workplan.hw.243018.2009-02-27.D004437-23_CDM.pdf

New York State Department of Environmental Conservation
Division of Environmental Remediation, 12th Floor
625 Broadway, Albany, New York 12233-7012
Phone: (518) 402-9764 • **FAX:** (518) 402-9722
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

February 27, 2009

Mr. Michael Memoli, P.E.
Program Manager
Camp Dresser & McKee
100 Crossways Park West, Suite 415
Woodbury, New York 11797

RE: Schedule 2.11 Approvals
Contract/WA No.: **D004437-23.1**
Site/Spill Name: **Former Paul Miller Dry Cleaners**
Site/Spill No./PIN: **243018**

Dear Mr. Memoli:

The New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) hereby approves the enclosed Schedule 2.11s for the above referenced WA Amendment in the amount of $31,878.43 for a total WA amount not to exceed $284,166.19. Your firm may now submit a request for reimbursement for work completed under this WA.

If you have any questions regarding the WA, please contact the Project Manager, Kevin Sarnowicz at (518) 402-9774.

Sincerely,

Michael J. Cruden, P.E.
Chief
Contracts and Payments Section
Bureau of Program Management
Division of Environmental Remediation

Attachments

ec: K. Sarnowicz, PM
A. Indelicato, CM
D. Desnoyers
S. Ervolina
D. Weigel
M. Cruden
R. Cozzy
J. Quinn
V. Brevdo, Region 2
D. Finlayson
T. Wolosen
M/WBE Unit

DOB/Office of the Director of State Operations Approved Request

Agency Code: 09000 **Agency:** Environmental Conservation, Department of
Request #: 09000-14-2008
Request Type: Capital - Change Orders / Other
NPS Type: N/A
Agency Contact: NANCY LUSSIER - 518-402-9228
Date Submitted to DOB: 02/19/2009

Request Title: Former Paul Miller Dry Cleaners, Site #243018

Description: CDM, Contract #D004437, Work Assignment #23, Former Paul Miller Dry Cleaners amendment, Site #243018. The work assignment is nearing completion & additional money is needed to cover increased costs that were incurred during the course of the investigation.

Justification: The authority for engineering standby contracts is granted by the ECL. Engineering standby contracts are typically used to address inactive hazardous waste sites or incidences under Navigaton Law. Cleanup of inactive hazardous waste sites are performed under 6 NYCRR Part 375 Environmental Remediation Programs. Once the contract is approved, site specific work assignments are issued. Many of these sites require cleanup and site management over multiple years.

Status

Status: Approved
Date Approved: 02/25/2009
DOB Approver: NANCY REUSS
Unit: Economic Development, Energy and Environment Unit
Validated by the Office of the Director of State Operations

Estimated Value
This Request:$ 31,878.00

CDM

Raritan Plaza I, Raritan Center
Edison, NJ 08818
tel: 732-225-7000
fax: 732-225-7851

January 27, 2009

Ms. Andrea Indelicato
Contract Manager
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233

PROJECT: NYSDEC Standby Contract No. D004437
Work Assignment No.: D004437-23
Re-budget Amendment

SUBJECT: Former Paul Miller Dry Cleaners (Site No. 2-43-018)
1465 Forest Avenue
Port Richmond, Richmond County, New York

Dear Ms. Indelicato:

Camp Dresser & McKee (CDM) is pleased to provide this explanation of the changes that were made to the budget for the above-referenced project. The overall cost of the project slightly exceeds the $252,287.76 that was authorized in the Work Plan Approval/Notice to Proceed dated March 27, 2008. Costs were shifted between tasks, and additional costs were included in the re-budget primarily to account for the additional work that was necessary to successfully install the monitoring wells at the site.

Successful installation of all of the proposed monitoring wells at the site required the use of two drilling companies, as well as involved additional CDM labor in the form of oversight, task management, and monitoring well development. The original drilling company, Aztech Technologies, Inc. (Aztech), originally estimated that 12 days were necessary to complete drilling at the site. After 14 days of Aztech successfully drilling and installing only five of the of the 13 proposed monitoring wells at the site, CDM and NYSDEC decided to let Aztech move on to other projects and to retain the services of another drilling company to complete the Former Paul Miller site monitoring well installation activities. Three bids were obtained for the drilling (**Attachment 1**), and the ultimate selection of Delta Well and Pump Co. (Delta) for completion of drilling activities was discussed with and approved by NYSDEC in July 2008. Delta successfully completed drilling and installation of the remaining eight wells in 20 days. Following is a summary of the changes that were made to the project budget.

Budget Estimates

<u>Estimated Budget and Level of Effort (LOE) Summary</u>
Former Paul Miller Dry Cleaners Site
Port Richmond, New York
Site No. 2-43-018

Task Items	Description/Cost	Dollars
1	Work Plan Development	Decreased $6,806.29 Total $7,236.52
2	Site Characterization	Increased $58,669.85 Total $235,616.97
3	Field Documentation and Reporting	Decreased $19,985.13 Total $41,312.71
	Total Estimated Budget Increase	**$31,878.43**
	Total Estimated Budget (Tasks 1 - 3)	**$284,166.19**

Attachment 2 presents the detailed costs by task and subtask on the amended NYSDEC schedule 2.11 forms. A Cost Review Checklist for Work Plan or Amendment form is provided in **Attachment 3**.

The addition of the Amendment No. 1 costs to the budget of this work assignment is expected to result in the M/WBE participation on the project to be 44.21% of the total project budget (15.85% MBE and 28.36% WBE). This is an increase of 6.35% in total M/WBE participation on this project. The M/WBE Utilization Plan Form is provided in **Attachment 4**.

The following is a summary of the changes that were made to the Schedule 2.11 forms (Amended 2.11s provided in **Attachment 2**). The costs discussed below pertaining to subcontractor-related items (2.11f items) include the subcontract management fee, where applicable.

- Delta was added as a WBE Well Driller to the "A) Total Cost-Plus-Fixed-Fee Subcontracts" section on the 2.11a form.

- The Direct Salary costs on the 2.11b form were revised for Task 3 and part of Task 2 to reflect the current 2009 reimbursement rates for Direct Salary Costs. Additionally, unused hours from the Task 1 budget were applied to the Task 2 budget to compensate for the extra hours of CDM oversight of drilling activities during the second phase of drilling conducted by Delta. The amended Total Direct Labor Cost totals $43,221.82, which increased from the originally approved total of $42,176.84.

- Total Direct Administrative Hours Budgeted on the 2.11b1 form increased from 38 to 39.5 hours.

- The costs for Ken Shider Consulting on sheet 211e decreased to $75.00 from the originally approved budget of $599.97. The reason for this is that the subcontractor was removed from the project as the M/WBE reporting consultant. His remaining tasks were conducted by CDM, and the remaining budget allotted for this work was rolled over into the Direct Labor Hours budgeted on the 2.11b form.

- The geophysical survey costs on Form 2.11f(geophysical) increased to $2,540.00 from the originally approved amount of $1,945.00. The reason for this increase is that a second mobilization to the site was required when concern was expressed over our initially selected locations being too close to an adjacent property undergoing its own investigation and cleanup (Michael's in association with the Charlton Cleaners site).

- Data validation costs reflected on Form 2.11f(datavalidation) decreased to $3,027.47 from the originally approved amount of $3,179.61 due to the fact that less samples were collected that required data validation.

- Drilling: The total cost for Aztech decreased to $32,793.76 from the originally proposed amount of $53,155.58 (on the originally approved 2.11 form 2.11f(drilling)). The original amount was proposed in the project work plan for the completion of all drilling activities onsite. The revised total Aztech costs are provided on the Form 2.11f(Aztech_drilling) of this amendment; these costs reflect the partial completion of the drilling work that was to be conducted under Task 2. A new 2.11f form, 2.11f(drilling_Delta), was added to the Schedule 2.11s for the second drilling company used at the site, Delta. Delta was not one of the original subcontractors identified in the project work plan. They were used for completion of drilling activities under Task 2. Total costs for Delta are $48,793.50. This results in a combined drilling total of $81,587.26, as reflected in this amendment.

- Laboratory costs reflected on Form 2.11f(Lab) increased to $34,923.89 from the originally proposed amount of $31,043.09. The reason for the cost increase is due to the fact that it was requested that the removal of investigation derived waste (IDW) generated during the initial field efforts be expedited. Additionally, due to the fact that evidence of contamination was observed during monitoring well installation activities, it was decided that additional waste characterization samples be collected so as to minimize the quantity of IDW that was to be removed as hazardous waste.

- IDW handling costs reflected on the 2.11f(IDW) form decreased to $12,562.00 from the originally proposed amount of $15,750. This is due to the fact that fewer hazardous 55-gallon drums were generated than originally anticipated.
- The 2.11g(Task3) summary form was updated to include the 2009 labor rates.
- The 2.11g supplemental forms were updated to include Delta.
- The hours in Form 2.11h were updated to reflect the changes made to the 2.11b form, specifically the addition of the 2009 labor rates for Task 2 and Task 3 items.

If you have any questions, or need additional information, please do not hesitate to contact me.

Very truly yours,

Cristina Ramacciotti
Project Geologist
Camp Dresser & McKee Inc.

cc: K. Sarnowicz/NYSDEC
D. Keil/CDM
D. Durfee/CDM
File

Attachments (4)

Attachment 2

Schedule 2.11(a)

Summary of Work Assignment Price

Work Assignment Number ***<u>D004437-23</u>***

1) Direct Salary Costs (Schedules 2.10(a) and 2.11(b))			$43,222
2) Indirect Costs (Schedule 2.10(g))			$72,569
3) Direct Non-Salary Costs (Schedules 2.10(b)(c)(d) and 2.11(c)(d))			$12,727

4) Subcontract Costs

Cost-Plus-Fixed-Fee Subcontracts (Schedule 2.10(e) and 2.11(e))

	Name of Subcontractor	Services To Be Performed	Subcontract Price
i)	YEC, Inc	MBE Surveying & Field Support	$11,704
ii)	Ken Schider Consulting	W/MBE Reporting	$75
iii)			

A) Total Cost-Plus-Fixed-Fee Subcontracts $11,779

Unit Price Subcontracts (Schedule 2.10 (f) and 2.11 (f))

	Name of Subcontractor	Services To Be Performed	Subcontract Price
i)	EDR	City Directories	$495
ii)	Aztech Technologies, Inc.	WBE Well Driller	$31,232
iii)	Delta Well and Pump Co., Inc.	WBE Well Driller	$46,470
iv)	ChemTech	MBE Laboratory	$33,261
v)	Nancy Potak	WBE Data Validator	$2,883
vi)	Naeva Geophysics	Geophysical Survey	$2,540
vii)	SeaCoast Environmental Services	IDW Removal	$12,562

B) Total Unit Price Subcontracts	$129,443	
5) Subcontract Management Fee	$6,320.42	
6) Total Subcontract Costs (lines 4A + 4B + 5)		$147,542
7) Fixed Fee (Schedule 2.10(h))		$8,105
8) Total Work Assignment Price (Lines 1 + 2 + 3 + 6 + 7)		$284,166

Engineer/Contract # D004437-23
Project Name former Paul Miller Dry Cleaners Site
Work Assignment No. D004437-23

Date Prepared: 1/27/2009

Schedule 2.11(b)
Direct Labor Hours Budgeted

Labor Classification	*IX*		*VIII*		*VII*		*VI*		*V*		*IV*		*III*		*II*		*I*		*Admin Support*		*Total No. of Direct Labor Hours and Costs Budgeted*	
*Av. Salary Rate ($) Year 2008	$65.24		$59.42		$52.09		$45.95		$38.75		$32.86		$28.62		$25.52		$21.12		$21.12		0	
Description	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost
Task 1 Work Plan Development	3	$195.72	16	$950.72	1	$52.09	2	$91.90	0	$0.00	31.5	$1,035.09	0	$0.00	0	$0.00	0	$0	3.5	$73.92	57	$2,399.44
Task 2 Site Characterization	27	$1,761.48	24	$1,426.08	2	$104.18	69	$3,170.55	0	$0.00	204	$6,703.44	11	$314.82	489	$12,479.28	10	$211	20	$422.40	856	$26,593.43
Total Hours	30		40		3		71		0		236		11		489		10		23.5		913	
Total Direct Labor Cost ($) **Year 2008**		$1,957.20		$2,376.80		$156.27		$3,262.45		$0.00		$7,738.53		$314.82		$12,479.28		$211.20		$496.32		$28,992.87

Labor Classification	*IX*		*VIII*		*VII*		*VI*		*V*		*IV*		*III*		*II*		*I*		*Admin Support*		*Total No. of Direct Labor Hours and Costs Budgeted*	
*Av. Salary Rate ($) Year 2009	$66.26		$60.35		$52.90		$46.67		$39.36		$33.38		$29.07		$25.92		$21.45		$21.45		0	
Description	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost
Task 2 Site Characterization	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	6	$200.28	0	$0.00	36	$933.12	0	$0	0	$0.00	42	$1,133.40
Task 3 Field Documentation and Reporting	2	$132.52	40	$2,414.00	40	$2,116.00	4	$186.68	0	$0.00	200	$6,676.00	40	$1,162.80	0	$0.00	12	$257	7	$150.15	345	$13,095.55
Total Hours	2		40		40		4		0		206		40		36		12		7		387	
Total Direct Labor Cost ($) **Year 2009**		$132.52		$2,414.00		$2,116.00		$186.68		$0.00		$6,876.28		$1,162.80		$933.12		$257.40		$150.15		$14,228.95

* For multiple years use one average salary rate row for each year and each years subtotal Labor Cost.

Engineer/Contract # D004437

Project Name Former Paul Miller Dry Cleaners

Work Assignment No. D004437-23

Date Prepared: 1/27/2009

Schedule 2.11(b-1)
Direct Administrative Labor Hours Budgeted

Labor Classification		*IX*	*VIII*	*VII*	*VI*	*V*	*IV*	*III*	*II*	*I*	*Admin. Support*	*Total No. of Direct Labor Hrs.*
Task 1	Work Plan Development	3	2	1	2	0	0	0	0	0	3.5	11.5
Task 2	Site Characterization	2	0	0	0	0	0	0	0	0	20	22
Task 3	Field Documentation and Reporting	1	0	0	0	0	0	0	0	0	4	5
TOTAL HOURS		6	2	1	2	0	0	0	0	0	27.5	38.5

Contract/Project administrative hours would include (subject to contract allowability) but not necessarily be limited to the following activities:

1) Work Plan Budget Development
   > Conflict of Interest Check
   > Budget schedules & supporting documentation
2) Review work assignment (WA) progress
   > Conduct progress reviews
   > Prepare monthly project report
   > Update WA progress schedule
   > Prepare M/WBE Utilization Report
3) Contractor Application for Payment (CAP)
   > Oversee and prepare monthly CAP

4) Program Management
   > Prepare monthly cost control report
   > Cost control reviews
   <> Staffing Plans
   >Manage subcontracts
   > NSPE list update
   > Equipment inventory
5) Miscellaneous
   > Conduct Health and Safety Reviews
   > Word processing and graphic artists
   > Report editing

Contract/Project Administration hours would **not** include:
1) QA/QC reviews
2) Techincal oversight by management
3) Develop subcontracts
4) Work plan development
5) Review of deliverables

Schedule 2.11 (c)

Direct Non-Salary Costs
Work Assignment Number **D004437-23**

	Item	Max. Reimbursement * Rate (Specify Unit)	Est. No. of Units	Total Estimated Cost
A)	Other			
1)	Shipping Task 1	LS	1	$25.00
2)	Outside Printing Task 1	LS	1	$250.00
3)	Shipping Task 3	LS	1	$50.00
4)	Outside Printing Task 3	LS	1	$400.00
			Sub-Total Other	$725.00
B)	Miscellaneous Task 1 - Workplan Development			
1)	Meals (per day)	$64.00	0	$0.00
2)	Lodging (per day)	$159.00	0	$0.00
3)	Mileage (per mile)	$0.505	90	$45.45
4)	PPE (level D) (per day)	$15.00	0	$0.00
5)	Tolls	$15.00	2	$30.00
6)	LVE	$1.00	8	$8.00
			Sub-Total Miscellaneous Task 1	$83.45
B)	Miscellaneous Task 2 - Site Characterization			
1)	Meals (per day)	$64.00	31	$1,984.00
2)	Lodging (per day)	$159.00	0	$0.00
3)	Mileage (per mile)	$0.505	400	$202.00
4)	PPE (level D) (per day)	$15.00	31	$465.00
5)	Tolls	$15.00	31	$465.00
6)	LVE	$1.00	208	$208.00
			Sub-Total Miscellaneous Task 2	$3,324.00
			Total Direct Non-Salary Costs	**$4,132.45**

Work Assignment No. D004437-23

Schedule 2.11(d) 3

Maximum Reimbursement Rate for Vendor Rented Equipment

Item	Max Reimbursement Rate ($)*	Est. Usage (unit of time)	Est. Rental Cost ($) (Col. 2 x 3)
Task 2			
PID (month)	$398.75	1	$398.75
CGI (week)	$247.50	3	$742.50
Bailers, weighted teflon (3') (2 cases of 12 and 3 individual)	$415.80	1	$415.80
Submersible pump (week)	$159.50	2	$319.00
Oil-Water Interface probe (day)	$24.75	1	$24.75
Water level meter (week)	$27.50	2	$55.00
Horiba U-22 Water Quality meter (week)	$165.00	2	$330.00
3/8"IDx1/2"OD poly tubing (feet)	$0.25	1350	$337.50
Generator (week)	$74.25	2	$148.50
Truck (from Enterprise) (month)	$2,600.50	2	$5,201.00
Dust Monitor (week)	$104.50	3	$313.50
Helium tank rental (from Walmart)	$60.00	1	$60.00
Helium Meter (day)	$49.50	2	$99.00
Teflon-lined tubing (3/16 by 1/4") (feet)	$1.00	100	$100.00
Low Flow Pump (<0.2 L/min) (day)	$24.75	2	$49.50
		SUBTOTAL:	**$8,594.80**

* Reimbursement will be made at the Maximum Reimbursement rate or the actual rental rate, whichever is less.

Schedule 2.11 (e)

Cost-Plus-Fixed-Fee Subcontracts
Work Assignment Number D004437-23

Name of Subcontractor	Services to be Performed	Subcontract Price
Ken Schider Consulting	M/WBE Reporting	$75.00

A) *Direct Salary Costs*

Professional Responsibility Level	Labor Classification	Ave. Reimbursement Rate ($/Hr.)	Max. Reimbursement Rate ($/Hr.)	Est. No. of Hours	Total Est Direct Salary Cost (Ave. Reimb. Rate x Est. # of Hrs.)
IV	Eng/Scientist 4	$32.60	$36.78	1	$32.60

Total Direct Salary Costs **$32.60**

Footnotes:

1) The labor rate averages and maximums shall be adjusted by a rate equal to the increase in the CPI index CUURA101SAO-"All Urban Consumers-New York-Northern N.J.-Long Island" for the previous year. This index is published by the U.S. Department of Labor's Bureau of Labor Statistics. The adjustment will be calculated every January and will be effective for subsequent work assignment billing and budgeting purposes.
2) Schedule 2.11(e) may be re-negotiated after four (4) years at the request of either party. Any revision as a result of re-negotiation will be subject to the approval of the Office of the State Comptroller.
3) The maximum annual escalation is limited to 5%.
4) Reimbursement will be limited to the lesser of either the individual's actual hourly rate or the maximum rate for each labor
5) Reimbursement will be limited to the maximum reimbursement rate for the professional responsibility level of the actual work
6) Only those labor classifications indicated with an asterisk will be entitled to overtime.
7) Reimbursement for technical time of principals, owners, and officers will be limited to the maximum reimbursement rate of that category, the actual hourly labor rate paid, or the State M-6 rate, whichever is lower.
8) Maximum reimbursement rates may be exceeded for work assignment activities that are under the jurisdiction of the Schedule of Prevailing Wage Rates set by the New York State Department of Labor.

B) *Indirect Costs*

Indirect costs shall be paid based on a percentage of direct salary costs incurred which shall not exceed a maximum of 115 % or the actual rate calculated in accordance with 48 CFR Federal Acquisition Regulation, whichever is lower.

Amount budgeted for indirect costs is: **$37.49**

C) *Maximum Reimbursement Rates for Direct Non-Salary Costs*

Item	Max Reimbursement Rate (Specify Unit)	Est. No. of Units	Total Est. Cost
1) Travel	See Schedule 2.10 (d) for rates		
2) Supplies			

Total Direct Non-Salary Costs **$0**

D) *Fixed Fee*

The fixed fee is: 7% **$4.91**
See Schedule 2.10 (h) for how the fixed fee should be claimed.

YEC, INC./YEC ENGINEERING, P.C.
Clarkstown Executive Park
612 Corporate Way, Suite 4M
Valley Cottage, NY 10989
Tel: (845) 268-3203 Fax: (845) 268-5313

Schedule 2.11 (e)
Cost Plus Fixed-Fee Subcontracts

Former Paul Miller Dry Cleaners Site

January 29, 2009

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICE
YEC, INC.	Survey and CAD	**$11,703.58**

A. Direct Salary Costs

Professional Responsibilty Level	Labor Classi-fication	Average Reimbursement Rate ($/Hr.)		Maximum Reimbursement Rate ($/Hr.)		Estimated Number of Hours	Total Estimated Direct Salary Cost ($)
Principal	VIII	2008	67.14	2008	72.53	2	134.28
Senior Geologist/Scientist/ Engineer/ Licensed Surveyor	V	2008	44.39	2008	48.83	36	1,598.04
Staff Geologist/ Scientist/Engineer	IV	2008	38.56	2008	42.45	8	308.48
Staff Geologist/ Scientist/Engineer/CAD Operator	III	2008	33.50	2008	37.16	36	1,206.00
Senior Technician/Staff Engineer/Scientist/Geologist	II	2008	24.76	2008	27.76	36	891.36
Technician/Draftsperson	I	2008	22.43	2008	25.15	0	0.00
						Total Direct Salary Costs:	**4,138.16**

B. Indirect Costs - 117% of direct salary cost

Indirect Costs: **4,841.65**

C. Maximum Reimbursement Rates for Direct Non-Salary Costs:

Item	Maxium Reimbursement Rate	Estimated No. of Units		
Mileage	0.505 /mi.	120 miles/trip	3 trips	181.80
Tolls	20.00 /day	3 trips		60.00
Survey Equipment Rental	65.00 /day	3 days		195.00
CAD Equipment	15.00 /hour	6 hours		90.00
GPS Subcontractor				850.00
			Total Direct Non Salary Costs:	**1,376.80**

D. Fixed Fee (15% of Total Direct and Indirect Salary Costs)

Fixed Fee: **1,346.97**

Schedule 2.11 (f)

Unit Price Subcontracts
Work Assignment Number D004437-23

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
EDR	Environmental Database, Aerial Photos, Topo Maps, etc	$495	$0

Item	Max. Reimbursement Rate (Specify Unit)	Est. No. of Units	Total Est. Cost
City Directories (30 Properties)		1	$495
Subtotal-Subcontract Price			**$495**
Subcontract Management Fee*			**$0**
TOTAL			**$495.00**

Schedule 2.11 (f)

Unit Price Subcontracts
Work Assignment Number **D004437-23**

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
Naeva Geophysics, Inc.	Utility Locate	$2,540.00	$0

Item	Max. Reimbursement Rate (Specify Uni	Est. No. of Units	Total Est. Cost
Geophysical Survey (Clear Drilling Locations)			
Project Total:	$1,710 day	1	$1,710.00
(5 hrs for 2-man crew, 2 hrs driving, 2 hrs GPR)			
Additional clearing at moved locations	$830 half day	1	$830.00
Subtotal-Subcontract Price			**$2,540.00**
Subcontract Management Fee*			**$0.00**
TOTAL			**$2,540.00**

Schedule 2.11 (f)

Unit Price Subcontracts
Work Assignment Number **D004437-23**

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
Nancy Potak	WBE Data Validator	$2,883.30	$144.17

Item	Max. Reimbursement Rate (Specify Unit)		Est. No. of Units	Total Est. Cost
DATA VALIDATION Task 2				
Groundwater				
VOCs 8260B	$12	/Sample	21	$242.55
SVOCs 8270C	$21	/Sample	21	$441.00
Full List CLP-TCL/TAL+30	$83	/Sample	3	$248.85
Soil				
VOCs 8260B	$13	/Sample	43	$541.80
SVOCs 8270C	$19	/Sample	30	$567.00
Full List CLP-TCL/TAL+30	$90	/Sample	6	$541.80
Air				
TO-15 VOCs	$12	/Sample	13	$150.15
TO-15 Dilution	$12	/Sample	13	$150.15
Subtotal-Subcontract Price				**$2,883.30**
Subcontract Management Fee*				**$144.17**
TOTAL				**$3,027.47**

* A subcontract management fee of 5% has been included for M/WBE subcontracts.

Schedule 2.11 (f)

Unit Price Subcontracts

Work Assignment Number **D004437-23**

Name of Subcontractor	Subcontract Price	Management Fee
Aztech Technologies, Inc.	$31,232.16	$1,561.61

Item	Subcontractor Price	Units	Est. No. of Units	Total Est. Cost
Mobilization/ Demobilization	$6,010.00	ls	1	$6,010.00
Permits	$2,110.24	ls	1	$2,110.24
Per Diem	$255.00	days	10	$2,550.00
4.25 inch ID Hollow Stem Augering (0-50 feet)	$14.00	per LF	138	$1,932.00
6 inch ID Hollow Stem Augering (0-50 feet)	$16.50	per LF	10	$165.00
Wash Rotary (6-inch)	$55.00	per LF	20	$1,100.00
Wash Rotary (4-inch)	$45.00	per LF	90	$4,050.00
Drive and Wash (6-inch casing) - (0 to 50 ft)	$46.00	per LF	44	$2,024.00
2.0 inch split spoon sampling (0-50 feet)	$25.00	each	73	$1,825.00
2.0 inch split spoon sampling (>50 feet)	$35.00	each	5	$175.00
Schedule 40 PVC well screen, 2.0 inch ID, #10 slot	$5.00	per LF	50	$250.00
Schedule 40 PVC riser, 2.0 inch ID	$4.00	per LF	159	$636.00
Well screen sand pack for 2.0 inch monitoring - well set in 4.25 inch hollow stem augers	$5.00	per LF	65	$325.00
Seal for 2.0 inch monitoring well set in 4.25 inch hollow stem augers	$9.00	per LF	25.5	$229.50
Riser Backfill	$7.00	per LF	181.5	$1,270.50
Flush-Mount, 6.0 inch ID Protector with locking cover, drain hole and concrete apron	$125.00	each	5	$625.00
Supply Clean DOT-approved 55 gallon drums with wood pallets and tarps	$70.00	each	34	$2,380.00
Moving 55 gallon drums to borehole; filling, transporting and staging of drill cutting drums	$55.00	each	10.9	$600.42
Pump and surge method (w/surge block)	$157.00	per hour	2.25	$353.25
Construction of one (1) decontaimination steam-cleaning pad using a swimming pool	$150.00	per hour	1	$150.00
Steam cleaning of drill rig, tools and all other equipment between borings	$135.00	per hour	5.4	$731.25
Concrete saw	$75.00	per Day	3	$225.00
Generator	$75.00	per Day	5	$375.00
Steam Cleaner	$95.00	per Day	12	$1,140.00
Subtotal-Subcontract Price				**$31,232.16**
Costs assume 95% Level D and 5% Level C.				
Subcontract Management Fee*				**$1,561.61**
TOTAL				**$32,793.76**

* A subcontract management fee of 5% has been included for W/MBE subcontracts.

Schedule 2.11 (f)

Unit Price Subcontracts

Work Assignment Number <u>D004437-23</u>

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
Delta Well and Pump Co., Inc.	**WBE Driller**	**$46,470.00**	**$2,323.50**

Item	Unit Cost		Est. No. of Units	Total Est. Cost
Mobilization/ Demobilization	$9,500.00	ls	1	$9,500.00
Per Diem	$250.00	days	17	$4,250.00
4.25 inch ID Hollow Stem Augering	$20.00	per LF	490	$9,800.00
2.0 inch split spoon sampling (0-50 feet)	$40.00	each	119	$4,760.00
2.0 inch split spoon sampling (>50 feet)	$50.00	each	40	$2,000.00
Schedule 40 PVC well screen, 2.0 inch ID, #10 slot	$5.00	per LF	80	$400.00
Schedule 40 PVC riser, 2.0 inch ID	$4.00	per LF	337	$1,348.00
Well screen sand pack for 2.0 inch monitoring - well set in 4.25 inch hollow stem augers	$8.00	per LF	106.5	$852.00
Seal for 2.0 inch monitoring well set in 4.25 inch hollow stem augers	$25.00	per LF	16	$400.00
Riser Backfill	$15.00	per LF	297	$4,455.00
Flush-Mount, 6.0 inch ID Protector with locking cover, drain hole and concrete apron	$225.00	each	8	$1,800.00
Supply Clean DOT-approved 55 gallon drums with wood pallets and tarps	$50.00	each	45	$2,250.00
Moving 55 gallon drums to borehole; filling, transporting and staging of drilling fluid/development water drums	$15.00	each	42	$630.00
Pump and surge method (w/surge block)	$180.00	per hour	11.5	$2,070.00
Construction of one (1) decontaimination steam-cleaning pad using a swimming pool	$875.00	per hour	1	$875.00
Steam cleaning of drill rig, tools and all other equipment between borings	$180.00	per hour	6	$1,080.00
Subtotal-Subcontract Price				**$46,470.00**
Subcontract Management Fee*				**$2,323.50**
TOTAL				**$48,793.50**

* A subcontract management fee of 5% has been included for W/MBE subcontracts.

Schedule 2.11 (f)

Unit Price Subcontracts
Work Assignment Number *D004437-23*

Name of Subcontractor **ChemTech**
Services to be Performed **MBE Laboratory**
Subcontract Price **$33,260.85**
Management Fee **$1,663.04**

Item	Max. Reimbursement Rate	Specify Unit	Est. No. of Units	Total Est. Cost
Task 2 - Site Characterization				
SAMPLING EQUIPMENT				
Summa Cannisters/Regulators/Tedlar bags	$52.50	Sample	14	$735.00
LABORATORY ANALYSIS				
Groundwater				
VOCs 8260B	$89.25	Sample	21	$1,874.25
SVOCs 8270C	$199.50	Sample	21	$4,189.50
Full List CLP-TCL/TAL+30	$546.00	Sample	3	$1,638.00
Soil				
VOCs 8260B	$89.25	Sample	43	$3,837.75
SVOCs 8270C	$199.50	Sample	30	$5,985.00
Full List CLP-TCL/TAL+30	$546.00	Sample	6	$3,276.00
Air				
TO-15 Air	$187.95	Sample	13	$2,443.35
Waste (Category A)				
TCLP VOCs 8260B	$84.00	Sample	13	$1,092.00
TCLP SVOCs 8270C	$189.00	Sample	13	$2,457.00
Pesticides (8081)	$105.00	Sample	13	$1,365.00
Herbicides (8151)	$89.25	Sample	13	$1,160.25
Metals	$99.75	Sample	13	$1,296.75
TCLP Extraction (1311)	$52.50	Sample	13	$682.50
RCRA Corrosivity (9045C)	$10.50	Sample	13	$136.50
RCRA Ignitability (1010, 1029A, 1030)	$21.00	Sample	13	$273.00
Reactive Sulfide (9012, SW-846 Ch7, Sec 7.3	$42.00	Sample	13	$546.00
Reactive Cyanide (9012A)	$21.00	Sample	13	$273.00
			Subtotal-Subcontract Price	**$33,260.85**
			Subcontract Management Fee*	**$1,663.04**
			TOTAL	**$34,923.89**

* A subcontract management fee of 5% has been included for W/MBE subcontracts.

Schedule 2.11 (f)

Unit Price Subcontracts
Work Assignment Number D004437-23

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
SeaCoast Environmental Services, Inc.	IDW Removal	$12,562.00	$628.10

Item	Max. Reimbursement Rate (Specify Unit)	Est. No. of Units	Total Est. Cost
IDW Removal (Non-Hazardous)	$60 drum	56	$3,360.00
IDW Removal (Hazardous)	$160 drum	20	$3,200.00
IDW Removal (Hazardous pH)	$289 drum	3	$867.00
Per Drum Transportation fee	$65 drum	79	$5,135.00
		TOTAL	**$12,562.00**

* Subcontract Management Fee of 5% on Subcontracts over $10,000

Schedule 2.11 (g) - Summary

Monthly Cost Control Report
Summary of Fiscal Information

Engineer **Camp Dresser & McKee**
Contract No. **D004437**
Project Name **Former Paul Miller Dry Cleaners**
Work Assignment No. **D004437-23**
Summary of Tasks
Percentage Completed

Date Prepared ____________
Billing Period ____________
Payment No. _____ **Invoice No.** ____________

	A	B	C	D	E	F	G	H
Expenditure Category	*Costs Claimed This Period*	*Paid to Date*	*Total Disallowed to Date*	*Total Costs Incurred to Date (A+B+C)*	*Estimated Costs to Completion*	*Estimated Total Work Assignment Price (A+B+E)*	*Approved Budget*	*Estimated Under/Over (G-F)*
1. Direct Salary Costs	$0	$0	$0	$0	$0	$0	$43,222	$0
2. Indirect Costs - '167.9%	$0	$0	$0	$0	$0	$0	$72,569	$0
3. Subtotal Direct Salary Costs and Indirect Costs	$0	$0	$0	$0	$0	$0	$115,791	$0
4. Travel	$0	$0	$0	$0	$0	$0	$2,726	$0
5. Other Non-Salary Costs	$0	$0	$0	$0	$0	$0	$10,001	$0
6. Subtotal Direct Non-Salary Costs	$0	$0	$0	$0	$0	$0	$12,727	$0
7. Subcontractors	$0	$0	$0	$0	$0	$0	$141,222	$0
7a. Subcontract Mgt. Fee	$0	$0	$0	$0	$0	$0	$6,320	$0
8. Total Work Assignment Cost	$0	$0	$0	$0	$0	$0	$276,061	$0
9. Fixed Fee	$0	$0	$0	$0	$0	$0	$8,105	$0
10. Total Work Assignment Price	$0	$0	$0	$0	$0	$0	$284,166	$0

Project Manager (Engineer) **David Keil**

Date 1/27/09

Schedule 2.11 (g)

Monthly Cost Control Report
Summary of Fiscal Information

Engineer Camp Dresser & McKee
Contract No. D004437
Project Name Former Paul Miller Dry Cleaners
Work Assignment No. D004437-23
Task #/Name Task 1 - Work Plan Development
Complete 0%

Page 1 of 4
Date Prepared ________
Billing Period ________
Invoice No. ________

	A	B	C	D	E	F	G	H
Expenditure Category	*Costs Claimed This Period*	*Paid to Date*	*Total Disallowed to Date*	*Total Costs Incurred to Date (A+B+C)*	*Estimated Costs to Completion*	*Estimated Total Work Assignment Price (A+B+E)*	*Approved Budget*	*Estimated Under/Over (G-F)*
1. Direct Salary Costs	$0	$0	$0	$0			$2,399	$0
2. Indirect Costs - '167.9%	$0	$0	$0	$0			$4,029	$0
3. Subtotal Direct Salary Costs and Indirect Costs	$0	$0	$0	$0			$6,428	$0
4. Travel	$0	$0	$0	$0			$75	$0
5. Other Non-Salary Costs	$0	$0	$0	$0			$283	$0
6. Subtotal Direct Non-Salary Costs	$0	$0	$0	$0			$358	$0
7. Subcontractors	$0	$0	$0	$0			$0	$0
7a. Subcontract Mgt. Fee	$0	$0	$0	$0			$0	$0
8. Total Work Assignment Cost	$0	$0	$0	$0			$6,787	$0
9. Fixed Fee	$0	$0	$0	$0			$450	$0
10. Total Work Assignment Price	$0	$0	$0	$0			$7,237	$0

Project Manager (Engineer) David Keil

Date 1/27/09

Schedule 2.11 (g)

Monthly Cost Control Report
Summary of Fiscal Information

Engineer Camp Dresser & McKee
Contract No. D004437
Project Name Former Paul Miller Dry Cleaners
Work Assignment No. D004437-23
Task #/Name Task 2- Site Characterization
Complete 0%

Date Prepared ______
Billing Period ______
Invoice No. ______

	A	B	C	D	E	F	G	H
Expenditure Category	*Costs Claimed This Period*	*Paid to Date*	*Total Disallowed to Date*	*Total Costs Incurred to Date (A+B+C)*	*Estimated Costs to Completion*	*Estimated Total Work Assignment Price (A+B+E)*	*Approved Budget*	*Estimated Under/Over (G-F)*
1. Direct Salary Costs	$0	$0	$0	$0			$26,593	
2. Indirect Costs 167.9%	$0	$0	$0	$0			$44,650	
3. Subtotal Direct Salary Costs and Indirect Costs	$0	$0	$0	$0			$71,244	
4. Travel	$0	$0	$0	$0			$2,651	
5. Other Non-Salary Costs	$0	$0	$0	$0			$9,268	
6. Subtotal Direct Non-Salary Costs	$0	$0	$0	$0			$11,919	
7. Subcontractors	$0	$0	$0	$0			$141,147	
7a. Subcontract Mgt. Fee	$0	$0	$0	$0			$6,320	
8. Total Work Assignment Cost	$0	$0	$0	$0			$230,630	
9. Fixed Fee	$0	$0	$0	$0			$4,987	
10. Total Work Assignment Price	$0	$0	$0	$0			$235,617	

Project Manager (Engineer) David Keil

Date 1/27/09

Schedule 2.11 (g)

Monthly Cost Control Report
Summary of Fiscal Information

Engineer Camp Dresser & McKee
Contract No. D004437
Project Name Former Paul Miller Dry Cleaners
Work Assignment No. D004437-23
Task #/Name Task 3 - Field Documentation and Reporting
Complete 0%

Page 3 of 4
Date Prepared
Billing Period
Invoice No.

Expenditure Category	A Costs Claimed This Period	B Paid to Date	C Total Disallowed to Date	D Total Costs Incurred to Date (A+B+C)	E Estimated Costs to Completion	F Estimated Total Work Assignment Price (A+B+E)	G Approved Budget	H Estimated Under/Over (G-F)
1. Direct Salary Costs	$0	$0	$0	$0			$14,229	$0
2. Indirect Costs 167.9%	$0	$0	$0	$0			$23,890	$0
3. Subtotal Direct Salary Costs and Indirect Costs	$0	$0	$0	$0			$38,119	$0
4. Travel	$0	$0	$0	$0			$0	$0
5. Other Non-Salary Costs	$0	$0	$0	$0			$450	$0
6. Subtotal Direct Non-Salary Costs	$0	$0	$0	$0			$450	$0
7. Subcontractors	$0	$0	$0	$0			$75	$0
7a. Subcontract Mgt. Fee	$0	$0	$0	$0			$0	$0
8. Total Work Assignment Cost	$0	$0	$0	$0			$38,644	$0
9. Fixed Fee	$0	$0	$0	$0			$2,668	$0
10. Total Work Assignment Price	$0	$0	$0	$0			$41,313	$0

Project Manager (Engineer) David Keil

Date 1/27/09

Schedule 2.11 (g) - Supplemental

Cost Control Report for Subcontracts

Engineer **Camp Dresser & McKee**
Contract No. **D004437**
Project Name **Former Paul Miller Dry Cleaners**
Work Assignment No. **D004437-23**

Page **4 of 4**
Date Prepared
Billing Period
Invoice No.

Subcontract Name	*A* Subcontract Costs Claimed this Application Inc. Resubmittals	*B* Subcontract Costs Approved for Payment on Previous Applications	*C* Total Subcontract Costs to Date (A plus B)	*D* Subcontract Approved Budget	*E* Management Fee Budget	*F* Management Fee Paid	*G* Total Costs to Date (C plus F)
1. EDR	$0	$0	$0	$495	$0	$0	$0
2. Nava Geophysics	$0	$0	$0	$2,540	$0	$0	$0
3. Nancy Potak	$0	$0	$0	$2,883	$144	$0	$0
4. YEC	$0	$0	$0	$11,704	$0	$0	$0
5. Aztech Technologies, Inc.	$0	$0	$0	$31,232	$1,562	$0	$0
6. Delta Well and Pump Co., Inc	$0	$0	$0	$46,470	$2,324	$0	$0
7. Chemtech	$0	$0	$0	$33,261	$1,663	$0	$0
8. SeaCoast Environmental	$0	$0	$0	$12,562	$628	$0	$0
9. Ken Shider Consulting	$0	$0	$0	$75	$0	$0	$0
TOTALS	$0	$0	$0	$141,222	$6,320	$0	$0

Project Manager (Engineer) **David Keil**

Date 1/27/09

NOTES:

1) Costs listed in Columns A, B, C & D do not include any management fee costs.
2) Management fee is applicable to only W/MBE and properly procured, satisfactorily completed, unit price subcontracts over $10,000.
3) Line 11, Cloumn G should equal Line 7 (Subcontractors), Column D of Summary Cost Control Report.

Schedule 2.11(h)
Monthly Cost Control Report
Summary of Labor Hours
Number of Direct Labor Hours Expended to Date/Estimated Number of Direct Labor Hours to Completion

Engineer/Contract # D004437
Project Name Former Paul Miller Dry (
Work Assignment No. D004437-23

Date Prepared ____
Billing Period ____
Invoice No. ____

NSPE Labor Classification	*IX Exp/Est*	*VIII Exp/Est*	*VII Exp/Est*	*VI Exp/Est*	*V Exp/Est*	*IV Exp/Est*	*III Exp/Est*	*II Exp/Est*	*I Exp/Est*	*Admin.*	*Total No. of Direct Labor Hrs. Exp/Est*
Task 1	0 / 3	0 / 16	0 / 1	0 / 2	0 / 0	0 / 32	0 / 0	0 / 0	0 / 0	0 / 4	0 / 57
Task 2	0 / 27	0 / 24	0 / 2	0 / 69	0 / 0	0 / 210	0 / 11	0 / 525	0 / 10	0 / 20	0 / 898
Task 3	0 / 2	0 / 40	0 / 40	0 / 4	0 / 0	0 / 200	0 / 40	0 / 0	0 / 12	0 / 7	0 / 345
Total Hours	0 / 32	0 / 80	0 / 43	0 / 75	0 / 0	0 / 442	0 / 51	0 / 525	0 / 22	0 / 31	0 / 1300

* Expended/Estimated

New York State Department of Environmental Conservation
Division of Environmental Remediation, 12th Floor
625 Broadway, Albany, New York 12233-7011
Phone: (518) 402-9706 • **FAX:** (518) 402-9020
Website: www.dec.state.ny.us

Alexander B. Grannis
Commissioner

MAR 27 2008

Mr. Michael Memoli, P.E.
Program Manager
Camp Dresser & McKee
100 Crossways Park West, Suite 415
Woodbury, New York 11797

Re: Work Plan Approval/Notice to Proceed
Contract/WA No. - D004437-23
Site No. - 243018
Former Paul Miller Dry Cleaners

Dear Mr. Memoli:

The New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) approves the work plan dated March 2008 for the above referenced work assignment (WA). The work plan is for a total amount of $252,288 for performing a Remedial Investigation/Feasibility Study at the above-referenced site. This WA has been developed to evaluate and fully delineate the extent of groundwater contamination.

DER authorizes your firm to proceed with the scope of work in this WA's approved work plan. All work should be completed in accordance with the schedule in the approved work plan.

If you have any questions regarding this work plan, please contact the Project Manager, Kevin Sarnowicz, at (518) 402-9774.

Sincerely,

Dale A. Desnoyers
Division Director
Division of Environmental Remediation

ec: K. Sarnowicz, PM
A. Indelicato, CM
T. Christian, M/WBE
T. Wolosen
M. Cruden
D. Weigel
D. Desnoyers
R. Cozzy
J. Quinn
D. Walsh
V. Brevdo
M. Memoli, memolima@cdm.com
C. Ramacciotti, ramacciotticn@cdm.com

☑ APPROVED

AI 3/14/08

KS 3/14/08

WORK PLAN
REMEDIAL INVESTIGATION
AND
FEASIBILITY STUDY
FORMER PAUL MILLER DRY CLEANERS SITE
(Site No.: 2-43-018)
Port Richmond, New York

Prepared for

New York State Department of Environmental Conservation
Investigation and Design Engineering Services
Standby Contract No. D004437
Work Assignment No. D004437-23

Prepared by

Camp Dresser & McKee
Raritan Plaza I, Raritan Center
Edison, New Jersey

March 2008

Contents

Appendices

List of Tables

List of Figures

Section 1
Introduction

This Work Plan for the former Paul Miller Dry Cleaners (Paul Miller) site located at 1465 Forest Avenue, Port Richmond, Richmond County, NY was prepared by Camp Dresser & McKee (CDM) for the New York State Department of Environmental Conservation (NYSDEC) under the Engineering Services for Investigation and Design, Standby Contract No. D004437-23. The Work Plan was developed in accordance with the *"Draft Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, dated December 2002"*.

In addition, NYSDEC has provided historical information about the site vicinity and has made requests and observations during a January 7, 2008 site reconnaissance visit with CDM representatives. The major focus of this Work Assignment is to conduct a Remedial Investigation/Feasibility Study to evaluate monitored natural attenuation and to determine the most effective remedial alternatives to address groundwater contamination. Additionally, a soil gas survey will be conducted to assess potential soil vapor migration pathways and appropriate IRM measures and mitigation alternatives.

The requested RI/FS scope of work includes:

- Public File Records Search
- A geophysical survey
- Collection and analysis of Subsurface Soil samples
- Installation and sampling of sub slab soil vapor probes and indoor air samples
- Installation, development and sampling of groundwater monitoring wells
- Survey of all new soil borings/monitoring wells and site features to produce a site plan with scale of 1" equals 50;
- Report of findings

Detailed descriptions of each scope task are presented in Section 2 of this Work Plan.

This Work Plan is comprised of the following sections:

- Section 1 - "Introduction" - This section presents the site description and history, containing the location, operational and remedial history, project objectives, and fate and transport information for PCE.
- Section 2 - "Scope of Work" - This section presents the scope of work for the following four tasks of this work assignment:

1. Task 1: Work Plan Develop
2. Task 2: Scope of Field Work
3. Task 3A: Field Documentation and Reporting
4. Task 3B: Feasibility Study

- Section 3 - "Project Schedule" - The project schedule for the performance of the above three tasks is presented in this section.

- Section 4 - "Budget Estimate" - A detailed work assignment budget is presented in this section, itemized by tasks and sub-tasks utilizing schedule 2.11 in accordance with the contract's budget reporting requirements.

- Section 5 - "Staffing Plan" - The staffing plan identifies the roles and responsibilities of the CDM project team. CDM has assembled a team of environmental engineers and scientists experienced in conducting the scope of work tasks effectively and efficiently.

- Section 6 - "Subcontracting" - This section identifies the services provided by subcontractors on this work assignment. The name and location of each proposed subcontractor is also presented in this section.

- Section 7- "MBE/WBE Utilization Plan" - The Minority Business Enterprise (MBE) and Woman Business Enterprise (WBE) Utilization Plan is presented in this section. CDM's subcontractors have been carefully selected to provide the most reasonable cost-effective services while achieving the contract-specific MBE/WBE utilization goals.

The following appendices are also included in this Work Plan:

- Appendix A - " Generic Quality Assurance Project Plan" - The Generic QAPP presents methods that will be used to collect field data including project samples, and focuses on the analytical methods and quality assurance/quality control (QA/QC) procedures that will be used to analyze project samples, ensure the data are of known and acceptable quality, and manage the resultant data

- Appendix B - "Health and Safety Plan" - The site-specific Health and Safety Plan (HASP) specifies the health and safety procedures to ensure safe work practices are employed.

- Appendix C - "Citizen Participation Plan" - The CPP provides the primary contacts for the site as well as various public entities and provides ways for citizens to be involved in the project.

- Appendix D - "Schedule 2.11" - Contains a detailed cost estimate by task and subtask of all work elements contained in this work assignment.

- Appendix E – "Subcontractor Backup" - contains individual quotes for drilling, laboratory and validation services to provide documentation for reasonable competitive costs.

1.2 Site Description and Background

1.2.1 Site Description

Located at 1465 Forest Avenue, Port Richmond, NY the former Paul Miller site occupies a 0.4 acre parcel in a commercial area in the Forest Avenue Shopping Center. The former dry cleaner building is currently occupied by Boston Market Corporation and is being used as a restaurant. The site is relatively flat with its surface area covered with concrete and/or asphalt. Review of the USGS Arthur Kill Quadrangle map indicates that ground surface elevations range from approximately 30 to 33 feet above mean sea level. General site conditions can be viewed in the aerial photograph presented as Figure 1-1.

1.2.2 Operational History

Only minor historical operations information for the former Paul Miller Dry Cleaners is available at the time of this writing. Information from the 2006 Leggette, Brashears & Graham, Inc. (LBG) "Remedial Investigation Report for the former Charlton Cleaners Facility," provided by NYSDEC, indicates that the former Paul Miller Dry Cleaners facility appears in the City Directory (EDR) from 1960 to 1995.

1.2.3 Remedial History

In 1994, the owner of the Forest Avenue Shopping Center conducted an environmental investigation at the former Paul Miller site. Subsequently, in May 2000, NYSDEC retained Lawler, Matusky & Skelly Engineers LLP (LMS) to conduct an Immediate Investigation Work Assignment (IIWA) of the former Paul Miller site. The objectives of the IIWA were to determine groundwater flow in the vicinity of the site, the identify the nature and extent of groundwater contamination as related to historic site activities, and to assess whether residual hazardous waste poses a threat to public health or the environment.

1.2.3.1 Soil Quality

Piezometers were installed and boring logs constructed by LMS. According to their logs, the site is underlain by heterogeneous soils characteristic of the glacial till that covers much of Staten Island. The soils were identified in LMS borings logs as being reddish to brown in color and being comprised of sands and silts to clays with some gravel.

No soil samples were collected for laboratory analysis, therefore no soil quality data exists to date. However, the presence of volatile organics (as detected with a photoionization detector or via olfactory or visual observations) was not noted in any of the three boring logs available from the LMS IIWA report (boring logs P-1 through P-3).

1.2.3.2 Groundwater Quality

During the course of the LMS 2000 IIWA, seven piezometers were installed and sampled. These seven wells supplemented previously existing monitoring wells installed by others. No additional information is available for these wells. During the CDM site visit, five piezometers and two monitoring wells were located on the Boston Market parcel. Two additional monitoring wells were noted to the north of the building in the Forest Avenue Shopping Center.

Groundwater results from the LMS IIWA identified the highest concentrations of chlorinated volatile organic compounds in groundwater immediately adjacent to the east side of the building. The contamination was determined to be migrating vertically downward as evidenced by higher PCE concentrations in the deeper piezometers.

Based on the results of this investigation, LMS recommended that a soil gas survey be conducted in the area to identify the potential impact of PCE contamination to indoor air at the former Paul Miller site, and the adjacent two buildings (Kentucky Fried Chicken restaurant to the east and the Northfield Savings Bank to the west). Additionally, LMS recommended that a deeper well be installed to vertically delineate groundwater contamination in the vicinity of P-3D on the east side of the site building and that continuous soil cores be collected to better characterize the subsurface stratigraphy in the vicinity of the former Paul Miller site.

1.3 Environmental Setting

The site is relatively flat with its surface area covered with concrete and/or asphalt. Review of the USGS Arthur Kill Quadrangle map indicates that ground surface elevations range from approximately 30 to 33 feet above mean sea level.

1.3.1 Geology

The site is located within the Atlantic Coastal Plain Physiographic Province. A history of coastal submergence and emergence spanning the Cretaceous Period, significant differential erosion during the Cenozoic, and glaciation during the Quaternary Period is reflected in the present day geology of Staten Island.

As identified in *The glacial geology of New York City and Vicinity* by Sanders and Merguerian (1994), at the site the Newark Supergroup (approximately 120 feet below ground surface at this location) is unconformably overlain by the Harbor Hill formation, a widespread Quaternary ground moraine deposits comprised of reddish-brown glacial till and outwash. This unconsolidated sequence is representative of the subsurface materials that immediately underlie the site.

1.3.2 Hydrogeology

No groundwater contour map was constructed during the LMS IIWA; difficulty was encountered in determining groundwater flow. Initial CDM review of LMS boring logs revealed that the subsurface materials at the site consist of the unsorted sands, silts, clays, gravel and boulders that are characteristic of the Harbor Hill formation.

The deposit in the area of the site is approximately 100 to 150 feet thick. Groundwater in these deposits occurs under water-table or confined conditions depending on the nature of the subsurface at any given location. Based on review of USGS Report 87-4048, *Geologic and Geohydrologic Reconnaissance of Staten Island, New York,* the general flow of groundwater in the unconsolidated glacial till is to the northwest-north towards Kill van Kull, locally, and according to discussions with NYSDEC, groundwater flow may be in a northerly direction. From the LMS investigation groundwater (or potentially perched water-bearing intervals) is expected to be encountered at depths between four and nine feet below grade. Planned work for this investigation is expected to yield more specific information on groundwater flow direction.

The consolidated rock units of the Newark Supergroup and the overlying unconsolidated deposits are hydraulically connected, and groundwater flows both vertically and horizontally within. However, the majority of the groundwater flows occurs within the glacial unconsolidated deposits due to it greater hydraulic conductivities.

Section 2
Scope of Work

2.1 Task 1 - Work Plan Development

This Work Plan references procedures detailed in the CDM Generic Quality Assurance Project Plan (QAPP), provided as Appendix A, revised July 2007 which has been provided to NYSDEC for Contract Number D-004437. The Generic QAPP presents methods that will be used to collect field data including project samples, and focuses on the analytical methods and quality assurance/quality control (QA/QC) procedures that will be used to analyze project samples, ensure the data are of known and acceptable quality, and manage the resultant data.

This Work Plan also includes a site specific Health and Safety Plan (HASP) presented in Appendix B and a Citizen Participation Plan (CPP) presented in Appendix C. The HASP describes the site health and safety for the field activities that will be performed and includes a community air monitoring plan (CAMP). The CPP provides the primary contacts for the site as well as various public entities and provides ways for citizens to be involved in the project.

2.2 Task 2 – Remedial Investigation

The scope of work for the Remedial Investigation phase of this Work Assignment is described below. The reader is advised that this Work Plan is a flexible and evolving document. Scope changes may be necessary based upon field conditions, observations, weather and a myriad of factors. Any changes to the approved scope of work will be communicated to the NYSDEC on-site representative for approval prior to implementation. Cost impacts will also be identified at the time approved scope changes are implemented. The planned scope of work is presented below.

All work will be conducted in accordance with the "*Draft DER-10, Technical Guidance for Site Investigation and Remediation dated 12/25/02*" or the most current version of the document when available.

2.2.1 Records Search

A records search will be conducted to meet the requirements of NYSDEC's *Draft DER-10 Technical Guidance for Site Investigation and Remediation* dated December 2002. Information collected during the records/background search will be summarized in a Record Search Report and utilized to gain insight into previous operational activities any subsequent remedial activities conducted at the site. The Record Search Report will be provided to NYSDEC as a stand alone document, submitted soon after submittal of the Draft Work Plan.

2.2.2 Utility Mark-out and Geophysical Survey

Prior to outdoor intrusive work, a private utility locating firm will be subcontracted to mark out subsurface structures and utilities at the proposed locations. Their work will be conducted in addition to the general utility markout (One-Call) to limit the potential for encountering subsurface utilities and structures during the intrusive work.

CDM will oversee and supervise the performance of a geophysical survey which is expected to cover an area of 30 feet by 100 feet along the eastern side of the present structure (Boston Market). Specifically, proposed monitoring well and soil boring locations will be geophysically surveyed for the presence of underground utilities, tanks, dry wells, and/or obstacles. Additionally, the area to the east of the former Paul Miller site building will be surveyed via geophysical techniques to help confirm the presence of a reported former sump. It is anticipated that ground-penetrating radar (GPR) will be used in this survey and that the perimeter of the facility will be surveyed.

2.2.3 Groundwater Monitoring Well Installation

Based on the findings of the LMS IIWA, chlorinated solvent contamination consisting predominantly of tetrachloroethylene (PCE), trichloroethylene (TCE), 1,2-dichloroethene (1,2-DCE), and vinyl chloride (VC) was identified at concentrations exceeding the New York Ambient Groundwater Quality Standards of 5 µg/L for PCE, TCE, and 1,2-DCE and 2 µg/L for VC. The greatest concentrations of these contaminants were identified in the east-central portion of the site building at the location of P-3S and P-3D. Concentrations exhibit a decreasing trend outward from this location and decrease even more rapidly to the north and south.

Review of available data indicates that chlorinated volatile organic contamination is greatest immediately to the east of the site building, at an approximate depth of 20 feet below ground surface. It is suspected at this time that this is the location of a potential former sump, to which spent dry cleaning chemicals were discharged during historic dry cleaning activities. Observations made during a January site visit indicate the presence of some sort of floor drain/structure and associated, but currently disconnected, piping leading from the first floor of the site building to the area of the observed floor drain/structure.

It should be noted that five currently operating dry cleaning facilities are located within a mile to the northeast of the site. One site in particular, the former Charlton Cleaners located at 24 Barrett Avenue (currently a Michaels Store), has a known groundwater problem caused by historic Charlton Cleaners dry cleaning operations. In part, data gathered during this RI will be used to assess the potential impact of off-site contaminant sources on the site and/or the potential that the groundwater contamination plume associated with the site is co-mingling with groundwater contamination plumes from off-site sources.

For the purpose of this RI, installation of 13 monitoring wells is proposed: four monitoring well clusters (MW-9S/D, MW-10S/D, MW-11S/D, and MW-13S/D), four additional shallow monitoring wells (MW-8S, MW-12S, MW-15S, and MW-16S), and one additional deep monitoring well (MW-14D). Shallow monitoring wells will be installed to an approximate depth of 35 and deep monitoring wells to an approximate depth of 70 feet below ground surface. In each case the well will be screened across the interval demonstrating the greatest amount of contamination as evidenced by elevated photoionization readings, visual or olfactory cues, hydrophobic dye and/or ultraviolet light. Monitoring wells will not be screened across potential confining units. CDM proposes to install the wells as follows:

- **MW-8S**: Shallow well to the west of the site, in westernmost portion of large driveway between site building and Northfield Savings Bank building, west of LMS P-1 to delineate the extent of groundwater contamination in the shallow portion of the unconsolidated unit in this direction and to assess groundwater flow direction. Access agreement will need to be obtained from property owner.

- **MW-9S/9D**: Shallow and deep cluster north of existing MW-2, in parking lot of Forest Avenue Shopping Center to delineate the extent of groundwater contamination in both the shallow and deeper portion of the unconsolidated unit in this direction and to assess groundwater flow direction. Access agreement will need to be obtained from property owner.

- **MW-10S/10D:** Shallow and deep cluster northeast of existing MW-4, in parking lot of Forest Avenue Shopping Center to delineate the extent of groundwater contamination in both the shallow and deeper portion of the unconsolidated unit in this direction and to assess groundwater flow direction. Access agreement will need to be obtained from property owner.

- **MW-11S/11D**: Shallow and deep cluster northeast of LMS P-2 and site building's basement, in parking lot to delineate the extent of groundwater contamination in the shallow portion of the unconsolidated unit in this direction and to assess groundwater flow direction. This location is located approximately half-way between the site building to the former Charlton Cleaners building (Michaels Store) and is on the Kentucky Fried Chicken property. Access agreement will need to be obtained from property owner.

- **MW-12S**: Shallow well that is deeper than existing LMS P-2, to the east of the suspected sump on the east side of the site building. This location will be installed to determine extent of potential groundwater contamination due to suspected historic discharges to sump or similar feature. Well will additionally detail conditions between site building and MW-11 and MW-13 clusters to the northeast and approximate east, respectively.

- **MW-13S/13D**: Shallow and deep cluster to north-northeast of LMS P-4D and P-4S on Kentucky Fried Chicken property parking lot to delineate the extent of groundwater contamination in the shallow and deep portions of the unconsolidated unit in this direction and to assess groundwater flow direction. Access agreement will need to be obtained from property owner.

- **MW-14D**: Deep well immediately east of site building, in vicinity of LMS P-3S and P-3D/location of historically highest concentrations of chlorinated VOCs in groundwater. Install to delineate the vertical extent of groundwater contamination in the unconsolidated unit at the site and to assess groundwater flow direction.

- **MW-15S:** East of proposed monitoring well cluster MW-14D and on Kentucky Fried Chicken property. Install to delineate extent of groundwater contamination in the shallow portion of the unconsolidated unit in this direction and to assess groundwater flow direction. Access agreement will need to be obtained from property owner.

- **MW-16S**: South of building and slightly southeast of existing MW-1, adjacent to sidewalk along Forest Avenue to delineate the extent of groundwater contamination in both the shallow and deeper portion of the unconsolidated unit in this direction, to assess groundwater flow direction, and to determine upgradient groundwater conditions.

The proposed monitoring well locations are shown on Figure 2-1. The final well locations will be determined in consultation with the NYSDEC Project Manager. The drilling logs for the new off-site wells will be evaluated along with existing well logs to determine if there are preferential layers of groundwater migration. Field documentation, well installation, decontamination, and IDW sampling procedures are provided in the Generic QAPP.

All new monitoring wells will be drilled via 4 ¼-inch hollow stem augering techniques, and split-spoon soil samples will be collected. The monitoring wells will be constructed of 2-inch diameter Schedule 40 PVC flush-joint blank riser pipe with ten feet of 2-inch diameter Schedule 40 0.01-inch flush-joint machine-slot screens. Monitoring well sand filter medium will consist of #0 Quartz-silica sand and will be installed to a depth of 2 feet above the top of the screen. A bentonite pellet seal will be installed to a depth of 2 feet above the top of the sand filter pack. The remaining annular space will be grouted to grade via tremie pipe method with Cement/Bentonite Grout.

All wells will be completed as flushmount and provided with a locking compression cap or locking cover, drain hole, and concrete apron. Upon completion of monitoring well installation, wells will be allowed to rest for a period of 24 hours before being developed, to allow the grout to set. Well development will be accomplished by a combination of surging (with appropriate surge blocks) and purging or air lifting techniques so as to thoroughly cleanse the well screen. Wells will be developed until purged water runs visibly clear and free of fines and debris and surging no longer produces substantial turbidity.

2.2.4 Subsurface Soil Collection

Continuous split spoon samples will be collected at all shallow wells. Split spoon sampling at the deep wells will commence at the depth interval at which split spoon sampling terminated at the respectively paired shallow wells. All split-spoon soil samples will be field screened for the presence of contamination via visual and olfactory indicators, a photoionization detector (PID), and hydrophobic dye and/or ultraviolet light where PID readings are elevated (above background concentrations).

Should evidence of contamination be identified in the soil cores, a soil sample will be collected. The sample exhibiting the highest level of contamination will be sent to the laboratory for analysis. Only one sample per borehole is expected to be sent for analysis.

In general, soil samples will be sent to an off-site laboratory to be analyzed for VOC by EPA Method 8260B and SVOC by EPA Method 8270C. Additionally, three of the soils samples collected during this investigation will be analyzed for the Full List TCL/TAL+30. Results will be compared to the *6 NYCRR Sub-Part 375-6 Soil Cleanup Objectives*. All samples will be analyzed by an ELAP certified laboratory. A NYSDEC ASP Category B data deliverable will be provided for these analyses. Table 2-1 presents a summary of the analytical program for the site.

2.2.5 Groundwater Sample Collection

Groundwater samples will be collected from all of the existing wells (MW-1 through MW-7 and P-1 through P-5, provided that the wells are accessible and structurally sound) and all proposed wells (MW-8S through MW-15) following completion of monitoring well installation activities. This is a total of up to 27 groundwater sampling locations. Prior to sampling, depth-to-water and product thickness measurements will be collected from all wells using an oil-water interface probe. Purging will be accomplished via low-flow methods. Final determination of well purging and sampling protocols will be developed in consultation with NYSDEC. During purging, pH, temperature, conductivity, oxidation-reduction potential (ORP), dissolved oxygen, and turbidity will be measured. Groundwater samples will be collected from each of these wells using a disposable bailer or alternate apparatus/methodology approved by NYSDEC.

Groundwater samples and QA/QC samples will be collected in accordance with the procedures outlined in the Generic QAPP. Purge water will be containerized and staged in a secure location on-site until waste characterization can be completed. IDW sampling procedures are detailed in the Generic QAPP.

In general, groundwater samples will be sent to an off-site laboratory to be analyzed for VOC by EPA Method 8260B and SVOC by EPA Method 8270C. Three (3) of the groundwater samples collected during this investigation will be analyzed for the Full List TCL/TAL+30. Table 2-1 summarizes analytical program for the site. Groundwater sample results will be compared to the New York Ambient Groundwater Quality Standards. All groundwater samples will be analyzed by an ELAP certified laboratory. A NYSDEC ASP Category B data deliverable will be provided for these analyses.

2.2.6 Soil Vapor and Indoor Air Sample Collection

Sub-slab soil vapor and indoor air sampling will be conducted at up to three (3) structures along Forest Avenue, to determine the extent of VOC contaminated soil vapor in the vicinity of the site. The proposed locations are identified on Figure 2-2. These samples will be collected in accordance with the NYSDOH "*Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006*" and the NYSDEC "*Draft Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, dated December 2002*". This task will include:

- Collect one sub-slab soil vapor sample at basement level or first floor (if not underlain by basement) at each structure,
- Collect an indoor air sample at the basement level or first floor (if not underlain by basement) at each structure, and
- Collect one outdoor ambient air sample at each structure; where two structures are located within close proximity to each other, one ambient air sample will be collected to represent both locations.

2.2.6.1 Sub-Slab Soil Vapor Sample Collection

At each structure, sub-slab soil vapor samples will be collected from the basement level (if present), the first floor of the building (where not underlain by basement), and from any sumps identified during RI activities. A duplicate sub-slab soil vapor sample will also be collected at one of the three structures along Forest Avenue. Sample port installation and vapor sample collection will be conducted in accordance with the NYSDOH "*Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006*" and the NYSDEC "*Draft Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, dated December 2002*".

After the slab has been inspected, the location of any subsurface utilities determined, and the ambient air surrounding the proposed sampling location screened with a PID, a temporary sub-slab soil sampling implant will be hand drilled to approximately one foot, piercing the concrete slab. The implant installation and soil vapor sampling procedures are detailed in Section 3.8 of the Generic QAPP. The selected soil vapor sample locations shall be placed away from floor penetrations and co-located with their respective indoor air sample locations. Three borehole volumes will be purged from the subsurface at a rate less than 200ml per minute and captured in a Tedlar™ bag using the low-flow pump. PID readings will be observed from this sample and the highest reading shall be recorded on the appropriate field form.

The sample shall be collected with a 6 Liter, laboratory-certified summa canister with an 8-hour regulator and an initial vacuum of 38 inches Hg +/- 2 inches. A vacuum of 5 inches Hg +/- 1 inch must be present when the sample collection is completed. The sub-slab sample will be collected concurrently with the indoor and outdoor air samples.

The sub-slab samples will be analyzed for volatiles using EPA Method TO-15 by a NYSDOH approved ELAP certified lab. The holding time is fourteen (14) days from the verified time of sample collection. The analysis will achieve detected limits of 1 $\mu g/m^3$ for each compound except for TCE, VC and carbon tetrachloride, which will have a detection limit of 0.25 $\mu g/m^3$.

2.2.6.2 Indoor Air Sample Collection

Indoor air samples will be collected on the basement level (if present) of the building of the three (3) structures and on the first floor of structures at which part of the slab is not underlain by basement. Indoor air samples will be co-located with any respective sub-slab sample(s). A duplicate indoor air sample will also be collected at one of the locations. The New York State Department of Health *Indoor Air Quality Questionnaire and Building Inventory* shall be completed for each structure where indoor air testing is being conducted. Field documentation and sampling procedures are provided in the QAPP. A copy of the NYSDOH questionnaire is also provided as Attachment 1 to the QAPP.

All indoor air samples will be collected with a laboratory-certified summa canister regulated for a 24-hour sample collection. The summa canister will be placed in such a location as to collect a representative sample from the breathing zone at three feet above the floor.

2.2.6.3 Outdoor (Ambient) Air Sample Collection

An outdoor ambient air sample will be collected when indoor air sampling is being conducted. Where two structures are located within close proximity to each other, one ambient air sample will be collected from between the two structures to represent both locations. All outdoor air samples will be collected with a laboratory-certified summa canister regulated for a 24-hour sample collection. The summa canister will be placed upwind of the structures in such a location as to collect a representative sample from the breathing zone at four or six feet above the ground. Field documentation and sampling procedures are provided in the Generic QAPP.

The sub-slab soil vapor and indoor and outdoor air samples will be sent to an off-site laboratory for VOC analysis via EPA Method TO-15. All samples will be analyzed by an ELAP certified laboratory. A NYSDEC ASP Category B data deliverable will be provided for these analyses. Table 2-1 presents a summary of the analytical program for the site.

2.2.7 Investigative Derived Waste

Soil cuttings will be used as backfill to the extent possible; however, soil cuttings generated during monitoring well installation and soils demonstrating evidence of contamination will be containerized in 55-gallon drums, labeled as investigative derived waste (IDW), and staged on pallets at an appropriate location approved by the property owner and NYSDEC. Monitoring well development and purge water will be containerized in closed-top 55-gallon drums and staged in the same location as drums containing soil cuttings..

IDW will be sampled for TCLP and RCRA characteristics as per the procedures outlined in the Generic QAPP. Samples will be sent to an off-site laboratory to be analyzed for Full TCLP and RCRA Characteristics to determine appropriate disposal methods. IDW samples will be collected at a rate of one sample per location for soils and two cumulative samples for groundwater/purge water.

Investigation derived waste to be staged on-site will be arranged to be picked up within approximately one week of receiving the expedited results from the first week's worth of IDW. Subsequent pick ups will occur on a weekly basis thereafter.

2.2.8 Decontamination Procedures

All non-dedicated equipment and tools used to collect samples for chemical analysis will be decontaminated prior to and between each sample interval using an Alconox rinse and potable water rinse prior to reuse. Additional cleaning of the equipment with steam may be needed under some circumstances. Decontamination fluids will be containerized and staged at the drum-staging location.

2.3 Task 3A - Field Documentation and Reporting

2.3.1 Field Documentation Procedures

Field notebooks will be used during all on-site work. A dedicated field notebook will be maintained by the field technician overseeing the site activities. In addition to the notebook, any and all original sampling forms, and purge forms used during the field activities, will be submitted to the NYSDEC as part of the final report. Field and sampling procedures, including installation of the sample boreholes, existing monitoring wells, etc., will be photo-documented.

2.3.2 Sample Identification

Each sample collected will be designated by an alphanumeric code that will identify the type of sampling location, matrix sampled, and the specific sample designation (identifier).

2.3.3 Sample Location

The newly installed monitoring wells will be surveyed by a subcontracted New York State licensed surveyor to identify the location (NAD83, New York State Plane 3102 coordinate system) and elevation (NAVD68 vertical datum) of the wells. Subsequently, these data will be used to create the site maps. Additional costs are reflected to include survey of existing monitoring wells and topographic survey of site building and surrounding properties.

2.3.4 Reporting

A total of four copies of a draft report will be submitted that documents the work conducted and presents the results of the sample analysis for review and comment by NYSDEC and NYSDOH. Upon receipt of the comments, CDM will revise the draft report and print the four final copies and submit to NYSDEC. One copy of the final report; text, tables, maps, photos, etc., will be submitted as a single pdf file. All electronic files will be submitted to NYSDEC on a compact disc. The site investigation data will be submitted in the most recent version of the NYSDEC Electronic Data Deliverable (EDD) with the final report submission. Currently this is the USEPA Region 2 EDD dated December 2003.

2.3.5 Laboratory Analysis and Validation

All sub-slab soil vapor and indoor air samples will be analyzed by a NYSDOH approved ELAP certified laboratory. Air samples will be analyzed for VOC using EPA Method TO-15. The analysis for air samples will achieve detection limits of 1 $\mu g/m^3$ for each compound. For specific parameters identified by the NYSDOH, where the selected parameters may have a higher detection limit (e.g., acetone), and the higher detection limits will be designated by the NYSDOH.

Groundwater and soil samples will be sent to an off-site laboratory to be analyzed for VOC by EPA Method SOM01.2-Trace and SVOC by EPA Method OLM04.3. Three (3) of these groundwater and soil samples collected will be analyzed for the Full List CLP-TCL/TAL+30, which includes VOC by EPA Method SOM01.2-Trace, SVOC and Pesticides/PCBs by EPA Method OLM04.3, Inorganics (metals), Mercury or Total Cyanide by EPA Method ILM04.2. The analysis for groundwater samples will achieve the detection limits discussed in the QAPP. A NYSDEC ASP Category B data deliverable will be provided for these analyses (Table 2-1).

All samples collected will be validated in accordance with NYSDEC Data Usability Summary Report (DUSR) guidance by a party that is independent of the laboratory which performed the analyses and CDM. A usability analysis will be conducted by a qualified data validator and a DUSR will be submitted to the NYSDEC.

2.4 Task 3B -Feasibility Study

Following the implementation of the RI, CDM will evaluate the need for IRM and conduct a feasibility study (FS) to evaluate remedial action alternatives using the data collected during the RI. Should a sub-slab depressurization system be deemed the most appropriate measure to address soil vapor mitigation at the site and/or the neighboring two buildings investigated during the RI, the system will be installed as an IRM in accordance with the Radon Mitigation Standards (EPA 402-R-93-078, or the most current version) and NYSDOH SVI guidance document.

The objective of the FS will be to evaluate the most appropriate remedial alternative to address site soil and/or groundwater contamination so as to eliminate or mitigate threats to public health and the environment as a result of former site activities. Such remedial alternatives to be evaluated will include but will not be limited to full-monitored natural attenuation including groundwater sampling events and soil vapor extraction and/or groundwater recovery system installation.

In accordance with DER-10, Remedial Action Objectives (RAOs) will be developed based on contaminant-specific SCGs. Once established, up to four remedial actions will be identified and evaluated based on the following eight criteria set forth in Section 4.1 of DER-10:

1. <u>Overall Protection of Public Health and the Environment</u>. This criterion is an evaluation of the remedy's ability to protect public health and the environment, assessing how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, engineering controls or

institutional controls. The remedy's ability to achieve each of the RAOs is evaluated. [see 6 NYCRR § 375- 1.10(c)(2)]

2. <u>Compliance with Standards, Criteria, and Guidance (SCGs)</u>. Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance. All SCGs for the site will be listed along with a discussion of whether or not the remedy will achieve compliance. For those SCGs that will not be met, provide a discussion and evaluation of the impacts of each, and hether waivers are necessary. [see 6 NYCRR § 375-1.10(c)(1)] DRAFT DER-10 Technical Guidance for Site Investigation and Remediation December 2002 Page 69 of 103

3. <u>Long-term Effectiveness and Permanence</u>. This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated:

4. <u>Reduction of Toxicity, Mobility or Volume with Treatment</u>. The remedy's ability to reduce the toxicity, mobility or volume of site contamination is evaluated. Preference should be given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the site. [see 6 NYCRR § 375- 1.10(c)(5)]

5. <u>Short-term Effectiveness</u>. The potential short-term adverse impacts and risks of the remedy upon the community, the workers, and the environment during the construction and/or implementation are evaluated. A discussion of how the identified adverse impacts and health risks to the community or workers at the site will be controlled, and the effectiveness of the controls, should be presented. Provide a discussion of engineering controls that will be used to mitigate short term impacts (i.e. dust control measures). The length of time needed to achieve the remedial objectives is also estimated. [see 6 NYCRR § 375-1.10(c)(3)]

6. <u>Implementability</u>. The technical and administrative feasibility of implementing the remedy is evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc. [see 6 NYCRR § 375-1.10(c)(6)]

7. <u>Cost</u>. Capital, operation, maintenance and monitoring costs are estimated for the remedy and presented on a present worth basis. [see 6 NYCRR § 375-1.10(c)(6)]

8. <u>Community Acceptance.</u> Provide a summary of the public participation program that was followed for the project, see section 1.10 for requirements. The public's comments, concerns and overall perception of the remedy are evaluated in a format that responds to all questions that are raised (i.e. responsiveness summary). [see 6 NYCRR § 375-1.10(c)(7)] technical feasibility, cost, overall protection of human health and the environment, and duration.

The combined RI/FS report will detail the findings and results of the RI in accordance with DER-10, discuss the need for and scope of any additional investigation activities recommended, and discuss the conceptual plan for the recommended remedial strategies and/or systems identified during the FS in sufficient detail so as to facilitate procession to the development of a Record of Decision (ROD).

Section 3
Project Schedule

The following tabulation provides the proposed project schedule and key milestones for this work assignment. As currently planned, field work will be initiated within two weeks of written receipt of final work plan approval. The duration of initial field activities (geophysical survey, monitoring well installation, completion and development, and groundwater sampling) for the Remedial Investigation activities is estimated to be eight weeks assuming no delays are experienced due to inclement weather, site access problems, or for other unforeseen reason. Sub-slab and indoor air sampling is estimated to take five days.

The scheduled submittal dates for deliverables are based on standard laboratory turnaround times of four weeks, and turnaround for data validation of three weeks.

Project Milestone	**Date**
Issue Work Assignment (WA)	December 13, 2007
Work Assignment Acceptance	January 7, 2008
Submit Task 1 Draft Work Plan, HASP, CPP	February 8, 2008
DEC/DOH Comment on Draft Work Plan	March 21, 2008
Submit Task 1 (Final Work Plan) Deliverables	March 14, 2008
Notice to Proceed (NTP)	March 21, 2008
Commence Task 2 Field Work	March 24, 2008
Task 2 Field Work Completed	May 31, 2008
Task 3 and Task 4 Submit Draft Report and Final Feasibility Study	July 31, 2008
Approve Draft Report	35 Days after Draft Report Submitted
Task 3 and Task 4 Submit Final Report and Final Feasibility Study	45 Days after Approval of Draft Report

Section 4
Budget Estimates

Estimated Budget and Level of Effort (LOE) Summary
Former Paul Miller Dry Cleaners
Port Richmond, Staten Island, New York
Site No. 2-43-018

Task Items	Description/Cost	Dollars
1	Work Plan Development	$14,042.81
2	Remedial Investigation	$176,947.11
3	Field Documentation and Reporting	$61,297.84
	Total Estimate Budget (Tasks 1 - 3)	**$252,287.76**

Appendix D presents the detailed costs by task and subtask on the NYSDEC schedule 2.11.

General Assumptions:

- Work will be performed from April 2008 to mid-November 2008 (7.5 months).
- All costs are based upon the scope and schedule provided in this Work Plan. Costs associated with project delays or expedited schedules beyond CDM's control are not assumed.
- CDM will provide four hard copies by mail and one electronic file (pdf) by e-mail for each report submitted to the NYSDEC.

Task 1 - Work Plan Development:

- Only one site visit is assumed for this phase.
- Only one round of comments received concurrently is anticipated on draft deliverables. The review comments will be consolidated by NYSDEC. It is assumed that comments are minimal in nature and no re-evaluation is required. It is assumed that all comments can be addressed in 8 hours.
- Project management, subcontractor procurement, scheduling, budgeting, administrative activities are included in this task.
- A comprehensive Work Plan will be delivered to the Department submitted as a separate document.

- The Work Plan should include the description of the major tasks and sub-tasks to be performed including pertinent information to conduct field activities, potential areas of concern, analytical methods and sampling methods, a staffing plan identifying key and technical staff, identification of areas of subcontracting, work assignment budget, generic Health and Safety Plan, and Citizen participation Plan

- CDM's Generic QAPP has been previously submitted to NYSDEC; a copy of this document will not be submitted with the Work Plan.

<u>Task 2 - Remedial Investigation:</u>

- The Records Search report will identify potential sources of contamination (i.e. the reported sump and UST) and identify sample locations for follow up site characterization/remedial investigations.

- A notice to proceed must be received at least two (2) weeks prior to mobilization.

- Drilling, analytical, surveying (land and geophysical), data validation, and IDW disposal will be subcontracted.

- CDM will provide oversight during all field activities.

- CDM will implement the buddy system at all time during field activities (2 CDM personnel or 1 CDM personnel and subcontractor).

- No schedule delays are assumed due to inclement weather or equipment failure.

- Delays due to the site owner or public are not assumed.

- Only one mobilization/demobilization for drilling is assumed to be required.

- CDM assumes that all material and equipment staged in access areas will be removed to allow easy access to all sampling locations by the drilling equipment.

- Based on review of investigation report at adjacent former Charlton Cleaners property, it is assumed that groundwater monitoring wells will not require double casing, as no confining unit (greater than 15 feet thick) is expected to be encountered during hollow-stem augering.

- CDM assumes that monitoring well installation will take three (3) weeks.

- CDM assumes that well installation activities will not require permits, however, should it be determined that it is indeed necessary, CDM will make provisions to retain all necessary permits.

- No continuous air monitoring has been included in this cost estimate. One PID and one QRAE unit will be utilized for air monitoring purposes. A dust meter will be staged at each sub-slab soil vapor sampling point.

- For costing purposes, CDM assumes that soil samples will be collected from each of the 13 proposed monitoring well locations.

- Costs include one comprehensive round of synoptic water level measurements and groundwater sampling at the 13 proposed and up to 14 existing groundwater monitoring wells/piezometers.

- CDM assumes that groundwater sampling will take five (5) days.

- Groundwater and soil samples will be sent to an off-site laboratory to be analyzed for VOC by EPA Method 8260B and SVOC by EPA Method 8270C. Three (3) of these groundwater and soil samples collected will be analyzed for the Full List TCL/TAL+30, which includes VOC by EPA Method 8260B, SVOC by 8270C, Pesticides/PCBs by EPA Method 8081A/8082, and Metals by EPA Method ILM04.2. Should an alternate analytical method be requested by NYSDEC, requests should be made at least 10 working days before the scheduled sampling to avoid or minimize costs impacts.

- Costs include one sub-slab, indoor air, and indoor sump air sampling event in three (3) structures. It is assumed that no outdoor sumps will be identified during investigation activities.

- It is assumed that all three (3) structures sampled during the annual sub-slab and indoor air sampling event can be accessed during the same week.

- It is assumed that sub-slab and indoor air sampling will take place during the peak heating season or as deemed acceptable by the NYSDOH.

- CDM assumes that the sub-slab soil vapor and indoor air sampling will take no more than five (5) days.

- It is assumed that laboratory-grade helium will not be required for tracer testing conducted at the temporary sub-slab sampling ports.

- All sub-slab soil gas and indoor air samples will be analyzed by a NYSDOH approved ELAP certified laboratory. Air samples will be analyzed for VOC using EPA Method TO-15. Should an alternate analytical method be requested by NYSDEC, requests should be made at least ten (10) working days before the scheduled sampling to avoid or minimize costs impacts.

- It is assumed that up to 70 55-gallon drums of non-hazardous waste will be generated from field activities and require off-site disposal.

- It is assumed that NYSDEC will assist with arranging access to locations to stage IDW until characterization and disposal can be completed.

<u>**Task 3A and 3B - Field Documentation and Reporting:**</u>

- Only conference calls are anticipated to be necessary for this phase. Meetings are not assumed to be required for this task.
- Only one round of comments received concurrently is anticipated on draft deliverables. The review comments will be consolidated by NYSDEC. It is assumed that comments are minimal in nature and no re-evaluation is required. It is assumed that all comments can be addressed within 8 hours.
- During site work, digital photographs and field notes will be kept.
- It is assumed that no more than four (4) remedial alternatives will be evaluated and recommended.
- A combined Remedial Investigation/Feasibility Study Report will be developed including the finding of the Records Search, description of work conducted with field notes, photos, validated analytical data, figures, field measurements, summary tables, any recommendations for additional investigation, and outcome of feasibility study.
- Only one round of comments received concurrently is anticipated on draft deliverables. The review comments will be consolidated by NYSDEC. It is assumed that comments are minimal in nature and no re-evaluation is required. It is assumed that all comments can be addressed within one (1) week.
- It is assumed that the combined RI/FS Report will be sufficient to proceed to development of a Record of Decision.

Section 5
Staffing Plan

This project management organization for this project is to provide a clear delineation of functional responsibility and authority.

5.1 Program Manager - Michael A. Memoli, P.E., DEE

The primary responsibilities for program management activities rest with the Program Manager (PRM). The Program Manager, Mr. Memoli, will have ultimate contract responsibility for the project, including responsibility for the technical content of all engineering work. Mr. Memoli will direct, review and approve all project deliverables, schedule staff and resources, resolve scheduling conflicts and identify and solve potential program problems. He will be directly accountable to NYSDEC's Division of Hazardous Waste Remediation for program execution. He has authority to assign staff, negotiate and execute contracts and amendments, as well as execute subcontracts. The PRM will communicate directly with CDM's Project Manager.

5.2 Project Manager - David Keil, P.G.

The Project Manager, Mr. David Keil, will have the overall responsibility for the technical and financial aspects of this project. He will assign technical staff, maintain control of the project budget and schedule, prepare monthly progress reports, review and approve project invoices, evaluate the technical quality of the project deliverables as well as the adherence to QA/QC procedures and manage subcontractors. He will serve as CDM's point of contact for this project.

5.3 Program Quality Assurance Manager - Jeniffer M. Oxford

The Program Quality Assurance Officer, Ms. Jeniffer Oxford, will monitor QC activities of program management and technical staff, as well as identify and report needs of corrective action to the Program Manager. He will also conduct an internal review of all project deliverables prepared by CDM staff and sign off on the final investigation reports.

5.4 Health and Safety Officer - Christopher S. Marlowe, C.I.H., Q.E.P

The Program Health and Safety Officer, Mr. Chris Marlow, will review and make recommendations to the Subcontractors on health and safety plans for compliance with OSHA requirements. He will develop a Health and Safety plan for CDM and NYSDEC employees, handle over-sight activities, evaluate the performance of health and safety officers and maintain required health and safety records. He will report to the Program Manager

5.5 Project Geologist - Cristina Ramacciotti

The Project Geologist, Ms. Cristina Ramacciotti, will assist the Project Manager with the work plan draft and final, as well as general geologic tasks related to field work, subcontractor coordination, reporting, etc. She is directly accountable to the Project Manager.

5.6 Field Manager/Health and Safety Site Supervisor/Coordinator - Shawna Martinelli

The Field Manager, Ms. Shawna Martinelli, will be responsible for overseeing and coordinating field activities. This will include, but is not limited to: overseeing the installation of monitoring wells, coordinating drill work, coordinating work with other subcontractors and monitoring health and safety conditions in accordance with the approved Health and Safety Plan. She is directly accountable to the Project Manager.

As the Health and Safety Site Supervisor/Coordinator, she will be responsible for ensuring that the Health and Safety Plan is implemented during field activities and that a copy of the site-specific Health and Safety Plan are maintained at the site at all times. He/she is also responsible for upgrading or downgrading personnel protection based on actual conditions at the time of the investigation. The Coordinator must also present an overview of the Health and Safety Plan to field personnel prior to initiating any field activities and is responsible for insuring that field personnel sign off on this plan. She will contact the Program Health and Safety Officer if any questions or issues arise during the field activities that she cannot answer.

Section 6
Subcontracting

AppendixE presents a comparison of quotes from various subcontractors. CDM proposes to engage subcontractors to provide the following services for this work assignment:

6.1 Geophysical Survey (Utility Markout) – Naeva Geophysics, Inc.

At this time, CDM is proposing to use Naeva Geophysicas, Inc. to perform the geophysical survey work. They are located at 50 N. Harrison Street, Suite 11, Congers, New York, 10920.

6.2 Well Installation – Aztech Technologies, Inc.

At this time, CDM is proposing to use Aztech Technologies, Inc. (WBE) as the well installation subcontractor. They are located at 5 McCrea Hill Road, Ballston Spa, New York 12020.

6.2 Analytical Laboratory – ChemTech

At this time, CDM is proposing to use ChemTech (MBE) as the analytical laboratory subcontractor. They are located at 284 Sheffield Street, Mountainside, New Jersey, 07092.

6.3 Data Validation – Nancy Potak

At this time, CDM is proposing to use Nancy Potak (WBE) as the data validation subcontractor. She is located at 1796 Craftsbury Road, Greensboro, Vermont 05841.

6.4 M/WBE Reporting – Kenneth Shider

At this time, CDM is proposing to utilize Ken Shider (M/WBE consultant) to prepare the quarterly M/WBE reports that are required by NYSDEC.

6.5 Site and Topographic Survey – YEC, Inc

At this time, CDM is proposing to utilize YEC, Inc. (MBE) as the field technical support subcontractor. They are located at 612 Corporate Way, Valley Cottage, New York 10989. They will perform a site and topographic survey and is directly accountable to the Project Manager.

6.6 IDW Disposal – SeaCoast Environmental Services, Inc.

At this time, CDM is proposing to utilize SeaCoast Environmental Services, Inc. as the IDW disposal subcontractor. They are located at 716 Newman Springs Rd, PMB 292, Lincroft, NJ 07738.

Section 7
MBE/WBE Utilization Plan

To meet the requirements of the MBE/WBE program, CDM has prepared the following utilization plan:

Total Dollar Value of the work assignment	**$252,287.76**
MBE Percentage Goal	15%
MBE Dollar Value Goal	$37,843.16
WBE Percentage Goal	5%
WBE Dollar Value Goal	$12,614.39
Combined MBE/WBE Percentage Goal	20%
Combined MBE/WBE Dollar Value Goal	$50,457.55

Minority and woman-owned firms are expected to participate as follows:

Services to be Provided	Description of Services	Subcontractor Name and Contact Information	Proposed Subcontract Price
WBE - Drilling	Well Installation	Aztech Technologies, Inc. Matthew Darcangelo (518) 885-5383	$50,624.36
MBE - Laboratory Analysis	Vapor, Water and Soil Sample Analysis	ChemTech Joe Dockery (908) 789-8900	$29,564.85
M/WBE Quarterly Reports	M/WBE Quarterly Reports	Kenneth Shider (518) 269-2207	$600.00
MBE - Survey	Site and Topographic Survey	YEC, Inc Ed Chen (845) 268-3203	$11,703.58
WBE - Data Validation	DUSR	Nancy Potak (802) 533-9206	$3,028.20
		TOTAL	$95,520.96

TABLES

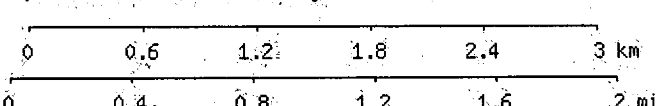
Table 2-1
Analytical Program Summary
former Paul Miller Dry Cleaners Site
Port Richmond, New York

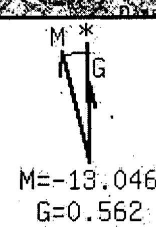
Analytical Parameter	Sample Matrix	Number of Samples	Analytical Method	Field Duplicates (b)	MS/ MSDs	Field Blank/ Ambient Air Blank (b)	Trip Blanks (c)	Container	Sample Preservation	Holding Time
GROUNDWATER SAMPLES										
Volatile Organic Compounds	Groundwater	23	EPA 8260B	2	0	5	3	3 - 40ml clear glass vial with Teflon septum	HCl to pH <2; Cool to 4°C	14 days
Semi-volatile Organic Compounds	Groundwater	23	EPA 8270C	2	0	5	0	1000 ml amber glass bottle with teflon lined cap	Cool to 4°C	7/40 days
Full List CLP-TCL/TAL+30	Groundwater	3	EPA 8260B EPA 8270C EPA 8081A/8082 EPA SOW ILM04.2	0	1	0	0	3 - 40ml clear glass vial with Teflon septum; 1000 ml amber glass bottle with teflon lined cap; 1-500 ml plastic with plastic cap	$HNO_3 < 2$	180 days
SOIL SAMPLES										
Volatile Organic Compounds	Soil	9	EPA 8260B	1	0	12	12	3 - 40 ml glass VOC with plastic cap with Teflon septum with 25 ml methanol (prepared by lab)	Cool to 4°C	14 days
Semi-volatile Organic Compounds	Soil	9	EPA 8270C	1	0	12	0	1 - 8 ounce glass jar with plastic cap	Cool to 4°C	14 days
Full List CLP-TCL/TAL+30	Soil	3	EPA 8260B EPA 8270C EPA 8081A/8082 EPA SOW ILM04.2	0	1	0	0	3 - 40 ml glass VOC with plastic cap with Teflon septum with 25 ml methanol (prepared by lab); 1 - 8 ounce glass jar with plastic cap; 1 - 2 ounce glass jar with plastic cap	Cool to 4°C	180 days
SOIL VAPOR SAMPLES										
Volatile Organic Compounds (VOCs)	Air	12	EPA TO-15	2	0	2	0	1.4L SUMMA canisters with flow regulators		30 days

Notes:
(a) A minimum of 5% of all samples will be collected in duplicate.
(b) Field blanks are collected at a frequency of 1 per day.
(c) Trip blanks are collected at a frequency of 1 per sample cooler or 1 per every five days.

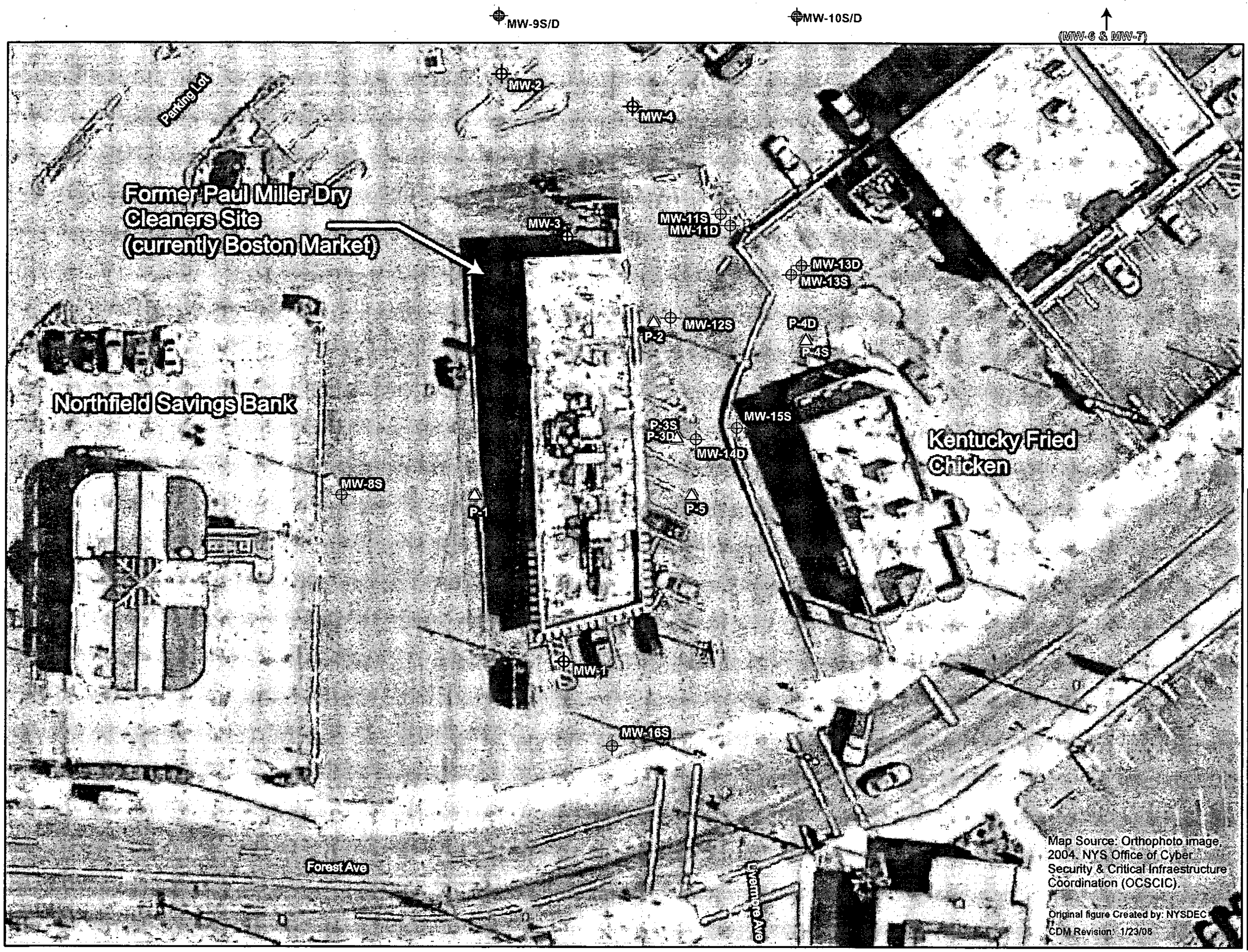
FIGURES

Figure 1-1
Site Location Map





UTM 18 573024E 4497258N (NAD27)
USGS Arthur Kill (NY,NJ) Quadrangle
Projection is UTM Zone 18 NAD83 Datum
www.topoozone.com



N
W E
S

FIGURE 2-1
Proposed Monitoring Well Locations

Site No.:
243018
Site Name:
Former Paul Miller Dry Cleaners
Site Address:
1465 Forest Avenue
Staten Island, NY 10301

LOCATIONS NOT TO SCALE

- Existing Piezometer Locations
- Existing Monitoring Well Locations
- Proposed Monitoring Well Locations

0 50
Feet

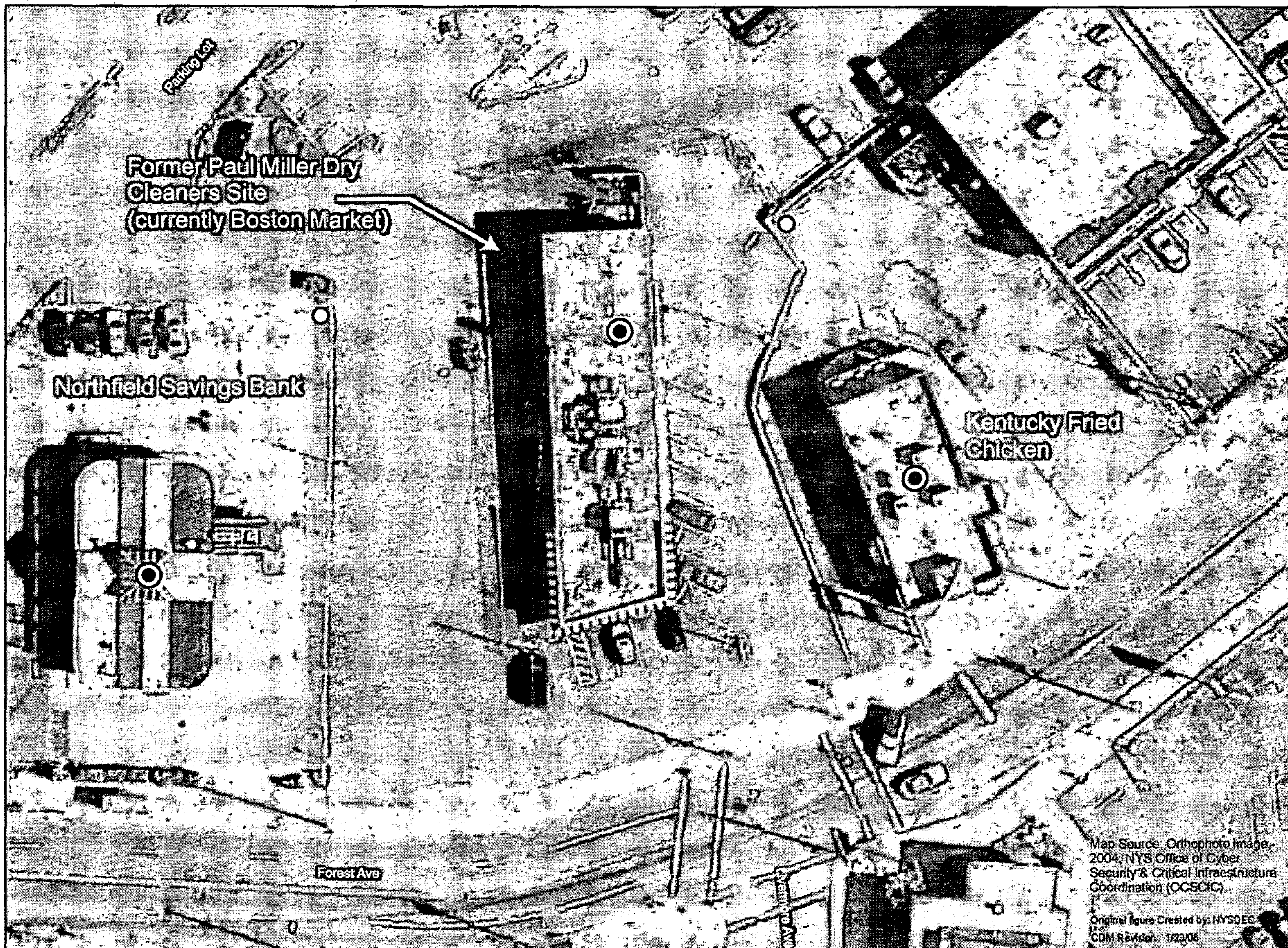


FIGURE 2-2
Proposed Vapor Intrusion Investigation Sampling Locations

Site No.:
243018
Site Name:
Former Paul Miller Dry Cleaners
Site Address:
1465 Forest Avenue
Staten Island, NY 10301

LOCATIONS NOT TO SCALE

○ Outdoor Ambient Air Locations

◉ Sub-Slab Soil Vapor/ Indoor Air/ Sump Sample Locations

0 50
Feet

Appendix A

CDM Generic Quality Assurance Project Plan
for NYSDEC Contract No. D004437

CDM GENERIC QUALITY ASSURANCE PROJECT PLAN (QAPP) FOR NYSDEC STANDBY CONTRACT NO. D-004437

Prepared for

New York State Department of Environmental Conservation
Investigation and Design Engineering Services

Prepared by

Camp Dresser & McKee
Raritan Plaza I, Raritan Center
Edison, New Jersey

Revised February 2008

CDM

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List of Tables

List of Attachments

Section 1 Introduction

This Generic Quality Assurance Project Plan (QAPP) is the documentation of the quality assurance/quality control (QA/QC) procedures required to complete projects under New York State Department of Environmental Conservation (NYSDEC) under the Engineering Services for Investigation and Design, Standby Contract No. D004437. Site specific procedures will be included as an attachment to the site specific Work Plan for that site.

1.1 Purpose

The principal purpose of this document is to specify quality assurance/quality control (QA/QC) procedures for the collection, analysis, and evaluation of data that will be legally and scientifically defensible.

1.2 Objectives

The QAPP provides general information and procedures applicable to the activities and analytical program detailed in each site-specific Work Plan. This information includes definitions and generic goals for data quality and required types and quantities of QA/QC samples. The procedures address field documentation; sample handling, custody, and shipping; instrument calibration and maintenance; auditing; data reduction, validation, and reporting; corrective action requirements; and QA reporting specific to the analyses performed by the laboratories subcontracted by CDM.

Section 2
Project Organization and Responsibility

2.1 Overview

The project management organization for each project is to provide a clear delineation of functional responsibility and authority. The project manager for CDM is the primary point of contact with the regulatory agency. He/she is responsible for development and completion of the site-specific investigation, project team organization and supervision of all project tasks. In this role, he/she will communicate directly with NYSDEC staff.

For the fieldwork, field teams consisting of CDM personnel and subcontractors will be assembled and will be responsible for implementing all aspects of the fieldwork. Several key activities will be performed as part of the field and analytical work. These activities include:

- Ensuring that sample collection, testing and data collection procedures are performed according to DEP-10 requirements
- That health and safety procedures as outlined in the site-specific health and safety plan (HASP) are followed
- That the field QA/QC procedures are implemented
- That laboratory analysis, data validation, data processing, and data QC activities are performed in accordance with NYSDEC guidelines.
- That minority business enterprise/women business enterprise (MBE/WBE) goals are achieved.

2.2 Responsibility

The primary responsibilities for program management activities rest with the Program Manager (PRM). The Program Manager will have ultimate contract responsibility for the project, including responsibility for the technical content of all engineering work. The program manager will direct, review and approve all project deliverables, schedule staff and resources, resolve scheduling conflicts and identify and solve potential program problems. He will be directly accountable to NYSDEC's Division of Hazardous Waste Remediation for program execution. He has authority to assign staff, negotiate and execute contracts and amendments, as well as execute subcontracts. The PRM will communicate directly with CDM's Project Manager.

The Project Manager will have overall responsibility for the technical and financial aspects of this project. He/she will assign technical staff, maintain control of the project budget and schedule, prepare monthly progress reports, review and approve project invoices, evaluate the technical quality of the project deliverables as well as the adherence to QA/QC procedures and manage subcontractors. He/she will serve as CDM's point of contact for this project.

The Program Quality Assurance Officer will monitor QC activities of program management and technical staff, as well as identify and report the needs for corrective action to the Program Manager. She will also conduct an internal review of all project deliverables prepared by CDM staff and sign off on the final investigation reports.

The Program Health and Safety Officer will review and make recommendations to the Subcontractors on health and safety plans for compliance with OSHA requirements. He will develop a Health and Safety plan for CDM and NYSDEC employees, handle over-sight activities, evaluate the performance of health and safety officers and maintain required health and safety records. He will report to the Program Manager.

The Health and Safety Site Supervisor/Coordinator will be responsible for ensuring that the Health and Safety Plan is implemented during field activities and that a copy of the site-specific Health and Safety Plan are maintained at the site at all times. He/she is also responsible for upgrading or downgrading personnel protection based on actual conditions at the time of the investigation. The Coordinator must also present an overview of the Health and Safety Plan to field personnel prior to initiating any field activities and is responsible for insuring that field personnel sign off on this plan. He/she will contact the Program Health and Safety Officer if any questions or issues arise during the field activities that he/she cannot answer.

2.3 Subcontractors

The following subcontractor services may be required as part of the site investigations and performed by subcontractors under CDM's supervision:

- Geophysical Survey
- Geoprobe Installation
- Drilling
- Well Installation
- Groundwater Sampling
- Chemical Analytical Services
- Site Survey
- Investigation Derived Waste Removal

Section 3
Field Procedures

CDM's points of contact for the field investigation are the Site Manager and the onsite NYSDEC representative. Any minor changes in sampling activities that are within the proposed scope of the project will be documented each day in the field logbook and signed by both representatives. Any modifications that are inconsistent with the approved work plan are to be approved by NYSDEC prior to implementation.

3.1 Documentation (Field Log Book)

Information recorded in field log books include observations, data, calculations, time, weather, description of the data collection activity, methods, instruments, and results. Additionally, the logbook may contain descriptions of wastes, biota, geologic material, and site features including sketches maps, or drawings as appropriate.

3.1.1 Preparation

In addition to this QAPP, site personnel responsible for maintaining logbooks must be familiar with other site specific standard operating procedure (SOPs). These should be consulted as necessary to obtain specific information about equipment and supplies, health and safety, sample collection, packaging, decontamination, and documentation.

Prior to use in the field, each logbook should be marked with a specific control number. The field notebook will then be assigned to an individual responsible for its care and maintenance.

Field logbooks will be bound with lined, consecutively numbered pages. All pages must be numbered prior to initial use of the logbook. The following information will be recorded inside the front cover of the logbook:

- Field logbook document number
- Activity (if the log book is to be activity-specific)
- Person and organization to whom the book is assigned, and phone number(s)
- Start date

3.1.2 Operation

The following is a list of requirements that must be followed when using a logbook:

- Record work, observations, quantities of materials, calculations, drawings, and related information directly in the log book. If data collection forms are specified by an activity-specific plan, this information need not be duplicated in the logbook. However, any forms used to record site information must be referenced in the logbook.

- Do not start a new page until the previous one is full or has been marked with a single diagonal line so that additional entries cannot be made. Use both sides of each page.

- Do not erase or blot out any entry at any time. Before an entry has been signed and dated, any changes may be made but care must be taken not to obliterate what was written originally. Indicate any deletion by a single line through the material to be deleted.

- Do not remove any pages from the book.

- Record as much information as possible.

- Specific requirements for field logbook entries include:

  - Initial and date each page.
  - Initial and date all changes.
  - Multiple authors must sign out the logbook by inserting the following:

- Above notes authored by:

  - (Sign name)
  - (Print name)
  - (Date)

- A new author must sign and print his/her name before additional entries are made.

- Draw a diagonal line through the remainder of the final page at the end of the day.

- Record the following information on a daily basis:

  - Date and time
  - Description of activity being conducted including station (i.e., well, boring, sampling location number) if appropriate
  - Weather conditions (i.e., temperature, cloud cover, precipitation, wind direction, and speed) and other pertinent data
  - Level of personnel protection to be used

Entries into the field logbook will be preceded with the time (written in military units) of the observation. The time should be recorded at the point of events or measurements that are critical to the activity being logged. All measurements made and samples collected must be recorded unless they are documented by automatic methods (e.g., data logger) or on a separate form. In these cases, the logbook must reference the automatic data record or form.

Other events and observations that should be recorded include:

- Changes in weather that impact field activities.
- Deviations from procedures outlined in any governing documents. Also record the reason for any noted deviation.
- Problems, downtime, or delays.
- Upgrade or downgrade of personnel protection equipment.

3.1.3 Post-Operation

To guard against loss of data due to damage or disappearance of logbooks, copies of completed pages will be made periodically (weekly, at a minimum) and submitted to the project manager. Documents that are separate from the logbook will be copied and submitted regularly and as promptly as possible to the project manager. This includes all automatic data recording media (printouts, logs, disks or tapes) and activity-specific data collection forms required by other SOPs.

At the conclusion of each activity or phase of site work, the individual responsible for the log book will ensure all entries have been appropriately signed and dated, and that corrections were made properly (single lines drawn through incorrect information, then initialed and dated). The completed logbook will be submitted to the records file.

3.2 Sample Collection, Documentation and Identification

The following procedures describe proper sample collection, and documentation to be included in field notebooks. Documentation includes describing data collection activities, logging sample locations, sample IDs, container labeling and chain-of-custody forms. Procedures for sample classification to insure proper labeling of samples are also included.

3.2.1 Responsibilities

The field manager and/or field technician is required to oversee drilling of the boreholes, collection of vapor, groundwater, and air samples, fill out field book logs, submit samples for analysis, COC forms and labeling of any waste-containing drums, if required. Also, the field manager and/or field engineer is required to adhere to the Site-Specific Health & Safety Plan. Field book entries should state starting time of monitoring, equipment used and results.

3.2.2 Sample Collection

3.2.2.1 Water Samples

- VOCs, if analyzed, are to be sampled first. Pour water slowly into the 40-ml vial, tipping the vial and allowing water to run down the side to prevent aeration. Fill until a meniscus forms and tightly seal the vial. Invert the vial and check for bubbles. If bubbles are present, add water and repeat. It may be necessary to discard the vial and use another if bubbles continue to appear.

- Remaining bottles should then be filled, again preventing aeration.

- If filtering is required (filtering is sometimes requested when samples are to be analyzed for metals and turbidity is high), use a dedicated 0.45 micron filter for each sample and filter prior to preservation.

- Label bottles with sample designation, project, date, time, preservative and required analysis. Clear tape may be used to cover the completed label.

- Place sample in a cooler with ice to maintain temperature at 4°C +/- 2°C. Samples will be maintained at this temperature throughout the sampling and transportation period. Chain of Custody and shipping procedures are discussed in See Section 3.3.

3.2.2.2 Soil/Sediment/Sludge Samples

- VOCs, if analyzed, are to be sampled first. Fill the jar completely such that there is no air space. VOCs must not be homogenized.

- For the remaining parameters, homogenize the samples with a decontaminated stainless bowl (Section 3.12) and trowel prior to filling the remaining bottles. Use of dedicated disposable trowels is permitted.

- Label bottles with sample designation, project, date, time, preservative and required analysis. Clear tape may be used to cover the completed label.

- Place sample in a cooler with ice to maintain temperature at 4°C +/- 2°C. Samples will be maintained at this temperature throughout the sampling and transportation period. Chain of Custody and shipping procedures are discussed in Section 3.3.

3.2.2.3 Soil Vapor/Ambient Air Samples

- Soil Vapor samples will be collected with 1.4-liter summa canisters, with 2-hour flow controllers (regulators) and particulate filters (if required). Flow rate shall not exceed 200 ml/min.

- Sub slab soil vapor samples will be collected with 6-liter summa canisters, with 24-hour flow controllers (regulators) and particulate filters (if required). Sample flow rate shall not exceed 200 ml/minute.

- Soil Vapor samples will be collected with 6-liter summa canisters, with flow controllers (regulators) and particulate filters (if required). Sample flow rate shall not exceed 200 ml/minute.

- Indoor and outdoor ambient air samples will be collected with 6-liter summa canisters, with flow controllers (regulators) and particulate filters (if required). Sample flow rate shall not exceed 200 ml/minute.

- Instantaneous grab samples may also be collected, as permitted by NYSDEC.
- Record vacuum prior to and at conclusion of sampling. Prior to sampling, vacuum should be 28-30 inches.
- At conclusion of sampling, vacuum should be 5 inches Hg +/- 1 inch Hg.
- Label summa canister and prepare for shipping. Summa canisters are not chilled or otherwise preserved.

3.2.3 Field Notebooks

Complete thorough notes of all field events are essential to a timely and accurate completion of this project. The field manager and/or field engineer is responsible for accounting for particular actions and times for these actions of the subcontractor while in the field. Also, identification (numbers and description) of field samples duplicates samples, and blank samples should also be noted in the field book. For a particular workday, the field book should contain the following:

- Field personnel name, contractors name, number of persons in crew, equipment used, weather, date, time, and location at start of day (boring number).
- Sample identification number, depth, amount of sample recovery, PID readings and soil descriptions.
- Description of any unusual surface or subsurface soil conditions
- Record of Health and Safety monitoring; time, equipment and results
- Record of site accidents or incidents
- Record of any visitors
- Potential of delays
- Materials and equipment used during borehole installation
- Final daily summary of work completed including list of samples obtained
- Completion of daily QA/QC log sheet
- Contractor downtime, decontamination time, equipment breakdowns, movement tracking throughout the day, etc.
- Any other data that may be construed as relevant information at a later date.

The field logs should confirm the subcontractor's data. Field notes should be photocopied weekly and returned to the project manager.

If a borehole is completed as a monitoring well, simply note this on the form, and complete the monitoring well log. Examples of completed boring logs should be reviewed and adequate blank log forms obtained.

Monitoring well logs are required in addition to the boring log form if the borehole is completed as a monitoring well. These are to be completed in the field after a monitoring well is installed. They should include data such as screen length, riser length, materials used, etc. Examples of monitoring well logs should be reviewed and adequate blank log forms obtained.

3.2.4 Drum Labeling

Labeling of drums is essential for tracking hazardous materials. The responsibility of the contractor is to collect, handle, and store the drums, but the responsibility of field personnel is to label these drums appropriately. There is a significant cost implication if drums are not property labeled. Unknown material must be disposed of as hazardous waste if any hazardous waste is found on-site.

The following drum labeling procedures are to be adhered to:

- Field staff shall secure packing list envelopes to the side of the drum(s) at the completion of a boring.
- Field staff shall print with an indelible marker on information cards all information pertaining to the contents of the drum(s). If more than one drum is collected from the same borehole, each information card shall be numbered sequentially in parenthesis starting with the number one after the boring number. The information shall include:
    - Program Area
    - Boring No.(s)
    - Date collected
    - Description of contents (i.e., soil cuttings, well water, etc.)
    - Amount of water (specify in inches)
    - Fullness of drum (not including free liquid, specify in fractional form)
- Field staff shall insert information card into packing list envelope. The packing list envelope shall be sealed at this time.
- Field staff shall record in field book all information pertaining to the contents of the drum that was printed on the information card.
- Program manager, upon receipt of the analytical data for the drums, shall prepare a summary table of the analytical results on a weekly basis, and provide the designated coordinator.

- Based on the tabulated information the designated coordinator will determine and prepare the appropriate storage labels required:
  - Hazardous Waste label
  - Non-hazardous label
- The designated coordinator will fill out these labels.
- Field staff shall attach these labels to the appropriate drums. If the information cards inside the packing list envelopes are damaged, they shall be reprinted at this time.

It is noted that waste material is expected to be transported off-site during excavation. No investigation derived wastes are expected to be drummed.

3.2.5 Sample Identification

Each sample collected will be designated by an alphanumeric code that will identify the type of sampling location, matrix sampled, and the specific sample designation (identifier). The sample identification for all samples will begin with the Site ID for the site.

The following terminology shall be used for the **soil** sample identification:

SITE ID - BORING/SAMPLE LOCATION ID – DEPTH

The sample ID for the soil vapor and groundwater samples will then include the sample type designation, followed by the sample number. The following terminology shall be used for the **soil vapor** sample identification:

SITE ID - SV- #
SITE ID - SV - #

Where there are shallow and deep samples at a location, the shallow samples will be designated "S" and the deep samples designated "D".

The following terminology shall be used for the **groundwater** sample identification:

SITE ID - MONITORING WELL ID - DEPTH (for monitoring well samples)
SITE ID – GW - BORING ID - DEPTH (for temporary well point or hydro-punch samples)

For sub-slab and indoor air samples, the site ID will be followed by the sample type designation, the sample number and then the date. The following terminology shall be used for the **structure** sample identification:

SITE ID-SS-xx-DATE (for sub-slab locations)

SITE ID-IA-xx-DATE (for indoor ambient air)
SITE ID-A-xx-DATE (for outdoor ambient air)

Field blank and trip blank samples will be designated as follows:

SITE ID-FB-DATE (for field blanks)
SITE ID-TB-DATE (for trip blanks)

Field duplicates will be designated by using the next consecutive sample number for the site.

3.3 Chain-of-Custody Procedures

This section describes the procedures used to ensure that sample integrity and chain-of-custody are maintained throughout the sampling and analysis program. Chain-of-custody (COC) procedures provide documentation of sample handling from the time of collection until its disposal by a licensed waste hauler. This documentation is essential in assuring that each sample collected is of known and ascertainable quality.

The COC begins at the time of sample collection. Sample collection is documented in the field notebooks in accordance with the specified SOP. At the same time, the sampler fills out the label on the sample container with the following information:

- Sample ID code
- Required analyses
- Sampler initials
- Date and time of sample collection

3.3.1 Chain-of-Custody Forms

The COC forms are a paper trail system that follows the samples collected and indicates which laboratory analyses are to be performed on which samples. Each sample should be clearly labeled and listed on the COC. The laboratory will only perform analyses on samples indicated and all other samples should be indicated with a "HOLD" designation. By labeling a sample "HOLD", the laboratory will store the sample until further instruction is given. Do not check the request for analysis blocks on the COC for samples designated with "HOLD" Status. Never indicate duplicate or blank samples on a COC.

It is the responsibility of the field manager to coordinate COC forms and supply copies of all COC to the project manager for data management use.

A COC form is filled out for each sample type at each sampling location. Each time the samples are transferred to another custodian or to the laboratory, the signatures of the people relinquishing the sample and receiving the sample, as well as the time and date, are documented. Labels will be filled out with an indelible, waterproof, marking pen.

3.3.2 Chain-of-Custody Records

The COC record is a three-part form. The laboratory retains the original form and the person relinquishing the samples keeps a copy of the form at the time of sample submittal. This form is then returned to the project manager or person in charge of data coordination.

The COC Record will be placed in a Ziplock bag and placed inside of all shipping and transport containers. All samples will be hand delivered or shipped by Federal Express to the laboratory specified by the field manager. Samples should be packed so that no breakage will occur (e.g. placed upright in the cooler surrounded by packing materials). Sample vials may be placed on their sides if frozen. Custody seals will be placed on all coolers/packages containing laboratory samples during shipment.

3.4 Field Quality Control Samples

In order to maintain QA/QC in both the field and the laboratory, additional samples such as trip blanks, duplicates, field blanks, performance evaluation samples and background samples will be collected. Each type of QA/QC sample is described below. Details of the QA/QC samples collected will be provided to the project data validator for use in their evaluation.

3.4.1 Quality Control for Soil Sampling

Approximately twenty percent of all soil samples analyzed should be QA/QC samples. These samples act as a verification of appropriate field and laboratory procedures. These samples should be recorded in the field book but should not be identified on the Chain-of-Custody (COC) form other than with an MD (Miscellaneous Discrete). All QA/QC samples should be numbered sequentially with other field samples on the soil log form. The following is a breakdown of types of QA/QC samples that are to be taken:

3.4.1.1 Duplicate Samples

Approximately ten percent of all soil samples analyzed should be duplicate samples. Soil duplicates shall be field-homogenized samples. To ensure laboratory "blind" analyses, duplicate samples will be identified with the next sequential sample number on sample containers and the COC forms. The actual identification of the duplicate samples shall be recorded in the field book. Duplicate samples are collected from the same split spoon sampler, homogenized in the field and analyzed for the same compounds.

3.4.1.2 Field Blanks

Approximately two percent of all soil samples analyzed should be field blanks. Rinsate blanks are collected after a sample is taken and the equipment used (i.e., split spoon sampler) has been decontaminated. Distilled water is then poured over the decontaminated sampling equipment and collected in sample jars for analysis. It should be documented in the field book which soil sample preceded the field blank and which soil sample followed the field blank for the equipment used.

3.4.2 Quality Control for Soil Vapor and Air Sampling

Approximately five percent of all soil vapor (including sub-slab soil vapor) samples analyzed should be duplicate samples. Soil vapor duplicates will be collected in a manner so that the sample and duplicate are being collected simultaneously from the same sample location. One duplicate indoor air sample will be collected per site where indoor air sampling is being conducted. Duplicate outdoor air samples will be collected only at the sites where indoor air sampling is also being conducted. Duplicate samples are analyzed for the same compounds. All summa canisters must be certified to be free of contaminants in accordance with QA/QC protocol.

3.4.3 Quality Control for Groundwater Sampling

Approximately twenty percent of all groundwater samples analyzed should be QA/QC samples. These samples act as a verification of appropriate field and laboratory procedures. These samples should be recorded in the field book but should not be identified on the COC form as a QA/QC sample. All QA/QC samples should be numbered sequentially with other field samples. The following is a breakdown of types of QA/QC samples that are to be taken:

3.4.3.1 Duplicate Samples

Approximately five percent of all groundwater samples analyzed should be duplicate samples. To ensure laboratory "blind" analysis, duplicate samples will be recorded with the well I.D. number and the next sequential sample number on sample containers and the COC forms. Duplicate samples are collected from the same bailer and analyzed for the same compounds.

3.4.3.2 Trip Blanks

Each cooler packed and shipped for aqueous VOC analysis should also contain a trip blank. Trip blanks are VOA vials filled with distilled water. These pre-filled vials are to be carried with the sample bottles and samples and should remain sealed the entire time. It should be documented in the field book which aqueous samples were collected and transported with the trip blank.

3.4.3.3 Field Blanks

One field blank sample will be collected per day of sampling. Field blanks are collected after a sample is taken and the equipment used (i.e., bailer) has been decontaminated. Distilled water is then poured over the decontaminated sampling equipment and collected in sample jars for analysis. It should be documented in the field book which groundwater sample preceded the field blank and which sample followed the field blank for the equipment used.

3.5 Premobilization

Prior to initiating fieldwork, the following preparatory activities will be completed:

- Project mobilization.
- Utility clearance and permitting. The drilling subcontractor is responsible for contacting the appropriate local utility or "one-call" service to locate subsurface and aboveground utilities in the vicinity of the soil gas survey area.
- Site specific issues resolved.
- Sample analysis will be scheduled with the laboratory.
- Appropriate sample containers and preservatives for the various sample parameters will be obtained. Extra containers will be obtained to account for possible breakage.
- Field blank water will be obtained from the laboratory performing the analysis.
- Necessary field sampling and monitoring equipment will be obtained. Prior to use, the equipment will be checked to confirm that it is in good working condition, properly calibrated, and decontaminated. **The field equipment for the procedures detailed in Sections 3.6 through 3.27 is listed in Table 3-1.**
- Materials necessary for personal protection and decontamination will be obtained.
- Coordinate with subcontractors.

3.6 Direct Push Groundwater Sampling

3.6.1 Macro Core Sampling

Direct push methods will be used to collect 48 or 60-inch macro-core samples continuously at each of the groundwater sample locations. The samples will be used by the CDM engineer to determine the depth to groundwater at each location. Once saturated soil is verified, a screen point groundwater sampler will be set approximately 5 feet into the water table. The depth to water will be used to determine the depth of the soil vapor probes.

Table 3-1
Equipment List

Equipment List \ Field Procedure	Soil Vapor Sampling	Temporary Port Sub-Slab Soil Vapor Sampling	Permanent Port Sub-Slab Soil Vapor Sampling	Indoor (Ambient) Air Sampling	Outdoor (Ambient) Air Sampling	Direct Push Groundwater Sampling	Low Flow Groundwater Sampling	Monitoring Well Purging	Groundwater Sampling by Bailer	Tap Water Sampling	Surface Water Sampling	Sediment/Sludge Sampling	Subsurface Soil Sampling	Surface Soil Sampling	Investigative Derived Waste	Water Level/NAPL Measurement	Rock Coring	Packer Testing	Aquifer Performance Test	Membrane Interface Probe	Fish Sampling	Benthic Macroinvertibrate Sampling
¼-inch flush mount hex socket plug, Teflon coated			x																			
¼-inch OD Teflon tubing	x	x	x				x															
¼-inch outside diameter (OD) stainless steel tubing			x																			
¼-inch Swagelock™ female and male connector			x																			
½- to ¾-inch braided nylon line or Teflon-coated wire rope									x		x	x										
1.4 or 6 Liter summa canisters	x	x	x	x	x																	
1-gallon buckets with foam along the rim	x	x																				
5-gallon bucket							x	x	x	x											x	x
60 cm^3 syringe	x	x	x																			
6-ft Engineers Scale																	x					
Aluminum foil												x									x	
Anchoring cement			x																			
Auger, rotary, air hammer or other drilling method (provided by subcontractor)																	x	x				
Bailer (sampler) and rope or wire line								x	x		x											
Boat (as needed for deep water)												x										
Bricks (or equivalent)	x																					
Camera	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cement (to patch floor)		x																				
Check valve																			x			
Clear waterproof tape												x										
Composite Liquid Waste Sampler (COLIWASA) or sample thief for liquid sampling in a container															x							
Coolers/Sample shipping containers with ice packs						x	x		x	x	x	x	x	x	x			x			x	x
Core Barrel (provided by subcontractor)																	x					
Data logger and laptop																x			x			
Decontamination supplies						x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
Direct-push drill rig or rotary drill rig (for split-spoon/split barrel or direct push sampling)													x									
Discharge Hosing/piping								x											x			
Electrical conduit putty or modeling clay		x	x																			
Field parameters meters (Temperature, conductivity, pH, dissolved oxygen, Redox, turbidity)							x		x	x	x							x				
Flow meter with totalizer																		x	x			
Generator/electric supply source							x	x											x			
Hammer Drill with 1.25-inch bit		x																				
Hammer Drill with 3/8,1-inch bit			x																			

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Equipment List \ Field Procedure	Soil Vapor Sampling	Temporary Port Sub-Slab Soil Vapor Sampling	Permanent Port Sub-Slab Soil Vapor Sampling	Indoor (Ambient) Air Sampling	Outdoor (Ambient) Air Sampling	Direct Push Groundwater Sampling	Low Flow Groundwater Sampling	Monitoring Well Purging	Groundwater Sampling by Bailer	Tap Water Sampling	Surface Water Sampling	Sediment/Sludge Sampling	Subsurface Soil Sampling	Surface Soil Sampling	Investigative Derived Waste	Water Level/NAPL Measurement	Rock Coring	Packer Testing	Aquifer Performance Test	Membrane Interface Probe	Fish Sampling	Benthic Macroinvertibrate Sampling
Hand auger and extension rods (for manual sampling)												x	x									
Helium, regulator and detector	x	x																				
Indelible black ink pen or marker	x	x	x	x	x	x	x		x	x	x	x	x	x	x		x	x				
Inflatable Packers (provided by subcontractor)																		x				
Kimwipe or paper towels						x	x	x	x		x	x	x	x	x	x					x	x
Labels and shipping products	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x		x			x	x
Large, wide-mouth breakers for measuring field parameters							x		x	x	x							x				
Lift pipe (provided by subcontractor)																		x				
Logbook	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
low-flow air pump	x	x	x																			
low-flow groundwater pump							x															
Nitrogen																		x				
Personal protective equipment per Health and Safety Plan	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Photoionization detector (PID)	x	x	x			x	x		x	x		x	x	x	x			x				
Plastic Zip-top bag									x	x		x	x	x							x	x
Polyethylene or plastic sheeting						x	x	x	x		x	x	x	x	x			x		x	x	x
Ponar sampler/ Eckman grab												x										
Pond sampler											x											
Pressure Gauges																		x				
Sample containers and preservatives (supplied by laboratory)						x	x		x	x	x	x	x	x	x			x				
Sampling port/valve																		x	x			
Scale																					x	x
Slide Hammer with extension rods (for manual sampling)													x									
Stainless steel push tubes (as needed)												x										
Stainless steel trowels, spoons, pan, tray, or bowls												x	x	x	x							
Stop watch										x									x			
Submersible pump								x										x	x			
Surveyor's stand (or equivalent to place canister on)				x																		
Tap and deionized water						x			x		x	x	x	x	x	x	x	x				
Tape Measure (100+ ft)	x	x	x	x	x	x	x				x	x	x	x				x	x		x	x
Locating device (GPS)	x	x	x	x	x	x	x		x		x	x	x	x			x	x		x		
Tedlar™ sample bags	x	x	x																			
Teflon thread tape			x																			
T-handle (extension rod) and hand auger													x									
three-way valve	x	x	x																			
trowel or putty knife			x																			
Tubing cutter	x	x	x				x	x														
Water level indicator						x	x	x	x							x		x	x			

Table 3-1
Equipment List

Equipment List \ Field Procedure	Soil Vapor Sampling	Temporary Port Sub-Slab Soil Vapor Sampling	Permanent Port Sub-Slab Soil Vapor Sampling	Indoor (Ambient) Air Sampling	Outdoor (Ambient) Air Sampling	Direct Push Groundwater Sampling	Low Flow Groundwater Sampling	Monitoring Well Purging	Groundwater Sampling by Bailer	Tap Water Sampling	Surface Water Sampling	Sediment/Sludge Sampling	Subsurface Soil Sampling	Surface Soil Sampling	Investigative Derived Waste	Water Level/NAPL Measurement	Rock Coring	Packer Testing	Aquifer Performance Test	Membrane Interface Probe	Fish Sampling	Benthic Macroinvertibrate Sampling
Water spray bottle						x	x				x	x	x	x	x							
Water storage container (if necessary)					x	x	x											x	x			
Wrenches and pliers	x	x	x	x	x		x	x	x				x									

3.6.2 Purge and Sampling

Standard purge techniques will be utilized to purge and sample groundwater. Standard purge and sampling techniques consist of using a check valve and tubing to purge the well at a low flow rate. The check valve intake is set approximately in the middle of the screen. The well is purged at the low rate until the water flows clear or the turbidity is reduced to 50 nephelometric turbidity units (NTUs) or less or to a level deemed acceptable by NYSDEC. The sample is then collected directly from tubing or bailer.

3.6.3 Groundwater Sampling Procedure

Personal protective equipment will be donned in accordance with the requirements of the Site Health and Safety Plan (HASP).

- Assemble the screen point groundwater sampler.
- Attach the Mill-slotted screen point groundwater sampler, onto the leading probe rod.
- Thread the drive cap onto the top of the probe rod and advance the sampler using either the hydraulic hammer or hydraulic probe mechanism. Replace the 30-centimeter (cm) rod with the 90-cm rod as soon as the top of the sampler is driven to within 15 cm of the ground surface.
- Advance the sampler to the interval to be sampled using the hydraulic hammer. Add additional probe rods as necessary to reach the specified sampling depth.
- Move the probe unit back from the top of the probe rods and remove the drive cap.
- Attach the pull cap to the top probe rod, retract the probe rods, push the screen into the formation, remove extension rods from the probe rods, and measure and record the water level, allowing time for the water level to reach equilibrium.
- Purge the groundwater until the water flows clear or the turbidity has been reduced to 50 NTUs or less. If the well is purged dry, the sample may be collected after the well recharges.
- Collect the samples using a check valve and flexible tubing system or a dedicated bailer.
- Label and store samples. Samples will be preserved, labeled, and placed immediately into a cooler and maintained at 4°C throughout the sampling and transportation period. Samples should be labeled, recorded on the chain-of-custody and shipped according to the proper procedures. Custody seals will be placed on all coolers/packages containing laboratory samples during shipment.

3.7 Soil Vapor Sampling

Soil vapor sampling will be conducted in accordance with the NYSDOH "*Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006*" and the NYSDEC "*Draft Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, dated December 2002*".

3.7.1 Soil Vapor Probe Installation

A Soil vapor probe installation at all locations will be performed according to the following procedures:

- At each location, a Geoprobe will be used to drive stainless steel rods equipped with detachable stainless steel drive points to the desired depth (approximately 8 feet bgs).
- Once the probe is in place, retract the drive rod slightly to expose a 6-inch sampling screen and sampling port. Insert Teflon-lined tubing through the rods and attach it to the soil gas probe just above the tip.
- Seal the probe at the surface using electrical conduit putty or non-shrink bentonite grout.
- The borehole will then be backfilled with sand to a minimum depth of 6 inches above the screen interval.
- Bentonite slurry will then be placed from approximately 6 inches above the screen to the ground surface and immediately hydrated. The bentonite will be allowed to set-up for a minimum of 24 hrs.
- Repeat steps 1 through 4 at a second co-located borehole to the second depth (~2 feet above the water table).

3.7.2 Tracer Testing

Tracer tests will be conducted at all soil vapor locations to verify the integrity of the soil vapor probe seal. Tracer tests will be conducted according to the following procedures:

- Set up the tracer test apparatus by first sealing the open area around the tubing with wax or bentonite.
- A bucket is then placed upside down over the borehole with the tubing coming out through a hole at the top.
- Helium will then be injected through a hole near the bottom of the bucket to enrich the atmosphere to at least 80 percent helium. The concentration of helium

inside the bucket will be monitored by a helium detector located at a second hole near the bottom of the bucket.

- Once the atmosphere is enriched to the appropriate concentration, the helium detector will then be used to check the concentration coming out of the tubing from the borehole located at the top of the bucket. If the reading is below 10 percent tracer gas, the probe seal is sufficient; proceed with sampling, as described in the following sections. If the reading is above 10 percent tracer gas, the probe seal is not sufficient; reseal the probe surface with bentonite and repeat the tracer test until the reading is below 10 percent tracer gas.

3.7.3 Soil Vapor Sampling Procedures for Offsite Analysis

Once the soil gas probe is installed and a tracer test is conducted, soil gas samples for off site analysis will be collected according to the following procedures:

- The soil vapor samples will be collected using a laboratory-certified clean summa canister with a two-hour regulator ensuring that the sample flow rate less than 200 milliliters per minute (ml/min) to minimize outdoor air infiltration during sampling. The summa canisters will have a vacuum of 28 inches mercury (in Hg) ± 2 inches prior to the collection of the soil vapor sample.

- Calculate the volume of the tubing including the screen interval as part of the volume. The tubing has an inside diameter of ¼ inch and a volume of 9.65 ml/foot.

- Attach the vacuum pump and purge at least 3 tube volumes from the tubing. Syringes will be utilized to purge the tubing if obtaining a flow rate of 200 ml/min is difficult with vacuum pump.

- A Tedlar™ bag will be filled toward the end of the purge volume to be screened using the PID meter. The PID readings will be observed and recorded on the appropriate field form.

- After purging is complete, the tubing will be connected to the summa canister.

- Record the initial pressure in the stainless steel summa canister to be used for the sample prior to connecting the tubing. The samples will be collected using laboratory-certified clean summa canisters with flow regulators and a vacuum of 28 inches Hg ± 2 inches. Vacuum readings in the canister should be approximately 28-30 inches Hg. If no vacuum reading is obtained, use a different canister as this indicates the canister was not properly evacuated.

- Connect the end of the tubing directly to the summa canister intake valve.

- Collect the sample into the summa canister, which will be provided by CDM's laboratory. An additional canister and regulator will be ordered as backup. Sample flow rate will not exceed 200 ml/min.

- When the vacuum gauge reads 5 inches Hg, close the valve. Sampling is complete. A vacuum of 5 inches Hg ± 1 inch must be present when sample collection is terminated to prevent contamination during transit. Record the final pressure reading in the summa canister.

- CDM personnel will label, pack and ship the samples to an NYSDOH ELAP-approved laboratory. The serial numbers for the summa canisters and the regulators will be recorded on the chain of custody. Custody seals will be placed on all coolers/packages containing laboratory samples during shipment.

- The field sampling team will maintain a sample log sheet summarizing the following:

  - sample identification.
  - date and time of sample collection
  - sampling height
  - serial numbers for summa canisters and regulators
  - sampling methods and devices
  - purge volumes
  - volume of soil vapor extracted
  - vacuum of summa canisters before and after sample collection
  - apparent moisture content (dry, moist, saturated, etc.) of the sampling zone
  - chain of custody protocols and records used to track samples from sampling point to analysis.

It is critical to ensure that moisture does not enter the summa canister which can compromise the analytical results.

3.8 Temporary Port Sub-Slab Soil Vapor Sampling Procedures for Offsite Analysis

Sub-slab soil gas samples for off site analysis will be collected according to the following procedures:

- Prior to installation of the sub-slab vapor probe, the building floor should be inspected and any penetrations (cracks, floor drains, utility perforations, sumps, etc.) should be noted and recorded. Probes should be installed at locations where the potential for ambient air infiltration via floor penetrations is minimal.

- After the slab has been inspected and the location of any subsurface utilities determined, the ambient air surrounding the proposed sampling location will be screened with a PID.

- A hammer drill with a 1.25-inch diameter drill bit will be used to advance a boring to a depth of approximately three to six inches beneath the slab. When drilling is complete, clean around drilled area.

- Insert probe constructed with 3/8-inch outer diameter, ¼-inch inner diameter Teflon® tubing. The tubing should not extend further than 2 inches into the sub-slab material

- The annular space between the borehole and the sample tubing will be filled and sealed with electrical conduit putty (or equivalent) at the surface.

- Conduct tracer testing in accordance with the procedures detailed in Section 3.7.2 above.

- The tubing will be connected to a low-flow sample pump. A three-way valve will be used to allow purging of all the lines. Flow rates for both purging and collection must not exceed 200 milliliters per minute to minimize the ambient air infiltration during sampling.

- Approximately 1 liter of gas will be purged from the subsurface probe and captured in a Tedlar™ bag using the low-flow pump. PID readings will be observed from this sample and the highest reading shall be recorded on the appropriate field form.

- Record the initial pressure in the stainless steel SUMMA canister to be used for the sample prior to connecting the tubing. The samples will be collected using laboratory-certified clean summa canisters with flow regulators and a vacuum of 28 inches Hg ± 2 inches. Vacuum readings in the canister should be approximately 28-30 inches Hg. If no vacuum reading is obtained, use a different canister as this indicates the canister was not properly evacuated.

- The end of the tubing will be connected directly to the summa canister's regulator intake valve via the three-way valve. Flexible silicone tubing will be used at a minimum and as a tubing adapter only. The sample shall be collected with a 6 Liter laboratory-certified summa canister with dedicated regulator set for a 24-hour sample collection.

- Collect the sample into the Summa canister, which will be provided by CDM's laboratory. An additional canister and regulator will be ordered as backup. Sample flow rate will not exceed 200 ml/min.

- When the vacuum gauge reads 5 inches Hg, close the valve. Sampling is complete. A vacuum of 5 inches Hg ± 1 inch must be present when sample collection is terminated to prevent contamination during transit. Record the final pressure reading in the summa canister.

- CDM personnel will label, pack and ship the samples to an NYSDOH ELAP-approved laboratory. The serial numbers for the SUMMA canisters and the regulators will be recorded on the chain of custody. Custody seals will be placed on all coolers/packages containing laboratory samples during shipment.

- Remove the sample port and patch the floor with concrete.

When sub-slab vapor samples are collected, the following actions should be taken to document conditions during sampling and ultimately to aid in the interpretation of the sampling results:

- historic and current storage and uses of volatile chemicals should be identified, especially if sampling within a commercial or industrial building (e.g., use of volatile chemicals in commercial or industrial processes and/or during building maintenance);

- the use of heating or air conditioning systems during sampling should be noted;

- floor plan sketches should be drawn that include the floor layout with sampling locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system air supply and return registers, compass orientation (north), footings that create separate foundation sections, and any other pertinent information should be completed;

- outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sampling locations (if applicable), compass orientation (north), and paved areas;

- weather conditions (e.g., precipitation and indoor and outdoor temperature) and ventilation conditions (e.g., heating system active and windows closed) should be reported; and

- any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID, Jerome Mercury Vapor Analyzer, etc.), should be recorded.

Additional documentation that could be gathered to assist in the interpretation of the results includes information about air flow patterns and pressure relationships obtained by using smoke tubes or other devices (especially between floor levels and between suspected contaminant sources and other areas), the barometric pressure and photographs to accompany floor plan sketches.

The field sampling team should maintain a sample log sheet summarizing the following:

- sample identification,
- date and time of sample collection,
- sampling depth,
- identity of samplers,
- sampling methods and devices,
- soil vapor purge volumes,
- volume of soil vapor extracted,
- if canisters used, vacuum of canisters before and after samples collected,
- apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and
- chain of custody protocols and records used to track samples from sampling point to analysis.

3.9 Permanent Port Sub-Slab Soil Vapor Sampling Procedures for Offsite Analysis

Sub-slab soil gas samples for off site analysis will be collected from permanent sub-slab ports according to the following procedures:

- Prior to installation of the sub-slab vapor probe, the building floor should be inspected and any penetrations (cracks, floor drains, utility perforations, sumps, etc.) should be noted and recorded. Probes should be installed at locations where the potential for ambient air infiltration via floor penetrations is minimal.

- After the slab has been inspected and the location of any subsurface utilities determined, the ambient air surrounding the proposed sampling location will be screened with a PID.

- A hammer drill with a 3/8-inch diameter drill bit will be used to drill an inner pilot hole into the concrete slab to a depth of approximately two inches.

- Using the pilot hole as the center, drill an outer hole to an approximate depth of 1 3/8 inch using the one-inch diameter drill bit.

- Clean any cuttings out of the hole.

- Using the 3/8 inch drill bit, continue to drill the pilot hole through the slab and several inches into the sub-slab material.

- Assemble the stainless steel probe:

- Determine the length of stainless steel tubing required to reach from the bottom of the outer hole, through the slab, and into the open cavity below the slab. To avoid obstruction of the probe tube, insure that it does not contact the sub-slab material.
- Attach the measured length of ¼-inch OD stainless tubing to the female connector with the swagelock™ nut and tighten the nut.
- Insert the ¼-inch hex socket plug into the female connector. Tighten the plug. Do not over tighten.
- Place the completed probe into the outer hole. The probe tubing should not contact the sub-slab material and top of the female connector should be flush with the surface of the slab and centered in the outer hole.
- Fill the space between the probe and the inside of the outer hole with anchoring cement and allow to cure.

- Wrap one layer of Teflon thread tape onto the NPT end of the male connector

- Remove the ¼-inch hex socket plug from the female connector

- Screw and tighten the male connector into the female connector.

- A length of Teflon tubing is attached to the probe assembly and connected to the sample system using for purging and sample collection.

- A three-way valve will be used to allow purging of all the lines. Flow rates for both purging and collection must not exceed 100 milliliters per minute to minimize the ambient air infiltration during sampling.

- Purge at least 3 volumes from the subsurface probe and captured in a Tedlar™ bag using a 60 cc syringe. PID readings will be observed from this sample and the highest reading shall be recorded on the appropriate field form.

- Record the initial pressure in the stainless steel summa canister to be used for the sample prior to connecting the tubing. The samples will be collected using laboratory-certified clean summa canisters with flow regulators and a vacuum of 28 inches Hg ± 2 inches. Vacuum readings in the canister should be approximately 28-30 in Hg. If no vacuum reading is obtained, use a different canister as this indicates the canister was not properly evacuated.

- The end of the tubing will be connected directly to the SUMMA canister's regulator intake valve via the three-way valve. Flexible silicone tubing will be used at a minimum and as a tubing adapter only. The sample shall be collected with a 6 Liter laboratory-certified summa canister with dedicated regulator set for a 24-hour sample collection.

- Collect the sample into the summa canister, which will be provided by the subcontracted laboratory.

- When the vacuum gauge reads 5 inches Hg, close the valve. Sampling is complete. A vacuum of 5 inches Hg ± 1 inch must be present when sample collection is terminated to prevent contamination during transit. Record the final pressure reading in the summa canister.

- CDM personnel will label, pack and ship the samples to an NYSDOH ELAP-approved laboratory. The serial numbers for the summa canisters and the regulators will be recorded on the chain of custody. Custody seals will be placed on all coolers/packages containing laboratory samples during shipment.

When sub-slab vapor samples are collected, the following actions should be taken to document conditions during sampling and ultimately to aid in the interpretation of the sampling results:

- historic and current storage and uses of volatile chemicals should be identified, especially if sampling within a commercial or industrial building (e.g., use of volatile chemicals in commercial or industrial processes and/or during building maintenance);

- the use of heating or air conditioning systems during sampling should be noted;

- floor plan sketches should be drawn that include the floor layout with sampling locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system air supply and return registers, compass orientation (north), footings that create separate foundation sections, and any other pertinent information should be completed;

- outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sampling locations (if applicable), compass orientation (north), and paved areas;

- weather conditions (e.g., precipitation and indoor and outdoor temperature) and ventilation conditions (e.g., heating system active and windows closed) should be reported; and

- any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID, Jerome Mercury Vapor Analyzer, etc.), should be recorded.

Additional documentation that could be gathered to assist in the interpretation of the results includes information about air flow patterns and pressure relationships obtained by using smoke tubes or other devices (especially between floor levels and between suspected contaminant sources and other areas), the barometric pressure and photographs to accompany floor plan sketches.

The field sampling team should maintain a sample log sheet summarizing the following:

- sample identification,
- date and time of sample collection,
- sampling depth,
- identity of samplers,
- sampling methods and devices,
- soil vapor purge volumes,
- volume of soil vapor extracted,
- if canisters used, vacuum of canisters before and after samples collected,
- apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and
- chain of custody protocols and records used to track samples from sampling point to analysis.

3.10 Indoor (Ambient) Air Sampling Procedures for Offsite Analysis

All indoor air samples will be collected with a 6 Liter laboratory-certified summa canister regulated for a 24-hour sample collection. Sample collection will be similar to outdoor ambient air sample collection. The summa canister will be placed in such a location as to collect a representative sample from the breathing zone at four or six feet above the floor. Personnel should avoid lingering in the immediate area of the sampling device while samples are being collected.

The New York State Department of Health *Indoor Air Quality Questionnaire and Building Inventory* shall be completed for each structure where indoor air testing is being conducted. The following actions should be taken to document conditions during indoor air sampling and ultimately to aid in the interpretation of the sampling results:

- historic and current uses and storage of volatile chemicals should be identified, especially if sampling within a commercial or industrial building (e.g., use of volatile chemicals in commercial or industrial processes and/or during building maintenance);

- a product inventory survey documenting sources of volatile chemicals present in the building during the indoor air sampling that could potentially influence the sample results should be completed;

- the use of heating or air conditioning systems during sampling should be noted;

- floor plan sketches should be drawn that include the floor layout with sampling locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system supply and return registers, compass orientation (north), footings that create separate foundation sections, and any other pertinent information should be completed;

- outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sampling locations (if applicable), compass orientation (north), and paved areas;

- weather conditions (e.g., precipitation and indoor and outdoor temperature) and ventilation conditions (e.g., heating system active and windows closed) should be reported; and

- any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID, etc.), should be recorded.

Additional documentation that could be gathered to assist in the interpretation of the results includes information about air flow patterns and pressure relationships obtained by using smoke tubes or other devices (especially between floor levels and between suspected contaminant sources and other areas), the barometric pressure and photographs to accompany floor plan sketches.

The field sampling team should maintain a sample log sheet summarizing the following:

- sample identification,
- date and time of sample collection,
- sampling height,
- identity of samplers,
- sampling methods and devices,
- volume of air sampled,
- vacuum of canisters before and after samples collected, and
- chain of custody protocols and records used to track samples from sampling point to analysis.

3.11 Outdoor (Ambient) Air Sampling Procedures for Offsite Analysis

All outdoor air samples will be collected with a laboratory-certified summa canister regulated for a 24-hour sample collection using a 6 Liter summa canister. The summa canister will be placed in such a location as to collect a representative sample from the breathing zone at four or six feet above the ground.

Personnel will avoid lingering in the immediate area of the sampling device while samples are being collected. Ambient air samples will be collected in a location of as far away as possible from any boring or dust generating activities.

The following actions will be taken to document conditions during ambient air sampling:

- Outdoor plot sketches will be drawn that include the building site, area streets, ambient air sample locations, the location of potential interferences, compass orientation, and paved areas.

- Weather conditions (e.g. precipitation, temperature, wind direction and barometric pressure)

- Any pertinent observations, such as odors, reading from field instruments, and significant activities in the vicinity (e.g. operation of heavy equipment) will be recorded.

The field sampling team will maintain a sample log sheet summarizing the following:

- sample identification,
- date and time of sample collection,
- sampling height,
- identity of samplers,
- sampling methods and devices,
- volume of air sampled,
- vacuum of canisters before and after samples collected, and
- chain of custody protocols and records used to track samples from sampling point to analysis.

3.12 Decontamination

All non-dedicated, non-disposal sampling equipment and tools used to collect samples for chemical analysis will be decontaminated prior to and between each sample interval using an Alconox rinse and potable water rinse prior to reuse. Unless disposable sampling equipment is used, the equipment will be decontaminated by the following procedure:

- Wash with the non-phosphate detergent
- Tap water rinse
- Deionized water rinse
- Air dry and wrap in aluminum foil, shiny side out

Additional cleaning of the drilling equipment with steam may be needed under some circumstances if elevated levels of contamination appear to be present using field monitoring equipment or visible stained soils. Decontamination fluids will be discharge to the ground surface unless visible sheen or odor is detected either on the equipment or the fluids, at which point the decontamination water will be contained in a 55-gallon drum, staged and properly disposed.

3.13 Investigative Derived Waste

Soil cuttings and purge water will be placed and dispersed on the ground unless visible contamination or elevated PID readings are observed. If contamination is present, investigative derived waste (IDW) will be contained and analyzed to determine the appropriate disposal methods.

3.13.1 Waste Sampling

Waste classification sampling will occur before the completion of site investigation activities. Representative soil samples (5 grab samples) will be collected from waste containers with a decontaminated stainless steel trowel. The aliquots will be homogenized in a stainless steel bowl and transferred to the sample container(s) for subsequent analysis. Grab samples will be collected from each container containing aqueous wastes.

The requirements for waste characterization will be determined by the disposal facility. The containers of waste will be stored in an area designated by NYSDEC until the analytical results are received and the waste can be characterized for disposal.

3.13.2 Waste Sampling Procedure

Soil Waste

- Scan the sample with the OVM and record readings.
- Collect a sample of the soil from the container using a decontaminated stainless steel trowel in and place the sample in a stainless steel bowl. Homogenize the soil using the trowel. Several samples will be collected and homogenized in the steel bowl to represent each drum.
- Remove the cap from the container
- Fill the sample container as completely as possible by transferring the sample to the container immediately after collected the sample with a stainless steel trowel, and screening the sample with the OVM.
- Close the sample container tightly.
- Label the container and place it into in a cooler with bagged ice sufficient to cool the samples to 4°C.
- Maintain Chain-of-Custody forms for samples.
- Log the description and depth of the sample sent for analysis in the field book.
- Record field information and sample location, including measurements from fixed points in logbook.

Aqueous Waste

- Remove the cap from the drum containing the aqueous waste.
- Fill a sample container(s) as completely as possible by transferring liquid sample from the waste container to the sample container with the COLIWASA (or similar), and screening the sample with an OVM.
- Close the sample container(s) tightly.

- Place sample container(s) in cooler with bagged ice sufficient to cool the samples to 4°C.
- Maintain Chain-of-Custody forms.

3.14 Soil Boring Logs/Geoprobe

Geological logging includes keeping a detailed record of drilling (or excavating) and a geological description of materials on a prepared form. Geological logs are used for all types of drilling and exploratory excavations and include descriptions of both soil and rock. Accurate and consistent descriptions are imperative.

3.14.1 Log Form

When drilling in soils or unconsolidated deposits, the log should be kept on a standard Soil Boring Log Form. The following basic information should be entered on the heading of each log sheet:

- Project name and number
- Boring or well number
- Locations (approximate in relation to an identifiable landmark; will be surveyed)
- Elevations (approximate at the time; will be surveyed)
- Name of drilling contractor
- Drilling method and equipment
- Water level
- Start and finish (times and date)

The following technical information is recorded on the logs:

- Depth of sample below surface
- Sample interval
- Sample type and number
- Length of sample recovered
- Standard penetration test (ASTM-D1586) results if applicable
- Soil description and classification
- Graphic soil symbols
- PID readings

In addition to the items listed above, all pertinent observations about drilling rate, equipment operation, or unusual conditions should be noted. Such information might include the following:

- Size of casing used and method of installation
- Rig reactions such as chatter, rod drops, and bouncing
- Drilling rate changes
- Material changes
- Zones of caving or heaving

3.14.2 Soil Classification

The soil description should be concise and should stress major constituents and characteristics. Soil descriptions should be given in a consistent order and format. The following order is as given in ASTM D2488:

- Soil name. The basic name of the predominant constituent and a single-word modifier indicating the major subordinate constituent.
- Gradation or plasticity. For granular soil (sand or gravel) that should be described as well graded, poorly graded, uniform, or gap-graded, depending on the gradation of the minus 3-inch fraction. Cohesive soil (silts or clays) should be described as non-plastic, slightly plastic, moderately plastic, or highly plastic, depending on the results of the manual evaluation for plasticity as described in ASTM D2488.
- Particle size distribution. An estimate of the percentage and grain-size range of each of the soil's subordinate constituents with emphasis on clay-particle constituents. This description may also include a description of angularity. This parameter is critical for assessing hydrogeology of the site and should be carefully and fully documented.
- Color. The color of the soil using Munsell notation.
- Moisture content. The amount of soil moisture, described as dry, moist, or wet.
- Relative density or consistency. An estimate of density of a granular soil or consistency of a cohesive soil, usually based on standard penetration test results (see Table 3-2 and 3-3).
- Local geologic name. Any specific local name or a generic name (i.e., alluvium, loess). Also use of Unified Soil Classification System of symbols.

The soil logs should also include a complete description of any tests run in the borehole; placement and construction details of piezometers, wells, and other monitoring equipment; abandonment records; geophysical logging techniques used; and notes on readings obtained by air monitoring instruments.

- Additional data in sedimentary rocks includes:
  - Sorting
  - Cementation
  - Density or compaction
  - Rounding

The core should be logged as quickly as possible after removal from the hole. Some materials may degrade rapidly upon exposure, resulting in apparently poor rock, which was not actually present in the subsurface.

Check carefully each core end and try to determine if the fracture is natural or mechanical in origin. Mechanical fractures often can be identified by their orientation, the absence of secondary coatings or filling and slickensides, and its fit with the adjacent core piece. If doubt exists, consider it a natural fracture. If it is determined that the fracture is mechanical, ignore it and consider the two pieces of core as a single piece.

Table 3-2
Relative Density of Noncohesive Soil

Blows/Ft	Relative Density	Field Test
0-4	Very Loose	Easily penetrated w/ ½-inch steel rod pushed by hand
5-10	Loose	Easily penetrated w/ ½-inch steel rod pushed by hand
11-30	Medium	Easily penetrated w/ ½-inch steel driven with a 5- lb hammer
31-50	Dense	Penetrated one foot with a ½-inch steel road driven with 5-lb hammer
>50	Very Dense	Penetrated only a few inches with a ½-inch steel rod driven with a 5-lb hammer

Blows/Ft= Blows per foot
lb = pound

Table 3-3
Relative Consistency of Cohesive Soil

Blows/Ft	Consistency	Pocket Penetrometer (TSF)	Torvance (TSF)	Field Test
<2	Very Soft	<0.25	<0.12	Easily penetrated several inches by fist
2-4	Soft	0.25-0.8	0.12-0.25	Easily penetrated several inches by thumb
5-8	Firm	0.50-1.0	0.25-0.5	Can be penetrated several inches by thumb with moderate effort
9-15	Stiff	1.0-2.0	0.5-1.0	Readily indented by thumb but penetrated only with great effort
16-30	Very Stiff	2.0-4.0	1.0-2.0	Readily indented by thumbnail
>30	Hard	>4.0	>2.0	Indented with difficulty by thumbnail

TSF= Tons per square foot

3.15 Monitoring Well Installation

This section provides procedures for well design and well construction to aid in the development of drilling subcontracts. Drilling operation and well development guidelines are presented to aid the reader in the oversight of the installation of monitoring wells.

The principal reason that monitoring wells are constructed is to collect groundwater samples that, upon analysis, can be used to delineate a contaminant plume and track movement of specific chemical or biological constituents. A secondary consideration is the determination of the physical characteristics of the groundwater flow system to establish flow direction, transmissivity, quantity, etc. The spatial and vertical locations of monitoring wells are important. Of equal importance are the design and construction of monitoring wells that will provide easily obtainable samples and yield reliable, defensible, meaningful information. In general, monitoring well design and construction follows production well design and construction techniques. However, emphasis is placed on the effect these practices may have on the chemistry of the water samples being collected rather than on maximizing well efficiency.

From this emphasis, it follows that an understanding of the chemistry of the suspected pollutants and of the geologic setting in which the monitoring wells are constructed plays a major role in determining the drilling technique and materials used.

3.15.1 Well Siting

The following procedures should be followed:

- Review and be familiar with pertinent proposal sections, specifications, and subcontractor's contracts. Review and be familiar with any regulations governing how, where or when the well is drilled. Review and be familiar with data (supplied by the Client, or any other data available) used for program planning.

- Identify well site on a topographic map or other suitable project base map. Contact landowner at the beginning of well siting. Inquire whether the proposed drill locations will interfere with the landowner's established land use. Unless the property is owned by the client, the landowner is always contacted before entering the property, even if he is leasing back the property from the client.

- Check route to insure a drill rig can access the proposed well site. Plan routes that require the least disturbance of natural vegetation or natural countryside conditions and which would not require grading or other types of work by i.e., backhoes, etc.

- The well site should be reasonably level and absent of large boulders or other hazardous obstructions.

- Check to insure absence of buried high-pressure gas, oil or water lines. If any lines are present relocate the well site a safe distance away from them. Be sure to check with the subcontractor to insure his/her agreement.
- Check to insure absence of overhead power transmission lines. If any overhead power lines are present, relocate the well site a safe distance away from them. Be sure to check with the subcontractor to insure his/her agreement.
- Consult landowner about water source and access, and then notify the driller of these decisions.
- Explain to the driller the need for care and accurate retrieval of drill cuttings and, if necessary, placement and accounting of materials during well completion.
- If necessary, request access agreement to the well site.

3.15.2 Well Design

The following procedures should be followed:

- Examine the geophysical log and determine the exact interval(s) and depth(s) of the completion zone(s). Calculate the quantity of slotted casing or screen, blank casing, sealing materials, gravel pack and cement necessary to complete the well.
- Calculate the quantities of gravel pack, sealing materials and cement figuring the volume of the bore hole [borehole radius squared time the length of the borehole (r_B^2 x L)] minus the volume of the casing [radius of the casing squared times the length of the casing (r_C^2 x L)] which will yield the volume per linear foot.

  A cubic foot of silica sand weighs 100 pounds. Frequently silica sand is packaged in 100-pound sacks but should be purchased and delivered in bulk quantities. A five-gallon bucket is equal to 0.67 cubic feet. Dividing the determined or calculated volume between the well bore and the outside of the casing(s) into 0.67 cubic feet per bucket will yield approximately the number of feet per bucket of silica sand. Dividing the total interval of the intended gravel pack by the number of feet per bucket of gravel pack will yield approximately how many buckets of gravel will be required. This same method can be used if the silica sand arrives in 1-cubic foot sacks (100 pounds) except the final value is approximately the number of feet per sack of silica sand.

  Cement usually comes in 94 pound sacks and can be mixed in the field to obtain volumes between 0.88 cubic feet per sack to 1.50 cubic foot per sack. See Table 3-4 for the most common cement slurry mixtures.

  Clay seals are routinely placed in a well completion above the gravel or filter pack and below the cement or grout cap or plug. The clay seals are generally a bentonite clay and before swelling (in the borehole) has the form of ¼ inch to ½ inch pellets. The pellets generally come in plastic containers of 20 and 50 pounds but can also arrive in boxes or cloth sacks.

Table 3-4
Monitoring Well Grout

Water-Cement Ratio (Gallons water per sack)	Weight per Gallon of Slurry (pounds)	Volume of Mixture per sack (cubic feet)
7 1/2	14.1	1.50
7	14.4	1.43
6 1/2	14.7	1.35
6	15.0	1.28
5 1/2	15.4	1.21
5	15.8	1.14
4 1/2	16.25	1.08
4	16.50	1.00
3 1/2	17.35	0.95
3	18.1	0.88

The volume of the bentonite tablets needed for a specific seal thickness is calculated in the same manner as was done for the gravel pack and cement requirements.

Measure all materials twice during the well construction. First, when estimating the quantity of supplies needed for the completion, second, during well construction. Keep the first estimate in the daily log book record the actual (second measurement) intervals (tops and bottoms), quantity and type of materials placed in the well recorded on the appropriate forms.

3.15.3 Well Construction

The following procedures should be followed:

3.15.3.1 Final Design of Casing - Screen/Slotted Casing String(s)

If there is any doubt about the final design of the casing string, based on data from the pilot hole or the individual drill holes scheduled for completion, verify the design with the hydrogeologist in charge.

It is the rig hydrogeologist's responsibility to insure adequate supplies are maintained at each well site even though it may be the contractor's responsibility for supplying the materials.

3.15.3.2 Installing Casing (Slotted/Screen Casing String(s))

- Plastic or Polyvinylchloride (PVC) Casing - Join all 5 or 10 foot lengths of casing (blank and screen) by flush-joint threading. All pipe is to be cut with a cutting tool which leaves a smooth, square end.

- Both the hydrogeologist and the contractor keep a complete casing-slotted/screen casing string tally. Seal the bottom on the casing-slotted/screen casing string with a cap, glued and screwed permanently in place.

3.15.3.3 Installing Filter Material (Gravel Pack)

- Place the filter material downhole by gravity feed.

- The filter material shall be installed to levels pre-determined by the hydrogeologist. The exact depth for each well is determined from the final well design. However, generally the top of the filter material will be 5 feet above the top of the highest slotted/screened interval.

- Following placement of the filter material "sound" or "tag" this depth with the tremie pipe to insure it is at the prescribed level.

3.15.3.4 Installing Bentonite Pellet Seals (Blanket)

Following the installation of the filter material place a bentonite pellet blanket seal on top of the filter material to prevent contamination of the filter pack by the grout.

The actual amount of the annulus that is filled with bentonite pellets may vary from completion to completion but a minimum of 6 inches of the annulus should be filled with bentonite by gravity feed from the surface. The tremie pipe remains in the bore hold during gravity feed of the bentonite pellets. Calculate the exact volume of pellets needing placement.

3.15.3.5 Grouting

- Grout the annular space above the bentonite pellets as directed by the hydrogeologist.

- The grouted volume of annular space will vary from completion to completion, and sometimes within the same completion. Generally, if the annular space exceeds approximately 20 feet then the grouting is done in more than one stage. Take care to insure that the grout does not displace the bentonite seal or exceed (in weight) the collapse strength of the casing.

- The methods of mixing grout in the field are numerous. The first concern is that the slurry mixture is fluid enough for placement by tremie pipe and heavy enough to give the desired strength and sealing properties required. Reference the table from Halliburton Cementing Tables, 1979 or some other suitable source for the amount of water per sack, and then measure accurately into a large tub (water trough) or steel pit. Mix the correct number of bags of cement with the water at a rate which prevents, clotting or settling out of dry, unmixed cement. Usually this procedure is accomplished with a portable pump that sucks the water or cements mixtures in and then expels it under pressure through a hose that is used in a jetting fashion at the opposite end of the tank, pit or trough.

  Grout also can be mixed using a shovel or hoe. Generally, the grout is placed on the side of the tub, the bag is ruptured, and the cement is slowly added to the water. If the cement has hard spots place on a screen of approximately ¼ inch mesh attached to some type of frame that is placed across the mixing tub. The cement is then "filtered" for the larger; hard pieces or blocks.

- Pumping or Pouring Grout

  Place the mixed grout above the bentonite pellets. The time between placement of the bentonite pellets and the grout should not be less than 15 to 20 minutes. This allows the pellets to settle to the top of the gravel pack and to begin to swell, while not allowing the grout to harden.

  - The grout can either be pumped down the tremie pipe by same pump used for jetting or it can be poured by buckets through a funnel into the tremie pipe. Displacement of the bore hole fluid is almost certain because the grout slurry weighs more than the residual borehole fluid (10 or 11 pounds per gallon for the mud versus 14 to 18 pounds per gallon for the grout).

  - Except under rare circumstances, grout is never poured from the surface nor is it ever poured into standing water.

  - Grout the remainder of the hole by gravity feed from the surface as directed by the hydrogeologist. The quantity of grout placed from the surface should not exceed the collapse strength of the casing and should not be initiated prior to the curing of the grout seal above the bentonite pellets.

3.16 Monitoring Well Development

All completed wells, whether the production or monitoring type, must be developed in order to facilitate unobstructed and continuous groundwater flow into the well. Well development is the process of cleaning the fines from the face of the borehole and the formation near the well screen. During any drilling process the side of the borehole becomes smeared with drilling mud, clays or other fines. This plugging action substantially reduces the permeability and retards the movement of water into the well screen. If these fines are not removed, especially in formations having low permeability, it then becomes difficult and time consuming to remove sufficient water from the well before obtaining a fresh groundwater sample because the water cannot flow easily into the well.

The development process is best accomplished for monitoring wells by causing the natural formation water inside the well screen to move vigorously in and out through the screen in order to agitate the clay and silt, and move these fines into the screen. The use of water other than the natural formation water is not recommended.

3.16.1 Development Methods

The following well development methods may be used including:

- Surge Block - A surge block is a round plunger with pliable edges such as belting that will not catch on the well screen. Moving the surge block forcefully up and down inside the well screen causes the water to surge in and out through the screen accomplishing the desired cleaning action. Surge blocks are commonly used with cable-tool drilling rigs, but are not easily used by other types of drilling rigs.

- Bailer - A bailer sufficiently heavy that it will sink rapidly through the water can be raised and lowered through the well screen. The resulting agitating action of the water is similar to that caused by a surge block. The bailer, however, has the added advantage of removing the fines each time it is brought to the surface and dumped. Bailers can be custom-made for small diameter wells, and can be hand-operated in shallow wells.

- Surging and pumping - Starting and stopping a pump so that the water is alternately pulled into the well through the screen and backflushed through the screen is an effective development method. Periodically pumping to the surface will remove the fines from the well and permit checking the progress to assure that development is complete.

Well development should continue until the water becomes free of sediment or contains sediment in a lesser amount than was initially present. Conductivity, pH, temperature and turbidity (as measured by a turbidity meter) of the development water must all have stabilized prior to ceasing development. Disposal of development water is site specific and should be discussed in the Sampling and Analysis Plan or Work Plan.

3.17 Low Flow Groundwater Sampling

Low-flow purge and sampling is appropriate at locations where disturbance of the media around the well screen needs to be minimized. A common concern is turbidity in the monitoring wells and the consequent undesirable effects on metals sampling results.

The low-flow purge and sample method creates less disturbance and agitation in the well, and therefore excess turbidity is not generated during the purging and sampling process. The result is a more rapid stabilization of turbidity and other parameters (pH, temperature, specific conductivity, and dissolved oxygen), and a sample more representative of conditions in the formation is collected.

The low flow purge and sample method consists of using a submersible or bladder pump to purge the well at a very low flow rate (0.5 to 1.5 liter/minute). The pump intake is set approximately in the middle of the well screen, with a stagnant water column over the top of the pump. The well is purged at the low rate until the field parameters (temperature, pH, specific conductivity, turbidity, dissolved oxygen, and Eh) have stabilized. The sample is then collected directly from the pump discharge at a low flow rate.

- Check and record the condition of the well for any damage or evidence of tampering.
- Remove the well cap.
- Measure well headspace with a PID and record the reading in the field logbook. For wells installed on a landfill, also measure the headspace with a combustible gas indicator.
- Measure and record the depth to water with an electronic water level device and record the measurement in the field logbook. Do not measure the depth to the bottom of the well at this time (to avoid disturbing any sediment that may have accumulated). Obtain depth to bottom information from installation information in the field logbook or drilling logs. Calculate volume of the water column by depth of water column times the cross-sectional area of the well.
- Lower pump to desired sampling depth. During purging, monitor the water level and field parameters (temperature, pH, turbidity, specific conductance and dissolved oxygen) approximately every 3 to 5 minutes. Continue monitoring until the water level stabilizes and field parameters have stabilized to within 10 percent (plus or minus 5 percent) over a minimum of three readings. Turbidity and dissolved oxygen are typically the last parameters to stabilize. Note: once turbidity readings get below 10 NTUs, then the stabilization range can be amended to 20 percent (plus or minus 10 percent) over a minimum of three readings.

Readings should be taken in a clean container (preferably a less beaker) and the monitoring instrument allowed to stabilize before collection of the next sample. The Horiba instrument takes the readings consecutively and therefore the process to record all the measurements may take longer than five minutes. If so, measurements should be taken as often as practicable.

- Once the water level and field parameters have stabilized, collect the samples from the pump. Collect samples per Section 3.2.2.1.

- Decontaminate equipment in accordance with Section 3.12.

3.18 Monitoring Well Purging

Well purging can be performed on a volume basis or on a field parameter stabilization basis. In both cases, field parameters are recorded; however, for the former case purging is concluded after a target number of well volumes (typically 3 to 5) regardless of whether parameters have stabilized. In the latter case, purging continues until field parameters stabilize within 10 percent.

3.18. 1 Volumetric Method of Well Purging

The following steps should be followed when purging a well by the volumetric method:

- Don personal protective clothing and equipment as specified in the site-specific health and safety plan.

- Open the well cover and check the condition of the wellhead, including the condition of the surveyed reference mark, if any.

- Monitor the air space at the wellhead, using a PID or equivalent, as soon as well cover is removed according to health and safety requirements.

- Calibrate the required field parameter meters according to manufacturer's specifications.

- Determine the depth to static water level and depth to bottom of well casing. Calculate the volume of water within the well bore based on the following well volumes

Table 3-5
Well Volumes

Well Diameter (inches)	Gallons per foot
2	0.16
4	0.65
6	1.5
8	2.6
10	4.1
12	5.9

Note: Record all data and calculations in the field logbook.

- Set up field parameter probes at the discharge orifice or dedicated probe port of the pump assembly or within the flow-through chamber.
- Prepare the pump and tubing, or bailer, and lower it into the casing.
- Remove the number of well volumes specified in the site-specific plans. Generally, three to five well volumes will be required. Field parameters should be measured and recorded, if required by site-specific plans. In low recharge aquifers, the well commonly will be pumped or bailed to dryness before three well volumes of water are removed. If this is the case, there is no need to continue with purging operations. Record pertinent data in the field logbook.
- Remove the pump assembly or bailer from the well, decontaminate it (if required), and clean up the site. Lock the well cover before leaving. Containerize and/or dispose of development water as required by the site-specific plan.

3.18.2 Indicator Parameter Method of Well Purging

- Don personal protective clothing and equipment as specified in the site-specific health and safety plan.
- Open the well cover and check the condition of the wellhead, including the condition of the surveyed reference mark, if any.
- Monitor the air space at the wellhead, using a PID or equivalent, as soon as well cover is removed according to health and safety requirements.
- Calibrate the required field parameter meters according to manufacturer's specifications.

- Determine the depth to static water level and depth to bottom.
- Set up field parameter probes at the discharge orifice or dedicated probe port of the pump assembly or within the flow-through chamber.
- Assemble the pump and tubing, or bailer, and lower into the casing.
- Begin pumping or bailing the well. Record indicator parameter readings for every purge volume. Maintain a record of the approximate volumes of water produced.
- Continue pumping or bailing until indicator parameter readings remain stable within ±10 percent for three consecutive recording intervals, or in accordance with site-specific plans. Purging should continue until the discharge stream is clear or turbidity becomes asymptotic-low or meets project requirements. In a low recharge aquifer, the well may pump or bail to dryness before indicator parameters stabilize. In this case, there is no need to continue purging. Record pertinent data in the field logbook.
- Remove the pump assembly or bailer from the well, decontaminate (if required), and clean up the site. Lock the well cover before leaving. Containerize and/or dispose of development water as required by the site-specific plans.

3.19 Groundwater Sampling by Bailer

Groundwater is typically sampled by bailer after purging 3 to 5 well volumes per Section 3.18.

- Don personal protective clothing as specified in the site-specific health and safety plan.
- Prepare the area for sample acquisition. If required, cover ground surface around well head with plastic sheeting.
- Open well head and immediately check for organic vapors with PID or flame ionization detector as appropriate.
- Determine static water level and calculate water volume in well.
- Purge well in accordance with Section 3.18.
- Allow water level to recover to a depth at least sufficient for complete submergence of the bailer without contacting well bottom. Ideally, water level should recharge to 75 percent of static level. Samples shall be collected within 3 hours of purging if recharge is sufficient. Wells with a low recharge rate must be collected within 24 hours of purging.

- Securely attach the bailer to the line and test the knot. The opposite end of the line should be secured to prevent loss of bailer into well.
- Lower bailer slowly into the water to prevent aeration, particularly when VOC samples are collected.
- Retrieve filled bailer and fill sample bottles in accordance with Section 3.2.2.1.
- Collect required field parameters and depth to water.
- Decontaminate non-disposable sampling equipment in accordance with Section 3.12.
- Secure well; clean up area.

3.20 Well Abandonment

Once it is deemed that the temporary or permanent monitoring well is no longer needed, the well will be abandoned by a New York State certified well driller as follows:

- The well will be sounded (its depth measured with a weighted line or appropriate method) immediately before it is destroyed to make sure that it contains no obstructions that could interfere with filling and sealing.
- Where possible, remove all material within the original borehole - including the well casing, filter pack and annular seal. If the casing, filter pack and annular seal materials cannot be removed, they may be left in place
- The casing left in place may require perforation or puncturing to allow proper placement of sealing materials. Where the casing is left in the hole, the casing may be cut at the surface.
- Fill well screen with sand per NYSDEC specifications.
- The monitoring well should be filled to the surface with cement grout, or within 20 feet of the surface with bentonite grout. After the placement of the bentonite grout (if used), the remaining portion of the well then should be sealed with a Portland Type I, II or Type I/II cement with 2 percent to 5 percent bentonite.

3.21 Surface Water Sampling

Four surface water sampling scenarios are provided below. These include 1) shallow surface water samples for VOC analysis (preserved and unpreserved), 2) shallow surface water samples for non-VOC or inorganic compound analysis (preserved and unpreserved), 3) deep surface water samples using a weighted bottle sampler and 4) deep surface water samples using a peristaltic pump.

The following steps should be taken when preparing for sampling surface water:

- Don the appropriate personal protective clothing as dictated by the site-specific health and safety plan.
- Select stream/river sampling locations as directed in work plan.
- Prepare sampling site by laying out clean plastic sheeting on the ground or any flat, level surfaces near the sampling area and place equipment to be used on the plastic.
- Make field measurements as required by the project plans in physical, chemical, and biological characteristics of the water (e.g., temperature, dissolved oxygen, conductivity, pH).
- The samples shall be collected from areas of least to greatest contamination (when known) and, when collecting several samples in 1 day, always collect from downstream to upstream.
- The sampler should be facing upstream when sampling.
- Document the sampling events, recording all information in the designated field logbook and take photographs if required or if possible. Document any and all deviations from this SOP and include rationale for changes.

3.21.1 Collecting Shallow Surface Water Samples

The following steps must be taken when collecting shallow surface water samples:

- Approach the sample location from downstream; do not enter the sample area. Slowly submerge VOA vials completely into an area of gently flowing water and fill. Do not disturb bottom sediments. The sampler and open end of the vials should be pointed upstream. If wading is necessary, approach the sample location from downstream; do not enter the actual sample area. When using gasoline-powered vessels, make sure the engine is turned off.
- Collect samples per Section 3.2.2.1 If preserved bottles are used, collect sample in a dedicated non-preserved bottle and transfer to the preserved bottle.

Note: When collecting samples for VOC analysis, avoid collecting from a surface water point where water is cascading and aerating. Cap the VOC vial while it is under water. After the vial is capped, check the vial to see if there are any air bubbles trapped in it. If air bubbles are present discard the sample.

3.21.2 Collecting Deep Surface Water Samples at Specified Depth Using a Weighted Bottle Sampler

The following steps must be followed when collecting surface water samples at specific depths using a weighted bottle sampler:

- Lower the weighted bottle sampler to the depth specified in the site-specific plan.
- Remove the stopper by pulling on the sampler line; allow the sampler to fill with water.
- Release the sampler line to reseat the stopper and retrieve the sampler to the surface.
- Wipe the weighted bottle sampler dry with a Kimwipe or clean paper towel.
- Remove the stopper slowly. Collect samples per Section 3.2.2.1.
- Decontaminate equipment according to the Section 3.12.

3.21.3 Collecting Deep Surface Water Sample Collection Using a Peristaltic Pump

The following steps must be followed when collecting deep surface water samples using a peristaltic pump:

- Install clean silicon or Teflon tubing on the pump head. Leave sufficient tubing on the discharge side for convenient dispensing of liquid directly into sample containers.
- Select the appropriate length of Teflon intake tubing necessary to reach the specified sampling depth. Attach the intake sampling tube to the intake pump tube.
- Lower the intake tube into the surface water at the specified sampling location to the specified depth; make sure the end of the intake tube does not touch underlying sediments.
- Start the pump and allow at least three tubing volumes of liquid to flow through and rinse the system before collecting any samples. Do not immediately dispense the purged liquid back to the surface water body. Instead, collect the purged liquid and return it to the source after sample collection is complete.
- Fill the specified number of sample containers directly from the discharge line, in accordance with Section 3.2.2.1.
- Drain the pump system, rinse it with deionized water, and wipe it dry. Replace all tubing with new tubing before sampling at another sampling location. Place

all used tubing in plastic bags to be discarded or decontaminated according to the Section 3.12.

3.22 Sediment/Sludge Sampling

The following steps should be taken when preparing for sampling sediment/sludge:

- Don the appropriate personal protective clothing as dictated by the site-specific health and safety plan.
- Select stream/river sampling locations in accordance with the site-specific work plan.
- Prepare sampling site by laying out clean plastic sheeting on the ground or any flat, level surfaces near the sampling area and place equipment to be used on the plastic.
- The samples shall be collected from areas of least to greatest contamination (when known) and, when collecting several samples in 1 day, always collect from downstream to upstream.
- When sampling sediment and surface water from the same surface water body, collect surface water samples prior to sediment samples.

3.22.1 Sediment/Sludge Sample Collection from Shallow Waters

- Use a decontaminated stainless steel or Teflon, long-handled scoop, corer, push tube, or dredge to collect the entire sample in one grab. If wading is necessary, approach the sample location from downstream. Do not enter the actual sample area.
- Retrieve the sampling device and slowly decant off any liquid phase.
- Collect samples in accordance with Section 3.2.2.2.

3.22.2 Subsurface Sediment/Sludge Sample Collection Using a Corer or Auger from Shallow Waters

- At the specified sampling location, force or drive the corer to the specified depth.
- Twist and withdraw the corer in a smooth motion.
- Retrieve the sampling device, remove the corer nosepiece (if possible), and extrude the sample into the specified sampling container(s). Use a clean stainless steel or Teflon spoon or spatula to completely fill the container(s), ensuring no headspace.
- Collect samples in accordance with Section 3.2.2.2.

3.22.3 Sediment/Sludge Sample Collection Using a Dredge from Deep Waters

- Attach a clean piece of 12- to 19-mm (½- to ¾-inch) braided nylon line or Teflon-coated wire rope to the top of the sampler. The line must be of sufficient length to reach sediment or sludge and have enough slack to release the mechanism. Mark the distance to the bottom on the line.

- Attach the free end of the sampling line to a fixed support to prevent loss of the sampler.

- At the specified sampling location, open the sampler jaws and slowly lower the sampler until contact with the bottom (sediments/sludge) is felt.

- Release tension on the line; allow sufficient slack for the mechanism (latch) to release. Slowly raise the sampler.

- Once the sampler is above the water surface, place the sampler in a stainless steel or Teflon lined tray or pan. Open the sampler.

- Collect samples in accordance with Section 3.2.2.2.

3.22.4 Restrictions/Limitations

Core sampling devices may not be usable if cobbles exist in the sediment/sludge. Bumping of core sampling devices and Ponar dredge samplers may result in the loss of some of the sample.

For VOC analysis or for analysis of any other compound(s) that may be degraded by aeration grab sampling is necessary to minimize sample disturbance and, hence, analyte loss. The representativeness of this sample, however, is difficult to determine because the collected sample represents a single point, is not homogenized, and has been disturbed.

3.23 Subsurface Soil Sampling

Subsurface soil samples may be collected using a hand auger at depths of up to 10 feet (typical). In such cases, CDM typically performs the boring and collects the samples for analysis. For deeper depths, a drilling subcontractor is typically used to perform a boring and collect subsurface soil samples by split spoon or Shelby tube via rotary drilling methods, or by direct push methods. In such cases, the driller provides the soil samples to CDM, and CDM then collects the laboratory samples.

The following steps should be taken when preparing for subsurface soil sampling:

- Don the appropriate personal protective clothing as dictated by the site-specific health and safety plan.

- Locate sampling location(s) in accordance with project documents (e.g., work plan) and document pertinent information in the appropriate field logbook. When possible, reference locations back to existing site features such as buildings, roads, intersections, etc.

- Processes for verifying depth of sampling must be specified in the site-specific plans.

- Clear away vegetation and debris from the ground surface at the boring location.

- Prepare an area next to the sample collection location for laying out cuttings by placing plastic sheeting on the ground to cover the immediate area surrounding the borehole.

The following general steps must be followed when collecting all subsurface soil samples:

- VOC samples or samples that may be degraded by aeration shall be collected first and with the least disturbance possible.

- Sampling information shall be recorded in the field logbook and on any associated forms.

- Describe lithology, including color, grains size, moisture, odor and other observations.

3.23.1 Manual (Hand) Augering

The following steps must be followed when collecting hand-augered samples:

- Auger to the depth required for sampling. Place cuttings on plastic sheeting or as specified in the site-specific plans. If possible, lay out the cuttings in stratigraphic order.

- Throughout the augering, make detailed notes concerning the geologic features of the soil or sediments in the field logbook.

- Cease augering when the top of the specified sampling depth has been reached. If required, remove the auger from the hole and decontaminate the auger or use a separate decontaminated auger, then obtain the sample.

- Scan sample with organic vapor meter as appropriate.

- Collect samples in accordance with Section 3.2.2.2. Collect VOCs quickly to minimize loss of volatiles.

- When all sampling is complete, dispose of cuttings, plastic sheeting, etc., as specified in the site specific plans.
- Decontaminate all equipment in accordance with Section 3.12

3.23.2 Split-Spoon/Split Barrel Sampling

Note: the first 15 bullets describe activities to be performed by a licensed drilling contractor, not CDM personnel.

The following steps must be followed when collecting split-spoon samples:

- Remove any pavement and subbase material from an area of twice the bit diameter, if necessary.
- The drilling rig will be decontaminated at a separate location prior to drilling.
- Attach the hollow-stem auger with the cutting head, plug, and center rod(s) to the drill rig.
- Begin drilling and proceed to the first designated sample depth, adding auger(s) as necessary.
- Upon reaching the designated sample depth, slightly raise the auger(s) to disengage the cutting head, and rotate the auger without advancement to clean cuttings from the bottom of the hole.
- Remove the plug and center rods.
- If required by the site-specific sampling plan, install decontaminated liners in the splitspoon/split barrel sampler.
- Install a decontaminated split-spoon on the center rod(s) and insert it into the hollow-stem auger. Connect the hammer assembly and lightly tap the rods to seat the drive shoe at the top of undisturbed soil or sediment.
- Mark the center rod in 15-centimeter (6-inch) increments from the top of the auger(s).
- Drive the split-spoon using the hammer. Use a full 76-cm (30-inch) drop as specified by the American Society for Testing and Materials (ASTM) Method D-1586. Record the number of blows required to drive the spoon or tube through each 15-cm (6-inch) increment.
- Cease driving when the full length of the spoon has been driven or upon refusal. Refusal occurs when little or no progress is made for 50 blows of the hammer.

ASTM D1586-99 § 7.2.1 and 7.2.2 defines "refusal" as >50 blows per 6-inch advance or a total of 100 blows.

- Pull the split-spoon free by using upswings of the hammer to loosen the sampler. Pull out the center rod and split-spoon.
- Unscrew the split-spoon assembly from the center rod and place it on the plastic sheeting.
- Remove the drive shoe and head assembly. If necessary, tap the split-spoon assembly with a hammer to loosen threaded couplings.
- With the drive shoe and head assembly off, open (split) the split-spoon, being careful not to disturb the sample.
- Scan sample with organic vapor detector as appropriate.
- Collect samples in accordance with Section 3.2.2.2. Collect VOCs quickly to minimize loss of volatiles.
- When all sampling is complete, dispose of cuttings, plastic sheeting, etc., as specified in the site specific plans.
- Decontaminate all equipment in accordance with Section 3.12.

3.23.3 Direct Push Drilling

Note: The first six bullets describe activities to be performed by a licensed drilling contractor, not CDM personnel.

- Decontaminate equipment.
- Install acetate sleeve in direct push sampler (no acetate sleeve required for split spoon).
- Drive samples from the surface to the desired depth, using either 4-foot or 5-foot long direct push samplers, or 2-foot split spoons.
- Use discrete interval sampling (sampler end is plugged while driving to top of desired sample interval to exclude soil from non-desired depths) when appropriate (for example, deeper than 8 feet or below the water table).
- At top of sampling interval, release plug (if used) and drive sampler across desired sample interval.
- Retrieve sample and provide to CDM.

- Cut open acetate sleeve with two parallel slices, scan with organic vapor meter as appropriate.
- Collect samples in accordance with Section 3.2.2.2.
- At the conclusion of the boring, grout the borehole and decontaminate equipment in accordance with Section 3.12.

3.23.4 Restrictions/Limitations

- Basket or spring retainers may be needed for split-spoon sampling in loose, sandy soils.

3.24 Surface Soil Sampling

The following steps must be followed when preparing for sample collection:

- Don the appropriate personal protective clothing as dictated by the site-specific health and safety plan.
- Locate sampling location(s) in accordance with project documents (e.g., work plan) and document pertinent information in the appropriate field logbook. When possible, reference locations back to existing site features such as buildings, roads, intersections, etc.
- Processes for verifying depth of sampling must be specified in the site-specific plans.
- Carefully remove vegetation, stones etc. from the ground surface to expose soil.
- Pace clean plastic sheeting on a flat, level surface near the sampling area, if possible, and place equipment to be used on the plastic; place the insulated cooler(s) on separate plastic sheeting.
- A clean, decontaminated trowel, scoop, or spoon will be used for each sample collected. Other equipment may be used (e.g., shovels) if constructed of stainless steel.
- Surface soil samples are normally collected from the least contaminated to the most contaminated areas, if known.
- Document the sampling events, recording the information in the designated field logbook. Document any and all deviations from SOPs in the field logbook and include rationale for changes.
- Collect samples in accordance with Section 3.2.2.2.
- Decontaminate sampling equipment in accordance with Section 3.12.

3.25 Water Level/NAPL Measurement

Water levels can be measured by several instruments. The three most common are covered here - electric water level meter (measures depth to water only), interface probe (measures depth to water and depth to non-aqueous phase liquid) and pressure transducer (typically used to measure depth to water for long term monitoring or aquifer testing).

3.25.1 Procedures for Use of Water Level Meter

- Standing upwind of the well, open the well head and monitor with organic vapor meter as dictated by the site-specific health and safety plan.
- Check that water level meter is functioning correctly (test button, or immerse probe in tap water to test).
- Lower probe slowly into well until contact with water surface is indicated (tone and/or light).
- Slowly raise and re-lower probe until a precise, repeatable depth to water can be measured.
- Record the depth to water from the measuring point of known elevation, usually marked at the top of the casing. If no mark is present, measure from the highest point of the casing or as otherwise instructed in the site-specific work plan.
- Remove and decontaminate probe, secure well.

3.25.2 Procedures for Use of Interface Probe

The interface meter is used to measure the depth to water and the depth to non-aqueous phase liquid (light and/or dense).

- Standing upwind of the well, open the well head and monitor with organic vapor meter as dictated by the site-specific health and safety plan.
- Check that the interface level meter is functioning correctly (test button, or immerse probe in tap water and NAPL to test).
- Lower probe slowly into well until contact with water or NAPL surface is indicated. Water is typically indicated by a steady tone; NAPL is typically indicated by a beeping tone - check manufacturer's specifications.
- Slowly raise and re-lower probe until a precise, repeatable depth to water/NAPL can be measured.
- Record the depth to water/NAPL from the measuring point of known elevation, usually marked at the top of the casing. If no mark is present, measure from the

highest point of the casing or as otherwise instructed in the site-specific work plan.

- Measurement of interface depth between LNAPL and water: For LNAPL, the non-aqueous phase is floating on top of the water column, and the probe must be lowered through the NAPL before encountering water. In this case, shake the probe after water is encountered to help dislodge any NAPL droplets stuck to the probe. Then raise the probe slowly until it re-enters the NAPL. Perform this procedure until a repeatable result is obtained. The interface depth should be recorded in the up direction, never the down direction. When the probe is moving down, past the LNAPL, it may still be coated with product and can therefore yield misleading results. Therefore, it must be shaken in the water and raised to the interface for an accurate result. Record depth from measuring point, per item 5 above.

- Measurement of interface depth between DNAPL and water: For DNAPL, the non-aqueous phase is at the bottom of the well, below the water column. Lower the probe until NAPL is encountered. Then raise the probe, shake it in the water to dislodge any NAPL droplets, and lower it again. Perform this procedure until a repeatable result is obtained. The interface depth should be recorded in the down direction, never in the up direction. When the probe is moving up from the DNAPL it may still be coated with product and can therefore yield misleading results. Therefore, it must be shaken in the water and lowered to the interface for an accurate result. Record depth from measuring point, per item 5 above.

- Remove and decontaminate probe, secure well.

3.26 Tap Water Sampling

Tap water sampling may be performed in residential, commercial or industrial areas for several reasons. The most common tap water samples are used to obtain groundwater samples from private wells.

- Obtain permission to access the property and collect samples.

- Obtain the name(s) of the resident(s) or water supply owner/operator, the exact mailing address, and telephone numbers. This information is required to obtain access to the property to be sampled and to submit a letter of introduction to the owner/representative.

- Determine the location of the tap to be sampled based on its proximity to the water source. It is preferable that the tap water sampling be conducted at a tap located prior to any holding or pressure tanks, filters, water softeners, or other treatment devices that may be present.

- If possible, obtain well construction details, holding tank volumes etc. to evaluate standing volume of water in the system.

- If the sample must be collected at a point in the water line beyond a pressurization or holding tank, a sufficient volume of water should be purged to provide a complete exchange of fresh water into the tank and at the location where the sample is collected. If the sample is collected from a tap or spigot located just before a storage tank, spigots located inside the building or structure should be turned on to prevent any backflow from the storage tank to the sample tap or spigot. It is generally advisable to open as many taps as possible during the purge, to ensure a rapid and complete exchange of water in the tanks.

- Samples collected to determine if system related variables (e.g., transmission pipes, water coolers/heaters, holding/pressurization tanks, etc.) are contributing to the quality of potable water should be collected after a specific time interval (e.g., weekend, holiday, etc.). Sample collection should consist of an initial flush, a sample after several minutes, and another sample after the system has been purged.

- Devices such as hoses, filters, or aerators attached to the tap may harbor a bacterial population and therefore should be removed prior to sampling.

- Sample containers should not be rinsed before use when sampling for bacterial content, and precautions should be taken to avoid splashing drops of water from the ground or sink into either the bottle or cap.

- Samples of the raw water supply and the treated water after chlorination should be collected when sampling at a water treatment plant.

- In the logbook, record the location and describe the general condition of the tap selected for sampling. The rationale used in selecting the tap sampling location, including any discussions with the property owner, should also be recorded. Provide a sketch of the water supply/distribution system noting the location of any filters or holding tanks and the water supply source (i.e., an onsite groundwater well or surface water intake or a water service line from a public water main). If an onsite water supply is present, observe and record the surrounding site features that may provide potential sources of contamination to the water supply.

- Don the appropriate personal protective clothing as dictated by the site-specific health and safety plan. Gloves should be changed between sampling locations to avoid possible cross-contamination of the tap water samples.

- Prior to sample collection, the supply system should be purged by turning the cold-water tap on. The following general guidelines should be followed to determine when the system is adequately purged (refer to the site-specific sampling plans for any other requirements):

- Onsite Water Supply. A minimum of three standing volumes of water (i.e., the static volume of water in the well and holding tank, if present) should be purged. Obtain water temperature, conductivity, and pH measurements after each volume of water is purged. If the standing volume of water in the supply system is unknown, the tap should be allowed to run for a minimum of 15 minutes and temperature, conductivity, and pH measurements, or other parameters as specified by the project plan, should be collected at approximately 3- to 5-minute intervals. (In general, well construction details and holding tank volumes should be obtained prior to conducting the sampling event to estimate the standing volume of the water supply system.) The system is considered adequately purged when the temperature, conductivity, and pH stabilize within 10 percent for three consecutive readings. If these parameters do not stabilize within 15 minutes, then purging should be discontinued and tap water samples may be collected.

- Large Distribution Systems. Because it is impractical to purge the entire volume of standing water in a large distribution network, a tap should be run for a minimum of 5 minutes, which should be adequate to purge the water service line. Obtain temperature, conductivity, and pH measurements at approximately 1-minute intervals. The system is considered adequately purged when the temperature, conductivity, and pH readings, or other parameters as specified by the project plan, stabilize within 10 percent for three consecutive readings. If these parameters do not stabilize within 5 minutes, then purging should be discontinued and tap water samples may be collected. During purging, a 5-gallon bucket and stopwatch may be used to estimate the flow rate if required by the site-specific plans. Dispose the purged water according to the site-specific plans. Record the temperature/conductivity/pH readings, or other parameters as specified by the project plan, the volume of water purged, the flow rate if measured, and the method of disposal in the field logbook.

- After purging the supply system, collect the samples directly from the tap (i.e., if a hose was used for purging, the hose should be disconnected prior to sampling). Any fittings on the end of the faucet that might introduce air into the sample (i.e., a fine mesh screen that is commonly screwed onto the faucet) should be removed prior to sample collection also.

- Obtain a smooth-flowing water stream at moderate pressure with no splashing. Collect samples in accordance with Section 3.2.2.1. chain-of-custody forms.

3.26.1 Restrictions/Limitations

To protect the sample from contamination on the exterior of a tap, a tap should not be chosen for sampling if any of the following conditions exist:

- A leaky tap allowing water to flow out from around the stem of the valve handle and down the outside of the faucet.
- A tap located too close to the bottom of the sink or the ground surface.
- A tap that allows water to run up on the outside of the lip.
- A tap that does not deliver a steady stream of water. A temporary fluctuation in line pressure may cause sheets of microbial growth, lodged in some pipe sections or faucet connections, to break loose.

Careful sampling for VOC analysis, or for any other compound(s) that may be degraded by aeration, is necessary to minimize sample disturbance and, hence, analyte loss.

3.27 Sample Handling, Packaging, and Shipping

The shipping containers (coolers or shuttles) will be provided by the laboratory providing the analysis. These containers, once filled, will be secured with fiber tape, wrapped entirely around the container and will either be delivered directly to the Con Edison laboratory in Astoria Queens by the field crew or picked up by a laboratory provided courier. Consequently, the strict packaging, labeling and shipping of hazardous wastes and substances requirements set forth by the U.S. Department of Transportation (DOT) under CFR 49 will not be necessary. However, the following sample packaging procedures will be followed to guard against sample breakage and to maintain chain-of-custody.

- Check to ensure that the sample is properly filled; tighten cap securely.
- Enclose and seal sample containers in a clear plastic bag.
- Place freezer packages or ice in large ziplock plastic bags and place the bags in a sample cooler so that ice is not in direct contact with sample bottles. Sufficient ice will be added to cool the samples to 4°C.
- Pack noncombustible, absorbent vermiculite around bottles and ice to avoid sample breakage during transport.
- Complete Chain-of-Custody Records and other shipping/sample documentation including air bill numbers for each shipment of samples using a ballpoint pen. Seal documentation in a waterproof plastic bag and tape the bag inside the shipping container under the container lid. Include a return address for the cooler.
- Close the container and seal it with fiber tape and custody seals in such a manner that the custody seals would be broken if the cooler were opened.

3.28 Rock Coring

The rock core will be collected as follows:

- Decontaminate all equipment in accordance with Section 3.12 of the generic QAPP.
- Advance borehole to the desired depth using auger, rotary, air hammer or other drilling method, as appropriate.
- Install a steel casing in the borehole and grout it in place. Casing must be set into competent bedrock. Let the grout set for a minimum of 12 hours.
- Collect core (using specified core barrel) in accordance with ASTM D2113-06, as appropriate for site conditions.
- Record penetration rate.
- Record any fluid loss and depth of loss.
- Place core in new, sturdy, wooden, core boxes.
- Clearly label boxes with borehole number and depth.
- Drilling/coring induced breaks should be marked with 3 parallel lines across the break.
- Photograph full core box, with hole's number and depths clearly visible in the photo.
- Record core data including rock type, fractures and other pertinent information.
- Determine Rock Quality Designation (RQD) for each core run:

$$\text{RQD} = \frac{\text{the total length of core pieces greater than four inches long}}{\text{total core run}}$$

  - Measure core lengths along the center line of the core.
  - Do not count core pieces that are not "hard and sound" as part of the RQD; however, record such lengths separately.
  - Core breaks known to be induced by drilling or core handling should be fitted together and counted as one piece when determining RQD.

3.29 Packer Testing

Packer testing is performed to obtain groundwater samples from discrete intervals within a larger open borehole in bedrock. A dual straddle packer system or single packer system can be used, as appropriate. The single packer is often used when collecting a groundwater sample from near the bottom of the borehole. Inflatable packers, with a submersible pump between the packers (or below the single packer) are typically used. Geophysical logging can be used prior to packer testing to design the packer interval. If packer testing occurs concurrent with drilling, then a single packer is typically used at progressively deeper depths.

Packer testing will be conducted as follows:

- Decontaminate all down hole equipment in accordance with Section 3.12 of the generic QAPP.
- Assemble packer(s) lift pipe and pump. If a straddle packer system will be used, assemble packers at desired spacing.
- Lower packer assembly to desired depth.
- Measure static water level using a water level indicator.
- Inflate packers with nitrogen, with sufficient pressure to seal against borehole wall.
- Calculate volume of water in packer zone and lift pipe using Table 3-5.
- Begin purging with submersible pump; record totalizer readings and flow rates. Dispose/contain water as appropriate for the site.
- Monitor water quality parameters if appropriate.
- Collect water sample based upon volume of water pumped and/or water quality parameters.
- Deflate packers.
- Move system to next test zone or remove from borehole, as appropriate.

3.30 Aquifer Performance Test

Aquifer performance tests are typically performed to characterize the hydraulic properties of wells and aquifers. Properties evaluated include specific capacity, hydraulic conductivity, transmissivity and storativity.

3.30.1 Continuous Background Monitoring

- Baseline groundwater level measurement data will be used to evaluate the effects of outside influences (i.e., influences other than the proposed pump test withdrawal) on groundwater levels. These influences will then be considered when analyzing the pump test data.

- Groundwater level data will be recorded with electronic data loggers at selected well, at 30-minute intervals.

- The loggers will be synchronized to record water levels at the same time.

- A synoptic round of water levels will be made at the wells prior to installing the transducers. After the transducers have been installed and recording has been started, a second round of synoptic water levels will be collected on the day of transducer installation to confirm proper data recording.

- A third round of manual groundwater level measurements will be collected from continuous monitoring points and any other existing wells just prior to beginning pump testing to:

  1) confirm proper data recording by transducers and

  2) obtain a broader baseline groundwater level data set.

- Groundwater level data will also be downloaded from data loggers at this time, saved to electronic media, and reviewed to confirm that groundwater levels have stabilized.

- Precipitation and barometric pressure data will be obtained for the APT period from the local weather station (within approximately 5 miles of the project).

3.30.2 Step Drawdown Test

The step drawdown test (or step test) is required to determine the specific capacity and short term yield of the recovery well and select the pumping rate for the long-term pump test.

- During the test, continuous groundwater levels at the pumping well and select observation points will be recorded logarithmically. An example of a logarithmic schedule is provided below.

Table 3-6
Step Drawdown Test Logarithmic Schedule

Log Cycle	*Elapsed Time*	*Sample Interval*	*Points/Cycle*
1	0-20 seconds	0.2 second	101
2	20-60 seconds	1 second	40
3	1-10 minutes	10 seconds	54
4	10-100 minutes	2 minutes	45
5	100-480 minutes	10 minutes	38

- The drawdown-time data shall be plotted semi-logarithmically.
- The drawdown (y-axis) shall be plotted on a linear scale and time (x-axis) shall be plotted on a logarithmic scale. The drawdown curves shall be extrapolated to the specified time of the proposed long-term test. The rate that results in the maximum drawdown without dropping the water level below the design pumping level within the time period of the long-term test shall be considered the flow rate to be used for the long-term test.
- The specific capacity versus pumping rate should also be plotted to determine if excessive well losses occur at the selected rate.
- A variable rate submersible pump capable of operating across the above flow range will be used to complete testing. A vertical check valve will be placed on the discharge line immediately above the pump. A one-inch diameter polyvinylchloride line will be placed in the well, with the open, bottom end extending to within one foot of the pump. This one-inch line will be used as the stilling pipe for the water level transducer.

After the pumping equipment is installed, the following testing steps will be followed:

- *Step 1* - Connect a flow meter, valve, and sample port to the pump discharge line. Extend the pump discharge line from the pumping well to the existing groundwater treatment system influent sump using flexible, chemical-resistant pipe/hose (e.g., garden hose, polyethylene pipe).
- *Step 2* - Measure and record the static groundwater level reading in the pumping well.
- *Step 3* – Start log cycle for select transducers, and initiate pumping. Set to initial flow rate (Step 1) using the valve (or variable-speed controller). Record the stabilized flow rate and start time for pumping. Confirm proper operation of the pumping well transducer. Confirm that significant leaks are not present along

the above-ground hose/pipe line extending between the pumping well and the influent sump.

- *Step 4* - Monitor the groundwater level in the pumping well using the transducer, and collect manual groundwater level measurements at monitoring points at ± 20 minute intervals.

- *Step 5* - After approximately two hours, calculate the specific capacity of the well (flow/drawdown [gpm/ft]), estimate the maximum well yield based upon the calculated capacity and pump depth, and increase the pumping rate to approximately 50 percent (%) of the calculated maximum yield (Step 2). If 50% of the yield has already been exceeded, adjust the rate to approximately 75% of the yield. Record the flow rate and adjustment time. Confirm proper operation of the pumping well transducer.

- *Step 6* - Monitor the groundwater level in the pumping well using the transducer, and collect manual groundwater level measurements at monitoring points at ± 20 minute intervals.

- *Step 7* - Repeat Steps 5 and 6 for up to two additional steps at approximately 75% and 95% of the maximum well yield (Steps 3 and 4). Be careful not to drop the water level below the top of the pump.

- *Step 8* - Shut off the pump at the end of the last step test (after 4 tests and 8 hours, maximum), and download the groundwater level data from all transducers. Also collect manual groundwater level measurements at approximately 20 minutes and 40 minutes after terminating pump operation. Leave the transducers in place.

3.30.3 Long-Term Constant Rate Test

The long-term constant rate test (72-hour pump test) will be performed at the pumping well on the day after completion of the step test, assuming groundwater levels have recovered to 90% of baseline values. The 72-hour pump test will not commence until this condition is met or a minimum of 72 hours have elapsed since the termination of the step testing. The step test results will be reviewed in advance and used to select the pumping rate for this test, which will equate to approximately 50 to 75% of the calculated short-term, maximum well yield.

- During this test, continuous groundwater levels at the pumping well and select observation points will be recorded logarithmically. An example of a logarithmic logging schedule is provided below.

Table 3-7
Long Term Constant Rate Test Logarithmic Schedule

Log Cycle	*Elapsed Time*	*Sample Interval*	*Points/Cycle*
1	0-20 seconds	0.2 second	101
2	20-60 seconds	1 second	40
3	1-10 minutes	10 seconds	54
4	10-100 minutes	2 minutes	45
5	100-480 minutes	10 minutes	38

The following testing steps will be followed:

- *Step 1* - Manually measure groundwater levels in recovery well and all observation points prior to initiating pumping.

- *Step 2* - Start log cycle for transducers, and initiated pumping at the pre-determined rate by adjusting the valve (or variable-speed controller). Record flow rate and start time. Also check proper data recording at the pumping well transducer.

- *Step 3* - Collect manual groundwater level measurements at 20 minute intervals until drawdown begins to stabilize. Also check pump flow rate and adjust valve as necessary to maintain a constant pumping rate until stabilization (difference between consecutive measurements less than 10%).

- *Step 4* - Perform manual groundwater level measurements and flow rate checks/adjustments at one-hour intervals after the system has approached stabilization. Download and review pressure transducer data at 6-hour intervals to confirm proper data recording and observe data trends.

- *Step 5* - Stop pumping after 72 hours have elapsed, and record time. Leave the transducers in place. Download and review pressure transducer data at 6-hour intervals to confirm proper data recording and observe data trends.

3.30.4 Recovery water level measurement

- Initiate a new log cycle for the transducers immediately upon termination of the constant-rate pumping test.

- Continuous groundwater levels at the pumping well and select observation points will be recorded logarithmically.

- Leave the transducers in place to record continuous groundwater level data until:

    1) the groundwater level at the pumping well has recovered to 90% of its baseline value or

    2) 72 hours (minimum) have elapsed since termination of pump testing.

3.30.5 Discharge Water Management

The water pumped from the well shall be discharged and managed following the plan specific to the project.

3.31 Pre-Packed Direct Push Well Installation

A subcontracted driller will perform the well installation. CDM will oversee the fieldwork.

- Wells will be constructed of a pre-packed 2.5 inch OD (1 inch ID) slotted PVC well screen (pre-packed with sand and stainless steel mesh) and 1-inch ID, schedule 40 PVC riser casings. The pre-packed well screens are manufactured prior to mobilization.

- Thread the drive cap onto the top of the 3.25 inch OD probe rod and advance the drive rod using either the hydraulic hammer or hydraulic probe mechanism.

- Advance the drive rod to the target depth using the hydraulic hammer. Add additional probe rods as necessary to reach the specified sampling depth.

- Lower the well assembly into the probe rod string with threaded PVC riser pipe to the bottom of the probe rod string.

- Install a sand filter around the well screen to directly above the screen. Grain size of the sand will be appropriate for the slot size of the screen (normally 0.01-inch). Retract the probe rods to a point above the screen.

- Install 2-foot grout penetration seal using "00" gravel or bankrun sand.

- Insert a tremie pipe and backfill the remainder of the hole with bentonite-cement grout until it flows at the surface.

- Square cut the well pipe below grade.

- Install protective flushmount casing around new well.

3.32 Membrane Interface Probe (MIP)

In order to provide a screening-level characterization of VOC contamination in subsurface soil in both the vadose and saturated zones, CDM will utilize a MIP to obtain qualitative, depth-continuous, relative instrument response data for VOCs and electrical conductivity data in the subsurface soil. The MIP data will be used to establish an instrument response gradient in subsurface soils to identify "hot spots" for sampling during the soil boring investigation.

- The MIP utilizes a truck-mounted photo-ionization detector (PID), flame-ionization detector (FID), and an electron-capture devise (ECD).

- The 1.5-inch diameter MIP will be pushed into the subsurface at a penetration rate of approximately 1-foot per minute. The tip of the probe contains a thermister, which provides a heat source to volatilize VOCs. The gasses that are produced pass into the probe through a permeable membrane and enter a sampling loop. The gasses then are transported to the surface and pass through the PID, FID, and ECD. The MIP will produce a response to all compounds that:

  1) Volatilize sufficiently to diffuse through the MIP probe membrane,

  2) are carried to the detector in the carrier gas, and

  3) produce a response on one or more of the detectors (PID, FID, and ECD).

The total response for each detector is related to the total contaminant concentration and the relative response of the detector to the compounds in the carrier gas stream. Therefore, the MIP is considered to produce qualitative data.

A number of "performance checks" have been incorporated into the MIP screening program to provide a basis for evaluating MIP performance during subsurface soil screening activities. The following performance checks will be used during the MIP screening activities:

- <u>Ex situ response check</u> - This performance check will be used to test the response of the probe to a known concentration of a target contaminant in a test cell. This check will be performed in accordance with Geoprobe® Systems Technical Bulletin MK3010 (Geoprobe® 2003)

- <u>Reproducibility check</u> - This performance check includes performance of a replicate push within 5 to 10 feet of a selected push. The MIP profiles for the replicate locations will be compared to assess the reproducibility of the data. As a guideline, MIP responses that are within one order of magnitude will be considered to be reasonable evidence of reproducibility.

- Ex situ response checks will be run at the following times:

  - at the start of each day

- if more than 3 hours elapses between the last response check and the next logging run
- if the MIP probe, membrane, trunk line, dryer, probe rod, or any major components of the MIP system are repaired or replaced.

- Replicate MIP profiles will be run on approximately 1 in 20 samples.

Performance check results will be reviewed for each sample lot to evaluate MIP performance. If MIP performance issues are identified, the MIP subcontractor will take corrective actions to remedy the issues.

3.32.1 MIP Procedure

Prior to initiating any field activities, the field team will review and discuss, in detail, the HASP and any appropriate background documentation. All monitoring and protective equipment will be thoroughly checked at this time. All underground and overhead utilities and structures which may interfere with the progress of the work will be located prior to the commencement of subsurface drilling activities.

- The MIP soil screening will be conducted using a Geoprobe® rig or equivalent direct push rig (as discussed above) and will follow the general drilling procedures outlined in Section 3.23.3.

- At each location the direct push rig will continuously collect data on the lithology and the VOC contamination.

- The MIP technology will provide a continuous depth qualitative readout of VOC concentrations. This probe will be used until the final depth is reached.

- The MIP subcontractor will provide CDM with an electronic data file of each push containing qualitative VOC readings and electrical conductivity readings.

- The screening point boreholes will be tremie-grouted with a cement-bentonite mixture after all sampling has been completed and the boring locations will be restored to pre-existing conditions.

3.33 Fish Sampling

Fish samples will be collected from an adequate number of locations in order to characterize and address project objectives, or as directed by the NYSDEC.

- Samples will be collected using site-specific common fisheries techniques (e.g., seine net, electroshocking, etc.).

- During each investigation, species representative of the site or individual location (i.e., dominant taxa, high percentage of total biomass, etc.) will be targeted for analysis.

- The age and/or trophic level of species and other pertinent sampling design information will be decided after consultation with the NYSDEC.

- Upon capture, sampling crews will taxonomically identify fish retained for analysis and record the weight and total length of representative individuals.

- In order to satisfy analytical requirements, it may be necessary in specific cases (e.g., minnow species) to composite samples consisting of an individual species. When required, the total number of individuals and total weight of the composite will be noted.

- After processing, individual samples will be wrapped in aluminum foil, placed in re-sealable plastic bags and placed on wet or dry ice.

- Samples will be shipped via overnight delivery (see Section 3.27) to the subcontracted analytical laboratory for the analyses specified in the site specific Work Plan.

3.34 Benthic Macroinvertebrate Sampling

Benthic macroinvertebrate (benthos) samples will be collected from an adequate number of locations in order to characterize and address project objectives, or as directed by the NYSDEC.

- Samples will be collected using site-specific sampling techniques (e.g., kick net, surber sampler, etc.).

- During each investigation, species representative of the site or individual location (i.e., dominant taxa, high percentage of total biomass, etc.) will be targeted for analysis. Pertinent sampling design information (e.g., sample size, etc.) will be decided after consultation with the NYSDEC.

- As samples are collected they will be placed into a clean sample vessel (e.g., stainless steal bucket, high density polyethylene bucket, etc.) for sorting.

- Representative species retained for analysis will be taxonomically identified to Order.

- Due to analytical requirements, all samples will consist of a given number of individuals composited together until the proper sample mass is achieved.

- After processing, individual samples will be placed into the appropriate sample container, placed in re-sealable plastic bags and placed on wet ice or dry ice.
- Samples will be shipped via overnight delivery (see Section 3.27) to the subcontracted analytical laboratory for the analyses specified in the site specific Work Plan.

Section 4
Instrument Procedures

4.1 Photoionization Detector
4.1.1 Introduction
This Standard Operating Procedure (SOP) is specific to the HNu PI 101 and the Thermal Environmental Organic Vapor Monitor (OVM) PID. These portable instruments are designed to measure the concentration of trace gases in ambient atmospheres at industrial and hazardous waste sites and are intrinsically safe. The analyzers employ PIDs.

The PID sensor consist of a sealed ultraviolet light source that emits photons which are energetic enough to ionize many trace species (particularly organics) but do not ionize the major compounds of air such as O_2, N_2, CO, CO_2, or H_2O. An ionization chamber adjacent to the ultraviolet lamp source contains a pair of electrodes. When a positive potential is applied to one electrode, the field created drives any ions, formed by absorption of UV light, to the collector electrode where the currents (proportional to concentration) are measured. One major difference between a flame ionization detector (FID) and a PID is that the latter responds to inorganic compounds as well as non methane type organic compounds.

To assess whether the instrument will respond to a particular species, the ionization potential (IP) should be checked. If the IP is less than the lamp energy, or, in some cases, up to 0.2-0.3 electron volts (ev) higher than the lamp energy, instrument response should occur. For example, hydrogen sulfide (IP = 10.5 ev) may be detected with a 10.2 ev lamp, but butane (IP 10.6 ev) will not be detected.

4.1.2 Calibration
Qualified personnel trained in calibration techniques for all field items perform calibration of all CDM field equipment. When a field instrument that requires calibration is obtained from the equipment room, the unit will display a calibration tag denoting the date when the instrument was last calibrated and/or maintained. All field instruments are calibrated each time they leave the equipment facility for a site. A maintenance file is kept for each calibrated field item.

PID and FID detector type instruments come with field calibration kits. A field calibration kit would be used if the instrument is to be kept out at the site for extended periods of time, or if the instrument endures prolonged environmental extremes. In either case, a calibration check standard could be introduced in the instrument to verify its accuracy. If an instrument will not calibrate or shows improper field operation, it should be sent back to the office, and another instrument reissued.

Field personnel should not try to maintain the instruments in the field. If long sampling program is required, be prepared to take more equipment for backup in case of instrument failure. Records and procedures of all calibration techniques are on file at the CDM equipment management facility in Ten Cambridge Center, Cambridge, Massachusetts.

With the instrument fully calibrated, it is now ready for use. Any results obtained should be reported as parts per millions (ppm) as isobutylene. If you need to convert these numbers based on a benzene standard, HNu offers a conversion table which is available from CDM. Important instrument specifications for each PID detector are listed as follows.

<u>HNu PI 101 Performance</u>	<u>OVM Model 580A</u>
Range - 0.1 to 2000	0 - 2000
Detection limit 0.1 PPM	0.1 PPM

<u>HNu PI 101 Power Requirements</u>	<u>OVM Model 580A</u>
Continuous use, battery >10 hours	8 hours
Recharge time, max >14 hours, 3 hours +	8 hours
NiCd Battery	Gel Cell Battery

Unit can be operated on battery charger.
Both units provide protection circuitry for the battery. This prevents deep discharging of the battery and considerably extends the battery life.

4.1.3 HNu PI 101

4.1.3.1 Procedure

- Before attaching the probe, check the function switch on the control panel to make sure it is in the off position. The 12-pin interface connector for the probe is located just below the span adjustment on the face of the instrument. Carefully match the slotted groove on the probe to the raise slot on the 12-pin connector on the control panel. Once in line, twist the outer ring on the 12-pin connector until it locks into position (a distinct snap noise will be felt when in place).

- Turn the function switch to the battery check position. The needle on the meter should read within or above the green battery arc on the scaleplate. The battery, if needle falls below the green arc, should be recharged before any measurements are taken. If the read LED on the instrument panel should come on, the battery needs charging and the unit cannot be operated without a charger.

- If the battery is functioning properly, turn the function switch to the STANDBY position. If the needle on the instrument does not read 0, then turn the knob on the instrument panel until the needle deflects to the zero point on the meter.

- Once the zero is confirmed, turn the function switch to the 0-20 position. At this point, the needle will read approximately 0.5 ppm. This reading is normal background for ambient air. For CDM health and safety reasons, the HNU PI 101 should be operated on this range to insure maximum sensitivity in the work area. The unit, however, has 2 other ranges (0-200), (0-2000) should monitoring be required for other purposes such as headspace analysis etc. where readings could exceed the 0-20 ppm range.

4.1.3.2 Limitations

- AC power lines (high-tension lines), or power transformers can interfere with the instruments performance. This situation can be confirmed by noting a deflection of the meter while in the STANDBY position.

- Environmental factors such as humidity, rain and extreme cold can limit the instrument performance. To verify the "water sensitivity" condition, gently blow in the hole at the end of the probe. If the needle deflects positively (on the 0-20 position) by 2 ppm or more, water sensitivity problem exists and the unit should be brought into the warehouse for service. HNU PI 101 should be kept out of the rain as much as possible or covered. This will insure longer operating times with less false positive readings.

- Quenching the detector can limit the instrument performance. This occurs when a compound such as methane at a very high concentration is introduced to the detector. The concentration is so high that the unit does not respond at all or gives a negative reading.

4.1.4 OVM 580A

4.1.4.1 Procedures

- With the unit being fully calibrated before receiving it, you are ready for operation. Located on the right hand side of the unit is a panel. Slide this panel off of the unit. Inside there is a switch that supplies power to the LCD portion of the instrument. Turn this switch on and replace the panel. On the top of the OVM, there is an instrument panel. Locate the on/off switch and turn the unit on. This switch activates the lamp as well as the pump. Turn this switch off when the instrument is not in use, but leave the internal switch on.

- The unit is now in the operation mode with all readings shown on the LCD display. Options for the OVM 580A include automatic recording and alarm settings. Should any options be required, they can be set up before the instrument leaves the CDM equipment warehouse.

  Warning signals associated with the OVM include a Low Battery signal. A flashing B will appear in the left-hand corner of the bottom line of the display when the 580A is in the RUN mode. If a gas concentration >2000 ppm is detected by the OVM, the top line of the display will show OVERRANGE. Once this occurs, the instrument will "lock out" until the unit is brought to a clean area. A clean area is described as an area where the concentration of organic vapors is below 20 ppm.

4.2 pH Meter

4.2.1 Introduction

pH is the negative logarithm of the effective hydrogen ion concentration (or activity) in gram equivalents per liter used. This expresses both acidity, and alkalinity on a scale whose valves run from 0 to 14. Number 7 represents neutrality, and numbers greater than 7 indicate increasing alkalinity while numbers less than 7 indicate increasing acidity. pH is one of the most commonly analyzed parameters. Water supply treatments such as neutralization, softening, disinfection and corrosion control are all pH dependent. CDM has a variety of pH monitoring instruments in the equipment warehouse.

4.2.2 Orion SA 250 pH Procedures

With the instrument fully calibrated, it is now ready for use. Follow the check out procedures:

- Slide power switch to on position. Attach BNC shorting plug to BNC connector on top of meter.
- If LO BAT indicator on LCD remains on, the battery must be replaced.
- Slide mode switch to mV. Display should read 0 $\pm$ .3.
- Slide mode switch to TEMP. Display should read 25.0. If 25.0 is not displayed, scroll using, and X10 keys, until 25.0 is displayed and press enter.
- Slide mode switch to pH .01. Press iso. Display should read the letters ISO, then a value of 7.000. If 7.000 is not displayed, scroll until 7.00 is displayed and press enter.
- Press slope. Display should read the letters SLP, then a value of 100.0. If 100.0 is not displayed, scroll until 100.0 is displayed and press enter.
- Press sample. Observe the letters pH, then a steady reading of 7.00, $\pm$0.02 should be obtained. If not, press CAL and scroll until 200 is displayed and press enter. Press sample and observe a reading of 7.00.
- Remove the shorting plug. After completing these steps, the meter is ready to use with an electrode.
- Attach electrodes with BNC connectors to sensor input by sliding the connector onto the input, pushing down and turning clockwise to lock into position.

Connect reference electrodes with pin tip connectors by pushing connector straight into reference input.

- Put the temperature probe in the sample and let it stabilize.
- Once temperature is stable, set the unit to read pH (by 0.1 or 0.01) and take a reading in the aqueous sample. (Remembering first to remove the cap on the end of the pH probe.)

4.2.3 Model Tripar Analyzer Procedures

With the instrument fully calibrated, it is now ready for use:

- Connect the pH probe's BNC input connector to the front of the Tripar.
- Put the pH/mV switch on the pH position.
- Turn the parameter display selection switch to TEMP.
- Plug in the gray temperature plug jack in the input temperature sensor connector.
- Put end of temperature probe in the sample.
- Allow the temperature to stabilize.
- Turn the temperature compensation knob to the temperature shown.
- Turn the parameter display selection switch to pH.
- Put pH probe in the aqueous sample (remembering first to remove the cap on the end of the probe). Let it stabilize and record the reading.

4.3 Conductivity Meter

4.3.1 Introduction

Conductivity is a numerical expression of the ability of an aqueous solution to carry an electrical current. This ability depends on the presence of ions in the solution, and their total concentration. Factors such as mobility valence, relative concentration, and temperature also combine to create this occurrence. Solutions of most inorganic acids, bases and salts are relatively good conductors. Organic compounds in aqueous solutions are not good conductors. For example, freshly distilled water has conductivity reading of 0.5 to 2 mhos/cm and increases with time. This increase is caused by absorption of atmospheric carbon dioxide, and to a lesser extent ammonia. While industrial type wastes have conductivity readings of $\pm$10,000 mhos/cm.

4.3.2 Model SCT Procedures

The model 33 SCT has 3 conductivity scales of 0-500, 0-5000, and 0-50,000 mhos/cm. Salinity is scaled 0-40 parts per thousand in a temperature range of -2 to +45BC. Temperature is scaled -2B to +5BC.

With the instrument calibration verified, the unit is now ready for use. The model 33 S-C-T meter face is scaled and calibrated to give an accurate reading of the conductivity of a water sample by measuring the amount of current flow between two fixed electrodes in the probe. The unit also measures salinity in a special range conductivity circuit, which includes a user-adjusted temperature compensator. A precision thermistor in the probe measures temperature by changing its resistance in relation to the temperature of the water.

The start-up procedure is as follows:

- Plug the probe plug receptacle in the side of the meter.
- With the mode select in the OFF position, check to see that the meter needle is centered at the zero mark on the conductivity scale and adjust if necessary.
- Turn the mode control switch to Red Line position.
- Adjust the Red Line control knob so the meter needle lines up with the red line on the meter face. If this cannot be accomplished, replace the batteries. If battery replacement is necessary, use only alkaline "D" cells, as regular carbon zinc batteries will cause errors.
- Place the probe into the solution to be measured.
- Set the mode control to TEMPERATURE. Read the temperature on the bottom scale of the meter in Degrees C. Allow time for the probe temperature to come to equilibrium before taking a reading.
- With the probe in the solution to be tested, adjust the conductivity scale until the meter reading is on scale. (Multiply the reading by the correction on the calibration sticker on the instrument).
- When using the X10 and X100 scales, depress the CELL TEST button. If the reading on the dial moves +2%, the electrode is fouled and needs to be cleaned. Repeat the measurement on another instrument.
- Store the probe in distilled water when not in use.

4.4 Photovac Portable Gas Chromatograph

4.4.1 Introduction

The Photovac portable gas chromatograph (GC) can provide for accurate and specific identification of volatile organic compounds in a field control laboratory.

4.4.2 Equipment Preparation

- The Photovac portable GC should be set up in a sheltered area and, if possible, within a climate controlled area to minimize temperature changes. Do not place the GC near any equipment that causes vibration. A flat table, large enough to accommodate the GC, the printer, a laboratory size oven, and electrical power packs for the GC should be utilized during operation.

- Fill the GC with carrier gas being sure not to pressurize the GC with more than 1500 pounds per square inch (psi) of carrier gas. Check to ensure the pressure of the air feed to the GC column is 40 psi. The carrier gas should contain no more than 2.0 parts per million by volume (ppmV) of total hydrocarbons and not less than 0.1 ppmv of total hydrocarbons. The lower the hydrocarbon concentration the lower the baseline of the GC. A lower baseline minimizes interference of compound identification.

- Install new Teflon septa in the injection port being utilized. The septa should be replaced at the start of each day and after every twenty injections.

4.4.3 Calibration Procedures and Frequency

The Photovac portable GC will be calibrated at the beginning of each day prior to sample analysis.

Gas Standards

Gas standards used to calibrate the GC will be obtained from certified compressed gas cylinders of known concentration. CDM stocks two compressed gas standard cylinders containing the following gases and concentrations:

Cylinder 1

Benzene - 10 ppmv
Toluene - 10 ppmv
Ethyl Benzene - 10 ppmv
M-xylene - 10 ppmv
O-xylene - 10 ppmv
P-xylene - 10 ppmv

Cylinder 2

trans 1,2 Dichloroethylene - 1.05 ppmv
1,1,1 Trichloroethane - 19.3 ppmv
Trichloroethylene - 1.13 ppmv

These gas cylinders were purchased from Scott Specialty Gas Corporation and are certified by Scott to be traceable to NBS standards.

The calibration procedure using these cylinders is as follows:

- A two stage pressure regulator (CGA 350) is attached to the standard gas cylinder to be used.

- A 250 ml glass sampling bulb, determined clean by injecting a volume of air obtained from the bulb onto the GC (described later), is labeled and attached to the effluent port of the second stage of the gas regulator. The Teflon stopcocks of the sampling bulb are opened.

- The sample cylinder valve is opened and the first stage of the regulator is pressurized.

- Slowly the diaphragm valve controlling the gas flow entering the second stage is opened until the pressure reads 2 psig.

- The valve allowing the gas to exit the second stage of the regulator is opened until the gas can be heard escaping from the regulator and passing through the glass sample bulb. Purge the bulb for approximately ten seconds. Close the Teflon stopcock located at the discharge end of the sampling bulb, then, the stopcock closest to the regulator. In this way the calibration gas is collected at the same pressure as the delivery pressure of the second stage of the regulator.

- Using a gas tight 1 ml syringe, extract approximately 500 microliters (µl) of the calibration gas from the glass bulb and purge the volume of gas into the atmosphere. Repeat this step.

- Place the syringe needle in the glass bulb. Pull the syringe plunger back approximately 500 µl of calibration gas enters the syringe barrel. Without removing the syringe from the glass bulb depress the plunger. Pump the syringe in this manner several times.

- Extract the syringe from the glass bulb with approximately 500 µl of calibration gas present. Carefully depress the plunger until 300 µl of calibration gas is present in the syringe barrel. Immediately inject this gas volume into the Photovac GC.

- A response factor for each analyte is obtained as the ratio of the known gas concentration injected and the area under the peak produced by that injection. This integration is performed automatically by the internal Photovac data processor and stored in the library.

- The procedure to obtain a calibration gas sample is repeated and the gas volume is injected into the GC. The GC will identify the compounds in the sample stream that have retention times within +/- 20% of the retention times of the compounds in the library. The area of these identified peaks will be compared to the response factor of the compounds stored in the library and integrate a corresponding concentration.

- If the calibration check concentration does not equal +/- 15% of the library concentration, a new calibration check is performed. If this check fails, a new library is created.

4.4.4 Sample Analyses

The following procedure will be followed when performing analysis of samples.

- The Photovac portable GC is set as described above. The GC function and application file is loaded into memory. This includes all previously established calibration data and retention time information.

- 300 µl of sample are obtained from the sample source and injected into the GC. Samples will be injected as soon as possible after it is collected.

- Immediately after injection the GC is started.

- Each chromatograph run will run for a minimum of 5 minutes. At this time the run will be stopped and the results obtained.

- Following completion of the run, the Photovac GC will produce a hard copy printout of the results. This printout will include the sample identification, time of analysis, and appropriate operating parameters.

This procedure will be followed for all sample runs.

4.4.5 Method Blanks and Duplicates

Prior to any calibration or sample injections, the integrity and level of contamination of each syringe used for injections will be verified.

- Plungers will be removed from the barrel of the syringe and placed into a laboratory oven for 5 minutes. The temperature of the oven should not be above 150 degrees Fahrenheit (F) or below 120 degrees F.

- The syringes will be removed from the oven, cooled, and reassembled.

- Pump the syringe plunger several times, purging the syringe with ambient air.

- Collect approximately 500 µl of ambient air in the syringe and carefully depress the plunger to 300 µl. Immediately inject the gas volume into the GC.

- Detection of the target compounds above the detection limit (50 ppbv for most compounds) will require another decontamination procedure before additional analyses.
- Blanks will be performed after every sample and calibration injection. Blanks will not be performed between duplicate sample injections.
- Duplicate samples will be performed at a minimum of 1 every 10 sample injections.

Section 5
Laboratory Procedures

The term "data quality" refers to the level of uncertainty associated with a particular data set. The data quality associated with environmental measurement data is a function of the sampling plan rationale and procedures used to collect the samples as well as the analytical methods and instrumentation used in making the measurements. Each component has its own potential sources of error and biases that can affect the overall measurement process.

Sources of error that can be traced to the sampling component of environmental data collection are: poor sampling plan design, inconsistent use of standard operating procedures, sample handling and transportation. The most common sources of error that can be traced to the analytical component of the total measurement system are calibration and contamination problems. It is recognized that by far the largest component of the total uncertainty associated with environmental data collection originates from the sampling process. All sampling programs initiated in support of this project will stress forward planning and be well conceived and reviewed prior to the collection of any samples as a way to minimize this major source of potential error.

Uncertainty cannot be eliminated from environmental measurement data. The amount of uncertainty that can be tolerated depends on the objective of the sampling program and the intended use of the data collected. The purpose of the project's quality assurance program is to assure that the data quality of all data collected be of known and ascertainable value.

5.1 Data Quality Criteria

Data quality can be assessed in terms of its precision, accuracy, representativeness, completeness, and comparability. Analytical method detection limits will also be discussed in this section.

5.1.1 Precision

Precision is a measure of the reproducibility of analyses under a given set of conditions. The overall precision of a sampling event is a mixture of sampling and analytical factors. The precision of data collected in support of this project will be assessed on two different levels:

- By calculating the relative percent difference (RPD) of laboratory matrix spike duplicates and/or laboratory replicate samples (a measure of analytical precision).

- By calculating the RPD of field duplicates samples submitted to laboratory "blind" (a measure of the precision of the entire measurement system, including sampling).

Relative percent difference will be calculated according to the following equation:

$$RPD = \frac{|A - B|}{(A + B)/2} \times 100\%$$

where: A = Sample Result
B = Replicate Sample Result

5.1.2 Accuracy

Accuracy is a measurement of the amount of bias that exists in a measurement system. This can be thought of as the degree that the reported value agrees with the supposed "true value". The accuracy of data collected in support of this project will be assessed in the following ways:

- By calculating the percent recovery (%R) of laboratory matrix spikes and/or laboratory control standards
- By documenting the level of contamination that exists (if any) in laboratory method blanks
- By documenting the level of contamination that exists (if any) in field and/or trip blanks submitted to the laboratory "blind" for analysis
- Percent recovery will be calculated according to the following equation:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

where: SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Concentration

5.1.3 Representativeness

Unlike the previous two criteria which can be expressed in quantitative terms, representativeness is a qualitative parameter. However, in terms of overall data quality, representativeness may be the most important parameter of all.

The representativeness criterion is concerned with the degree to which a sample reflects (represents) a characteristic of a population, parameter variations at a specific location or an environmental condition. Sample representativeness will be addressed in support of this project through a detailed sampling plan design and rationale and through the proper use of the appropriate sampling standard operating procedures, depending on sample matrix and the parameters to be analyzed.

Composite samples will be collected in situations conducive to compositing techniques (particularly samples collected along the vertical extent of a borehole). The use of composite samples tends to maximize the representativeness of a sampling round because more information is provided about a much broader area than a single grab sample. This is especially true in situations where the objective of sampling is to determine where gross contamination exits on site and the location of any "hot spots". In these cases, broad coverage of the area to be sampled is more important than obtaining the lowest possible detection limits.

5.1.4 Completeness

Completeness is a measure of the amount of usable data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions. Usability will be determined by evaluation of the precision, accuracy, representativeness, and comparability parameters. Those data that are validated as correct, or are qualified as estimated or non-detect are considered usable. Rejected data are not considered usable. A completeness goal of 90% is projected. If this goal is not met, the effect of not meeting this goal will be discussed by the CDM project manager and the NYSDEC site manager. Completeness is calculated using the following equation:

$$\textit{Percent Completeness} = \frac{DO}{DP} \times 100$$

Where:

DO	=	Data obtained and usable
DP	=	Data planned to be obtained

There also may be incomplete data while still meeting the 90 percent goal if a critical sample location cannot be sampled.

5.1.5 Comparability

The comparability criterion is a quality characteristic which is an expression of the confidence with which one data set can be compared with another. Comparability issues are of importance at two different levels of a sampling program. The primary comparability issues are concerned with whether the field sampling techniques, analytical procedures, and concentration units of one data set can be compared with another.

The comparability criterion also applies to the environmental conditions/ considerations present at the time of the sampling. Temporal and/or seasonal variations may make data collected from the same location at different times of the year incomparable, or comparable in a relative sense only, for example.

Comparability is judged by comparing results to other similar data sets. Consistency in the acquisition, handling, and analysis of samples is necessary for comparing results. Data developed under this investigation will be collected and analyzed using Soil Vapor Intrusion Guidance for soil vapor collection and NYSDEC Department of Remediation Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated December 2002 to ensure comparability of results with other analyses performed in a similar manner.

5.1.6 Method Detection Limits

Whenever environmental measurement data is to be used in comparison with predetermined "action levels" or other regulatory requirements, the reported method detection limits of the analytical data is of prime importance. Analytical methods specified in support of this project should have a reported detection limit at least 50% below the required action level to assure that measurements made in the vicinity of the action level are of high quality. In circumstances concerning extremely low action levels or regulatory requirements where analytical techniques will have to be pushed to their limits, every effort will be made to select the most appropriate analytical procedures. It is recognized that analytical detection limits are sample specific and are affected by sample volumes as well as the need for sample concentration or dilution. These circumstances will be accounted for in the review and interpretation of the analytical results.

5.2 Quality Control

Two separate levels of quality control exist for all samples collected in support of this project, internal laboratory quality control and program generated quality control.

5.2.1 Internal Laboratory Quality Control

Internal laboratory quality control is a function of the individual laboratory's QA/QC Plan. A laboratory's QA/QC plan contains specific criteria governing the manner in which analyses are conducted and provide information on the laboratory's performance and control of the sources of error that exist within the lab. Included in the plan are requirements for the type and frequency of quality control check samples that are to be analyzed on a routine basis.

All laboratory analysis conducted in support of this project must include the following quality control check samples:

- Surrogate spikes (where appropriate)
- Matrix spike/matrix spike duplicate or laboratory duplicates and laboratory control samples (where appropriate)
- Method blanks

The laboratory may adhere to the analysis frequency specified in their QA/QC plan for these check samples provided that the specified frequency is equal-to or greater-than the frequency specified in Table 5-1 or as modified/specified by the QAPP.

5.2.2 Program Generated Quality Control

Program generated quality control consists of quality control check samples that are submitted to the laboratory for analysis "blind" along with actual environmental samples. These samples provide quality control information for the entire sampling event, from the actual sampling and handling through laboratory analysis. As such, they can provide the best overall estimate of the total uncertainty associated with the sampling round.

TABLE 5-1

LABORATORY SAMPLE FREQUENCY

QC Check Sample	Frequency of Analysis
Method Blanks	One per analytical batch or one per every twenty samples
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One per analytical batch or one per every twenty samples
Surrogate Spikes	One per every trace organic analysis

The combination of laboratory duplicates and laboratory control samples may be substituted for MS/MSD analysis for parameters where they are more appropriate.

Program generated quality control samples collected in support of this project are:

- Duplicate samples
- Field blanks
- Trip blanks

Each report should have a cover page that references the CDM task number.

The cover page also provides an opportunity to describe in a narrative format any unusual problems or interferences encountered during analysis. In addition, all results should be reported on a dry weight basis for soils and at dilution-corrected concentrations for all samples.

5.2.3 QC Deliverables Package

The following quality control data is required to be reported. For "priority pollutant" type analysis, the following quality control data is required per sample batch:

- Method Blanks associated with each analytical procedure.

- Surrogate Spike Recoveries for volatile organics, PCBs, semi-volatiles and polynuclear aromatic hydrocarbons.
- MS/MSDs for all priority pollutant parameters. One MS/MSD should be run for every 20 samples.

For non-priority pollutant parameters, the following quality control data is required per sample batch:

- Method Blanks
- Laboratory Duplicates -- One duplicate analysis should be performed at a frequency of one per twenty samples.

No specific acceptance criteria for blanks and spike recoveries will be set forth here, however, all laboratories are expected to conform to standard EPA quality control specifications. CDM expects laboratories to reanalyze samples if quality control samples fail to meet EPA specifications.

The quality control data may be presented as a quality control section within the report or it may be integrated among the results.

5.3 Data Quality Requirements

Taking into consideration a project's overall objective and intended use of the data, it should be considered that analyses be conducted in accordance with SW-846, Test Methods for Evaluating Solid Waste, Third Edition procedures. In cases where additional procedures are required, other EPA approved laboratory methods will be used.

5.4 Data Deliverable

Analytical data deliverable will be provided in accordance with NYSDEC requirements (EPA Region 2 EDD, dated December 2003).

5.5 Analytical Data Validation

If a Work Assignment requires the validation of data; i.e., data validation is performed to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use.

Laboratories results shall be supported by sufficient back-up data and QA/QC results to enable the reviewer to conclusively determine the quality of the data. The laboratory will review data prior to its release from the laboratory. Objectives for review are in accordance with the QA/QC objectives stated in each site-specific Work Plan. The laboratory is required to evaluate their ability to meet these objectives. Outlying data will be flagged in accordance with laboratory standard operating procedures, and corrective action will be taken to rectify the problem.

A NYSDEC-approved qualified independent third party data validator will review the data package to determine completeness and compliance in accordance with Standby Contract D004437. A narrative describing how the data did or did not meet the validation criteria is part of the data validation procedure. The validation assessment will describe the overall quality of the data and the data validation report will provide a written statement upon completion of the validation indicating whether or not the data are valid and usable, and include a percent completeness value of usable data.

5.6 Data Usability Summary Report

A Data Usability Summary Report (DUSR) provides a thorough evaluation of analytical data without the third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use. If a Work Assignment requires a DUSR, the DUSR will be developed by a NYSDEC approved qualified environmental scientist in accordance with Standby Contract D004437.

ATTACHMENT 1

NYSDOH Indoor Air Quality Questionnaire and Building Inventory

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name ________________________________ Date/Time Prepared ____________

Preparer's Affiliation ____________________________ Phone No.__________________

Purpose of Investigation____

1. OCCUPANT:

Interviewed: Y / N

Last Name: ______________________ First Name: ______________________

Address: ____

County: _______________

Home Phone: _________________ Office Phone: _________________

Number of Occupants/persons at this location ______ Age of Occupants ____________________

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: ______________________First Name: ________________________

Address: ____

County: _______________

Home Phone: _________________ Office Phone: _________________

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: _______________

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_______________

If multiple units, how many? ________

If the property is commercial, type?

Business Type(s) ______________________________________

Does it include residences (i.e., multi-use)? Y / N If yes, how many? ______

Other characteristics:

Number of floors______ Building age______

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

____

____

____

Airflow near source

____

____

____

Outdoor air infiltration

____

____

____

Infiltration into air ducts

____

____

____

5. **BASEMENT AND CONSTRUCTION CHARACTERISTICS** (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other ________
c. Basement floor:	concrete	dirt	stone	other ________
d. Basement floor:	uncovered	covered	covered with ______________	
e. Concrete floor:	unsealed	sealed	sealed with ______________	
f. Foundation walls:	poured	block	stone	other ________
g. Foundation walls:	unsealed	sealed	sealed with ______________	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	
j. Sump present?	Y / N			
k. Water in sump?	Y / N / not applicable			

Basement/Lowest level depth below grade: ________(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

____

____

6. **HEATING, VENTING and AIR CONDITIONING** (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other __________

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _________________________

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other__________
Air conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

____

____

____

____

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)
Basement	______________________
1st Floor	______________________
2nd Floor	______________________
3rd Floor	______________________
4th Floor	______________________

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA Please specify__________

d. Has the building ever had a fire? Y / N When?__________

e. Is a kerosene or unvented gas space heater present? Y / N Where? __________

f. Is there a workshop or hobby/craft area? Y / N Where & Type? __________

g. Is there smoking in the building? Y / N How frequently? __________

h. Have cleaning products been used recently? Y / N When & Type? __________

i. Have cosmetic products been used recently? Y / N When & Type? __________

j. Has painting/staining been done in the last 6 months? Y / N Where & When? ______________

k. Is there new carpet, drapes or other textiles? Y / N Where & When? ______________

l. Have air fresheners been used recently? Y / N When & Type? ______________

m. Is there a kitchen exhaust fan? Y / N If yes, where vented? ___________

n. Is there a bathroom exhaust fan? Y / N If yes, where vented? ___________

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type? ______________

Are there odors in the building? Y / N
If yes, please describe: ____

Do any of the building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? ____

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) No
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: ___________
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply: Public Water Drilled Well Driven Well Dug Well Other: _______

Sewage Disposal: Public Sewer Septic Tank Leach Field Dry Well Other: _______

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: ______________________________

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement:

First Floor:

12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.

13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: ______________________

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo ** Y / N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

Appendix B

Health and Safety Plan

HEALTH AND SAFETY PLAN FORM **CDM Health and Safety Program**	*This document is for the exclusive use of CDM and its subcontractors*	**CAMP DRESSER & McKEE INC.** **PROJECT DOCUMENT #:**

PROJECT NAME former Paul Miller Dry Cleaners site Site No. 243018 **PROJECT#** ____ **REGION** PSG NER

JOBSITE ADDRESS 1465 Forest Avenue Port Richmond, Richmond County, New York

CLIENT NYSDEC
CLIENT CONTACT Kevin Sarnowicz
CLIENT CONTACT PHONE # (518) 402-9774

( ) AMENDMENT TO EXISTING APPROVED H&SP
( ) H&SP AMENDMENT NUMBER? ____ **() DATE EXISTING APPROVED H&SP** ____

OBJECTIVES OF FIELD WORK:
(e.g. collect surface soil samples):

1) Site survey and geophysical survey including all sampling locations
2) Soil vapor sampling (6 vapor points) on three properties within the shopping center at which site is located.
3) Installation (oversight) of 13 new groundwater monitoring wells (soil sampling will be conducted).
4) Groundwater sampling at up to 27 new and existing wells.
5) Oversight of sub-slab depressurization system installation.

Type *Check as many as applicable*

Active	(X)	Landfill	( )	Unknown	( )
Inactive	( )	Uncontrolled	(X)	Military	( )
Secure	( )	Industrial	( )	Other (specify)	(X) Commercial
Unsecure	(X)	Recovery	( )		
Enclosed space	( )	Well Field	( )		

All requirements described in the CDM Health and Safety Assurance Manual for Hazardous Waste Operations are incorporated in this health and safety plan by reference.

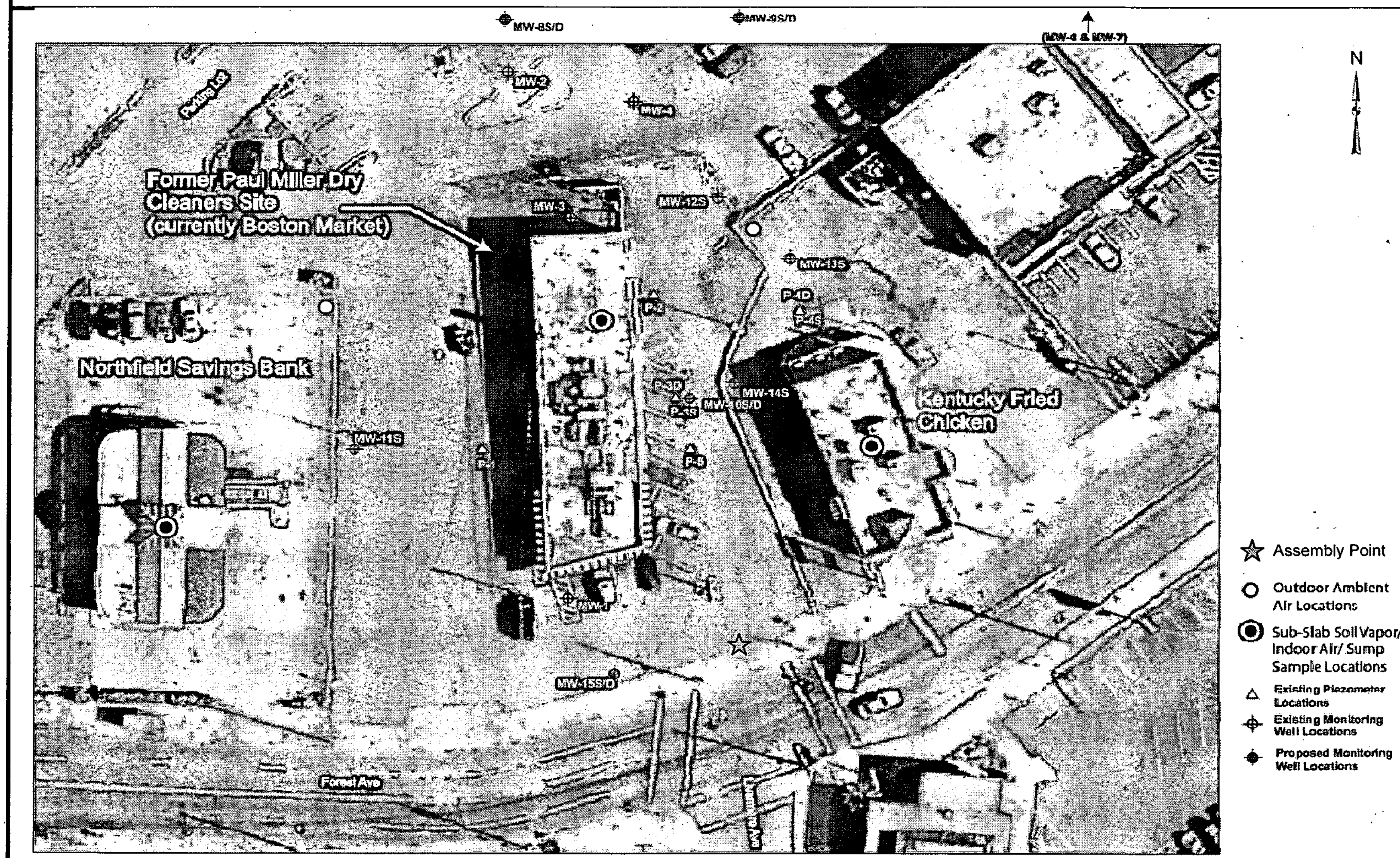
DESCRIPTION AND FEATURES:

Located at 1465 Forest Avenue, Port Richmond, NY the former Paul Miller site occupies a 0.4 acre parcel in a commercial area in the Forest Avenue Shopping Center. The former dry cleaner building is currently occupied by Boston Market Corporation and is being used as a restaurant. The site is relatively flat with its surface area covered with concrete and/or asphalt. Review of the USGS Arthur Kill Quadrangle map indicates that ground surface elevations range from approximately 30 to 33 feet above mean sea level.

SURROUNDING POPULATION: ( ) Residential ( ) Industrial (X) Commercial ( ) Rural (X) Urban OTHER:

HEALTH AND SAFETY PLAN FORM CDM Health and Safety Program	*This document is for the exclusive use of CDM and its subcontractors*	CAMP DRESSER & McKEE INC. PROJECT DOCUMENT #:

SITE MAP: *Show Exclusion, Contamination Reduction, and Support Zones. Indicate Evacuation and Reassembly Points*



The exclusion zone will include all points within 10 feet of the investigation activities or a sampling location. The contamination reduction zone will consist of a ten foot radius outside of the exclusion zone and will be cordoned off with cones and caution tape. The support zone will be a 10 foot radius outside of the CRZ. All zones are mobile, established in consideration of the prevailing wind direction and will be established and moved as work crew advances to new locations.

HEALTH AND SAFETY PLAN FORM CDM Health and Safety Program	*This document is for the exclusive use of CDM and its subcontractors*	CAMP DRESSER & McKEE INC. PROJECT DOCUMENT #:

HISTORY: *Summarize conditions that relate to hazard. Include citizen complaints, spills, previous investigations or agency actions, known injuries, etc.*

In 1994, the owner of the Forest Avenue Shopping Center conducted an environmental investigation at the former Paul Miller site. Subsequently, in May 2000, NYSDEC retained Lawler, Matusky & Skelly Engineers LLP (LMS) to conduct and Immediate Investigation Work Assignment (IIWA) of the former Paul Miller site. No soil samples were collected for laboratory analysis at the site, therefore no soil quality data exists to date. However, the presence of volatile organics (as detected with a photoionization detector or via olfactory or visual observations) was not noted in any of the three boring logs available from the LMS IIWA report (boring logs P-1 through P-3). Groundwater results from the LMS IIWA identified the highest concentrations of chlorinated volatile organic compounds in groundwater immediately adjacent to the east side of the building. The contamination was determined to be migrating vertically downward as evidenced by higher PCE concentrations in the deeper piezometers. Based on the results of this investigation, LMS recommended that a soil gas survey be conducted in the area to identify the potential impact of PCE contamination to indoor air at the former Paul Miller site, and the adjacent two buildings (Kentucky Fried Chicken restaurant to the east and the Northfield Savings Bank to the west).

Additionally, LMS recommended that a deeper well be installed to vertically delineate groundwater contamination in the vicinity of P-3D on the east side of the site building and that continuous soil cores be collected to better characterize the subsurface stratigraphy in the vicinity of the former Paul Miller site.

WASTE TYPES: ( ) Liquid ( ) Solid ( ) Sludge ( ) Gas ( ) Unknown (X) Other, specify: contaminated groundwater

Check as many as applicable.

( ) Corrosive	( ) Flammable	( ) Radioactive
( ) Toxic	**(X) Volatile**	( ) Reactive
( ) Inert Gas	( ) Unknown	**(x) Other, specify: PCE in groundwater, soil vapor and subsurface soils**

WORK ZONES: *Describe the Exclusion, Contamination Reduction, and Support Zones in terms on-site personnel will recognize*

The exclusion zone will include all points within 10 feet of the investigation activities or a sampling location. The contamination reduction zone will consist of a ten foot radius outside of the exclusion zone. The support zone will be a 10 foot radius outside of the CRZ. All zones are mobile, established in consideration of the prevailing wind direction and will be established and moved as work crew advances to new locations.

HAZARDS OF CONCERN:

(X) Heat Stress	**(X) Noise**
(X) Cold Stress	( ) Inorganic Chemicals
( ) Explosive/Flammable	**(X) Organic Chemicals**
( ) Oxygen Deficient	**(X) Motorized Traffic**
( ) Radiological	**(X) Heavy Machinery:Drill Rig**
( ) Biological	**(X) Slips, Trips, & Falls**
( ) Other	

FACILITY'S PAST AND PRESENT DISPOSAL METHODS AND PRACTICES:

The Site's past disposal methods include discharging into a sump, which dispersed waste to subsurface and ultimately groundwater. It is unknown as to whether the sump still is present or was previously removed.

HEALTH AND SAFETY PLAN FORM **Health and Safety Program**			*This document is for the exclusive use of CDM and its subcontractors*		
HAZARDOUS MATERIAL SUMMARY:	*Circle waste type and estimate amounts by category.*				
CHEMICALS: *Amount/Units:*	**SOLIDS:** *Amount/Units:*	**SLUDGES:** *Amount/Units:*	**SOLVENTS:** *Amount/Units:*	**OILS:** *Amount/Units:*	**OTHER:** *Amount/Units:*
Acids	Flyash	Paints	Halogenated (chloro, bromo) Solvents	Oily Wastes	Laboratory
Pickling Liquors	Mill or Mine Tailings	Pigments	Hydrocarbons	Gasoline	Pharmaceutical
Caustics	Asbestos	Metals Sludges	Alcohols	Diesel Oil	Hospital
Pesticides	Ferrous Smelter	POTW Sludge	Ketones	Lubricants	Radiological
Dyes/Inks	Non-Ferrous Smelter	Aluminum	Esters	PCBs	Municipal
Phenols	Metals	Distillation Bottoms	Ethers	Polynuclear Aromatics	Construction
Halogens	Other *specify:*	Other *specify:*	Other *specify:* PCE* - suspect from upgradient source	Other *specify:*	Munitions
Metals	Heavy Metals - unspecified				Other *specify:*
Dioxins					
Other *specify:*					

LL HAZARD EVALUATION: ( ) High ( ) Medium (X) Low ( ) Unknown *(Where tasks have different hazards, evaluate each.)*

JUSTIFICATION:
The contamination is reported isolated to the water table aquifer. High concentrations might be present in groundwater and/or soil during intrusive activities.

EXPLOSION POTENTIAL: ( ) High ( ) Medium (X) Low ( ) Unknown

(X) Incomplete - file review to be conducted prior to site activities

HEALTH AND SAFETY PLAN FORM CDM Health and Safety Program	*This document is for the exclusive use of CDM and its subcontractors*	CAMP DRESSER & McKEE INC. PROJECT DOCUMENT #:

KNOWN CONTAMINANTS	HIGHEST OBSERVED CONCENTRATION	PEL/TLV *ppm or mg/m3 (specify)*	IDLH *ppm or mg/m3 (specify)*	Warning Concentration *(in ppm)*	SYMPTOMS & EFFECTS OF ACUTE EXPOSURE	PHOTO IONIZATION POTENTIAL
Tetrachloroethylene (PCE)	830 ug/L in GW	25 ppm	150 ppm	47 ppm	Irritated eyes, nose, throat, flushed face & neck, dizziness	9.32
1,2 Dichloroethylene	84 ug/L in GW	200 ppm	1,000 ppm	1.1 ppm	Irritated eyes, CNS depression	<11.0
Trichloroethylene	68 ug/L in GW	50 ppm	1,000 ppm	82 ppm	Vertigo, visual disturbance, headache, drowsiness	9.45
Vinyl Chloride	10 ug/L in GW	1 ppm	Carc.	NA	Weakness, stomach pain, cancer	10
2-Butatnone	58 ug/L in GW	200 ppm	3,000 ppm	16 ppm	Irritated eyes, dizziness, vomiting	9.53

Chemicals which detected concentrations at estimated levels are not presented.

NA = Not Available **NE = None Established** **U = Unknown**

Attach, to this plan, an MSDS for each chemical you will use at the site: Isobutylene calibration gas.

S = Soil	SW = Surface Water	T = Tailings	W = Waste	TK = Tanks	SD = Sediment
A = Air	GW = Ground Water	SL = Sludge	D = Drums	L = Lagoons	OFF = Off-Site

HEALTH AND SAFETY PLAN FORM	*This document is for the exclusive*	CAMP DRESSER & McKEE INC.
CDM Health and Safety Program	*use of CDM and its subcontractors*	PROJECT DOCUMENT #:

TASK DESCRIPTION/SPECIFIC TECHNIQUE/SITE LOCATION *(attach additional sheets as necessary)*	Type	Primary	Contingency	HAZARD & SCHEDULE
1) Site survey and geophysical survey	Intrusive Non-intrusive	A B C D Modified	A B C D Exit Area	Hi Med Low Apr-08
2. Soil vapor sampling	Intrusive Non-intrusive	A B C D Modified	A B C D Exit Area	Hi Med Low Nov-08
3. Installation (oversight) and groundwater sampling of monitoring wells	Intrusive Non-intrusive	A B C D Modified	A B C D Exit Area	Hi Med Low April - June 2008
4. Groundwater sampling of new and existing monitoring wells.	Intrusive Non-intrusive	A B C D Modified	A B C D Exit Area	Hi Med Low Jan-09
5. Sub-slab depressurization system installation oversight	Intrusive Non-intrusive	A B C D Modified	A B C D Exit Area	Hi Med Low
	Intrusive Non-intrusive	A B C D Modified	A B C D Exit Area	Hi Med Low

PERSONNEL AND RESPONSIBILITIES

NAME	FIRM/DIVISION	CDM HEALTH CLEARANCE	RESPONSIBILITIES	On Site?
Melissa Koberle	CDM/EMP	B-S	Field Scientist	1-2-3-4-5-6
Shawna Martinelli	CDM/EMP	B-S	H & S Coordinator/Field Manager	1-2-3-4-5-6
Dennis Grove	CDM/EMP	B-S	Field Technician	1-2-3-4-5-6
Edward Kulkusky	CDM/EMP	B-S	Field Technician	1-2-3-4-5-6
Cristina Ramacciotti	CDM/EMP	B-S	Task Manager	1-2-3-4-5-6
David Keil	CDM/EMP	B-S	Project Manager	1-2-3-4-5-6
Chris Marlowe	CDM/EMP	C	H&S Manager	No

Buddy system must be complied with either by client, CDM or contractor serving as buddy.

HEALTH AND SAFETY PLAN FORM *This document is for the exclusive use of CDM and its subcontractors* **CAMP DRESSER & McKEE INC.**

CDM Health and Safety Program **PROJECT DOCUMENT #:**

PROTECTIVE EQUIPMENT: *Specify by task. Indicate type and/or material, as necessary. Group tasks if possible. Use copies of this sheet if needed.*

BLOCK A - Primary

TASKS: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8
LEVEL: A - B - C - D - Modified
(x) Primary ( ) Contingency

Respiratory: **(XX)** Not needed
( ) SCBA, Airline
( ) APR
( ) Cartridge
( ) Escape Mask
( ) Other:

Head and Eye: ( ) Not needed
(x) Safety Glasses:
( ) Face Shield:
( ) Goggles:
(x) Hard Hat:
( ) Other:

Boots: ( ) Not needed
(x) Steel-Toe
( ) Rubber **(X) Leather**
( ) Overboots: Latex (optional)

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit
( ) Splash Suit
( ) Apron
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Cloth Coverall
(XX) Other: **work clothes**
(XX) Other: **traffic safety vest**

Gloves: ( ) Not needed
(XX) Undergloves: **Nitriles**
(X) Gloves: Nitrile for Task 3
( ) Overgloves: Nitrile

Other: specify below
( ) Tick Spray
( ) Flotation Device
(X) Hearing Protection
(X) Sun Screen

BLOCK B-Contingency

TASKS: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
LEVEL: A - B - C - D - Modified
( ) Primary (x) Contingency

Respiratory: ( ) Not needed
( ) SCBA, Airline
( ) APR
( ) Cartridge/Combination
( ) Escape Mask
( ) Other

Head and Eye: ( ) Not needed
( ) Safety Glasses
( ) Face Shield
( ) Goggles
( ) Hard Hat
( ) Other

Boots: ( ) Not needed
( ) Steel-Toe ( ) Steel Shank
( ) Rubber ( ) Leather
( ) Overboots: Latex

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit
( ) Splash Suit
( ) Apron
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Cloth Coverall
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves: PVC
( ) Gloves: Cotton
( ) Overgloves: Nitrile

Other: specify below
( ) Tick Spray
( ) Flotation Device
( ) Heating Protection
( ) Sun Screen

Exit Area

BLOCK C

TASKS: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
LEVEL: A - B - C - D - Modified
(x) Primary ( ) Contingency

Respiratory: ( ) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
( ) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

Boots: ( ) Not needed
( ) Steel-Toe ( ) Steel Shank
( ) Rubber ( ) Leather
( ) Overboots:

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
( ) Gloves:
( ) Overgloves:

Other: specify below
( ) Tick Spray
( ) Flotation Device
( ) Heating Protection
( ) Sun Screen

BLOCK D

TASKS: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
LEVEL: A - B - C - D - Modified
( ) Primary (x) Contingency

Respiratory: ( ) Not needed
( ) SCBA, Airline
( ) APR
( ) Cartridge
( ) Escape Mask
( ) Other:

Head and Eye: ( ) Not needed
( ) Safety Glasses
( ) Face Shield
( ) Goggles
( ) Hard Hat
( ) Other:

Boots: ( ) Not needed
( ) Steel-Toe ( ) Steel Shank
( ) Rubber ( ) Leather
( ) Overboots

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit
( ) Splash Suit
( ) Apron
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Cloth Coverall
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves
( ) Gloves
( ) Overgloves

Other: specify below
( ) Tick Spray
( ) Flotation Device
( ) Heating Protection
( ) Sun Screen

HEALTH AND SAFETY PLAN FORM	This document is for the exclusive	CAMP DRESSER & McKEE INC.
CDM Health and Safety Program	use of CDM and its subcontractors	PROJECT DOCUMENT #:

MONITORING EQUIPMENT: *Specify by task. Indicate type as necessary. Attach additional sheets if needed.*

INSTRUMENT	TASK	ACTION GUIDELINES		COMMENTS *(When and how will you use the monitor?)*
Combustible Gas Indicator	1-2-3-4-5-6-7-8	0-10% LEL 10-25% LEL >25% LEL 21.0% O2 <21.0% O2 <19.5% O2	*No explosion hazard* *Potential explosion hazard; notify SHSC* *Explosion hazard; interrupt task/evacuate* *Oxygen normal* *Oxygen deficient; notify SHSC* *Interrupt task/evacuate*	( ) Not Needed Needed for all drilling activities
Radiation Survey Meter	1-2-3-4-5-6-7-8	3 x Background: >2mR/hr:	*Notify HSM* *Establish REZ*	(X) Not Needed
Photoionization Detector 10.6eV Lamp Type OVM	1-2-3-4-5-6-7-8	*Specify:* 0-2 ppm: Level D 2-20 ppm: Level D. Check for vinyl chloride > 20 ppm Leave area. Call HSM		( ) Not Needed Monitor breathing zone continuously. Compare action levels to time-averaged breathing zone measurements.
Flame Ionization Detector Type	1-2-3-4-5-6-7-8	*Specify:*		(X) Not Needed
Detector Tubes/ Monitox Type: Vinyl Chloride	1-2-3-4-5-6-7-8	*Specify:* 0-0.5 ppm: level D > 0.5 ppm Leave Area. Call HSM		( ) Not Needed
Respirable Dust Monitor Type	1-2-3-4-5-6-7-8	*Specify:* If team observes visible concentrations of airborne dust or dry, windy conditions that dust, team will leave area.		( ) Not Needed
Other *Specify:*	1-2-3-4-5-6-7-8	*Specify:* If team notices unusual odors or irritation of the eye or throat, they will leave the area.		

HEALTH AND SAFETY PLAN FORM CDM Health and Safety Program	*This document is for the exclusive use of CDM and its subcontractors*	CAMP DRESSER & McKEE INC. PROJECT DOCUMENT #:
DECONTAMINATION PROCEDURES		
ATTACH SITE MAP INDICATING EXCLUSION, DECONTAMINATION, AND SUPPORT ZONES AS PAGE TWO		
Personnel Decontamination *Summarize below or attach diagram;* Team members will remove their protective clothing in the following order: 1. Equipment drop. 2. Glove removal 3. Hand and face wash.	**Sampling Equipment Decontamination** *Summarize below or attach diagram;* Sampling equipment will be decontaminated by: 1. Gross mechanical removal of dirt. 2. Alconox/Water wash. 3. Potable water rinse. 4. Distilled water rinse.	**Heavy Equipment Decontamination** *Summarize below or attach diagram;* Drill rigs and/or geoprobes used for hydropunch and soil vapor sampling will be decontaminated by: 1. Gross mechanical removal of dirt. 2. Alconox/Water wash. 3. Potable water rinse. Heavily contaminated equipment will be steam cleaned
Containment and Disposal Method Disposable protective equipment will be disposed of in CDM dumpster, unless heavily contaminated. If heavily contaminated, disposable equipment will be contained in drums and left on site for proper disposal.	**Containment and Disposal Method** Sampling equipment cleaning water solutions will be allowed to drain to the groundwater. If heavily contaminated, disposable equipment will be contained in drums and left on site for proper disposal.	**Containment and Disposal Method** Decontamination fluids will be released to the ground, unless heavily contaminated. If heavily contaminated, contractor will contain the waste in drums, and left on site for proper disposal.

HEALTH AND SAFETY PLAN FORM	*This document is for the exclusive*	CAMP DRESSER & McKEE INC.
CDM Health and Safety Program	*use of CDM and its subcontractors*	**PROJECT DOCUMENT #:**

EMERGENCY CONTACTS	NAME	PHONE
Water Supply		
Site Telephone	Sherri (Boston Market)	718-815-1198
EPA Release Report #:		800-424-8802
CDM 24-Hour Emergency #:		732-539-8128
CHEMTREC Emergency #:		800-424-9300
Underground Utility	UFPO	800-962-7962

CONTINGENCY PLANS: *Summarize below*

If CDM work team observes hazards for which they have not prepared, they will withdraw from the area and call the CDM Project Manager

SHSC will designate evacuation routes. Teams will cease work if they see lightning or thunder storms in the area.

CDM may rely on instruments operated by contractor personnel only upon HSM approval. If contractor directs a higher level of protection than this plan does, CDM personnel will wear that level. CDM personnel may choose to wear more

potection than directed by this plan.

Contractor will be expected to inspect its equipment and certify its suitability for the

project to the CDM site health and safety coordinator.

HEALTH AND SAFETY PLAN APPROVALS

Prepared by Cristina Ramacciotti Date 2/2008

HSM Signature ____________________ Date ________

EMERGENCY CONTACTS	NAME	PHONE
CDM Health and Safety Manager	Chris Marlowe	732-590-4632
CDM Field Manager	Shawna Martinelli	508-942-0448
CDM Site Safety Coordinator	Shawna Martinelli	508-942-0448
Client Contact	Kevin Sarnowicz	518-402-9774
Other: CDM Task Manager	Cristina Ramacciotti	732-421-3513
Environmental Agency	NYSDEC - Kevin Sarnow	518-402-9774
State Spill Number	New York	800-342-9296
Fire Department		911
Police Department		911
State Police		911
Health Department		866-881-2809
Poison Control Center	Nationwide	800-222-1222
Occupational Physician	Jerry Berke	800-350-4511

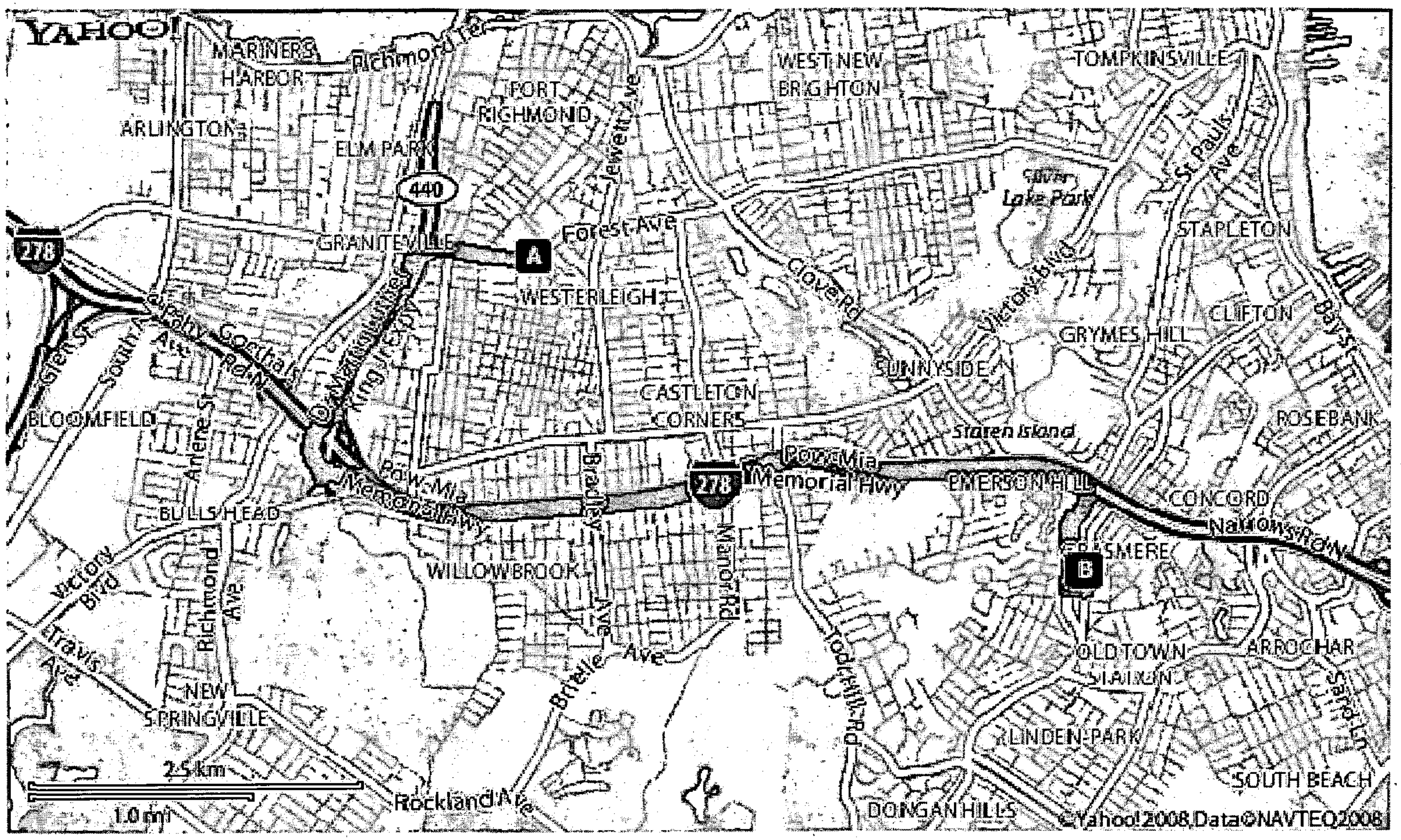
HOSPITAL INFORMATION

Name: **Staten Island University Hospital Concord Site**
Phone: **(718) 390-1400**
Address: **1050 Targee Street, Staten Island, NY 10304**

Route:
1) Start at **1465 FOREST AVE, STATEN ISLAND** going toward **LIVERMORE AVE (0.5 mi)**
2) Turn **LEFT** on **WILLOW RD W** (0.1 mi)
3) Take **LEFT** ramp onto **RT-440 S** toward **STATEN IS EXPWY (I-278)**
4) Take the **GOETHALS BR/VERRAZANO BR** exit onto **I-278 E** toward **#10E/VERRAZANO BR/BROOKLYN** (go 3.2 mi)
5) Take exit **#13/CLOVE RD/RICHMOND RD/HYLAN BLVD** onto **MILFORD DR** (go 0.3 mi)
6) Continue on **CLOVE RD** (go 0.4 mi)
7) Turn **RIGHT** on **RICHMOND RD** (go 0.5 mi)
8) Turn **LEFT** on **VENICE AVE (go 0.1 mi)**
9) Turn **LEFT** on **TARGEE ST** (go 0.1 mi)
10) Arrive at **1050 TARGEE ST, STATEN ISLAND,** on the **LEFT**

Distance: 5.75 Miles

ROUTE TO HOSPITAL MAP:



HEALTH AND SAFETY PLAN SIGNATURE FORM

CDM Health and Safety Program

All site personnel must sign this form indicating receipt of the HASP. Keep this original on site or with the field manager. It becomes part of the permanent project files. Send a copy to the Health and Safety Manager (HSM).

SITE NAME/NUMBER: former Paul Miller Dry Cleaners Site - NYSDEC Site Number 243018

DIVISION/LOCATION: Forest Ave, Port Richmond, Richmond County, New York

CERTIFICATION:

I understand, and agree to comply with, the provisions of the above referenced HASP for work activities on this project. I agree to report any injuries, illnesses or exposure incidents to the site Health and Safety Coordinator (SHSC). I agree to inform the SHSC about any drugs (legal and illegal) that I take within three days of site work.

PRINTED NAME	SIGNATURE	DATE

February 2008

PID ANALYZERS

Instrumentation for Environmental, Process & Industrial Hygiene Monitoring

Isobutylene in Air MSDS

Home

MATERIAL SAFETY DATA SHEET - CALIBRATION CHECK GAS/ISOBUTYLENE IN AIR

PRODUCT NAME: 100 PPM ISOBUTYLENE/AIR (100 PPM ISOBUTYLENE/AIR) MSDS
Version:4 Date: January, 2004

---

1. Chemical Product and Company Identification **PID ANALYZERS, LLC** 25 Walpole Park Drive South Walpole, MA 02081 TELEPHONE NUMBER: (508) 660-5001 **24-HOUR EMERGENCY NUMBER: 1-617-699-4307** FAX NUMBER: (508) 660-5040 E-MAIL: sales@hnu.com

PRODUCT NAME: ISOBUTYLENE (100 PPM – 0.9%) IN AIR
CHEMICAL NAME: Isobutylene in air

COMMON NAMES/ SYNONYMS: Calibration Gas

CLASSIFICATION: 2.2 WHIMIS CLASSIFICTATION: A, D2A, D2B

---

2. COMPOSITION/ INFORMATION ON INGREDIENTS
INGREDIENT %: Isobutylene 0.0001-0.9/Air 99-99.9999
VOLUME:17L
PEL-OSHA: N/A
TLV-ACGIH: N/A
LD50or LC50Route/Species:N/A
FORMULA: C4H8/Air 99.0

---

3. HAZARDS IDENTIFICATIONEMERGENCY OVERVIEW Release of this product may produce oxygen-deficient atmospheres (especially in confined spaces or other poorly ventilated environments); individuals in such atmospheres may be asphyxiated. Isobutylene may cause drowsiness and other central nervous system effects in high concentrations; however, due to the low concentration of this gas mixture, this is unlikely to occur.

ROUTE OF ENTRY:
Skin: No
Contact Skin: No
Absorption: No
Eye Contact: No
Inhalation: Yes
Ingestion:No

HEALTH EFFECTS:
Exposure Limits: Yes

Irritant: No
Sensitization: No
Reproductive Hazard: No
Mutagen: No
Carcinogenicity: No
NTP: No
IARC: No
OSHA: No

EYE EFFECTS: N/A.
SKIN EFFECTS: N/A.

MATERIAL SAFETY DATA SHEET - CALIBRATION CHECK GAS
PRODUCT NAME: ISOBUTYLENE (1 PPM - 0.9%) IN AIR
INGESTION EFFECTS: Ingestion unlikely. Gas at room temperature.
INHALATION EFFECTS: Due to the small size of this cylinder, no unusual health effects from over-exposure are anticipated under normal routine use.

NFPA HAZARD CODES HMIS HAZARD CODES RATING SYSTEM
Health: **1**
Flammability: **0**
Flammability: **0**
Reactivity: **0**

***0= No Hazard, 1= Slight Hazard, 2= Moderate Hazard, 3= Serious Hazard, 4= Severe Hazard**

---

4. FIRST AID MEASURES EYES: N/A

SKIN: N/A

INGESTION: Not required

INHALATION: PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASED OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED THE SELF-CONTAINED BREATHING APPARATUS. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing has stopped administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

---

5. FIRE-FIGHTING MEASURES These containers hold gas under pressure, with no liquid phase. If involved in a major fire, they should be sprayed with water to avoid pressure increases, otherwise pressures will rise and ultimately they may distort or burst to release the contents. The gases will not add significantly to the fire, but containers or fragments may be projected considerable distances - thereby hampering fire fighting efforts.

---

6. ACCIDENTAL RELEASE MEASURES In terms of weight, these containers hold very little contents, such that any accidental release by puncturing etc. will be of no practical concern.

---

7. HANDLING AND STORAGE Suck back of water into the container must be prevented. Do not allow backfeed into the container. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Use only in well-ventilated areas. Do not heat cylinder by any means to increase rate of product from the cylinder. Do not allow the temperature where cylinders are stored to exceed 130oF (54oC).

---

8. EXPOSURE CONTROLS/PERSONAL PROTECTION Use adequate ventilation for extended use of gas.

MATERIAL SAFETY DATA SHEET - CALIBRATION CHECK GAS PRODUCT NAME: ISOBUTYLENE (1 PPM - 0.9%) IN AIR

---

9. PHYSICAL AND CHEMICAL PROPERTIES PARAMETER: VALUE: Physical state : Gas Evaporation point : N/A pH : N/A Odor and appearance : Colorless, odorless gas

---

10. STABILITY AND REACTIVITY Stable under normal conditions. Expected shelf life 24 months.

---

11. TOXICOLOGICAL INFORMATION No toxicological damage caused by this product.

---

12. ECOLOGICAL INFORMATION No ecological damage caused by this product.

---

13. DISPOSAL INFORMATION Do not discharge into any place where its accumulation could be dangerous. Used containers are acceptable for disposal in the normal waste stream as long as the cylinder is empty and valve removed or cylinder wall is punctured.

---

14. TRANSPORT INFORMATION
United States DOT/Canada TDG PROPER SHIPPING NAME:
Compressed Gas N.O.S. Compressed Gas N.O.S. (Isobutylene in Air)
HAZARD CLASS: 2.2
IDENTIFICATION NUMBER: UN1956
SHIPPING LABEL: NONFLAMMABLE GAS

---

15. REGULATORY INFORMATION Isobutylene is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

---

16. OTHER INFORMATION This MSDS has been prepared in accordance with the Chemicals (Hazard Information and Packaging for Supply (Amendment) Regulation 1996. The information is based on the best knowledge of PID Analyzers, LLC , and its advisors and is given in good faith, but we cannot guarantee its accuracy, reliability or completeness and therefore disclaim any liability for loss or damage arising out of use of this data. Since

conditions of use are outside the control of the Company and its advisors we disclaim any liability for loss or damage when the product is used for other purposes than it is intended.
MSDS/S010/248/January, 2004

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PID ANALYZERS

Instrumentation for Environmental, Process & Industrial Hygiene Monitoring

Isobutylene in Air MSDS

Home

MATERIAL SAFETY DATA SHEET - CALIBRATION CHECK GAS/ISOBUTYLENE IN AIR

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Version:4 Date: January, 2004

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1. Chemical Product and Company Identification **PID ANALYZERS, LLC** 25 Walpole Park Drive South Walpole, MA 02081 TELEPHONE NUMBER: (508) 660-5001 **24-HOUR EMERGENCY NUMBER: 1-617-699-4307** FAX NUMBER: (508) 660-5040 E-MAIL: sales@hnu.com

PRODUCT NAME: ISOBUTYLENE (100 PPM – 0.9%) IN AIR
CHEMICAL NAME: Isobutylene in air

COMMON NAMES/ SYNONYMS: Calibration Gas

CLASSIFICATION: 2.2 WHIMIS CLASSIFICTATION: A, D2A, D2B

---

2. COMPOSITION/ INFORMATION ON INGREDIENTS
INGREDIENT %: Isobutylene 0.0001-0.9/Air 99-99.9999
VOLUME:17L
PEL-OSHA: N/A
TLV-ACGIH: N/A
LD50or LC50Route/Species:N/A
FORMULA: C4H8/Air 99.0

---

3. HAZARDS IDENTIFICATIONEMERGENCY OVERVIEW Release of this product may produce oxygen-deficient atmospheres (especially in confined spaces or other poorly ventilated environments); individuals in such atmospheres may be asphyxiated. Isobutylene may cause drowsiness and other central nervous system effects in high concentrations; however, due to the low concentration of this gas mixture, this is unlikely to occur.

ROUTE OF ENTRY:
Skin: No
Contact Skin: No
Absorption: No
Eye Contact: No
Inhalation: Yes
Ingestion:No

HEALTH EFFECTS:
Exposure Limits: Yes

Irritant: No
Sensitization: No
Reproductive Hazard: No
Mutagen: No
Carcinogenicity: No
NTP: No
IARC: No
OSHA: No

EYE EFFECTS: N/A.
SKIN EFFECTS: N/A.

MATERIAL SAFETY DATA SHEET - CALIBRATION CHECK GAS
PRODUCT NAME: ISOBUTYLENE (1 PPM - 0.9%) IN AIR
INGESTION EFFECTS: Ingestion unlikely. Gas at room temperature.
INHALATION EFFECTS: Due to the small size of this cylinder, no unusual health effects from over-exposure are anticipated under normal routine use.

NFPA HAZARD CODES HMIS HAZARD CODES RATING SYSTEM
Health: **1**
Flammability: **0**
Flammability: **0**
Reactivity: **0**

***0= No Hazard, 1= Slight Hazard, 2= Moderate Hazard, 3= Serious Hazard, 4= Severe Hazard**

---

4. FIRST AID MEASURES EYES: N/A

SKIN: N/A

INGESTION: Not required

INHALATION: PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASED OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED THE SELF-CONTAINED BREATHING APPARATUS. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing has stopped administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

---

5. FIRE-FIGHTING MEASURES These containers hold gas under pressure, with no liquid phase. If involved in a major fire, they should be sprayed with water to avoid pressure increases, otherwise pressures will rise and ultimately they may distort or burst to release the contents. The gases will not add significantly to the fire, but containers or fragments may be projected considerable distances - thereby hampering fire fighting efforts.

---

6. ACCIDENTAL RELEASE MEASURES In terms of weight, these containers hold very little contents, such that any accidental release by puncturing etc. will be of no practical concern.

---

7. HANDLING AND STORAGE Suck back of water into the container must be prevented. Do not allow backfeed into the container. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Use only in well-ventilated areas. Do not heat cylinder by any means to increase rate of product from the cylinder. Do not allow the temperature where cylinders are stored to exceed 130oF (54oC).

---

8. EXPOSURE CONTROLS/PERSONAL PROTECTION Use adequate ventilation for extended use of gas.

MATERIAL SAFETY DATA SHEET - CALIBRATION CHECK GAS PRODUCT NAME:
ISOBUTYLENE (1 PPM - 0.9%) IN AIR

---

9. PHYSICAL AND CHEMICAL PROPERTIES PARAMETER: VALUE: Physical state : Gas Evaporation point : N/A pH : N/A Odor and appearance : Colorless, odorless gas

---

10. STABILITY AND REACTIVITY Stable under normal conditions. Expected shelf life 24 months.

---

11. TOXICOLOGICAL INFORMATION No toxicological damage caused by this product.

---

12. ECOLOGICAL INFORMATION No ecological damage caused by this product.

---

13. DISPOSAL INFORMATION Do not discharge into any place where its accumulation could be dangerous. Used containers are acceptable for disposal in the normal waste stream as long as the cylinder is empty and valve removed or cylinder wall is punctured.

---

14. TRANSPORT INFORMATION
United States DOT/Canada TDG PROPER SHIPPING NAME:
Compressed Gas N.O.S. Compressed Gas N.O.S. (Isobutylene in Air)
HAZARD CLASS: 2.2
IDENTIFICATION NUMBER: UN1956
SHIPPING LABEL: NONFLAMMABLE GAS

---

15. REGULATORY INFORMATION Isobutylene is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

---

16. OTHER INFORMATION This MSDS has been prepared in accordance with the Chemicals (Hazard Information and Packaging for Supply (Amendment) Regulation 1996. The information is based on the best knowledge of PID Analyzers, LLC , and its advisors and is given in good faith, but we cannot guarantee its accuracy, reliability or completeness and therefore disclaim any liability for loss or damage arising out of use of this data. Since

conditions of use are outside the control of the Company and its advisors we disclaim any liability for loss or damage when the product is used for other purposes than it is intended.
MSDS/S010/248/January, 2004

Appendix C

Citizen Participation Plan

CITIZENS PARTICIPATION PLAN
FORMER PAUL MILLER DRY CLEANERS
(Site No.: 2-43-018)
Port Richmond, New York

Prepared for

New York State Department of Environmental Conservation
Investigation and Design Engineering Services
Standby Contract No. D004437
Work Assignment No. D004437-23

Prepared by

Camp Dresser & McKee
Raritan Plaza I, Raritan Center
Edison, New Jersey

February 2008

CDM

Contents

Section 1 Introduction

This Citizens Participation Plan (CPP) for the former Paul Miller Dry Cleaners (Paul Miller) (herein referred to as the "Site") located at 1465 Forest Avenue, Port Richmond, Richmond County, New York was prepared by Camp Dresser and McKee Inc. (CDM) for the New York State Department of Environmental Conservation (NYSDEC) under the Engineering Services for Investigation and Design, Standby Contract No. D004437. Background and site information used in the development of this CPP was furnished by NYSDEC. The Site is a former dry cleaning facility which is now operated by Boston Market Restaurants as a fast-food restaurant.

1.1 Purpose and Objectives

The objective of this work assignment (WA) is to determine the extent of tetrachlorotheylene (PCE) contamination in soil and groundwater at the Site as a result of previous discharges to an on-site sump and potentially the ground surface. The major focus of this Work Assignment is to conduct a Remedial Investigation/Feasibility Study to evaluate monitored natural attenuation and to determine the most effective remedial alternatives to address groundwater contamination. Additionally, a soil gas survey will be conducted to assess potential soil vapor migration pathways and appropriate IRM measures and mitigation alternatives. Tasks for this investigation include:

- Conduct file review of site to obtain additional historical operational and environmental investigation/remedial action information;
- Perform a geophysical survey to identify subsurface utilities and attempt to pin-point the locations of former sump(s) on the site. The geophysical survey will also be used to clear the boring locations prior to drilling;
- Install 13 new monitoring wells at the site and in the vicinity of the site to investigate extent of groundwater contamination in overburden materials;
- Conduct groundwater sampling at all existing wells associated with the site;
- Conduct a soil vapor investigation of sub-slab soil and indoor air to assess vapor migration from the PCE plume, through the soils, and into the site and immediately neighboring two buildings.
- Prepare a site survey including general site features, topography, and investigation locations;
- Disposal of investigation derived waste.

1.2 Site Description and Background

1.2.1 Site Description

Located at 1465 Forest Avenue, Port Richmond, NY the former Paul Miller site occupies a 0.4 acre parcel in a commercial area in the Forest Avenue Shopping Center. The former dry cleaner building is currently occupied by Boston Market Corporation and is being used as a restaurant. The site is relatively flat with its surface area covered with concrete and/or asphalt. Review of the USGS Arthur Kill Quadrangle map indicates that ground surface elevations range from approximately 30 to 33 feet above mean sea level. General site conditions can be viewed in the aerial photograph presented as Figure 1-1.

1.2.2 Operational History

No historical operations information for the former Paul Miller Dry Cleaners is available at the time of this writing. .

1.2.3 Remedial History

In 1994, the owner of the Forest Avenue Shopping Center conducted an environmental investigation at the former Paul Miller site. Subsequently, in May 2000, NYSDEC retained Lawler, Matusky & Skelly Engineers LLP (LMS) to conduct an Immediate Investigation Work Assignment (IIWA) of the former Paul Miller site. The objectives of the IIWA were to determine groundwater flow in the vicinity of the site, the identify the nature and extent of groundwater contamination in the vicinity of the site as potentially related to historic site activities, and to assess whether hazardous waste had been disposed of on-site and whether or not it posed a significant threat to public health.

1.2.3.1 Soil Quality

Piezometers were installed and boring logs constructed by LMS. According to their logs, the site is underlain by heterogeneous soils characteristic of the glacial till that covers much of Staten Island. The soils were identified in LMS borings logs as being reddish to brown in color and being comprised of sands and silts to clays with some gravel.

No soil samples were collected for laboratory analysis at the site, therefore no soil quality data exists to date. However, the presence of volatile organics (as detected with a photoionization detector or via olfactory or visual observations) was not noted in any of the three boring logs available from the LMS IIWA report (boring logs P-1 through P-3).

1.2.3.2 Groundwater Quality

During the course of the LMS 2000 IIWA, seven piezometers were installed and sampled. Prior to LMS' IIWA, seven monitoring wells had been installed. No additional information is available for these wells. During the CDM January 7, site visit, all five piezometers and two monitoring wells located on the Boston Market parcel were noted. Two additional monitoring wells were noted to the north of the building in the Forest Avenue Shopping Center.

Groundwater results from the LMS IIWA identified the highest concentrations of chlorinated volatile organic compounds in groundwater immediately adjacent to the east side of the building. The contamination was determined to be migrating vertically downward as evidenced by higher PCE concentrations in the deeper piezometers.

Based on the results of this investigation, LMS recommended that a soil gas survey be conducted in the area to identify the potential impact of PCE contamination to indoor air at the former Paul Miller site, and the adjacent two buildings (Kentucky Fried Chicken restaurant to the east and the Northfield Savings Bank to the west). Additionally, LMS recommended that a deeper well be installed to vertically delineate groundwater contamination in the vicinity of P-3D on the east side of the site building and that continuous soil cores be collected to better characterize the subsurface stratigraphy in the vicinity of the former Paul Miller site.

1.3 Environmental Setting

The site is relatively flat with its surface area covered with concrete and/or asphalt. Review of the USGS Arthur Kill Quadrangle map indicates that ground surface elevations range from approximately 30 to 33 feet above mean sea level.

1.3.1 Geology

The site is located within the Atlantic Coastal Plain Physiographic Province. A history of coastal submergence and emergence spanning the Cretaceous Period, significant differential erosion during the Cenozoic, and glaciation during the Quaternary Period is reflected in the present day geology of Staten Island.

As identified in *The glacial geology of New York City and Vicinity* by Sanders and Merguerian (1994), at the site the Newark Supergroup (approximately 120 feet below ground surface at this location) is unconformably overlain by the Harbor Hill formation, a widespread Quaternary ground moraine deposits comprised of reddish-brown glacial till and outwash. This unconsolidated sequence is representative of the subsurface materials that immediately underlie the site.

1.3.2 Hydrogeology

No groundwater contour map was constructed during the LMS IIWA; difficulty was encountered in determining groundwater flow. Initial CDM review of LMS boring logs revealed that the subsurface materials at the site consist of the unsorted sands, silts, clays, gravel and boulders that are characteristic of the Harbor Hill formation. The deposit in the area of the site is approximately 100 to 150 feet thick. Groundwater in these deposits occurs under water-table or confined conditions depending on the nature of the subsurface at any given location. Based on review of USGS Report 87-4048, *Geologic and Geohydrologic Reconnaissance of Staten Island, New York,* the general flow of groundwater in the unconsolidated glacial till is to the northwest-north towards Kill van Kull, locally, and according to discussions with NYSDEC, groundwater flow may be in a northerly direction. From the LMS investigation groundwater (or potentially perched water-bearing intervals) is expected to be encountered at depths between four and nine feet below grade. Planned work for this investigation is expected to yield more specific information on groundwater flow direction.

The consolidated rock units of the Newark Supergroup and the overlying unconsolidated deposits are hydraulically connected, and groundwater flows both vertically and horizontally within. However, the majority of the groundwater flows occurs within the glacial unconsolidated deposits due to it greater hydraulic conductivities.

Section 2 Scope of Work

2.1 Task 1A - Work Plan Development

This Work Plan references procedures detailed in the CDM Generic Quality Assurance Project Plan (QAPP) revised July 2007 which has been provided to NYSDEC for Contract Number D-004437. The Generic QAPP presents methods that will be used to collect field data including project samples, and focuses on the analytical methods and quality assurance/quality control (QA/QC) procedures that will be used to analyze project samples, ensure the data are of known and acceptable quality, and manage the resultant data. Procedures that are not contained in the current version of the CDM Generic QAPP are provided in Appendix A of this Work Plan.

This Work Plan also includes a site specific Health and Safety Plan (HASP) presented in Appendix B and a Citizen Participation Plan (CPP) presented in Appendix C. The HASP describes the site health and safety for the field activities that will be performed and includes a community air monitoring plan (CAMP). The CPP provides the primary contacts for the site as well as various public entities and provides ways for citizens to be involved in the project.

2.2 Task 1B - Records Search

A records search will be conducted to meet the requirements of NYSDEC's *Draft DER-10 Technical Guidance for Site Investigation and Remediation* dated December 2002. Information collected during the records/background search will be summarized in a Record Search Report and utilized to gain insight into previous operational activities any subsequent remedial activities conducted at the site. The Record Search Report will be provided to NYSDEC as a stand alone document, submitted soon after submittal of the Draft Work Plan.

2.2 Task 2 - Remedial Investigation

The scope of work for the Remedial Investigation phase of this Work Assignment is described below. The reader is advised that this Work Plan is a flexible and evolving document. Scope changes may be necessary based upon field conditions, observations, weather and a myriad of factors. Any changes to the approved scope of work will be communicated to the NYSDEC on-site representative for approval prior to implementation. Cost impacts will also be identified at the time approved scope changes are implemented. The planned scope of work is presented below.

All work will be conducted in accordance with the "*Draft DER-10, Technical Guidance for Site Investigation and Remediation dated 12/25/02*" or the most current version of the document when available.

2.2.1 Utility Mark-out and Geophysical Survey

Prior to outdoor intrusive work, a private utility locating firm will be subcontracted to mark out subsurface structures and utilities at the proposed locations. Their work will be conducted in addition to the general utility markout (One-Call) to limit the potential for encountering subsurface utilities and structures during the intrusive work.

CDM will oversee and supervise the performance of a geophysical survey which is expected to cover an area of 30 feet by 100 feet along the eastern side of the present structure (Boston Market). Specifically, proposed monitoring well and soil boring locations will be geophysically surveyed for the presence of underground utilities, tanks, dry wells, and/or obstacles. Additionally, the area to the east of the former Paul Miller site building will be surveyed via geophysical techniques to help confirm the presence of a reported former sump. It is anticipated that ground-penetrating radar (GPR) will be used in this survey and that the perimeter of the facility will be surveyed.

2.2.2 Groundwater Monitoring Well Installation

Based on the findings of the LMS IIWA, chlorinated solvent contamination consisting predominantly of tetrachloroethylene (PCE), trichloroethylene (TCE), 1,2-dichloroethene (1,2-DCE), and vinyl chloride (VC) was identified at concentrations exceeding the New York Ambient Groundwater Quality Standards of 5 µg/L for PCE, TCE, and 1,2-DCE and 2 µg/L for VC. The greatest concentrations of these contaminants were identified adjacent to the middle of the east side of the site building at the location of P-3S and P-3D. Concentrations exhibit a decreasing trend outward from this location and decrease even more rapidly to the north and south.

Review of available data indicates that chlorinated volatile organic contamination is greatest immediately to the east of the site building, at an approximate depth of 20 feet below ground surface. It is reported that this is the location of a former sump, to which spent dry cleaning chemicals were discharged during historic dry cleaning activities. It should be noted that five currently operating dry cleaning facilities are located within a mile to the northeast of the site. One site in particular, the former Charlton Cleaners located at 24 Barrett Avenue (currently a Michaels Store), has a known groundwater problem caused by historic Charlton Cleaners dry cleaning operations. In part, data gathered during this RI will be used to assess the potential impact of off-site contaminant sources on the site and/or the potential that the groundwater contamination plume associated with the site is co-mingling with groundwater contamination plumes from off-site sources.

For the purpose of this RI, installation of 13 monitoring wells is proposed: four monitoring well clusters (MW-9S/D, MW-10S/D, MW-11S/D, and MW-13S/D), four additional shallow monitoring wells (MW-8S, MW-12S, MW-15S, and MW-16S), and one additional deep monitoring well (MW-14D). Shallow monitoring wells will be installed to an approximate depth of 35 and deep monitoring wells to an approximate depth of 70 feet below ground surface. In each case the well will be screened across the interval demonstrating the greatest amount of contamination as evidenced by elevated photoionization readings, visual or olfactory cues, hydrophobic dye and/or ultraviolet light. Monitoring wells will not be screened across potential confining units. CDM proposes to install the wells as follows:

- **MW-8S**: Shallow well to the west of the site, in westernmost portion of large driveway between site building and Northfield Savings Bank building, west of LMS P-1 to delineate the extent of groundwater contamination in the shallow portion of the unconsolidated unit in this direction and to assess groundwater flow direction. Access agreement will need to be obtained from property owner.

- **MW-9S/9D**: Shallow and deep cluster north of existing MW-2, in parking lot of Forest Avenue Shopping Center to delineate the extent of groundwater contamination in both the shallow and deeper portion of the unconsolidated unit in this direction and to assess groundwater flow direction. Access agreement will need to be obtained from property owner.

- **MW-10S/10D:** Shallow and deep cluster northeast of existing MW-4, in parking lot of Forest Avenue Shopping Center to delineate the extent of groundwater contamination in both the shallow and deeper portion of the unconsolidated unit in this direction and to assess groundwater flow direction. Access agreement will need to be obtained from property owner.

- **MW-11S/11D**: Shallow and deep cluster northeast of LMS P-2 and site building's basement, in parking lot to delineate the extent of groundwater contamination in the shallow portion of the unconsolidated unit in this direction and to assess groundwater flow direction. This location is located approximately half-way between the site building to the former Charlton Cleaners building (Michaels Store) and is on the Kentucky Fried Chicken property. Access agreement will need to be obtained from property owner.

- **MW-12S**: Shallow well that is deeper than existing LMS P-2, to the east of the suspected sump on the east side of the site building. This location will be installed to determine extent of potential groundwater contamination due to suspected historic discharges to sump or similar feature. Well will additionally detail conditions between site building and MW-11 and MW-13 clusters to the northeast and approximate east, respectively.

- **MW-13S/13D**: Shallow and deep cluster to north-northeast of LMS P-4D and P-4S on Kentucky Fried Chicken property parking lot to delineate the extent of groundwater contamination in the shallow and deep portions of the unconsolidated unit in this direction and to assess groundwater flow direction. Access agreement will need to be obtained from property owner.

- **MW-14D**: Deep well immediately east of site building, in vicinity of LMS P-3S and P-3D/location of historically highest concentrations of chlorinated VOCs in groundwater. Install to delineate the vertical extent of groundwater contamination in the unconsolidated unit at the site and to assess groundwater flow direction.

- **MW-15S:** East of proposed monitoring well cluster MW-14D and on Kentucky Fried Chicken property. Install to delineate extent of groundwater contamination in the shallow portion of the unconsolidated unit in this direction and to assess groundwater flow direction. Access agreement will need to be obtained from property owner.

- **MW-16S**: South of building and slightly southeast of existing MW-1, adjacent to sidewalk along Forest Avenue to delineate the extent of groundwater contamination in both the shallow and deeper portion of the unconsolidated unit in this direction, to assess groundwater flow direction, and to determine upgradient groundwater conditions.

The proposed well locations are shown on Figure 2-1. The final well locations will be determined in consultation with the NYSDEC Project Manager. The drilling logs for the new off-site wells will be evaluated along with existing well logs to determine if there are preferential layers of groundwater migration. Field documentation, well installation, decontamination, and IDW sampling procedures are provided in the Generic QAPP.

All new monitoring wells will be drilled via 4 ¼-inch hollow stem augering techniques, and split-spoon soil samples will be collected. The monitoring wells will be constructed of 2-inch diameter Schedule 40 PVC flush-joint blank riser pipe with ten feet of 2-inch diameter Schedule 40 0.01-inch flush-joint machine-slot screens. Monitoring well sand filter medium will consist of #0 Quartz-silica sand and will be installed to a depth of 2 feet above the top of the screen. A bentonite pellet seal will be installed to a depth of 2 feet above the top of the sand filter pack. The remaining annular space will be grouted to grade via tremie pipe method with Cement/Bentonite Grout.

All wells will be completed as flushmount and provided with a locking compression cap or locking cover, drain hole, and concrete apron. Upon completion of monitoring well installation, wells will be allowed to rest for a period of 24 hours before being developed, to allow the grout to set. Well development will be accomplished by a combination of surging (with appropriate surge blocks) and purging or air lifting techniques so as to thoroughly cleanse the well screen. Wells will be developed until purged water runs visibly clear and free of fines and debris and surging no longer produces substantial turbidity.

2.2.3 Subsurface Soil Collection

Continuous split spoon samples will be collected at all shallow wells. Split spoon sampling at the deep wells will commence at the depth interval at which split spoon sampling terminated at the respectively paired shallow wells. All split-spoon soil samples will be field screened for the presence of contamination via visual and olfactory indicators, a photoionization detector (PID), and hydrophobic dye and/or ultraviolet light where PID readings are elevated (above background concentrations).

Should evidence of contamination be identified in the soil cores, a soil sample will be collected. The sample exhibiting the highest level of contamination will be sent to the laboratory for analysis. Only one sample per borehole is expected to be sent for analysis.

In general, soil samples will be sent to an off-site laboratory to be analyzed for VOC by EPA Method 8260B and SVOC by EPA Method 8270C. Additionally, three of the soils samples collected during this investigation will be analyzed for the Full List TCL/TAL+30. Results will be compared to the *TAGM 4046 Recommended Soil Cleanup Objectives*. All samples will be analyzed by an ELAP certified laboratory. A NYSDEC ASP Category B data deliverable will be provided for these analyses. Table 2-1 presents a summary of the analytical program for the site.

2.2.4 Groundwater Sample Collection

Groundwater samples will be collected from all of the existing wells (MW-1 through MW-7 and P-1 through P-5, provided that the wells are accessible and structurally sound) and all proposed wells (MW-8S through MW-15) following completion of monitoring well installation activities. This is a total of up to 27 groundwater sampling locations. Prior to sampling, depth-to-water and product thickness measurements will be collected from all wells using an oil-water interface probe. Purging will be accomplished via low-flow methods. Final determination of well purging and sampling protocols will be developed in consultation with NYSDEC. During purging, pH, temperature, conductivity, oxidation-reduction potential (ORP), dissolved oxygen, and turbidity will be measured. Groundwater samples will be collected from each of these wells using a disposable bailer or alternate apparatus/methodology approved by NYSDEC.

Groundwater samples and QA/QC samples will be collected in accordance with the procedures outlined in the Generic QAPP. Purge water will be containerized and staged in a secure location on-site until waste characterization can be completed. IDW sampling procedures are detailed in the Generic QAPP.

In general, groundwater samples will be sent to an off-site laboratory to be analyzed for VOC by EPA Method 8260B and SVOC by EPA Method 8270C. Three (3) of the groundwater samples collected during this investigation will be analyzed for the Full List TCL/TAL+30. Table 2-1 summarizes analytical program for the site. Groundwater sample results will be compared to the New York Ambient Groundwater Quality Standards. All groundwater samples will be analyzed by an ELAP certified laboratory. A NYSDEC ASP Category B data deliverable will be provided for these analyses.

2.2.5 Soil Vapor and Indoor Air Sample Collection

Sub-slab soil vapor and indoor air sampling will be conducted at up to three (3) structures along Forest Avenue, to determine the extent of VOC contaminated soil vapor in the vicinity of the site. The proposed locations are identified on Figure 2-2. These samples will be collected in accordance with the NYSDOH "*Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006*" and the NYSDEC "*Draft Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, dated December 2002*". This task will include:

- Collect one sub-slab soil vapor sample at each structure,
- Collect an indoor air sample at the basement level (if present) of each structure, and
- Collect one outdoor ambient air sample at each structure; where two structures are located within close proximity to each other, one ambient air sample will be collected to represent both locations.

2.2.5.1 Sub-Slab Soil Vapor Sample Collection

At each structure, sub-slab soil vapor samples will be collected from the basement level (if present) or first floor of the building and from any sumps identified during RI activities. A duplicate sub-slab soil vapor sample will also be collected at one of the three structures along Forest Avenue. Sample port installation and vapor sample collection will be conducted in accordance with the NYSDOH "*Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006*" and the NYSDEC "*Draft Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, dated December 2002*".

The sub-slab sample locations will be installed as permanent points to facilitate future sampling events. After the slab has been inspected, the location of any subsurface utilities determined, and the ambient air surrounding the proposed sampling location screened with a PID, a hammer drill will be used to advance a boring to a depth of approximately two inches beneath the building slab. A permanent port constructed of stainless steel tubing and fittings will be installed in the opening. The annular space between the borehole and the sample tubing will be filled and sealed with anchoring cement. Teflon tubing will be connected to the stainless steel sample port and utilized for sample collection. Flow rates for both purging and sample collection must not exceed 0.2 liters per minute to minimize ambient air infiltration during sampling. Approximately three dead air volumes of gas will be purged from the subsurface probe and captured in a Tedlar™ bag using a syringe. PID readings will be observed from this sample and the highest reading shall be recorded on the appropriate field form. A three-way valve will be utilized to allow purging of all the lines. The end of the tubing will be connected directly to the summa canister's regulator intake valve. The sample shall be collected with a laboratory-certified summa canister with dedicated regulator set for 24-hour sample collection. Field documentation and sampling procedures are provided in the QAPP.

2.2.5.2 Indoor Air Sample Collection

Indoor air samples will be collected on the basement level (if present) of the building of the three (3) structures. Indoor air samples will be co-located with any respective sub-slab sample(s). A duplicate indoor air sample will also be collected at one of the locations. The New York State Department of Health *Indoor Air Quality Questionnaire and Building Inventory* shall be completed for each structure where indoor air testing is being conducted. Field documentation and sampling procedures are provided in the QAPP. A copy of the NYSDOH questionnaire is also provided as Attachment 1 to the QAPP.

All indoor air samples will be collected with a laboratory-certified summa canister regulated for a 24-hour sample collection. The summa canister will be placed in such a location as to collect a representative sample from the breathing zone at three feet above the floor.

2.2.5.3 Outdoor (Ambient) Air Sample Collection

An outdoor ambient air sample will be collected when indoor air sampling is being conducted. Where two structures are located within close proximity to each other, one ambient air sample will be collected from between the two structures to represent both locations. All outdoor air samples will be collected with a laboratory-certified summa canister regulated for a 24-hour sample collection. The summa canister will be placed upwind of the structures in such a location as to collect a representative sample from the breathing zone at four or six feet above the ground. Field documentation and sampling procedures are provided in the Generic QAPP.

The sub-slab soil vapor and indoor and outdoor air samples will be sent to an off-site laboratory for VOC analysis via EPA Method TO-15. All samples will be analyzed by an ELAP certified laboratory. A NYSDEC ASP Category B data deliverable will be provided for these analyses. Table 2-1 presents a summary of the analytical program for the site.

2.2.6 Investigative Derived Waste

Soil cuttings will be used as backfill to the extent possible; however, soil cuttings generated during monitoring well installation and soils demonstrating evidence of contamination will be containerized in 55-gallon drums, labeled as investigative derived waste (IDW), and staged on pallets at an appropriate location approved by the property owner and NYSDEC. Monitoring well development and purge water will be containerized in closed-top 55-gallon drums and staged in the same location as drums containing soil cuttings..

IDW will be sampled for TCLP and RCRA characteristics as per the procedures outlined in the Generic QAPP. Samples will be sent to an off-site laboratory to be analyzed for Full TCLP and RCRA Characteristics to determine appropriate disposal methods. IDW samples will be collected at a rate of one sample per location for soils and two cumulative samples for groundwater/purge water.

Investigation derived waste to be staged on-site will be arranged to be picked up within approximately one week of receiving the expedited results from the first week's worth of IDW. Subsequent pick ups will occur on a weekly basis thereafter.

2.2.7 Decontamination Procedures

All non-dedicated equipment and tools used to collect samples for chemical analysis will be decontaminated prior to and between each sample interval using an Alconox rinse and potable water rinse prior to reuse. Additional cleaning of the equipment with steam may be needed under some circumstances. Decontamination fluids will be discharged to the ground surface unless a visible sheen or odor is detected either on the equipment or the fluids, at which point the decontamination water will be staged in an appropriate container and disposed of appropriately.

2.3 Task 3A - Field Documentation and Reporting

2.3.1 Field Documentation Procedures

Field notebooks will be used during all on-site work. A dedicated field notebook will be maintained by the field technician overseeing the site activities. In addition to the notebook, any and all original sampling forms, and purge forms used during the field activities, will be submitted to the NYSDEC as part of the final report. Field and sampling procedures, including installation of the sample boreholes, existing monitoring wells, etc., will be photo-documented.

2.3.2 Sample Identification

Each sample collected will be designated by an alphanumeric code that will identify the type of sampling location, matrix sampled, and the specific sample designation (identifier). Site specific procedures are described in the QAPP (Appendix A).

2.3.3 Sample Location

The newly installed monitoring wells will be surveyed by a subcontracted New York State licensed surveyor to identify the location (NAD83, New York State Plane 3102 coordinate system) and elevation (NAVD68 vertical datum) of the wells. Subsequently, these data will be used to create the site maps. Additional costs are reflected to include survey of existing monitoring wells and topographic survey of site building and surrounding properties.

2.3.4 Reporting

A total of four copies of a draft report will be submitted that documents the work conducted and presents the results of the sample analysis for review and comment by NYSDEC and NYSDOH. Upon receipt of the comments, CDM will revise the draft report and print the four final copies and submit to NYSDEC. One copy of the final report; text, tables, maps, photos, etc., will be submitted as a single pdf file. All electronic files will be submitted to NYSDEC on a compact disc. The site investigation data will be submitted in the most recent version of the NYSDEC Electronic Data

Deliverable (EDD) with the final report submission. Currently this is the USEPA Region 2 EDD dated December 2003.

2.3.5 Laboratory Analysis and Validation

All sub-slab soil vapor and indoor air samples will be analyzed by a NYSDOH approved ELAP certified laboratory. Air samples will be analyzed for VOC using EPA Method TO-15. The analysis for air samples will achieve detection limits of 1 $\mu g/m^3$ for each compound. For specific parameters identified by the NYSDOH, where the selected parameters may have a higher detection limit (e.g., acetone), and the higher detection limits will be designated by the NYSDOH.

Groundwater and soil samples will be sent to an off-site laboratory to be analyzed for VOC by EPA Method SOM01.2-Trace and SVOC by EPA Method OLM04.3. Three (3) of these groundwater and soil samples collected will be analyzed for the Full List CLP-TCL/TAL+30, which includes VOC by EPA Method SOM01.2-Trace, SVOC and Pesticides/PCBs by EPA Method OLM04.3, Inorganics (metals), Mercury or Total Cyanide by EPA Method ILM04.2. The analysis for groundwater samples will achieve the detection limits discussed in the QAPP (Appendix A). A NYSDEC ASP Category B data deliverable will be provided for these analyses (Table 2-1).

All samples collected will be validated in accordance with NYSDEC Data Usability Summary Report (DUSR) guidance by a party that is independent of the laboratory which performed the analyses and CDM. A usability analysis will be conducted by a qualified data validator and a DUSR will be submitted to the NYSDEC.

2.4 Task 3B -Feasibility Study

Following the implementation of the RI, CDM will evaluate the need for IRM and conduct a feasibility study (FS) to evaluate remedial action alternatives using the data collected during the RI. Should a sub-slab depressurization system be deemed the most appropriate measure to address soil vapor mitigation at the site and/or the neighboring two buildings investigated during the RI, the system will be installed as an IRM in accordance with the Radon Mitigation Standards (EPA 402-R-93-078, or the most current version) and NYSDOH SVI guidance document.

The objective of the FS will be to evaluate the most appropriate remedial alternative to address site soil and/or groundwater contamination so as to eliminate or mitigate threats to public health and the environment as a result of former site activities. Such remedial alternatives to be evaluated will include but will not be limited to full-monitored natural attenuation including groundwater sampling events and soil vapor extraction and/or groundwater recovery system installation.

In accordance with DER-10, Remedial Action Objectives (RAOs) will be developed based on contaminant-specific SCGs. Once established, up to four remedial actions will be identified and evaluated based on the following eight criteria set forth in Section 4.1 of DER-10:

1. Overall Protection of Public Health and the Environment. This criterion is an evaluation of the remedy's ability to protect public health and the environment, assessing how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, engineering controls or institutional controls. The remedy's ability to achieve each of the RAOs is evaluated. [see 6 NYCRR § 375- 1.10(c)(2)]

2. Compliance with Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance. All SCGs for the site will be listed along with a discussion of whether or not the remedy will achieve compliance. For those SCGs that will not be met, provide a discussion and evaluation of the impacts of each, and hether waivers are necessary. [see 6 NYCRR § 375-1.10(c)(1)] DRAFT DER-10 Technical Guidance for Site Investigation and Remediation December 2002 Page 69 of 103

3. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated:

4. Reduction of Toxicity, Mobility or Volume with Treatment. The remedy's ability to reduce the toxicity, mobility or volume of site contamination is evaluated. Preference should be given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the site. [see 6 NYCRR § 375- 1.10(c)(5)]

5. Short-term Effectiveness. The potential short-term adverse impacts and risks of the remedy upon the community, the workers, and the environment during the construction and/or implementation are evaluated. A discussion of how the identified adverse impacts and health risks to the community or workers at the site will be controlled, and the effectiveness of the controls, should be presented. Provide a discussion of engineering controls that will be used to mitigate short term impacts (i.e. dust control measures). The length of time needed to achieve the remedial objectives is also estimated. [see 6 NYCRR § 375-1.10(c)(3)]

6. Implementability. The technical and administrative feasibility of implementing the remedy is evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc. [see 6 NYCRR § 375-1.10(c)(6)]

7. Cost. Capital, operation, maintenance and monitoring costs are estimated for the remedy and presented on a present worth basis. [see 6 NYCRR § 375-1.10(c)(6)]

8. Community Acceptance. Provide a summary of the public participation program that was followed for the project, see section 1.10 for requirements. The public's

comments, concerns and overall perception of the remedy are evaluated in a format that responds to all questions that are raised (i.e. responsiveness summary). [see 6 NYCRR § 375-1.10(c)(7)] technical feasibility, cost, overall protection of human health and the environment, and duration.

The combined RI/FS report will detail the findings and results of the RI in accordance with DER-10, discuss the need for and scope of any additional investigation activities recommended, and discuss the conceptual plan for the recommended remedial strategies and/or systems identified during the FS in sufficient detail so as to facilitate procession to the development of a Record of Decision (ROD).

Section 3
Project Schedule

The following tabulation provides the proposed project schedule and key milestones for this work assignment. As currently planned, field work will be initiated within two weeks of written receipt of final work plan approval. The duration of initial field activities (geophysical survey, monitoring well installation, completion and development, and groundwater sampling) for the Remedial Investigation activities is estimated to be eight weeks assuming no delays are experienced due to inclement weather, site access problems, or for other unforeseen reason. Annual sub-slab and indoor air sampling is estimated to take five days.

The scheduled submittal dates for deliverables are based on standard laboratory turnaround times of four weeks, and turnaround for data validation of three weeks.

Project Milestone	Date
Issue Work Assignment (WA)	December 13, 2007
Work Assignment Acceptance	January 7, 2008
Submit Task 1 Draft Work Plan, HASP, CPP	February 29, 2008
DEC/DOH Comment on Draft Work Plan and Draft Records Search Reports	March 21, 2008
Submit Task 1 (Final Work Plan) Deliverables	April 4, 2008
Notice to Proceed (NTP)	April 11, 2008
Commence Task 2 Field Work	April 28, 2008
Task 2 Field Work Completed	November 30, 2008
Task 3 and Task 4 Submit Draft Report and Final Feasibility Study	January 31, 2009
Approve Draft Report	35 Days after Draft Report Submitted
Task 3 and Task 4 Submit Final Report and Final Feasibility Study	45 Days after Approval of Draft Report

Section 4
Contacts

4.1 Key Project Contacts

It is the expressed intent of NYSDEC and the Town of Jericho, NY to provide information to the public in a timely, complete, and accurate manner. Towards this end, the State has compiled a list of individuals to whom the public can address specific requests for information. These contacts are both local and state public officials and are knowledgeable of the proposed investigative activities. This list of contacts is provided below:

Environmental Concerns

Kevin Sarnowicz
Environmental Engineer
Project Manager
Division of Environmental Remediation
625 Broadway, 11th Floor
Albany, NY 12233-7016
(518) 402-9774

Health Related Concerns

Bridget Callaghan
NYSDOH Bureau of Environmental Exposure Investigation
Room 300, Flanigan Square
547 River St.
Troy, NY 12180-2216
(518) 402-7880

Citizen Participation

William Fonda
NYSDEC Division of Environmental Remediation
Region 1 Office
Loop Road, Building 40
Stony Brook, NY 11790-2356
(631) 444-0350

4.2 Repository

Four document repositories have been established to provide the public with convenient access to important project documents and other information. A copy of the documents relevant to the Remedial Investigation and Feasibility Study, including the Work Plan, will be placed in the repositories to allow interested citizens and groups to review these documents.

All documents pertaining to this site will be available for public review at the following repository locations:

1) *NYSDEC Division of Environmental Remediation*
625 Broadway
Albany, NY 12233-7016
Mon-Fri 9:00 am - 4:00 pm
By appointment only
(518) 402-9774 - Kevin Sarnowicz

2) *New York Public Library, Port Richmond Branch*
75 Bennett Street
Staten Island, NY 10302
Mon & Wed 10:00 am - 6:00 pm
Tues & Thurs 10:00 am - 8:00 pm
Fri & Sate 10:00am - 5:00 pm
(718) 442-0158

3) *Staten Island City Clerk's Office*
Town Hall
10 Richmond Terrace
Staten Island, NY 10301
Mon-Fri 8:30 am - 4:00 pm
(718) 816-2290

Section 5
Citizen Participation Activities
5.1 Fact Sheet and Mailing List

A Fact Sheet detailing the availability of the Site Characterization Work Plan will be sent out to the residents and other interested parties on the mailing list. This mailing will include information about the document repositories, the name and address of NYSDEC Citizen Participation Specialist, NYSDEC Project Manager and NYS Department of Health contact. Parties who express interest in being placed on or removed from the mailing list will be added or removed as requested.

The Fact Sheet will also serve as an invitation for the public to provide input on the Work Plan or other project related documents via written or oral comments. Additional activities, such as a public meeting and/or Fact Sheet after the site investigation is completed will be added as appropriate.

Schedule 2.11(a)

Summary of Work Assignment Price

Work Assignment Number ***D004437-23***

1) Direct Salary Costs (Schedules 2.10(a) and 2.11(b))	$42,177
2) Indirect Costs (Schedule 2.10(g))	$70,815
3) Direct Non-Salary Costs (Schedules 2.10(b)(c)(d) and 2.11(c)(d))	$12,727

4) Subcontract Costs

Cost-Plus-Fixed-Fee Subcontracts (Schedule 2.10(e) and 2.11(e))

	Name of Subcontractor	Services To Be Performed	Subcontract Price
i)	Ken Schider Consulting	W/MBE Reporting	$600
ii)	YEC, Inc	MBE Surveying & Field Support	$11,704
iii)			

A) Total Cost-Plus-Fixed-Fee Subcontracts $12,304

Unit Price Subcontracts (Schedule 2.10 (f) and 2.11 (f))

	Name of Subcontractor	Services To Be Performed	Subcontract Price
i)	EDR	City Directories	$495
ii)	Aztech Technologies, Inc.	WBE Well Driller	$50,624
iv)	ChemTech	MBE Laboratory	$29,565
v)	Nancy Potak	WBE Data Validator	$3,028
vi)	Naeva Geophysics	Geophysical Survey	$1,945
vii)	SeaCoast Environmental Services	IDW Removal	$15,750

B) Total Unit Price Subcontracts $101,407

5) Subcontract Management Fee $4,948.37

6) Total Subcontract Costs (lines 4A + 4B + 5)	$118,659
7) Fixed Fee (Schedule 2.10(h))	$7,909
8) Total Work Assignment Price (Lines 1 + 2 + 3 + 6 + 7)	$252,288

Engineer/Contract #	D004437-23
Project Name	former Paul Miller Dry Cle:
Work Assignment No.	D004437-23

Date Prepared: 3/11/2008

Schedule 2.11(b)
Direct Labor Hours Budgeted

Labor Classification	*IX*		*VIII*		*VII*		*VI*		*V*		*IV*		*III*		*II*		*I*		*Admin Support*		*Total No. of Direct Labor Hours and Costs Budgeted*	
*Av. Salary Rate ($) Year 2008	$65.24		$59.42		$52.09		$45.95		$38.75		$32.86		$28.62		$25.52		$21.12		$21.12		0	
Description	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost
Task 1 Work Plan Development	2	$130.48	20	$1,188.40	0	$0.00	0	$0.00	0	$0.00	100	$3,286.00	0	$0.00	0	$0.00	0	$0	8	$168.96	130	$4,773.84
Task 2 Site Characterization	2	$130.48	24	$1,426.08	2	$104.18	8	$367.60	0	$0.00	120	$3,943.20	80	$2,289.60	80	$2,041.60	280	$5,914	8	$168.96	604	$16,385.30
Task 3 Field Documentation and Reporting and Feasibility Study	4	$260.96	120	$7,130.40	100	$5,209.00	90	$4,135.50	0	$0.00	80	$2,628.80	20	$572.40	20	$510.40	20	$422	7	$147.84	461	$21,017.70
Total Hours	8		164		102		98		0		300		100		100		300		23		1195	
Total Direct Labor Cost ($) **Year 2008**		$521.92		$9,744.88		$5,313.18		$4,503.10		$0.00		$9,858.00		$2,862.00		$2,552.00		$6,336.00		$485.76		$42,176.84

* For multiple years use one average salary rate row for each year and each years subtotal Labor Cost.

Engineer/Contract # D004437
Project Name Former Paul Miller Dry Cleaners
Work Assignment No. D004437-23

Date Prepared: 3/11/2008

Schedule 2.11(b-1)
Direct Administrative Labor Hours Budgeted

Labor Classification	*IX*	*VIII*	*VII*	*VI*	*V*	*IV*	*III*	*II*	*I*	*Admin. Support*	*Total No. of Direct Labor Hrs.*
Task 1 Work Plan Development	2	2	2	2	0	0	0	0	0	8	16
Task 2 Site Characterization	2	0	0	0	0	0	0	0	0	8	10
Task 3 Field Documentation and Reporting	4	0	1	0	0	0	0	0	0	7	12
TOTAL HOURS	8	2	3	2	0	0	0	0	0	23	38

Contract/Project administrative hours would include (subject to contract allowability) but not necessarily be limited to the following activities:

1) Work Plan Budget Development
 > Conflict of Interest Check
 > Budget schedules & supporting documentation
2) Review work assignment (WA) progress
 > Conduct progress reviews
 > Prepare monthly project report
 > Update WA progress schedule
 > Prepare M/WBE Utilization Report
3) Contractor Application for Payment (CAP)
 > Oversee and prepare monthly CAP

4) Program Management
 > Prepare monthly cost control report
 > Cost control reviews
<> Staffing Plans
 >Manage subcontracts
 > NSPE list update
 > Equipment inventory
5) Miscellaneous
 > Conduct Health and Safety Reviews
 > Word processing and graphic artists
 > Report editing

Contract/Project Administration hours would **not** inclu
1) QA/QC reviews
2) Techincal oversight by management
3) Develop subcontracts
4) Work plan development
5) Review of deliverables

Schedule 2.11 (c)

Direct Non-Salary Costs
Work Assignment Number D004437-23

	Item	Max. Reimbursement * Rate (Specify Unit)	Est. No. of Units	Total Estimated Cost
A)	Other			
1)	Shipping Task 1	LS	1	$25.00
2)	Outside Printing Task 1	LS	1	$250.00
3)	Shipping Task 3	LS	1	$50.00
4)	Outside Printing Task 3	LS	1	$400.00
			Sub-Total Other	$725.00
B)	Miscellaneous Task 1 - Workplan Development			
1)	Meals (per day)	$64.00	0	$0.00
2)	Lodging (per day)	$159.00	0	$0.00
3)	Mileage (per mile)	$0.505	90	$45.45
4)	PPE (level D) (per day)	$15.00	0	$0.00
5)	Tolls	$15.00	2	$30.00
6)	LVE	$1.00	8	$8.00
			Sub-Total Miscellaneous Task 1	$83.45
B)	Miscellaneous Task 2 - Site Characterization			
1)	Meals (per day)	$64.00	31	$1,984.00
2)	Lodging (per day)	$159.00	0	$0.00
3)	Mileage (per mile)	$0.505	400	$202.00
4)	PPE (level D) (per day)	$15.00	31	$465.00
5)	Tolls	$15.00	31	$465.00
6)	LVE	$1.00	208	$208.00
			Sub-Total Miscellaneous Task 2	$3,324.00
			Total Direct Non-Salary Costs	**$4,132.45**

Work Assignment No. D004437-23

Schedule 2.11(d) 3

Maximum Reimbursement Rate for Vendor Rented Equipment

Item	**Max Reimbursement Rate ($)***	**Est. Usage (unit of time)**	**Est. Rental Cost ($) (Col. 2 x 3)**
Task 2			
PID (month)	$398.75	1	$398.75
CGI (week)	$247.50	3	$742.50
Bailers, weighted teflon (3') (2 cases of 12 and 3 individual)	$415.80	1	$415.80
Submersible pump (week)	$159.50	2	$319.00
Oil-Water Interface probe (day)	$24.75	1	$24.75
Water level meter (week)	$27.50	2	$55.00
Horiba U-22 Water Quality meter (week)	$165.00	2	$330.00
3/8"IDx1/2"OD poly tubing (feet)	$0.25	1350	$337.50
Generator (week)	$74.25	2	$148.50
Truck (from Enterprise) (month)	$2,600.50	2	$5,201.00
Dust Monitor (week)	$104.50	3	$313.50
Helium tank rental (from Walmart)	$60.00	1	$60.00
Helium Meter (day)	$49.50	2	$99.00
Teflon-lined tubing (3/16 by 1/4") (feet)	$1.00	100	$100.00
Low Flow Pump (<0.2 L/min) (day)	$24.75	2	$49.50
		SUBTOTAL:	**$8,594.80**

* Reimbursement will be made at the Maximum Reimbursement rate or the actual rental rate, whichever is less.

Schedule 2.11 (e)

Cost-Plus-Fixed-Fee Subcontracts
Work Assignment Number D004437-23

Name of Subcontractor	Services to be Performed	Subcontract Price
Ken Schider Consulting	M/WBE Reporting	$599.97

A) Direct Salary Costs

Professional Responsibility Level	Labor Classification	Ave. Reimbursement Rate ($/Hr.)	Max. Reimbursement Rate ($/Hr.)	Est. No. of Hours	Total Est Direct Salary Cost (Ave. Reimb. Rate x Est. # of Hrs.)
IV	Eng/Scientist 4	$32.60	$36.78	8	$260.80

Total Direct Salary Costs **$260.80**

Footnotes:

1) The labor rate averages and maximums shall be adjusted by a rate equal to the increase in the CPI index CUURA101SAO-"All Urban Consumers-New York-Northern N.J.-Long Island" for the previous year. This index is published by the U.S. Department of Labor's Bureau of Labor Statistics. The adjustment will be calculated every January and will be effective for subsequent work assignment billing and budgeting purposes.
2) Schedule 2.11(e) may be re-negotiated after four (4) years at the request of either party. Any revision as a result of re-negotiation will be subject to the approval of the Office of the State Comptroller.
3) The maximum annual escalation is limited to 5%.
4) Reimbursement will be limited to the lesser of either the individual's actual hourly rate or the maximum rate for each labor
5) Reimbursement will be limited to the maximum reimbursement rate for the professional responsibility level of the actual work
6) Only those labor classifications indicated with an asterisk will be entitled to overtime.
7) Reimbursement for technical time of principals, owners, and officers will be limited to the maximum reimbursement rate of that category, the actual hourly labor rate paid, or the State M-6 rate, whichever is lower.
8) Maximum reimbursement rates may be exceeded for work assignment activities that are under the jurisdiction of the Schedule of Prevailing Wage Rates set by the New York State Department of Labor.

B) Indirect Costs

Indirect costs shall be paid based on a percentage of direct salary costs incurred which shall not exceed a maximum of 115 % or the actual rate calculated in accordance with 48 CFR Federal Acquisition Regulation, whichever is lower.

Amount budgeted for indirect costs is: **$299.92**

C) Maximum Reimbursement Rates for Direct Non-Salary Costs

Item		Max Reimbursement Rate (Specify Unit)	Est. No. of Units	Total Est. Cost
1)	Travel	See Schedule 2.10 (d) for rates		
2)	Supplies			

Total Direct Non-Salary Costs **$0**

D) Fixed Fee

The fixed fee is: 7% **$39.25**

See Schedule 2.10 (h) for how the fixed fee should be claimed.

YEC, INC./YEC ENGINEERING, P.C.

Clarkstown Executive Park
612 Corporate Way, Suite 4M
Valley Cottage, NY 10989
Tel: (845) 268-3203 Fax: (845) 268-5313

Schedule 2.11 (e)
Cost Plus Fixed-Fee Subcontracts

Former Paul Miller Dry Cleaners Site

March 14, 2008

NAME OF SUBCONTRACTOR	SERVICES TO BE PERFORMED	SUBCONTRACT PRICI
YEC, INC.	Survey and CAD	**$11,703.58**

A. Direct Salary Costs

Professional Responsibilty Level	Labor Classi-fication	Average Reimbursement Rate ($/Hr.)		Maximum Reimbursement Rate ($/Hr.)		Estimated Number of Hours	Total Estimated Direct Salary Cost ($)
Principal	VIII	2008	67.14	2008	72.53	2	134.28
Senior Geologist/Scientist/ Engineer/ Licensed Surveyor	V	2008	44.39	2008	48.83	36	1,598.04
Staff Geologist/ Scientist/Engineer	IV	2008	38.56	2008	42.45	8	308.48
Staff Geologist/ Scientist/Engineer/CAD Operator	III	2008	33.50	2008	37.16	36	1,206.00
Senior Technician/Staff Engineer/Scientist/Geologist	II	2008	24.76	2008	27.76	36	891.36
Technician/Draftsperson	I	2008	22.43	2008	25.15	0	0.00
						Total Direct Salary Costs:	**4,138.16**

B. Indirect Costs - 117% of direct salary cost

Indirect Costs: **4,841.65**

C. Maximum Reimbursement Rates for Direct Non-Salary Costs:

Item	Maxium Reimbursement Rate	Estimated No. of Units		
Mileage	0.505 /mi.	120 miles/trip	3 trips	181.80
Tolls	20.00 /day	3 trips		60.00
Survey Equipment Rental	65.00 /day	3 days		195.00
CAD Equipment	15.00 /hour	6 hours		90.00
GPS Subcontractor				850.00
			Total Direct Non Salary Costs:	**1,376.80**

D. Fixed Fee (15% of Total Direct and Indirect Salary Costs)

Fixed Fee: **1,346.97**

Schedule 2.11 (f)

Unit Price Subcontracts
Work Assignment Number D004437-23

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
EDR	Environmental Database, Aerial Photos, Topo Maps, etc	$495	$0

Item	Max. Reimbursement Rate (Specify Unit)	Est. No. of Units	Total Est. Cost
City Directories (30 Properties)		1	$495
Subtotal-Subcontract Price			$495
Subcontract Management Fee*			$0
TOTAL			$495.00

Schedule 2.11 (f)

Unit Price Subcontracts

Work Assignment Number **D004437-23**

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
Naeva Geophysics, Inc.	Utility Locate	$1,945.00	$0

Item	Max. Reimbursement Rate (Specify Uni	Est. No. of Units	Total Est. Cost
Geophysical Survey (Clear Drilling Locations)			
Project Total:	$1,945 day	1	$1,945.00
(5 hrs for 2-man crew, 2 hrs driving, 2 hrs GPR)			
Subtotal-Subcontract Price			**$1,945.00**
Subcontract Management Fee*			**$0.00**
TOTAL			**$1,945.00**

Schedule 2.11 (f)

Unit Price Subcontracts
Work Assignment Number D004437-23

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
Nancy Potak	WBE Data Validator	$3,028.20	$151.41

Item	Max. Reimbursement Rate (Specify Unit)		Est. No. of Units	Total Est. Cost
DATA VALIDATION Task 2				
Groundwater				
VOCs 8260B	$12	/Sample	34	$392.70
SVOCs 8270C	$21	/Sample	31	$651.00
Full List CLP-TCL/TAL+30	$83	/Sample	4	$331.80
Soil				
VOCs 8260B	$13	/Sample	35	$441.00
SVOCs 8270C	$19	/Sample	23	$434.70
Full List CLP-TCL/TAL+30	$90	/Sample	4	$361.20
Air				
TO-15 VOCs	$12	/Sample	18	$207.90
TO-15 Dilution	$12	/Sample	18	$207.90
Subtotal-Subcontract Price				**$3,028.20**
Subcontract Management Fee*				**$151.41**
TOTAL				**$3,179.61**

* A subcontract management fee of 5% has been included for M/WBE subcontracts.

Schedule 2.11 (f)

Unit Price Subcontracts

Work Assignment Number **D004437-23**

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
Aztech Technologies, Inc.	WBE Driller	$50,624.36	$2,531.22

Item	Unit Cost Level C	Unit Cost Level D		Est. No. of Units	Total Est. Cost Level C	Total Est. Cost Level D
Mobilization/ Demobilization ($2,950 lump sum + $255 for 12 days of work)	$6,010.00	$6,010.00	ls	1	$6,010.00	$6,010.00
Permits	$700.00	$700.00	ls	1	$700.00	$700.00
Per Diem	$255.00	$255.00	days	13	$3,315.00	$3,315.00
Personal Protective Equipment	$22.00	$0.00	each	26	$572.00	$0.00
4.25 inch ID Hollow Stem Augering (0-50 feet)	$16.80	$14.00	per LF	530	$8,904.00	$7,420.00
4.25 inch ID Hollow Stem Augering (50-100 feet)	$19.80	$16.50	per LF	100	$1,980.00	$1,650.00
2.0 inch split spoon sampling (0-50 feet)	$30.00	$25.00	each	195	$5,850.00	$4,875.00
2.0 inch split spoon sampling (>50 feet)	$42.00	$35.00	each	50	$2,100.00	$1,750.00
Schedule 40 PVC well screen, 2.0 inch ID, #10 slot	$5.00	$5.00	per LF	130	$650.00	$650.00
Schedule 40 PVC riser, 2.0 inch ID	$4.00	$4.00	per LF	500	$2,000.00	$2,000.00
Well screen sand pack for 2.0 inch monitoring - well set in 4.25 inch hollow stem augers	$5.00	$5.00	per LF	156	$780.00	$780.00
Seal for 2.0 inch monitoring well set in 4.25 inch hollow stem augers	$9.00	$9.00	per LF	26	$234.00	$234.00
Riser Backfill	$7.00	$7.00	per LF	448	$3,136.00	$3,136.00
Flush-Mount, 6.0 inch ID Protector with locking cover, drain hole and concrete apron	$125.00	$125.00	each	13	$1,625.00	$1,625.00
Supply Clean DOT-approved 55 gallon drums with wood pallets and tarps	$70.00	$70.00	each	70	$4,900.00	$4,900.00
Moving 55 gallon drums to borehole; filling, transporting and staging of drilling fluid/development water drums	$66.00	$55.00	each	18	$1,188.00	$990.00
Moving 55 gallon drums to borehole; filling, transporting and staging of drill cutting drums	$66.00	$55.00	each	52	$3,432.00	$2,860.00
Pump and surge method (w/surge block)	$188.40	$157.00	per hour	13	$2,449.20	$2,041.00
Construction of one (1) decontaimination steam-cleaning pad using a swimming pool	$180.00	$150.00	per hour	3	$540.00	$450.00
Steam cleaning of drill rig, tools and all other equipment between borings	$162.00	$135.00	per hour	13	$2,106.00	$1,755.00
Rig and crew	$180.00	$150.00	per hour	13	$2,340.00	$1,950.00
Steam Cleaner	$114.00	$95.00	per Day	13	$1,482.00	$1,235.00
Subtotal-Subcontract Price					**$56,293.20**	**$50,326.00**
Costs assume 95% Level D and 5% Level C.						**$50,624.36**
Subcontract Management Fee*						**$2,531.22**
TOTAL						**$53,155.58**

* A subcontract management fee of 5% has been included for W/MBE subcontracts.

Schedule 2.11 (f)

Unit Price Subcontracts
Work Assignment Number D004437-23

Name of Subcontractor ChemTech
Services to be Performed MBE Laboratory
Subcontract Price $29,564.85
Management Fee $1,478.24

Item	Max. Reimbursement Rate	Specify Unit	Est. No. of Units	Total Est. Cost
Task 2 - Site Characterization				
SAMPLING EQUIPMENT				
Summa Cannisters/Regulators/Tedlar bag	$52.50	Sample	19	$997.50
Cannister Re-Certification	$105.00	Canister	1	$105.00
LABORATORY ANALYSIS				
Groundwater				
VOCs 8260B	$89.25	Sample	34	$3,034.50
SVOCs 8270C	$199.50	Sample	31	$6,184.50
Full List CLP-TCL/TAL+30	$546.00	Sample	4	$2,184.00
Soil				
VOCs 8260B	$89.25	Sample	35	$3,123.75
SVOCs 8270C	$199.50	Sample	23	$4,588.50
Full List CLP-TCL/TAL+30	$546.00	Sample	4	$2,184.00
Air				
TO-15 Air	$187.95	Sample	18	$3,383.10
Waste				
RCRA/Full TCLP (solid)	$252.00	Sample	13	$3,276.00
RCRA/Full TCLP (aqueous)	$252.00	Sample	2	$504.00
			Subtotal-Subcontract Price	**$29,564.85**
			Subcontract Management Fee*	**$1,478.24**
			TOTAL	**$31,043.09**

* A subcontract management fee of 5% has been included for W/MBE subcontracts.

Schedule 2.11 (f)

Unit Price Subcontracts
Work Assignment Number D004437-23

Name of Subcontractor	Services to be Performed	Subcontract Price	Management Fee
SeaCoast Environmental Services, Inc.	**IDW Removal**	**$15,750.00**	**$787.50**

Item	Max. Reimbursement Rate (Specify Unit)	Est. No. of Units	Total Est. Cost
IDW Removal (Non-Hazardous)	$60 drum	0	$0.00
IDW Removal (Hazardous)	$160 drum	70	$11,200.00
Per Drum Transportation fee	$65 drum	70	$4,550.00
		TOTAL	**$15,750.00**

* Subcontract Management Fee of 5% on Subcontracts over $10,000

Schedule 2.11 (g) - Summary

Monthly Cost Control Report
Summary of Fiscal Information

Engineer **Camp Dresser & McKee**
Contract No. **D004437**
Project Name **Former Paul Miller Dry Cleaners**
Work Assignment No. **D004437-23**
Summary of Tasks
Percentage Completed

Date Prepared ____________
Billing Period ____________
Payment No. _____ **Invoice No.** ____________

	A	B	C	D	E	F	G	H
Expenditure Category	*Costs Claimed This Period*	*Paid to Date*	*Total Disallowed to Date*	*Total Costs Incurred to Date (A+B+C)*	*Estimated Costs to Completion*	*Estimated Total Work Assignment Price (A+B+E)*	*Approved Budget*	*Estimated Under/Over (G-F)*
1. Direct Salary Costs	$0	$0	$0	$0	$0	$0	$42,177	$0
2. Indirect Costs - '167.9%	$0	$0	$0	$0	$0	$0	$70,815	$0
3. Subtotal Direct Salary Costs and Indirect Costs	$0	$0	$0	$0	$0	$0	$112,992	$0
4. Travel	$0	$0	$0	$0	$0	$0	$2,726	$0
5. Other Non-Salary Costs	$0	$0	$0	$0	$0	$0	$10,001	$0
6. Subtotal Direct Non-Salary Costs	$0	$0	$0	$0	$0	$0	$12,727	$0
7. Subcontractors	$0	$0	$0	$0	$0	$0	$113,711	$0
7a. Subcontract Mgt. Fee	$0	$0	$0	$0	$0	$0	$4,948	$0
8. Total Work Assignment Cost	$0	$0	$0	$0	$0	$0	$244,378	$0
9. Fixed Fee	$0	$0	$0	$0	$0	$0	$7,909	$0
10. Total Work Assignment Price	$0	$0	$0	$0	$0	$0	$252,288	$0

Project Manager (Engineer) **David Keil**

Date ____________________

Schedule 2.11 (g)

Monthly Cost Control Report
Summary of Fiscal Information

Engineer Camp Dresser & McKee
Contract No. D004437
Project Name Former Paul Miller Dry Cleaners
Work Assignment No. D004437-23
Task #/Name Task 1 - Work Plan Development
Complete 0%

Page 1 of 4
Date Prepared ______
Billing Period ______
Invoice No. ______

Expenditure Category	A Costs Claimed This Period	B Paid to Date	C Total Disallowed to Date	D Total Costs Incurred to Date (A+B+C)	E Estimated Costs to Completion	F Estimated Total Work Assignment Price (A+B+E)	G Approved Budget	H Estimated Under/Over (G-F)
1. Direct Salary Costs	$0	$0	$0	$0			$4,774	$0
2. Indirect Costs - '167.9%	$0	$0	$0	$0			$8,015	$0
3. Subtotal Direct Salary Costs and Indirect Costs	$0	$0	$0	$0			$12,789	$0
4. Travel	$0	$0	$0	$0			$75	$0
5. Other Non-Salary Costs	$0	$0	$0	$0			$283	$0
6. Subtotal Direct Non-Salary Costs	$0	$0	$0	$0			$358	$0
7. Subcontractors	$0	$0	$0	$0			$0	$0
7a. Subcontract Mgt. Fee	$0	$0	$0	$0			$0	$0
8. Total Work Assignment Cost	$0	$0	$0	$0			$13,148	$0
9. Fixed Fee	$0	$0	$0	$0			$895	$0
10. Total Work Assignment Price	$0	$0	$0	$0			$14,043	$0

Project Manager (Engineer) David Keil

Date ______

Schedule 2.11 (g)

Monthly Cost Control Report
Summary of Fiscal Information

Engineer Camp Dresser & McKee
Contract No. D004437
Project Name Former Paul Miller Dry Cleaners
Work Assignment No. D004437-23
Task #/Name Task 2- Site Characterization
Complete 0%

Date Prepared ______
Billing Period ______
Invoice No. ______

Expenditure Category	*A* *Costs Claimed This Period*	*B* *Paid to Date*	*C* *Total Disallowed to Date*	*D* *Total Costs Incurred to Date: (A+B+C)*	*E* *Estimated Costs to Completion*	*F* *Estimated Total Work Assignment Price (A+B+E)*	*G* *Approved Budget*	*H* *Estimated Under/Over (G-F)*
1. Direct Salary Costs	$0	$0	$0	$0			$16,385	
2. Indirect Costs 167.9%	$0	$0	$0	$0			$27,511	
3. Subtotal Direct Salary Costs and Indirect Costs	$0	$0	$0	$0			$43,896	
4. Travel	$0	$0	$0	$0			$2,651	
5. Other Non-Salary Costs	$0	$0	$0	$0			$9,268	
6. Subtotal Direct Non-Salary Costs	$0	$0	$0	$0			$11,919	
7. Subcontractors	$0	$0	$0	$0			$113,111	
7a. Subcontract Mgt. Fee	$0	$0	$0	$0			$4,948	
8. Total Work Assignment Cost	$0	$0	$0	$0			$173,874	
9. Fixed Fee	$0	$0	$0	$0			$3,073	
10. Total Work Assignment Price	$0	$0	$0	$0			$176,947	

Project Manager (Engineer) David Keil

Date ______

Schedule 2.11 (g)

Monthly Cost Control Report
Summary of Fiscal Information

Engineer Camp Dresser & McKee
Contract No. D004437
Project Name Former Paul Miller Dry Cleaners
Work Assignment No. D004437-23
Task #/Name Task 3 - Field Documentation and Reporting
Complete 0%

Date Prepared ______
Billing Period ______
Invoice No. ______

Expenditure Category	A Costs Claimed This Period	B Paid to Date	C Total Disallowed to Date	D Total Costs Incurred to Date (A+B+C)	E Estimated Costs to Completion	F Estimated Total Work Assignment Price (A+B+E)	G Approved Budget	H Estimated Under/Over (G-F)
1. Direct Salary Costs	$0	$0	$0	$0			$21,018	$0
2. Indirect Costs 167.9%	$0	$0	$0	$0			$35,289	$0
3. Subtotal Direct Salary Costs and Indirect Costs	$0	$0	$0	$0			$56,306	$0
4. Travel	$0	$0	$0	$0			$0	$0
5. Other Non-Salary Costs	$0	$0	$0	$0			$450	$0
6. Subtotal Direct Non-Salary Costs	$0	$0	$0	$0			$450	$0
7. Subcontractors	$0	$0	$0	$0			$600	$0
7a. Subcontract Mgt. Fee	$0	$0	$0	$0			$0	$0
8. Total Work Assignment Cost	$0	$0	$0	$0			$57,356	$0
9. Fixed Fee	$0	$0	$0	$0			$3,941	$0
10. Total Work Assignment Price	$0	$0	$0	$0			$61,298	$0

Project Manager (Engineer) David Keil

Date ______

Schedule 2.11 (g) - Supplemental

Cost Control Report for Subcontracts

Engineer Camp Dresser & McKee
Contract No. D004437
Project Name Former Paul Miller Dry Cleaners
Work Assignment No. D004437-23

Date Prepared ________
Billing Period ________
Invoice No. ________

	A	B	C	D	E	F	G
Subcontract Name	*Subcontract Costs Claimed this Application Inc. Resubmittals*	*Subcontract Costs Approved for Payment on Previous Applications*	*Total Subcontract Costs to Date (A plus B)*	*Subcontract Approved Budget*	*Management Fee Budget*	*Management Fee Paid*	*Total Costs to Date (C plus F)*
1. EDR	$0	$0	$0	$495	$0	$0	$0
2. Nava Geophysics	$0	$0	$0	$1,945	$0	$0	$0
3. Nancy Potak	$0	$0	$0	$3,028	$151	$0	$0
4. YEC	$0	$0	$0	$11,704	$0	$0	$0
5. Aztech Technologies, Inc.	$0	$0	$0	$50,624	$2,531	$0	$0
6. Ken Schider	$0	$0	$0	$600	$0	$0	$0
7. Chemtech	$0	$0	$0	$29,565	$1,478	$0	$0
8. SeaCoast Environmental	$0	$0	$0	$15,750	$788	$0	$0
TOTALS	$0	$0	$0	$113,711	$4,948	$0	$0

Project Manager (Engineer) David Keil

Date ________

NOTES:

1) Costs listed in Columns A, B, C & D do not include any management fee costs.
2) Management fee is applicable to only W/MBE and properly procured, satisfactorily completed, unit price subcontracts over $10,000.
3) Line 11, Cloumn G should equal Line 7 (Subcontractors), Column D of Summary Cost Control Report.

Schedule 2.11(h)
Monthly Cost Control Report
Summary of Labor Hours
Number of Direct Labor Hours Expended to Date/Estimated Number of Direct Labor Hours to Completion

Engineer/Contract # D004437
Project Name Former Paul Miller Dry (
Work Assignment No. D004437-23

Date Prepared ____________
Billing Period ____________
Invoice No. ____________

NSPE Labor Classification	*IX Exp/Est*	*VIII Exp/Est*	*VII Exp/Est*	*VI Exp/Est*	*V Exp/Est*	*IV Exp/Est*	*III Exp/Est*	*II Exp/Est*	*I Exp/Est*	*Admin.*	*Total No. of Direct Labor Hrs. Exp/Est*
Task 1	0 / 2	0 / 20	0 / 0	0 / 0	0 / 0	0 / 100	0 / 0	0 / 0	0 / 0	0 / 8	0 / 130
Task 2	0 / 2	0 / 24	0 / 2	0 / 8	0 / 0	0 / 120	0 / 80	0 / 80	0 / 280	0 / 8	0 / 604
Task 3	0 / 4	0 / 120	0 / 100	0 / 90	0 / 0	0 / 80	0 / 20	0 / 20	0 / 20	0 / 7	0 / 461
Total Hours	0 / 8	0 / 164	0 / 102	0 / 98	0 / 0	0 / 300	0 / 100	0 / 100	0 / 300	0 / 23	0 / 1195

* Expended/Estimated