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March 18, 2013

Gary A. Abraham, Esq.
Law Office of Gary A. Abraham
170 No. Second Street
Allegany, NY14706

Re: Comments on Groundwater Issues of Site-Wide Permit Renewal
CWM Chemical Services Model City Site, Model City, New York

Dear Mr. Abraham:

At your request, I have reviewed various documents related to site-wide permit renewal for CWM Chemical Services Model City Site located in Model City, New York. Below are my comments on groundwater issues of the permit renewal.

HYDROGEOLOGIC CONCEPTUAL MODEL UTILIZED BY THE APPLICANT IS OBSOLETE

The conceptual hydrostratigraphic model of the site is based on a 27-year-old interpolation of conditions encountered in two boreholes located more than one mile apart. The model, presented in Figure 3 in Groundwater Sampling and Analysis Plan (Golder Assoc., 2009a) and attached herewith as Exhibit 1, was originally proposed by Golder Associates (1985), and was only slightly modified by Golder Associates (1993). Subsequent boring and well data have indicated substantial variability in thickness of the Upper Till Sequence, the Glaciolacustrine Clay, and the Middle Silt Units, and in the depth of the top of bedrock within the project area. However, these new data are not reflected on structural maps of individual hydrostratigraphic units of the model, and no updated cross-sections have been provided. Therefore, the presentation of site hydrogeologic conditions is overly simplistic and obsolete.

The thickness of the Glaciolacustrine Clay unit, the main aquitard unit in the study area, can be less than one (1) foot. Out of eight geotechnical borings with measured thickness of various units at the proposed RMU-2 western expansion perimeter, two showed the Upper Glaciolacustrine Clay to be only 0.7 ft thick. In the third boring this unit was 1.9 ft thick and the fourth 4.0 ft (Golder Assoc., 2002, Table 1). See Exhibit 2.

A much more detailed and robust graphical representation of site hydrological conditions is required under Part 360-2.11. CWM must provide maps depicting actual elevations of the top and bottom surfaces of the various units identified; the thickness of these units, or site cross-sections depicting the units; the relationship between groundwater and surface water; and relation of the operating landfill to other waste management units.

The current site-wide permit, issued in 2005, fails to adequately inform the public about the presence of all known groundwater contamination areas. For example, two key maps intended to show the site-wide distribution of volatile organic chemicals in groundwater are unreadable. See NYSDEC 2005, Appendix E-4 (Corrective Action), Figs. III-1, III-2. Also, in a table provided in the Operation and Maintenance Manual for the Groundwater Extraction System, information on individual wells/sumps in the Process Area intended to indicate the presence or absence of Dense Non-Aqueous Phase Liquid (DNAPL) (Y or N option) is blacked out (See CWM 2012, page 16). Presumably, the blackened cells in the table stand for "Y". Similarly, the current Groundwater Sampling and Analysis Plan provides well ID charts that merely indicate whether a given well is "Clean" or "Dirty," without providing any information quantifying the nature and degree to which each well is "Dirty." See Golder Assoc., 2009a, Appendix D.

THE PERMEABILITY OF SUBSURFACE SOILS IS SUBSTANTIALLY GREATER THAN ASSERTED BY THE APPLICANT.

The Applicant calculated a very long travel time across the site's aquitard, on the order of hundreds of years, based on average hydraulic conductivity values that are contradicted by the results of permeability (slug) tests conducted in monitoring wells. This contradiction becomes apparent by comparing the average/typical values reported for the various units in Table 1 of the current Groundwater Sampling and Analysis Plan against actual values measured in monitoring wells listed in Table 4; See Golder Assoc., 2009a Tables 1 and 4. The latter tests show much larger hydraulic conductivity values and the reported averages.

The Applicant failed to indicate that the Upper Till unit contains joints/fractures that increase vertical permeability of this unit and can provide potential downward migration pathways. The presence of such joints in the till unit is indicated by onsite boring logs. Example of such a log for Boring No. 34 is attached (Exhibit 3). It shows that the till is "(J)ointed, joints filled with gray silt and fine roots." It is well-documented in technical literature from Canada and the U.S. that fractures/joints provide preferential flow and contaminant migration pathways across the tills.

Because the Glaciolacustrine Clay unit is thin to the West of RMU-1, the likelihood of downward migration of contaminants across this unit is high. This is confirmed by detections of VOCs and acetone in some lower aquifer/deep wells on the Model City Site.

AN INVESTIGATION OF THE SOURCE OF VOCs IN WELL MW10-2S INDICATES VERTICAL GROUNDWATER FLOW IS ORDERS OF MAGNITUDE GREATER THAN ASSERTED BY THE APPLICANT.

In December 1987, approximately 15 years after the start-up of hazardous waste disposal operations by CWM, Golder completed a soil boring and sampling program in the vicinity of well MW10-2S located between SFL10 and Facultative Pond 3. The program was designed to investigate the source of VOCs detected in this well; see Golder (1993). In soil boring MW10-2S-1E, VOCs were detected at a depth of 26 to 28 ft. See Exhibit 4 (from id.).

One of the VOCs detected in this boring was 1,1,1 Trichloroethane (TCA). Between 1970 and 1980, U.S. production of this solvent increased rapidly, as production of TCE declined (Pankow and Cherry, 1996). Thus, it is likely that the detected TCA was discharged at or after the start of CWM operations.

Assuming conservatively that the discharge of VOCs detected at the 26-28 ft depth range in MW10-2S-1E occurred at the start of the CWM operations, or 15 years prior to the sampling event, the vertical migration rate for the VOCs in the Upper Till unit is calculated to be at least 1.8 ft/year. This velocity is 45 times faster than the vertical groundwater velocity of 0.04 ft/year claimed by the Applicant (Figure 4 of Groundwater Sampling and Analysis Plan).

THE PRESENCE OF ACETONE IN THE LOWER AQUIFER WELLS INDICATES VOC MIGRATION INTO THE LOWER AQUIFER

The Applicant's assertion, that subsurface soils are characterized by very low hydraulic conductivity resulting in a very long travel time into the Lower Aquifer unit, is contradicted by detections of VOCs, such as acetone, in some lower aquifer monitoring wells, as presented in documents prepared for the RMU-2 permit application.

Acetone can be viewed as a groundwater tracer in an inadvertent experiment that took place beneath the site. Analytical results of well sampling conducted in 2008 within the proposed RMU-2 area showed acetone detections, as reported in Table 7 of Golder (2010) RMU-2, at the following concentrations: R201D (at 790 ug/L), R202D (at 650 ug/L), R209D (at 820 ug/L) and R210D (at 55 ug/L). See also Exhibit 5, attached hereto (id., Fig. 5). On this Exhibit, locations of these four deep monitoring wells are marked with red circles.

Acetone was not detected in any adjacent shallow wells of these four well clusters, indicating a distant origin of the acetone detected in the those deeper wells. Acetone was detected in two shallow wells: R208S (42 ug/L) and R213S (150 ug/L) (marked with "X" on Exhibit 5). The latter well is located near the northwestern corner of Fac Pond 8 where acetone was detected in soil/sediment sample F8-G1 during pond closure sampling conducted in 2005 (Golder, 2009). Exhibit 5 also shows the location of the Fac Pond 8 sample on the original sampling location map from Golder (2009). See Exhibit 5, marked letter "A". This general area appears to be a source area of acetone that migrated across the aquitard and then within the lower aquifer for a distance of some 1,500 ft. Id. This extensive westward migration of acetone occurred within a time span of less than 35 years.

THE UPPER AND LOWER AQUIFERS ARE HYDRAULICALLY CONNECTED, CONTRARY TO THE APPLICANT'S CLAIM.

In addition to the detection of man-made chemicals in the Lower Unit, potentiometric data provide another indicator of a significant hydraulic connection between the Upper and Lower Aquifer units - rather than their hydraulic isolation as asserted by the Applicant. The difference between the potentiometric levels of the upper and lower aquifer units is generally small, as low as 0.72 ft in well cluster R210S/R210D. This small difference implies a significant degree of vertical hydraulic connection between the units. The connection is more likely in areas of permeability windows at locations where the intervening glaciolacustrine clay is thin or missing. As stated earlier, out of eight geotechnical borings completed at the RMU-2 western expansion perimeter, two showed the Upper Glaciolacustrine Clay to be only 0.7 ft. thick (Exhibit 2).

BENEATH THE MOST CONTAMINATED AREAS, GROUNDWATER IN THE LOWER AQUIFER FLOWS TO THE WEST, NOT TO THE NORTH AS ASSERTED BY THE APPLICANT.

The Lower Aquifer unit, which the Applicant refers to as "Glaciolacustrine Silts/Sand," constitutes the main aquifer unit at the site. It is the only unit that is called an "aquifer" in Table 1 of Applicant's Groundwater Sampling and Analysis Plan (Golder Assoc., 2009a). All other overlying units are called "aquitards".

In hydrogeological reports prepared for the adjacent NFSS site, the Lower Aquifer unit is called "Alluvial Sand and Gravel" (e.g. RI Report prepared by SAIC and Tetra Tech in December 2007). The latter name implies that the Lower Aquifer unit was deposited by an ancient river flowing westward along a channel controlled by the bedrock surface. The Lower Aquifer provides the fastest potential horizontal contaminant migration pathway. Whereas the importance of this aquifer unit appears to be recognized by the Applicant, the groundwater flow direction in this unit is misrepresented, which makes the proposed monitoring network for this unit inadequate and ineffective.

The Process Area and nearby Lagoon Area include several areas of severe groundwater contamination by VOCs (Golder Assoc., 1993). For example, LNAPL and DNAPL product was observed in a number of soil borings in the former West Drum Area; DNAPL was found in the Lagoon Area (Lagoons 1, 2, 5, 6 and 7); and the area located immediately south of SF-3 is contaminated with DNAPL. Id.

The Applicant proposes to utilize the existing monitoring well network for the Lower Aquifer that is based on an assumed northerly to northwesterly groundwater flow direction. However, the dominant groundwater flow direction within the middle and southern portion of the study area of this aquifer is westward. This determination is based on two potentiometric maps for the Lower Unit (Glaciolacustrine Silt/Sand), which the Applicant made available: one map for February 1988 (Appendix C of Engineering Report, Golder (2012)) and the other for October 2008 (Figure 5 in Golder 2010). Both maps are included in Exhibit 6.

Both maps show a close spacing of the potentiometric contours in the northern portion of the study area, and a wide spacing of the contours within its central portion. The wide spacing of the contours reflects a greater permeability and transmissivity of the ancient river deposits occurring within the central portion of the area. On the other hand, the area of closely-spaced potentiometric contours in the northern portion of the study area is associated with low-permeability deposits overlying a bedrock ridge there, which creates a hydrogeologic barrier forcing the bulk of groundwater flow in the westerly direction, the direction of greater transmissivity of the Lower Aquifer unit, which is toward the Fourmile Creek.

It is thus evident from both available maps that the westerly flow direction prevails below the heavily contaminated former Process Area (Exhibit 6). One can ascertain this by drawing groundwater flow lines perpendicular (orthogonal) to the potentiometric contours over the Process Area on both maps.

NO EFFECTIVE MONITORING EXISTS, OR IS PROPOSED, FOR THE LOWER AQUIFER DOWNGRADIENT OF KNOWN DNAPL AREAS.

There is site-specific evidence of downward migration of DNAPLs and/or dissolved contamination into the Lower Aquifer. In the Process Area, DNAPL was encountered in the Upper Tills and "target compounds were detected in samples collected from the Glaciolacustrine Silt/Sand and the Basal Red Tills units" (Golder Assoc., 1993, p. 16). Whereas the text of that report merely mentioned that two borings (PRO-21 and PRO-5), which were advanced into the Lower Aquifer, "contained target compounds other than trace levels of TCE and toluene", the analytical data tables for these borings show that the detected concentrations of chlorinated solvents in groundwater and deep soils were high enough to indicate a likely presence of DNAPL product phase in the Lower Aquifer (See pages 5 and 23 in Table 5.24-4 of Golder Assoc., 1993). As discussed earlier, acetone was also detected in some Lower Aquifer wells upgradient of the West Drum area.

Because groundwater in the Lower Aquifer flows west, enhanced monitoring of DNAPL areas, including the West Drum Area, is warranted. While a number of shallow extraction wells/sumps and performance piezometers operate in the West Drum Area, not a single Lower Aquifer (Glaciolacustrine Silt/Sand) monitoring well is found truly downgradient (i.e., west) of the line of DNAPL sumps DS01 through DS07. As shown on Figure 5 of Groundwater Sampling and Analysis Plan (2009) and attached as Exhibit 7, the nearest and the only deeper monitoring well in this area, WDA01D, is located more than 300 ft north-northeast of DS01, which is hydraulically cross-gradient and slightly upgradient relative to the line of DNAPL sumps, given the westerly groundwater flow direction in the Lower Aquifer at that location.

The seven "dirty" sumps (DS01 through DS07) extend to depths between 24.5 ft and 28.5 ft, which is a depth range close to the Glaciolacustrine Silt/Sand unit. (In WDA01D the top of screen is at 29.4 ft; see Table 3 of Groundwater Sampling and Analysis Plan (Golder Assoc., 2009a). As stated earlier, the Upper Till unit is not an effective barrier, as it contains joints/fractures that can provide potential downward migration pathways for DNAPL, and the Glaciolacustrine Clay unit is thin in this area.

In spite of this evidence of contaminant penetration into the Lower Aquifer unit and the role of this unit as a principal horizontal contaminant migration pathway, no attempt was made to assess actual impacts of the West Drum area on the Lower/Deep Aquifer (Glaciolacustrine Silt/Sand). Presently, it's not possible to determine the effectiveness of on-going DNAPL removal and corrective action pumping, as there are no Lower Aquifer monitoring wells installed downgradient of the West Drum area. In the absence of such monitoring wells, the extent of this migration is yet to be defined.

Given the deficiencies and the findings stated above, the Permit should require installation of additional detection/delineation monitoring wells into the lower unit (Glaciolacustrine Silt/Sand) at the West Drum Area and other DNAPL areas.

Please call me at (908) 757-8867 with any questions on the above comments.

Very truly yours,

Andrew Michalski, Ph.D., CGWP, LSRP
Principal Consultant

Attachments:
- References
- Exhibits

REFERENCES

CWM Chemical Svcs., LLC 2012a. 6 NYCRR Part 373 Sitewide Permit Renewal Application, July 31, 2012; available at <http://modelcity.wm.com/>.

CWM Chemical Svcs., LLC 2012b. Model City TSDR Facility Groundwater Extraction Systems, Operation and Mainenance Manual, revised May 2012; available at <http://modelcity.wm.com/>.

CWM Chemical Svcs., LLC 2008. Model City TSDR Facility Groundwater Extraction Systems, Operation and Mainenance Manual, revised April 2008; available at <http://modelcity.wm.com/>.

Golder Assoc. 2012. Engineering Report for CWM Chemical Services, LLC Model city Facility, Residual Management Unit 1, revised August 2012; available at <http://modelcity.wm.com/>.

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Golder Assoc. 2009b. Report on Facultative Pond Number 8 Closure Certification, CWM, Model City, NY.

Golder Assoc. 2002. CWM Engineering Report, RMU-2, Appendix A (Letter Report entitled "Geotechnical Investigation for Proposed Residuals Management 2 Western Expansion Area").

Golder Assoc. 1993. Final Report on 1993 Hydrogeologic Characterization Update, Model City TSDR Facility, 3 vols., June 1993.

Golder Assoc. 1985. Hydrogeologic Characterization, Chemical Waste Management, INc., Model City, New York Facility, March 1985.

NYSDEC 2005. 6 NYCRR Part 373 Hazardous Waste Management - Model City Facility Draft Permit, DEC No. 9-2934-00022/00097, EPA ID No. NYD049836679, available at <http://www.dec.ny.gov/chemical/49051.html>.

Pankow, J.F. and J.A. Cherry 1996. Dense Chlorinated Solvents and Other DNAPLs in Groundwater (Waterloo Press 1996).

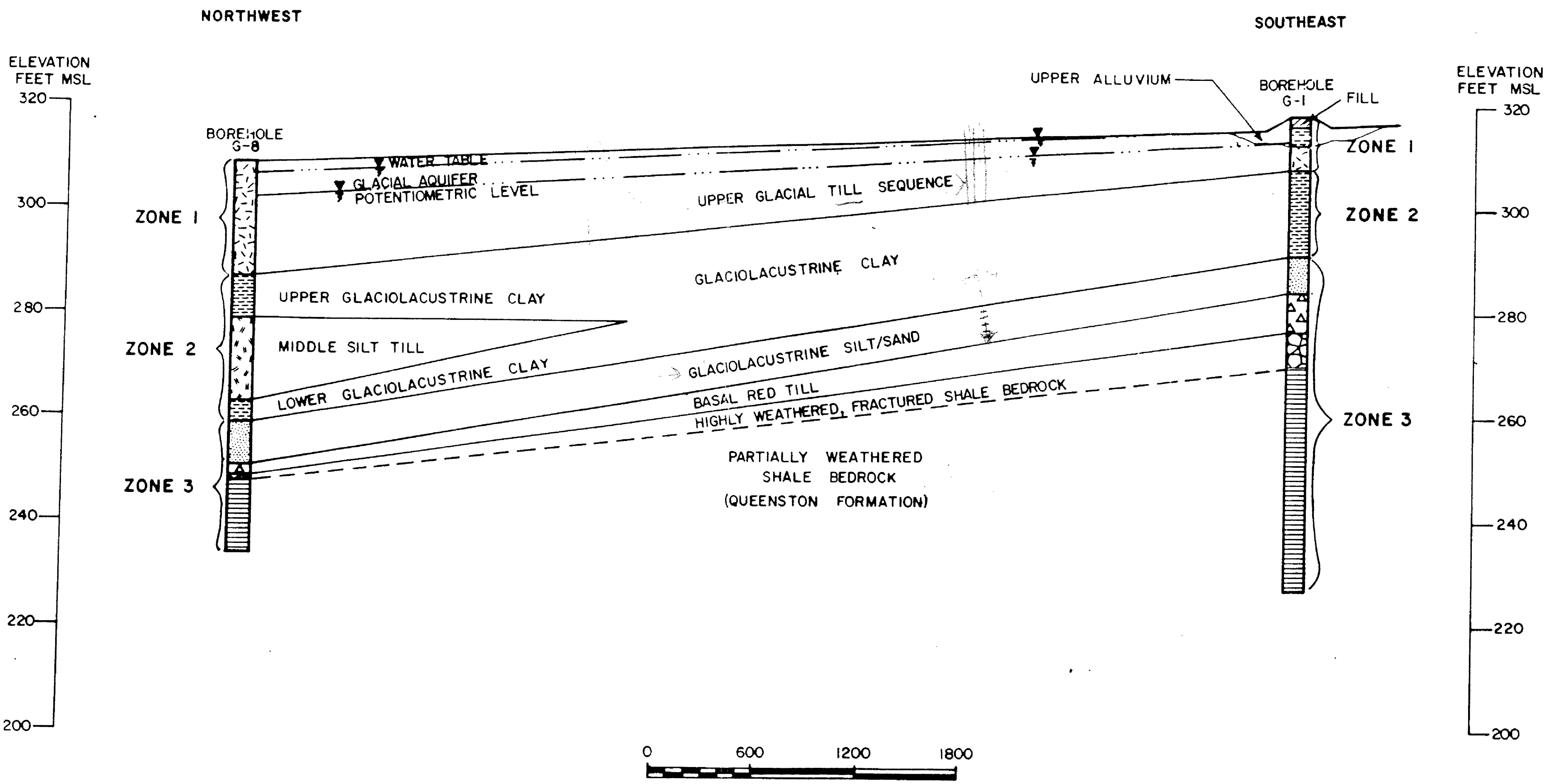
U.S. Army corps of Engineers 2007. Remedial Invesitigation Report for the Niagara Falls Storage Site, December 2007; available at <http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/NiagaraFallsStorageSite.aspx>.

Wehran Engineering Corp. 1977. Hydrogeologic Investigation, ChemTrol Pollution Services, Townships of Porter and Lewiston, Niagara County, New York, October 14, 1977.

EXHIBIT 1

GENERAL SITE STRATIGRAPHY

(Golder Assoc., 2009a, Figure 3)



HORIZONTAL SCALE IN FEET

VERTICAL EXAGGERATION 30 TIMES

NOTE:

This figure is a schematic representation of the geologic stratigraphy made by straight line interpolation between boreholes G-1 and G-8. Some of the strata shown are discontinuous.

FILE NUMBER 853-3047

853-3055	SCALE AS SHOWN	GENERAL SITE STRATIGRAPHY	
DRAWN SKB	DATE 3/2/85		
CHECKED DJM	DWG NO 19		
Golder Associates		CHEMICAL WASTE MANAGEMENT, INC.	FIGURE 3

EXHIBIT 2

THICKNESS OF THE UPPER GALCIOLACUSTRINE CLAY UNIT IN TEN GEOTECHNICAL BORINGS COMPLETED AT RMU-2

(Golder Assoc., 2002, Table 1)

TABLE 1
BOREHOLE SUMMARY
GEOTECHNICAL INVESTIGATION - PROPOSED RMU-2 WESTERN EXPANSION AREA
MODEL CITY TSD FACILITY
MODEL CITY, NEW YORK

OREHOLE NUMBER	COORDINATES		GROUND ELEVATION (ft vsd)	TOP OF UCT ELEVATION (ft vsd)	TOP OF UST ELEVATION (ft vsd)	TOP OF UGC ELEVATION (ft vsd) (1)	THICKNESS OF UGC (ft) (1)	TOP OF MST ELEVATION (ft vsd)	THICKNESS OF MST (ft)	TOP OF LGC ELEVATION (ft vsd)	TOP OF GSS ELEVATION (ft vsd)	THICKNESS OF LGC (ft)	TOP OF BRT ELEVATION (ft vsd)	THICKNESS OF GSS (ft)
	NORTHING	EASTING												
B-02-01	9,950.62	10,169.11	316.35	316.3	300.3	293.0	0.7	n/a	n/a	n/a	292.3	n/a	280.2	12.1
B-02-02	8,764.22	10,505.74	321.07	319.1	n/a	307.1	4.0	303.1	4.5	298.6	288.0	10.6	n/a	>7.3
B-02-2A	8,772.16	10,504.81	320.99	-	-	-	-	-	-	-	-	-	-	-
B-02-3	9,600.00	10,570.73	321.83	321.8	n/a	307.8	4.0	303.8	6.0	297.8	289.8	8.0	n/a	>4
B-02-3A	9,588.43	10,561.50	321.20	-	-	-	-	-	-	-	-	-	-	-
B-02-4	10,001.91	11,015.36	319.76	315.8	n/a	310.9	8.1	302.8	5.4	297.4	285.8	11.6	276.8	9.0
B-02-5	9,881.80	10,249.01	317.37	317.4	n/a	307.4	17.1	n/a	n/a	n/a	290.3	n/a	n/a	>2.9
B-02-6	9,950.73	10,255.52	315.02	315.0	n/a	305.0	0.7	304.3	5.3	299.0	291.0	8.0	n/a	>6.0
B-02-7	9,920.30	10,334.07	316.06	316.1	n/a	303.6	14.2	n/a	n/a	n/a	289.4	n/a	278.1	11.3
B-02-8	9,945.35	10,430.85	315.54	315.5	309.5	304.9	1.9	303.0	11.5	291.5	289.7	1.8	277.5	12.2

otes:
na = Not applicable/not available
UCT = Upper Clay Till Unit
UST = Upper Silt Till Unit
UGC = Upper Glaciolacustrine Clay Unit
MST = Middle Silt Till Unit
LGC = Lower Glaciolacustrine Clay Unit
GSS = Glaciolacustrine Silt/Sand Unit
BRT = Basal Red Till Unit
(1) = Also refers to the top of the Glaciolacustrine Clay unit when the LGC is not present.
ft = Feet
ft vsd = Feet CWM Vertical Site Datum
- = Stratigraphic breaks were not logged during drilling.

Table By:	JPR
Reviewed:	FTA
Date:	12/18/02

EXHIBIT 3

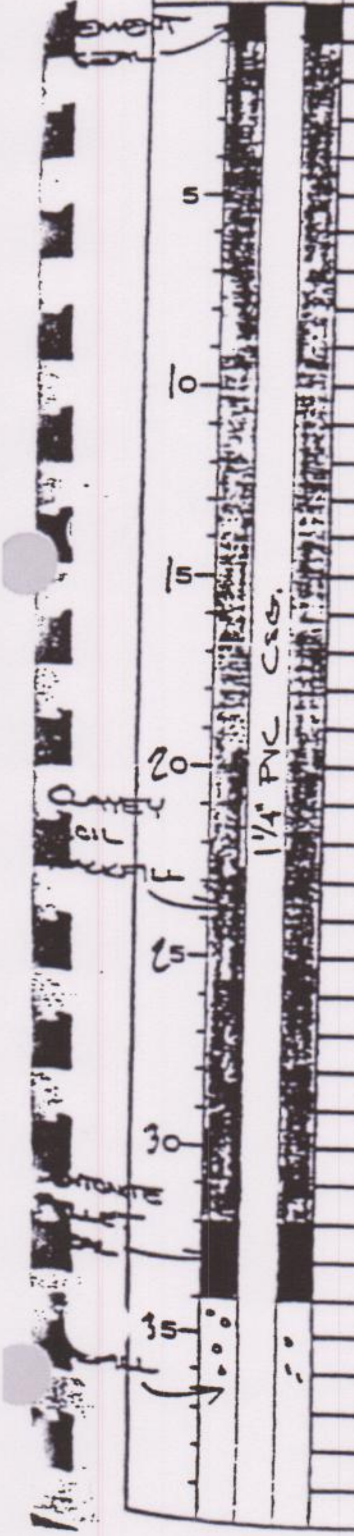
LOG OF BORING NO. 34

(from Wehran, 1997)

WEHRAN ENGINEERING

TEST BORING LO

Project No. C-77213 Client SCA SERVICES, INC.
Boring No. 34
Project CHEM-TROL POLLUTION SERVICES, INC.
Date Start 8/2/77
Location NIAGARA COUNTY, NEW YORK
Date Finish 8/3/77
Type of Rig CME AUGER
Driller EMPIRE SOILS
Inspector WSP



Depth	Elevation	Casing Blows/ft	Sample				Average Blows/ft	Log	Classification "O" Elev. = 319.9	Remarks
			No.	Type	Spoon blows 6" Penetr.					
			1	SS	13	23	R=10"		ALLUVIAL DEPOSIT: Lt. brown SILT, trace fine Sand, trace fine Gravel	Very dense dry
					17	17				
			2	SS	23	19	R=8"		Becoming @ 2': Brown & green Clayey SILT to CLAY & SILT in irregular laminations 5'-6"	
5			3	SS	10	14				bec. slightly moist
					21					
					18"	REC.				
10			4		10	9		UGT 5.5-14'	GLACIAL TILL: Red-brown CLAY & SILT little Sand, little Gravel Jointed, joints filled with grey silt and fine roots	Very stiff, slightly moist
					10					
					12"	REC.				bec. wet @ 10'-6"
15			5	SS	1	2			Becoming "mottled" with fine Sand; Clay @ 5' 14'0"	
					1					
					14"	REC.			GLACIOLACUSTRINE DEPOSIT: Occ. layer of Brn fine SAND and Silt @ 15'	
20			6	SS	8	11	R=18"			Soft, wet
					11					
			7	SS	W.H.	2			Grey Silty CLAY occ. laminations of Grey and Red-brown SILT	
					2					
25			8	U	PRES:	50 psi		GC 14-35'		
					24"	REC.				
30			9	SS	2	3			grading w/ occ. 1/8" layers of fine Sand & Silt, tr fine Gravel	Bec. Firm. wet
					3					
					18"	REC.				
35									TRANSITION 35'0"	
			10	SS	10	15		GSS 35-40'	GLACIOLACUSTRINE DEPOSIT: Red-brown m-f SAND, some Silt, little m-f Gravel 38'-0"	V. dense, saturated
					30					
					18"	REC.				
									ALLUVIAL CHANNEL DEPOSITS:	

P. 77 of Eng. Report

EXHIBIT 4

SUMMARY OF HEADSPACE ANALYSIS RESULTS FOR SOIL SAMPLES FROM BOREHOLE MW10-2S-1E

(Golder Assoc., 1993, Table 5.6-1)

TABLE 5.6-1

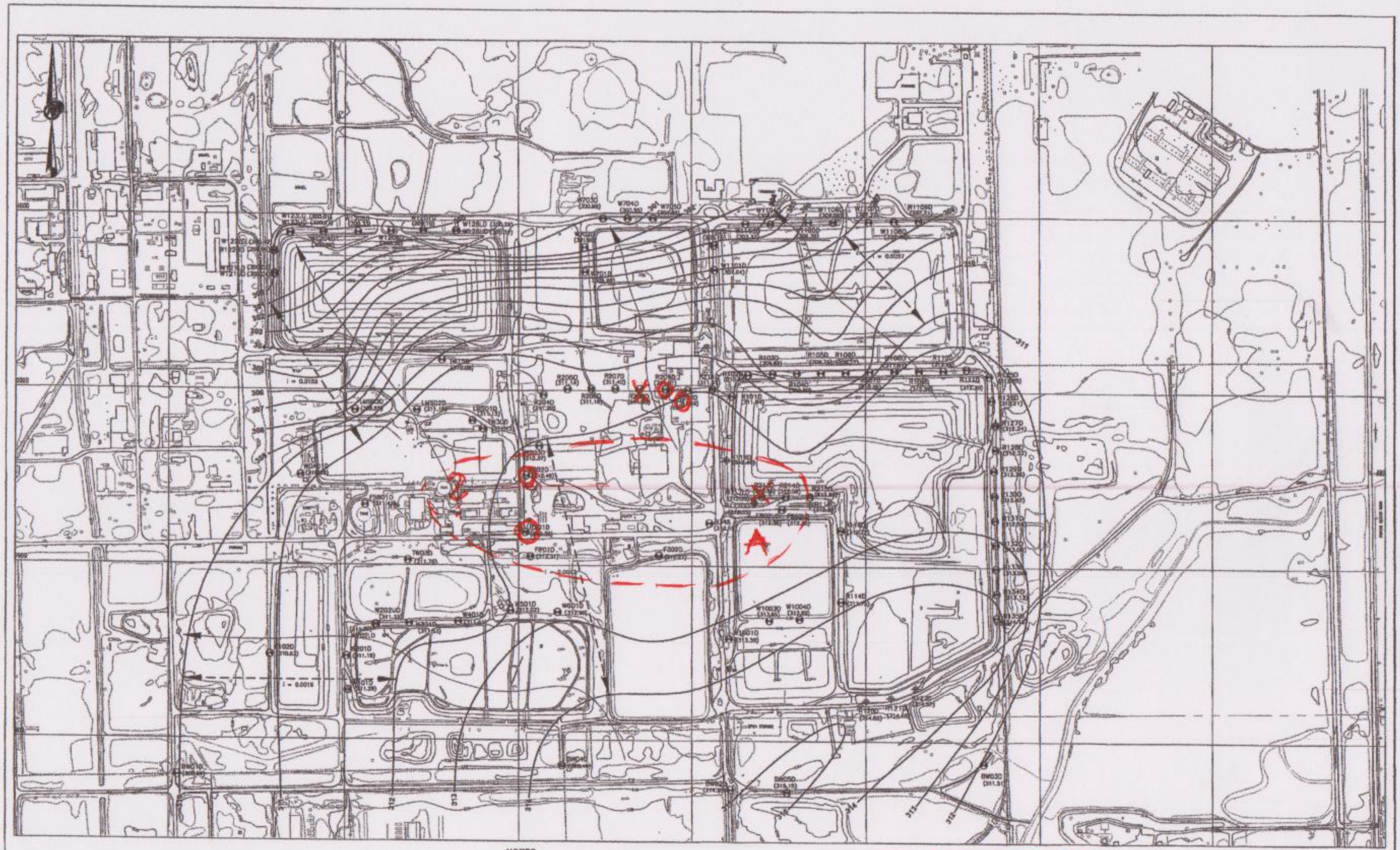
SUMMARY OF HEADSPACE ANALYSIS RESULTS
(1 of 3)

Borehole No.	Date Analyzed	OVA Scale Setting	GC Run No.(1)	Volume Injected(2) (uL)	Sample Depth(3)	Column Type	Peak No.) Area of Peak(4) (sq.in.)	Peak No.) Distance from Injection Point(5) (in.)	Peak No.) Elution Time (secs)	Concentration(6) (ppm)	Identification of Compound
MW10-2S-1E	12-08-87	X1	1	2000	26-28	T-24	1) 0.05 2) 0.22	1) 2.75 2) 3.40	1) 242.0 2) 299.2	--- —	VOLATILE COMPOUND(7) -
MW10-2S-1E	12-08-87	X1	2	2000	26-28	T-24	1) 0.15 2) 0.065	1) 3.30 2) 4.00	1) 290.4 2) 352.0	-- --	VOLATILE COMPOUND -
MW10-2S-1E	12-08-87	X1	3	2000	32-34	T-24	1) 0.01	1) 0.30	1) 26.4	N/A	RECOVERY PEAK(8)
MW10-2S-1E	12-12-87	X1	11	2000	26-28	T-24	1) 0.008 2) 0.15	1) 0.65 2) 3.15	1) 57.2 2) 277.2	-- 0.2	VOLATILE COMPOUND CHCL3
MW10-2S-2W	12-09-87	X1	4	500	12-13	T-24	1) 0.023 2) 0.008 3) 1.14 4) 0.45	1) 0.55 2) 1.65 3) 2.65 4) 3.80	1) 48.4 2) 145.2 3) 233.2 4) 334.4	— 0.05 -- --	VOLATILE COMPOUND 1.1.1-TCE VOLATILE COMPOUND -
MW10-2S-2W	12-09-87	X1	5	500	13-14	T-24	1) 0.008 2) 1.68 3) 0.063 4) 1.40	1) 0.50 2) 1.80 3) 2.75 4) 4.00	1) 44.0 2) 158.4 3) 242.0 4) 352.0	-- -- -- --	VOLATILE COMPOUND - - -
MW10-2S-2W	12-09-67	X1	6	-	14-15	T-24	1) 1.83 2) 2.15	1) 1.60 2) 3.70	1) 140.8 2) 325.6	-- --	VOLATILE COMPOUND -
MW10-2S-2W	12-09-67	X1	7	500	14-15	T-24	1) 0.019 2) 0.025 3) 2.22 4) 0.05 5) 3.90 6) 0.22	1) 0.35 2) 0.55 3) 1.75 4) 2.70 5) 4.00 6) 7.30	1) 30.8 2) 48.4 3) 154.0 4) 237.6 5) 352.0 6) 642.4	-- -- 12 -- -- --	VOLATILE COMPOUND - 1.1.1-TCE VOLATILE COMPOUND - -
MW10-2S-2W	12-09-67	X1	8	250	14-15	T-24	1) 0.03 2) 0.01 3) 1.95 4) 0.038 5) 3.25 6) 0.138	1) 0.35 2) 0.55 3) 1.75 4) 2.75 5) 4.10 6) 7.55	1) 30.8 2) 48.4 3) 154.0 4) 242.0 5) 360.8 6) 664.4	-- -- 32 -- -- --	VOLATILE COMPOUND - 1.1.1-TCE VOLATILE COMPOUND - -
MW10-2S-2W	12-09-87	X1	9	500	15-16	T-24	1) 0.02 2) 0.33 3) 0.315 4) 0.04 5) 6.23 6) 0.125	1) 0.50 2) 1.50 3) 1.80 4) 2.60 5) 3.90 6) 7.05	1) 44.0 2) 132.0 3) 158.4 4) 226.8 5) 343.2 6) 620.4	-- -- -- -- -- --	VOLATILE COMPOUND - - - - -

EXHIBIT 5

ACETONE DETECTIONS IN DEEP AND SHALLOW MONITORING WELLS AND SOIL/SEDIMENT SAMPLE IN POND NO.8

(Golder Assoc., 2010, Fig.5)



O ACETONE IN DEEP WELLS
X ACETONE IN SHALLOW WELLS
- — ACETONE PLUME

LEGEND

⊖	GLACIOLACUSTRINE SILT/SAND UNIT MONITORING WELL
⯁	GLACIOLACUSTRINE SILT/SAND UNIT PIEZOMETER
BW030	GLACIOLACUSTRINE SILT/SAND UNIT MONITORING WELL/PIEZOMETER DESIGNATION
(309.86)	GROUNDWATER ELEVATION
(313.66)	GROUNDWATER ELEVATION NOT USED FOR INTERPRETATION
310 ———	LINE OF EQUAL POTENTIAL
———▶	FLOW DIRECTION
◀— — —▶ i=0.0102	HYDRAULIC GRADIENT

NOTES

1.) WATER LEVELS OBTAINED ON OCTOBER 15, 2008 BY CWM and GOLDER PERSONNEL.

REFERENCES

1.) BASE MAP COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED MAY 31, 2001 BY AIR SURVEY CORP., DULLES, VIRGINIA.

2.) FIGURE ORIGINALLY PRESENTED IN THE REPORT ENTITLED "2008 GROUNDWATER LEVEL INTERPRETATION, CWM CHEMICAL SERVICES, L.L.C., MODEL CITY, NEW YORK", DATED FEBRUARY, 2009 BY GOLDER ASSOCIATES.

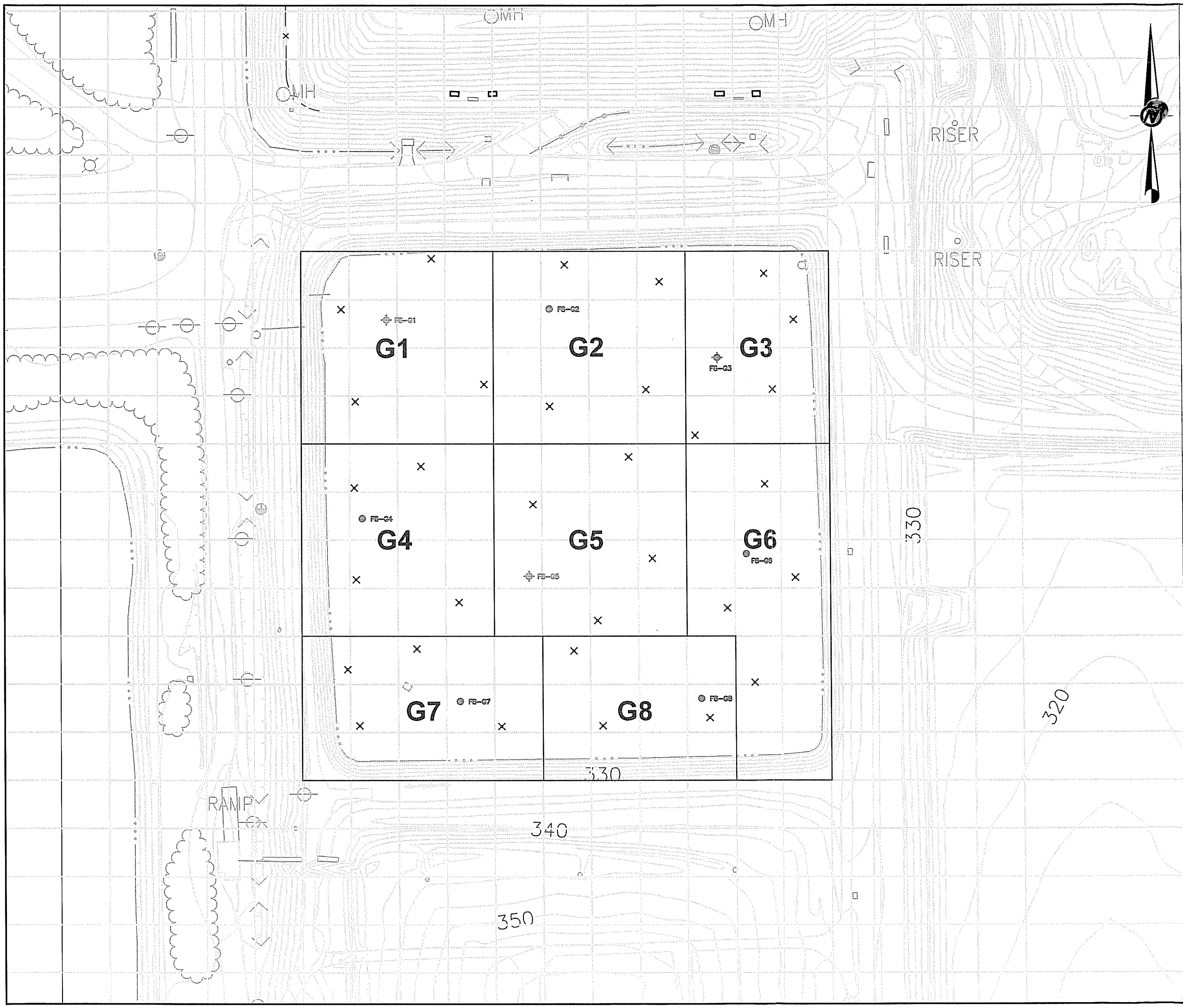
REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW

PROJECT
CWM CHEMICAL SERVICES, L.L.C.
RMU-2 PHASE I GROUNDWATER
MONITORING PROGRAM
MODEL CITY, NEW YORK

TITLE
GLACIOLACUSTRINE SILT/SAND POTENTIOMETRIC SURFACE CONTOURS
OCTOBER 2008

Golder Associates
Buffalo, NY

PROJECT No.	083-89111		FILE No.	08389111A348
DESIGN	AJH	1/15/07	SCALE AS SHOWN	REV. 0
CADD	AJH	12/9/08		
CHECK	[illegible]	[illegible]	FIGURE 5	
REVIEW	[illegible]	[illegible]		



LEGEND

×	COMPOSITE SUB-SAMPLE LOCATION (COLLECTED 0"-1" AND 6"-7" BELOW GROUND SURFACE)
● F8-G2	PRIORITY POLLUTANT ORGANICS (PPO) AND METALS GRAB SAMPLE LOCATION (COLLECTED 6"-7" BELOW GROUND SURFACE)
⌖ F8-G1	MODIFIED APPENDIX 33 LIST AND METALS GRAB SAMPLE LOCATION (COLLECTED 6"-7" BELOW GROUND SURFACE)
G1	GRID DESIGNATION

NOTES

1.) ALL SAMPLE LOCATIONS ARE APPROXIMATE.

REFERENCES

1.) BASE MAP COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED MAY 31, 2001 BY AIR SURVEY CORP., DULLES, VIRGINIA.

100 0 100

SCALE FEET

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	01/01/01	XXX	REV_DESC	XXX		

PROJECT
CWM CHEMICAL SERVICES, L.L.C.
FACULTATIVE POND 8 CLOSURE
MODEL CITY, NEW YORK

TITLE

FACULTATIVE POND 8
GRID LAYOUT AND SAMPLE LOCATIONS

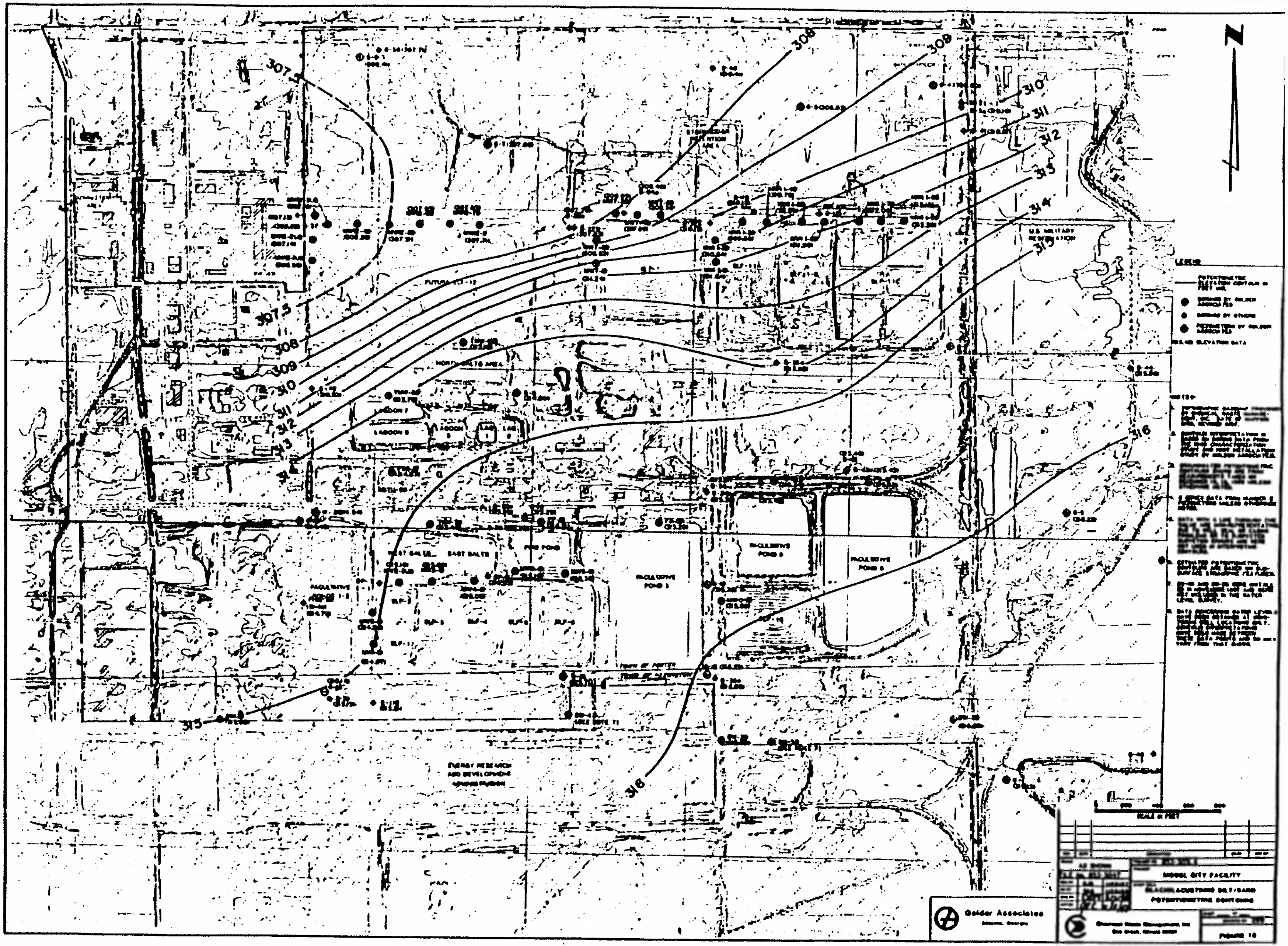
Golder Associates
Buffalo, NY

PROJECT No.		053-9442	FILE No.	0539442A257
DESIGN	JPR	9/7/05	SCALE AS SHOWN	REV. 0
CADD	RJM	5/6/09		
CHECK	EL	6/11/09		
REVIEW	BCS	11/3/09		

FIGURE 3

EXHIBIT 6

POTENTIOMETRIC MAPS OF THE GLACIOLACUSTRINE SILT/SAND UNIT


N
307.5
307.5
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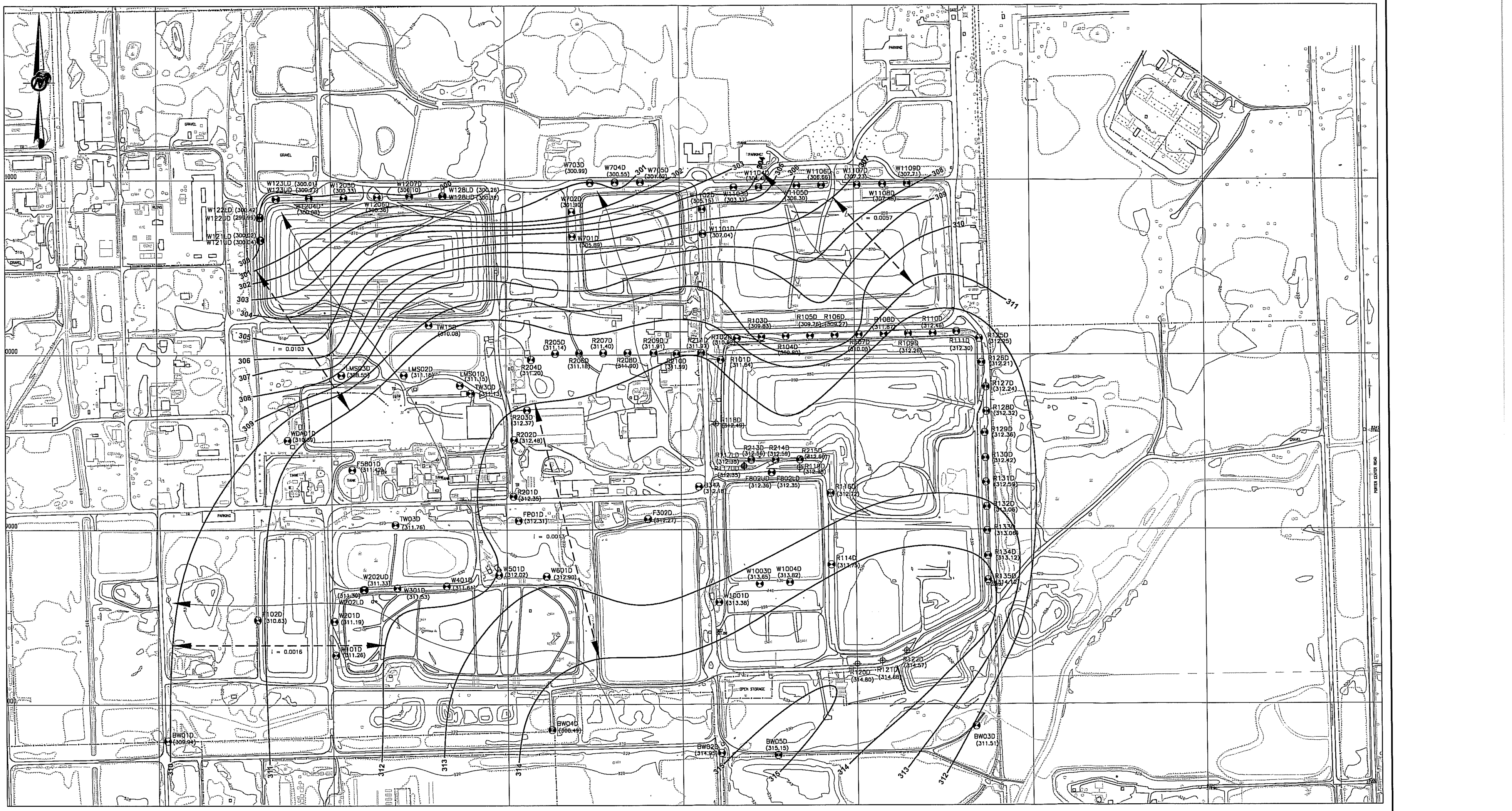
316
FUTURE FCT-12
NORTH SALTS AREA
LAGOON 1
LAGOON 2
WEST SALTS
EAST SALTS
FACULTATIVE POND 1-2
FACULTATIVE POND 3
FACULTATIVE POND 5
FACULTATIVE POND 8
FIRE POND
U.S. MILITARY RESERVATION
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
LEGEND
GROUND ELEVATION DATA
NOTES:
SCALE IN FEET
AS SHOWN
MODEL CITY FACILITY
GLACIOLACUSTRINE SILT/SAND POTENTIOMETRIC CONTOURS
Golder Associates
Atlanta, Georgia
Chemical Waste Management, Inc.
Oak Brook, Illinois
FIGURE 10



LEGEND

●	GLACIOLACUSTRINE SILT/SAND UNIT MONITORING WELL
⊕	GLACIOLACUSTRINE SILT/SAND UNIT PIEZOMETER
BW03D	GLACIOLACUSTRINE SILT/SAND UNIT MONITORING WELL/PIEZOMETER DESIGNATION
(309.65)	GROUNDWATER ELEVATION
~~(313.88)~~	GROUNDWATER ELEVATION NOT USED FOR INTERPRETATION
310 ———	LINE OF EQUAL POTENTIAL
———▶	FLOW DIRECTION
◀— — — —▶ i=0.0103	HYDRAULIC GRADIENT

NOTES

1.) WATER LEVELS OBTAINED ON OCTOBER 15, 2008 BY CWM and GOLDER PERSONNEL.

REFERENCES

1.) BASE MAP COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED MAY 31, 2001 BY AIR SURVEY CORP., DULLES, VIRGINIA.

2.) FIGURE ORIGINALLY PRESENTED IN THE REPORT ENTITLED "2008 GROUNDWATER LEVEL INTERPRETATION, CWM CHEMICAL SERVICES, L.L.C., MODEL CITY, NEW YORK", DATED FEBRUARY, 2009 BY GOLDER ASSOCIATES.

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW

PROJECT
CWM CHEMICAL SERVICES, L.L.C.
RMU-2 PHASE I GROUNDWATER
MONITORING PROGRAM
MODEL CITY, NEW YORK

TITLE
GLACIOLACUSTRINE SILT/SAND POTENTIOMETRIC SURFACE CONTOURS OCTOBER 2008

Golder Associates
Buffalo, NY

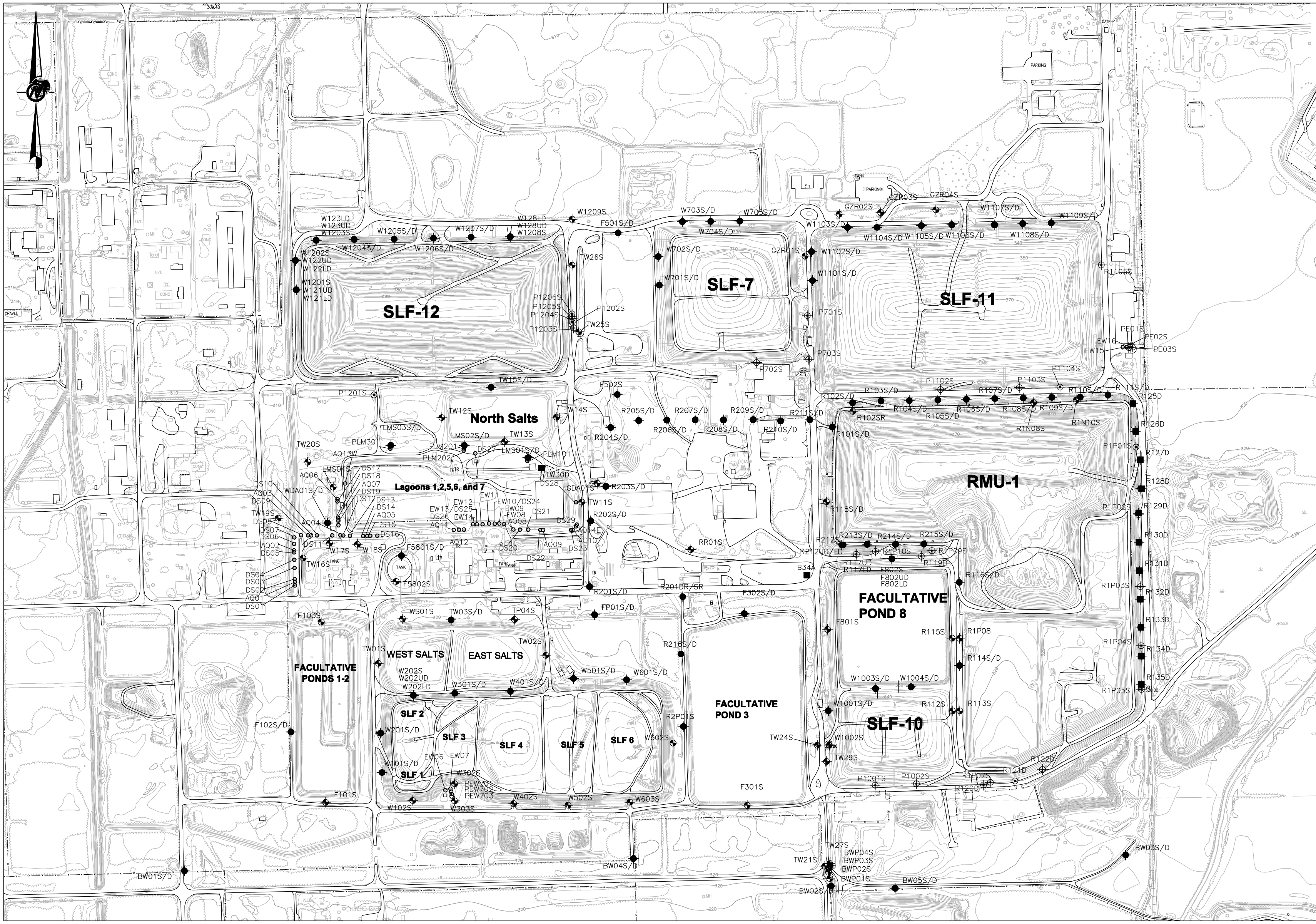
PROJECT No.	083-89111		FILE No.	08389111A349
DESIGN	AJN	1/15/07	SCALE AS SHOWN	REV. 0
CADD	AJN	12/9/09		
CHECK	Rjm	1/26/10		
REVIEW	Rw	1/26/10		

FIGURE 5

EXHIBIT 7

FACILITY WELLS

(Golder Assoc., 2009A, Fig.5)



LEGEND

⌖	UPPER TILLS UNIT (SHALLOW) MONITORING WELL
◆	UPPER TILL UNIT (SHALLOW) AND GLACIOLACUSTRINE SILT/SAND UNIT (DEEP) MONITORING WELL PAIR OR TRIPLET
■	GLACIOLACUSTRINE SILT/SAND UNIT (DEEP) MONITORING WELL OR DEEP PAIR
⌖	PIEZOMETER
○	GROUND WATER EXTRACTION AQUEOUS SUMP, DNAPL SUMP OR EXTRACTION WELL

NOTES

1.) WELL AND PIEZOMETER LOCATIONS ARE APPROXIMATE.

REFERENCES

1.) BASE MAP COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED MAY 31, 2001 BY AIR SURVEY CORP., DULLES, VIRGINIA.

200 0 200 400
SCALE FEET

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
6	1/12/10	AJN	Added RMU-2 Footprint Relocation wells: F501S/D, F502S; R201DR/SR; R216D/S; R2P01S; R212S/UD/LD.	AJN	DCW	BCS
5	10/9/08	AJN	Added RMU-2 wells; west-central portion of figure. Removed wells R1P06S, R123D and R124D (removed for construction of truck ramp).	AJN	DCW	BCS
4	2/21/05	AJN	Changed name of F58025 to F5802S.	AJN	JPR	JPR
3	9/23/04	JPR	Changed R118S/D from piezometers back to monitoring wells.	JPR	JPR	BCS
2	2/11/04	AJN	Removed compliance boundaries; changed R118S/D, R117LD/UD, R119D-R124D to piezometers.	AJN	JPR	BCS
1	10/29/03	JPR	Added new wells east of RMU-1 and compliance boundaries.	JPR	JPR	BCS

PROJECT

CWM CHEMICAL SERVICES, L.L.C.
MODEL CITY, NEW YORK

TITLE

FACILITY WELLS

Golder Associates
Buffalo, NY

PROJECT No.	023-9312		FILE No.	0239312D172
DESIGN	JPR	02/04/02	SCALE AS SHOWN	REV. 1
CADD	AJN	1/12/10		
CHECK	DCW	1/25/10		
REVIEW	DCW	2/1/10		

FIGURE 5