Vertical Dispersivity Equation

Equation R18 oz=ox/20

Symbol	Input Value(s)	Units	Explanation	Source
ox	250.00	cm	Longitudinal Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R16

Symbol	Output Value	Units	Explanation
oz	12.50	cm	Vertical Dispersivity

Specific Discharge Equation

Equation R19 U=(K*i)/n

Symbol	Input Value(s)	Units	Explanation	Source
K	0.1305	cm/d	Aquifer Hydrualic Conductivity	Field Measurement
i	0.2100	unitless	Hydraulic Gradient	Field Measurement
n	0.43	cm^3/cm^3soil	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific

Symbol	Output Value	Units	Explanation
U	0.06	cm/d	Specific Discharge

Soil-Water Partition Coefficent Equation

Equation S19 Kd=Koc*Foc

Symbol	Input Value(s)	Units	Explanation	Source
Koc	18.60	cm3/g	Organic Carbon Partition Coefficient	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
Foc	0.0095	g/g	Organic Carbon Content of Soil	Field Measurement

Symbol	Output Value	Units	Explanation
kd	0.18	cm3/g	Soil Water Sorption Coefficient

Water Filled Porosity Equation

Equation S20 Ow=n*(I/Ks)^(1/2b+3)

Symbol	Input Value(s)	Units	Explanation	Source
n	0.43	cm^3/cm^3soil	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific
I	0.30	m/yr	Infiltration Rate	IAC Title 35, Part 742, Appendix C, Table B
Ks	5.00	m/yr	Saturated Hydraulic Conductivity	IAC Title 35, Part 742, Appendix C, Table K
1/(2b+3)	0.042	unitless	Exponential in Equation S20	IAC Title 35, Part 742, Appendix C, Table K

Symbol	Output Value	Units	Explanation
Ow	0.38	L/L	Water-Filled Soil Porosity

Air Filled Porosity Equation

Equation S21 Oa=n-Ow

Symbol	Input Value(s)	Units	Explanation	Source
n	0.43	L/L	Total Soil Porosity	IAC Title 35, Part 742, Appendix C, Table B - Soil Specific
Ow	0.38	L/L	Water-Filled Soil Porosity	IAC Title 35, Part 742, Appendix C, Table A, Equation S20

Symbol	Output Value	Units	Explanation
Oa	0.05	L/L	Air-Filled Soil Porosity

RBCA GROUNDWATER EQUATION R26

EQUATION FOR THE GROUNDWATER INGESTION EXPOSURE ROUTE

Dissolved Solvent Concentration Along the Centerline of the Plume to the Nearest Property Boundary

Compound: Vinyl Chloride (Forward)

Equation R26 C(x)=Csource*(exp((x/2ox)*(1-(1+(4L*ox/U))^0.5)*erf1((Sw/(4*(oy*x)^0.5))*erf2(Sd/(2*oz*x)))

Symbol	Input Value(s)	Units	Explanation	Source
x	2500	cm	Distance along the centerline of the ground water plume emanating from the source (ie., UST bed) to the point of compliance. The x direction is the groundwater flow direction.	Field Measurement
ox	250.00	cm	Longitudinal Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R16
λ	0.00024	d^-1	First Order Degradation Constant	IAC Title 35, Part 742, Appendix C, Table E - Chemical Specific
U	0.06	cm/d	Specific Discharge	IAC Title 35, Part 742, Appendix C, Table C, Equation R19
erf1	0.860000	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
erf2	0.999600	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
Sw	1920.00	cm	Source Width Perpendicular to Ground Water Flow Direction in a Horizontal Plane	Field Measurement
oy	83.33	cm	Transverse Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R17
Sd	915.00	cm	Source Width Perpendicular to Ground Water Flow Direction in a Vetrical Plane	Field Measurement
oz	12.50	cm	Vertical Dispersivity	IAC Title 35, Part 742, Appendix C, Table C, Equation R18
Error Term 1	1.0516	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
Error Term 2	2.5880	unitless	Mathematical Error Function	IAC Title 35, Part 742, Appendix C, Table G
Csource	0.9437	mg/L	Greatest Potential concentration at source	IAC Title 35, Part 742, Appendix B, Table E

Symbol	Output Value	Units	Explanation
C(x)=	0.002	mg/l	Steady State Attenuation Along the Center line of a Dissolved Plume